

# Mangrove Plantation Destruction in Noakhali Coastal Forests of Bangladesh: A Case Study on Causes, Consequences and Model Prescription to Halt Deforestation

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## ABSTRACT

Mangroves play a fundamental role in moderating monsoon tidal floods and coastal protection. The depletion of mangroves is a cause of serious environmental and economic concern to many developing countries. Problems of sustainability of mangrove ecosystems are not only technical but also socio-economic. A study based on the needs of specific situation was conducted to conserve and restore mangrove ecosystems sustainability. Through this study we were able to identify the causes and consequences of mangrove forest destruction and plausible solution to halt deforestation at Noakhali region of Bangladesh and a model has been formulated. It is believed that if the proposed model is applied in the present study as well as other coastal areas, it will bring a positive change in coastal plantation in Bangladesh. The model is applicable to others countries facing similar situations.

**Key Words:** Mangrove; Deforestation; Noakhali; Model; Bangladesh

## INTRODUCTION

Mangroves are the littoral plant arrangement of tropical and sub-tropical sheltered coastlines, which are usually saline, anaerobic and frequently alkaline. Area accounting for global mangrove is about 181,000 km<sup>2</sup>. Indonesia has the biggest total area of mangrove forest while the Sundarbans swamp region in Bangladesh and India is the largest single chunk of mangrove forest in the world. Major decline of mangrove area has been noticed in recent years. This is 60% for the Philippines, 55% for Thailand, 37% for Vietnam and 12% for Malaysia (Siddiqi, 2001).

Mangroves in Bangladesh occur both as natural and planted forests. The Sundarbans of Bangladesh is the single largest tract of mangrove forest of the world covering an area of 6017 km<sup>2</sup> (Faizuddin, 2001). Bangladesh Forest Department has been starting extensive afforestation activities along the coast and offshore islands to protect coastal lives and properties from tidal surges and cyclonic storms since 1966. Noakhali Forest Division (NFD) is one of the four coastal forest divisions of Bangladesh which lies at the south-eastern zone of the country. It covers the districts of Noakhali and coastal areas of Laxmipur district. It lies between 22° 3' and 21°30' N latitude and 91° and 91° 30' E longitude. The forest areas of Noakhali Coastal Forest Division comprises of newly accreted chars of the Ganges, Brahmaputra and Meghna estuaries and the fringes of the mainland delta, which is 182186.0 ha (Canonizado, 1999). Noakhali Forest Division has been raising mangroves since its establishment in 1966 in the newly accreted char land. As soon as the land is raised people encroach the land illegally and sometimes start settlement on lease. Encroachment

started in the Noakhali Forest Division in the 1990s, while a grazing permit was issued by the Land Department of Laxmipur district. Following this, landless people as well as some vested group gathered in the area and encroached about 6045.0 ha forest land and destroyed existing forest resources. The objective of this study was to identify the causes and consequences of mangrove forest destruction and explore effective remedies for forest restoration.

## METHODOLOGY

Primary data were collected from Noakhali Forest Division and the secondary data were obtained from the Forest Department, published books, journals, periodicals and bulletins (i.e. data source). Three "chars" and "mouzas" (referred to as villages) of Char Habibia, Char Bata and Char Alauddin Range namely Char Bagga, Char Mazid and Char Laxmi were selected randomly for sampling from a total of 24 chars using standard statistical procedure (Gomez & Gomez 1983) for a social survey to investigate root causes of deforestation and encroachment of forest areas of Noakhali Forest Division. Frequent field visits were carried out into study area for familiarization, observation, parameter verification and to instigate research (i.e. reconnaissance survey). Present status of the Noakhali Forest Division was evaluated using secondary sources of data accompanied with field observation. Based on the pattern of landholding; households have been grouped into four strata viz. landless, small farmer, medium farmer and big farmer (Table I). This grouping pattern was followed in compliance with the Bangladesh Bureau of Statistics (BBS).

