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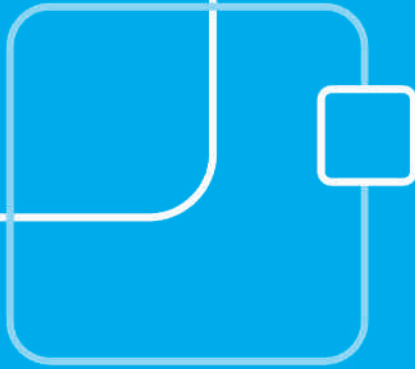


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## LAND USE DYNAMICS AND WETLAND BIODIVERSITY OF DORA BEEL IN KAMRUP DISTRICT-ASSAM

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### ABSTRACT

*Dora Beel, a unique wetland habitat providing plenty of resources and ecological services to the people inhabiting the surrounding region, situated in the Kuls-Brahmaputra flood plain. The Beel lies between 26°04'48" latitude N to 26°05'27" N latitude and 91°26'37" E longitude to 91°27'37" E longitude. According to the Survey of India toposheet of 1971, it was estimated that the total area of the Beel was 297.96 acres which has shrunk to 278.41 acres according to the Landsat imagery 2005, surrounded by 10 to 13 small villages respectively.*

*Wetlands are ecologically, socio-economically and aesthetically important natural resources. The riverine state of Assam has numerous wetlands, the majority of which can be term as Floodplain wetland with immense economic value provides source of livelihood for local community. While the productivity and survival of these wetlands is totally dependent on human activities and interferences which pose a great threat to the existing ecological balance.*



*With the changing patterns of land use and livelihood, the people have a great role to play in the overall biodiversity and ecosystem of the wetland. Due to human interference, the wetland is facing serious threats for survival and becomes ecologically fragile which requires an urgent need for restoration.*

*This paper is a modest attempt to explore and establish the linkages of land use, livelihood and biodiversity and their associated impacts with special reference to Dora Beel in Kamrup District, Assam.*

**KEYWORDS:** *Beel, Biodiversity, Floodplain, Land use and Livelihood.*

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## INTRODUCTION

River floodplains are unique geomorphic features created by the process of stream meandering and over bank flooding. Geomorphic features of floodplain include active and relict river channels, point bars, oxbow lakes, meander scrolls, natural levees and backwater sloughs and wetlands (Gower, 1980,). Over the years, the floodplain geomorphic features, especially the wetlands gained unprecedented importance due to its rediscovered role in floodplain ecology, biodiversity, hydrology, economy and livelihood of the people.

Wetlands are typically heterogeneous habitats of permanent or seasonal shallow water dominated by large aquatic plants and broken into diverse microhabitats occupying transitional areas between terrestrial and aquatic habitats (Craft, 2000).

Wetlands exhibits enormous diversity based on their genesis, geographical location, water regime, chemistry, and dominant plant, soil and sediment characteristics. The dynamics of water inflow and loss are fundamental to the development, maintainance and functioning of wetlands. Inflow-outflow balance is influenced primarily by climate and catchment configuration while the storage is controlled by local geomorphology and geological characteristics.

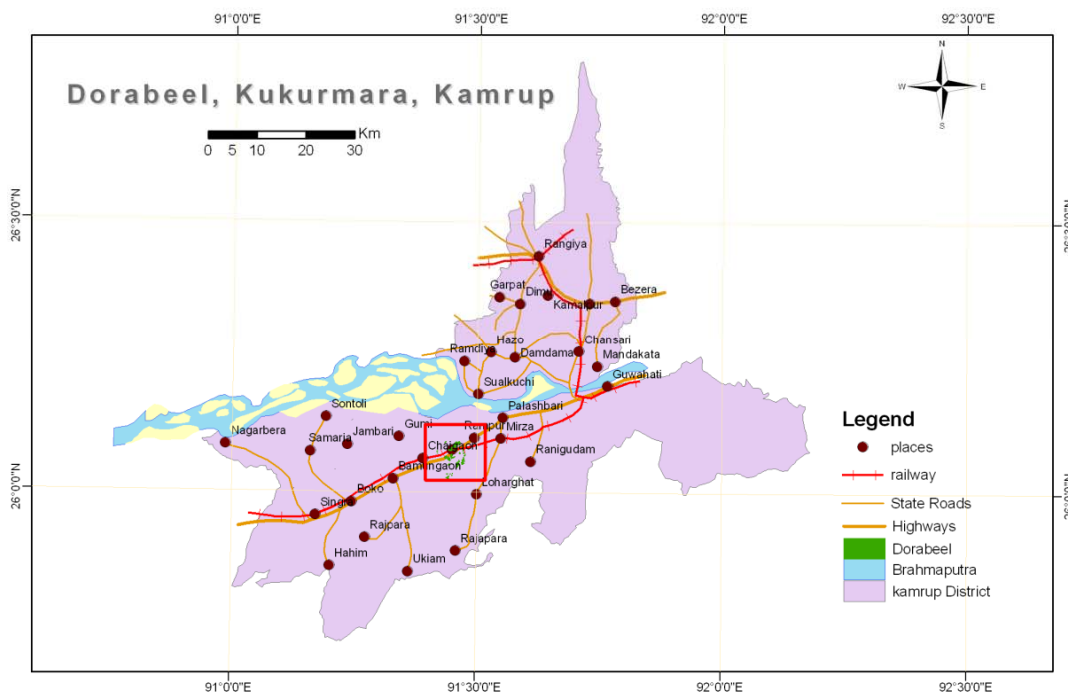
The riverine state of Assam has numerous wetlands which can be classified into two categories – the lake-like features with a clear waterspread area in the middle are the beels while those covered by weeds, grasses, etc are the swamps and marshes. Majority of the wetlands found in Assam can be termed as “floodplain wetlands” (Sahariah and Bora, 2006). The floodplain wetlands comprise a major component of the hydrological regime of the state. They act as storage basins during the floods, reducing their impacts and minimizing the potential for erosion. They provide water for drinking and irrigation, fertile soil for agriculture, timber, firewood and various cash crops and act as fisheries which economically benefits the local communities who inhabit the neighbouring areas. They also support a large number of aquatic flora and fauna, thus serving as areas of high biodiversity.

