PRESENT STATUS OF CHAKARIA SUNDARBANS—THE OLDEST MANGROVE FOREST IN THE SUBCONTINENT

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ABSTRACT

The Chakaria Sundarbans has been subjected to severe biotic interferences in the recent decades. A study was carried out to assess the present status, past condition, process of destruction and also to examine the feasibility of reforestation in this mangrove forest. The remnants of most of the commercially important species are available. The greater part of the forest has been converted to shrimp farms. The entire area is virtually without any vegetative cover. The land is apparently suitable for reforestation with mangrove species. However, a rehabilitation programme is only possible if the cooperation of the shrimp farmers and local people can be ensured.

সারসংক্ষেপ

বিগত দশকগুলিতে অতিমাত্রায় জৈবিক হস্তক্ষেপের কারণে চকরিয়া সুন্দর বন ধ্বংস হইয়াছে। এই বনাঞ্চলের বর্তমান ও অতীত অবস্থা, এবং পুনর্বনায়নের সম্ভাব্যতা যাচাই করার একটি নিরীক্ষা করা হয়। অর্থনৈতিক গুরুত্বপূর্ণ অধিকাংশ বৃক্ষ প্রজাতির চিহ্ন এখনও বর্তমান। এই বনাঞ্চলের অধিকাংশ ভূমি চিংড়ী খামারে রূপান্তরিত করা হইয়াছে। বস্তুতপক্ষে সম্পূর্ণ বনাঞ্চল বৃক্ষশূন্য। অঞ্চলটি মূল্যবান ম্যানগ্রোভ বৃক্ষচারা পুনর্বনায়নের উপযুক্ত বলিয়া মনে হয়। তবে প্রত্যাবাসন পরিকল্পনা কেবলমাত্র চিংড়ী চাষী ও স্থানীয় জনগণের সহযোগিতার মাধ্যমেই সফল করা সম্ভব।

INTRODUCTION

Mangrove occurs in Bangladesh as a natural forest and also as a planted stand. The world's biggest mangrove plantations have also been established along the coastal belt and offshore islands of Bangladesh (Imam 1982). Thus, Bangladesh has become the pioneer country in management of natural and planted mangroves (Siddiqi and Khan 1990). The mangrove areas in Bangladesh have been gradually expanding while the other forest types are shrinking due to mainly population pressure.

A study on the possibility of a rehabilitation programme was proposed by the Forest Department in 1990. The Bangladesh Forest Research Institute thus initiated an experimental plantation at Chakaria with different mangrove species. As a first step, the relevant information was collected and a reconnaissance survey of the forest was carried out in 1990 and 1991 to assess the present status. Information available in the literatures and the physical verification of the forest areas have formed the basis of this study. It aims at

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documenting the background of the forest, the processes of its deterioration, the factors responsible for deforestation, and to state the present status. It also examines whether reforestation of the Chakaria Sundarbans is silviculturally practicable and socially acceptable.

LOCATION AND CONFIGURATION

The Chakaria Sundarbans is situated between the latitude 21°.36'N to 21°45'N and longitude 91°58'E to 92°05'E. It lies in the delta of the Matamuhury river and in the district of Cox's Bazar.

The land is flat and criss-crossed by the innumerable creeks and channels. The forest occupies the central part of the Matamuhury delta.

MANAGEMENT BACKGROUND

The Chakaria Sundarbans covering an area of about 8540 hectares was declared as Reserved Forest in 1903 (Choudhury *et al.* 1990). Subsequently, 7490 ha of land was declared as a reserved forest and the rest area as a protected forest (Anon 1984). In the past the area of the forest was about 18,200 ha (Cowan 1926 as quoted by Karim and Khan 1980).

The Chakaria Sundarbans was managed as a Working Circle under the Cox's Bazar Forest Division. A working plan for the reserve was prepared in 1911 (Anon 1954), but it came into force in 1913-14 and expired in 1920-21. It put a limit to the amount of fuel wood extraction. The felling of the important species was however restricted. The coppice shoots were prescribed to be cut one foot above the ground to prevent regular submersion of the stumps during the high tides, and grazing was forbidden.

The treatment prescribed in the Cowan's working plan was coppice combined with pollarding and selection felling (cited in Anon 1954). A felling cycle of 15 years was adopted. Later, Ghani's working plan came into force in 1950-51. A selection-cum-improvement felling for the reserved species (*Kendelia candel, Heritiera fomes* and *Bruguiera* spp.), selection felling for *Ceriops decandra* and coppice combined with pollarding for the fuel wood species were prescribed. The extraction of fuel wood from the forests for bulk export to Chittagong, Cox's Bazar and other distant markets was closed. Restrictions were imposed on extraction of fuel wood for the use of even the neighbouring population. But this could not improve the condition of the forest.

