

**Evaluation Report**

**Name of the project**

**Biodiversity Monitoring in Six Protected Areas of Bangladesh**

**Implementing entity**

**Jahangirnagar University**



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## Executive Summary

The biodiversity of Bangladesh is under tremendous pressure of legal and illegal overexploitation in order to meet the needs of the swelling human population. The country has a poorly managed network of protected areas (PAs) where animals and plants do not get sufficient protection. Moreover, there is no scientific monitoring of the biodiversity of these PAs. The project on 'Biodiversity Monitoring in Six Protected Areas of Bangladesh' was designed to fulfill this gap and intended to establish a scientifically sound, replicable and feasible monitoring system in these protected areas of the country, i.e., Rema-Kalenga Wildlife Sanctuary, Fasiakhali Wildlife Sanctuary, Teknaf Game Reserve, Dudpukuria-Dhopachari WS, Sitakunda Eco-Park and Inani Protected Forest. The objectives of the projects include listing of existing flora and fauna, create a computerized data base of the flora and fauna, documentation of biodiversity profile and identify the needs for conservation of biodiversity.

The data on biodiversity in these protected areas were collected through extensive field visits. A total of 493 plant species were recorded during this study. Among these 127 are tree species, 147 herbs, 119 shrubs, 87 climbers, 9 epiphytes and 4 parasites. Of these 79 are recorded as medicinal plants. A total of 160 species of invertebrates were recorded from these PAs, of which 60 were butterfly species. Eighty nine fish samples were collected from these sites. Twenty six species of amphibians and 58 species of reptiles were recorded. A total of 245 species of birds were recorded from these sites, of which 49 species were migratory. A total of 47 species of mammals were recorded from these sites of which 11 species were recorded only during night.

During this study, photographic evidence of four mammalian species was found in the country. These are Particolored Flying Squirrel, Yellow Throated Marten ,Hog Badger and Pallas's squirrel. A new plant species, *Osbeckia truncata*, was rediscovered in Bangladesh after more than one hundred years in Fashiakhali wildlife sanctuary of Chakaria Upazila in Cox's Bazar district. It is an angiospermic species under the family Melastomaceae.

One of the most important objectives of this project was to develop a computerized database for the biodiversity of the protected areas of Bangladesh. For easy access by all stakeholders, an open access online database was developed through which everyone will have free access to the biodiversity data of the protected areas of Bangladesh. Already the programme has been developed and data entry is in progress. Seventy percent data for four protected areas have already been added in this program. One book on the flora and fauna with pictures on the on Rema-Kalenga Wild life Sanctuary has been published. Similar books on the rest PAs are in the process of publications. The report concluded with recommendation to extend the project for at least two more years.

## **Introduction**

There is an indiscriminate damage of forest all over the world. The cruelty has seriously touched the tropical forest that holds tremendous significance, because it has the highest diversity of flora and fauna comprising two-thirds of the world's biodiversity. As a result, there is an imminent danger of losing the valuable biodiversity. Arannayk Foundation, also known as the Bangladesh Tropical Forest Conservation Foundation, aims at improved management, conservation and restoration of natural forest and biodiversity in the country.

With this aim in view, Arannayk Foundation provides grants to promote interventions on conservation, protection, restoration and sustainable use and management of tropical forests in Bangladesh. The grant is available to a wide range of public, NGO and private sector organizations working in creating enabling environment by improved management, conservation and restoration of tropical forest and biodiversity in the country. The Grant size is Tk 3,500,000 – 5,000,000/- for a period of 4 - 8 years. On completion of the project, monitoring and evaluation of the performance is the usual task in all donor funded venture. To this end, this external review is sought. The assignment was accomplished through review of relevant document and discussion with implementing project personnel.

## **Context and Objectives of the Project**

Bangladesh is one of the few countries where the species of two bio-geographic realms (Indian and Malayan) overlap. As a consequence, the biodiversity of the country, in all its levels, is very rich. Unfortunately, however, the country's biodiversity is under tremendous pressure of legal and illegal overexploitation in order to meet the needs of the swelling human population. The country has a poorly managed network of protected areas (PAs) where animals and plants do not get sufficient protection. Moreover, there is no scientific monitoring of the biodiversity of these PFAs. This study has been designed to fulfill this gap and intends to establish a scientifically sound, replicable and feasible monitoring system in six protected areas of the country, i.e., Rema-Kalenga Wildlife Sanctuary, Fasiakhali Wildlife Sanctuary, Teknaf Game Reserve, Dudpukuria-Dhopachari WS, Sitakunda Eco-Park and Inani Protected Forest.

