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HORTICULTURE

Survey on Flora and Fauna of Bishnupur Bill (Horse Shoe Lake) and It's surrounded Area at Berhampore in Murshidabad District of West Bengal

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ABSTRACT

In India, there are many number of Lakes, some are natural and some are man-made. These lakes are the source of Flora and Fauna. "Bishnupur Bill" a horse shoe lake is one of them. This natural lake is derived from our Holy River the Ganges. This paper provides a taxonomic inventory of plant species and animal species collected by the authors during the last two years from this 'Bill' and its surrounded area. This natural lake and its surrounded area have lots of Flora and Fauna from algae to mammalians. The inventory records a total of 168 species and 64 genera. The present study also investigates some exotic birds which come every year to this 'Bill'. The present study revealed a handsome diversity of Flora and Fauna in this ecosystem. The inventory is expected to provide baseline scientific data for further studies on plant and animal diversity in this 'Bill', and can be used to facilitate the long-term conservation and sustainable use of plant and animal resources in this ecosystem.

Highlights

- Bishnupur Bill is a natural "horse shoe lake" with a total of 168 species and 64 genera of plant and animal species.
- This study can also help to identify the exotic birds comes every year in winter seasons and pertinent ecosystem exploration.

Keywords: Ecosystem, horse shoe lake, exotic bird, bill

Lake is an example of water body. By its definition we can say that a horse shoe lake is 'U' shaped water body that forms when a wider meander form when the main stream river is cut off, creating a free standing body of water.

These types of lakes are the natural habitat of various flora and fauna. However not enough attention has yet been given to the preservation of lakes that exists within Metro Politian Limits. Lakes often have cultural and religious significance for the local populations. Festival and natural ceremonies are also associated for the local population. (Koduru and Dutta, 2013). "Bishnupur Bill" has a holy story about the Goddess "Maa Kali" (Bishnupur Kali Bari). Every year in the Bengali month of "Poush" (December-January) a Fair (Locally named as Bistupur Kali Bari Mela) is conducted by the Mela Committee on the bank of this "Bill".

Of the various environmental problems faced in modern times, the loss of Biodiversity is the most

serious one. The unprecedented rate of species extinction, mainly driven by unbridled human activities, is fraught with grave economic and ecological consequences (Gh. Hassan Dar *et al.* 2014).

Indian subcontinent, a part of the vast Oriental Bio-geographic regions, is very rich in biodiversity. Indian biodiversity includes large number of species of invertebrates, 2546 species of fishes, 204 species of amphibians, 446 species of reptiles, 1228 species of birds and 372 species of mammals (WII 2009).

Fisheries play an important role in the economy of India in augmenting food supply, generating employment, raising nutritional level and in earning foreign exchange. Fishes are invariable living components of water bodies (Sarkar *et al.* 2015). West Bengal is the important domain for fresh water fish Biodiversity (Bandhopadhyay *et al.* 2014). Understanding of species and communities reveal crustal facts necessary to the management of ecosystem and habitat (Mogalekar *et al*. 2015). Main causes of the decline of native fish species are habitat loss and species introductions. The conservation of the freshwater fishes has never been adequately addressed in India which has been mainly due to lack of scientific data and perception about the criteria to be used for the characterization and designating conservation status of threatened fishes. Knowledge of the species composition and distribution patterns of fishes are fundamental for conservation and management of native fish fauna (Mogalekar *et al*. 2015)

According to an estimate total 1263 bird species found in Indian sub-continent, out of the more than 9000 bird species of the world, over 12% of the world's bird fauna are found in India (Mukherjee 2016). Avifauna are important for the ecosystem as they play various roles as scavenger, pollinators, seeds dispersal agent and predators of insect pest and an important indicator to evaluate different habitats both qualitatively and quantitatively (Padmavati *et al*. 2010). Unfortunately global diversity of birds is decreasing due to anthropogenic activities and climate changes (Chen *et al*. 2011 and Sekercioglu *et al.* 2012). IUCN Red List of endangered birds has already recognized 1226 bird species as threatened globally and India with 88 threatened bird species (Bird Life International 2010).

Roy *et al*. (2012) studied avifaunal diversity in three different national parks and reserve forest in North Bengal and founded a total of 117 bird species belonging to 42 families. Patra and Chakrabarti (2014) observed 86 bird species belonging 10 orders and 35 families in Digha in West Bengal. Pramanik *et al*. (2015) studied Plants and animal diversity in Kulik Bird Santuary in Raigang, West Bengal and observed 29 birds species with 20 families. Though there are numerous habitats for birds across West Bengal, India. Very few have been systematically surveyed to understand their importance for birds. In Berhampore town, Murshidabad district, West Bengal, India has long been known to support rich diversity of birds. Ahiran Lake situated in Murshidabad district harbor large populations of resident and migrant water birds (Mistry *et al.* 2015)

This 'Bill' and its adjacent area have plenty of flora and fauna, which helps to maintain the Biodiversity of this Local Environment. This diversity is deteriorating day by day due to environmental hazards or man-made hazards. In our study we tried to find out the flora and fauna of this bill and its surrounding area and some threatened species also.

Global Watershed Treatment Policies and Strategies

Watershed treatment is an indispensable element of effective drinking water strategy. The solution for the problem is to develop a "Sustainable Water Resource Management Policy" based on the principles of:

- Holistic ecosystem based approach,
- Understanding behavior of urban water bodies,
- Private Sector involvement in maintenance, and
- People's involvement

'UNEP's Global Perspective of Fresh Water Stress' states, "Conservation and restoration requires a systematic and comprehensive plan to study selective and representative freshwater ecosystems." Details of the study should include the status of lakes, their suitable use, management and conservation so that they serve as a good resource for future use and the formation of strategies for long-term management in the urban areas.

