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Changing Status of Wetland Environment: A Case Study of Morikolong Beel of Nagaon District, Assam

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Abstract:

Wetlands are one of the crucial natural resources. Nagaon district of Assam is endowed with rich wetland resources. These wetlands areas have been recognized traditionally as valuable resource for food and fodder production. Besides these wetlands can support aqua culture, grazing, provide habitat for harvestable plant and animal species. Morikolong beel is one of the ox-bow lake shaped of the wetland of Nagaon district which lies in the central part of the district. The Morikolong beel is located between 26° 15/41' N to 26° 20/34' N and 92° 36/46' E to 92° 44/43' E. The increasing population growth of the district stresses upon the land use pattern of wetland environment and therefore several developmental activities has been taking place in the surrounding wetland environment of Morikolong Beel. In this way wetland areas of Morikolong beel has been decreased day by the day and the natural ecosystems have lost much of their original character, leading to reduce biodiversity and reduce performance and productivity. Hence, the present paper is an attempt to identify what changes have been taking place under the influence of several developmental activities and to suggest conservative plans. The changes have been identified based on the comparison of topographical map, different period of remote sensing data, Google earth image and field data.

Keywords: Wetland environment, land use pattern, estimating change, management plan.

1. Introduction

Wetlands are the most important ecosystem on the earth and they play vital link between land and water. They are the corridors through which life evolved and prospered. Generally, Wetland is defined as which is transitional between terrestrial and aquatic system where the water table is usually at or near the surface or the land is covered by shallow water. The Internationally accepted wetland definition was given by Ramsar Convention in 1971. According to Ramsar convention wetlands are areas of marsh, fen, peat land 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 to the depth of which at low tide does not exceed six meters. Wetlands are the areas of seasonally, intermittently, or permanently waterlogged soils or inundated land, whether natural or artificial, fresh or saline, e.g- waterlogged soils, ponds, lakes, swamps, tidal flats, rivers and their tributaries (Wetland Advisory Committee, 1977). Wetlands consider as the 'kidneys' of the biosphere as they moderate the flow of nutrients and silt from land to water by trapping them. Wetlands are one of the most threatened habitats of the world. Now a days Wetlands are increasingly facing several anthropogenic pressures. The rapidly expanding human populations, large scale changes in land use/ land cover, development projects and improper use of watersheds have all caused a substantial decline of wetland resources of the country. Due to various industrial, agricultural and urban developments have created tremendous pressure on wetlands and in this way the natural ecosystems have lost much of their original character, leading to reduce biodiversity and reduce performance and productivity.

2. Location of Study Area

Morikolong beel lies in the central part of the Nagaon District. The Morikolong beel is located between 26° 15/41' N to 26° 20/34' N and 92° 36/46' E to 92° 44/43' E. Morikolong beel one of the ox-bow lake shaped wetland of Nagaon district. Morikolong beel spread from Nagaon town which includes with urban area and it extends upto Morikolong Barghat which is basically fall in rural area. Originally Morikolong beel was linked with Puta Kolong and Milanpur fisheries. Morikolong beel were formed by the shifting courses of river Kolong. The total area of Morikolong beel approximately 578099 sq. m in 2014. The NH 36 passes nearby in the eastward side of Morikolong Beel.

