

A Study on Morphological Pattern and Degradation of Wetlands in Dimoria, Assam

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Abstract: Assam is endowed with a large number of wetlands of different kind. The wetlands, which have water spread areas, are locally known as 'beel'. The wetlands support subsistence and livelihood to thousands of people through fishing, collecting edible plants, agriculture, irrigation and commercial fisheries, besides rich in biodiversity and maintain environmental quality of a region. The role of such wetlands is socio-economic condition of the people of their surroundings very significant. Unfortunately, at present increasing of encroachments, dumping of solid and liquid waste disposal, excessive use of water, over exploitation of resources, fishing, hunting, poaching, construction of engineering structures across the wetlands, land use of surrounding areas, conflicting uses and other human interferences wetlands have been degrading. In the present investigation, the some wetlands of Dimoria under Kamrup(Metro) district of Assam, India have been selected for study area as it witnessed various anthropogenic and other activities near the beel and it has tremendously impact on the environment of wetlands. 17 numbers of beels have been identified for the study of its environmental quality. In this study morphological pattern and environmental degradation process of wetlands has been mainly emphasized. Based on the analysis of the results of relevant data a few remedial measures have been suggested for conservation and proper management of the wetlands, which may be reflected in similar wetlands of other parts of the region.

Keywords: Morphological pattern, biodiversity, anthropogenic, degradation, conservation.

1. INTRODUCTION

The Brahmaputra valley is endowed with a large number of fresh water lakes. In Assam there are altogether 1,392 such lakes covering 33,630 hectares of land (Sharma and Goswami-1995)^[1]. These lakes locally known as 'beel' are the important component of wetlands. The term 'Wetland' subsumes the swamps, bogs, lagoons and marshy lands etc. under the broad connotation (Sharma, 1993)^[2]. There is a worldwide confusion about the definition of wetlands. There are many definitions currently used in different disciplines according to their purposes. A modified definition given by the International Union for the Conservation of Nature and Natural Resources (IUCN), which is accepted by many has been considered for defining the wetlands in this study. In this definition it is stated as, "all 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 called wetlands” (William J. Mitsch and James G. Gosselink, 2007)^[3]. In the first meeting of the convention in Ramsar Iran, in 1971, it was stated that wetlands are the areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt including areas of marine water, the depth of which at low tide does not exceed 6 meters(20 ft.). On the other hand the marshes and the swamps are locally known as Jalah, Pitoni, Doloni, Doba or Hola etc. in Brahmaputra valley (Sharma, 1993)^[4]. The majority of beels in Assam are formed mainly due to fluvial action of the rivers, a few of them originated due to tectonic disturbances. The beels formed by fluvial action of rivers can be divided in to two types viz. open type and closed type. The open types of beels are connected through feeder channels. The closed beels are abandoned channels of rivers or rivulets disconnected from the main stream following changes in their course.

Wetlands have been identified, as one of the most important features which provide ample natural resources and maintain environmental quality of a region. Wetlands provide habitat for a large variety of flora and fauna, residential as well as migratory birds and provide water for cultivation in the nearby agricultural land. Moreover, it maintains the ecosystem of an area by sheltering many species of aquatic plants, fishes, insects etc. Besides, wetlands help mankind in various ways such as improvement of water quality, flood control, recharge and discharge of ground water, and as an economic resource by providing livelihood to the poorer section of the rural population.

As many as 29 numbers of large beels have been identified in toposheets in the Dimoria region (Deka and Sharma, 2007)^[5]. Beels are traditionally used as natural fisheries in Assam. The beels in Assam produce about 100 kg/ha/year fishes (Dutta and Lahon, 1987)^[6], whereas the rate of production in some developed Indian reservoirs is only 79 kg/ha/year (Jhingran, 1982)^[7]. In Dimoria beels are always being considered as a main source of fish for the people of the surrounding areas. The beels are the important source of income both for the government as well as for welfare of local people as these have been utilized for the socio-economic development and for improvement of local institutions like educational institutions, religious institutions, community hall etc. The wetland plays an important role in agricultural development in Dimoria region. The people of the Dimoria region have been using the wetlands as natural water reservoirs especially during the dry periods. Besides, the beels of Dimoria region are being used for cultural and recreational activities. Most of the beels of Dimoria are associated with the finer sense of the people as reflected in folk songs and folk stories. There are some healthy wetlands which are rich in bio-diversity need to be preserved and others to be managed for economic use scientifically. In this study, it has been tried to analyze the wetlands of Dimoria region in a scientific way so that the proper environmental status could be focused. The study area covers the part of a Kamrup district (Metro) of Assam lying between 26⁰ N. to 26⁰ 11' N. latitudes and 91⁰ 45' E. to 92⁰ E. longitudes with an area of 323.18 sq. km. The study area confined mainly to the Dimoria Development Block (DDB) of Kamrup district (Metro), which has been taken up for this study is dissected by the two rivers viz. Digaru & Kalong. Many beels were located in the flood plain of Digaru and Kalong river. A few beels developed on the

