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Hydrobiology and Fisheries Of Gainadi Beel of Dhemaji District, Assam, India

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ABSTRACT

Hydrobiology and fisheries of Gainadi Beel of Dhemaji District has been studied during January to December 2016. Gainadi Beel is a perennial one. 8 hydrological parameters were monitored during the present study. Some of the parameters showed slight monthly fluctuation. A total of 32 fish species belonging to 5 Orders, 13 families and 25 genera were recorded from the beel. Cyprinidae was found to be the most dominant family followed by Bagridae, Siluridae and Mastacembalidae in the beel. Conservation status (CAMP Report, 1998) of the recorded species was assessed.

Keywords : Gainadi Beel, Hydrobiology & Fisheries.

I. INTRODUCTION

The Gainadi Beel is located somewhat 20kms from the heart of Silapathar town in Dhemaji district. It is located near River Gainadi. The beel is a rainfed one and is an oxbow lake. The beel remains lodged with water throughout the year. On the left hand side of the beel, there is railway line and on the right hand side is the NH-15. The substratum is soily. The beel was once the main course of River Gainadi, which had changed its course and diverted to different direction. According to native fisher and local residents the beel originated in the year 2000 after the flood of 1998 that had created devastation and had huge impact on socio-economy as well as geographical condition in almost all parts of Assam, India.

India has been bestowed with a wide diversity of freshwater ecosystems ranging from small ephemeral pools to large natural or man-made lakes and reservoirs. Among these, the flood-plain lakes deserve special mention because of their interesting limnological features and greater biotic production potential. The flood-plain lakes are commonly known as 'Beels', 'Jheels', 'Mauns', Chaurs", 'Hoars' and 'Pats' in different parts of India (Jhingran and Jha, 1988). They are however locally known as 'Beels' in the state of Assam. The flood-plain lakes comprise one of the most lucrative sources of fisheries. By virtue of their unique position, location and carrying capacity, these ecosystems have emerged as major life sustaining entities and, hence, play a vital role in the socio-economic development of the rural people in various states of India. They constitute an integral component of the principal riverine systems and over the ages have acted as a 'sink' for the flood waters, thus mitigating the devastating effect of floods. These characteristically shallow water bodies are threatened with extinction because of continuous siltation and proliferation of aquatic macrophytes. Further, indiscriminate human interference has almost converted some of them into sewage pots. Hence, conservation of these aquatic resources is essential to revitalize their potential for optimum exploitation.

Physico-chemical parameters play a vital role in determining the distribution pattern and quantitative abundance of organisms inhabiting an aquatic ecosystem. Aquatic ecosystems are affected by several health stressors that significantly deplete biodiversity. In

future, the loss of biodiversity and its effects are predicted to be greater for aquatic ecosystems than for terrestrial ecosystems (Sala *et al*., 2000). There are also a few reports available on the hydrobiology and fisheries of the Brahmaputra River (Yadava & Chandra, 1994; Biswas & Sugunan, 2008). However, no detailed systematic work or very few works on hydrobiology and fish inventory has been available in this beel of Upper Assam. Moreover, the beel is a vital resource to provide food, water and recreation for human beings as well as habitat for diverged species of aquatic plants and animals. Keeping this in view, an attempt has been made to investigate the water quality & fish diversity of Gainadi Beel of Dhemaji district, Assam.

II. METHODS AND MATERIAL

The study was carried out during January to December 2016. For this study 3 sampling sites were selected. The positioning of the beel was recorded using GPS (Global Positioning System) as ($27^0$33'49.42" N & $94^0$39'49.29" E). Water Quality analysis was done seasonally; winter (December-February), Pre-monsoon (March-May), Monsoon (June-August) and Post Monsoon (September-November). The water samples were collected between 6:30 to 9:30 am and analyzed the selected physico-chemical parameters (Air & water temperature, pH, transparency,DO, FCO_2 & hardness) as per standard procedures (Trivedi & Goel, 1986 & APHA, 1998).

The fishes were caught from the beel every month. The collected specimens were preserved in 5% formalin and identified with the help of standard keys of Talwar and Jhingran (1991) and Vishwanath (2002). The abundance and status of the recorded fish species was also evaluated by CAMP (1998). The documentation of present study was carried out with the help of local fishermen, having more than 25 years of fishing experience.