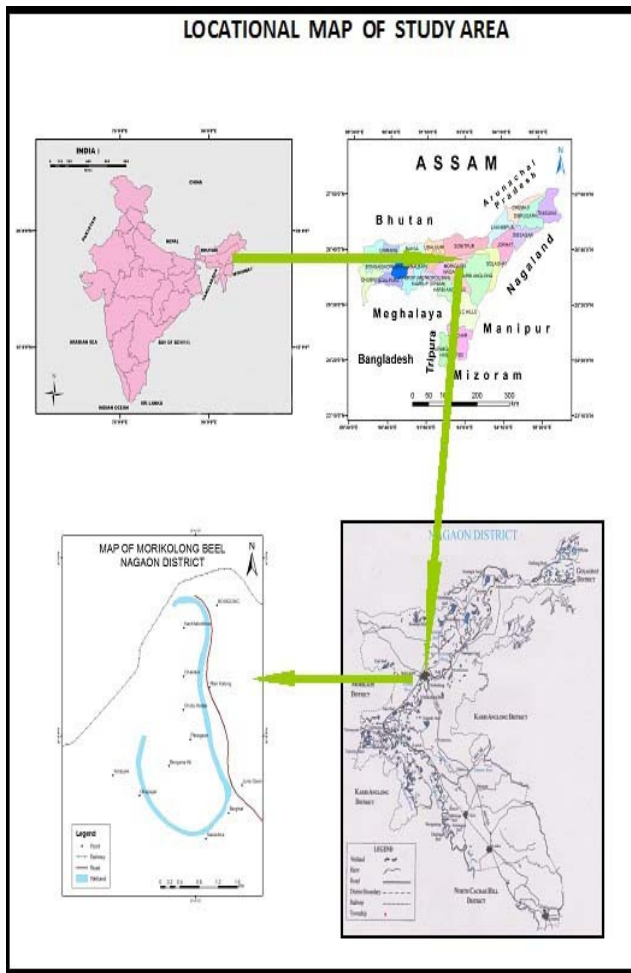


Figure 1: Location map

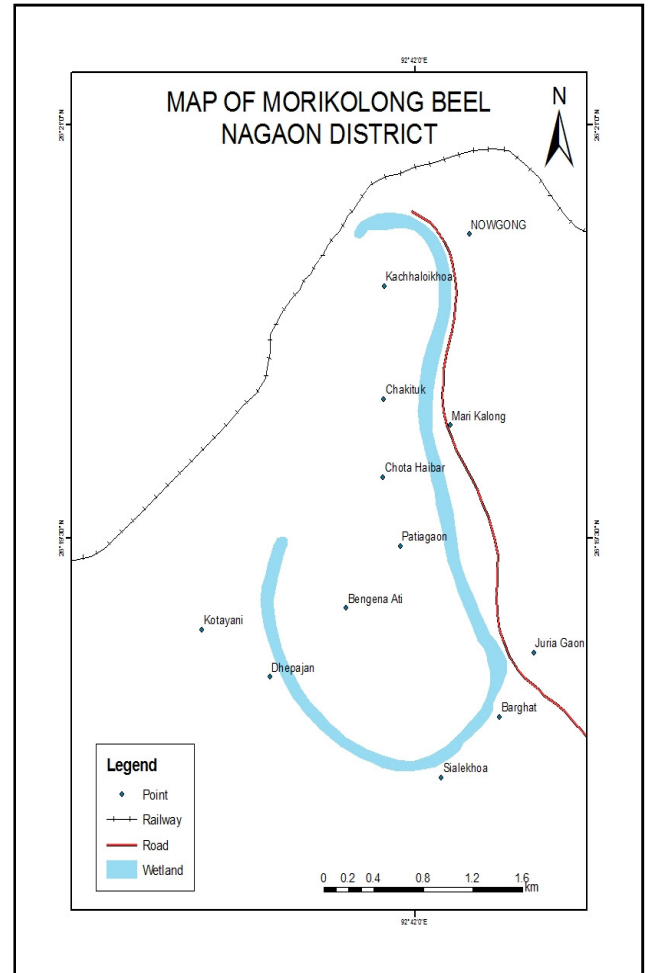


Figure 2: Base map of the study area

2.1. Objectives

The main objectives of the study are:

- To identify the map extent of the area of Morikolong beel corresponding to the year 1987, 1991, 2006, and 2014
- To identify the type of changes that has been occurred over the considered years.
- To suggest measures for conservation of wetland

3. Database and Methodology

The base map of wetland will be prepared from survey of India Toposheet No 83B/11. Arc GIS 9.3 has been used for derivation of required results. Google Earth and ETM+ imagery has also been used to detect changing status. The imageries which are used for analysis include- LANDSAT TM Imagery of the year 1987, LANDSAT ETM+ Imagery of the year 1991, LANDSAT ETM+ Imagery of the year 2006, Google Earth Imagery of 2014, dated 4th September. Besides these qualitative and quantitative information has been collected from both primary and secondary sources.

3.1. Physical Background of the Study Area

Morikolong beel enjoys hot-wet summer and cool-dry winter. The temperature of these area drops to minimum of 8^oc and raises up to maximum of 34.3^o C. The average annual rainfall is about 1514.44 mm. June, July, August and September are the wettest months. On the other hand, December and January record the minimum rainfall. During dry season depth of the water of Morikolong beel remains at 2 meters but it raises up to 4 meters during monsoon.

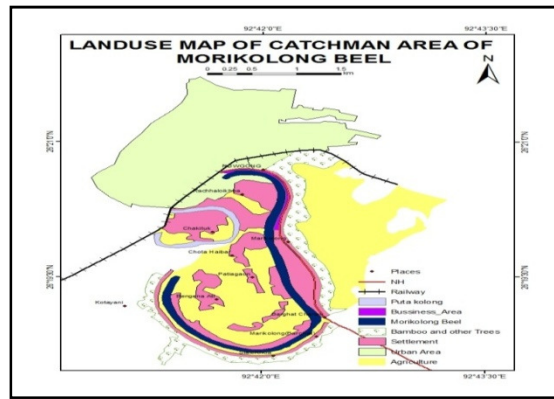


Figure 3: Landuse map

3.1.1. Landuse

Various landuse patterns has been seen in the catchment area of Morikolong beel which include – agriculture, commercial area, residential area, and some area covers by bamboo and other trees. The ever growing landuse changes have caused the shrinkage of wetland area.