The riverine wetlands include abandoned river channels and streams, ox-bow lakes, riverine marshes, seasonally flooded arable land, swamp forest and temporarily flooded forest, etc. The



lake-like wetlands with clear waterspread area in the centre are known as beels in Assam. The beels of Assam generally occupy the low lying areas on the floodplains of rivers that are naturally depressed.

The present study area (figure 1) i.e. Dorabeel is one of the key wetland of Kamrup District. The Dorabeel wetland act as habitat for fish and for birds, reptiles and amphibians, many of which are ecologically significant. They also provide the source of livelihood for the local community who reside in the nearby areas.



**FIGURE 1: LOCATION MAP OF THE STUDY AREA**

The present study discusses the impact of Land use and Livelihoods related to the survival of wetlands in Dorabeel, in western Kamrup District, Assam. As we have mentioned earlier, wetland studies have received importance in different quarters of the academia. It is well understood that the changing Land use and Livelihood of the people has a great role to play in the overall biodiversity and the ecosystem of the wetland (Sahariah 1998). Keeping in view the growing population with the growing needs and demands of the people, wetland had been prone to be exploited by people through human settlement, establishment of industries, practice of agriculture and livestock rearing. This leads to the degradation of wetlands biodiversity and wetland ecosystem as a whole.





The changing land use pattern like irrational encroachment for settlement, industrial purpose and also for various resource extractions had threatened the existence of wetland in Kamrup district. Moreover wetlands of urban area are prone to different anthropogenic alterations (Sahariah and Bora, 2001) due to its drastic increase in population along with their increasing needs and Dora Beel is one among them which special measures to check all these consequences.

Keeping the long association of the people of Assam with the wetland resource of the floodplain it has been felt that there is an urgent need for proper assessment and evaluation of land use and livelihood that influence the biodiversity of the wetlands. It is believe that such knowledge will give the academic world as well as the planners a better understanding of the problems associated the floodplain wetlands.

### **OBJECTIVES**

The main objectives of the study are as follows

1. To evaluate association and relationship of Land use, Livelihood, Biodiversity of the wetland.
2. To analyze various problems associated with the wetland and to suggest measures for the conservation and management of the wetland in the study area.

### **METHODOLOGY AND DATABASE**

The work has been framed within the definite and precise stages one after another in order to achieve the desired objectives. Survey of India toposheets, cadastral maps and satellite images has been the prime source of information. The necessary samples and other relevant primary information of the study area are generated from the study area through house hold survey and field survey through predesigned survey schedule. In the field the age old personal records with the villagers are also given due importance. The collected information and results has been analyzed and presented in GIS environment for better cartographic representation.

### **THE STUDY AREA**

The Dora Beel is a floodplain wetland in the south bank of river Brahmaputra in Kamrup district.. It lies near Kukurmara under the Palasbari Revenue Circle. The Beel is very rich in biotic communities. The Beel lies along 26<sup>0</sup>05'376" N latitude and 91<sup>0</sup> 27' 99" E longitudes. According to the Survey of India, 1971 the total area of the Beel was 297.96 acres which has shrunk to 278.41 acres according to Land sat imagery 2005. The Beel is surrounded by following villages- Bortezpur, Horutezpur, Rampur, Jiakur, Kukurmara, Rajapukhuri, Nahora, Bhakatpara, Rodulpara, Satrapara, Kuldung, Jayabari and Khidirpukhuri.

The area lies within the regime of monsoon climate and has close affinity with other parts of Brahmaputra Valley. The location and physiographic factor greatly influenced the climate characteristics of the district. As the study area falls under Kamrup district it also has same climatic character with Kamrup, the area falls under humid sub-tropical region characterized by



warm humid climate with heavy rainfall and a relatively cool winter with rather scanty rainfall. Winter, pre-monsoon, monsoon and retreating monsoon are the four distinct seasons experience here in a year. As far as the drainage system of Dora Beel is concern, the Beel is well drained by the River Kulsi locally known as Kolohi River originating from Meghalaya Plateau and other small streams and Nala of the surrounding area. The river Kolohi which serve as the main inlet of the Beel also act the role of outlet too, it is in such a manner that when the water level of the Beel rise up to such extend that it does not have enough room for further inflow, rather it serve as the path for the outflow of water from the Beel that finally pour down to Brahmaputra.

