A Study on Certain Physico-Chemical Parameters and Fish Resources of Tamranga Beel, Bongaigaon, Assam

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Abstract— Beels/ wetlands are the most productive and biologically rich ecosystem which provides a natural habitat to many aquatic plants and animals. Bongaigaon district of Assam situated in the northwestern part of Assam between 26°10' N and 26°45' N latitudes and 90°50' E and 91°00' E longitudes has a total 2.90 % of wetland area (Bhagawati et al.,2015) covering an area of 22149ha**.** Among the important beels in Bongaigaon district, Tamranga Beel is one of the most potential beel for fish resources having an area of 627 ha and it lies within the co-ordinates of N 26°18' -26°21'and E 90°33' - 90°35' and at an altitude of 36 m. In this study an attempt has been made to record different fish species available in the wetland along with certain physico-chemical parameters. From the water analysis, it is revealed that water temperature lies between 20^0c-13^0 c in March, 29^0 c- 23^0 c in July and 27.3^0c -18.9^0c in September whereas atmospheric temperature lies in between 23^0c -16^0c in March, 33.8^0c -28^0c in July and 29.5^0c- 21.2^0c in September. Further, pH was recorded as 7, 6.8 and 7.7 in March, July and September respectively, DO was found as 8.0, 6.7, 8.1 respectively in March, July and September and free carbon dioxide content was recorded as 3.5 mg L^{-1}, 5.5 mg L^{-1}, 3.8 mg L^{-1} respectively in March, July and September. In this study, total 54 species of fish belonging to 22 families were identified in Tamranga beel, of which 4 numbers of species are near threatened and one species is vulnerable.

Key words: Wetland, Vulnerable, Threatened, Biodiversity

I. Introduction

Wetlands are most productive and biologically rich ecosystem on earth and it holds a vast and varied repository of biodiversity, rich in fish, mammals, birds and other plants and animal species. (http:/www.igidr.ac.in). Due to the water filtration processes which occur at wetlands, they are sometimes referred to as the 'kidneys' of a catchment area (Mitch et al., 1986).

Wetland ecosystem services include Conservation of wildlife, Water detention, Improving water quality, Flood control, Erosion control, Groundwater aquifer recharge, Timber, thatch, medicine, food, fodder and fuel, Transport, Natural fire breaks, Education, Eco–tourism, Recreation etc.

All over the world, the wetlands are becoming wasteland gradually despite of their valuable functions by different natural and manmade activities. Therefore, the work has been considered to study few water quality parameters along with the fish resources in Tamranga beel of Bongaigaon District Assam.

II. Objectives of the Study

- Analysis of Physico-chemical parameters like DO, free Carbon dioxide, total alkalinity, pH.
- To record the different fish species available in the wetlands.
- To create awareness among the farmer about conservation and management of the beel.

III. Materials and Methods

A. Site of the Study

Tamranga Beel N C village is located in Boitamari Tehsil of Bongaigaon district in Assam, India. It occupies 2, 15,900 hectares of area. It is bounded on the east by Barpeta and on the west by Dhubri district. Chirang district is situated on its north, whereas mighty Brahmaputra is flowing along the southern part.

B. Collection of Water Samples

Water samples were collected from the different selected points of the beel and data were presented seasonally viz., pre-monsoon (March), monsoon (July), post monsoon (Sept). The study was carried out between March, 2016 and September, 2016. Standard Laboratory methods have been adopted for the analysis of water samples.

IV. Result and Analysis

Season	Temperature/ ^{0}C				pH	DO mg/lt	FC O_2 mg/lt	Alkalinity mg/lt
	Atmosphere		Water					
	Max	Min	Max	Min				
Pre monsoon	23.4±.62 (22.5-24.2)	17±.71 (16-18)	20.7±.39 (19.5-22)	13.44±.54 (12.7-14.2)	7±.37 (6.8-7.3)	7.8±1.4 (6-9)	3.6±.69 (3.2-3.9)	50.2±2.14 (49-53)
Monsoon	33.9±.80 (33-35.4)	28±.60 (27.3-29)	29.4±.60 (28.5-30.2)	23.16±.24 (22.8-23.5)	6.7±.17 (6.5-7.0)	6.6±.16 (6.4-6.9)	5.8±1.0 (5.5-6.0)	64.6±1.85 (62-67)
Post monsoon	29.6±1.32 (28.2-31.5)	21.9±.49 (21.2-22.5)	27.5±.55 (26.8-28.2)	19.2±.39 (18.9-20)	7.6±.10 (7.5-7.8)	8.3±.13 (8.1-8.5)	3.9±1.4 (3.8-4.2)	32.8±1.5 (29-37)

