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ATTITUDE OF LOCAL PEOPLE TOWARDS THE
RESOURCE MANAGEMENT OF THE SUNDARBANS:
A CASE STUDY OF BANIASHANTA UNION, MONGLA

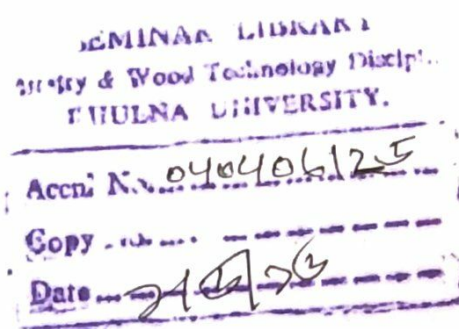


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2016

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RESOURCE MANAGEMENT OF THE SUNDARBANS:A
CASE STUDY OF BANIASHANTA UNION, MONGLA**



Course Title: Project Thesis

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**A thesis submitted to the Forestry and Wood Technology Discipline for
partial fulfillment for the degree of B. Sc. (Hon's) in Forestry.**

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Declaration

The results submitted in this paper are entirely the author's own investigations and neither any part of the result have not been accepted for any degree, nor it is being concurrently submitted for any degree.

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**DEDICATED
TO
MY BELOVED PARENTS**

Approval

This project thesis submitted to Forestry and Wood Technology Discipline, Khulna University, Khulna, Bangladesh in partial fulfillment of the requirements for the B.Sc. (Hon's) degree in Forestry. I have approved the style and format of the project thesis.



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Amit Kumar Mondal

Abstract

The Sundarbans Reserved Forest, and its surrounding buffer zone, is one of the most diverse and richest areas of natural resource in Bangladesh. It is a part of the largest mangrove forest in the world, with an area of about 10,000 km², of which 6,000 km² are in Bangladesh and about 4,000 km² are part of India: it has been recognized as an internationally important World Heritage and Ramsarsite. The mangroves provide substantial ecosystem services supporting the livelihood of local communities. This study describes the diverse uses of these natural resources and aims to evaluate the contribution of ecosystem services to the livelihood of residents. The results indicate that residents depend on ecosystem services in two ways. First, local households earn cash income by selling ecosystem products, such as fish, honey, and nipa palm, at local markets. Second, the use of natural resources provides substantial subsistence such as food, fresh water, and timber. However, residents' income may be significantly increased by improved resource management, including reducing local authority corruption and improvements in law enforcement. The study revealed that local communities in the area had positive attitudes towards conservation and that their demographic and socio-economic conditions influenced people's attitudes. Local communities valued those functions of mangrove forests that were directly linked to their wellbeing. Despite human-wildlife conflict, the attitudes of the local people's were not altogether negative, and they were willing to participate in mangrove restoration. People agreed to adopt alternative resources if access to forest resources were curtailed. Respondents living near the forests, who could not afford alternatives, admitted that they would resort to pilfering. Hence, increasing their livelihood options may reduce the pressure on mangrove forests. In contrast with other ecosystems, the linkages of mangrove ecosystem services with local livelihoods and security are direct and tangible. It is therefore possible to develop strong local support for sustainable management of mangrove forests in areas where a positive attitude towards mangrove conservation prevails.

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LIST OF ABBREVIATION(S)

FAO	Food and Agricultural Organization
FD	Forest Department
IUCN	International Union for Conservation of Nature
NGO	Non-government organization
NP	National Park
SBCP	Sundarban Biodiversity Conservation Project
UNDP	United Nations Development Programme
UNESCO	United Nations Education, Scientific and Cultural Organization

Chapter One

Introduction

1.1 Background of the study

Forests cover almost 25% of the world's land and are critical in meeting human needs for food, shelter, medicine, fuel wood, fodder and timber. They also provide a wide range of environmental services which mainly include biodiversity conservation, watershed Protection, protection of soil, mitigation of global climate change etc (Land ell-Mills and Porras, 2002). In last several decades, deforestation and biodiversity loss became a common event throughout the globe. This phenomenon is much more frequent in developing countries like Bangladesh. During the last two or three decades the forest cover of the country decreased from nearly 20% to 9%. Of late as a signatory of various regional and international conventions, treaties and protocol government has taken various initiatives to address the situation and to ensure the conservation of remaining floral and faunal diversity (Brown and Durst, 2003).

People's attitude is a major factor in the success or failure of any resources management. Studies on attitudes and perceptions of local people's have contributed to the understanding of people's needs and aspirations, and in identifying their ideas, opinions and suggestions regarding management issues. The term 'attitude' has been used in relation to the positive or negative responses towards one or more stimuli but can also be related to possible conduct and behavior (Murphy and Watson, 1991; Karanth et al., 2008). Attitudes are formed in part by peoples or by individuals' perceptions and experiences (Infield and Namara, 2001) and can change their values and thoughts and improve their overall welfare. Although the conservation of wetland resources may be influenced by larger policy decisions, but their sustainable use relies mainly on farmers, fishermen and other users living close to wetlands (Pyrovetsi and Daoutopoulos, 1997; Sah and Heinen, 2001). Through attitude surveys, it may be possible to predict how people's attitudes will be influenced by conservation policies and vice versa allowing more effective resource allocation and planning as well as provide baseline data to assess the efficiency of new policies regarding natural resource conservation (Fiallo and Jacobson, 1995), thereby guiding policy and management decisions in the design, implementation and evaluation of integrated conservation and development projects

(Parry and Campbell, 1992). In the case of mangrove forests, resources management decisions are often governed by the policy makers' and users' perceptions of the direct use benefits provided by this ecosystem, accruing from their exploitation, versus the indirect benefits, or ecosystem services, resulting from the conservation of this system. Ecosystem services are the benefits that people derive from ecosystems, including commodities and regulating, supporting and cultural services (Daily, 1997). Apart from their structural and compositional characteristics, the type, quality and quantity of services provided by an ecosystem are affected by the resource use decisions of individuals and communities. When the benefits of an ecosystem service accrue mainly to those who make management decisions or when the users of such ecosystems are involved in their management, such ecosystems are likely to work well in providing ecosystem services (Jack et al., 2008).

Humans have depended on natural resources for their livelihood and to improve their quality of life for centuries; this dependence continues today. In much of the developing countries, high population growth rate coupled with poor performance within non-agricultural employment sectors has created unprecedented pressure on natural resources (Clever and Schreiber, 1994; Hayami, 1997). Massive degradation of natural resources, including forests, rangeland, and irrigation water has been taking place in the Third World. The growing population has increased demand for land, trees and water, which coupled with tenure insecurity or the absence of clear property rights, has resulted in the over-exploitation of these natural resources (Otsuka, 2001). The consequences of environmental problems could threaten economic and social well-being as well. In recent years, people have realized that it is necessary to place more importance on specific species and habitats than on human needs. This leads the people come to realize the need to integrate development and protection into a single concept-sustainable use, wise use or sustainable management (Iwama, 1999)

1.2 Rationale of the study:

Although there have been some studies undertaken focusing on people's access to, and control over, community forest resources; as well as disaster victim's coping strategies in both northern and southern districts in Bangladesh. There have been very few studies that have been conducted in Khulna, and none have been done in the village of Banishanta, which this particular study has focused on. On a practitioner level in

Bangladesh, a great deal of research projects dealing with people's rights to the forest and environmental management has been initiated and funded by the donor agencies. Those professional research projects hardly present a comprehensive juncture between the disasters victims' knowledge on the forest and human- Sundarbans relations. Given this, it is expected that the findings of the thesis tends to present a clear picture of the beliefs connected with the Sundarbans forest, as well as contribution of the forest for environmental security. It is also hoped that the dissemination of the findings will produce a new perspective in the field of customs of mangrove forested people's , as well as human security anticipated by the Sundarbans forest, and offer data which likely researchers of Gender Studies or Development Studies in the future can design further and merge through their work.

Bangladesh is one of the poorest of the developing countries with a low resource base, a very low land-man ratio, threatened by both natural hazards and anthropogenic mismanagement and over-exploitation. The vast majority of the population is amongst the poorest in the world and lives almost exclusively on the natural resource base. The economy of the country is characterized by an almost the extraction, use and management of natural resources and the physical environment(Asaduzzaman and Taufique,1997).Any natural resource degradation in a major way is therefore likely to disrupt the normal pace of the economy.

