

RIVER BIODIVERSITY: A STUDY OF RIVER BAGAD (A TRIBUTARY OF GANGA)

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Abstract : River boundaries are transitional zones between the terrestrial and aquatic environment. These habitats perform major ecological role in the biosphere. Many of the fossil fuels are known to be produced and preserved by the swampy environment of the carboniferous period. Rivers are of immense use to mankind both economically and ecologically. They are unique habitats and substantial biodiversity. A large number of aquatic plant and animals species restricted only to river. Their survival depends totally on the existence of these habitats. The rivers of India are defined as "one of the richest regions in terms of biodiversity and it is often referred to as a biodiversity hotspot". The ecosystem of river has experienced tumultuous changes due to river valley and other development projects in the last 60 years. Inventorying and monitoring the biodiversity and ecology of river would help in the formulation and implementation of appropriate conservation and management strategies in the Bagad river. This report documents the biodiversity significance of the Bagad river. The trees were cut at that time and the openings created resulted in the extinction of most of swamps. River are one of the most productive ecosystems and thus subjected to human greed which is yet another reason for their extinction. In winters it provides a good habitat for migrating waterfowls, that come here in large numbers.

Keywords : Bagad River, Biodiversity, Phytoplankton, Swamps, Zooplankton

INTRODUCTION

Environmental conditions play a vital role in governing the life history, behavior, distribution and abundance of organism particularly in the aquatic environments. Knowledge of the environmental feature is highly essential for understanding the occurrence and abundance of aquatic organism. Biodiversity is the totality of genes, species and ecosystem in a region. Biodiversity means variability among living organisms at all levels and from all sources. It represents sum total of various types of microbes, plants and animals present in a system in a given area. Biodiversity is the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystem and the ecological complex of which they are a part. It includes diversity within species, between species and ecosystem. Freshwater ecosystems of the tropics and subtropics are undergoing rapid deterioration due to developmental pressures and opportunistic exploitation and neglect. The challenging issues here are to improve the current knowledge of its biodiversity so that it would aid in sustainable management of the ecosystem through suitable conservation approaches. Generally, the conservation importance of an area is determined by assessing its ecological values and functions. Assessments are based on the unique habitats and species composition, but in recent times it has been advocated to consider the catchment of a river for assessment involving the distribution and abundance of plants and animals with a catchment. This is in a way to bring the linkages between aquatic and terrestrial ecosystems, such an approach was lacking in earlier studies.

An important step is to understand the variation in

relation to soil type, water status, altitude etc. This necessitated inventorying, mapping and monitoring of the ecosystem, to arrive at viable conservation and sustainable management strategies. The Bagad River is one of the most important tributaries of river Ganga. This report focuses on the biodiversity of Bagad river carried out by a multidisciplinary team, which helps to diagnose the adverse effects of the ongoing land use changes on the ecology. This study also addresses the issues like environmental management, restoration of natural ecosystem, restitution of corridors of animal migration and quality of aquatic ecosystem. These are an addition to the benchmark database on existing biodiversity and ecology of river basin. The main objective of the study was to enlist the species diversity in the region, to highlight the ecological sensitivity of the region. The floral components included are trees, shrubs, herbs, orchids etc., whereas fauna comprised of butterflies, odonates, fish, amphibians, reptiles, birds and mammals.

MATERIAL AND METHOD

Study Area

The Bagad river and its selected sampling sites located in the area of Gajraula town. The five selected sites are situated in some distance from Gajraula town. The site is shabazpur dor, Naipura Khadar, Tigaria Bhur, Sultanpur Dhar and Soharka. These all sites are villages which are situated on side of the Bagad river. Gajraula town is situated in the northern part of India and western part of Uttar Pradesh. It is located at 28.85 °N, 78.23 °E. It is a Nagar Panchyat of J.P. Nagar district of Uttar Pradesh State. It is fast growing town and has been urbanized and industrialized rapidly during last 20

years. The river systems with numerous perennial streams with typical tropical evergreen forested catchment areas are the regions of high conservation value. It provides an ideal habitat for a larger number of migratory waterfowl from the temperate region across the Himalayas during winter season (October–March). There are many resident species of water fowl living in the reservoir and nearby area. The maximum rainfall occurs during the months of July–August and minimum is recorded during January–February. The maximum temperature reaches up to 42 °C in May–June and minimum 10–12 °C December–January.

