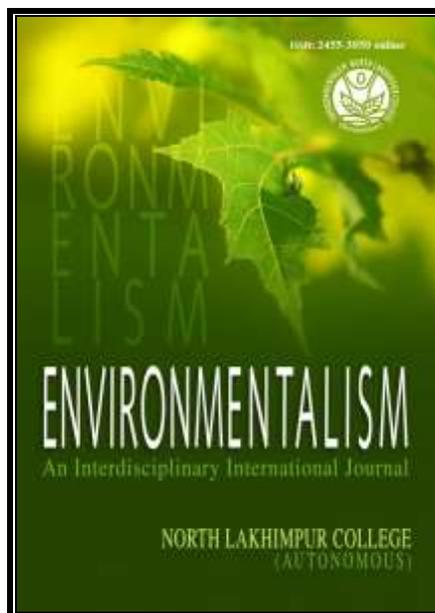


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## A STUDY ON BORDOIBAAM WETLAND OF ASSAM, INDIA

*Bubu Boruah\**, *Tomo Riba*

Dept. of Geography, Rajiv Gandhi University, Itanagar, India

Email: [bububoruahrgu@gmail.com](mailto:bububoruahrgu@gmail.com)\*, [tomoriba123@rediffmail.com](mailto:tomoriba123@rediffmail.com)

### Abstract.

Wetlands are the most common and integral features of the physical landscape of Assam, as the state is a truly riverine land, drained by the dense networks of the Brahmaputra and the Barak river systems and situated in the central part of the hills of the North-East provides a favourable geo-ecological conditions for the growth and development of wetlands. Ecologically wetlands are of great significance for an area as they perform a number of vital functions in maintaining the overall balance of nature as well as they occupy vital position as natural resources in the region. In view of these multidimensional importances, wetlands assume much significant role and thus draw attention of the natural scientist in general and geographers in particular. The growing attention toward the wetland is required due to constant human interference, which has been degrading the wetland environment and has posed serious problems which threaten the biodiversity of the wetland. In this paper, an attempt has been made to analyse the transformation of wetland and its degradation in Bordoibam wetland of Assam. It is further hoped that, study will have utility in preparing management plan for conservation of this particular ecosystem.

**Keywords:** Wetland, Geo-Ecological, Biodiversity, Management and Conservation.

### 1 Introduction

Wetlands are the most important ecosystem of the earth surface which constitutes an integral part of the terrestrial and aquatic system which cover nearly 6 percent of the earth's surface. The study of wetlands began in 1930 with Beadle study on the Paraguayan Swamps. But the systematic study of wetlands started just after the International Convention for Wetlands held in Ramsar of Iran in 1971 which is known as Ramsar Convention. In India, diverse wetlands are seen and some of them are unique. They occupy 1-5 percent of the total geographical area of the country.

*\*Correspondence to: Bubu Boruah, North Lakhimpur College (Autonomous), Khelmati, Lakhimpur-787031, Assam, (India). E-mail: bububoruahrgu@gmail.com*

The first scientific mapping of wetlands of India was carried out in the year 1992-1993 by Space Application Centre (ISRO). This inventory had found that the total extent of wetlands of the country is about 8.26 million hectare. According to International Union for the Conservation of Nature (IUCN) “All the submerged or water saturated lands, natural or man-made, inland or coastal, permanent or temporary, static or dynamic, vegetated or non-vegetated, which necessarily have a land-water interface, are the wetlands”.