'The National Lake Conservation Policy, India (NLCP)' carved out of the Wetland Programme focuses on urban lakes that are subjected to anthropogenic pressures. Under this, the 'Ministry of Environment and Forests (MoEF)' has identified 10 polluted urban lakes for conservation and management in 1994 and has already released a large number of proposals for funding. Out of these, Bhoj Lake from Madhya Pradesh is already getting assistance under the funds provided by Overseas Economic Cooperation Fund (OECF), Japan. Approval has also been given for Dal Lake Conservation Program (DLCP) in Jammu and Kashmir. Others like Nainital Lake, a few lakes in Karnataka, Andhra Pradesh, Maharashtra and Haryana are in the pipeline waiting to be taken up depending on the pollution status and the availability of funds.

Lakes perform various important and indigenous functions in any urban area. Each of these water bodies is unique and has its own ecological character that is defined by the flora and fauna and, the urban ecosystem service it performs. (Koduru & Dutta 2013)

MATERIALS AND METHODS

Area of Study: Bishnupur Bill (Local People called as Bistupur Bill)

Mouja: Bishnupur

Location: 24° 6' 36'' North; 88° 15' 47'' East (According to Google Earth)

Area: Seven Wards (Ward Nos.-02, 07, 08, 09, 15, 16, 17) under Berhampore Muncipality, Murshidabad, W.B

Eastern Side: Bishnupur Kalibari.

Western Side: Kantanagar- Machmara Jay Chand Road & Amar Chakraborty Road.

Northern Side: Cossimbazar Road from "Hota Sanko".

Southern Side: Facing Ranibagan Vivekananda Road.

Length of the Lake: 2.5 km, Breadth: - 600 to 709 meter.

Every day two hours in the morning and in the evening we observe the aquatic body and its surrounding area and collected the data. During our survey we had collected some algal species from this 'Bill", and from the surrounded area we had collected some fungal species, 24 species of herbs and shrubs, 25 species of trees etc. Not only the flora but we also had collected lots of fauna species from diverse habitats in this area.

During collection detailed field observations were recorded. The species were identified with the help of Krishnath College School, Botany Department, Berhampore, using relevant floras and other available taxonomic literature (Hooker 1872,97; Stewart, 1972; Sharma and Kachroo 1981-1982) and online resources to search Flora of West Bengal and "Books of Ecology" by S. Dutta and B.P. Pandey.

During our survey, we nearly found about 33 types of fish which are identified by the local fisherman with its common name. The scientific names of these fishes were identified by the Fishery Department, (Meen Bhavan), Govt. of West Bengal. During our

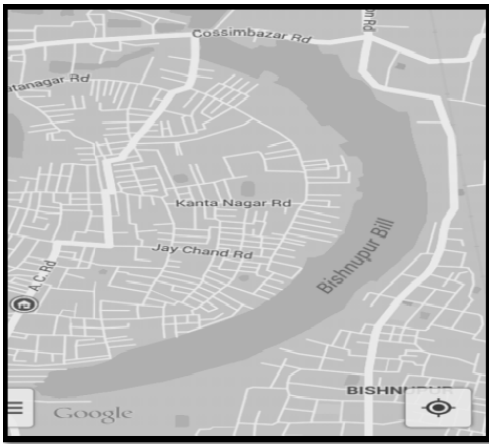

Fig. 1: Maps of Bishnupur Bill

Fig. 2: Position of Hooghly River (The Ganges) in respect of Bill (*Source*: Google Earth)

study we not only found fishes, we had come across some amphibians,reptilian, indigenous & exotic birds, mammalian, and some invertebrates too. To identify these fauna we had collected some snap using Nikon L120 semi DSLR camera and they were identified by the Forest Department ,Govt. of West Bengal, specially the birds were identified with a book named, "The Book of Indian Birds (13th Edition)" by Selim Ali. In this 'Bill' some exotic birds are coming from different countries which were also identified by us.

RESULTS AND DISCUSSION

In our study we found a lot of plant and animal species which are present in this 'Bill' ecosystem. (Table 1 to 11). We had also come across some species which are declining in trend and some are vulnerable as well. In the present paper, the results of plant surveys and collections made from this 'Bill' during the last two years are consolidated, with a view to facilitate the documentation of their overall flora and fauna diversity. The inventory provided here records a total of 232 species and genera of plants and animals which belongs to various families. In our study, we are trying to focus on the condition of flora and fauna in this ecosystem.

From the below tables, we know that "Bishnupur Bill" ecosystem is an example of Urban lake. From these results, we see that many of the species belong to the animal kingdom or the plant kingdom which have either decreased or are decreasing day by day. Some of species 100% decreased from this zone. This turns to be a bad sign for our environment and our ecosystem as well. For example, if we see the Class Insecta (Table 7), it is decreasing from this ecosystem, due to which *Bufo melanostictus* and *Rana tigrina* are also decreasing 80% and 95% respectively day by day (Table 7). If we analyze the food chain of *Bufo melanostictus* and *Rana tigrina*, both the species depend heavily on Insects. Due to the decreasing insect population, food materials of both the species become scarce. This study also indicates that some species are increasing vigorously, which is not agood sign for our environment. These species are creating hazards to both our daily life and environment. For example, increase of Parthenium (*Parthenium hysterophorus)* (Table 5) may have an impactful effect on our environment. It can create pollution and also effect various domestic organisms.

Besides, the present study indicates that the population of mosquito is increasing day by day (Table 7) which will create health hazards for the human beings. Malaria, Dengue etc. are some diseases that are the synonyms with mosquitoes.