Collection of Aquatic Flora and Fauna

Collection was made by using nets (bag net, cast net, drag net etc) as well as by hand picking. The plankton samples were collected with standard plankton nets. Both dry and wet specimen were preserved in the appropriate laboratory reagents such as 4% formalin and rectified spirit. Identification of the specimen was carried out in the respective laboratories. Parts of different types of vegetation having flower, bud, node etc where collected and then pressed in newspaper and dried for identification. Rare and unidentified specimens were

Table 1. List of Plants

Plants			
	Aquatic Plant	•	<i>Polygonum globrum</i>
•	<i>Eichhornia crassipes</i>	•	<i>Polygonum lanigerum</i>
•	<i>Photamogeton pectinatus</i>	•	<i>Aeschynomene sp.</i>
•	<i>Typha elephantina</i>	•	<i>Phyllanthus sp.</i>
•	<i>Cerophyllum demersum</i>	•	<i>Monochoria hastate</i>
	Trees	•	<i>Mosla dianthera</i>
•	<i>Shorea rubusta</i>	•	<i>Lantana Camara</i>
•	<i>Bombax cebia</i>		Herbs
•	<i>Bischofia Javanica</i>	•	<i>Acorus calamus</i>
•	<i>Lannea coromandelica</i>	•	<i>Parthenium</i>
•	<i>Dalbergia sisso</i>	•	<i>Hysterophorus</i>
	Shrubs		List of Algae
•	<i>Eclipta prostrata</i>		Bacillariophyceae
•	<i>Ipomea fistulosa</i>	•	<i>Navicula</i>
•	<i>Cyperus sp.</i>	•	<i>Cymbella</i>
•	<i>Mimosa pudica</i>	•	<i>Diatoma</i>
•	<i>Tabellaria</i>	•	<i>Chlorella</i>
•	<i>Synedra</i>	•	<i>Spirogyra</i>
•	<i>Flagillaria</i>	•	<i>Chladophora</i>
•	<i>Meridion</i>	•	Myxophycela
•	<i>Cocconeis</i>	•	<i>Oscillatoria</i>
	Chlorophyceae	•	<i>Spirulina</i>
•	<i>Ulothrix</i>		

collected for herbaria using dry method. Fresh specimens were identified with the help of regional and other floras. Apart from primary data, we have also collected secondary data in term of research paper published, interview and interaction with knowledgeable local people and scientists who earlier worked in the region. This helped in a better understanding of the ecological sensitiveness of the region.

RESULT

People of the region have from time immemorial depended on the forest ecosystem for most of their need including water.

Plant Diversity

The aquatic biodiversity of Bagad river affected by the industrial effluents discharged by different industries. These industrial effluents affect directly or indirectly to the aquatic biodiversity. So, the aquatic biodiversity present is very less in Bagad river. The aquatic vegetation of the reservoir consists of *Eichhornia Crassipes*, *Photamogeton pectinatus*, *Typha elephantina* and *Ceratophyllum demersum*. The other plant diversity is arranged in following list.

Animal Diversity

Animla diverstiy found in the wetland include basically those residing permanently or temporary in and around

the river or aquatic ecosystem. A total 20 species of fish and other species are found in the river.

Table 2. List of Fishes found in the Bagad River

	Vernacular Name	Scientific Name
1	Pathal	<i>Chagunius chagunio</i>
2	Phuti	<i>Puntius sophore</i>
3	Boala	<i>Labeo dyochelius</i>
4	Kali Machchi	<i>Tor chelyoides</i>
5	Mahaseer	<i>Tor putitora</i>
6	Makhni	<i>Tor tor</i>
7	Childi	<i>Barilius barna</i>
8	Chalra	<i>B. vagra</i>
9	Chand	<i>Danio devaoir</i>
10	Chal	<i>Esomus danricus</i>
11	Asela	<i>Schizothorax richardsonii</i>
12	Saknera	<i>Crossocheilus latius latius</i>
13	Gadera	<i>Nemacheilus beavani</i>
14	Gadera	<i>N. botia</i>
15	Gadera	<i>N. doonensis</i>
16	Ghiwa	<i>Lepidocephalus coudofurcatus</i>
17	Ghiwa	<i>L. guntea</i>
18	Chiri	<i>Badis badis</i>
19	Bam	<i>Macrognathus pancalus</i>

Amphibian

Amphibians are one of the best biological indicators of ecosystem health. In the present study, opportunistic surveys were carried out in four localities. This region being biologically rich and following table enlists the previous records of amphibians from the region.