### **HUMAN INTERFERENCE ON WETLANDS**

Human activities can have some positive and some negative impact upon the wetlands. Human interference can enhance or reduce the abilities of the wetland to provide the essential goods and services. The physical, chemical and biological components of the wetlands are altered due to human interference. Generally, the tendency of man to gain maximum benefits from this resource is one of the major cause of its degradation. Since, the wetlands are found in relatively flat, fertile and easily accessible land, therefore, the population pressure upon them is very high. Increasing population has resulted in encroachment upon the wetland for the purpose of settlement and agriculture. Agricultural interventions often have significant effects on the ecology and hence functioning of wetland ecosystems (Mc. Cartney et.al, 2005, Butet and Leroux, 2001). The agricultural activities may benefit human beings by providing adequate food supply, but increasing use of fertilizers may reduce the ability of the wetland to provide clean water. Human settlement and use of surplus manure and chemical fertilizers for agriculture in the areas surrounding the wetland may increase the nutrient level, thereby having an impact upon its soil and water quality.

The activities such as land development, deforestation etc. in the upland areas results in erosion, thereby generating excessive amount of sediments. These sediments are then deposited in the low-lying wetlands. The increased accumulation of sediments can change the chemical and hydrological regime of the wetlands over a short period of time.

Human activities can also result in pollution of the wetland. Pollution from industrial waste, garbage and sewage disposal has an adverse impact upon its soil and water quality. The balance of wetland water chemistry and the biogeochemical cycling of materials in the wetland ecosystem will be disturbed if the wetland is excessively polluted.

The construction of roadways, railways, embankments, dykes etc. may alter the floodplain hydrology and cause disturbances to the aquatic flora and fauna. The ecosystem will be modified to a large extent and have an impact upon the forest resources, wildlife habitat and fish habitat of the wetland. The biological diversity will be greatly affected.

The excessive hunting, trapping and killing of birds, over-exploitation of fish fauna, aquatic plants etc. may reduce the biological diversity of the wetland and degrade its ecological conditions. Further, the grazing of cattle's in the wetland when the water recedes can affect the water quality and habitat of the wetland. It may also result in eutrophication.





The overuse of the wetlands due to human activities leads to their degradation. Since, human beings are the modifier of this resource, it is their duty to protect and preserve them by formulating appropriate policies for their sustainable management.

### **LANDUSE AND LIVELIHOOD**

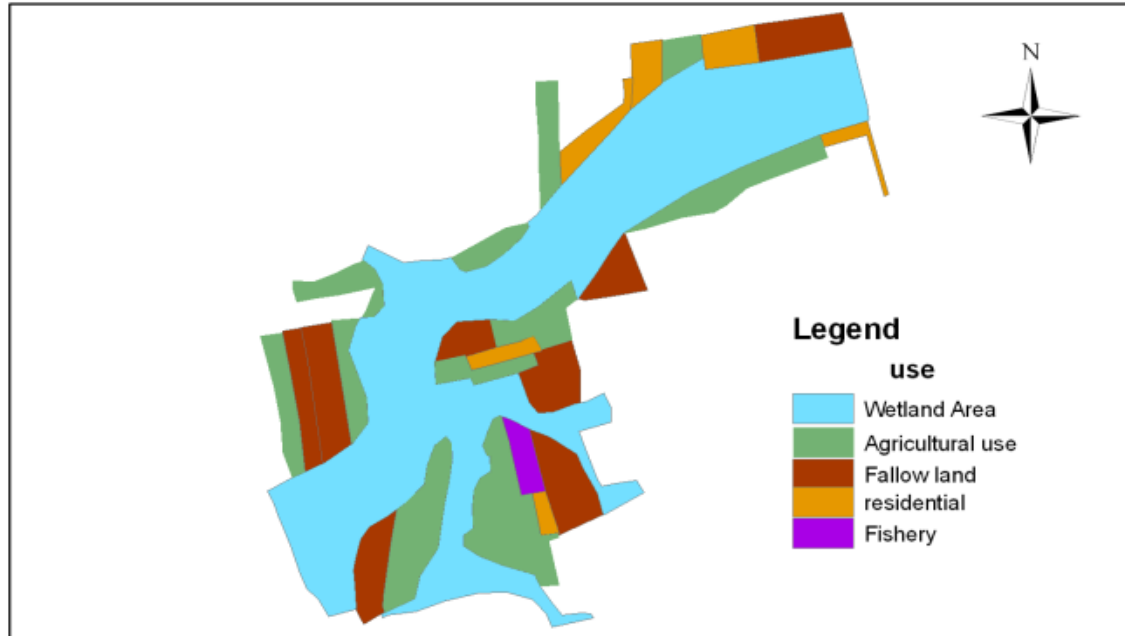
Though wetlands were once perceived as wastelands, today the natural functions and public benefits of wetlands are well understood by both scientists and land managers. Wetlands now receive special protections under different law, statutes and public support for wetland preservation has increased in recent decades. Despite these gains, large gaps still exist in the public's understanding of what and where wetlands are, why they matter, and how they are protected. These gaps fuel public controversies over wetland development proposals, and sometimes result in land use decisions being made without full or accurate information about the economic and ecological consequences of wetland loss.

Since settlement, we have lost approximately 50% of Dora Beel wetland (field survey). Depending upon the quality and geographical characteristics of the land the pattern of landuse in the Beel area may be categories into different classes; (figure 2).