This study is an attempt to bring together comprehensive sets of data, information and analysis of land resource rights of the local people with the reference to the natural resource management.

1.3 Objectives of the study

General Objective

The general objective of this study is to examine the attitudes of local people towards the resource management of the Sundarbans; this will help us to understand the relationship between the local and the state agencies.

Specific Objectives

- To assess community dependency on the Sundarbans natural resources
- To assess socioeconomic status of the Sundarbans resources dependents community
- To identify the attitudes of the Sundarbans depended people towards the sustainable management of Sundarbans.

1.4 Research questions:

The thesis mainly documents women's and men's activities in the Sundarbans forest, and women's interaction with the forest resources. The study will thoroughly answer the following questions:

- What are the community people's perceptions about the Sundarbans, its resources and to what extent have changes in the use of forest resources happened?
- What are the attitudes of the community people to the Forest Department and forest laws that protect the forest?

1.5 Limitation of the study

- It was hard to convince the local villagers about the objectives of conducting the study.
- There was inadequate information available on different groups in the literature or other sources.

Chapter Two

Literature Review:

The Sundarbans, which means 'the beautiful forest' in Bengali language, is the biggest single area of the tidal mangrove forest in the world. Even though the mangrove forest is jointly owned by Bangladesh and India, 60% of the total area is situated in the southwest districts Satkhira, Khulna and Bagerhat in Bangladesh (HCoBs, 2013). The forest stands in the natural outlet of the Ganges, the river Brahmaputra and the Meghna. The Sundarbans connects numerous branches of rivers, producing muddy lands and is intermingled by small Islands of salt tolerant mangrove forests.

The Forest Department of Bangladesh reports that the Sundarbans consists of 6, 01,700 hectares, of which 4.1% is the total land mass of the country and covers 40% of the total forested land. The ministerial website of the Forest and Environment of Bangladesh presents that the Sundarbans houses as many as 334 species of trees and shrubs, 35 mammal, 270 birds, 400 fishes, as well as 35 reptile species. In addition, the forest record of 1998 confirms that Sundarbans approximately belongs to 12.26 million cubic meter timber from the species of Sundri (*Heritiera fomes*), Gewa (*Excoecaria agallocha*), Keora (*Sonneratia apetala*), Baen (*Avecennia officinalis*), and Dhundul (*Xylocarpus granatum*). Beyond these, the forest mainly attracts tourists around the world for the presence of the noted Royal Bengal Tiger or 'Bagh,' with its majestic movement. One can also view the saltwater crocodiles, several species of primates, leopards, and King Cobras around many small water bodies (Basar, 2009). In 1997, the Bangladesh part of the Sundarbans was listed by UNESCO as a World Heritage Site.

Throughout years, the Sundarbans continuously serves as livelihood support and ecological services to a vast majority of people living nearby the forested regions. It supplies forestry products (firewood, charcoal, fruits, honey etc.) and fishery products (shrimp prawns, snails, crabs, mollusks, etc.) to the area inhabitants. The mangrove twigs are highly important to the calorific values, contributing to the making of charcoal and firewood, and more importantly it burns producing high heat without generating smoke (Kathiresan) In addition, the fascinating honeybees of the Sundarbans's mangroves promote apicultural activities and offer employment for 2000 people. It is exemplified by the fact that people of mangrove regions extract 111 tons of honey accounting for 90% of annual honey production in India (Krishnamurty, 1990). While in Bangladesh,

approximately 185 tons of honey and 44.4 tons of wax are garnered from the western part of the mangrove forest (Siddiqi,1997).

In Bangladesh, the mangroves of the Sundarbans protect a vast area of coastal regions from UV-B radiation, the effects of global warming, the risk of cyclones and floods, as well as the coastal erosion. The mangrove bogs function as traps for the sediment and sink for absorbing the pollutants such as methane, carbon-dioxide, and sulphur-dioxide, as well as CFCs. The roots of the mangrove keep the substrate steady, and consequently contribute to a stable ecosystem in the Sundarbans. The Sundarbans' ecosystem affords a great source of food, serving as breeding grounds and nurseries for food fishes, flora and fauna and maintaining a balance between wildlife and forested animals (FAO, 1994)

Although the rural poor, which are accommodated nearby the Sundarbans zone, are profoundly benefited by the livelihood facilities and ecological support, they cannot help but bearing the brunt of environmental calamities at times, and coping with such severe situations. Bangladesh is currently ranked as one of the world's most disaster prone countries, with 97.1 percent of its total area and 97.7 per cent of the total population at risk of multiple hazards, including cyclones (WB, 2005). There is a common consensus among climatologists that Bangladesh is situated in the most vulnerable zone, due to the impact of climate change. Owing to the increase in water temperature and soil salinity throughout the periods of 1998-2008, the population around the Sundarbans forest zone experienced a serious lessening of their productivity (Basar, 2009). The livelihood scarcity of this population worsened when Cyclone Sidr struck on 15 November, 2007. It resulted in the death of as many as 3,406 people, and caused destruction totaling nearly US\$ 1.7 billion (Paul 2009). Comparing this to the estimated death of 140,000 and physical (e.g., coastal embankment, forest ecology, disconnection of the road networks) damage due to the Cyclone Gorky, which occurred in the same region in 1991, Paul's article reveals that the Sidr caused far fewer deaths than Gorky; but it staged a huge massacre on the forest ecology, imposing threats to the area dwellers and wild animals. It has been suggested that almost 45% of the area of the Sundarbans was destroyed due to the cyclonic hit of Sidr (Bhowmik and Carbal, 2011).

While the Sundarbans's ecosystem and the coastal people were struggling to recover from the overwhelming aftermath of Sidr, in 2009, an incredibly strong cyclone, Aila, hit the same region, causing the deaths of 320 people, among the total victim of 2.3 million people (Kamal, 2013). The duration of the Aila was more prolonged than that of the Sidr, with a nonstop rainfall and tidal surges, with the waves lashing against the embankment

and submerging many villages in 15 coastal districts of Bangladesh. In addition, the tidal surge washed away a great deal of houses, crops, livestock, and livelihood sources in the affected regions. During the Aila, unexpectedly the village Dumuria adjacent to Shora at Shamnagar, under the district Satkhira, was washed away since three embankments were destroyed, and villagers had to stay on the rooftop of mosques and primary schools (Kamal, 2013). Particularly, women and children of the region were the worst victims, and it was more severe than 75% of the displaced individuals (WHO, 2009). Therefore, in the post-Aila scenario, it is evident that people's source of livelihood and human security are undergoing a significant change.

Chapter Three

Management of the Resources of the Sundarbans

3.1 Geographical Location:

The Sundarbans is a natural region in the Bengal region comprising Eastern India and Bangladesh. It is the largest single block of tidal halophytic mangrove forest in the world. The Sundarbans covers approximately 10,000 square kilometers (3,900 sq mi) of which 60 percent is in Bangladesh with the remainder in India. The Sundarbans is a UNESCO World Heritage Site. The Sundarban forest lays in the vast delta on the Bay of Bengal formed by the super confluence of the Ganges, Padma, Brahmaputra and Meghna rivers across southern Bangladesh. The seasonally flooded Sundarbans freshwater swamp forests lie inland from the mangrove forests on the coastal fringe. The forest covers 10,000 square kilometres (3,900 sq mi) of which about 6,000 square kilometres (2,300 sq mi) are in Bangladesh. It became inscribed as a UNESCO world heritage site in 1997. The Indian part of Sundarbans is estimated to be about 4,110 square kilometres (1,590 sq mi), of which about 1,700 square kilometres (660 sq mi) is occupied by waterbodies in the forms of river, canals and creeks of width varying from a few meters to several kilometers (UNESCO ,1997)

The Sundarbans is intersected by a complex network of tidal waterways, mudflats and small islands of salt-tolerant mangrove forests. The interconnected network of waterways makes almost every corner of the forest accessible by boat. The area is known for the eponymous Royal Bengal tiger (*Panthera tigris tigris*), as well as numerous fauna including species of birds, spotted deer, crocodiles and snakes. The fertile soils of the delta have been subject to intensive human use for centuries, and the ecoregion has been mostly converted to intensive agriculture, with few enclaves of forest remaining. The remaining forests, taken together with the Sundarbans mangroves, are important habitat for the endangered tiger. Additionally, the Sundarbans serves a crucial function as a protective barrier for the millions of inhabitants in and around Khulna and Mongla against the floods that result from the cyclones. The Sundarbans has also been enlisted among the finalists in the New7Wonders of Nature. (Hussain and Karim, 1994)