The last working plan of the Chakaria Sundarbans was compiled by Choudhury (1967) covering the period from 1968-69 to 1977-78. It is apparent from this working plan that due to ruthless exploitation of forest in the past, the growing stock was almost destroyed. The high demand for fuel wood for domestic consumption and for salt manufacture in the locality caused depletion of the forest. To recoup its lost stock and to work the forest to its full capacity from the next working plan period, timber extraction for ten years was banned. Moreover, it was proposed that 20 ha of land would be selected annually for artificial regeneration with mangrove species. The banks of the channel and creeks were suggested to be planted with *Nypa fruticans*. But due to failure of proper implementation of the Working Plan, the targeted improvement of the forest could not be achieved.

SOIL AND SALINITY

The soil salinity for 15 cm depth varies between 5.75 m mhos/cm and 11.25 m mohs/cm in the driest months. The pH ranges from 6.1 to 7.8. The soil texture is silty-loam in the northern part, gradually becoming silty-clay towards the sea. The water salinity ranges from 23 ppt to 34 ppt. In the north, outside the embankment of shrimp ponds, where a few *H. fomes* trees still exist, the salinity of water is 5 ppt. The salinity is remarkably lower in the monsoon

due to downward flow of the Matamuhury river and it is not found above 10 ppt in any part of the forests.

VEGETATION

The species composition is almost similar to that of the Khulna Sundarbans. But it differs in the abundance of *Dalbergia spinosa* and profusion of *Aegielitis rotundifolia* (Choudhury 1967). The forests in the past supported a good number of species.

PRESENT STATUS OF IMPORTANT SPECIES

A survey made by Karim and Khan (1980) showed the occurrence of some commercially important mangrove species in a reasonably large number. However, the present study after a decade indicated a very poor condition of the forest flora both in respect of species composition and abundance (Table 1). The present status of the important species is as follows :

1. *Heritiera fomes* : The past status of *H. fomes* could not be clearly ascertained from the available literature. Choudhury *et al.* (1990) mentioned that *H. fomes* was the main tree species in the north-western part of the forest, where elevation of land is higher. The species was found in association with others in the lower ground. During the present survey, only 34 trees of *H. fomes* could be detected in northern extremity of the forests in association with *Excoecaria agallocha, Avicennia officinalis, Hibiscus tiliacious, Chnometra ramiflora, Bruguiera spp., Pongamia pinnata,* etc. All these trees were found over an area of 0.5 ha only and virtually, these are the only trees left in the forests.

   The area still appears to be suitable for the growth of *H. fomes* provided that the normal tidal flow can be ensured by manipulating the embankments of shrimp ponds. Profuse seedling regeneration and saplings of *H. fomes* were found under the trees. The average height of the standing trees was 15 m, and the tree with a maximum 22 m height was recorded with a diameter of 69 cm.

   When the first transfer of the forest for shrimp culture was proposed, it was claimed that the area was too saline for the growth of mangrove species. But the area is found less saline during the monsoon and salinity level goes down below the optimal level for shrimp production.

2. *Excoecaria agallocha* : The species was once common as apparent from the coppices on the stumps of the exploited trees throughout the forest. The coppice was not found to produce any tree. However, it is clear from the even distribution of the species that it will grow well if the area can somehow be brought under normal tidal inundation and protected from the human and other biotic interferences.

3. *Sonneratia apetala* : Still a few healthy *S. apetala* trees were found scattered in the middle and southern parts of the forest. It is encouraging to note that natural regeneration of the species was found along the streams and channels. However, most of them failed to establish due to biotic influence including fishing and cattle grazing.

4. *Phoenix paludosa* : Dense patches of *P. paludosa* exist along the streams and upper plains towards mid-northern part of the forest which are not yet been converted into shrimp ponds. This species was found to be harvested by the people for local use.