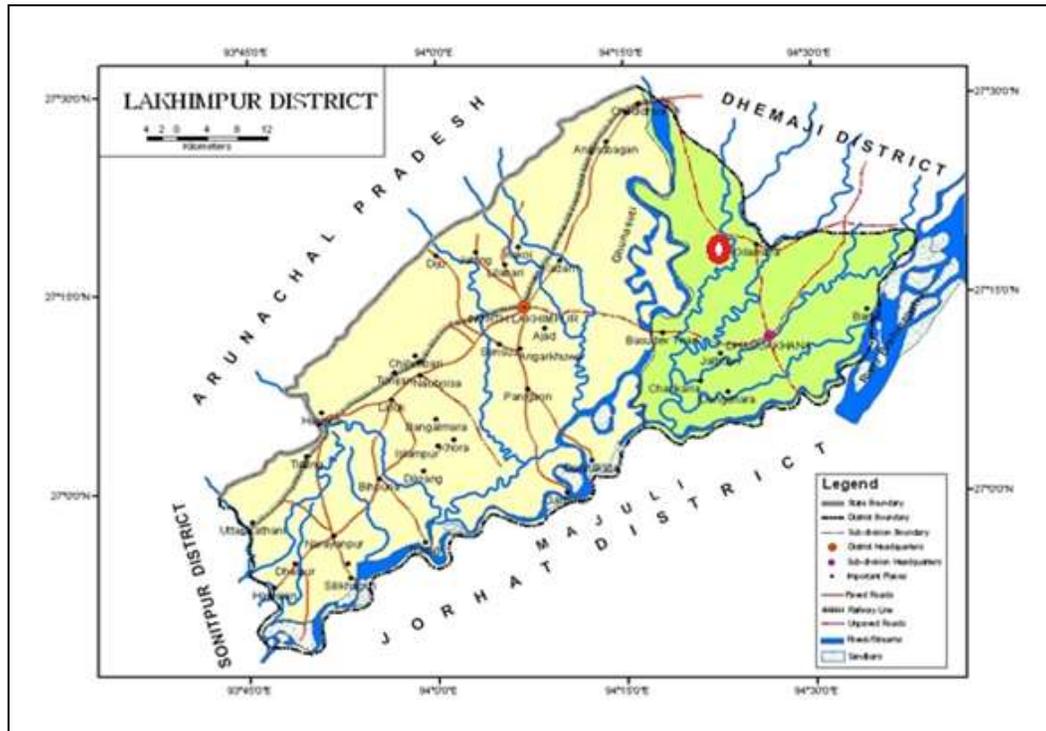
Wetlands are the most common and integral features of the physical landscape of Assam, as the state is a truly riverine land drained by the dense networks of the Brahmaputra and the Barak river systems and situated in the central part of the hills of the North-East provides a favourable geo-ecological conditions for the development and growth of wetlands. From satellite data we come to know that there are as many as 3513 wetlands in Assam covering a total area of 1012 km<sup>2</sup> which constitutes 1.29 percent of the total geographical area of the state. The Lakhimpur district of Assam has a total number of 692 wetlands according to National Wetland Atlas of Assam, out of which 458 wetlands are small in size, accounting for about 27307 hectare of area; they are especially in the third southerly low lying geomorphic unit. There are many meandering streams and the areas devastated by the migrating channels leave behinds many beels, swamps and marshes. There are many water bodies in the district abounding in fish, reptiles, aquatic birds and swamp vegetations. The large beels or wetlands of the district are; Maj Noa of Dhalpur Mauza, Barbeel of Narayanpur Mauza, Kachikata of Bihpuria, from Pakimari and satajaan of Lakhimpur Mauza and Bardubi, Mudoi, Holmari and Merbeel of Telahi Mauza and Badhakara, Dighali, Chench and Bhimpara of Kadam Mauza were the main. In Dhakuwakhana sub-division; Hariana and Charak neighbouring the Subansiri were the main wetlands of the district (Mohammed 2013).

Ecologically wetlands are of great significance for an area as they perform a number of vital functions in maintaining the overall balance of nature, flood control, soil erosion control, water storage and purification, ground water recharge and discharge, food chain, food webs, regulate hydrological cycle, trapping of energy and shelter to large numbers of flora and fauna having great ecological and economical value (Kundu 1997). It also improves the water quality by reducing water pollution due to presence of certain species of algae. Besides it has commercial value and sustains local inhabitants. In view of their multidimensional importance, wetlands assume much significance and thus draw attention of the natural scientist in general and geographers in particular.