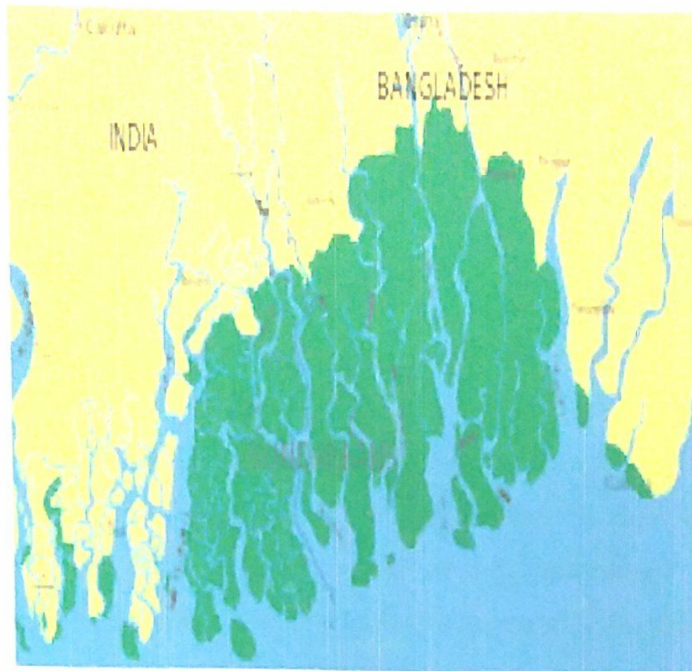


Fig 3.1: Map of Sundarbans in Bangladesh

3.2 Physiographic Condition of the Sundarbans

The mangrove-dominated Ganges Delta – the Sundarbans – is a complex ecosystem comprising one of the three largest single tracts of mangrove forests of the world. Situated mostly in Bangladesh, a small portion of it lies in India. The Indian part of the forest is estimated to be about 19 percent, while the Bangladeshi part is 81 percent. To the south the forest meets the Bay of Bengal; to the east it is bordered by the Baleswar River and to the north there is a sharp interface with intensively cultivated land. The natural drainage in the upstream areas, other than the main river channels, is everywhere impeded by extensive embankments and polders. The Sundarbans was originally measured (about 200 years ago) to be of about 16,700 square kilometres (6,400 sq mi). Now it has dwindled into about 1/3 of the original size. The total land area today is 4,143 square kilometres (1,600 sq mi), including exposed sandbars with a total area of 42 square kilometres (16 sq mi); the remaining water area of 1,874 square kilometres (724 sq mi) encompasses rivers, small streams and canals. Rivers in the Sundarbans are meeting places of salt water and freshwater. Thus, it is a region of transition between the freshwater of the rivers originating from the Ganges and the saline water of the Bay of Bengal. The Sundarbans along the Bay of Bengal has evolved over the millennia through natural deposition of upstream sediments accompanied by intertidal segregation. The

physiography is dominated by deltaic formations that include innumerable drainage lines associated with surface and subaqueous levees, splays and tidal flats. There are also marginal marshes above mean tide level, tidal sandbars and islands with their networks of tidal channels, subaqueous distal bars and proto-delta clays and silt sediments. The Sundarbans' floor varies from 0.9 to 2.11 metres (3.0 to 6.9 ft) above sea level. (Forest Department, 2012)

Biotic factors here play a significant role in physical coastal evolution, and for wildlife a variety of habitats have developed which include beaches, estuaries, permanent and semi-permanent swamps, tidal flats, tidal creeks, coastal dunes, back dunes and levees. The mangrove vegetation itself assists in the formation of new landmass and the intertidal vegetation plays a significant role in swamp morphology. The activities of mangrove fauna in the intertidal mudflats develop micromorphological features that trap and hold sediments to create a substratum for mangrove seeds. The morphology and evolution of the eolian dunes is controlled by an abundance of xerophytic and halophytic plants. Creepers, grasses and sedges stabilise sand dunes and uncompacted sediments. The Sunderbans mudflats (Banerjee, 1998) are found at the estuary and on the deltaic islands where low velocity of river and tidal current occurs. The flats are exposed in low tides and submerged in high tides, thus being changed morphologically even in one tidal cycle. The interior parts of the mudflats serve as a perfect home for mangroves. (Forest Department, 2012)

3.3 Types of Land within the Sudarbans

The Sudarbans of Bangladesh covers 601,700 hectares, of which 414,300 hectare is land and remaining portion is under water in the form of rivers, canals and creeks of width varying from a few meters to several km. present land types within the Sundarbans are shown in Table 3.3

Table 3.3 Land Types in the Sundarbans

Land Type	Area (hectare)
Total Area	414,300
Production Forest	384,100
Existing Wildlife Sanctuaries	30,100
Water (rivers, creeks and canals)	187,400
Total Area inside the Sundarbans Boundary	601,700
Additional Marine Area	160,300

Source: UNDP/FAO, 1997

3.4 Various Resources

3.4.1. Flora

A total 245 genera and 334 plant species were recorded by David Prain in 1903. While most of the mangroves in other parts of the world are characterized by members of the Rhizophoraceae, Avicenniaceae or Combretaceae, the mangroves of Bangladesh are dominated by the Malvaceae and Euphorbiaceae. Dominant flora includes:

The Sundarbans flora is characterised by the abundance of sundari (*Heritiera fomes*), gewa (*Excoecaria agallocha*), goran (*Ceriops decandra*) and keora (*Sonneratia apetala*) all of which occur prominently throughout the area. The characteristic tree of the forest is the sundari (*Heritiera littoralis*), from which the name of the forest had probably been derived. It yields a hard wood, used for building houses and making boats, furniture and other things. New forest accretions are often conspicuously dominated by keora (*Sonneratia apetala*) and tidal forests. It is an indicator species for newly accreted mudbanks and is an important species for wildlife, especially spotted deer (*Axis axis*). There is abundance of dhundul or passur (*Xylocarpus granatum*) and kankra (*Bruguiera gymnorrhiza*) though distribution is discontinuous. Among palms, *Poresia coaractata*, and golpata (*Nypa fruticans*), and among grasses spear grass (*Imperata cylindrica*) and khagra (*Phragmites karka*) are well distributed. The varieties of the forests that exist in Sundarbans include mangrove scrub, littoral forest, saltwater mixed forest, brackish water mixed forest and swamp forest. Besides the forest, there are extensive areas of brackish water and freshwater marshes, sand flats, sand dunes with typical dune

vegetation, open grassland on sandy soils and raised areas supporting a variety of terrestrial shrubs and trees. Since Plain's report there have been considerable changes in the status of various mangrove species and taxonomic revision of the mangrove flora. However, very little exploration of the botanical nature of the Sundarbans has been made to keep up with these changes. Differences in vegetation have been explained in terms of freshwater and low salinity influences in the Northeast and variations in drainage and siltation. The Sundarbans has been classified as a moist tropical forest demonstrating a whole mosaic of seres, comprising primary colonization on new accretions to more mature beach forests. Historically vegetation types have been recognized in broad correlation with varying degrees of water salinity, freshwater flushing and physiographic. (IUCN, 1994)



Fig 3.4.1 (a): Sundari tree



Fig 3.4.1 (b) Golpata (*Nypa fruticans*)

3.4.2. Fauna

The Sundarbans provides a unique ecosystem and a rich wildlife habitat. According to the 2015 tiger census, the Sundarbans have about 170 tigers (106 in Bangladesh and 64 in India). Although previous rough estimates had suggested much higher figures close to 300, the 2011 census provided the first ever scientific estimate of tigers from the area. Tiger attacks are frequent in the Sundarbans. Between 0 and 50 people are killed each year. There is much more wildlife here than just the endangered Royal Bengal tiger (*Panthera tigris tigris*). Most importantly, mangroves are a transition from the marine to freshwater and terrestrial systems, and provide critical habitat for numerous species of small fish, crabs, shrimps and other crustaceans that adapt to feed and shelter, and reproduce among the tangled mass of roots, known as pneumatophores, which grow upward from the anaerobic mud to get the supply of oxygen. Fishing cats, macaques, wild boars, common grey mongooses, foxes, jungle cats, flying foxes, pangolins, and spotted deer are also found in abundance in the Sundarbans. (IUCN, 1994)

