
Research Papers



A study on fluctuation of hydrogen ion concentration (pH) in Pagladia river of Assam

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Abstract

The present study was carried out for the fluctuation of water hydrogen ion concentration (pH) in Pagladia river during the period of 2009-2010. The hydrogen ion concentration (pH) in this study ranged from 6.64 to 7.20 at different stations with little seasonal variation. It is concluded that hydrogen ion concentration (pH) of this tributary was never too low or too high to threaten the aquatic life and productive in nature.

Keywords: Water, hydrogen ion concentration, Pagladia river.

INTRODUCTION:

Power of hydrogen ion (pH) is a vital environmental factor for all aquatic media. pH is a scale of intensity of acidity or alkalinity and measures the negative logarithm of hydrogen ion concentration (Saha, 2010). It is one of the most important parameters in determining the productivity of aquatic ecosystem and is the resultant effects of many chemical and biological reactions, occurring in the water medium.

pH affects directly or indirectly other limnological parameters such as transparency, viscosity, total dissolved solids and conductivity (Whitney, 1942); all of which constitute the very important physical and chemical parameters that form the basis for an enlightened fisheries and water resources management (Araoye et al., 2007).

There are a few reports on the physio-chemical parameters of beels, wetlands and tributaries of Brahmaputra and Barak river system of Assam were documented. Among these works of Bhuyan (1970), Dey (1977), Dey (1981), Hazarika and Dutta (1994), Boruah (1999), Acharjee et al. (2005), Nath and Dey (2008) are worth mentioning. But literature also reveals that there is a scarcity of sufficient knowledge about pH of water in lotic ecosystems of Assam. There is a dearth of knowledge about pH of Pagladia river and therefore, it is important to surveying quality of pH in this tributary.

MATERIAL AND METHODS:

The Pagladia is one of the tributaries of the river Brahmaputra in Assam. It originates from the Bhutan Hills of Himalayan range in the form of two streams Pagla and Dia that meet near Chowki and runs out through Nalbari district and finally mixed into the Brahmaputra river near Sotemari of Nalbari

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District. Pagladia river is situated in the northern tributaries of the river Brahmaputra from 91015' N to 91030' N latitude and 26045' E to 26015' E longitude. (Sarma, 2008).

The study was carried out by systematic collection and analysis of water samples. The water samples were collected during the period of 2009-2010 in four different seasons viz., pre-monsoon (March-May), monsoon (June-September), retreating monsoon (October-November) and winter (December-February) after Barthakur (1986).

During the study period the total tributary was divided into five zones as survey stations on the basis of altitudinal and geographical variation. The selected survey stations are respectively-Station-1: From Chowki (91025/35.34//E, 26048/31.402//N) to Uttarkuchi (91028/16.499//E, 26044/36.2//N), Station-2: From Thalkuchi (91030/41.503//E, 26038/21.747//N) to Kadamtal (91026/25.557//E, 26037/29.802//N), Station-3: From Khatikuchi (91030/45.331//E, 26031/14.947//N) to Katra (91028/23.45//E, 26029/22.27//N), Station-4: From Murkona (91028/58.867//E, 26024/21.915//N) to Sonkuriha (91027/58.581//E, 26022/51.054//N) and Station-5: From Bijulighat (91028/24.982//E, 26019/4.439//N) to Sotemari (91024/34.883//E, 26016/10.812//N).

Water pH was measured on the collection site using digital pH meter. After sampling, water was filtered by filter paper. The pH value of the clear filtrate was read with a field pH meter and also neutralit pH paper.

RESULTS:

During year 2009, pH values of water ranged between 6.79 (minimum) in monsoon and 6.95 (maximum) in retreating monsoon at station-1, 6.66 (minimum) in winter and 6.94 (maximum) in monsoon at station-2, 6.78 (minimum) in winter and 6.97 (maximum) in monsoon at station-3, 6.76 (minimum) in monsoon and 7.10 (maximum) in retreating monsoon at station-4, 6.84 (minimum) in monsoon and 6.95 (maximum) in pre-monsoon at station-5.

Similarly during year 2010, pH values of water fluctuated between 6.72 (minimum) in monsoon and 6.94 (maximum) in retreating monsoon at station-1, 6.64 (minimum) in pre-monsoon and 7.10 (maximum) in retreating monsoon at station-2, 6.86 (minimum) in winter and 7.16 (maximum) in monsoon at station-3, 6.88 (minimum) in retreating monsoon and 7.20 (maximum) in pre-monsoon at station-4, 6.82 (minimum) in monsoon and 7.10 (maximum) in pre-monsoon at station-5. All the values of pH of water collected from field survey plotted in table-1.

Season	Year	pH value				
		S-1	S-2	S-3	S-4	S-5
Pre-monsoon	2009	6.88	6.69	6.85	6.90	6.95
	2010	6.92	6.64	6.93	7.20	7.10
Monsoon	2009	6.79	6.94	6.97	6.76	6.84
	2010	6.72	6.87	7.16	6.90	6.82
Retreating monsoon	2009	6.95	6.75	6.89	7.10	6.88
	2010	6.94	7.10	6.95	6.88	6.91
Winter	2009	6.87	6.66	6.78	6.93	6.92
	2010	6.77	6.78	6.86	6.89	6.90

S= Station

Table-1: Water pH of Pagladia

DISCUSSION:

During the present study pH of water ranged from 6.64 to 7.20 at different stations with little seasonal variation (Table-1, Fig-1 and 2). Jhingran (1982) stated that the pH value below 7 and above 8.5 is not suitable for normal life of aquatic organisms. According in this tributary pH was never too low or too high to threat the aquatic life. Dutta (2012) reported that alkaline water is more productive than acidic water. Weak alkaline reaction (pH) is considered most suitable for fish production due to

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availability of various nutrient elements in the aquatic environment and physiological activity of fish remains optimum at this point. So, it may be concluded that this tributary was productive in nature.