Now a days, every year people are affected by such fatal diseases. As per the latest report of WHO-UNICEF, India is the third among 15 countries having the highest cases of malaria and deaths due to this disease. (Times of India, Dated: 18/09/2016). This report supports our study result which is reflected in Table 7.

Present study indicates that *Diatom sp* is increasing in the populations of 'Bill', which may happen due to some artificial effect. But it has some good impact in the population. *Diatom sp.* can yield more oxygen when compared to *Hydrilla sp, Oscillatoria sp, Spirogyra sp,* even with less intensity of light and temperature. For this reason, BOD is also decreasing in "Bishnupur Bill". (Bahattacharyya & *et al*. NCSC-2016)

In this study 33 species of fishes are found. Out of the 33 species of fishes, 12 species are perished, 5 species under threatened or near threatened categories and 16 species are under non-threatened categories (Table 9). West Bengal has rich freshwater fish genetic resources constituting about 28.34% to the freshwater fish diversity of India (Froese and Pauly 2016). Among documented fishes, maximum species have ornamental value which has been already been noticed in publications of Mishra *et al.* (2003), Das (2015), Dey *et al.* (2015), Nath and Patra (2015). Invasive alien fish species has been emerging as a growing threat to biodiversity of small indigenous fishes. In this back drop, achieving sustainable utilisation of indigenous fishes, appropriate planning for conservation and management strategies are of utmost importance.

In our study, almost 54 types of birds were taken under consideration (Table 10). From them 9 types of birds are missing from this zone. Some birds are declining in trend while some are less found. Weaver Birds "Babui" *Ploceus phillippines*" are missing from this zone (Table 10). "Babui" birds are likely to make their skillful artistic nest in Tal Tree i.e. Asian Palmyra Palm Tree (*Borassus flabellifer*). But in this area, we found only one Asian Palmyra Palm Tree (Table 6) which is not sufficient for the birds

PLANT KINGDOM

Table 1: Enumeration of Algal Genera found in "Bishnupur Bill" (Horse Shoe Lake)

Sl. No.	Name of the algal genera	Remarks	Approximately decreasing and increasing %
1	*Chara*	Perished	100% decreased
2	*Chlamydomanas*	Slightly decreased	5% decreased
3	*Chlorella*	Declining	10% decreased
4	*Diatoms*	Increasing	65% increased
5	*Gleocapsa*	Declining	30% decreased
6	*Hydrodiction*	Perished	100% decreased
7	*Nostoc*	Declining	10% decreased
8	*Oedogonium*	Declining	40% decreased
9	*Oscillatoria*	Declining	50% decreased
10	*Pithophora*	About to perish	85% decreased
11	*Spirogyra*	Declining	15% decreased
12	*Spirulina*	Declining	15% decreased
13	*Ulothrix*	Perished	100% decreased
14	*Vaucheria*	Perished	100% decreased
15	*Volvox*	Slightly decreased	5% decreased
16	*Zygnema*	Declining	20% decreased

Table 2: Enumeration of Fungal Genera found in "Bishnupur Bill" (Horse Shoe Lake) and its surrounded area

Sl. No.	Name of the fungal genera	Remarks	Approximately decreasing and increasing %
1	*Agaricus bisporus*	Enormous	60% increased
2	*Ascobolus*	Enormous	50% increased
3	*Boletus*	Increasing	15% increased
4	*Cyathus* (Bird nest Fungi)	Perished from this zone	100% decreased
5	*Daldinia*	Perished	100% decreased
6	*Ganoderma*	Increasing	20% increased
7	*Mycoplasma* on *Datura*	Increasing	40% increased
8	*Penicillium*	Increasing	25% increased
9	*Pezzia*	Perished from this zone	100% decreased
10	*Phytopthora* in *colocassin* Plant	Increasing	70% increased
11	*Polyporus*	Increasing	30% increased
12	*Puccinia graminis* (Brown rust)	Increasing	50% increased
13	*Saprolegnia*	Enormous	75% increased
14	*Schizophyllum*	Increasing	65% increased
15	*Volvariella volvacea* (Straw Maushroom)	Enormous	70% increased
16	*Xylaria*	Perished from this zone	100% decreased

Table 3: Enumeration of Bryophyte found in "Bishnupur Bill" (Horse Shoe- Lake) and its surrounded area

Sl. No.	Name of the bryophyte	Scientific name	Remarks	Approximately decreasing and increasing %
1	A *bryophyte* sp.	*Riccia sp.*	Increasing	10% increased

Table 4: Enumeration of Pteriodophytes found in "Bishnupur Bill" (Horse Shoe- Lake) and its surrounded area

Sl. No.	Name of the pteriodophytes	Scientific name	Remarks	Approximately decreasing and increasing %
1	A fern sp.	*Ceratopteris sp.*	Perished from this zone	100% decreased
2	Dhakishak (B)	*Dryopteris sp.*	Increasing	40% increased
3	A fern sp.	*Pteris sp.*	Declining	20% decreased
4	A fern sp.	*Thelypteris sp.*	Increasing	20% increased
	B=Bengali			

Table 5: Enumeration of Herbs and Shrubs Species found in "Bishnupur Bill" (Horse Shoe- Lake) and its surrounded area