3.2. Biodiversity of Wetland

Various types of flora and fauna are found in Morikolong beel.

Flora: Morikolong beel is rich in floral diversity. Some of the flora found in Morikolong beel is given in following table:

Local Name	Plant Name
Bih Meteka	Eichornia crassipes
Dal Ghah	Nymeneche assamicanith
Boss	Acorus Calamus Linn
Kuhila	Aeschynomene aspera Linn
Jora	Alpinia galanya
Kola Kochu	Alocasia fornicate schott
Mati Kanduri	Alternanthera sessile
Guri Puni	Azolla Pinnata
Kona Simalu	Commelina benghalensis Linn
Keheraj	Eclipta Prostrata
Kalmou	Jpomoea aquatic Forsk
Sorupuni	Lemna Perpusilla Journey
Pani Meteka	Monocharia vaginalis
Pani Likosi	Najas indica(will) eham
Bhet	Nymphaea Stellata Willd
Bihlongoni	Polygonaceae
Leheti	Renunculus sceleratus Linn

Table 1: Floral Diversity

Source: Field Survey and P. Sharma

Fauna: Morikolong beel rich in faunal diversity include various types of aquatic birds and fishes. But due to several anthropogenic activities create threat to reduce these diversities.

Birds: The dominant aquatic birds found in Morikolong Beel include-

Local Name	English Term	Scientific Name
Sarali Hah	Whistling Duck	Dendrosygna javanica
Samukvanga	Openbill stork	Anastomus
Bogoli	Cattle egret	Bubulcus
Dolghora	Grayheaded lapwing	Vanellus cinereous
Pani kauri	Little Cormorant	Phalacrocorax
Masruka	Kingfisher	Alcedo atthis
Dawk	White breasted waterhen	Amaurosis phoenicurus
Dolmoura	Red walted lapwing	Venellus indicus

Table 2: List of bird species

Source: Field Survey

Images (Aquatic Vegetation)

Nellumboo nucifera



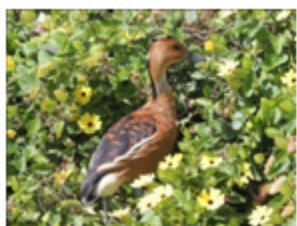
Salvania natans



Nymphaea Stellata



Willd Monocharia vaginalis

Images (Birds)

Whistling duck



Little cormorant



Kingfisher



Asian open bill

Figure 4

Fishes: Various types of fish species are found in Morikolong beel which are listed below in the table

Local Name	Scientific Name
Puthi	Puntius Chola
Moa	Amblypharyngodon mola
Darikona	Brachydanio rerio
Kandhuli	Notopterus
Singi	Heteropneustes
Magur	Clarius batrachus
Kawoi	Anabas testudineus
Sal	c.marulius
Soul	C.stariatus
cuchia	Monopterus cuchia
Kholihona	Colisa fasciatus
Goroi	Channa punactatus
Turi	Macrogonatus aculeatum
Patimutura	Glosogobius giuris

Table 3: list of fish species

Source: field survey

4. Surrounding Villages and Its Population Structure of Morikolong Beel

Morikolong beel surrounded by several villages Viz. Kachalukhuwa, Morikolong, Bengena Ati, Mahrul, Nampathori and northern part of the beel falls in Nagaon town. The increasing trend of population growth creates tremendous pressure on this beel. Some part of the beel converted into settlement purpose.

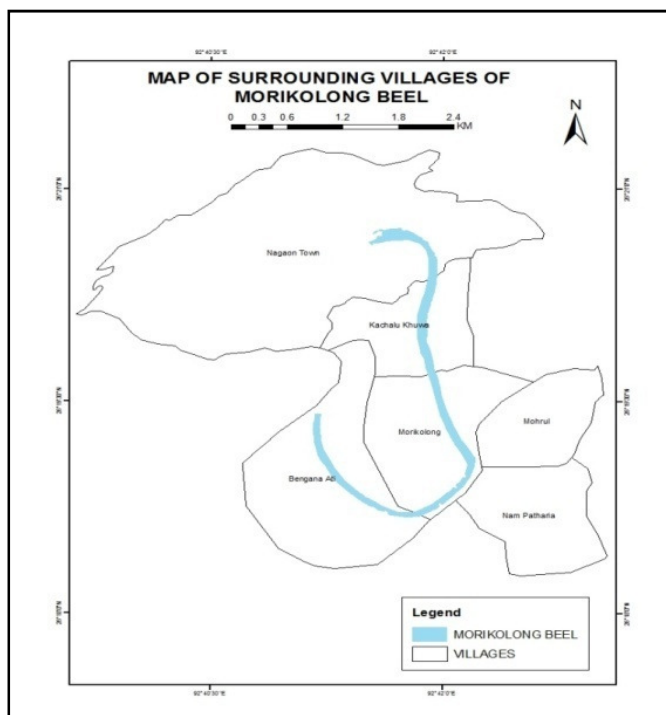


Figure 5: Surrounding villages of Morikolong beel

Village Name	Population 2001			Population 2011		
	Total Population	Male	Female	Total Population	Male	Female
Nagaon town	108786	56815	51371	121628	61642	59986
Kachalu Khuwa	830	461	369	2917	1493	1424
Morikolong	1552	784	768	2064	1001	1063
Bengana Ati	3341	1700	1641	4158	2129	2029
Mahrul	378	193	185	410	219	191
Nampathori	188	101	87	238	128	110