A 1991 study has revealed that the Bangladeshi part of the Sundarbans supports diverse biological resources including at least 150 species of commercially important fish, 270 species of birds, 42 species of mammals, 35 reptiles and 8 amphibian species. This represents a significant proportion of the species present in Bangladesh (i.e. about 30% of the reptiles, 37% the birds and 34% of the mammals) and includes a large number of species which are now extinct elsewhere in the country. Two amphibians, 14 reptiles, 25 aves and five mammals are endangered. The Sundarbans is an important wintering area for migrant water birds and is an area suitable for watching and studying avifauna. The management of wildlife is restricted to, firstly, the protection of fauna from poaching, and, secondly, designation of some areas as wildlife sanctuaries where no extraction of forest produce is allowed and where the wildlife face few disturbances. Although the fauna of Bangladesh have diminished in recent times and the Sundarbans has not been spared from this decline, the mangrove forest retains several good wildlife habitats and their associated fauna. Of these, the tiger and dolphin are target species for planning wildlife management and tourism development. There is high profile and vulnerable mammals living in two contrasting environments, and their statuses and management are strong indicators of the general condition and management of wildlife. Some of the

species are protected by legislation, notably by the Bangladesh Wildlife (Preservation) Order, 1973 (P.O. 23 of 1973) (IUCN, 1994)

3.4.3 Predators

The fertile soils of the delta have been subject to intensive human use for centuries, and the ecoregion has been mostly converted to intensive agriculture, with few enclaves of forest remaining. The remaining forests, together with the Sundarbans mangroves, are important habitats for the endangered Bengal tiger (*Panthera tigris*). The forest also contains leopard (*Panthera pardus fusca*) and several other smaller predators such as the jungle cats (*Felis chaus*), fishing cats (*Prionailurus viverrinus*), and leopard cats (*Prionailurus bengalensis*). Several predators dwell in the labyrinth of channels, branches and roots that poke up into the air. This is the only mangrove ecoregion that harbours the Indo-Pacific region's largest predator, the Bengal tiger. Unlike in other habitats, tigers live here and swim among the mangrove islands, where they hunt scarce prey such as the chital deer (*Axis axis*), Indian muntjacs wild boars, and even rhesus macaque. It is estimated that there are now 500 Bengal tigers and about 30,000 spotted deer in the area. The tigers regularly attack and kill humans who venture into the forest, human deaths ranging from 30–100 per year.

Some of the reptiles are predators too, including two species of crocodiles, the saltwater crocodile (*Crocodylus porosus*) and mugger crocodile (*Crocodylus palustris*), as well as the gharial (*Gavialis gangeticus*) and the water monitor lizards (*Varanus salvator*), all of which hunt on both land and water. Sharks and the Gangetic dolphins (*Platanista gangetica*) roam the waterways (IUCN, 1994)

3.4.4 Avifauna

The forest is also rich in bird life, with 170 species including the endemic brown-winged kingfishers and the globally threatened lesser adjutants and masked finfoots and birds of prey such as the ospreys, white-bellied sea eagles and grey-headed fish eagles. The Sundarbans was designated a Ramsar site on 21 May 1992. Some of the more popular birds found in this region are open billed storks, black-headed ibis, water hens, coots, pheasant-tailed jacobins, pariah kites, brahminy kites, marsh harriers, swamp partridges, red junglefowls, spotted doves, common mynahs, jungle crows, jungle babblers, cotton

teals, herring gulls, Caspian terns, gray herons, brahminy ducks, spot-billed pelicans, great egrets, night herons, common snipes, wood sandpipers, green pigeons, rose-ringed parakeets, paradise flycatchers, cormorants, white-bellied sea eagles, seagulls, common kingfishers, peregrine falcons, woodpeckers, whimbrels, black-tailed godwits, little stints, eastern knots, curlews, golden plovers, pintails, white-eyed pilchards and lesser whistling ducks (IUCN, 1994)



Fig 3.4.4: A blue-eared kingfisher sighted in the Sundarbans

3.4.5 Reptiles

The Sundarbans National Park houses an excellent number of reptiles as well. Some of the common ones are olive ridley turtles, sea snakes, dog faced water snakes, green turtles, estuarine crocodiles, chameleons, king cobras, salvatorlizards, hard shelled batgun terrapins, Russels vipers, mouse gekkos, monitor lizards, curviers, hawks bill turtles, pythons, common kraits, green vine snake, checkered keelbacks and rat snakes. The river terrapin (*Batagur baska*), Indian flap-shelled turtles (*Lissemys punctata*), peacock soft-shelled turtles (*Trionyx hurum*), yellow monitors (*Varanus flavescens*), Asian water monitors (*Varanus salvator*), and Indian pythons (*Python molurus*) are some of the resident species (IUCN, 1994)

3.4.6. Other resources:

The mangroves are an important contributor to Bangladesh economy which is exploited for a wide range of forest products such as sawn timber, fuel wood, wood for making pulp, matches, hard board, balling board, and thatching material etc (Chaffey et. al, 1985). The major animal products obtained from the Sundarban mangroves as fish, honey, bees-wax and molluscs shells (Mahmood, 1995). Sundarban mangroves forest contributes 40% of the total productive forest in Bangladesh (Karim, 1999)

Around half a million people belonging to seventeen thanes surrounding the sundarbans are skstantially depended on the extraction of the sundarban sources for their livelihood (Murtaza et. al, 1999). About 4% of the total population of greater Khulna and Barisal districts is depended asundarbans directly or indirectly for their livelihood. The forest is contributing about 50% of the revenue earned by the forestry sector.

Sundarban provides a livelihood of about 3, 00,000 people working as woodcutters, fishermen boney collector, golpata leaves, and thatching grass and other minor forest produces collector (Karim, 1999).

The sundarban contributes significantly towards the socio-economically in the southern part of Bangladesh. Ecologically, the forest is particularly important as a barrier to cyclones, tidal surges. etc. Considering the conservation values; IUCN has declared the Sundarban as a world heritage site. More than 90% of the total population depends on biomass fuel for their day-to-day needs. Fuel wood supplies about 15% of the biomass energy. There are 90% of the fuel wood supplies only from sundri. Mangrove also acts as the ground or buffer agent and prevents the coastlands from soil and water erosion, which helps in balance of ecocli-matic factors. Chakariasundarban supply firewood, and good source of mangrove species seeds used in coastal afforestation. This has been protecting the lives and properties of the people of chakania from cyclones and tidal surges. This mangrove affords protection to Moiscal and Kutubdia islands (Katebi and Habib).



Fig 3.4.6: Razzakra from the Sunderban.

3.5 Importance of Sundarban mangroves

3.5.1. Fishery:

Fisheries in and around mangroves require management measure allowing little men or degradation. From the fires point of view, the principal issue is how uses of vest can be accommodated to sustain fisheries, or at least minimizing losses or changes that affect the aquatic productivity. Mangroves are of primary importance to fisheries in many which are discussed below: -

3.5.1(1) Habitat of fishes:

Plenty of species make use of mangrove ecosystem in various manners. Some being obligate, i.e. spending their entire life cycle in this environment, or crucial part of it. (E.g. Penaeid prawns). The mangrove water body is highly nutritional zone, which is suitable for about 400 species of fishes. White fishes, shellfishes, molluscs, crabs, decapods and other aquatic species we used mangroves swamps for their habitat.



Fig 3.5.1: Puffer fish found in the Sundarban.

3.5.1(2) Nursery ground:

The sundarbans estuary supports a huge nursery area for various types of fishes and Shellfish consisting a major fishery of the country. It is used as shelter, or as a source of food (feeding range); other facultative; i.e. being able to survive and reproduce even in absence of mangroves. But yet showing preferences for the habitats and nutrition provided therein. The larvae of *Penaeus monodon* and *Macrobrachium rosenbergii* used largely this ground as nursery. The forest and mudflats of the Sundarbans provide breeding and nursery ground for a large proportion of the both Marine and fresh water fish and shellfish.