Sl. No.	Name of the herbs and shrubs	Scientific name	Remarks	Approximately decreasing and increasing %
1		*Clerodendron inermi*	Increasing slowly	5% increased
2		*Globba bulbifera*	Decreasing	35% decreased
3		*Jatropha gossypifolia*	Increasing	20% increased
4		*Lipia alba*	Perished	100% decreased
5		*Oldenlandia corymbosa*	Present	20% increased
6		*Rungia pectinata*	Perished from this zone	100% decreased
7		*Wolffia arhiza*	Declining	50% decreased
8	Anantalata (B)	*Antigonon sp.*	Perished from this zone	100% decreased
9	Basak (B)	*Adhatoda vesica / Justicia adhotada*	Perished from this zone	100% decreased
10	Chotra (B)	*Lantana camara*	Balanced	80% increased
11	Ghetu(B)	*Clerodendron infortunatum*	Increasing vigorously	90% increased
12	Gulancha (B)	*Tinospora cordifolia*	Increasing	55% increased
13	Ishwarmul (B)	*Aristolochia sp.*	Perished from this zone	100% decreased
14	Kachuripana (B)	*Eichornia sp.*	Enormous	75% increased
15	Kalkasundha	*Cassia sophera*	Declining	80% decreased
16	Nishinda(B)	*Vitexnegundo*	Perished from this zone	100% decreased
17	Padma(B)	*Nelumbo nucifera*	Perished from this zone	100% decreased
17	Pana (B)	*Lemna sp.*	Declining	25% decreased
19	Parthenium	*Parthenium hysterophorus*	Vigorously increasing	80% increased
20	Penny wart	*Centella asialica*	Increasing	20% increased
21	Reri (B)	*Ricinus communis*	Increasing	20% increased
22	Shaluk (B)	*Nymphea sp.*	Perished from this zone	100% increased
23	Telakucha (B)	*Coccinea sp*	Increasing	45% increased
24	Watter cabbage	*Pistia stratiotes*	Declining	25% increased

Table 6: Enumeration of Tree Species found in "Bishnupur Bill" (Horse Shoe-Lake) and its surrounded area

Sl. No.	Name of the trees	Scientific name	No of trees		Remarks
			2015	2016	
1	(Assianpalmyra palm) Doub or Tala Palm /Tal (B)	*Borassus flabellifer*	1	1	Constant
2	Babla (B)	*Acacia arabica*	2	1	Declining

3	Banyan Tree/ Bot (B)	*Ficus benghalensis*	2	2	Constant
4	Beetle Nut/Supari (B)	*Areca catechu*	76	58	Declining
5	Coconut /Narkel (B)	*Coccos nucifera*	65	60	Declining
6	Date Palm/Khejur (B)	*Phoenix sylvestris*	6	6	Constant
7	Fig/ Dumur (B)	*Ficus cunea*	19	18	Declining
8	Golden Apple or Indian Bael [Bel (B)]	*Aegle marmelos*	20	20	Constant
9	Jack fruit/ Kanthal (B)	*Artocarpus heterophyllus*	2	2	Constant
10	Litchi/Lichu (B)	*Litchi chinensis*	20	13	Declining
11	Mango/Aam (B)	*Mangifera indica*	15	14	Declining
12	Maulsari/ Bakul (B)	*Mimusops elengi*	10	11	Increasing
13	Neem (B)	*Azadirachta indica*	21	18	Declining
14	Papaya/ Pepe (B)	*Carica papaya*	9	8	Declining
15	Plum/ Kul	*Ziziphus jujube*	10	9	Declining
16	Pomegranate/ Dalim (B)	*Punica granatum*	1	1	Constant
17	Radhachura (B)	*Caesalpinia pulcherrima*	1	1	Constant
18	Red silk cotton shimul	*Bombax ceiba*	9	8	Declining
19	Royal palm	*Roystonea regia*	10	10	Constant
20	Royal poinciana/ Krishnachura (B)	*Delonix regia*	1	1	Constant
21	Sacred fig /Aswatha or Pakur (B)	*Ficus religiosa*	2	2	Constant
22	Sagina (B)	*Moringa olifera*	48	23	Declining
23	Sagoon (B)	*Tectona grandis*	8	21	Increasing
24	Shrish (B)	*Albizia saman*	71	63	Declining
25	Sisoo (B)	*Dalbergia sisoo*	4	6	Increasing

B=Bengali

ANIMAL KINGDOM

Table 7: Enumeration of Various Organisms (Arthropoda, Annelida, Amphibia /Chordata, found in "Bishnupur Bill" (Horse Shoe-Lake) and its surrounded area

Sl No.	Name of the organisims	Scientific name	Phylum/class	Remarks	Approximately decreasing and increasing %
1	Spider		Arthropoda /Arachnida	We have found 4 types spider	30% increased
2	Ant	*Formicidae sp.*	Arthropoda/Insecta	We have found 6 types ants.	70% increased
3	Butterfly	*Papilio sp.*	Arthropoda/Insecta	Reducing	60% decreased
4	Common green bottle fly	*Lucilia sericata*	Arthropoda/Insecta	Adequate	40% increased
5	Common scarlet-darter	*Crocothemis erythraea*	Arthropoda/Insecta	Declined	50% decreased
6	Crane fly	*Tipulidae sp.*	Arthropoda/Insecta	Reducing	60% decreased
7	Cricket	*Gryllidae sp.*	Arthropoda/Insecta	Declining	80% decreased
8	Cyclops	*Cyclops sp*	Arthopoda/ Maxillopoda	Decreasing	70% decreased
9	Daphnia	*Daphnia sp.*	Arthopoda/ Crustacea	Decreasing	70% decreased
10	Dragon fly/ Foring (B	*Sympetrum sp.*	Arthropoda/Insecta	Enormous	75% increased
11	Dung Beetle	*Scarabaeus sp.*	Arthropoda/Insecta	Reducing	60% decreased