In the year 2004, the Forest Department (FD) of Bangladesh, together with implementing partners (International Resources Group and others), had launched a unique project called Nishorgo Support Project (NSP) that is being followed by Integrated Protected Area Co-management (IPAC). With the financial support of the United States Agency for International Development (USAID), this project has introduced a new concept of involving the local communities in PA management and benefit sharing. Before this, PAs of the country were traditionally managed only by the FD that often encountered a lot of conflicts with the local communities. In face of the new trend of management, it has become necessary to monitor the biodiversity of the intervened areas in order to understand the impact of co-management. Therefore, Arannayk Foundation's (AF) initiative to monitor the biodiversity is well-deserved and Wildlife Research Group of Jahangirnagar University has been assigned to monitor the biodiversity of six intervened areas in order to understand the impact of co-management. The activities of the project were done during the project period starting from November, 2010 to November, 2011.

Species diversity and population density of wild animals in a particular area depend on the site's vegetation. Composite habitat profiles for an entire study area are useful in summarizing the relationship between the wildlife diversity and habitat type. This programme was planned to evaluate present status of the habitat and wildlife diversity of the six protected areas of Bangladesh.

The main objectives of this study are to –

1. List the existing flora (trees, shrubs, herbs & vines) with abundance and use of each species and that of the species that are locally extirpated
2. List the existing wildlife species (mammals, birds, reptiles, and amphibians), with present status, habitat preference and probable threats of each species.
3. Create a computerized database of the biodiversity resources (flora and fauna) of the PFAs with search and retrieval facilities
4. Publish biodiversity profile of selected protected areas.
5. Identify development needs for the conservation of biodiversity of the PFAs

### **Project Activities and outcomes**

Biodiversity monitoring was conducted in six protected areas of the country, viz., Teknaf Wildlife Sanctuary, Rema-Kalenga Wildlife Sanctuary, Fashiakhali Wildlife Sanctuary, Dudpukuria-Dhopachari Wildlife Sanctuary, Inani Protected Forest and Sitakunda Eco-park.

A team of experts conducted the study, all of whom have long term research experience in the floral and faunal diversity of protected areas of Bangladesh. Each field site was visited for six days in each month by a team. The team was headed by one Field Investigator, three field assistants (two wildlife biologist and one plant taxonomist). A total of 66 field trips were conducted by this team between November 2010 and October 2011. In addition another 15 field trips were conducted by the Principal Investigator and Co-Principal Investigator of the project. Camera traps were used at night for recording nocturnal species. Pitfalls were used for recording amphibians.

*Objective 1. Listing of the existing flora (trees, shrubs, herbs & vines) with abundance and use of each species and that of the species that are locally extirpated*

Detailed systematic data on biodiversity of six PAs was collected during the study period. A total of 493 plant species were recorded during this study. Among these 127 are tree species, 147 herbs, 119 shrubs, 87 climbers, 9 epiphytes and 4 parasites. Of these 79 are recorded as medicinal plants. A number of plants are still waiting for identification. The intensity of abundance could not be recorded due to time limitation. The description of the plants is given in categories such as tree species, herbs, shrubs, climbers, epiphytes and parasites. Full listing and uses of the species are included in the books already published or under publication on the biodiversity of the six protected areas. Many of the species have pictorial display.

During the study a new plant species, *Osbeckia truncata*, was rediscovered in Bangladesh after more than one hundred years in Fashiakhali wildlife sanctuary of Chakaria Upazila in Cox's Bazar district. It is an angiospermic species under the family Melastomaceae. The plant is shown in Fig.1.



The species was first reported from Madhupur in 1879. Subsequent to this, the species was not reported from any locality in Bangladesh. With the new finding in this study, it is now reported as rediscovery in Bangladesh after more than one hundred years. This rediscovery has been confirmed with the consultation of the data base of Salar Khan Herbarium of Dhaka University, Bangladesh National Herbarium, Chittagong University Herbarium,

Fig.1. Pictorial view of *Osbeckia truncata*

Bangladesh Forest Research Institute Herbarium and other relevant sources of literature.