## 2 Location of the Study Area

The Lakhimpur is the most flood prone district of Assam and is famous for its numerous water bodies and swamps. It is bordered by Arunachal Pradesh in the north, east by Dhemaji district of Assam, in the south by the Subansiri River, the northern branch of the Brahmaputra, embracing the Majuli Island and in the west by Sonitpur district of Assam. Lakhimpur extends between 26°49' to 27°37' N latitude and 93°42' to 94°38' E longitude. The total area of the district is 2277 km<sup>2</sup> and extends 85 km from south-west to the north-east and about 45 km wide from north to south along the Subansiri River. Fig 1 shows the map of study area. The district lies towards the head of the Brahmaputra valley and is built up by age long depositions by the Brahmaputra and its tributaries like Subansiri, the Ranga Nadi, the Dikrong and their sub tributaries. All these carry rich sediments from the Himalayas. The substratum of the valley was a synclinal fold representing perhaps the frontal portion of the Indian plate, which have got crumpled in course of its north-eastward migration. The colluvial and alluvial deposits have been laid over the

region layer by layer for the last one million years to form the present plain. The sub-stratum is overlaid by the Tipam Series, Dupi Series and Dihing Series of deposits (Barman 1998).



**Fig 1 Maps of study area**

Lakhimpur district being at the foot of the Himalayas, the plain has a relatively cool but humid climate. The average temperature varies from 5°C to 20°C in winter and 18°C to 36°C in summer. The warmest month is August and January is the coolest month of the year. The average annual rainfall varies between 200 cm to 250 cm, where July and August are the rainiest months and December and January are the driest month. The relative humidity remains almost high throughout the year and never drops below 60 percent (Mohammed 2013).

The study is being conducted on one of the major wetland, known as Bordoibaam wetland, and is located at Dhakuwakhana Subdivision of Lakhimpur district of Assam and is of riverine origin and favourite destination of migratory birds both national and intercontinental. The wetland is situated at a distance of 50 kms from the district headquarter and one of the most beautiful oxbow shaped wetland in the district formed due to shifting of meandering courses of river Champora Noi. Its latitudinal and longitudinal extension of Bordoibaam wetland is 27°20'57" N to 94°20'10" E and 27°20'67" N to 94°20'23" E and its altitude is 91 m above mean sea level (MSL). Today with the growing population, the wetland is under the pressure of human interference which affects the wetland ecosystem. Therefore, an attempt has been made in this paper to analyze the wetland transformation due to human interference. This study is expected to help formulate strategies for proper preservation and management of wetland.

### 3 Objectives of the study

The objectives of the study are:

- i) To examine the origin and growth of wetland.

- ii) To understand the biodiversity of wetland.
- iii) To analyse the various problems related to the wetland.
- iv) To suggest measures for conservation and development of wetland.

#### 4 Database and Methodology

The information used in this study has been collected mainly through field observations. The wetland area is being identified from topographical sheets and satellite imagery presented by National Wetland Inventory and Assessment (NWIA) project for a suitable classification. Detailed observation has also been made about different types of flora and fauna, for the purpose of assessment and review different publications and research works have been consulted. In order to study the present status and conditions of wetland a field study has been carried out in the study area for collecting necessary data and information.

#### 5 Discussion and Analysis

##### 5.1 Origin and Growth of the wetland

The beautiful oxbow shaped wetland in the district is formed due to shifting of meandering courses of river Champora Noi, it may be stated that this wetland is of riverine origin. In this particular region Champora Noi change its courses frequently due to low channel gradient and active aggradational processes. During the rainy seasons the river receive huge amount of water from Arunachal Himalayas. The high volumes of water and sediment with low carrying capacity of river cause them to aggrade the bed, thereby enhancing the process of channel shifting and thus the wetland takes its growth.