3.5.1(3) Fishing ground:

The mangrove habitat is important to fisheries because of the presence of various resources which are exploited by artisanal fishermen, e.g. those of our sundarbans generally consisting fin fishes, shell fishes, and economically important aquatic plants, yet to be exploited. Extensive small scale or subsistence capture fisheries exists in the sundarban but being a forest reserve, the fisheries is administrated by the forest department through the sundarban division at Khulna, and its different regional field offices, and as for other fauna exhaustive work on fishery resources is also lacking.

The fishery of sundarbans represent the most important non wood component of the total forest, constituting estimates ranging from 1% to 5% of the total fish harvest of Bangladesh (Kamal and Rabbani, 1998)

3.5.1(4) Primary Production:

Mangrove forests are vital for healthy coastal ecosystems. The forest detritus, consisting mainly of fallen leaves and branches from the mangroves, provides nutrients for the marine environment and supports immense varieties of sea life in intricate food webs associated directly through detritus or indirectly through the plank tonic and epiphytic algal food chains. (Note: Plankton and benthic algae are primary sources of carbon in the mangrove ecosystem, in addition to detritus.)

The shallow intertidal reaches that characterize the mangrove wetlands offer refuge and nursery grounds for juvenile fish, crabs, shrimps, and mollusks. Mangroves are also prime nesting and migratory sites for hundreds of bird species. In Belize, for instance, there are over 500 species of birds recorded in mangrove areas. Additionally, manatees, crab-eating monkeys, fishing cats, monitor lizards, sea turtles, and mud-skipper fish utilize the mangrove wetlands.

3.5.1(5) Employment:

Mangrove fisheries are economically very important in the economy of Bangladesh and probably Se best utilized for harvesting variety of resources of plant and animal origin. Extensive small of subsistence capture fisheries exist in the sundarbans employing more than 2, 00,000 people.



⊥

Fig 3.5.1: Fisherman captures fish in the Sundarban.

3.5.1(6) Aquaculture purpose

At present chakariasundarbans is used as extensively for aquaculture, particularly for shrimp mullet but Khulna sundarban is not take under fish culture. Shrimp fry collection from sundarbanecosystem The shrimp culture in coastal area is largely depending on natural shrimp fry. The inactive larvae came from deep sea through wave and tide to the estuary and mangrove area. Mangrove area is suitable for the development of shrimp fry due to high nutritive value. The best time of shrimp fry collection in greater Khulna, Patuakhali, Barguna, Bhola, & Noakhali is February to April and May. In Cox's Bazar the time is December-May and up to June. During full moon and new moon it is collected at high rate. Following increased demand, intense and wild-scale fishing of bagda shrimp fry is done in the Sundarbans. Funegaard and Mahmood (1986) described the gears and methods used in fishing and also the sorting procedure of bagdashrimp fry from the mixed catch of macro-zooplankton. It was observed that fry catches started to encroach in to the prohibited zones (FAO, 1984) and a recent investigation records that about 334 million tiger shrimp fries were collected by about 10,000 fry fishermen (Chantarasri, 1994) from the rivers within the reserve. The resources associated with the mangrove ecosystem but caught elsewhere mainly by near-shore capture fisheries are also important, but is difficult to quantify their degree of association with this ecosystem, because of their life history information required specifying this aspect is incomplete.

3.5.2. Eco Tourism

Eco-tourism is a major component of the Sundarban Biodiversity Conservation Project. It comprises a range of integrated activities. These activities are part of the SBCP Sundarban Eco-Tourism Development and Management Plan prepared last year and presently being implemented.

The development of eco-tourism in the Sundarban is one of the top priorities of the Forest Department and the SBCP. It forms part of the existing Government national objectives concerning existing and proposed tourism policies in Bangladesh. The Eco-Tourism Development and Management Plan advises on legislation, tourism practices, structural changes, training and facilities requirements, environmental impact, and marketing and promotion strategies. It will contribute to the development of a healthy, responsible and sustainable type of eco-tourism for the benefit of all. The Eco-tourism Plan consists of a range of activities that involve many of the different components of the SBCP project.

These activities will ultimately contribute to:

- The development and the improvement of eco-tourism policies
- The practice of responsible guidelines
- The compliance of new eco-tourism regulations
- The development of well planned limited infrastructure and facilities for visitors
- Capacity development and training of the Park Rangers and other forest department officials
- The training and assistance of tour operators in specialized topics
- The development, marketing, promotion and positioning of the SRF as a new and alternative world-class eco-tourism destination.

Eco-tourism in the Sundarban already exists on a limited basis. In the SBCP it has also been identified as a tool to promote conservation, for environmental awareness and education of all stakeholders and for the enjoyment of nature for both international and domestic visitors.

Eco-tourism will provide an important alternative source of revenue for the funding of Forest Department environmental and conservation initiatives. It will generate funds for the protected areas as well as the creation of new employment opportunities and local enterprises of the surrounding communities in the impact zone. Although generally it has been said that tourism in Bangladesh suffers from a poor image, eco-tourism potential on the contrary is rated high. Presently it is in a very early but promising stage of development.

Table3.5: Potentially sustainable (renewable) uses of mangroves

Fisheries	Small-scale fishing/collecting of crabs, shrimps, fish and molluscs. Nursery for commercial fish and shellfish.
Aquaculture	Integrated shrimp-cum-mangrove culture systems, crab culture, stock enhancement.
Wood	Firewood, charcoal, paper products, construction timber, wood chips, furniture.
Textiles	Synthetic fibres, dyes, tannins for leather
Fishing	Fish poisons, tannins for net preservation, poles for traps
Drugs	Pharmaceuticals
Food	Sugar, cooking oil, vinegar, honey, animal fodder.
Alcohol	Industrial alcohol fermented from sugar
Coastal management	Shoreline and riverbank protection
Recreation	Eco-tourism

Source:UNDP/FAO,1997

3.6 Destruction of mangrove fisheries

The causes of destruction of mangrove fisheries and their impacts are described in separately to Khulna sundarban and chakaria sundarbans.

Features of increasing pressure on mangrove coasts

- Increasing human population in the coastal zone
- Loss of mangrove forest area
- Increased coastal erosion
- Increased impact from storms
- Reduction in biodiversity
- Decreased fisheries production
- Decreased aquaculture pond production (in the long term)

- Municipal wastes, especially solid wastes;
- Industrial wastes, especially lead, mercury, and other heavy metals, sugar mills wastes, and tapioca plant wastes;

- Mangrove forests can be heavily exploited as a source of wood and for other uses (e.g. industrial clearance of mangrove for wood chips to supply the rayon industry)
- If tree cutting is not properly managed, the typical results are reduction in tree size and species diversity. Primary forest, dominated by large trees of 3-4 species of *Rhizophora*, *Brugeria*, *Kandelia* and *Avicennia* can be reduced to secondary forest of trees less than 5m high or even to mangrove scrub of 1 or 2 species, and only 1-2m high. In extreme cases, mangroves are completely cleared, leaving easily eroded mud.

Chapter Four

Materials and Methods

4.1 Selection of the study area

The Sundarbans is being managed by the FD for along period of time. There are many example of the conflict between the FD and the local people in the Sundarbans. The objective of this chapter is to present the results of a survey of local residents on their attitudes the present management practices in the Sundarbans. The study was conducted at Dakop of Khulna district.

4.2 Location of the study area

Dacope is located at 22.5722°N 89.5111°E . It has 25,377 households and a total area of 991.58 km². With an area of 99158 km², is bounded by Batiaghata Upazila on the north, Pashur River on the south, Rampal and Mongla Upazilas on the east and Paikgachha and Koyra Upazilas on the west. The main rivers are Pasur, Sibsa, Manki, Bhadra. The southern part of this upazila is surrounded by Sundarban (11790.13 hectares).

4.3 Tools of Data Collection

In term of data collection, fieldwork usually involves the researcher participating, overtly or covertly, in people's daily lives for an extended period of time, watching what happens, listening to what is said and asking questions through formal and informal interviews, collecting documents and artifacts (Hammersley and Aktinson, 2007). Furthermore, observation is defined as "the systematic description of events, behaviors, and artifacts in the social setting chosen for study" (Kawulich, 2005). Observation in fieldwork includes active looking, improving memory, informal interviewing, writing detailed field notes, and perhaps most importantly, patience of the researcher. Considering observation as a process, I placed myself in the position to learn about the activities of the informants in a natural setting, so that I could have the advantage of witnessing and participating in day-to-day or routine activities, an additional experience complementing listening to whatever they said. In addition, establishing rapport with the area inhabitants engaged me in having a close look into their social and cultural practices of gleaning forest resources from the Sundarbans.