*Objective 2. List the existing wildlife species (mammals, birds, reptiles, and amphibians), with present status, habitat preference and probable threats of each species.*

A total of 160 species of invertebrates were recorded from these PAs of which 60 were butterfly species. Eighty nine fish samples were collected from these sites. Twenty six species of amphibians and 58 species of reptiles were recorded. A total of 245 species of birds were recorded from these sites of which 49 species were migratory. A total of 47 species of mammals were recorded from these sites of which 11 species were recorded only during night. The description of the wildlife species is given in categories such as insects and invertebrates, fish and fisheries, amphibians, reptiles, birds and mammals. Full listing with the status of the species and distribution/preferred habitat of the species are included in the books already published or under publication on the biodiversity of the six protected areas. Many of the species have pictorial display. Such documentations will be assets for the future generation. However full description with pictures and habitats of many of the individual species are hosted in the web site of Arannayk Foundation ([www.arannayk.org/biotrack/](http://www.arannayk.org/biotrack/)).

During this study photographic evidence of four mammalian species was found in the country. Particolored Flying Squirrel and Yellow Throated Marten were recorded for the first time in Bangladesh from Rema Kalenga (Fig.2). Hog Badger was assumed to be found in Teknaf but photographic evidence of it was recorded for the first time in Bangladesh (Fig.2). Pallas's squirrel (*Callosciurus erythraeus*) was presumed to be found in our country without any site specific record. The researchers collected photographic evidence of presence of this species from Dudpukuria-Dhopachari Wildlife Sanctuary for the first time (Fig.2). These innovative outcomes are splendid. They confirmed natural distribution of Northern Trickle Frog (*Occidozyga borealis*) from Teknaf region. Three new amphibian records are waiting for identification.



Particolored Flying Squirrel



Pallas's squirrel



Hog-Badger



Yellow-throated Marten

Fig.2. Photographs of four new mammalian species found in protected areas of Bangladesh

Systematic long term Camera traps were used to identify nocturnal terrestrial animals of Protected areas of Bangladesh. Three to six nights in each month were spent for camera trapping at each site. Two Moultrie I60 and 4 Bushnell Trophy Cam (2010) camera traps were used in this study. Photos from the camera were transferred in the early morning.

Camera was set with time, date and moon phase and all photos were recorded with this information imprinted in it. A total of 11 species were recorded as nocturnal terrestrial mammals, viz., Jackal (*Canis aureus*), Palm civet, Fishing cat (*Prionailurus viverrinus*), Large Indian Civet (*Viverra zibetha*), Small Indian Civet (*Viverricula indica*), Indian Porcupine (*Hystrix indica*), Wild Boar (*Sus scrofa*), Hog-Badger (*Arctonyx collaris*), Greater Bandicoot Rat (*Bandicota indica*), Barking deer *Muntiacus muntjak* and Asian Elephant (*Elephas maximus*) from this Game Reserve. Among these species, large Indian civet was very common while Hog-Badger was very rare in Teknaf wildlife sanctuary. Presence of Hog-Badger (*Arctonyx collaris*) has been confirmed and photographed for the first time in Bangladesh.

A large number of photographs of different flora and fauna of the study sites were collected during the study period. Photographs of 200 flowering plants, 60 species of butterfly, 20 spp. of demson and dragon fly, 20 other insects, 55 spp. fishes, 26 spp. of amphibians, 40 spp. of reptiles, 135 spp of birds and 35 spp. of mammals were collected. All these photos can be seen with species profile in the online database of BioTrack ([www.arannayk.org/biotrack/](http://www.arannayk.org/biotrack/)).

*Objective 3. Creating a computerized database of the biodiversity resources (flora and fauna) of the PFAs with search and retrieval facilities*

One of the most important objectives of this project was to develop a computerized database for the biodiversity of the protected areas of Bangladesh. For easy access by all stakeholders, an open access online database was developed through which everyone will have free access to the biodiversity data of the protected areas of Bangladesh. Already the program has been developed and data entry is in progress. Seventy percent data for four protected areas have already been added in this program. Photographic and brief description of wild life species of all categories of fauna of each protected area is available in this web site ([www.arannayk.org/biotrack/](http://www.arannayk.org/biotrack/)). The hosting of data in regard to the flora is in progress. This is a praise-worthy achievement containing a treasure of information to be shared by all concerned.

