

Abstract Report on the studies of Biodiversity of Bengal Safari (Phase 1)

The study area of Bengal safari comprising 297 hectares was surveyed during the project duration period, i.e. year 2016 to 2017. Based on the few available literature regarding Baikunthapur Forest and Mahananda Wild Life Sanctuary, records, publications on the status of flora and fauna, it can be conferred that the study area is very rich with varied floral and faunal biodiversity. After thorough consultation with officials of forest department and local people efforts were made to recognize dense niches in deep forests in all parts of the Bengal Safari. During the survey, the plant samples were collected in duplicates or triplicates and kept in air-tight polythene bags. Collections of specimens were done with their reproductive structures intact, (flowers and fruits) but in many cases sterile specimens were also collected. Herbaceous plants were generally collected in full with roots. The methodology as suggested by Jain and Rao (1977) was followed in general for this work. During the field survey, specimens were photographed for capturing the unique characteristics. For Faunal diversity, Sample collection in Bengal Safari was carried out in three different seasons from the year 2016 to 2017. Different methodologies were followed during the survey, collection, identification and preservation of different categories of faunal specimens. In general, the specimens were collected using standard survey methods with the aid of field photographs and GPS location of sighted areas. Morphological features along with some unique characteristics of the collected specimens were noted in the field note book with collection date and numbers. Specimens, which were collected in field, were temporarily preserved in airtight container, killing jars in the field and processing along with identification was done with the available, accepted published books, journals, identification keys and monographs. For preservation, 10 % formaldehyde aqueous solution was used for vertebrate specimens, for invertebrates, 70 % alcohol was used. For insects, dry specimens were preserved in envelope containing naphthalene, pinned and some specimens were preserved in 70 % alcohol solution, nematodes were preserved in 5 % formaldehyde with a little drop of Glycerine.

The present research work in the study area of Bengal Safari dealt with the record of 88 Angiospermic families, 1 Gymnospermic family, 14 Pteridophytic families, 3 Bryophytic families, 4 Algal families and 15 Fungi families. The Angiosperm families comprises 391 species under 297 genera. The present survey recorded 29 species of Pteridophytes belonging to 22 genera under 14 families. Macro Fungal diversity was observed to be very interesting, a total of 28 Fungi species has been recorded under 22 genera of 15 families. Out of recorded 391 species of Angiosperms, 332 species were recorded as Terrestrial species, 5 are Epiphytic species, 14 Aquatic species, 40 are Wet lowland or Marshland species. A total of 64 species of Tree, 63 species of Shrubs, 7 species of Lianas, 52 climbing species and 205 Herbaceous species under Angiospermic elements were recorded during this one year survey based research work. A total of 29 species of Pteridophytic species were recorded under 14 families during one year research period. Pteridaceae presented maximum species, i.e. 7 species. The present research work of Bengal Safari dealt with record of 88 Angiospermic families, 1 Gymnospermic family, 14 Pteridophytic families, 3 Bryophytic families, 4 Algal families and 15 Fungi families. The Angiosperm families comprised 391 species under 297 genera. 29 species of Pteridophytes belonging to 22 genera under 14 families. In total, 28 Fungi species were recorded under 22 genera of 15 families. From this huge diversity of floristic elements, 307 species were found as Not Assessed (NA) in the IUCN Red List. Only one species is listed as Vulnerable (VU), 72 species under Least Concern (LC), 3 species under Lower Risk (LR) and 2 species fall in the Data Deficit (DD) category.

The present faunal survey recorded 496 species under 422 genera comprising 201 families. All of these comprise mainly macro fauna and natural inhabitant of this area. This short time research work dealt with 312 species of arthropods belonging to 276 families and 95 species of birds representing 75 families. Ichthyofaunal diversity comprised 33 species under 12 families, Molluscs comprised 20 species covering 11 families, reptiles and amphibians comprised 23 species. 12 species of mammals were recorded. Under Phylum Annelida, 2 species from 2 families of 2 different order were recorded. 312 species of arthropods were recorded which covered 276 genera and 103 families. Lepidoptera presented maximum number of species, followed by Coleoptera 40 species covering 14 families, Odonata 33 species covering 5 families, Orthoptera 28 species under 9 families, Hymenoptera 25 species of 11 families.

106 species of Lepidoptera were recorded in the present research work, comprising 89 genera and 21 families. This short time research also dealt with 18 species of insects under 11 families of order Diptera and 13 species under 10 families of order Hemiptera.