##### 5.2 Biodiversity of the Wetland

The geographical location of the Lakhimpur district have enhance the entire area as a suitable location for a large number of residential as well as migratory birds. The riverine sand bars and islands of the River Brahmaputra and its numerous tributaries like Giadhal, Subansiri, Ranganadi and dikrong and its innumerable fresh water lakes (locally called beel), or ox-bow lakes (era suti), marshy tracts and seasonally flooded plains creates an ideal wetland eco-system, which serve as a rare refuge for a large number of water birds, including some rare and Red Data Book species. In Lakhimpur district the number of wetland is 151(3033.50 ha).

On the Tropical and semi-tropical evergreen forest of these reserve forest and its adjacent hills of Arunachal Pradesh harbors a myriad of hills birds. Assam is part of a global biodiversity “hotspot” as well as two Endemic Bird Areas i.e., Eastern Himalaya, and Assam Plains (Choudhury 1990, *Birds of Assam*). The close by hills and plains of Lakhimpur District is stretch out within this “hotspot” region.

Bordoibam-Bilmukh is a large freshwater lake that was created during the great earthquake of 1950 (Talukdar 1993). It was part of the River Subansiri, which now flows 7 km away from the lake. A large number of migratory waterfowl are seen in winter while some globally threatened species such as the Spot-billed Pelican *Pelecanus philippensis* and Lesser Adjutant *Leptoptilos javanicus* are seen all over the year. The wetland is fringed by tall emergent vegetation, mainly *Arundo donax*, where the Swamp Francolin *Francolinus gularis* was not uncommon some years ago. However, the grassland has been destroyed by villagers, so this bird is now rarely seen. The typical aquatic, floating and emergent vegetation of wetlands is seen in this wetland also. In the drying and dried up part, *Arundo donax* dominates along with sedges. A few *Barringtonia acutangula* trees are found on the



fringes. AVIFAUNA: More than 165 bird species have been recorded (Phukan *et al.* 1997). Besides the Lesser Adjutant, there are some records of Greater Adjutant *Leptoptilos dubius*. Pallas's Fish-Eagle *Haliaeetus leucoryphus* is another globally threatened species seen here. It is of great conservation concern, as this large raptor requires undisturbed wetlands. The Bordoibaam wetland is known as a breeding ground of the Large Whistling Duck *Dendrocygna bicolor*, Purple Swamphen *Porphyrio porphyrio*, Bronze-winged Jacana *Metopidius indicus*, White-breasted Waterhen *Amaurornis phoenicurus* and Watercock *Gallicrex cinerea* (Talukdar 1993). Although this IBA does not support more than 20,000 birds (A4iii criteria), it has great potential as a major waterfowl sanctuary of Assam. It has been selected on the basis of the endangered species found here. This area has many habitat types that are important for many globally threatened species. Some of IBA sites are very important for the threatened species. If these IBAs are not protected, the global status of such birds will be adversely affected. Table-1 shows the various species and it's IBA along with IUCN categories.

Other important fauna of the site include the Fishing Cat *Prionailurus viverrina*, and Hog deer *Axis porcinus*. The latter has become very rare due to the destruction of its grassland habitat. Some Smooth Indian Otters *Lutrogale perspicillata* still survive. Not much work has been done on amphibians and reptiles, although *Hoplobatrachus tigerinus*, *Bufo melanostictus*, and *Rhacophorus* spp. have also been recorded.

