



# A study of plankton diversity in Kumri Beel, Goalpara, Assam, India

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## ABSTRACT

This study was carried out to assess the plankton diversity of Kumri beel, Goalpara district of Assam for a period of one year from April 2018 to March, 2019. Planktons were sampled in the morning hours between 6.00 and 8.00 AM by filtering 100 liters of water through standard plankton net of 70 micron ( $\mu$ ) mesh size. The samples were analyzed using Past software. The study revealed very rich diversity of phytoplankton including Chlorophyceae, Cyanophyceae, Flagellates, Euglenophyceae, Bacillariophyceae and Dianoplageletes and zooplankton including protozoan, Rotifer, Copepoda and Cladocera. The diversity indices analysis of Margalef D index, Shannon-Weiner and Simpson's index of diversity shows that monsoon season has the highest diversity than the other seasons whereas phytoplankton were highly dominated during the premonsoon season. Though the study revealed very rich diversity of population of plankton which indicates suitability to pisciculture the beel is under threat due to anthropogenic factors and in urgent need of conservation. Therefore strict implementation of fishery laws and permission of the brick industries should be totally restricted.

**Key words:** Anthropogenic factors, Diversity, Kumri beel, Plankton.

## INTRODUCTION

Plankton is a microscopic community of plants (phytoplankton) and animals (zooplankton), found usually free floating, swimming with little or no resistance to water current, suspended in water, non motile or insufficiently motile to overcome transport by currents. Apart from primary production, phytoplankton plays an important role as food for herbivorous animals and act as biological indicator of water quality. Zooplanktons are heterotrophic organisms that consume phytoplankton and regenerate nutrients via their metabolism and transfer energy to higher trophic levels (Tripathi et. al.

2006). Zooplanktons are often an important link in the transfer of energy from producer to carnivores (Singh et. al., 2013). Phytoplankton converts light energy into chemical energy through primary production which makes them very important in the food web. On the other hand, zooplankton plays an important role at consumer level and overall fish production in water body.

Goalpara district is very rich in wetlands. There are 11 registered and 64 unregistered beels. Out of these, the Kumri beel is an important freshwater wetlands harbouring a sizeable number of fish species and providing livelihood opportunities for local fishing communities. Several workers have studied limnology and plankton diversity of freshwater bodies in different regions (Goswami 1985; Goswami and Goswami, 2001; Sharma 2004, 2012, 2015; Bhuyan et. al., 2009). But the information on the diversity of plankton in Kumri beel is scanty. Hence the present study was undertaken to assess the diversity of plankton in Kumri beel along with the conservation status of the status of the beel.

## MATERIALS AND METHODS

### Study area:

The Kumri Beel is located in Goalpara district with 26°14' N latitude and 90°13' E longitude (Figure-1). The Beel covers an area of about 200 hectare.

### Plankton Sampling:

The study was carried out for a period of one year from April 2018 to May 2019. Planktons were sampled in the morning hours between 6.00 and 8.00 AM by filtering 100 liters of water through **standard plankton net** which is made up of bolting silk of 70 micron ( $\mu$ ) mesh size. The concentrate plankton biomass of 100 liters of sample water was transferred to a 30ml plastic bottle and fixed in 5 % formalin and identification of plankton were done in laboratory using standard identification keys from Needham & Needham (1962), Battish (1992) and Sudha (2012). The diversity of plankton were estimated in terms of species evenness, using Margalef D index, Shannon-Weiner and Simpson's index and bootstrap method was used to calculate 95% confidence intervals. The analyses were performed using Past software for plankton species Park et al. (2008).



Figure 1: Study sites

## RESULTS AND DISCUSSION

The study revealed highest number of phytoplankton from Bacillariophyceae (20 species) and lowest from Dianophyceae with only one species. Analysis of Shannon Weinner index of diversity in different season for phytoplankton showed that the retreating monsoon season was more diverse than the premonsoon, winter and monsoon season. Margalefs D and Simpson D index also indicate that the retreating monsoon season was more diverse and species richness was also high. Though the diversity index was higher during retreating monsoon the evenness was highest during monsoon season (Table-1).