Table 4: Population structure of surrounding villages of Morikolong Beel
Source: Population Census Atlas

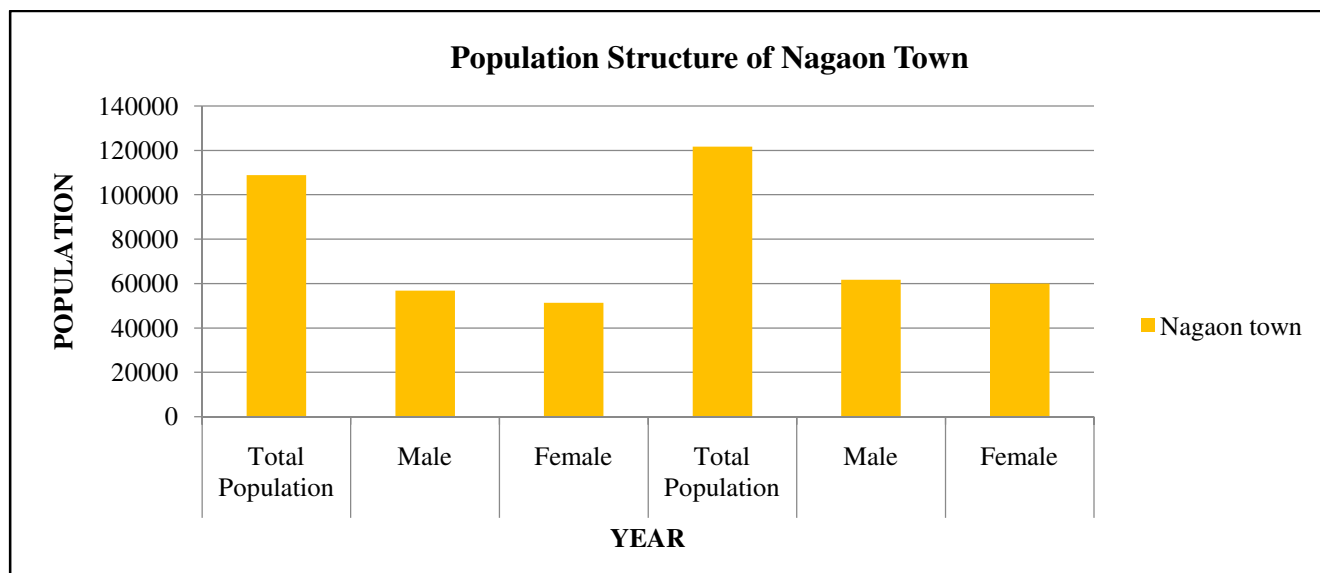


Figure 6: Population Structure Nagaon Town

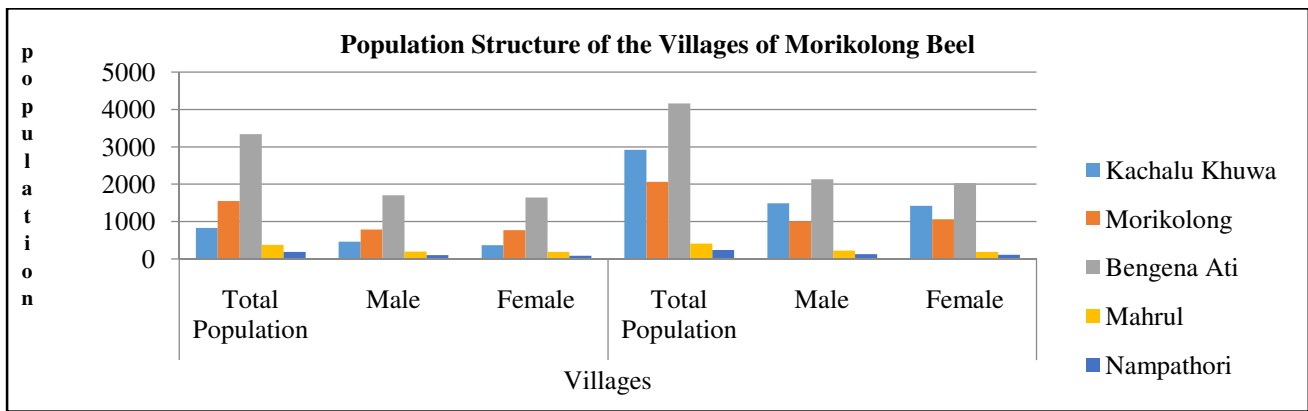


Figure 7: Population Structure of surrounding villages

4.1. Areal Change of Morikolong Beel from 1987 – 1991

In the present study it is found that the area of the Morikolong beel in 1987 was 80.49hac which is decrease to 79.53 hec in 1991.

