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# A Study on the Management Strategies of Protected Area in Bangladesh for Biodiversity Conservation on Nijhum Dwip, Noakhali, Bangladesh

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## Abstract:

The study tried to explore the role of national forest in sustaining and conserving biodiversity of a protected area named Nijhum Dwip National Park, Noakhali, Bangladesh. This study was conducted to assess the biodiversity status and to identify the management strategies of Nijhum Dwip, emphasizing on resource user, resource extraction, present condition of flora and fauna, causes and effects of biodiversity loss, people participation in management and training system for conservation of Nijhum Dwip National Park. For this purpose we collect data by using different methods such as key information interview, focus group discussion, eye sight visitation and various types of secondary data. On the basis of questionnaire survey, most of the respondents were illiterate 44%, fisherman 46% and older (above 40 yrs) 46% based on educational status and occupational status respectively. From this study, it has found that 94% people directly dependent on this forest resource, 64% people on fisheries. Government and local people have a broad contribution in management and governments also provide training for conservation of forest. In order to manage the continued degradation allowed by conventional forest management flaws, adaptive management process has been recommended to conserve this ecosystem in a more equitable way.

Keywords: Biodiversity, Conservation, Management, Nijhum Dwip.

## 1. Introduction

Forests cover almost 25% of the world's land and are critical in meeting human needs for water, 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 (Hirakuri, 2003; Landell *et al.*, 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 *et al.*, 2003). Protected area (PA) is one amongst them which introduced mainly to conserve biodiversity in its natural context. Declaration of protected area however, imposes some restriction on the access and utilization of forest products to local livelihoods that they have enjoyed customarily (Perez, 2005; Belcher *et. al.* 2005; Arnold *et. al.* 1999). They create opportunities to development of forest based small scale enterprises (FBSSE) and it is widely recognized that, increasing their commercial value will contribute to an increased

appreciation of forests, therefore contributing both poverty alleviation and forest conservation (Clay, 1992). In Bangladesh declaration PA for biodiversity conservation is rather a new concept and till now the country has only eighteen notified protected areas representing a tiny 11.08 percent of Bangladesh forests (Mukul, 2007). A significant portion of the small island of Nijhum Dwip (also referred to as Char Oshman), located in the Bay of Bengal under the jurisdiction of the Noakhali District of Bangladesh, was designated in 2001 as the Nijhum Dwip National Park (NDNP). The park is rich in plant and animal life, as well as being home to plentiful bird-life, while hosting numerous migratory birds. The forestry department of Bangladesh created lush mangrove forests in Nijhum Dwip as part of conservation efforts for the area. One of the main attractions in these forests is the herd of Spotted Deer, which is believed to number more than 5,000. The Keora (or Kerfa) tree was chosen for its fast growing root system, which anchors itself into the sandy ground. The leaves of this hardy tree are the spotted deer's favorite food, but most of the leaves are too high for the deer to reach. In an excellent example of how animals help one another, the resident monkeys shake or pluck the leaves from the trees, dropping them where the deer can pick them up. Other animals that visitors are likely to see in the Nijhum Dwip National Park and off its shores include Clawless Otter, Fishing Cat, Snakes, Tortoises, Turtles and Dolphins (Iftekhar et al., 2008). This study mainly highlighted the conservation & management of biodiversity status in the Nijhum Dwip. It also highlighted the need for development planners to recognize interacting ecological and socio-economic factors involved in the implementation of a development project. The absence of such perceptive planning is seen in the way in which the coastal resources of the coastal communities of Nijhum Dwip have been adversely affected by the community livelihood practices such as over fishing, destruction of mangrove forest, illegal hunting of deer etc which largely affect the biodiversity & socio-economic condition of the coastal community. In the present study it was assumed that, forest products still conspicuously contributing to the livelihoods of people living in and adjacent the protected areas of the country and hold a great potentiality for improved livelihoods and enhanced conservation in PA management, if exploited properly without hampering the ecology (Canonizado, 1999).