As a participant observer on a voluntary basis, involvement in the day-to-day deeds with the people being studied conveniently enabled the researcher to capture not only the

location of the forest and informants' wide range of salient tasks, but also their patterns of interactions with the forest resources. Throughout the fieldwork that followed, I was able to discover an in-depth understanding of community member's behavior and attitudes towards forest resources of everyday context.

Unstructured interviews, a kind of in-depth informal conversation, are used as a primary method of data collection, in eliciting people's social reality. Fundamentally, the core purpose of conducting an unstructured interview is to uncover to the researcher unanticipated themes, and to help him or her to develop a better understanding of the interviewees' social reality from the interviewees' perspectives. Patton (2002) suggests unstructured interviews as a natural extension of participant observation, because it more often than not occurs as part of ongoing participant observation in the fieldwork. Owing to the flexible nature of unstructured interview, it was employed here to capture the outlooks, conducts and insights of forest goers and non-forest users into the forest resources.

4.4 Sampling Procedure:

The purposive sampling technique comprises of selecting certain units, or cases, grounded on a specific purpose, rather than randomly. More precisely, it is framed to pick a small number of cases that propagate most significant pieces of information about an interlinked set of phenomena (Teddlie and Yu, 2007). Strategically, it was preferable for the study as the main aim was to document people's activities in the mangrove forest, and women's interaction with forest resources. Subsequently, purposive sampling as a rational choice offered the interested participants a chance to take part in the research process to express their ideas, practices and opinions independently. It indicated that informants who could satisfy the research objectives, and who were inclined to participate in the research process were sampled. A total forty people constituted the sample size for study. Besides, in order to document the men's perception explicitly, the research design also prioritized their concerns. Feasibly, it created the opportunity to find out a detailed answer to the first study question.

4.5 Recruitment of assistants

Most of the forest going women at the study setting do not have any more than a low level of schooling, and adopt a conservative outlook based on the Muslim religious perceptions. In this case a well-known woman was required to have an access to these

groups of women. After my arrival at the study site, I communicated with a village leader in finding out a friendly and educated woman as a research assistant, while the male assistant was recruited prior to reaching the field.

For lessening the power- relations between assistants and researcher, I played a friendly role, asking them about their lives, studies and leisure activities while they were assisting me. Since I was junior to them by age, but adequately educated, they had little initial problems talking to me, but my friendly behavior made it easy to establish a good relation with them. During the interviews, I would have to have the control and make the decisions vis-à-vis various open-ended questions. Also, it seemed that the assistants were lazy at the initial phase of the study. It was essential to inform the assistants about the core intention of conducting the field work following a participatory approach. I clarified each and every research aim to them, and tools to be applied to achieve the maximum information from the individual informant (Pollt and Hungler 1995).

4.6 Field Diary:

Harding (2008) argues that a field diary is a useful instrument in order to replicate upon our own role in the field during our research. The field diary as filed note is useful as a way of therapy. I tried jotting down all the experiences I gathered during observation, and wrote answer of the relevant questions retorted by participants.

4.7 Structure of the Gathered Data:

4.7.1. Observation Data:

Observation as a key technique for data collection took place at the dawn and concluded. I passed my time with the community members in order to better understand their attitudes and behaviors and their daily lives. It appeared that local inhabitants accepted me easily; possibly in part because as I usually wore 'lungi' and a towel, two of the most common local costumes. I observed the following: when women and men woke up, what they did in their households, how they prepared before going to the forest, and how they dressed themselves before going to the forest.

We noticed how they gathered forest resources, and how they transported these resources to the market. My observations helped me to comprehend the attitudes and behavior of the forest goers. I also noted the condition of the forest where some areas have limited trees and plants. The local people told me it was the outcome of the Sidr and Aila.

4.7.2. Unstructured in- depth Interviews Data:

Minichiello et al. (1990) described unstructured interviews as interviews in which neither the question nor the answer categories are predetermined; rather the unstructured interviews rely on social interaction between the researcher and the informant. This is why the spontaneous generation of questions in a natural flow during interactions with the participants is required. For me, it was not a difficult task. Previously gained knowledge about the community customs equipped me with the deep insights of the respondents' notions into the thematic areas designed for the study. The members of the study region preferred talking enthusiastically about their lives connected to the Sundarbans forest. This is precisely why, once the conversation started, it had consumed a great deal of time. In this case, when the talks turned irrelevant and did not satisfy with study objectives, I had to resume control over the discussion to make them precise and relevant. Nevertheless, I encouraged the interviewees to share their own experiences and perspectives, which were relevant and seemed relevant for the study.

Chapter Five

Results

5.1 General Profile of Respondents

Most of the respondents were directly or indirectly dependent on the Sundarbans for their livelihood and half of them (80.0%) are illiterate or have only primary school degree(Figure: 5.1), average monthly income of 63.2% respondents is around TK5000(Figure: 5.2) and more than 43% were within the age of 35(Figure: 5.3). All the respondents were employed or self-employed and they lived villages adjacent to the forest. Most of the respondents had no single occupation, 52% of the respondents were farmer and 24% were fishermen. Only 7% of the total respondents were wood cutter and they directly depend on the Sundarbans and another 18% respondents were boatman (Figure: 5.4)