- i) Agriculture
- ii) Residential
- iii) Commercial/Industrial
- iv) Open space/uncultivated land and
- v) Conversions to Cropland, Grazing land or Pasture



## Landuse around Dorabeel



## Satellite Image of Dorabeel, 2010



**FIGURE 2: PRESENT LANDUSE AROUND DORABEEL**



Among these agriculture is the most dominant feature. The land in an around Dora Beel are normally used for agriculture. But during summer season agricultural activities are disrupted due to flood and the area is covered by vast water bodies. The majority of the inhabitants practice agriculture. This agriculture activity is carried out when the water level of the Beel recedes. Many of the nearby areas of the Beel are reclaimed and developed as Residential, commercial and industrial areas. Rampur, Horutezpur, Bortezpur, Jiakur and Kukurmara villages are some of the good example of residential areas. Besides this there are various commercial areas in the area. And there is one important burning issues of establishing industry (Brewery Factory) at the site of the Beel which is a matter of great concern to environmental as well as ecological point of view of the Beel. There are some areas which are left as open space area which are not used for any activity due to unfavorable conditions.

Conversion of wetland to cropland and pasture especially to the adjoining part of the wetland with the residential site is a common characteristic feature of the wetland Dora Beel. If this is not properly check, there is danger to the physical existence of the wetland in the near future.

And besides these activities there are various encroachment activities like grazing, agriculture, settlement, livestock raring, etc. to be more precise the percentage of some of such activities are tabulated and shown in the following sheet.

Human activities like dumping of garbage, rubbish and waste water disposal to the wetland greatly threatens the physical and biological existence of the Beel. The dumped garbage and rubbish remain for long and occupy space that affects the physical area of the Beel and when it decomposed it affects the biotic habitats of the Beel. The following table clearly reveals the garbage disposal habits of the surrounding villages directly to the Beel.

**TABLE 1: GARBAGE DISPOSAL HABBITS IN SURVEYED VILLAGES**

Village	Beel/ river / open space	Total
Bortezpur	Beel	40%
	Open space	60%
Horutezpur	Beel	25%
Jiakur	Beel	50%
	Open space	50%
Kukurmara	Kolohi river	40%
Rampur	Beel	70%
	Open space	30%

Source: fieldwork

Construction of roads and ponds at the site of the wetland and the overall landuse activities in an around Dora Beel may alter the physical and hydrological characteristics of the wetland and

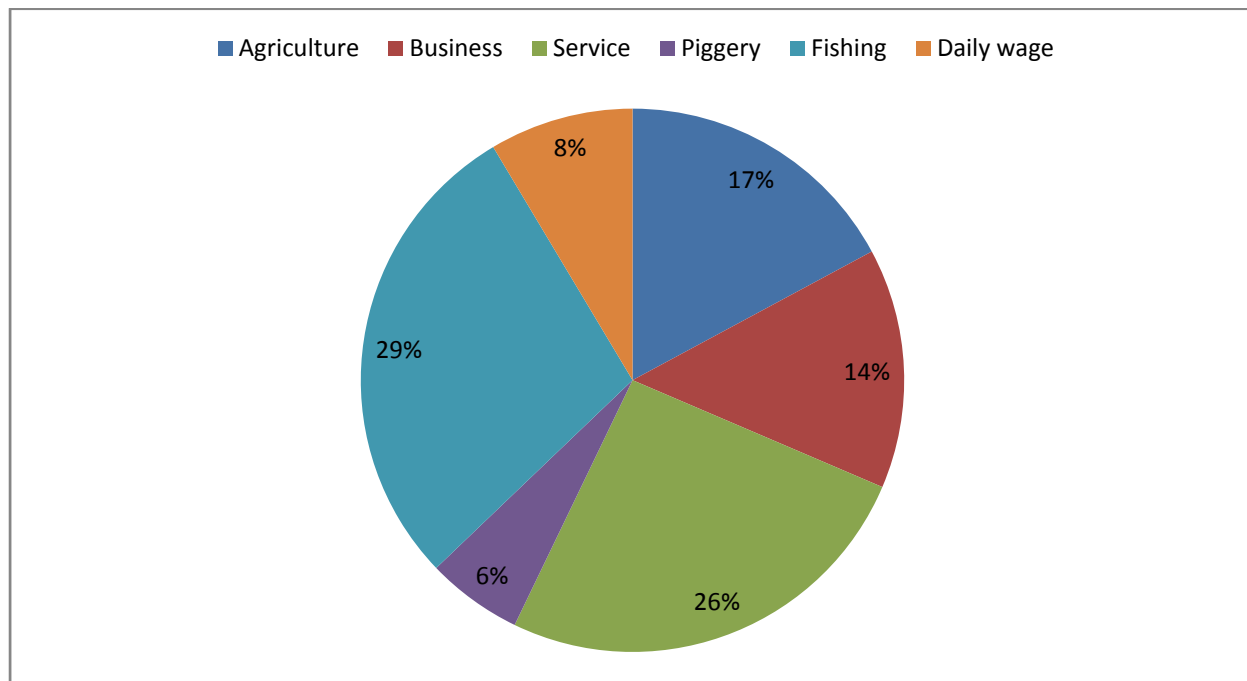


cause disturbances to the aquatic flora and fauna of the wetland. The ecosystem will be modified to a large extent and have a great impact upon the wetland resources, wildlife habitat and fish habitat of the wetland. The biodiversity of the wetland will be greatly affected. Further the grazing of cattle in the wetland when the water recedes can affect the water quality and habitat of wetland. It may also result in eutrophication. A number of roads across the wetland has been constructed under the ENREGA scheme bifurcating the wetlands. This shows how the existing nature of Governmental norms is conflicting to each other.