To complete the research works, the following objectives were conducted: to investigate the present status of forest resources and for what purposes they were used; to identify the causes and effects behind the biodiversity loss; to determine the management strategies; and to identify the threats and challenges of national park management

## 2. Materials and Methods

#### 2.1. Study area

#### 2.1.1. Background of the Study Area

The Nijhum Dwip Island is under Haitya Upazila (sub-unit of civil district) and Noakhali civil district. The island began to form in the 1950s, and during the 1970s and 1980s the higher parts of the island silted up to about the mean high water (MHW) line (+2.2 m public works datum) (MES, 1998; Iftekhar et al., 2006). The island extends from 22°05'-22°09'N to 91°01'-91°05'E; a recently accreted island with very extensive mudflats and associated sand bars, to the south of Hatiya Island. The waters around the islands are brackish, with a tidal rise and fall of about 1-2m. Mighty Bay of Bengal in the north of the island and all the three other sides are surrounded by Meghna. It is in the west of Char Damar, east of Manpura, south of Hatia Mainland and north of Bay of Bengal (Banglapedia, 2004). As per BBS (1992), land size of this char is 19200 acres / 7773ha (77.73 km<sup>2</sup>) and as per CEGIS, land size in 1999 stands 36.36 km<sup>2</sup> / 3636 ha. But according to CDSP land size in 2000 was 516 ha. This island is divided into 2 parts by a Canal Kamalarpur (Northern part) and Char Oshman (Southern Part). The island is isolated from mainland and population settlement is concentrated at Char Oshman (ICZM, 2002). Agriculture is the main occupation for the highest proportion of population (29%), followed by fishing (20%), fishing labor (15%), trading (11%) and agriculture labor (8%). At present, fishing provides one of the main sources of income. Average literacy rate 8.4% (ICZM, 2002).

Location	Area (Acres.)	Forest area criteria
Char oshman	500	Major buffer zone area, Wild animal grazing land, Breeding place of animal, Consisting various lakes, canals
Korner of char oshman	50	Transition zone area, Social forestation occurring, Catching fish from Bay of Bengal
Char komla	9000	Major buffer zone area, Wild animal grazing land, Breeding place, Human intervention
Choakhali	20	Concentrated people area (including market, hotels, housing etc)

 

 Table 2.1 summary information of the selected our study areas of national park (Source: Bangladesh Gazette, 2009)

#### 2.1.2. Soil and Vegetation Type

Nijhum Dwip is a part of the Young Lower Meghna Estuarine Floodplain. The soils are seasonally flooded, poorly drained and have been developed from moderately fine textured silt loams.

## 2.1.3. Climate and Topograph

The average rainfall is approximately 1200 cm. The terrain of Nijhum Dwip National Park has a gentle slope towards the sea with less than 1.5 m (maximum) to 0.2 m (minimum) elevation above mean sea level (Iftekhar et al., 2006)