Table 1. Present status of the vegetation

	Species (Family)	Local Name	Type of plants	Present status	Remarks
1.	*Acanthus ilicifolius* (Acanthaceae)	Bio-Kanta	Woody, thorny herb	Abundant	Found along the canal sides and newly accreted land.
2.	*Acrostichum aurium* (Pteridiaceae)	-	Fern	Rare	Found in some raised area.
3.	*Aegielitis rotundifolia* (Plumbaginaceae)	Nunya	Small tree	Rare	
4.	*Aegiceras corniculatum* (Myrsiniaceae)	Kasalong	Shrub or small tree	Absent	
5.	*Avicennia spp.* (Avicenniaceae)	Baen	Tree	Rare	A few trees are present. Old and fresh cut stumps are seen.
6.	*Brownlowia lanceolata* (Tiliaceae)	-	Scandant shrub	Absent	
7.	*Bruguiera spp.* (Rhizophoraceae)	Natinga	Tree	Rare	A few saplings and coppices on old stumps available.
8.	*Ceriops decandra* (Rhizophoraceae)	Cuttya	Shrub or small tree	Absent	
9.	*Cynometra ramiflora* (Leguminoseae)	Shingra	Shrub	Rare	A few plants are available in the northern part.
10.	*Dalbergia spinosa* (Leguminoseae)	Chulya Kanta	Scandent arm shrub	Common	Found in the north eastern part of the forest outside the shrimp pond.
11.	*Derris scandens* (Leguminoseae)	Gilalata	Climber	Absent	

Table 1. Present status of the vegetation: Contd

	Species (Family)	Local Name	Type of plants	Present status	Remarks
12.	*Excoecaria agallocha* (Euphorbiaceae)	Gewa	Tree	Fairly common	Found as coppice throughout the forest, only a few trees are available in north eastern part.
13.	*Heritiera fomes* (Sterculiaceae)	Sundri	Tree	Rare	A few tall trees are available in the north eastern periphery of the forest.
14.	*Hibiscus tiliaceous* (Mulvaceae)	Balai	Shrub or Small tree	Rare	Found along the north eastern periphery of the forest.
15.	*Imperata cylindrica* (Gramineae)	-	Grass	Abundant	Found along the canals and in newly accreted land.
16.	*Intesia bijuga* (Leguminoseae)	Bahal	Small tree	Rare	Only stumps with bushy coppice available in northern part.
17.	*Kandelia candel* (Rhizophoraceae)	Rohinya	Small tree	Absent	
18.	*Nypa fruticans* (Palmeae)	Golpata	Palm with underground stem	Absent	
19.	*Oryza coarctata* (Gramineae)	-	Grass	Common	Found along the canal bank
20.	*Pandanus foetidus* (Pandanaceae)	Kewa kanta	Succulent crewpine	Occasional	Scattered all over the forest.
21.	*Phoenix paludosa* (Palmeae)	Hental	Thorny palm	Common	Dense vegetation towards mid northern part of the forest.

Table 1. Present status of the vegetation Contd

Species (Family)	Local Name	Type of plants	Present status	Remarks
22. *Pongamia pinnata* (Leguminoseae)	Karanja	Tree	Rare	Found along the periphery of the forest.
23. *Rhizophora mucronata* (Rhizophoraceae)	Hawa	Tree	Absent	-
24. *Sarcobolus globosus* (Sclepiadaceae)	-	Climber	Absent	-
25. *Sonneratia apetala* (Sonneratiaceae)	Kerba	Tree	Rare	Only a few trees are available. New regeneration noticed sporadically.
26. *Tamarix indica* (Tamaraceae)	Nona Jhao	Shrub	Rare	Found scatteredly.
27. *Xylocarpus granatum* (Meliaceae)	Kampa	Small tree	Absent	-
28. *X. mekongensis* (Meliaceae)	Ail	Tree	Absent	-

PRESENT STOCKING AND CROP DENSITY

All the trees inside the shrimp ponds were cut. In the rest of the areas, most of the trees were illicitly harvested and only a few trees were scatteredly available. The entire Chakaria Sundarbans is now an open area. The stumps of the trees are found all over the forest. Most of the cuts appear to be new which indicates that area was under forest cover only a few years back. In the whole Chakaria Sundarbans, about 200 healthy trees are now found to exist.

PROCESS OF DEPLETION

The Chakaria Sundarbans was an isolated compact patch of mangrove forest (Karim and Khan 1980). It is one of the oldest mangrove forests of this sub-continent (Choudhury 1967). The forest was subjected to various human interferences for extension of agricultural land, collection of fuel wood, fishing, etc., (Cown 1926).

There was a heavy demand for forest produce in the local and distant markets of Chittagong. Due to easy accessibility by boats, Chakaria Sundarbans was subjected to ruthless exploitation. Even before the second world war, the area was reported to have been over cut and the crop was reduced in many parts. During the war from 1942 to 1945, the demand for fuel wood sharply increased for the troops camped near the area. There was serious negligence in the management of the forest. The growing stock was greatly affected by illicit fellings (Anon 1954). Choudhury (1967) stated that in the past the forest

was seriously damaged due to the large scale demand for fuel wood and salt manufacture in the locality and extraction of fuel wood from this forest for Chittagong, Cox's Bazar and other distant markets.