### LIVELIHOOD OF PEOPLE

People have a long and intimate association with wetlands. It's a relationship that's easy to understand when one considers the benefits or ecosystem services that wetlands provide to humanity. In addition to contributing to the life-support system that sustained us, wetlands also provide many people with a livelihood, or a means of earning a living. Often it is poor people, especially in rural areas, who are directly dependent on wetlands for their livelihoods.

Although agriculture is the main activity of the region however the surveyed villages revealed that people have a mixture of livelihood options. Fishing is practiced widely. The following figure will make clear to a more vivid picture to the economic activity of the people of the wetland area.



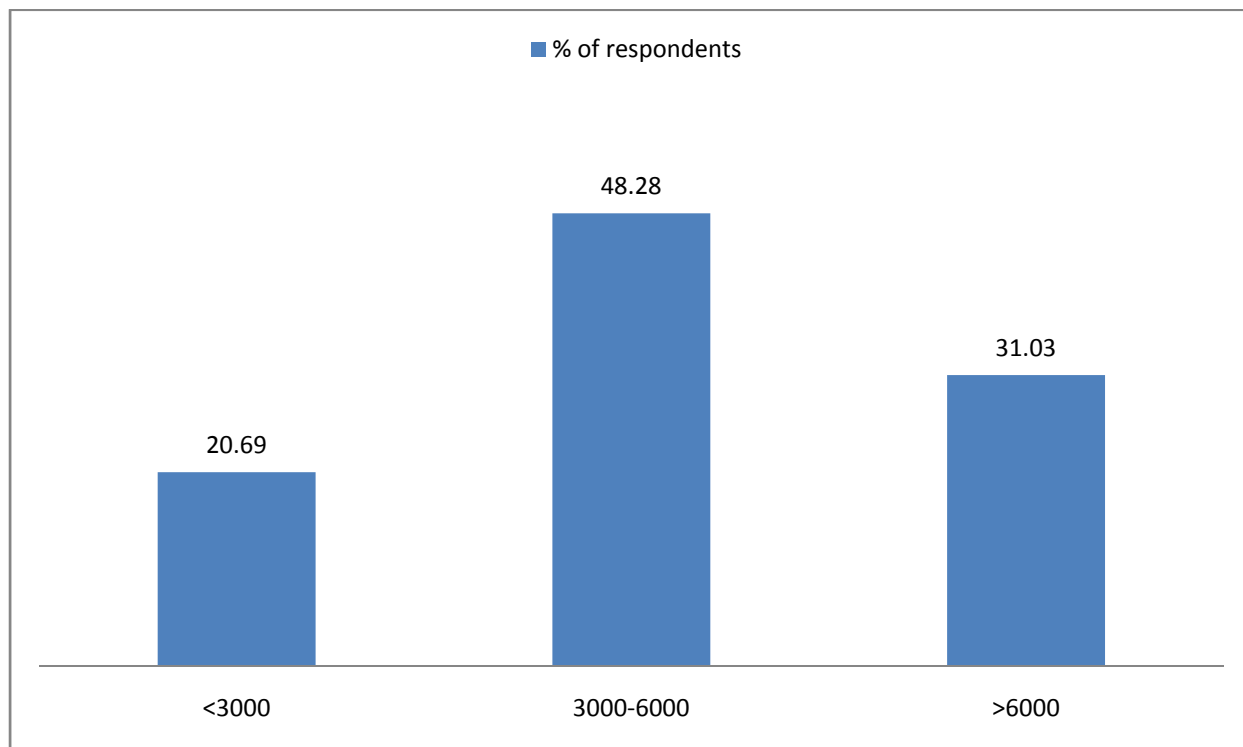
**FIGURE 3: ECONOMIC ACTIVITIES AROUND DORABEEL**

The traditional type of agriculture is still prevalent in the region. Majority of the people do agriculture only to meet their domestic requirement i.e. subsistence type of agriculture is mainly done, however 47% of the residents do both subsistence and commercial type of agriculture is



practiced in the study area. Paddy is the main cultivation in the area. People practice rainfed agriculture. However Bodo rice is cultivated near the wetlands when water level recedes in winter.

The economic level of the study area is comparatively low. Fish capturing and selling is the main activity of local people to earn livelihood. The main source of income of the people mainly consists of farming, business, fishing, service, piggery and wages selling. The following figure reveals the approximate monthly income of the people.