#### 2.1.4. Biodiversity

The ecosystem is biologically very diverse. Through a transect analysis Rosario (1997) estimated that the island contains 68 plant and 66 animal species. The most important type of tree planted in the island is Keora, also known as Kerfa, which has fast growing roots holding the sandy land. The plant also supplies pillars for houses, materials for making boats and agricultural implements, and fuel for domestic use (Banglapedia, 2005). Five important plant species more found in the forest of total plant species. Only a few of the plants (Sonneratia, Excoecaria, Avicennia, Bruguiera, and Nypa) were deliberately planted or introduced here. In the species shrubs, trees and climbers cover 37, 21 and 16%, respectively. Among all the major mangrove species, these are (S. apetala, E. agallocha, B. gymnorhizae and A. officinalis) available here (Rashid et al., 1987). It is an important fish breeding ground and wildlife habitat. Australasian Flyways and Central Asian Flyways and is the southern-most staging ground of around 60 species of migratory birds. The site supports globally critically endangered species such as the Indian Skimmer (Rynchops albicollis), Spoon-billed Sandpiper (Eurynorhynchus pygmeus), Nordmann's Greenshank (Tringa guttifer), and Asian Dowitcher (Limnodromus semipalmatus) by providing their wintering ground (Iftekhar et al., 2008). The forest department of the government of Bangladesh created mangrove forests in Nijhum Dwip and the main attraction in these forests is the herd of about 5000 spotted dear (Banglapedia, 2005). To further enhance the biodiversity three pairs of spotted deer (Axis axis) were released on the island in 1980. The number of deer has increased to 14,400 at present (BFD 2006). Subsequent introductions have included several pairs of monkeys (Macaca mulatta), snakes (Python molurus) and one pair of Leopard cat (Felis bengalensis) (ICZM, 2002). Some of the common reptiles include Calotes versicolor, Mabuiya sp, Varanus bengalensis, V. flavescens, Xenochrophis piscator, Naja naja and Lessimys punctata. Enhydrina schistosa is commonly reported by fishermen in the waters around Nijhum Dwip. The largest concentrations of birds were at Hatiya (19,000), Ghasiar (39,500), Maulvir (28,500) and Nijhum (14,500). The common were Ardeola gravii, Egretta garzetta, E. intermedia, E. alba, Anser indicus, Tadorna ferruginea, Anas Penelope etc. as well as 5,500 unidentified ducks and 56,500 unidentified shorebirds were existed. The Ganges River Dolphin Platanisia gangetica is reported to be common. Other common mammals include Canis aureus, Herpestes auropunctatus, Aonyx cinerea, Viverra zibetha and Bandicota indica. (Rashid et al., 1987)

#### 2.2. Methodology of the Study

The research was based on different methodologies as well as interview with local people, questionnaire, observations and experiences, especially on vulnerabilities and opportunities expressed by local communities with surveys, focus group discussion (FGD) and participatory rural appraisal (PRA) was applied for the data collection. The electronic and web based information will also be used for data collection. A total of 4 field visits have been made for study purpose. Binocular was used for spotting birds, small mammals and reptiles. The study process can be simply divided into two parts, viz, data collection and analysis.

#### 2.2.1. Data Collection

For the study both primary and secondary information were collected. Available data of demographic structure from BBS report, socio-economic conditions from community based survey, climatic and physiographic conditions from Banglapedia, existing land use pattern and management system from Forest department and Red Crescent. The maps from Google and other relevant information of Nijhum Dwip National Park were collected from Forest department (BIT office) and through questionnaire survey and open group's discussion. According to Forest department, there are 11 specified areas in Nijhum Dwip that are defined as "Char" surrounds the national park. Among the forest areas we were selected Char oshman, Korner of Char oshman, Char komla and Choakhali village. We have selected one key informant for each village. As key informant we have considered a person who was familiar and older among the local peoples and had a broad and in-depth knowledge about forest areas as well as forest resources. Considering these factors, our selected key informants of char oshman, korner of char oshman, char komla and choakhali village were forest guard, fisherman, fisherman and chairman respectively. A structured questionnaire was used to collect data where the details about the respondents, their involvement with the forest, resources exploited from the forest and quantity and frequency of exploitation of resources, traditional using pattern of the resources and forest conservation were assessed. The questionnaire sample size of the survey was two hundred. Both open and closed questions were asked and on each topic the respondent was free to express his/her views. The study was carried out within a time span of six month raging from February to July, 2012. Multi-visits were made during the collection of necessary data.

## 2.2.2. Data Processing and Analysis

After accumulating relevant data and information, analysis of them was done using SPSS and MS Excel. For the purpose of convenience and better presentation, we are also using various descriptive statistical techniques such as percentage and mean. Finally the analyzed data have been integrated and presented as, graphs and put in report by using MS Word. Ultimately, a draft report was prepared based on the field survey.

## 3. Results and Discussion

For the study, we were adopted 200 respondents for questionnaire survey. On the basis of questionnaire survey and open group discussion, we found the following findings.