12	*Duttaphrynumela nostictus*/ kuno bang (B)	*Bufo melanostictus*	Arthopoda/Amphibia	Declining	80% decreased
13	Earth worm	*Pheritima pousthuma*	Annelida/Clitellata	Declining very much	95% decreased
14	Fire Fly /Jonaki (B)	*Lampyridae sp*	Arthropoda/Insecta	Increased	50% increased
15	*Hoplobatrachustigerinus*/ Sona or Kola bang (B)	*Rana tigrina*	Arthopoda/Amphibia	Declining	95% decreased
16	Indian Honey Bee Moumachi (B)	*Apis cerana indica*	Arthropoda/Insecta	No hive found during our study	70% decreased
17	Ladybird beetle	*Coccinella septempunctata*	Arthropoda/Insecta	Reducing	50% decreased
18	Land snail	*Achatina fulica*	Mollusca/ Gastropoda	Increasing	20% increased
19	Millipede	*Eurymerodesmus sp.*	Arthropoda/Diplopoda	Balanced	65% increased
20	Mosquitoes	*Anopheles sp., Culex sp., Edis sp*	Arthropoda/Insecta	Vigorously Increasing	90% increased
21	ScolopendraCentiped	*Scolopendra gigantea*	Arthropoda/Chilopoda	Reduced	25% decreased
22	Small Prawn	*Fenneropenaeus indicus*	Arthropoda/Malacostraca	Balanced	50% increased
23	Stick Insect	*Carausius morosus*	Arthropoda/Insecta	Adequate	55% increased
24	Termite	*Isoptera sp.*	Arthropoda/Insecta	Reduced	80% decreased
25	Water snail	*Pila globosa*	Mollusca/ Gastropoda	We have found 4 types. But they are reducing	75% decreased

B=Bengali

Table 8: Enumeration of Reptiles' Species found in "Bishnupur Bill" (Horse Shoe- Lake) and its surrounded area

Sl. No.	Name of reptiles	Scientific name	Remarks	Approximately decreasing and increasing %
1	Banded kukri	*Oligodon arnensis*	Missing from this zone	100%decreased
2	Checkerd keelback Dhora (B)	*Xenochrophis piscator*	Declined	55%decreased
3	Common worm snake	*Typhina bramina*	Balanced	85%increased
4	Indian black turtle	*Melanochelys trijuga*	Perished from this 'Bill'	100%decreased
5	Indian Krait DaboiaChandra Bora (B)	*Daboia russelii*	Balanced	87%increased
6	Jat sap (B)	*Lycodon aulicus*	Declined	80%decreased
7	Kharish/ Gokhro (B)	*Naza naza*	Declining	60%decreased
8	Lizard	*Hemidactylus flaviviridis*	Increasing	50%increased
9	Rat snakeDahaman (B)	*Ptyas musosus*	Declined	90%decreased
10	Striped keelback	*Amphiesma stolatum*	Declining	90%decreased
11	Vine snake	*Ahaetulla nasuta*	Declining	90%decreased

Table 9: Enumeration of Fishes' Species found in "Bishnupur Bill" (Horse Shoe Lake)

Sl No.	Common name of the fish	Scientific name	Remarks	Approximately decreasing and increasing %
1	Bata fish	*Labeo bata*	Increasing	50% increased
2	Boal	*Wallagoatu*	Declined	80% decreased
3	Calbaus	*Labeo calbaus*	Abundant	70% increased

4	Chana Kholisa (Honey Gourami)	*Trichogaster chuna (White variety)*	Perished	100% decreased
5	Chital	*Chitala chitala*	Abundant	70% increased
6	Climbing Perch (Koi fish)	*Anabas testudinius*	Increasing	30% increased
7	Cyprinus	*Cyprinus carpio*	Increasing	70% increased
8	Darkina	*Esamusdanricus*	Perished	100% decreased
9	Foli (Bronze feather back)	*Notopterus notopterus*	Enormous	85% decreased
10	Ghora Chela	*Chela loubuca*	Perished	100% decreased
11	Goroi	*Colisa fasciota*	Perished	100% decreased
12	Gozar	*Channa marulius*	Rarely found	98% decreased
13	Grass carp	*Ctenopharyngodon ideilus*	Increasing	75% increased
14	Indian torrent fish	*Amblyceps mangois*	Perished	100% decreased
15	Kanchan Puti	*Putinus conchonius*	Perished	100% decreased
16	Katla fish	*Catla catla*	Increasing	50% increased
17	Khoira (Indian River shad)	*Gudusia chapra*	Perished	100% decreased
18	Kholisa	*Colisa fasciatus*	Perished	100% decreased
19	Lata	*Channa punctatus*	Increasing	65% increased
20	Mrigala fish	*Cirrhinus mrigala*	Increasing	65% increased
21	Packal Mach (Kharal)	*Pisodonophis boro*	Perished	100% decreased
22	Pangas (Globe fish)	*Pangasius pangasius*	Increasing	30% increased
23	Punti	*Putinus chola*	Declined	65% decreased
24	Rai Khoira (Silver Razor belly Minnow)	*Salmostoma boopis*	Rarely found	95% decreased
25	Rohu fish	*Labeo rohita*	Abundant	70% increased
26	Shingi (Cat Fish)	*Heteropneustis fossilis*	Enormous	70% increased
27	Shoal (Bloch fish)	*Channa striata*	Increasing	30% increased
28	ShoralPunti	*Putinus sarana*	Rarely found	95% decreased
29	Silver carp	*Hypopthalmix molitnix*	Increasing	80% increased
30	Tangra	*Mystus tangra*	Perished	100% decreased
31	Tepa (Ocellated puffer fish)	*Tetrodon cutcutia*	Perished	100% decreased
32	Tit punti	*Putinusticto*	Rarely found	95% decreased
33	Veda	*Nandus nandus*	Perished	100% decreased

Table 10: Enumeration of Birds Species found in "Bishnupur Bill" (Horse Shoe- Lake) and its surrounded area