AREA	1987 (Area in hectare)	1991 (Area in hectare)
		80.49

Table 5: Areal change of Morikolong Beel from 1987-91 Hactare

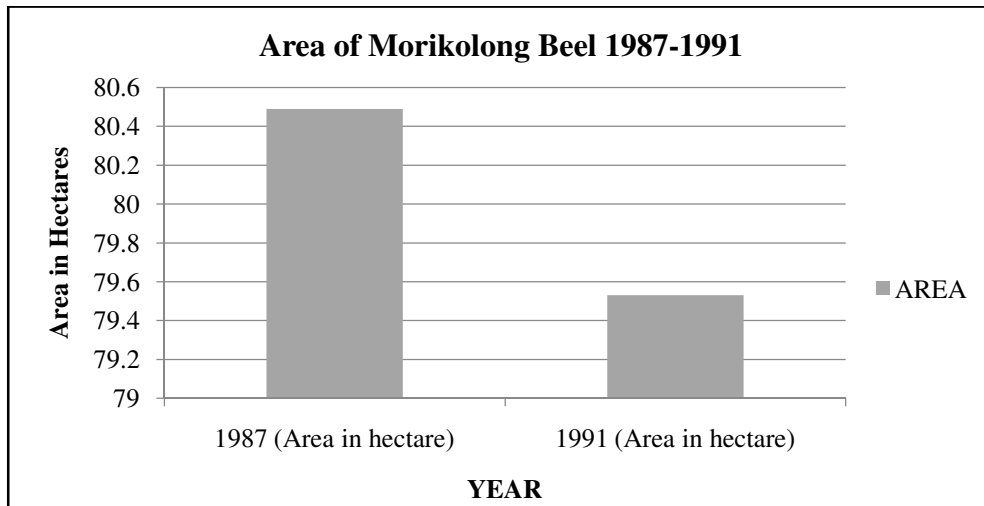


Figure 8: Areal change of Morikolong Beel from 1987-91

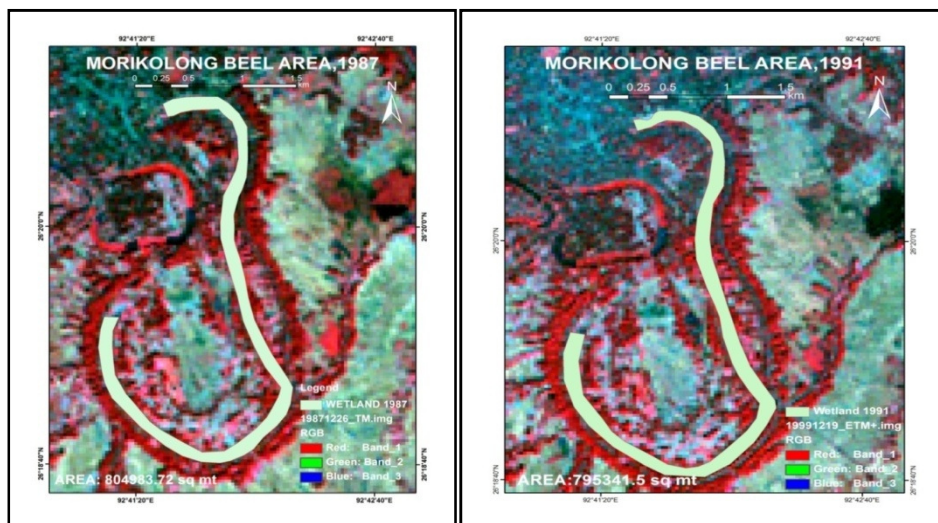


Figure 9: Areal extension of Morikolong Beel from 1987-91

4.2. Areal Change of Morikolong Beel from 1991 – 2006

Due to the encroachment of wetland area, the total area of the wetland decrease rapidly. In 1991, the total area of Morikolong beel was 79.53hac. But it decreases to 68.84hac. in 2006.