3.1. Demographic Characteristics of the Respondents

#### 3.1.1. Age group

To conduct the study, respondents were collected from four tiers of age group mentioning 18-20 years 6%, 20-30 years 14%, 31-40 years 34% and above 40 years 46%. The study revealed that the average age of the respondent is about 34 years. So, we have seen that most of the respondents were older.

#### 3.1.2. Sex

It is revealed from the study that almost 84% respondents are male followed by female 14%.

#### 3.1.3. Educational status

To assess the level of education of the respondents of this study, it has been categorized into: i) illiterate 44%, ii) up to Primary 26%, iii) up to S.S.C 16%, iv) up to H.S.C 10% and v) graduate 4%. However, we have seen that most of the respondents were illiterate.

#### 3.1.4. Socio-economic condition of the respondents

During the study time the primary occupation in the study areas were found as agriculture, business, service holder, shopkeeper, fisherman and others. The study revealed, most of the respondents occupation is fisherman 46% followed by the agriculture 28%, business 6%, service holder 8%, Shopkeeper 8%, and others 4% (Figure 3.1.).



Figure 3.1: Respondents involvement in various livelihood activities in NDNP

#### 3.1.5. Monthly income

For economic categorization we have divided the respondents based on their income level (i.e., monthly income). It is found that 54% respondent's monthly income level is 1000-5000 BDT that low income level followed by 5000-10000 BDT 40%, 10000-15000 BDT 4%, above 15000 BDT 2%.

#### 3.2. Present status of Nijhum Dwip National Park

#### 3.2.1. Resource user

It is noted from the study that about 94% respondents is direct user of Nijhum Dwip resources in the study area followed by have no idea 6%.

#### 3.2.2. Dependency on national park

Study depicted that, about 64% of respondents of sampled chars were totally dependent on the fisheries for their livelihoods, whereas, the remaining was found to be moderately or leastly dependent on the national park (Table 4.2.). The rest dependency respectively of the study areas on forest based business 4%, agriculture 28%, others 4%. However we have found that, in Nijhum Dwip area a strong link between poverty and dependence on forest was observed and it was also clearly found that forests are more important to low-income than to high-income people.

Dependency on	Percent
Fisheries	64.0
Forest based Business	4.0
Agriculture	28.0
Others	4.0
Total	100.0

Table 3.1: Forest dependency on Nijhum Dwip resources

Besides, in Nijhum Dwip forests were found to contribute in various aspects of rural life from fire wood, deer, fish, honey, medicinal trees and others for all sorts of household items to many intangible benefits whose values can't be measured in terms of money (Figure 4.2.). Among them 58% respondents are extracted fish from Nijhum Dwip followed by fire wood 18%, deer 8% honey 10%, medicinal plants 2%, and others 4%.



Figure 3.2: Showing the types of resources extraction in NDNP

#### 3.3. Causes of biodiversity loss and effects

#### 3.3.1. Present condition of biodiversity (flora & fauna) in NDNP

The study depicted 54% respondent's opinion that decreasing of forest biodiversity in Nijhum Dwip is higher followed by unchanged 20% and increase 26% (figure 4.3.).



Figure 3.3: Showing present condition of biodiversity in NDNP

#### 3.3.2. Causes of plant species changed in NDNP

According to the questionnaire survey in the study area, it has found that 86% respondents were appreciated in changing of the condition of plant species followed by 14% have no idea about this. Among the various causes of responsible change of plant species, deforestation 44% is most significant cause of changing followed by forest fire 2%, Soil erosion 8%, Natural disaster 36% and local people 10%.



Figure 3.4: Showing the causes of plant species changed in NDNP

#### 3.3.3. Causes of animal species changed in NDNP

According to the questionnaire survey in the study area, it has found that 96% respondents were appreciated in changing of the condition of animal species followed by 4% have no idea about this. Among the various causes of responsible change of animal species, food scarcity 36% is relatively high followed by hunting activities 18%, habitats destruction 34%, others 12%.