Table 1: The studied water parameters

Water temperature is a regulatory factor for all Physico-chemical parameters of a wetland. In this investigation, the result of atmospheric temperature lies between 23.4±.62 (22.5-24.2) and 17±.71 (16-18) 0 c in March, 33.9±.80 (33-35.4)0 c and 28±.60 (27.3-29)0 c in July and 29.6±1.32 (28.2-31.5) 0c and 21.9±.49 (21.2-22.5)0c in September and water temperature lies between 20.7±.39 (19.5-22) 0 c and 13.44±.54 (12.7-14.2) 0c in March, 29.4±.60 (28.5-30.2) 0 c- 23.16±.24 (22.8-23.5)0 c in July and 27.5±.55 (26.8-28.2) 0 c -19.2±.39 (18.9-20)0 c

in September in Tamranga beel. Fluctuation of water temperature was observed with the variation of air temperature, which was also earlier reported by Sarma et al., 2002, Kumar et al., (2009), Deka et al., 2011. Earlier studies of different workers also reported that temperature of the wetland of Tamranga, Doloni and Koyakujia are favourable for the fish growth and production. (Kalita et al., 2011, Das N., (2014), Bhagawati et al., 2015.

In this study pH was recorded in March, July and September and result was 7±.37 (6.8-7.3), 6.7±.17 (6.5-7.0) and 7.6±.10 (7.5-7.8) respectively in Tamranga beel. pH of the wetland shows that the wetland is productive wetland. Earlier literature of different authors also reported that the pH of beel waters in Assam lies in between 6.28-7.4 (Vass K K, 1989). Kalita et.al. 2011 also reported that monthly average concentration of pH was from 6.0 to 8.9 with a mean value of 6.8 in Koya kujia beel.

Dissolved oxygen content of the water also recorded in March, July and September in the studied wetlands and it was found that 7.8±1.4 (6-9), 6.6±.16 (6.4-6.9), 8.3±.13 (8.1-8.5) respectively in Tamranga beel, It is also observed that the Dissolved oxygen in the water of the wetland lies in between 6.6-8.3, which is good for aquaculture and suitable breeding and rearing ground for fishes. Previous workers also reported that pH in between 6-8 of any wetland is sign of good environmental health of any wetland. Variations of dissolved oxygen content was reported earlier by the study of kalita et al., 2011 from 4.2 mg L-1 to 9.0 mg L-1 with a mean value of 5.7 mg/ L in Koya kujia and 8.82 to 14.11 mg/L-1 was reported in Tamranga wetland by Bhagawati el.al., 2015.

The free carbon dioxide content in water of the wetland is recorded in different seasons, like in March, July and in September and found 3.6±.69 (3.2-3.9) mg L-1, 5.8±1.0 (5.5-6.0) mg L-1 and 3.9±1.4 (3.8-4.2) mg L-1 respectively. It is also observed that when water bodies are submerged heavily with aquatic weeds, FCO2 was found in increasing trend. In Tamranga beel, water weeds cannot deposit for a long time and it is seen that the water of the wetland are clear with low level of FCO2, which is significant for fish production.

Total alkalinity plays an important role in fresh water ecology. Average value of total alkalinity of the wetland was recorded in March, July and September and found as 50.2±2.14 (49-53), 64.6±1.85 (62-67) and 32.8±1.5 (29-37) mg L-1 respectively. The range of TA in the studied wetland was recorded, which shows the wetland is a productive wetland.

Bhuyan (1970), Dey (1981) and Lahon (1983) recorded increase in free carbon dioxide and decrease in total alkalinity and decrease in carbon dioxide value with the increase in the alkalinity in different freshwater lakes and beels of Assam. Deka P., 2012, Tripathi. P., and Dwivedi A.P., 2016, noticed that higher the temperature lower the oxygen content of water.

Das (2002) stated that dissolved oxygen acted as a regulator of metabolic processes of aquatic plants and animals and indicator of water condition.

In this study, fishes were collected from the fishermen and the lessee of the beel and were identified on spot and in laboratory by following standard methodologies (Talwar and Jhingran, 1991, Vishwanath, 2002).

Sl. No.	Scientific Name	Family	Local Name	IUCN 2016 Status
1	Notopterus notopterus	Notopteridae	Kanduli	Least Concern
2	Chitala chitala	Notopteridae	Chital	Near Threatened
3	Gudusia chapra	Clupeidae	Karati	Least Concern
4	Wallago attu	Siluridae	Borali	Near Threatened
5	Mystus vittatus *	Siluridae	Tengra	Least Concern
6	Hemibagrus menoda	Bagridae	Gagol	Least Concern
7	Sperata seenghala	Bagridae	Ari	Least Concern
8	Sperata aor	Bagridae	Bhew	Least Concern
9	Labeo rohita	Cyprinidae	Rahu	Least Concern
10	Labeo gonius	Cyprinidae	Kurhi	Least Concern
11	Labeo calbasu	Cyprinidae	Kaliajora	Least Concern
12	Labeo bata *	Cyprinidae	Bata	Least Concern
13	Cirrhinus reba*	Cyprinidae	Lachim Bhagoan	Least Concern
14	Cirrhinus mrigala	Cyprinidae	Mirika	Least Concern
15	Gibelion catla	Cyprinidae	Bhakua	Least Concern
16	Hypopthalmichthys molitrix	Cyprinidae	Silver carp	Near Threatened
17	Hypopthalmichthys nobilis	Cyprinidae	Bighead Carp	Data Deficient
18	Ctenopharyngodon idella	Cyprinidae	Grass Carp	Not Evaluated
19	Salmophasia bacaila *#	Cyprinidae	Chelakani	Least Concern
20	Cyprinus carpio	Cyprinidae	Common carp	Vulnerable A2ce
21	Barilius bendelisis*	Cyprinidae	Bariola	Least Concern
22	Rasbora daniconius*#	Cyprinidae	Shalynnai	Least Concern
23	Esomus danrica*	Cyprinidae	Dorikona	Least Concern
24	Amblypharyngodon mola *#	Cyprinidae	Moah	Least Concern
25	Puntius chola *#	Cyprinidae	Puthi	Least Concern
26	Pethia ticto *#	Cyprinidae	Puthi,	Least