Level of Education

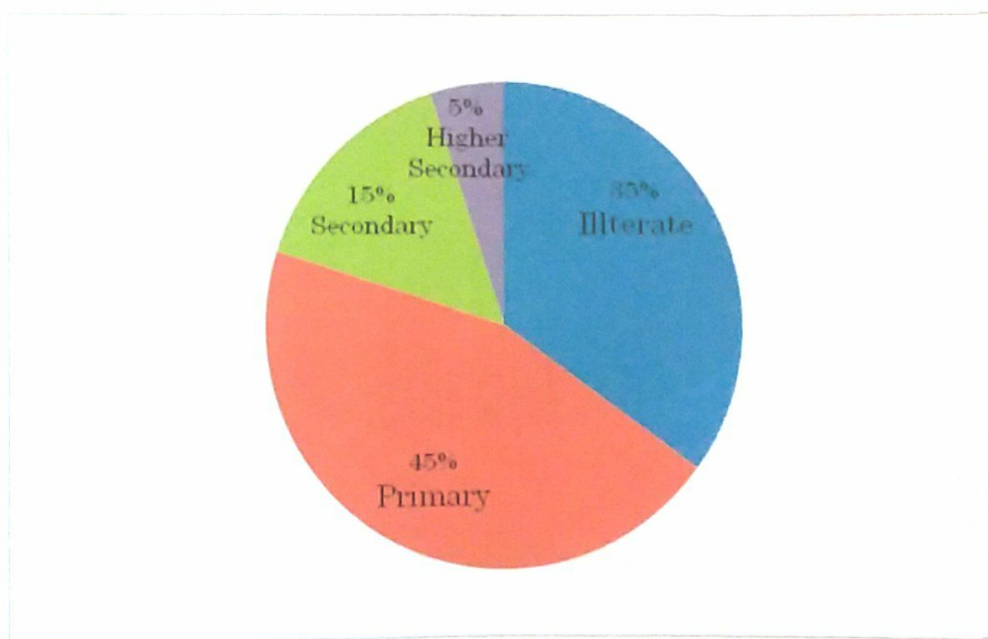


Figure 5.1: General profile of the Respondents by Education

Income Level

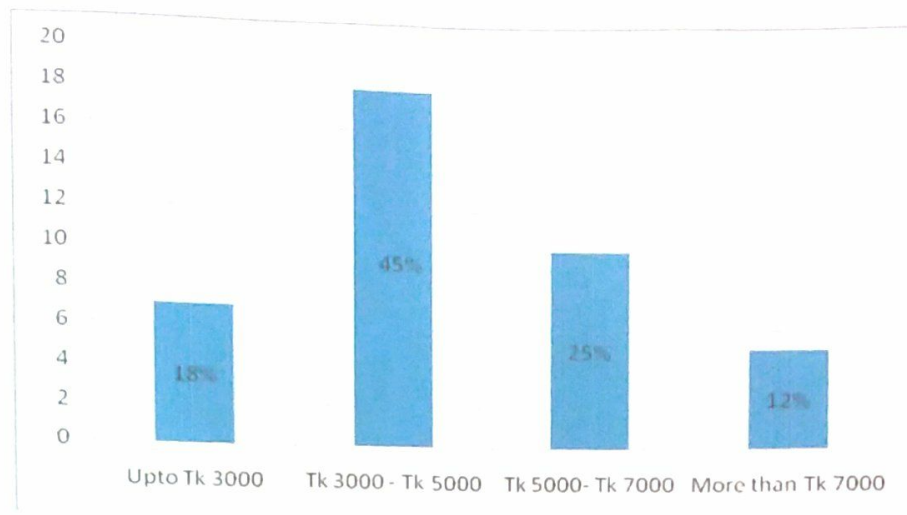


Figure 5.2: General profile of the Respondents by Income level

Age Structure

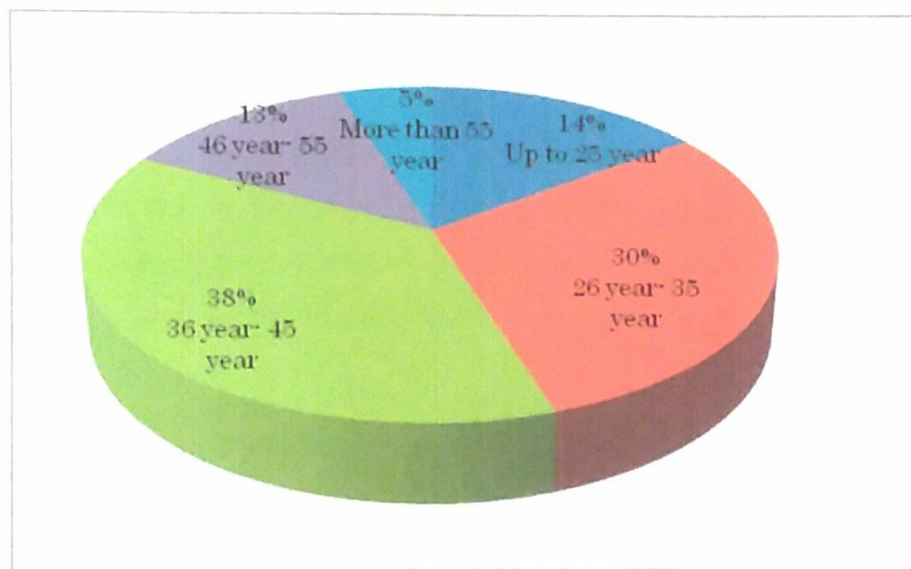


Figure 5.3: General profile of the Respondents by Age

Occupation

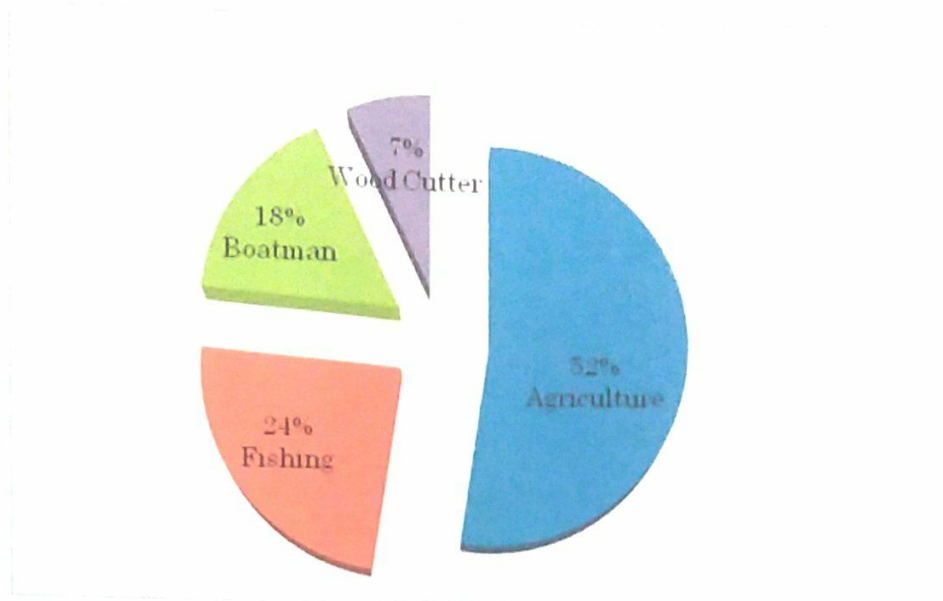


Figure 5.4: General profile of the Respondents by Occupation

5.2 Perceptions on the Sundarbans and its Management

The Forestry Department (FD) is responsible for all administration of the sundarbans including operational plans, revenue collection, and wildlife protection. The people's attitude towards the resources management of the Sundarbans was shown in Table 5.1. Thirty six percentage of the total respondents that FD people were doing their duties efficiently, eight were neutral and Fifty five thought that FD people were not doing their duties efficiently.

Table 5.1 reveals there is no literacy difference in opinions .No signification differences is found in the opinions by age and by occupations significant but differences among the income groups are statistically signification at $P>0.05$ level i.e., the proportion of the respondent's disagreement reduced as increasing income level. Respondents who were agreeing or strongly agree with the statement were of relatively high- income groups.

Table 5.1 Opinions about the Forestry Department with the statement “Forest Department is managing the Sundarbans very efficiently”

	N	Strongly Disagree or Disagree (%)	Neutral (%)	Strongly Agree or Agree (%)	Significant χ^2
Total sample	40	55.5	8.2	36.3	
Education					
Illiterate	14	13.3	1.7	9.8	
Primary	18	24.4	3.0	15.3	P>0.05
Secondary	6	10.3	2.2	6.2	
Higher Secondary	2	7.5	1.3	5.0	
Income					
Up to TK 3000	7	26.4	2.2	8.8	
TK 3000- Tk 5000	18	12.8	2.3	5.4	P<0.05
Tk 5000- Tk 7000	10	10.2	2.7	14.1	
More than Tk 7000	5	6.1	1.0	7.9	
Age					
Up to 25 year	6	10.2	1.1	8.4	
26 year- 35 year	12	15.5	1.6	10.6	P>0.05
36 year- 45 year	15	8.8	1.3	4.8	
46 year- 55 year	5	12.2	2.9	10.2	
More than 55 year	2	8.8	2.6	2.3	
Occupation					
Agriculture	22	4.6	2.8	10.6	
Fishing	10	22.9	1.9	2.8	P>0.05
Boatman	7	21.2	2.2	7.6	
Wood Cutter	3	6.8	1.3	15.1	

Table 5.2 The Sundarbans is the most important natural resources of Bangladesh

Level of Agreement	Percentage
Strongly Agree or Agree	100.0
Neither Agree nor Disagree	00.0
Strongly Disagree or Disagree	00.0
Total Percentage	100.0

All of the respondents known that Sundarbans is the most important natural resource of Bangladesh (Table 5.2).

Table 5.3 Reasons for not being able to proper manage the Sundarbans

Reasons	Percentage
Lack of proper knowledge	12.5
Dishonesty of FD people	32.2
Poverty the local people	48.7
Dishonesty of the local people	6.6
Total Percentage	100.0

The respondents were asked if they thought the Sundarbans was not being properly managed by the FD, what the reason(s) was for it. Table 5.3 shows that most of the respondents (48.7%) indicated the poverty of local people is the main reason for not being to proper manage of the Sundarbans, 32.2% indicated dishonesty of the FD officials and 12.5% indicated that lack of proper knowledge, respectively; were the causes for not being to resources management.