III. RESULTS AND DISCUSSION

The average value of the physico-chemical parameters of water recorded from three different sites of Gainadi beel is presented in Table 1 and is summarized as below:

(a) Temperature: The lowest (21.2 ^{0}C) atmospheric temperature was recorded in Winter and that of highest (26.8^0C) in Monsoon. Similarly, surface water temperature was found to be maximum (27.1^0C) in Monsoon and to be minimum (22.6 ^{0}C) in winter. Each species of aquatic organism has its own optimum (best) water temperature. Gradient in water temperature is closely associated with ambient temperature (Munawar, 1970) and it is one of the most important factors on the maturity, spawning period and development of fish (Bhatt *et al*., 1984).

(b) Conductivity: The minimum (20 μscm^{-1}) conductivity was found in Monsoon and maximum (163.33 μscm^{-1}) was recorded in winter. Conductivity is a measure of water's ability to conduct electrical current. Since specific conductivity, an index of dissolved solids, indicating the total concentration of soluble ions is a good conductor of productivity (Das *et al*., 2001).

(c) pH: Minimum pH was observed in Monsoon (7.1) and that of maximum in winter (7.6). The water body was slightly of acidic features and found within the permissible limit of 6.5 to 8.5 (BIS-1982). Similar results were reported in Subansiri River, tributaries of Brahmaputra River (Hazarika, 2012). Higher pH value is normally associated with the high photosynthetic activity in water (Hajure, 2008).

(d) Dissolved oxygen: DO level was highest (7.04 mg/l) in Monsoon and lowest (5.49mg/l) in Pre-monsoon. According to BIS (1982) the dissolved oxygen was within the tolerance limit. The variations in the dissolved oxygen level depend on the primary production and respiration of aquatic organism present in the water.

(e) Free CO_2: Free CO_2 content in the beel, was highest (3.9 mg/l) in Winter and lowest (1.83mg/l) in Monsoon. The variation of FCO_2 was due to the absorption by plants for photosynthesis and due to the activity of other living organisms (Singh *et al*., 2009). Lower level of free CO_2 is mainly due to high photosynthetic activity utilizing free CO_2, which is in agreement with the work of Hazarika (2012).

(f) Total alkalinity: The water body showed high fluctuation in alkalinity throughout the survey period. It ranged from 21.53 mg/l to 39.53 mg/l during winter and monsoon respectively. Surface alkalinity may result from waste discharge from nearby. Further, Girija *et al*., (2007) reported the water quality of the Bharalu, tributary of Brahmaputra stated that the run off was found to play a predominant role in alkalinity, hardness and BOD.

(g) Total hardness: In Gainadi beel, total hardness varied from 55.2mg/l (Monsoon) to 98.93mg/l (Pre-monsoon). The total hardness was dominated by the

cations of Ca++ and Mg++ and showed fluctuations, temporal as well as spatial.

FISH DIVERSITY: A total of 32 fish species belonging to 5 Orders, 13 families and 25 genera were recorded from the beel. (Table 2). Some species like, *Mystus tengra, Mystus vittatus, Puntius sophore, Puntius ticto, Puntius sarana, Aorithys aor, Labeo rohita, Labeo gonius, Amblypharyngodon mola, Chanda nama, Cirrhinus reba,* were mostly recorded during study period. While some species such as *Xenentodon cancila, Glossogobius giuris, Ompok pabo,* showed some degree of seasonality. Species like *Monopterus cuchia, Macrognathus aral, Macrognathus pancalus, Mastacembelus armatus, Rita rita* were found occasionally. Similarly, *Aorithys aor, Botia derio, Notopterus notopterus, and Labeo rohita* were mostly dominant during pre-monsoon season. According to the local fishermen, carnivorous fishes like *Channa gachua, Channa punctatus, Channa striatus* are becoming rare.

According to CAMP (1998) report, 5 species were included in Vulnerable category (Vu); 2 endangered (EN), 17 species in Lower Risk near threatened (LR-nt); 2 species in Lower Risk least concerned (LR-lc) and rest of species are not evaluated yet (NE).