Sl. No.	Common name of the birds	Scientific name	Remarks	Approximately decreasing and increasing %
1	Asian Koel	*Eudynamu sscolopacea*	Balanced	80% increased
2	Asian Pied starling (Guye Salik) (B)	*Gracupica contra*	Balanced	65% increased
3	Barn Owl (Lakshmi Pencha) (B)	*Tyto alba*	Declining	70% decreased
4	Black Drong Fingey (B)	*Dicrurus macrocerus*	Balanced	75% increased
5	Black- hooded oriole	*Oriolus xanthornus*	Increasing	20% increased
6	Black Kite/ Cheel (B)	*Milvus migrans*	Declining	80% decreased
7	Blue eared Kingfisher	*Alcedo meninting*	Slightly Decreased	15% decreased
8	Blue throated Barbet Basanta Buri (B)	*Megalaima asiatica*	Less density, but Balanced	20% increased

9	Brown fish Owl (Hottom Pencha) (B)	*Ketupa zeylonensis*	Declining	90% decreased
10	Brown hawk owl (Kaal Pencha) (B)	*Ninox scutulata*	Balanced	70% increased
11	Chestnut headed bee eater, Banspati (B)	*Merops leschenaulti*	Less found in this area	90% decreased
12	Common Hawk Cuckoo Chokh Gello (B)	*Hierococcyx varius*	Less found	90% decreased
13	Common Myna /Salik (B)	*Acridotheres tristis*	Balanced	85% increased
14	Common tailor bird Doorjee Pakhi (B)	*Orthotomus sutoris*	Balanced	90% increased
15	Copper Smith Barbet	*Megalaima haemocephala*	Increased	30% increased
16	Cotton Pygmy goose or Cotton Teal (Exotic Bird) (Bali Hans) (B)	*Nettapus coromandelianus*	Declining	60% decreased
17	Cuckoo /Kokil (B)	*Cacomantis merulinus*	Less found	90% decreased
18	Duck / Hans (B)	*Anas platyrynchos*	Balanced	80% increased
19	Egret	*Ardea alba*	Decreasing	
20	Fowl /Murgi (B)	*Gallus gallus*	Balanced	60% increased
21	GoBok Cattle heron	*Bubulcus ibis*	Balanced	80% increased
22	Golden fronted leaf bird	*Choloropsis aurifrons*	Missing from this zone	100% decreased
23	Great Cormorant (Boro Pankouri) (B)	*Phalacrocorax carbo*	Declining	10% decreased
24	Greater Coucal Kubo (B)	*Centropus sinensis*	Less found	95% decreased
25	House Crow/Kak (B)	*Corvus splendens*	Balanced	25% increased
26	Indian pond heron (Konch Bok) (B)	*Ardeola grayii*	Balanced	55% increased
27	Indian Robin	*Saxicoloides fulicatus*	Not found or Extinct here	95% decreased
28	Indian Roller Nilkanta (B)	*Coracius benghalensis*	Perished	100% decreased
29	Intermediate Egret	*Ardea intermedia*	Declined	20% decreased
30	Jungle Babbler	*Turdoides striata*	Balanced	85% increased
31	Jungle Crow	*Corvus macrorynchos*	Less found	95% decreased
32	Lineated Barbet	*Megalaima lineate*	Increased	10% increased
33	Little Cormorant (ChotoPankouri) (B)	*Phalacrocorax niger*	Declining	10% decreased
34	Little green bee eater Banspati (B)	*Merops orientalis*	Balanced	85% increased
35	Open bill stork Samukhkhol (B)	*Anastomus oscitans*	Least found	10% decreased
36	Oriental Magpie Robin Doyel	*Copsychus saularis*	Balanced	95% increased
37	Oriented pied/ Horn Bill	*Anthracoceros albirostris*	Seen once	10% increased
38	Pied Kingfisher	*Ceryle rudis*	Missing from this area	100% decreased
39	Pigeon/ Payra (B)	*Columbia livia*	Increasing	15% increased
40	Pipit	*Anthus rufulus*	Missing from this zone	100% decreased
41	Red vented bulbul	*Pycnonnotus cafer*	Balanced	85% increased

42	Red wattled lapwing /Titeer (B)	*Vanellus indicus*	Missing from this zone	100% decreased
43	Red whiskered bulbul	*Pycnonnotus jocosus*	Balanced	65% increased
44	Rose Ringed Parakeet/Parrot	*Pisttacula krameri*	Gradually increase	20% increased
45	Rufoustreepie / Haari Chancha (B)	*Dendrocitta vagabunda*	Very less found	95% decreased
46	Sparrow / Chorui (B)	*Passeridae domesticus*	Declining	50% decreased
47	Spotted Dove (TeliaGhuGhu) (B)	*Streptopelia chinensis*	Balanced	75% increased
48	Spotted Owlet (Kuture Pencha) (B)	*Athene brama*	Declining	80% decreased
49	Stork Billed Kingfisher	*Pelargopsis capensis*	Missing from this area	100% decreased
50	Stripe breasted wood pecker	*Dendrocopos ataratus*	Perished	100% decreased
51	Weaver Bird/ Babui (B)	*Ploceus phillippines*	Missing from this zone	100% decreased
52	White rumped/ Shayma (B)	*Copsychus malabaricus*	Missing from this zone	100% decreased
53	White throated Kingfisher	*Halcyon smyrnensis*	Missing from this area	100% decreased
54	White wag tail Khonjona (B)	*Motacilla alba*	Not found	100% decreased

B=Bengali

Table 11: Enumeration of Mammals Species found in "Bishnupur Bill" (Horse Shoe- Lake) and its surrounded area