Table 5.4 Forest laws are maintained properly in management of the Sundarbans

Level of Maintenance	Percentage
Strongly Maintained	14.6
Maintained Somewhat	38.6
Don't know	14.8
Not Maintained at all	32.0
Total Percentage	100.0

It was asked to the respondents whether the forest laws are maintained or not. About half of the respondents said that forest laws are strongly maintained or maintained, 32% said laws are not maintained and 14.8% were neutral (Table 5.4)

Table 5.5 Participation of Local people in management of the Sundarbans

Participation level	Percentage
Some Participation	30.3
Satisfactory Participation	10.6
Don't know	8.0
No Participation at all	51.1
Total Percentage	100.0

As per opinion of the 51.1% of the total respondents, there was no participation of the local people in management, 30.3% said that there was some participation of local communities and 10.6% of people defined themselves as either neutral or having no opinion about the participation of local people in the management of the Sundarbans (Table 5.5)

Table 5.6 The Sundarbans should be better managed if

Involved	Percentage
Local people are Involved	58.8
NGOs are Involved	30.7
Other Govt. Department are Involved	10.5
Total Percentage	100

The people expressed their opinions how the Sundarbans should be better managed. 58.8% of the respondents emphasized involvement of local people of all levels, 30.7% emphasized on NGO's involvement and 10.5% gave their opinion to involve with the other government department for sustainable management of the Sundarbans resources (Table 5.6)

Table 5.7 Wildlife is always the attraction of nature tourists

Level of Agreement	Percentage
Strongly Agree or Agree	100.0
Neither Agree nor Disagree	00.0
Strongly Disagree or Disagree	00.0
Total Percentage	100.0

There were some questions relating to the wildlife of the Sundarbans. Table 5.7 shows that each and every respondent agreed with statement 'wildlife is always the attraction of the nature tourists'.

Chapter Six

Discussion

For developing an ecologically resilient and sustainable biodiversity conservation programme, Social and ecological systems must be linked (Berkes and Folke, 1998; Brown, 2003) and local and scientific knowledge be integrated (Mackinson and Nottestad, 1998; Turner et al., 2000; Armitage, 2003; Moller et al., 2004). Experiences have proved that effective conservation of natural resources cannot depend merely on prohibition and that it is necessary to investigate the users' attitudes towards these vulnerable resources and then encourage their sustainable use (Pyrovetsi and Daoutopoulos, 1999). From this study, we concluded that the people were well informed about the ecosystem functions and use values of the mangrove forests. They valued those functions which were directly linked to their survival and wellbeing. Therefore, villagers in the vicinity of mangroves appreciated the storm protection function of the mangrove forests more than other functions (Badola and Hussain, 2005; Khan and Ali, 2009). The appreciation of this service of mangrove forests was high because people recollected a super-cyclone that hit local communities have positive attitudes towards conservation, and education and gender influence these (Mordi, 1987; Infield, 1988; Fiallo and Jacobson, 1995; Holmes, 2003). Respondents with a higher education level were more aware of the conservation status of the Bhitarkanika mangrove forests and had a positive attitude towards conservation issues as found in other areas (Chen et al., 2005). This emphasizes the need for improving the educational infrastructure in and around area, though the literacy of the respondents (85%) was higher than the average levels and the state of Orissa (65.38% and 63.09%, respectively). Women are most affected by the restrictions imposed on resource use: they are often left out of formal information systems/structures and are found to have a negative attitude towards policing-type conservation practices (Chandola et al., 2007; Ogra, 2008). This study revealed the positive attitude of local communities towards cooperating with the forest department in the conservation of the mangrove ecosystem. Policy reforms aimed at improving the sustainability of fishery and mangrove resources, adequate compensation for wildlife losses, sustainable use and equitable distribution of benefits (Ostrom, 1990) are needed in order to restore the ecosystem service value of the mangrove forests. In order to solve the problems arising from un-coordinated resource use decisions, it is proposed that the

area be managed on a larger spatial scale with the formation of a Conservation Area Management Authority having representation from policy makers at the federal and state levels, local communities and other government agencies. This authority should have linkages with the adjoining Sunderban Delta of West Bengal in India and Bangladesh so that it lies within a larger, internationally designated area.

The results of our study showed that FD was unable to manage the forest properly. The respondents indicated the poverty of the local people as one of the main reasons for not being able to properly manage the forest. Dishonesty of the FD officials as well as the local rich people was also indicated by the respondents. Local people are directly or indirectly related with hunting of the wildlife and as it is a great offense, some respondents were neutral to give their opinions. The socio-economic condition of the study area is really very bad and a large portion of the local residents are living below the poverty line. Sometimes the poor local people do the illegal activities only for their survival. If there were alternative, probably they would not do so. Sometimes corrupted FD officials allow the local people to do illegal activities by taking money from them. Some of rich local people always maintain the relationship with FD officials and make the poor people do the illegal activities. There are always some conflicts between the FD people and local communities, both parties put blame on each other for destroying forest and forest resources.

In the management of the sundarbans local people's participation is very low, although people's participation in the development programs is now being increasingly emphasized. There is some participation of the rich local people who are always benefited from the Sundarbans. In Bangladesh there has been a tendency among foresters and government to consider the community forestry, social forestry and agro-forestry as forestry program with participation. But those who are participating by providing labor do not have any role in arriving at decisions, even on matters preparing to them (FMP, 1992). People's participation is not a subject for idle talk. It is reiterated that participation, to be effective has to be well informed, planned, organized and institutionalized. In a participatory system, the forest resources of the Sundarbans might be effectively protected through 'social fencing' and development achieved through entrepreneurial approaches. Participation of the local residents in activities related to wildlife utilization can result in considerable financial and social gains to the

participants. Enhanced integrity of FD officials should be increased and an arrangement of protection of forest by associating local people in the protection program.

Chapter Seven

Conclusion

The Sundarbans is a unique ecosystem which is just not as conglomerate of trees. It has diverse resources all of which are very important for the economy of Bangladesh. The local people hold strongly negative attitudes towards the present's management done by the FD. Participation of the local communities is very low and all illegal activities are being done by the local residents. Involvement of local communities in the management of the Sundarbans might improve management of the forests; conserve the wildlife and the ecology of the forest. Participation of the local communities may improve the relationship with the FD as well. It should be borne in mind that without the improvement of the economic condition of the local communities, it is not possible to get any positive result. It is necessary to create awareness and motivate all stakeholders for conservation of the Sundarbans resources.

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Appendix-1

ATTITUDE OF LOCAL PEOPLE TOWARDS THE RESOURCE MANAGEMENT OF THE SUNDARBANS: A CASE STUDY OF BANIASHANTA UNION, MONGLA

Field survey questionnaire

1. General Profile

a)

Name.....
.....

b) Address (Vill &

P.S).....

c) Distance of Residence form the Sundarbanskm

d) Length OF Residence.....years

e) Education

Illiterate Primary SSC HSC Graduate and more

f) Occupation..... g) Age..... years

h) Monthly Income (TK).....

i) Agricultural Land owned

No Yes.....acres

j) Main Sources of income

Boatma Wood Fishing Agricultur Other.....

k) Religion

- Muslim Hindu Other.....

l) Total family members.....Person

m) Any family member engaged in any activity in the Sundarbans.

- No Yes.....acres

n) Whether migrated

- No Yes.....acres

o) Reasons for Migration

- Landless Scarcity of works More land bought here Suitable community to live
- Others.....

2. Sundarbans and its Management

(i) Sundarbans is the important natural resources of Bangladesh

- Strongly Agree Agree Don't know Disagree Strongly Disagree

(ii) Forest Department (FD) is responsible for all administration of the Sundarbans including operational plans, staff discipline, revenue collection, wildlife protection etc. Do you think FD people doing their duties efficiently?

- Strongly Agree Agree Don't know Disagree Strongly Disagree

(iii) What reasons do you think for not being able to properly manage the Sundarbans?

- Lack of proper knowledge Dishonesty of FD people Poverty of the local people Dishonesty of rich local people

- Others.....

(iv) Are the Forest laws maintained properly in management?

- Strongly Maintained
- Maintained
- Don't know
- Not maintained
- Not maintained at all

(v) At present participation of local people in management is:

- There is no participation at all
- Don't know
- There is some participation
- There is satisfactory participation

(vi) The Sundarbans currently managed by FD would be better managed if

- Local people of all levels are involved
- NGOs are involved
- Others Govt. Department are involved
(.....)

(vii) Wildlife is always the attraction of nature tourists.

- Strongly Agree
- Agree
- Don't know
- Disagree
- Strongly Disagree

(viii) What is your suggestion on better management of the Sundarbans?

.....
.....
.....