The study covered 60 households from three coastal

villages, 20 from each village with equal probability to each farm category by stratified random sampling. Furthermore, 20 respondents from Forest Official/Government Official/NGOs/Local leader/Reporter of Newspaper were interviewed. These respondents were named as "others" in this study. The information was collected by using structured questionnaire, formal, informal interviews and field observations. Moreover, group meetings with landless people as well as encroachers were conducted in each area to assess the views regarding causes of forest encroachment, consequences, land management strategy, suggestive measures, etc. The information was analyzed by using descriptive statistics and non parametric analysis.

## RESULTS AND DISCUSSION

**Mangrove plantation in the study area.** Plantation raised so far under Char Bagga, Char Mazid and Char Laxmi are 429.0, 2241.0 and 615.0 ha, respectively. Average age of this plantation was 25 years; however, maximum and minimum age was 30 and 15 years, respectively (Table II).

**Causes of mangrove forest destruction.** Saenger *et al.* (1983) broadly classified the causes of mangrove destruction in the world as over-exploitation by traditional users and destructive action resulting from activities generally unrelated to sustained uses of mangroves. Some of the major reasons for the destruction of the mangroves of the study area are identified by the respondents (Table III).

**Stripping by forest bandits.** Local petty criminals and extremely impoverished villagers in collaboration with some local influential political leader as well as land graver destroy the forest resources. These criminals, forming the gangs, became forest bandit later on. They either sold the forest resources or burnt them *in situ* to grave the land. Afterwards forest lands are sold and handed over to others. The cycle of transferring land from one hand to another was the main source of their income. This is identified as the most severe problem (opinion of 59% respondents).

**Lack of proper action taken by law enforcing agency.** Forty one out of 80 respondents opined that forest resources were destroyed due to the lack of proper action taken by law enforcing agency since beginning. Forest department filed cases to the court as per Forest Act, 1927 against forest offences, these cases were not decided which encouraged forest offences.

**Landless people.** River erosion is a common phenomenon in coastal areas. Many people become landless due to river erosion. These people encroach comparatively raised forest land with the help of bandits. Thirty eight respondents support this cause (Table III).

**Lack of proper guideline for forest land management.** Eleven respondents identified lack of guidelines as a cause of forest destruction.

**Connivance of forest official.** Eight respondents complained that due to corrupt forest officials and staff at territory level, forest resources were destroyed. They alleged

**Table I. Stratification of coastal people in Bangladesh**

Strata	Social category	Land holding (ha)
A	Landless	0-0.2
B	Small farmer	>0.2 to 1.0
C	Medium farmer	>1.0 to 3.0
D	Large farmer	Above 3.0

**Table II. Mangrove plantation of survey area**

Survey area	Age class				Total
	26-30 years	21-25 years	16-20 years	11-15 years	
Char Bagga	239.0 ha	190.0 ha	-	-	429.0 ha
Char Mazid	182.0 ha	1240.0 ha	-	819.0 ha	2241.0 ha
Char Laxmi	113.0 ha	180.0 ha	291.0	31.0 ha	615.0 ha

forest officials for cooperating with criminals, which encourages encroachment.

**Illegal shrimp farming.** Illegal shrimp farming started in Noakhali Forest Division in 1994 when a fishery company named Al-Amin Agro Fisheries followed by Globe Fisheries and Al Baraka Fisheries, who destroyed mangroves of Char Mazid. Several interested group also purchased forest land from the bandits for shrimp farming in due course.

**Lack of coordination among various agencies.** Forest resources are destroyed due to lack of coordination among various agencies and this was opined by six respondents.

**Consequences of forest destruction.** The result of forest destruction is very severe with coastal areas standpoints. The possible consequences of forest destruction were asked to know from the respondents and the result of the survey is shown in Table III. The suggestions of the respondents to accrue a better scenario in coastal forest management are arranged in order of ranking (Table III).

**Participatory Agroforestry as a model for solution.** Based on a limited study, Nandy and Paul (2001) suggested an effective management of lands through joint partnership of the settlers in the coastal areas. Paul (2001) also stressed on the participatory approaches for managing the existing coastal plantation in Noakhali. During the survey encroachers were asked for a future model and relevant information was collected during formal and informal discussion. Three group meeting were conducted in each area and ten landless from each area were asked. Nuclear family model was developed in the group meeting with encroachers/coastal villagers for rehabilitating the landless people in the encroached area.