Sl No.	Common name of the mammals	Scientific name	Remarks	Approximately decreasing and increasing %
1	Armadillo	*Dasypus sp.*	Less found	2% increased
2	Bat or Flying fox/ Badur (B)	*Pteropus medius*	Density becoming lesser	40% decreased
3	Bhodar	*Lutrangale perspicillata*	Missing from this zone	100% decreased
4	Buffalo	*Bubalus arnee*	Decreasing	60% decreased
5	Cat	*Felis domestica*	Slightly increased	10% increased
6	Common otter/ Udbiral (B)	*Lutra lutra*	Decreased	90% decreased
7	Cow	*Bos indicus*	Decreasing	70% decreased
8	Dog	*Canis familiaris*	Increasing	30% increased
9	Fox	*Vulpes vulpes*	Least number are present	7% decreased
10	Goat	*Capra sp.*	Decreasing	75% decreased
11	Human beings	*Homo sapiens*	Increasing rapidly	100% increased
12	Indian Pipistrelle Chamchika (B)	*Pipistrellus coromandra*	Density becoming lesser	80% decreased
13	Mole/ Chucha (B)	*Talpidae*	Density becoming lesser	70% decreased
14	Mongoose/Beji (B)	*Herpestes auauropunctatus*	Density becoming lesser	50% decreased
15	Monkey/ Hanuman (B)	*Macacca sp.*	Decreasing	60% decreased
16	Rat /Indur (B)	*Bandicuta benghalensis*	Increasing	10% creased
17	Squirrel	*Sciuridae sp.*	Balanced	85% increased

B=Bengali

to make their nest. The common mutuality between animal-animal, plant-animal, plant-plant is broken, it may create impediment for healthy ecosystem.

White-throated Kingfisher (*Halcyon smyrnensis*) in family Halcyonidae found in wetlands, tanks and agricultural fields, is the State Birds in West Bengal (WII 2009). But this bird is missing from this zone (Table 10). The winter migratory birds displayed a definite pattern specific to species for arrival at and departure from various wetland. They appeared at the wetland from November and stayed up to March. The peak of winter population of migratory birds was observed during the months of December to February. The basic requirements of migratory birds at their wintering ground are adequate food supply and safety (Lakshmi 2006), which are fulfilled by Bishnupur wetland and nearby agricultural fields and also by River Ganges. Birds in different habitats are under threat due to increased anthropogenic activities resulting in habitat destruction and fragmentation (Baral and Inskipp 2005; Datta 2011; Gautam and Kafle 2007). The various landscapes serve as a balancing reservoir for sustaining native flora and fauna (Grimmett and Inskipp 2005; Surana *et al.* 2007). Large numbers of anthropogenic activities like uses of pesticide in agriculture, deforestation, livestock grazing, hunting, fishing, development of industries and urbanization, sound pollution are some of the major threats to the bird biodiversity in the study area.

In this study, we found 16 types of mammalian. Out of 16 species, human beings are increasing rapidly (Table 11). Due to100% increasing of human beings, deforestation is occurred and it is not only reflected in Table 6, but also shown when our survey is conducted the local people reported us that in this area are covered by lots of fruits orchards i.e. Mango, Litchi, Jack fruits, Guava etc. Due to deforestation lots of birds, insect, amphibian, reptilian species are endangered or missing from this zone.

CONCLUSION

Present study clearly indicated that in Bishnupur Bill is standing on alarming position. If we see with poignant attention then it is indicating that almost the 15 Algal genera which are considered for study are decreasing except *Diatoms sp.* On the contrary present study indicates that in most of the fungal genera are increasing day by day. Present study also indicates that populations of almost 50% species of Herbs and Shrubs are decreased. Simultaneously almost 50% tree species are decreasing in the Bishnupur Bill. High population densing in surrounding encourages deforestation so tree populations are decreased. On the other hand, decreasing of Herbs and Shrubs populations encourages the growth of fungal populations and another reason is also responsible for increasing of fungal population i.e. due to increase human population, household waste usually organic substances destruction of plants increasing the fungus on organic substances and chopped down trees. Filamentous algae are usually due to cultivation of grass carp in Bishnupur Bill. In the Bill grass carp is cultured, so its rapidly reduces the algal populations from water body.

After studying the fauna of this area, populations of *Bufo melanostictus* and *Rana tigrina* are decreasing due to decreasing of insect populations. Grown of civilization in the surrounding bill almost wipes out reptile population. Populations of those genera of fishes are increased which are reared on this water body but other natural population of fishes are decreasing.

It supports the view that man made management of ecosystem drastically hampers the natural ecosystem. Present study indicates that in case of Mammalian species, most of the species are decreased except human beings.

The ecological balance is being destroyed from various interventions. We should come forward and save this type of lakes. We hope that this study will help in the future in order to select proper solution to save our ecosystem from various artificial interventions as well as human intervention.

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REFERENCES

Ali, Salim and Daniel, J.C. 1983. *The book of Indian Birds* (13th edition). New Delhi:, Bombay Natural History Society / Oxford University Press.

Bandyopadhyay, S., Kar, N.S., Das, S. and Sen, J. 2014. River Systems and Water Resources of West Bengal: A Review. *Geological Society of India Special Publication*, **3**: 63-84.

Baral, H.S. and Inskipp, C. 2005. Important Bird Areas in Nepal: Key Sites for Conservation. Bird Conservation Nepal and Bird Life International, Kathmandu and Cambridge.

Bhattacharyya, Budhaditya and *et al.* 2016. *"Declining of the aquatic system and its surrounding due to urbanization"* a project submitted at NCSC-2016.

Bird Life International 2010. IUCN Red List for birds. http://www.birdlife.org/,

Bird Life International 2012. "*Nettapuscoromandelianus*". IUCN Red List of Threatented Species. Version 2013.2. International Union for Conservation of Nature.