The study revealed that zooplankton population was dominated by protozoan group followed by copepod, rotifer and cladocera. Maximum numbers of zooplankton were recorded during retreating monsoon and monsoon season. Shannon Weinner index of diversity in different season for zooplankton showed that the retreating monsoon season was more diverse than the other season. Margalefs D and Simpson D index also indicate that the retreating monsoon season was more diverse and species richness was also high. Though the diversity index was higher during retreating monsoon the evenness was highest during winter season (Table-2).

Planktons play a significant role in determining the productivity of a water body. The qualitative and quantitative abundance of plankton are dependent on the environment and the impacts of plankton generally reflect on the growth and survival of the fish fauna. Phytoplankton forms the basic link of food chain in the aquatic ecosystem. The metabolic activities of these organisms depend on the physico-chemical factors of the aquatic environment. All the dynamic features of water bodies like colour, clarity, trophic state, zooplankton and fish production depend to a large extent on phytoplankton (Horne and Goldman 1994). Zooplankton abundance can give an index of fertility of aquatic environment and fishery potential as they play an important role as a source of food for higher organisms including fish. Variations in temperature of water body influenced the productivity of zooplankton. The density of zooplankton is chiefly dependent upon the abundance of phytoplankton. Seasonal variation in the plankton diversity was also recorded during the study period. During the present study, highest numbers of zooplanktons were reported during the retreating monsoon season. Similar observations were also made by Jitendra Kumar et al., (2017), Singh et al., (2017) and Karunesh singh et al., 2019. The results of the study indicate that the Kumri beel is very rich in terms of planktonic diversity which indicates its suitability for pisciculture.

**Table-1: Phytoplankton diversity in different seasons recorded during the study period from Kumri beel (Results in parenthesis were significantly higher than other at 5% level)**

Diversity Indices	Premonsoon	Monsoon	Reatreating Monsoon	Winter
Dominance_D	<b>0.38</b>	0.24	0.29	0.33
Simpson_1-D	0.61	0.55	<b>0.70</b>	0.66
Shannon_H	1.36	1.07	<b>1.64</b>	1.35
Evenness_e^H/S	0.58	<b>0.80</b>	0.70	0.64
Margalef	0.96	0.98	<b>1.99</b>	0.89

**Table-2: Zooplankton diversity in different seasons recorded during the study period from Kumri beel (Results in parenthesis were significantly higher than other at 5% level)**

Diversity Indices	Premonsoon	Monsoon	Reatreating Monsoon	Winter
Dominance_D	0.29	0.30	0.31	<b>0.34</b>
Simpson_1-D	0.68	0.69	<b>0.70</b>	0.65
Shannon_H	1.05	1.47	<b>1.58</b>	1.00
Evenness_e^H/S	0.70	0.89	0.87	<b>0.91</b>
Margalef	0.69	0.56	<b>0.97</b>	0.67

But due to over exploitation and water pollution the productivity of the beel might decrease. Similar observation was also reported by Nath and Deka (2012).

The ecosystems of Kumri beel are under serious threat due to natural and anthropogenic factors. Natural threats include siltation, decomposition of the organic matter in water and sediments by rain and sewage run-off. The degradation of the water quality of the beel is mainly due to anthropogenic pressure. The human activity on the beel has increased due to the rise of population which has caused destruction of the natural ecosystem. Water pollution resulting from dumping of garbage, drainage of sewage and waste product, surface run off carrying pesticides and fertilizers from the nearby crop fields, pollutants from the nearby brick industries etc. are matters of serious concern for the diversified organism of the beel including planktons. There is a gradual shrinkage in the size of the Beel due to the conversion of the land into agricultural land. This might eventually lead to the shortage of food for fishes finally hampering the fish production along with other biodiversity.

Therefore combined strategies for conservation of the water body are the need of the hour. This shall include, control of water pollution, promoting controlled harvest of fishes, awareness generation about the importance of the wetland and its biodiversity. But to make conservation meaningful participation of the local people is must. Therefore providing alternative livelihood to the local people of the study area is one of the prime importance..

### Conflict of Interest

The author declares that there is no conflict of interest.

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