older alluvium region while the other beels are developed in the younger alluvial plain that covers the major part of the region. The general slope of the land surface is mainly towards the North and North-West.

2. OBJECTIVES

As many as 14 numbers of beels located in the southern flood plains of Kalong river. The followings are the objectives of the study to examine various geographical and environmental aspects of the beels in Dimoria region.

- ❑ to describe the present pattern of distribution and morphological characteristics of the wetlands.
- ❑ to assessment of degradation processes of beels in Dimoria region.

3. METHODOLOGY

The study has been done based on both primary and secondary data. The primary data were collected from the field. All the information regarding the aquatic flora and fauna were collected from the field using a survey schedule specially designed for the purpose. The data related to socio-economic aspects of the study area were collected from the relevant books and journals etc. Preparation and identification of wetlands in Dimoria region Survey of India topographical map was used (Scale- 1:50,000). Besides, data related to aquatic flora and fauna were collected from the field during visiting time.

4. DISSCUSION

The morphological pattern of wetlands in Dimoria is discussed in respect of their shape and size. Shape is an important characteristic of wetlands. Various factors are responsible for the determination of shape of the wetlands, which are location, geology, stage of development, nature of feeder channels etc. Besides, human interference including construction of roads and bridges, railway lines etc. play an important role in the determination of the shape of the wetlands. The configuration of the wetlands can be broadly divided in to five categories, viz. linear, compact, discrete, irregular and ox-bow shape (Sarmah, 1993)^[8]. Among the linear shape wetlands the Itilla, Duani, Amkhola, Jalisora, Jiang are most important. The compact beel is practically absent in the region. The discrete type of beel looks like two separate beels but are generally connected by a narrow channel. The Saimaikuria and Chesakhal beel are the good examples of discrete beels. The Chong beel and Bomani beel near Digaru can be cited as an example of irregular beel. The Parkhali in the eastern part near Jagiroad and close proximity to Kalong river is the only example of ox-bow shape beel.

Table-1: Size of the some beels of Dimoria

Sl. No.	Name of the beel	Area in Hectares
1	Amkhola	4.48
2	Samaikuria	6.94
3	Chesakhhal	2.27
4	Chong	12.86
5	Gatua	6.89
6	Rowmari	0.99
7	Ittila	4.26
8	Amara	25.22
9	Nagazan	6.82
10	Borbeel	13.38
11	Katahani	2.91
12	Magarkur	0.31
13	Bomani	22.75
14	Duani	7.22
15	Jalisora	1.74
16	Parkhali	18.34
17	Jiyong	20.88

Source: Sonapur Revenue Circle

It has been observed that small sized beels are more in number. The number of beels decreases with the increase of the sizes (Table-1). Moreover, as the distance increase from the rivers the number of beels decreases (Table-2 / Fig – 1

Table-2: Distance of the beels from the rivers

Sl. No	Name of the beels	Name of the nearest rivers	Distance in km.
1	Chesakhhal	Digaru	1
2	Samaikuria	Digaru	2.5
3	Amkhola	Digaru	3
4	Chong	Digaru	2
5	Bomani	Digaru	8
6	Amara	Kalong	5
7	Itilla	Kalong	0.5
8	Duani	Kalong	9
9	Jalisora	Kalong	8
10	Parkhali	Kalong	5
11	Jiyong	Kalong	0.5