In the present study, in Gainadi beel, Cyprinidae family is the dominant group (11 species) with 35%. Next to Cyprinidae was found Bagridae (4 species) with a percentage of 13% and followed by Siluridae & Mastacembelidae (3 species each) with 10%; Channidae & Schilbeidae (2 species each) with having 6% each; and Cobitidae, Belonidae, Gobiidae, Synbranchidae, Tetraodontidae, Clariidae and Ambassidae (1 species each) with 3% each. Cyprinids are the most dominant group among the recorded fish species in the beel.

Table 1 : Average variations in physico-chemical parameters of Gainadi Beel (seasonally**)**

Parameter	Winter (Dec-Feb)	Pre-monsoon (Mar-May)	Monsoon (June-Aug)	Post-monsoon (Sep-Nov)
Air temp. (^{0}C)	20.1 ± 0.42	22.3 ± 0.50	26.4 ± 0.45	23.8 ± 1.32
Water temp. (^{0}C)	22.6 ± 0.32	23.5 ± 0.82	27.1 ± 0.62	25.3 ± 1.13
Conductivity(µscm^{-1})	163.33 ± 4.6	143.63 ± 8.8	70.00 ± 1.6	75.3 ± 3.2
pH	7.5 ± 0.50	7.2 ± 0.50	7.1 ± 0.50	7.4 ± 0.15
DO (mg/l)	5.49 ± 0.24	5.89 ± 0.31	6.89 ± 0.11	5.49 ± 0.18
Free CO_2 (mg/l)	3.9 ± 0.04	3.6 ± 0.08	1.83 ± 0.04	3.67 ± 0.09
Total Alkalinity (mg/l)	21.53 ± 0.68	23.53 ± 0.94	39.53 ± 0.92	25.18 ± 1.02
Total Hardness (mg/l)	98.93 ± 0.20	77.93 ± 1.23	55.2 ± 0.20	61.93 ± 0.20

Table 2: Fish species abundance in Gainadi Beel

Scientific name	Family	Abundance	IUCN status
1.*Labeo gonius* (Ham-Buch)	**Cyprinidae**	+++	LR-nt
2.*Labeo rohita* (Ham-Buch)		+++	LR-nt
3.*Catla catla* (Ham-Buch)		+++	Vu
4.*Amblypharygodon mola* (Ham-Buch)		+++	LR-nt
5. *Cyprinus carpio*		+++	LR-nt
6. *Barilius barila* (Ham-Buch)		+	LR-lc
7. *Esomus danricus* (Ham-Buch)		+++	LR-lc
8. *Puntius sophore* (Ham-Buch)		+++	LR-nt
9. *Puntius ticto* (Ham-Buch)		+++	LR-nt
10. *Puntius sarana* (Ham-Buch)		+++	LR-nt
11. *Cirrhinus reba* (Ham-Buch)		+++	Vu
12. *Botia dario* (Ham-Buch)	**Cobitidae**	+	NE
13. *Rita rita* (Ham-Buch)	**Bagridae**	++	LR-nt
14. *Mystus tengara* (Ham-Buch)		+++	NE

15. *Mystus vittatus* (Bloch)		++	Vu
16. *Aorithys aor* (Ham-Buch)		+++	NE
17. *Ompok pabda* (Ham-Buch)	**Siluridae**	++	EN
18. *Ompok pabo* (Ham-Buch)		++	NE
19. *Wallago attu* (Bloch-Schneider)		+++	LR-nt
20. *Clupisoma garua* (Ham-Buch)	**Schilbeidae**	++	Vu
21. *Eutropiichthys vacha* (Ham-Buch)		+	EN
22. *Xenentodon cancila* (Ham-Buch)	**Belonidae**	++	LR-nt
23.*Chanda nama* (Ham-Buch)	**Ambassidae**	+++	NE
24.*Glossogobius giuris* (Ham-Buch)	**Gobiidae**	++	LR-nt
25.*Monopterus cuchia* (Ham-Buch)	**Synbranchidae**	++	LR-nt
26. *Clarias batrachus* (Linn)	**Clariidae**	++	Vu
27. *Channa gachua* (Bloch-Schneider)	**Channidae**	+	LR-nt
28. *Channa punctatus* (Bloch)		+	LR-nt
29. *Macrognathus aral* (Bloch-Schneider)	**Mastacembelidae**	++	LR-nt
30. *Macrognathus pancalus (*Ham-Bloch)		++	LR-nt
31. *Mastacembelus armatus* (Lacepede)		++	NE
32. *Tetraodon cutcutia* (Ham-Buch)	**Tetraodontidae**	+++	LR-nt

Legend: + = Rare; ++ = Occasional; +++ = Common, LR-nt = Lower Risk near threatened, LR-lc = Lower Risk least concerned, NE = Not evaluated and Vu = Vulnerable.