AREA	1991 (Area in hec)	2006 (Area in hec)
		79.53

Table 6: Areal change of Morikolong Beel from 1991-06

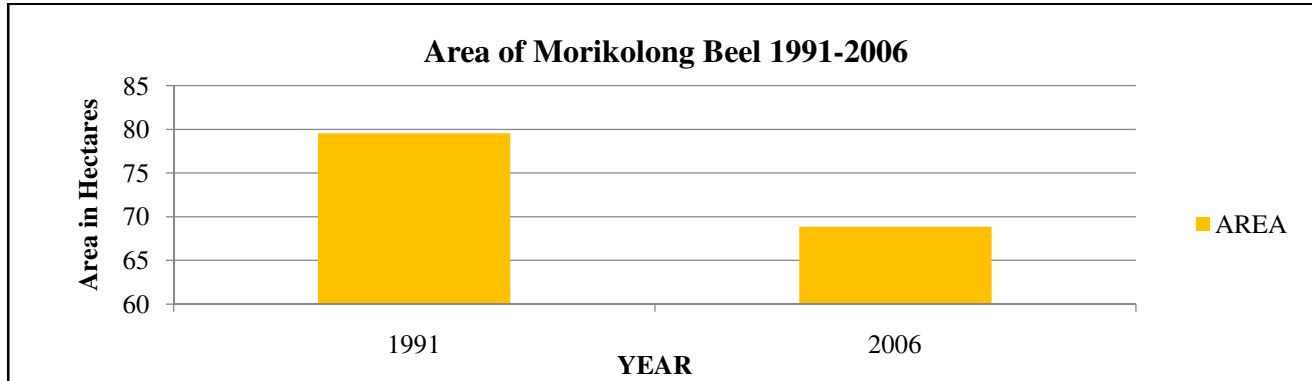


Figure 10: Areal change of Morikolong Beel from 1991-06

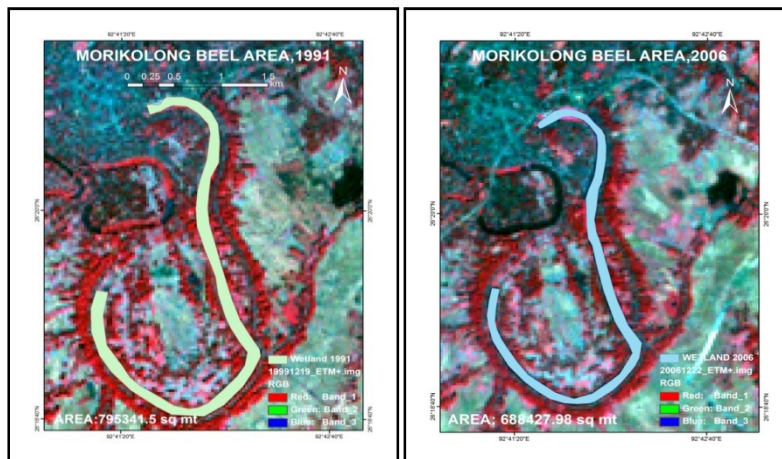


Figure 11: Areal extension of Morikolong Beel from 1991-06

4.3. Areal Change of Morikolong Beel from 2006 – 2014

Northern part of Morikolong beel falls in urban area other parts of the beel fall in rural area. Due to the development activities took place in the nearby places of the beel, the areal extent of the beel decrease day by day. In 2006 the total area of the beel was 68.84hac. but it decreases to 57.80hac. in 2014.

AREA	2006 (Area in hec)	2014 (Area in hec)
		68.84

Table 7: Areal change of Morikolong Beel from 2006-14

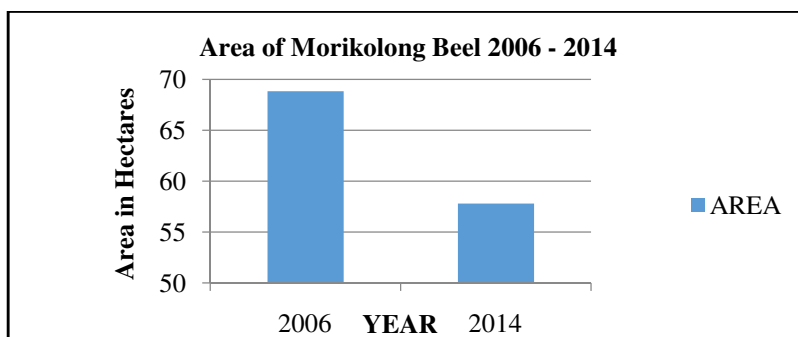


Figure 12: Areal change of Morikolong Beel from 2006-14

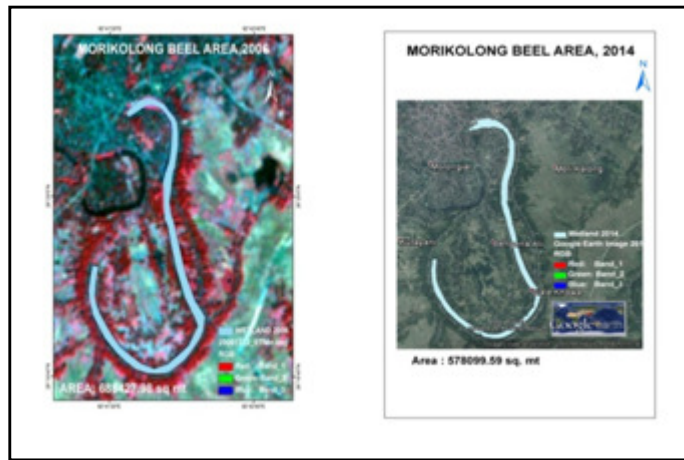


Figure 13: Areal extension of Morikolong Beel from 2006-14

4.4. Areal Extension of Morikolong Beel

From the Table 8 it is clear that the area of the Morikolong beel shows in a decreasing trend. From 1987 the area was 80.49 hac which decreases to 57.80 hac in 2014.