				Concern
27	Puntius sophore *#	Cyprinidae	Puthi	Least Concern
28	Puntius javanicus*#	Cyprinidae	Java Puthi	Least Concern
29	Oreochromis Mossambicus#	Chiclididae	Japani Koi	Near Threatened
30	Glossogobius giuris*#	Gobiidae	Balia/pani mutura	Least Concern
31	Anabas testudineus#	Anabantidae	Kaoi	Data Deficient
32	Lepidocephalichthys guntea *	Cobitidae	Botia	Least Concern
33	Canthophrys gongota*	Cobitidae	Ganga	Least Concern
34	Botia dario *	Cobitidae	Batia	Least Concern
35	Eutropiichthys vacha *	Schilbeidae	Bacha	Least Concern
36	Clarias batrachus#	Claridae	Magur	Least Concern
37	Heteropneustes fossilis#	Heteropneustidae	Singhi	Least Concern
38	Chaca chaca *	Chacidae	Devil Fish	Least Concern
39	Xenontodon cancila*	Belonidae	Kakila	Least Concern
40	Monopterus cuchia	Synbranchidae	Kuchia	Least Concern
41	Nandus nandus*#	Nandidae	Bhada/ Gadgedi,	Least Concern
42	Badis badis*	Nandidae	Bharirtala	Least Concern
43	Tetraodon cutcutia*	Tetraodontidae	Gangatope	Least Concern
44	Chanda nama*	Ambassidae	Chanda	Least Concern
45	Parambassis ranga*	Ambassidae	Chanda	Least Concern
46	Mastacembelus armatus*	Mastacembelidae	Ghutum / Tora	Least Concern
47	Macrognathus panculus*	Mastacembelidae	Ghutum / Tora	Least Concern
48	Trichogaster fasciata*#	Osphronemidae	Kholisa	Least Concern
49	T. lalius *#	Osphronemidae	Kholisa	Least Concern
50	Macroganatas aral*	Macroganthidae	Tora	Least Concern
51	Channa marulius*#	Channidae	Sal	Least Concern
52	C. punctata *#	Channidae	Goroi	Least Concern
53	C. striata#	Channidae	Shol	Least Concern
54	C. gachua*#	Channidae	Cheng	Least Concern

Table 2: List of fish available in the beels
*: Classified Ornamental fish, #: Larvivorous fish

In this study total 54 species of fish belonging to 22 families were identified in Tamranga beel, where 4 numbers of species are near threatened and one species are vulnerable. The beel is dominated by Cyprinidae family of 20 numbers of species followed by 4 species of Channidae family, 3 species of each Bagridae and Cobitidae family, 2 species of each Notopteridae, Siluridae, Nandidae, Ambassidae, Mastacembelidae, Osphronemidae family and one species of each Clupeidae, Chiclididae, Gobiidae, Anabantidae, Schilbeidae, Claridae, Synbranchidae, Heteropneustidae, Chacidae, Belonidae, Tetraodontidae, and Macroganthidae family. In this beel out of 54 species, 53 species are used as food fish and among them 31 species are classified ornamental fish, one species (Notopterus notopterus) is unclassified ornamental fish and 17 numbers of fish species are larvivorous fish.

In this studied beel 5 numbers of Indian major carp were identified, which are found in declining trend. This is also reported by Kalita et al., 2011 in Koya kujia beel. Fishes like Sperata aor, Channa marulius, Wallago attu are critically declining species in the beel. This was also earlier reported by Kalita., et al., 2011 in Koya kujia beel.

It is observed that studied wetland is under anthropogenic stress, which resulted in siltation of water beds of the beel. The water of the beel is contaminated due to regular uses of chemical pesticides in the paddy field. From the information of fishery department, a minute amount of pesticides may effect on the egg of the fishes, which result decreasing population of the fishes. Gill net practice is one of the major problems for fish production in the studied beel. Earlier studies from different authors also reveal the same (Kalita et al., 2011, Hazarika L., 2013, Bhagawati et al., 2015). Kalita et al., 2011 worked on Koya kujia beel and he observed the pesticidal and chemical application near the adjoining area of the beel.

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