Species

- **Family: Bufonidae**
 - *Bufo parietalis* boulenger
 - *Bufo brevirostris*
- **Family: microhylidae**
 - *Ramanella marmorata*
 - *Ramanella triangularis*
 - *Ramanella minor*

- **Family: Peteropedetidae**

- *Indirana semipalmatus*
- *Indirana gundia*
- *Indirana longicrus*
- *Indirana tenuilingua*

Availability of perennial sources of water has provided ample habitats for amphibians hence they are persisting in this region even during non-monsoon periods. (our sampling period)

Reptiles

A checklist of reptiles observed from the region is provided in following table. This list adds to the richness of the species in the region. Rat snake and Indian ornate flying snake were sighted in the area.

Table 3. Checklist of Reptiles found in the Region

	Common Name	Scientific Name
•	Common Indian monitor lizard	<i>Varnus bengalensis</i>
•	Lizard	<i>Calotes</i> sp.
•	Cobra	<i>Naja - naja</i>
•	Common hump nosed pit viper	<i>Hyphnale- hyphnale</i>
•	Water snake	<i>Xenochrophis piscator piscator</i>
•	Vine snake	<i>Ahaletula nasuta</i>
•	Rat snake	<i>Ptyas mucosus mucosus</i>
•	Python	<i>Python molurus molurus</i>

DISCUSSION

Biodiversity through time and space has provided the panorama of the genesis and diversification of

various life form, their interdependence, and link between life and support system, triggering a holistic approach to knowledge-building focused on various aspects of human affairs. These areas have already lost vast area of virgin forests as evident from

seasonal streams, local extinction of species, etc. with many still existing as revenue land waiting to be logged and gone for ever. Unplanned developmental activities in the region will further diminish the biodiversity, hydrology and ecology of the region. It is high time for us to understand nature, its importance for our sustainable living and for future generations to come than taking *ad hoc* decisions to build dams across rivers and inundate the natural resources forever. The factors which are adversely affecting the Bagad river and responsible for the deterioration of ecological conditions and posing threats to the resident and migratory birds species of the area include weed infestation, siltation drainage of water at wrong time, non-sustainable tourism and poaching. The threats to the river biodiversity may be divided into two broad categories: Natural threats and anthropogenic threats, which may be direct or indirect. Natural threats include eutrophication, erosion, storm damage drought or biotic interference other than by human which may lead to destruction of river biodiversity. Many researchers previously suggested a distinct link between macro algal form and its functions, and argued that predictable growth of weeds may be found under given levels of environmental stress or disturbance (Steneck and Watling, 1982, Litter and Littler, 1984a, Dethie, 1994, Steneck and Dethie, 1994, piazzai et al., 2002). Higher deforestation rate results in the loss of topsoil, which is drained off with rainwater and settles down in the stream. This results in rise of soil level in swamps making them much shallower, with reduced water spread area. Freshwater ecosystems are damaged primarily because the potential impacts of industries, Urban, energy and agriculture policies on these ecosystems are disregarded. Around the world, hydropower and irrigation development has destroyed freshwater habitat and pollutants from farms, cities and factories have been discharged into river, killing off species and dramatically altering riverine ecosystems.

Strategies for the Conservation of River

Industry already burdened with environmental regulation is far from enthusiastic about biodiversity conservation, but it should be. The corporate interests that stand to lose from biodiversity conservation are those that base their profits on unsustainable resource use. But for industries that do seek to manage resources sustainably, biodiversity conservation provides significant opportunities. Strict laws should be implemented for the protection of this area. Suitable measures should be undertaken for controlling the unchecked growth of Ipomea, Typha and Elchhornia, that are rapidly converting the river into a unsuitable habitat for various animal species. River are the sources, sinks and transformers of

chemical biological and genetic materials. They play an important role in environment by providing a unique habitat for a wide variety of flora and fauna. Thus in order to conserve it mass awareness is must and for this regular camps should be organized in which people should be educated about the importance of conserving the river biodiversity. Unless people realize the need to safeguard wetland ecosystems and are made aware of how they can contribute to this effort, there is little hope for the survival of these ecologically valuable and vulnerable habitats. Considering the importance of this river, the international organization viz. International body for conservation of nature (IBCN) and Bird International has declared it as an important Bird Area of India (IBA). Thus, it is very important to conserve this biodiversity natural resources.

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