AREA	1987 (Area in hac)	1991 (Area in hac)	2006 (Area in hac)	2014(Area in hac)
	80.49	79.53	68.84	57.80

Table 8: Areal change of Morikolong Beel from 1987-2014

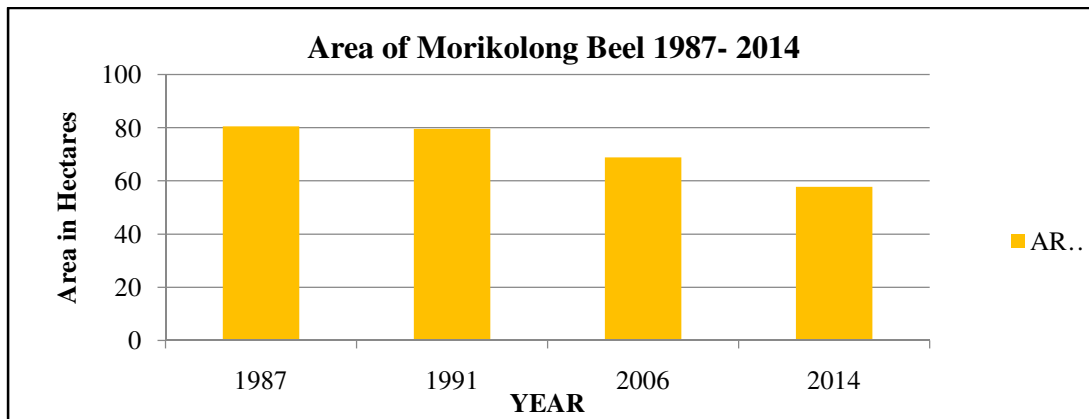


Figure 14: Areal change of Morikolong Beel from 1987-2014

4.5. Superimposed the layer of Morikolong Beel in Google Earth Image to Find out the Change

When superimposed the layer of 1987 and 2014, it is found that some part of the beel converted into business area, residential area and agricultural land. This change finds out from the analysis of Google Earth Image. The converted area of the beel is given in the tabular form.

Type	Changing area in hac (1987-2014)
Agricultural land	15.38
Market area	2.61
Settlement area	10.93

Table 9: Converted area of Morikolong Beel from 1987-2014

Again superimposed the layer of 2006 and 2014, from this it is found that some part of the beel converted into agricultural land, market area and residential area. The converted area of the beel is given in tabular form.

Type	Changing area in hac (2006-2014)
Agricultural land	7.69
Market area	0.8101
Settlement area	2.43