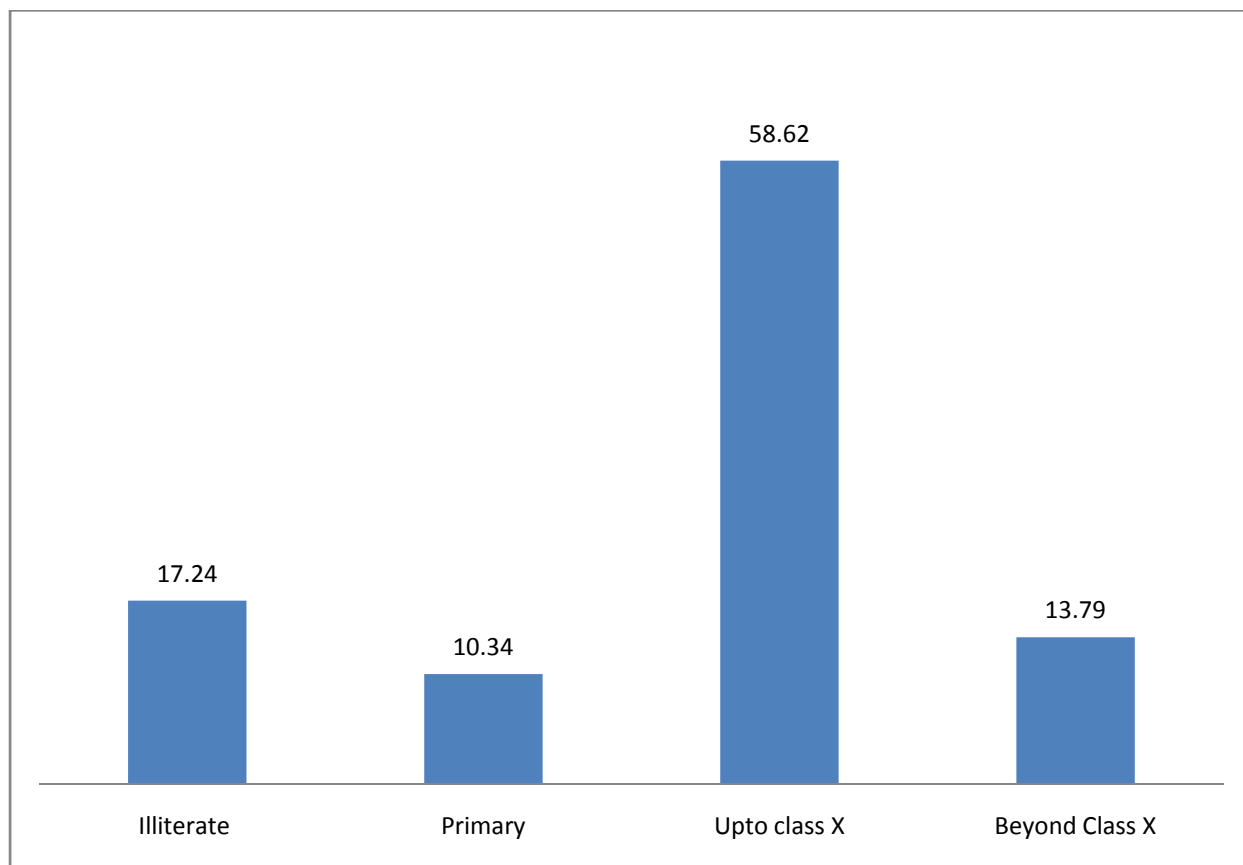
**FIGURE 4: MONTHLY INCOME OF THE RESPONDENTS IN THE SURVEYED VILLAGES**

Though the overall economic conditions of the people are low, the households support each other in various activities to earn their livelihood in harmonious way. There exists a good relationship between family relatives residing in the area. They help each other in agricultural activities, receives food and cash from one another during the time of economic flux in the area. The study reveals that the region have no measures to deal with economic flux. 93% of the people go for borrowing and only 7% depend on nature. That means the support capability of the ecosystem has been decreased considerably. Further 82% of the respondents reveal that they don't have any strategy counter economic fluxes. Only 10% say that they save for the time of crisis and 8% say that they prepare extra fishing net to collect more fish.

The educational level which determines the economic level and well being of a society is very low in the region. This is due lack of facilities for higher education in the region. To do so they



have to go nearer town but their poor economic condition and poor communication system do not favor them to do so. Due to this most of them are not able to attained Class X level. Only few section of population is found to attained higher educational qualification. Educational attainment of the surveyed four villages are shown below.



**FIGURE 4: LEVEL OF EDUCATION IN STUDY AREA**

The above discussed livelihood activities of the study area like predominance of agriculture and fishing, over other activities like business, service, other livestock raring along with the low economic level and low educational level has made poor section of the society to do reckless extraction of wetland resources like aquatic flora and fauna to meet their living. The reckless fishing from the wetland led to decrease in fish population of the wetland. Using of fertilizer in the agricultural field to increase food production to meet the need of the population has a great threat to the existence of biotic components of the wetland and eventually affects the overall biodiversity of the wetland to a great extend. This condition will continue to exist if the government does not take up certain measures to improve the well being of the region in order to curve the reckless resource extraction from the wetland being compelled by their poor economic level and ignorance, due to their poor educational attainment. Thus there is urgent need to curve out such problems in order to save the wetland which is the nature bounty of resources.