**Model description.** According to this model each family may be allotted 1.5 acre piece of land. 25% (37.5 decimal) of allotted land will be reserved for plantation. Depending on the land suitability and consulting the local people, Forest Department will select species and motivate people how to grow and maintain the plantation. Before final harvesting rehabilitated person will enjoy all interim products (like pruning/thinning materials, fruits etc.) After harvesting sale proceeds will be divided in the way given in Table IV. Each

**Table III. Causes and consequences of forest destruction and prescriptions to halt coastal forest deforestation in Noakhali**

Parameters	Landless	Small	Medium	Large	Others	Total	% of total respondents
<b>Causes</b>							
Forest bandits	11	5	5	11	15	47	59
Law enforcing agency	1	5	10	10	15	41	51
Landless people	15	4	3	5	11	38	48
Forest land management	0	1	1	3	6	11	14
Connivance of forest official	0	1	1	2	4	8	10
Shrimp farming	0	2	2	3	1	8	10
Lack of coordination	0	0	1	2	3	6	8
<b>Consequence</b>							
Environmental degradation	10	13	15	15	20	73	91
Fuelwood crisis	13	7	10	12	15	57	71
Loss of grazing land	15	5	4	10	12	46	58
Decreased employment opportunity	7	5	2	1	5	21	26
Scarcity of fish resources	4	2	2	6	3	17	21
NTFP habitat loss	5	3	3	4	2	17	21
Shortage of house building materials	6	6	1	1	0	14	18
<b>Prescriptions</b>							
Participatory forestry program	12	9	13	17	17	68	85
Shrimp culture	0	4	1	5	4	14	18
Afforestation and protection	0	1	4	4	5	14	18
Implementation of existing laws	0	1	2	6	4	13	16
Awareness creation	0	0	0	4	7	11	14
Magistracy power to forest officials	0	0	0	2	9	11	14
Development activities	1	0	1	1	7	10	13

Total respondents 80 from all the five categories

**Table IV. Benefit sharing of proposed participatory forestry model**

Respective family/organization	Share (%)
Rehabilitated family	65
Land owning agency/ District administration	10
Local Union Council	5
Tree Farming Fund (TFF)	10
Forest Department	10
Total	100

**Table V. List of species of proposed participatory forestry model**

Local Name	Scientific Name
<b>a. Forest Tree Species</b>	
Jhau	<i>Casuarina equisetifolia</i>
Akashmoni	<i>Acacia auriculiformis</i>
Mangium	<i>Acacia mangium</i>
Babla	<i>Acacia nilotica</i>
Natai	<i>Pithecolobium dulce</i>
Koroi	<i>Albizia procera</i>
Eucalyptus	<i>Eucalyptus camaldulensis</i>
Raintree	<i>Samanea saman</i>
Sissoo	<i>Dalbergia sissoo</i>
Karanja	<i>Pongamia pinnata</i>
Soan Boloji	<i>Thespesia populnea</i>
Arjun	<i>Terminalia arjuna</i>
<b>b. Fruit Tree Species</b>	
Tentul	<i>Tamarindus indica</i>
Gab	<i>Diospyros peregrina</i>
Kanthal	<i>Artocarpus heterophyllus</i>
Am	<i>Mangifera indica</i>
Dalim	<i>Punica granatum</i>
<b>c. Palm Species</b>	
Narikel	<i>Cocos nucifera</i>
Supari	<i>Areca catechu</i>
Khejur	<i>Phoenix sylvestris</i>
Tal	<i>Borassus flabellifer</i>

family will be allotted 60% (90.0 decimal) agriculture plot of the total land. There they will cultivate paddy and other seasonal crops and vegetables. Respective family will enjoy whole production. About 15% (22.5 decimal) of the land will be allotted for homestead and pond, where the rehabilitated

family will culture fish. In the homestead yard landless family will be rear the poultry as well as grow vegetables and fruit trees. Dwelling unit will be in between agriculture field and forest stand. The species combination will be as given in Table V.

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