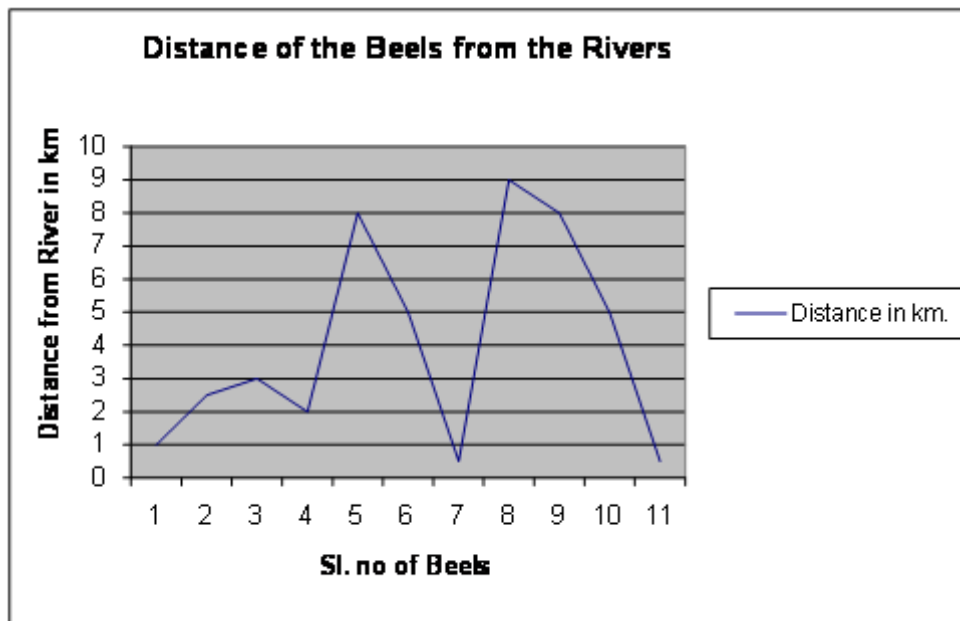


Fig.-1: Distance of the beels from the rivers

The natural environment of wetlands is degraded day by day due to variety of anthropogenic interventions. Most important threat arising the wetlands is from anthropogenic pressure. The greatest concern, in the context of wetland ecosystem, is the loss and modification of habitats, which is catastrophic in nature since it causes irreversible environmental degradation. Now, many of the wetlands in the study area have been degraded due to agricultural impacts, i.e. the chemical fertilizers and insecticides applied in the croplands and also solid and liquid wastes of some of the industries. It was found that agricultural and industrial impact is very significant in the study area. All these ultimately affect in the biodiversity scenario of the wetlands of the region. The study has indicated the causes of degradation of the beels due to natural processes as well as for human induced activities. In the last few years considerable changes have been observed in the wetland environment in Dimoria region. The origin of the wetlands is mostly related to rivers and they are closely tied with channel changes of adjacent rivers like Digaru and Kalong. It is observed that the courses of the rivers have changes at many places during the recent years. Shallowness of water bodies has been increasing due to occurrence of flash flood and floods occur almost every year by the river Digaru and Kalong respectively. In addition to this high rainfall and temperature are the main reasons for widespread growth of aquatic vegetation during the monsoon and early autumn periods. Different microphytic species form a floating mat over the beel water. It covers a considerable area of cultivable land and swamps. The roots below the floating mats progressively increase towards the bottom soil and ultimately get encroach in it. Such floating mats get enlarged in size in course of time and fill in the open surface area. Decomposition of the over crowded macrophytes of different types specially during the months of October and November causes mortality of fish (Goswami, 1987)^[9]. Due to continuous silting and accumulation of petrified matters over the years, most of feeder channels have become very shallow and ineffective. This, in turn, hampers the productivity level of fish. Besides these, unscientific construction of embankments, irrigation channels, roads, railway lines, brick kilns etc., encroachment in the marginal lands of wetlands, in earlier time dumping of solid and liquid waste from Nagoan Paper Mill, Jagiroad, cutting and

burning of vegetation over littoral areas during winter season, hunting of residential and migratory birds and unscientific methods of fishing etc. are the factors responsible for degradation of wetland environment in Dimoria region to a great extent. Although, Nagaon paper Mill is now closed down but impact of waste disposal of past has been found in the region. The chief causes of degeneration of wetland environment is identified as follows-