## BIODIVERSITY OF THE DORABEEL

Biodiversity or biological species richness, that is the sum total of various types of micro organisms, plants and animals present in a living community system. According to the World Resource Institute, Biodiversity is the variety of world organisms including their genetic diversity and the assemblages they form. The United States Office of Technology Assessment (1978) defined biodiversity as 'the variety and variability among living organisms and the ecological complexes in which they occur'. The wetlands are potentially very rich and ecologically very important features. They have very high carrying capacity in respect of wetland type vegetation, aquatic birds and different species of fishes. The wetlands act as huge store house of aquatic flora and fauna. A wide variety commercial fishes and ornamental fishes, migratory and indigenous birds, wide variety of floating and submerged aquatic plants, grasses and bushes besides numerous amphibians, reptiles, insects, etc. are supported by the wetland.

The flora found in these wetlands can be used as ornamental, medicine, natural fertilizer, fodder, water purifier and can also be used as household materials including mats and drying surfaces. The biodiversity of Dora beel is the true testimony to the richness of wetland biodiversity of the floodplain of Brahmaputra Valley. The Dora beel present a visual delight during the monsoon period at the full storage level as it abounds with a variety of aquatic flora. But during the post-monsoon period when the wetland is in the drought storage level mostly water hyacinth can be found in the beel and a major part of the beel becomes grazing ground for cattle. The common aquatic vegetation found in Dora beel is as follows:

**TABLE-2: COMMON AQUATIC VEGETATION OF DORA BEEL**

Ecological Group	Species
Free floating	Eichhornia crassipes (water hyacinth); Salvia natans (barpuni); Pistia species (sarupuni); Azolla pinnata; Lemna minor.
Rooted floating	Ipomoea aquatic (water lettuce); Nymphaea nucifera (padum); Nymphaea nauchali; Nymphaea stellata; Trapa bispinosa.
Submerged	Hydrilla verticillata; Najas indica.

Source: Borthakur, R. 2008

A wide variety of domicile as well as migratory birds are found in Dora beel. Some of them are Sarali, Kora, Adjutant Stork (Rajhanh), Ghog, Panikauri, Crane (Bogoli), Black Coat, Northern Pintails, Pochards, etc. the other fauna found in the Beel include bugs, crabs, water snakes, snail, frog, etc. the different species of fish include a large numbers of air breathing fish, minor carps, cat fish and ornamental fish.



**TABLE 3: COMMON FISH TYPES FOUND IN DORA BEEL**

Sl. No.	Local name	Scientific name	Sl. No.	Local name	Scientific name
1	Rohu	Labeo rohita	26	Pava	Ompok paba
2	Kuriha	Labeo gonius	27	Selkona	Alia coila
3	Bhagan	Labeo bata	28	Tinkata	Gagota cenia
4	Bhakua	Catla catla	29	Kokila	Xenontodon cancila
5	Mirika	Chirhinus mrigala	30	Sal	Channa marulius
6	Silver carp	Hypothalmichthys	31	Soul	Channa straitus
7	Grass carp	Ctenopharyngodon	32	Korati	Gadusia capra
8	Common carp	Cyprinus carpio	33	Goroi	Channa punctatus
9	Moa	Amblypharyngodon	34	Besa	Setipina phasa
10	Darikona	Eromus donricus	35	Kholihona	Calisa lalia
11	Bariola	Aspidopari morar	36	Kawoi	Anabus testedineus
12	Senduri puthi	Puntius sophose	37	Kholihona	Colisa fasciata
13	Ghona puthi	Puntius ticto	38	Patimutura	Glossogobius giuris
14	Japani puthi	Puntius javanicus	39	Chanda	Chanda nama
15	Lauputi	Danio aequipinnatus	40	Chanda	Chanda ranga
16	Chela	Chela laubuca	41	Gedgedi	Nandus nandus
17	Salkona	Salmostoma baciala	42	Kanchanmati	Badis badis
18	Botia	Botia derio	43	Tilapia	Oriochromis
19	Botia	Lepidocephalus	44	Khanduli	Notopterus
20	Bali botia	Nemacheilus botia	45	Chital	Notopterus chitala
21	Bogitingra	Mystus cavarius	46	Gangatop	Tetradon kutkutia
22	Kalitingra	Mystus vittatus	47	Bami	Mastacembulus
23	Aari	Aoerichthys	48	Turi	Macronagtus
24	Magur	Clarius batracus	49	Cuchia	Amphiopnus
25	Singhi	Heteropneustus			

Source: Borthakur, R. 2008

Dora beel wetland act as habitat for fish, birds, reptiles and amphibians many of which are of economic value in terms of subsistence and commercial fishing, hunting and trapping. Community fishing is also carried out in the wetland for economic purpose.

But the biodiversity of the wetland is degrading day by day due to various human activities like agricultural activities, extension of residential area due to excessive population growth, habitat destruction by overgrazing, poaching, excessive hunting, trapping and killing of birds, over exploitation of fish fauna; aquatic plants, etc. reduce the biological diversity of the wetland and degrade its ecological condition. Since, human are the modifier of this resource, it is their duty to protect and preserve them by formulating appropriate measures and policies for their sustainable management.

Thus there is an urgent need for their conservation. The changing land use system and so also the livelihood has a great impact to the degrading biodiversity of the wetland which is a matter of



concern. Thus it would be beneficial to bring the local people/community to monitor and manage these ecosystems and save them from the irreparable damage caused due to lack of our concern.

## CONSERVATION AND MANAGEMENT

The wetlands are very complex and fragile ecosystems. Because of their importance, their beauty, their religious and cultural significance, and their relative vulnerability to degradation, wetlands require more concerted attention (Parikh and Datye, 2003).