Table 10: Converted area of Morikolong Beel from 2006-2014



Figure 15: Superimposed layer of Morikolong Beel in Google earth from 1987-2014

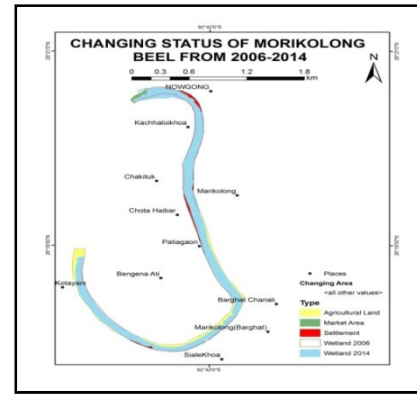


Figure 17: Superimposed layer of Morikolong Beel in Google earth from 2006-2014

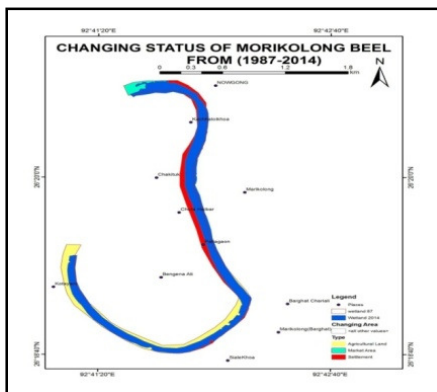


Figure 16: Converted area of Morikolong Beel in Google earth from 1987-2014

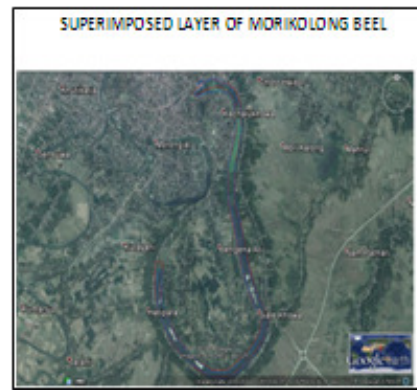


Figure 18: Converted area of Morikolong Beel in Google earth from 2006-2014

4.6. Anthropogenic Pressure and Degradation of Wetland Ecology

From the above discussion it is revealed that several anthropogenic activities which include agricultural, industrial and construction of buildings have created tremendous pressure on wetland environment which leads to threat upon wetland ecology. In this way wetland environment is being degraded day by day and several types of flora and fauna are extinct from the beel. In the northern most part of the beel mostly falls in urban environment and in this part wetland has been shrinkaged near about 2.61 hac land from 1987 to 2014. It is due earth filling of wetland area for construction of bus stand and dumping ground for urban solid wastes. In the western most part where Kachhalukhuwa village has located some people has constructed several multi storied building above the wetland. Liquid effluents domestic sewages are throwing towards the wetland which may cause the degradation of wetland environment. During winter season when water level falls down several agricultural activities has taken place in neighbouring areas of the wetland by the local people. These agricultural activities may also have resulted towards degradation of wetland environment.

4.7. Management Plan for Wetland Environment

For wise use of wetland resources, it is very important to assess the impact of socio economic factors upon the wetland environment in regards of management plan (Miner-Gulland et al., 1998). For proper management of wetland resources several Steps should be taken to protect the wetlands from encroachment and strict law should be implement for their protection to illegal encroachment. Alternative means of livelihood should be generated for the people who depend upon wetland resources for their survival. It will reduce the exploitation of wetland resources and killing of fish and fauna. In Morikolong beel, large part of the area covered by water hyacinth is facing a major problem. The eradication of weeds from the beel on a regular basis should be taken so that it may increase nutrient status and phytoplankton productivity. This will help to increase fish productivity. Efforts should be made to educate the local people and create awareness about the importance of management and conservation of this wetlands. Successful management of wetland resources depends upon how properly concern authorities adopt appropriate plan and in what way it should be implemented (D. Sahariah 2012-13).

5. Conclusion

Wetland constitutes one of the most crucial natural ecosystem of the earth surface. If it is disturbed its ecological condition, it will be hamper to our environment. The above discussion reveals that the ecological condition of morikolong beel gradually degraded day by day. Due to human interference on the beel some part of the area of Morikolong beel converted into business area, residential area and agricultural land. The areal extension of the beel decrease day by day. Anthropogenic pressure also creates threat to biodiversity of

wetland resources. Ecotourism project should be developed in wetland areas so that it may create job opportunities for the local people.

6. References

- i. ARSAC (1997): Wetlands of Assam: A study using Remote sensing technique, Guwahati.
- ii. Bhaskar BP, Baruah U, Vadivelu S and Raja P and Sarkar D (2010) : Remote sensing and GIS in the management of wetland resources of Majuli Island, Assam, India , Tropical Ecology , PP-31-40.
- iii. Bora AK and Sahariah .D (2001): Soil and Water quality of the Barsola Beel of Guwahati : A Study in Urban wetland Environment, Indian Journal of Geomorphology, Vol. 6, No. 1 & 2, PP- 29-36.
- iv. Gopal .B and Sah .M (1995) : Inventory and classification of wetlands, vegetation, Vol. 118, No. 12, PP- 39-48.
- v. Kalita H.C (2006): Ph.D Thesis “Wetlands of Goalpara District, Assam: A study of their Physical and economic Characteristics.”
- vi. Kangalawe RYM and Liwenga ET (2005) : Livelihood in the wetlands of Kilombero Valley in Tanzania : Opportunities and challenges to integrated water resource management, physics and chemistry of the Earth 30, PP-968-975.
- vii. Kaur R (1999): Wetlands in Assam : Their value and relevance, The Sentinel, Guwahati, Assam.
- viii. Kimmage K and Adams WM (1992) : Wetland Agricultural production and River Basin Development in Hadejia Jama are valley, Nigeria, The geographical journal, Vol. 158, No. 1, PP-1-12.
- ix. Living wetlands: An Introduction to wetlands, water and Rivers commission April, 2001.
- x. .National Wetland Atlas, Assam.
- xi. Sahariah .D (2009): Ph.D Thesis: “Wetlands of the Brahmaputra Floodplain in Darrang District, Assam : A Fluvio-Geomorphic Study”.
- xii. Tiner, Ralph W. (1999) , Wetland Indicators- A Guide To Wetland Identificatio, Delineation, Classification, and Mapping. Lewis pulishers, Boca Raton New York Washington, D.C.