**Table-1 Name of various species and it's IBA along with IUCN categories**

SPECIES	SEASON	IBA CRITERIA	IUCN CATEGORY
Swamp Francolin <i>Francolinus gularis</i>	resident	A1	Vulnerable
Lesser Adjutant <i>Leptoptilos javanicus</i>	resident	A1	Vulnerable
Greater Adjutant <i>Leptoptilos dubius</i>	breeding	A1	Endangered
Spot-billed Pelican <i>Pelecanus philippensis</i>	resident	A1	Near Threatened
Lesser Kestrel <i>Falco naumanni</i>	passage	A1	Least Concern
Pallas's Fish-eagle <i>Haliaeetus leucoryphus</i>	resident	A1	Vulnerable
White-rumped Vulture <i>Gyps bengalensis</i>	non-breeding	A1	Critically Endangered
Greater Spotted Eagle <i>Clanga clanga</i>	winter	A1	Vulnerable

#### *Major Wildlife Attractions -*

##### **Birds:**

Presently, twenty Four species of Birds have been witnessed in the study area, these are Kingfishers, Large whistling Teal, Lesser Adjutant Stork, Spotted Dove, Pheasant tailed Jacana, Bronze winged Jacana, Indian River Tern, Black Headed Gull, White Wagtail, Black Headed Oriole, Purple Moorhen, Openbill Stork etc.

**Aquatic species:** Different species of indigenous fishes, frogs & snakes etc.

#### *Human Interference and Degradation of Wetland Environment*

The wetland ecosystem of the district is very fragile and disturbed by human interference. Various factors are directly or indirectly responsible for the degradation of the wetland which include both- Natural and human factors. Natural factors includes extensive growth of water hyacinth and rapid eutrophication caused by debris from the floating vegetation. Whereas Human factors includes, the main threats is the continuing conversion of natural grassland and wetlands to agricultural uses. These habitats are now much reduced in area and also fragmented. Secondly, Poaching is a major problem in the study area by the local inhabitants. Most of the poaching is done for waterbirds during winter months, when migratory birds arrive. Thirdly, with the increase in population extensive encroachment is being seen near by the wetland. Fourthly, the region is famous for tea-production and large areas are cleared for tea cultivation. On the other hand the whole wetland ecosystems are badly affected by insecticides. Similarly, wetland is also affected by sewage and pesticides and water birds including migratory species are disappearing year after year. Fifth, the region is also worsely affected by the Brick Industries which releases certain intoxic smoke while producing bricks. Sixth, earth filling is also one of the major problems for the degradation of wetland for the purpose of settlement. Lastly, due to tilling of soil in the bank area, there has being bank erosion and the washout soil with rain water are being deposited inside the wetland which leads to shrink the wetland.

### **5.3 Conservation and Management**

From the study it is revealed that the functioning of ecosystem is being disturbed by interference of human activities in multidimensional ways. Thus, it is high time to study and to work properly for proper conservation and the maintenance of wetland. The suggestion for its conservation and protection are as below:

1. Siltation should be minimized or stopped by soil conservation and afforestation around the wetland.
2. Encroachment upon the wetland should be discouraged i.e. agricultural as well as from any other economic activities.
3. Hunting of birds should be prevented with the help of NGO's and by concerned forest department.
4. Community poaching should be stopped with the help of government rules and by educating the people.
5. Land use inventory of human uses of the natural resources in the wetland ecosystem using GIS and GPS should be done. GIS can be an effective monitoring and management tool which help in wetland management.
6. As regards for the conservation, the state govt. should take appropriate measures including awareness programmes, where the importance of wetlands should be highlighted.

### **6 Conclusion**

Wetlands all over the world are threatened in spite of various agreements and national policies. A number of reasons have been identified here. The economic activities lead to the human interference on wetland ecosystem which degrades the wetland ecosystem. In order to make progress, further intensified co-operation is needed between social and natural scientist. The Forest Department of Assam has submitted a proposal to make this wetland a bird sanctuary. Presently, the wetland is controlled by the Revenue Department and fishing lease is granted annually (Choudhury 1990; Talukdar 1993). Therefore the said wetland develops itself as tourist spot for birds watchers and nature lovers. However, the wetland with high degree of bio-diversity should be given priority in conservation and management programmes.



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