*Objective 4. Publication of biodiversity profile of selected protected areas*

The following publications are made or in the process of publication:

Books:

- Biodiversity of Protected areas of Bangladesh. Vol. I: Rema Kalenga Wildlife Sanctuary (Published)
- Tiger in the Mangrove: research and conservation of the tiger in the Sundarbans of Bangladesh (Published).
- Biodiversity of Protected areas of Bangladesh. Vol. II: Dudpukuria-Dhopachari Wildlife Sanctuary (In press)
- Biodiversity of Protected areas of Bangladesh. Vol. III: Teknaf Wildlife Sanctuary (Drafted)
- Biodiversity of Protected areas of Bangladesh. Vol. IV: Fashiakhali Wildlife Sanctuary (Drafted)

### Scientific Articles

- New record of *OCCIDOZYGA BOREALIS* (Northern Trickle Frog), **Frogleg** (In press)
- Pallas's squirrel (*Callosciurus erythraeus*) in Dudpukuria-Dhopachari Wildlife Sanctuary, Bangladesh. **Journal of Small Mammals Review**. (Published)
- Nocturnal terrestrial mammals of Teknaf Game Reserve of Bangladesh. **Journal of Threatened Taxa** (JoTT). (Accepted)
- Rediscovery of *Osbeckia truncata* D. Don ex Wight & Arn. in Bangladesh, **Bangladesh J Botany**, Vol.40(1):101-103, 2011
- Plant Biodiversity of Fashiakhali wildlife sanctuary, Bangladesh. Abstract presented and published in the First Bangladesh Forestry Congress 2011, Dhaka, Bangladesh 19-21 April 2011
- Road and railway traffic kill of wild animals in a semievergreen forest of Bangladesh, **Journal of Threatened Taxa** (JoTT). (submitted)

### M.Sc. Thesis/report completed/ongoing

- Core area and route use pattern of Asian elephant in Teknaf GR. M.Sc. Thesis. Jahangirnagar University. Bangladesh
- Comparative floristic studies in natural, planted and disturbed zones of Teknaf game reserve: implications for conservation. M.Sc. Thesis. Univ. of Dhaka. Bangladesh.
- Diversity of avian fauna in FashiaKhali WS. Ongoing Report. Jahangirnagar University. Bangladesh
- Diversity of avian fauna in Teknaf WS. Ongoing Report. Jahangirnagar University. Bangladesh
- Diversity of avian fauna in Rema-Kalenga WS. Ongoing Report. Jahangirnagar University. Bangladesh
- Breeding behavior of Black Drongo, Jungle Babbler and Long-tailed shrike in JU Campus. Unpublished M.Sc. Thesis. Jahangirnagar University. Bangladesh
- Ecology and behavior of rhesus macaques in Sylhet. Unpublished M.Sc. Thesis. Jahangirnagar University. Bangladesh
- Human wildlife conflict: Bangladesh Perspective. Research Report. Jahangirnagar University. Bangladesh

### *Objective 5. Identification of development needs for the conservation of biodiversity of the PFAs*

The project identified the following needs on the basis of the outcomes of the first year:

- Biodiversity monitoring in three protected areas of Chittagong-Hill-Track viz. Pablakhali WS, Hazarikhil WS and Sangu WS (No systematic study has been conducted during the last two decades).
- Development of a "prediction model" for sustainability of six studied PAs in first phase.
- Completion/ update of species entry in BioTrack open access database.
- Species level status and distribution in southeastern hill region, especially for Bear, Elephants, cats and Primates.

- Training Program on biodiversity monitoring and conservation (mid level forest officers and PI/CoPI/coordinator of Arannayk projects)
- Non-formal environmental education program in schools around PAs.
- Compilation of references on the publications of Wildlife ecology, Management and Conservation in Bangladesh.

**Impacts** ( especially on awareness and capacity development, livelihood improvement, institutional development and forest and biodiversity conservation)

*Awareness and capacity development:* A community awareness programme was arranged in a local school to focus the importance of conservation of biodiversity. The outreach programme like this is one of the means to carry the message to promote environmental awareness and grow a sense of commitment to the conservation of biodiversity. As a part of awareness development, a brochure with colored photographs for general public and the calendar with photographs of bird were published. T-shirts with print of conservation slogans were distributed among the people living around the PAs.