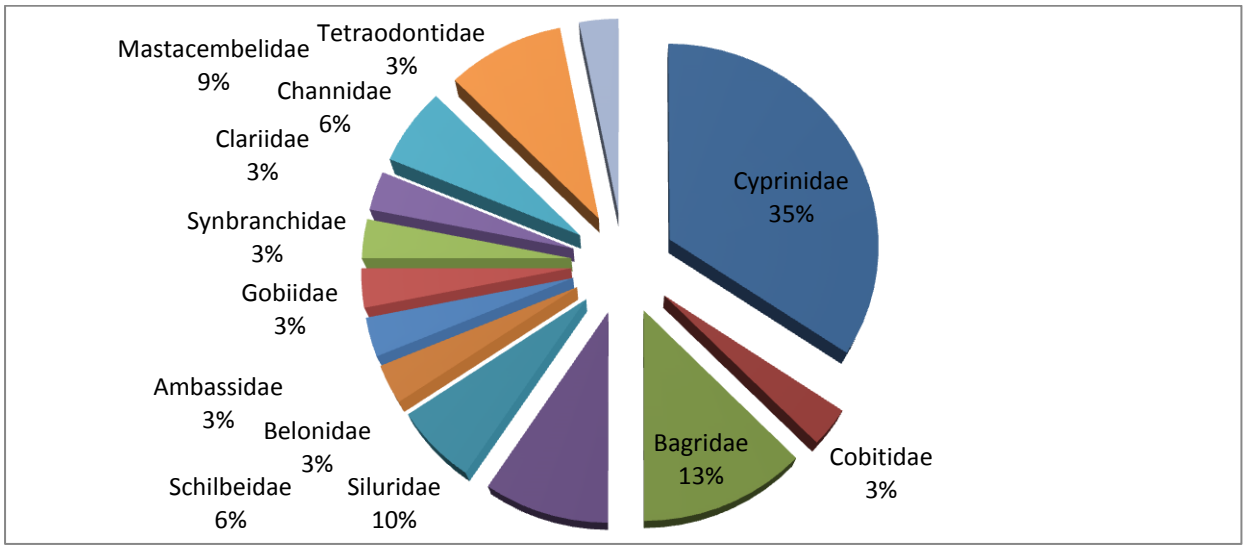

Figure 1. Familywise distribution of fishes in Gainadi Beel.

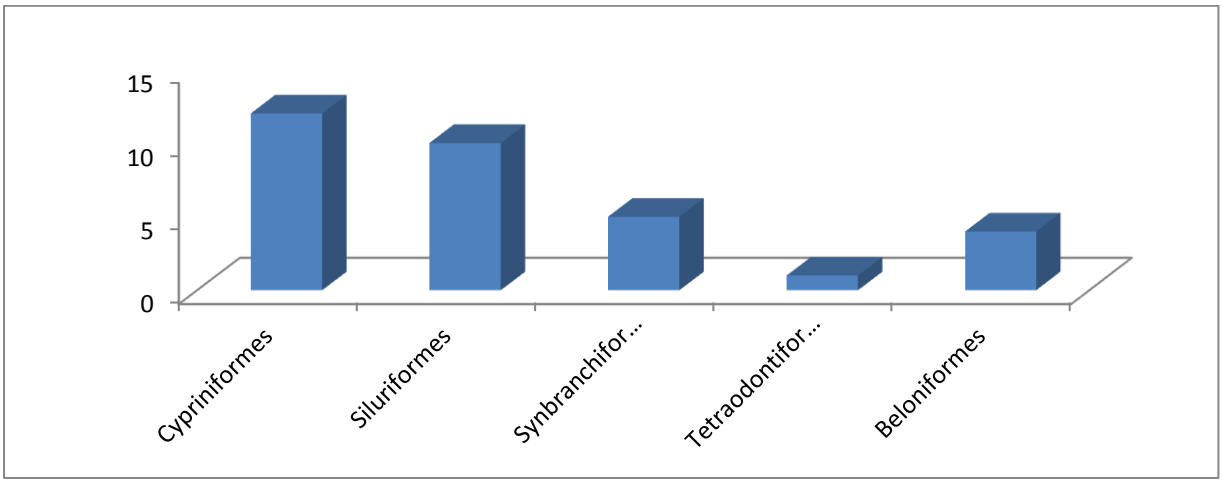

Figure 2. Orderwise distribution of fishes in Gainadi Beel.