The freshwater bodies of Bengal safari like Singjhora and Shyamjhora are very rich in benthic faunal diversity. The present survey recorded the fresh water ichthyofauna comprising 30 species under 20 genera of 12 families and 6 orders. Out of 30 species of fishes recorded from Singjhora of Bengal Safari, 2 species are listed as Near Threatened, 25 species are Least Concerned, 3 species as Not Evaluated (Table: 5.2.28). According to National Bureau of Fish Genetics and Research, Conservation Action and Management Plan (NBFGR, CAMP)

Conservation Status, 1998, 2 species are listed as Endangered (EN), 7 species as Vulnerable (VU), 10 species in Least Concern category, 8 species under Low Risk Near threatened (LrNT) and 3 species as Not Evaluated (NE).

Out of 12 recorded species of reptiles, *Chrysopelea ornata* has been identified as Near Threatened species (NT), *Python molurus* as Vulnerable species (VU) and *Varanus benghalensis* is listed under Least Concern category (LC) as per IUCN Red List status. 11 species of Amphibia under 7 genera covering 5 families were recorded in this one year research work.

This one year Research work dealt with 95 species of Birds under 75 genera comprising 48 families. 15 orders were recorded representing 48 families. Table 5.2.35 represents order wise species distribution of the avifaunal species surveyed. Order Passeriformes comprises maximum species (48 species) under 34 genera of 24 families, followed by Coraciiformes, Pelecaniformes, Piciformes etc.

The present research work of Bengal Safari dealt with the record of 391 Angiospermic species, 1 Gymnosperm, 28 species of Pteridophytes and 27 Fungi species. From this data, it can be conferred that the diversity of floristic elements is very rich in 297 hectare area of Bengal Safari. The floristic elements present here hold a great significance from the traditional, ecological and socio-economic point of view. The fodder intake or consumption among wild fauna varies in different seasons of Bengal Safari. Three different combination of species consumption has noticed in this one year research study. From this present study, pre monsoon, monsoon, and post monsoon feed plants species has recorded. A total of 65 species of plants were recorded during this one year research in which 6 species recorded whose fruits were also consumed by Spotted Deer and Barking Deer. 7 species were identified whose bark is consumed by Spotted Deer and Sambar Deer during grazing. In Total, 30 species of Herbs, 9 species of shrubs, 2 lianas, 14 trees and 10 specie climber were recorded during this study period which were consumed by the ungulates (Deer) in different seasons (Table:5.1.21). 21 species were recorded to be consumed by them throughout the year. During monsoon, only 9 species were recorded to be consumed by ungulates.

Human beings use both the terrestrial ecosystems and aquatic ecosystems for various purposes for their fooding, livelihood, fishing (being most common activity). For this vegetation cover is cleared, land is being used for cultivation, use of insecticides to yield better crops, Such anthropogenic disturbances lead to habitat fragmentation and habitat destruction. Hunting of birds with indigenous weapons also pose a major threat leading to decline in avifaunal diversity. One of the major threats to be highlighted nowadays are unethical approaches while birding such as in the name of photographing a species, the ecology and ethology of the species is being disturbed. Construction of roads, poaching, mining and quarrying activities, road accidents, electrocution are several other anthropogenic threats eliminating a major portion of faunal diversity.

Invertebrates as well as vertebrates play a significant role in various basic functions of ecosystems such as pollination, decomposition, biological control, source of food, medicinal value, source of recreation, sustainable development etc. Lepidopterans and Odonates serve a significant role as pollinators and bio indicator. Another growing demand is for live pupae for butterfly parks and research activities abroad. Ecotourism is nowadays a popular venture for this set up of butterfly parks with host plants attract tourists and generate revenue.

Awareness is critical to appraise young minds and season them towards harmonious coexistence between man and nature. At academic level certain prominent prospects such as simplified identification manuals for basic floral and faunal identification, insects lifecycle, basic diversity in fauna, their role in ecosystem services, threats faced by faunal diversity, preparations of biological models and posters briefing about conservation and habitat restoration approaches that could be taken to conserve biodiversity etc.

Since the North Bengal Wild Animals Park (Bengal Safari) is visited by a number of tourists, dissemination of information pertaining to the flora and faunal diversity can be undertaken using posters, audio visual presentations, concise field guides, booklets on the locally seen flora and fauna, souvenir shops, conducting environment and wildlife awareness programmes, nature walks, interactive workshops can pique one's interest in knowing about biodiversity and associated concepts.