With a view to develop the capacity of the field workers and student a field training programme was organized in collaboration with Wildlife Branch of Dept. of Zoology, Jahangirnagar University and Center for Global Field Study, University of Washington, USA. This training program was organized in Fashiakhali WS between 23 and 27 January 2011. Seventeen participants attended the field course including 8 students (B.Sc. and M.Sc. candidates) from Jahangirnagar University and 9 senior staff (Program Officers/Project Coordinators/Team Leaders) from Arannayk sponsored programmes. The attendance of 9 senior staff from Arannayk programs around provided an excellent mix of junior (students) and senior (staff) participants with broad background and experience, and in turn, the opportunity to share and contribute relevant knowledge throughout the training program.

This course provided an introduction to the disciplines of Biodiversity Monitoring, Conservation Biology and Global Health - at the Human-Environment Interface. A wide range of related topic areas were covered, including field study methods, management and conservation strategies, wildlife conservation in Bangladesh, primate behavior and ecology, the human-environment interface, and translational research. This course is intended to provide participants with an initial understanding of the basic principles of conservation biology, experience with the methods and techniques used in field research, an appreciation of the need for population and ecosystem management and conservation, and an appreciation of the complex relationship between environmental health and global health- at the human-environment interface. The course consisted of daily lectures, field exercises, and community outreach education. Field exercises included (use of / practice with):

- GPS Receiver (Global Positioning System) - to identify location of animals, ranging patterns, etc.
- Range Finder - to confirm distances to animals/objects
- Radio Telemetry Equipment - for tracking animals
- Camera Traps - for use in animal surveys/identification/confirmation
- Blow Pipe (darting) - to immobilize animals for biological sample collection

- Line-transect Sampling Method - to estimate population density and abundance
- Light Trap Sampling - to identify/record nocturnal insect species/density
- Fecal Collection Techniques – to permit subsequent analysis of parasites/genetics/hormones
- Intestinal Parasite Analysis – to identify intestinal parasites via fecal samples

Seven students completed M.Sc. thesis on different aspects of wild life. As such their capacity were developed to conduct further research with a view conservation of biodiversity.

A digital map of land cover use of each study sites focusing five major types, viz. i) Natural Forest, ii) Scattered forest, iii) Cultivated land, iv) Human settlement/other and v) water bodies was developed. This data base can be used for threat analysis and developing management plan.

*Livelihood improvement:* The project is not directly related to livelihood improvement. However, two local persons worked with the project team. As such they enhanced their knowledge on flora and fauna. They now act as tourist guide and supplement their livelihood.

*Institutional development:* The project facilitated to update laboratory and field work facilities through procurement of some important equipment and accessories as follows:

- Canon 7D SLR camera
- Canon 4L 300 Tele lenses
- Canon Kiss X5 camera
- Canon 28-135 UD IS lenses
- Four Bushnell camera Trap
- Four Bushnell Binocular
- Sony cybershot fixed lenses camera
- Generator
- Rain coat, boots and other basic facilities

The library was enriched with collection of 48 books and 5 reports related flora and fauna for conducting research and imparting education.

The institutional facilities were further developed with the collection and preservation of 28 wildlife species in wildlife laboratory of the department of zoology, Jahangirnagar University for further study. About 500 plant voucher specimens were collected and preserved in taxonomy and ethno botany laboratory of the department of botany, University of Dhaka for identification and reference materials for research and education.

*Forest and biodiversity conservation:* The project is not directly linked to forest and biodiversity conservation. However, the treasures of information documented will encourage the policy makers, planners, and local community to take actions in this regard. The capacity of resource persons developed and growing of institutional facilities will facilitate to conduct activities to this end.

## **Sustainability Potential**

The documents prepared will help prepare site specific management plan that will contribute to sustainability of biodiversity conservation.

## **Weaknesses**

- Field works were not adequate. More information could be collected if the project time would be longer and more fund would be available
- Circumstantial situation hindered free access to deep forest

## **Recommendations**

The project activities were confined to six PAs. This was a project only for one year. Some more information could be collected if the project period would be longer for at least two more years for:

- Biodiversity mentoring of the PAs where no systematic study has yet been conducted during the last two decades should be conducted. These PAs may be Pablakhali, Hazarikhil, Sangu , Kaptai Muke , Khadim Nagar, Singra, etc.
- Development of a prediction model for sustainability of six PAs already covered during the first year
- Completion-updating of Bio-Track open access in the web site. Link of Bio-Track to global web sites like Google, Yahoo, Face book should be established
- Promote awareness programme at the PAs and review of status of 6 PAs already covered