The whole forest area was open for grazing. Though the natural regeneration was good, but due to high pressure of grazing, new regeneration could not establish. Fishing in the forests was also permitted throughout the year. The permits for fishing stakes and dry fuel wood for the fisherman were also issued, which allowed the fisherman to enter the forests. In course of extraction of fishing stakes, considerable damage was made to the forests.

The study of Karim and Khan (1980) reveals that the vegetation of this forests was not so poor as compared to the present status. It is true that the process of deforestation got momentum in the sixties, but during 1981-1990, deforestation occurred alarmingly leading the forest almost to a barren area.

In 1977, an area of 228 ha forest land was handed over to a shrimp culture farm on lease (Anon 1984). In 1978, 2024 ha of land was handed over to the Fisheries Department for shrimp culture. Later on in 1982, another 694 ha of land was transferred temporarily to the Fisheries Department. In the same year, it was also proposed to hand over an area of 259 ha on lease to the landless people.

The government policy of converting the reserved forest to shrimp farms and human settlement primarily ecouraged the interested persons for rapid clearing of the forests. Consequently, the mangrove vegetation of Chakaria Sundarbans was destroyed and the tidally flooded forest land was converted into permanent water pools of shrimp pond. At present a greater part of the forest land is being used for shrimp culture.

CAUSES OF DEFORESTATION

A number of factors is responsible for the present condition of the mangrove forest. These are (i) removal of forest produces for the fuel wood, (ii) over grazing, (iii) human settlement, (iv) fishing and finally and the worst one is (v) shrimp culture. The uncontrolled grazing seriously affected regeneration. The fishing in the forest area is an old age practice. In the past, fishing was permitted throughout the year. The permits for extraction of fishing stakes and dry fuel wood for the fisherman was also issued. This process caused a considerable damage to the forests. In addition to this, the fisherman used to build dams in the mouth of the creeks and thereby disrupted the tidal inundation and caused water stagnation. For this change in hydrology, the seedlings in stagnant water failed to survive, seriously affecting the recouping of the lost stock. Such interference coupled with the policy of converting the reserve mangrove forest to shrimp farms and human settlement led to the drastic depletion of the mangrove, the production of wood from a mangrove forest is low and the tangible income is much lower as compared to shrimp culture. So, from the immediate economic consideration, the shrimp culture is gaining precedence over maintenance of mangroves. But the indirect benefits of mangrove forests in the conservation of nature and in protecting the lives and properties, cannot be undermined. The Chakaria Sundarbans, though presently yielding higher income through shrimp culture compared to that from the mangrove forests, yet its sustainability may be questionable.

NEED FOR REHABILITATION

Based on the concept of the higher income from shrimp farming, the entire area has been exposed to a catastrophic wind action. There has been new settlements inside or in the vicinity of

Chakaria Forests. The disastrous effect of the cyclone of 1991 claiming 20,000 lives from this area may be cited as an example. The intensity of damage to lives and properties could have been much lower if there were mangrove forests.

SCOPE OF REHABILITATION

Silvicultural consideration

a) The soil is suitable for supporting the mangrove species.

b) The soil and water salinity is within the optimal range for healthy growth of commercially important mangrove species.

c) Raising of trees in poldered land may not be possible due to ponding of water.

d) Raising trees in the outer periphery of poldered areas may not be feasible.

e) The tidally inundated southern part is suitable for reforestation with the mangrove species.

Socio-economic consideration

a) Cooperation of local people and shrimp farmers is imperative to make a successful rehabilitation programme with mangroves.

b) Grazing have to be controlled for the success of reforestation endeavour. Instead of grazing stall feeding may be encouraged.

c) Survival of the planted seedlings may be at a risk due to fishing by the fishermen.

d) The shrimp culture on the vacant saline coastal land may be encouraged instead of converting the mangrove forests to shrimp ponds.

The well-developed and productive mangrove forest land often constitute the least desirable site for the commercial shrimp pond as found in Ecuador. In some regards, semi-arid and arid coastal environments where mangroves develop poorly, the shrimp ponds have the potential to produce higher yield of shrimp with fewer management problems and at a relatively lower production cost (Snedaker 1988).

The protective role of the forest is now gaining precedence over the productive role in many parts of the world particularly in developing countries. Bangladesh may also join hands with the world communities in rehabilitating the Chakaria Sundarbans.

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