There is, therefore an urgent need for their conservation and management. The governments all over the world have now formally adopted the sustainable development policy objective to protect the wetlands. They have also imposed a range of national conservation measures and designations which complements the Ramsar Convention.

The Ministry of Environment and Forests, Government of India, is entrusted with the responsibility of conservation and management of wetlands. The scheme on conservation and management of wetlands was initiated in 1987 with the following objectives:-

- 1) To lay down policy guidelines for implementing programs of conservation and management of wetlands in the country.
- 2) To undertake priority wetlands for intensive conservation measures.

Even though the conservation and management of wetlands is of utmost importance but it has received insufficient attention in Assam. However in recent times the government has implemented certain laws to protect this degrading resource.

There are various steps which are ensured by the government agencies for the conservation and management of wetlands. They are as follows:-

1. To identify the various problems associated with a wetland.
2. Mapping the wetlands after proper identification and field survey.
3. To establish principles for wetland resource utilization on a sustainable basis.
4. To stop the conversion of wetlands for other purpose and to protect them from degradation.
5. Conservation and management of the wetlands should be done through proper landscape planning and by taking into account the wetland hydrology.
6. Application of scientific techniques for aquatic weed control.
7. To create environmental awareness among the local people.
8. To involve the local community in the conservation and management of wetlands.



9. Adopting sufficient measures for controlling the level of pollution.
10. To take measures for wildlife conservation in the wetland.
11. Adopt suitable plans for sustainable fisheries development.
12. Application of Environmental Impact Assessment for identifying, predicting and mitigating the impact of any development work within the boundary of a wetland.

The conservation and management of the wetland is very essential since they play an important role in regulating and improving the water quality, controlling floods, supporting diverse flora and fauna, recharging aquifers and reduced surface run-offs.

### **PROBLEMS AND SUGGESTIONS**

Wetlands which were once considered as 'unproductive wastelands' are now considered as an important natural resource having immense potential. Wetlands are now viewed as valuable ecosystems that play an important role in maintaining environmental quality, sustaining livelihoods and supporting biodiversity (Mc Cartney, 2005). Unfortunately, at present they are one of the most threatened habitats plagued by many problems. The wetland face both natural and anthropogenic problems.

Some of the problems faced by Dora Beel are as follows

- 1) The local people are not aware about the importance of this valuable resource
- 2) The local people do not have much knowledge about the need for conservation and proper management of the wetland.
- 3) Economic backwardness of the villagers which leads to overexploitation of wetland resources and indiscriminate fishing and hunting, trapping and killing of aquatic birds
- 4) Population pressure leading to large scale encroachment within the beel area.
- 5) The construction of dykes and embankment on Gumi River has degraded the condition of Dora beel. It has affected the migration of fishes in both the wetlands. These construction activities have closed the inlet mouth of the wetland from the rivers which forms the chief source of productive fisheries bed in the region.
- 6) Siltation: Siltation is an important problem of Dora beel. The wetlands are connected with channels which are subjected to continuous Siltation during floods. This degrades the quality of the wetland. Siltation leads to loss of physical and productive life of a wetland. In Assam 70% of the floodplain wetlands will lose their physical life within a span of 30 years and only 6% will continue life till 70 years. Only about 4% wetlands may continue their productive life beyond 100 years (Goswami, 2005). The causes of Siltation are high fluvial allochthonous discharge, human interference and autochthonous



input of macrophytes. Allochthonous materials enter from outside the system and include leaf litter and man's organic wastes.

- 7) Fragmentation of the wetlands by newly constructed roads: Dora beel is fragmented by few newly constructed roads under ENREGA. These activities may cause an alteration in the hydrology and elimination of sediment nourishment.
- 8) Lack of adequate sanitary facilities: Lack of adequate sanitary facilities is polluting the environment of Dora Beel. Even though there are some facilities but they are inadequate for the huge population. It has created an unhygienic condition in the area surrounding the wetland.
- 9) Agriculture: Agriculture is practiced in the Dora Beel during the winter season. There is fluctuation of the water level in summer and winter. During the summer season a large area is covered by water and during winter season it shrinks to such an extent that only a small core water-spread area is left. So, during winter, cultivation is done and the wetland becomes a grazing ground for cattle. These agricultural practices lead to the degradation of the wetland ecosystem. It is also a threat to fish fauna.

The above mentioned problems can be mitigated through some concrete effort of the government machinery, NGO's and the local people. The following measures have been suggested to eradicate these problems:-

1. Efforts should be made to educate the local people and create awareness among them about the importance and the need for conservation and management of these valuable wetlands.
2. Alternative means of livelihood should be generated for the people who depend upon the wetlands for their survival. This will reduce the exploitation and killing of fish and avian fauna.
3. Steps should be taken to protect the wetlands from encroachment and strict laws should be implemented for their protection from illegal encroachment.
4. The eradication of weeds in a scientific manner should be taken up so that it may increase nutrient status and phytoplankton density.
5. Adequate infrastructure should be provided to the people so that the beel environment is not polluted.
6. Ecotourism potential of the wetland should be enhanced so that it may create job opportunities for the poor local people and also help in generating revenue for the maintenance, conservation and management of the wetlands.



7. The ornamental flora and fauna provides great economic potentials. So they should be protected and strategies should be formulated for gaining economic benefits.

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