Chen, I.C., Hill, J.K., Ohlemüller, R., Roy, D.B. and Thomas, C.D. 2011. Rapid range shifts of species associated with high levels of climate warming. *Science,* **333**: 1024-1026.

Dar, Gh Hassan, Malik, A.H. and Khuroo, A.A. 2014. A Contribution to the Flora of Rajouri and Poonch district in the Pir Panjal Himalaya (Jammu & Kashmir*): Check List-Journal of Species lists and Distribution*, **10**(2): 317-328.

Das, D. 2015. Ichthyofaunal Diversity of River Torsa and Its Tributaries at Terai Region of West Bengal, India. *International Journal of Science and Nature*, **6**(2): 256-263.

Datta, T. 2011. Human interference and avifaunal diversity of two wetlands of Jalpaiguri, West Bengal, India. *Journal of Threatened Taxa*, **3**(12): 2253-2262.

Dey, A., Mukherjee, A., Sarkar, D. and Ray, N. 2015. Status of indigenous ornamental fish diversity and abundance in Ghargharia river in Coochbehar district of West Bengal. *International Journal of pure and Applied Bioscience*, **3**(1): 133-137.

Dutta, S. and Pandey, B.P. 2010. *Books of Ecology.*

Froese, R. and Pauly, D. (eds) 2013. Fish Base, www.fishbase.org, version (02/2013). Accessed October 2016.

Gautam, R. and Kafle, G.A. 2007. Preliminary Survey of Waterbirds in Phewa Lake, Kaski. *Danphe,* **16**(3/4): 6-8.

Grimmett, R. and Inskipp, T. 2007. Birds of Southern India. Om Books International, New Delhi, India.

Hooker, J.D. 1872-1997. *The Flora of British India*. Vols I-VII. London: L. Reeve and Co.

Koduru, S. and Dutta, S. 2013. Urban Ecosystems: Preservations and Management of Urban Water Bodies, *Creative Space (CS)*, **1**: 19-37.

Lakshmi, B.B. 2006. Avifauna of Gosthani estuary near Visakhapatnam, Andhra Pradesh. *Journal for Nature Conservation*, **18**(2): 291-304.

Mishra, S.S., Pradhan, P., Kar, S. and Chakraborty, S.K. 2003. Ichthyofaunal diversity of Midnapore, Bankura and Hooghly Districts, South West Bengal, *Rec. zool. Surv. India.*, **220**:1-65.

Mistry, J. and Mukherjee, S. 2015. Status and Threats of Water Birds in Ahiran Lake, Murshidabad, West Bengal, India, *International Journal of Plant, Animal and Environmental Sciences*, **5**(2): 59-64.

Mogalekar, H.S., Jawahar, P., Francis, T., Karal Marx, K., Sujathkumar, N.V. and Canciyal, J. *et al.* 2015. Review on New Records of Freshwater Fishes from India with Note on Distribution and Conservation Status. *Journal of Aquaculture in the Tropics*, **30**(3-4): 203-224.

Mukherjee, S. 2016. News Reported at India times, India has more than 12% of the World's Bird species. But where are the effort to save them? www.m.indiatimes.com, Accessed 27th July 2016.

Nath, A.K. and Patra, A. 2015. Survey on the present status of Fish species diversity in a stretch of Hooghly river of West Bengal, India. *International Journal of Fisheries and Aquatic Studies*, **3**(1): 244-250.

Padmavati, A., Alexandar, R. and Anbarashan, M. 2016. *Our Nature*, **8**: 247-253.

Patra, G. and Chakrabarti, S. 2014. Avian Diversity in and around Digha, District—East Midnapore (West Bengal, India), *Advances in Bioscience and Biotechnology,* **5**: 596-602.

Pramanik, A.K., Santra, K.B. and Manna, C.K. 2010. Abundance and Diversity of Plants and Animals in the Kulik Bird Sanctuary, Raiganj, West Bengal, India. *J Biodiversity*, **1**(1): 13-17.

Roy, U.S., Banerjee, P. and Mukhopadhyay, S.K. 2012. Study on avifaunal diversity from three different regions of North Bengal, India. Asian *Journal of Conservation Biology*, **1**(2): 120-129.

Sarkar, S., Kumar, A., Kumar, D., Sethi, L.N.M., Hazarika, M. and Das, G. 2015. Optimal Size of Fish Pond for Socio-Economical Development of Cachar (Assam): *International Journal of Agriculture, Environment and Biotechnology*, **332**: 405-411.

Sekercioglu, C.H., Primack, R.B. and Wormworth, J. 2012. The effects of climate change on tropical birds. *Biological Conservation,* **148**: 1-18.

Sharma, B.M. and Kachroo, P. 1981-1982. *Flora of Jammu and Plants of Neighbourhood.* Vols. I-II. Bishen Sing Mahendra Pal Sing, Dehra Dun, India.

Stewart, R.R. 1972. An annotated catalogue of the vascular plants of West Pakistan and Kashmir; :1028 In: E. nasir and S.I. Ali (eds.), *Flora of West Pakistan.* Fakhri Press, Karachi.

Surana, R., Subba, B.R. and Limbu, K.P. 2007. Avian diversity during rehabilitation stage of Chimdi Lake, Sunsari, Nepal. *Our Natur*., **5**: 75-80.

Wildlife Institute of India (WII) 2009. "State animals, birds, trees and flowers", Archived from the original (PDF) on 4March 2009. Retrieved 5 March 2012.http://web.archive.org/web/20090304232302/http://www.wii.gov.in/nwdc/state_animals_tree_flowers.pdf