Figure 3.5: Showing the causes of animal species changed in NDNP

#### 3.3.4. Effects of biodiversity loss

On the basis of questionnaire survey and focus group discussion (FGD), the study described that most of the respondents were responded about the number of trees will be reduced followed by habitat destruction, reduction of forest productivity, loss of natural beauty, natural disaster, salinity increase, migratory birds will not come, number of wildlife will be reduced, loss of medicinal plants, wildlife will go to other place, soil erosion and others.

#### 3.3.5. Agricultural practices of respondents in NDNP

According to the questionnaire survey in the study area, it has found that 20% respondents were directly related to cash crop activities, followed by corn product activities 64% and others 12%. However, we have seen that most of the respondents were practiced corn crops.

#### 3.4. Management and Conservation strategy of NDNP

#### 3.4.1. Participant of NDNP management

The study depicted 34% respondent's opinion that local people were participated in management perspective of NDNP is higher followed by GO participated 32%, NGOs participated 30% and others 4%.



Figure 4.6: Showing the participants of NDNP management perspective

## 3.4.2. Contribution of local respondents on plant diversity conservation

According to the questionnaire survey in the study area, it has found that 50% respondents were contributed on plant diversity conservation by tree plantation, followed by stop cutting trees 30%, developing awareness 6% and others 14%.



Figure 4.7: Showing the contribution of local respondents on plant diversity conservation

#### 3.4.3. Types of training for respondents to conservation of Biodiversity

According to the questionnaire survey in the study area, it has found that 32% respondents were trained in awareness building followed by tree plantation 28%, protection from natural disaster 12% and others 16%.



Figure 4.8: Showing the types of training for respondents to conservation of biodiversity

#### 4. Conclusion

This study was conducted for sustainable biodiversity conservation and existing management strategies. On the basis of questionnaire survey and open group discussion, the each respondent was free to express their views. According to the respondents most of the people were illiterate and poor in Nijhum Dwip. They were highly dependent on forest resources for their survival like as fisheries 64%, forest based business 4%, agriculture 28% and others 4%. The study depicted forest biodiversity decreasing based on 54% respondents opinion. There found many cause and effects for changing forest during this consumption. Mostly found deforestation and food scarcity were responsible for changing of plants and animals respectively. A large number of trees and wildlife will be extinct if this degradation to be continued by the questionnaire survey. Government and local people were directly contributed in management of forest and forest resources. According to the respondent's opinion government has involved in management perspective by 44%. They involved in various management program like as stop cutting trees, tree plantation and developing awareness. So necessary

relevant steps should be taken by GO and NGOs to assist the local people to adopt these management. The sustainable management approach keeping in mind the management techniques will certainly create a new path for the better and effective administration of the protected area viz. Nijhum Dwip national park. The diminishing and depleting natural resources in the developing countries like Bangladesh will surely be replenish if the concept of protected area management is properly executed. On the basis of questionnaire survey and open group discussion, there should have some steps included in the following:

- Taking poverty reduction strategies around PAs through developing alternative income generating (AIG) activities and by providing micro-credit facilities to the rural people.
- Restore and manage buffer zones as an alternative resource utilization zone as well as fixing an allowable resource use limit from the PAs that offers both ecological and economical sustainability to local environment and livelihoods.
- To provide alternative job opportunities so that local people can minimize their needs on forest resources and increase social forestation program for socio-economic development by local participation. Actions should be taken to control deer's that enter into crops field and damage crops and vegetables. Thus, number of deer in Nijhum Dwip should be reduced; forest department could sell them. This way government can earn money.
- Authority should be applied existing policy and laws to conserve forest and concerned to obstruct corruption of forest budget.
- To aware and concern the local people about the forest importance and provide proper training on local people for conserving and protecting this forest and their well being.
- To provide signaling systems during natural disaster and establish multipurpose cyclone shelters and manage rehabilitation program for erosion victims region.
- Need to stop encroachment of natural land, un-control harvesting of renewable natural resources and fishing, encroachment of wild habitat and pouching, tapping, illegal hunting of wildlife.

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