- (i) Multi use of wetland water for drinking, agriculture, industry and domestic use have many adverse effects on the water quality of the beels, which ultimately affect the aquatic flora and fauna.
- (ii) Receiving the solid and liquid wastes in earlier time from Nagaon paper mill of Jagiroad under Morigaon district, Which cause serious effect on the beels like Taranga (Elenga), Jiang, Parkhali, Itila and its surround waterbodies.(D. R. Deka)^[10].
- (iii) The middle part of the Digaru river basin affected by mushrooming of brick kilns. Wetlands like Chesakhal, Baralimara, Samaikuria, Amkhola, Deva Bela and Domorapathar beels are badly affected by these brickfields,
- (iv) Extensive use of chemical fertilizers and insecticides in the agricultural fields is responsible for drastic change of wetland water quality.
- (v) Some construction of engineering structures i.e.-roads, railways and bridges etc. cause deterioration of the wetland environment.
- (vi) The cutting and burning of vegetation in the littoral areas have affecting the aquatic flora and fauna in the water bodies.
- (vii) Overgrazing in the littoral areas has a serious consequence on the wetland environment. Many of the important flora species have been disappeared due to overgrazing.
- (viii) Shallowness of the wetlands, high rainfall and humidity, moderately high temperature and low sunshine are the main causes for widespread growth of aquatic macrophytes and spread of floating plants which converts a considerable part of wetlands into swamps (Sharma and Goswami, 1995)^[11].
- (xi) Due to continuous siltation and accumulation organic and inorganic substances over the years, most of the feeder channels have become very shallow and

5. FINDINGS

It has been observed that as the distance from the rivers increases the number of beels usually decreases. It indicates how close the formation of beels related to the nearby rivers. Most of the beels infested with floating vegetation which are of patchy or uniform in nature. Different varieties of vegetation growth indicate the biodiversity richness of the wetlands, because these vegetation support many varieties of birds, animals and insects & micro-organisms.

Further, it has been observed that many of the beels have dried up during the winter season and Boro rice has been cultivated by the local farmer in such beels. Besides, beels like Morogdola, Potabeel, Deobeel, Peholibeel etc. totally converted to cultivated land in recent years.

Most of the wetlands in the study area degraded in recent years due to natural causes like flash floods and floods and human induced causes like unscientific construction of embankments, irrigation channels, roads, railway lines, brick kilns, encroachment in the marginal lands of wetlands, dumping of solid and liquid waste from Nagoan Paper Mill(although the Mill has closed down but impact of the past is still working) , cutting and burning vegetation over littoral areas during winter season, hunting of residential and migratory birds and unscientific methods of fishing etc.

6. CONCLUSION

Undoubtedly, the wetlands of Dimoria may play an important role for the economic development of the region as well as wetland environmental quality in the surrounding areas. Many of the beels of the region is located along the bank of river Kalong and Digaru. The number of beels is more in the northern and western part of the study area. Although these wetlands are potentially very rich in aquatic resources, at present they are mostly in derelict or semiderelict conditions with high rate of siltation and interference due to agricultural and industrial activities and settlement in the surrounding areas. These processes lead to gradual conversion of beels in to dryland and thereby reducing the actual water spread area of the beel. Therefore, these wetlands need proper management so that they can effectively contribute towards the economic growth of the Dimoria region. The concerned authority could take adequate steps to develop pisciculture in these wetlands in organized manner. Besides, the vegetation growth of all categories directly or indirectly supports different type of animals, including birds and insects, micro-organisms etc. Therefore, in addition to maintain the geo-ecological status of the beels, efforts should also be made to develop these waterbodies as effective natural floodwater detention basins so as to lower the flood heights and reduce the extent of inundation in the area. Appropriate conservational measure should be taken up in the catchment areas of the beels. As such selected area may be preserved for biodiversity conservation. Based on a through evaluation of the existing status, using modern techniques like remote sensing and GIS, supplemented with detailed ground survey, a suitable environmental management strategy is to be evolved for these resourceful wetlands of Dimoria .

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