IV. CONCLUSION

This paper compiles a preliminary study on habitat ecology & fish diversity of Gainadi beel. From the above discussion, it is clear that a distinct monthly variation exists in selected physico-chemical parameters of the beel. However, temperature, dissolved oxygen; free CO_2, alkalinity and hardness are within approximate range or within permissible range of BIS (1982). The present study indicates rich concentration of fish species in the beel.

V. REFERENCES

[1]. APHA, 1998. Standard methods for examination of water and waste water, 20th ed. Public Health Association, Washington, D.C. 1193p.

[2]. Bhatt, S. D., Y. Bist and U. Negi, 1984. Ecology of Lunnofauna in the river Koshi of the Kumaun Himalayas (Uttar Pradesh), Proc. Indian Natl. Sci. Acad. B. 50(4): 395-405

[3]. BIS, 1982. Tolerance limits for inland surface waters subject to pollution, 2296p.

[4]. Biswas, B. K. and V. V. Sugunan, 2008. Fish diversity of Brahmaputra River system in Assam, India. J. Inland Fish. Soc. India, 40(1): 23-31.

[5]. CAMP, 1998. Report on the workshop on Conservation Assessment and Management Plans (CAMP) for Freshwater Fishes of India, organized by Zoo outreach and NBFGR, 21-26 September, 1997, 156p.

[6]. Das, S. K., B. K. Bhattacharya and U. C. Goswami, 2001. Diel variation of pH in fish ponds of Nagaon district, Assam. J. Inland Fish. Soc. India, 33(1);45-48

[7]. Girija, T. R., C. Mahanta and V. Chandramouli, 2007. Water quality assessment of an untreated effluent impacted urban stream: The Bharalu tributary of the Brahmaputra river, India. Env. Monitor. & Assessment, 130: 221-236.

[8]. Hazarika, L. P., 2012. Studies on river health of the Subansiri with special reference to dolphin, Platanista gangetica gangetica: A pre dam investigation of Lower Subansiri Hydro Electric Project. Unpublished Ph.D. Thesis, Dibrugarh University, 312p.

[9]. Hujare, M. S. 2008. Limnological studies of the perennial waterbody, Attigre Tank, Kolhapur Dist. Maharstra. Nat. Environ. & Poll. Tech., 7(1): 43-48.

[10]. Munawar, M., 1970. Limnological Studies on fresh water ponds of Hyderabad (India). The biocoenose: the distribution of Unicellular and colonial phytoplankton in polluted and the unpolluted environments. Hydrobiologia, 36: 105-128.

[11]. Sala, O. E., F. S. Chapin III, J. J. Armesto, E. Berlow, J. Bloomfield, R. Dirzo, E. Huber-Sanwald, L. F. Huenneke, R. B. Jackson, A. Kinzig, R. Leemans, D. M. Lodge, H. A. Mooney, M. Oesterheld, N. L. Poff, M. T. Sykes, B. H. Walker, M. Walker and D. H. Wall, 2000. Global biodiversity scenarios for the year 2100, Science, 287, 1770–1774.

[12]. Trivedy, R. K. and P. K. Goel, 1986. Chemical and Biological Methods of water pollution studies, Env. Publ., Karad, India, 257p

[13]. Talwar, P. K. and A. G. Jhingran, 1991. Inland Fishes of Inala and Adjacent Countries. (Vol. 1 & 2). Oxford & IBH, New Delhi, 1158p.

[14]. Vishwanath, W., 2002. Fishes of North East India (A field Guide to species Identification). NATP. (NBFGR, Lucknow), 198pp.

[15]. Yadava, Y. S. and R. Chandra, 1994. Some threatened carps and catfishes of Brahmaputra River system. In: Threatened fishes of India. P. V. Dehadrai, P. Das, S. R. Verma, (eds.), Natcon Publication, Muzaffarnagar. 4:45-55.