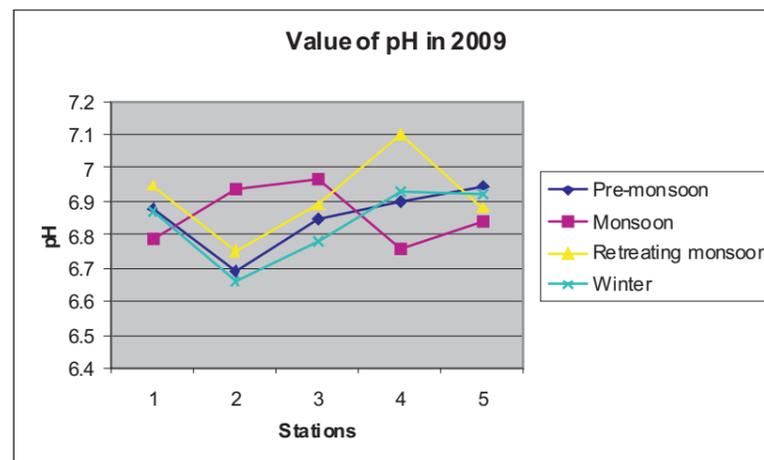


Fig-1: Seasonal variation of pH during 2009

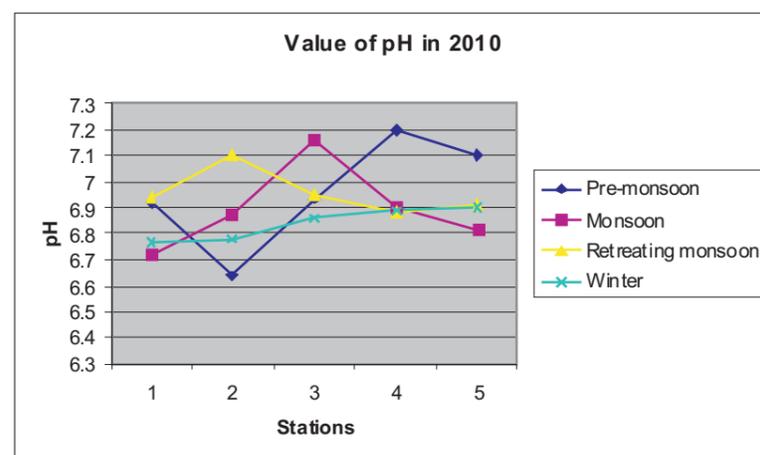


Fig-2: Seasonal variation of pH during 2010

REFERENCES:

- 1) Acharjee, B., Choudhury, M., Dutta, A. (2005): Biotic spectrum of a hill stream (Manas) of Assam. In: Vass, K.K., Abidi, S.A.H. & Agrawal, V.P. (eds.) Proceedings National Seminar on Aquatic Resource Management in Hills. National Research Centre on Coldwater fisheries (ICAR) Bhimtal (Uttaranchal) & Society of Biosciences, Mazaffarnagar, Uttar Pradesh: pp 20-28.
- 2) Araoye, P. A., Adedeji, R. A., Dada, J. O., Adebisi, G. O. (2007): Relationship between the rainfall water levels flooding and fish supply from Asa dam Ilorin, Nigeria. In: Proceedings of the Fisheries Society of Nigeria. Eds. Araoye PA, Adikwu IA, Banke ROK. Publ. Fisheries Society of Nigeria. pp 236-239.
- 3) Bhuyan, B. R. (1970): Physico-chemical qualities of the water of some ancient tanks in Sibsagar, Assam. Environ. Health., 12: 129-143, (34, 35).
- 4) Borthakur M, (1986): Weather and climate in N. E. India. Northeastern Geographer 18 (1 & 2) pp 20-27.
- 5) Boruah S, (1999): Investigation on certain aspects of hydrobiology in relation to fisheries in the upper stretches of the river Brahmaputra. Ph. D. Thesis (Unpublished), Dibrugarh University, Assam, India.
- 6) Dey, S. C. (1977): Some limnological observations of an Ox-bow lake in Kamrup district of Assam. Proc. Ind. Sc. Cong. 5:151 (Abstr).
- 7) Dey S C, (1981): Studies on the hydrobiological conditions of some commercially importance beels

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of Kamrup district of Assam and their bearing of fish production, Final Technical Report to N.E.C. 177p.

8) Dutta, R. (2012): Hydrobiology and fishery potential of Namsang (Chatju) stream in Arunachal Pradesh. Unpublished ph D thesis, Gauhati University.

9) Hazarika, A. K. and Dutta, A. (1994): Limnological Studies of two fresh water ponds of Guwahati, Assam. *Environ. And Ecol.* 12 (1): 26-29.

10) Jhingran, (1982): *Fish and Fisheries of India*. 2nd edition. Hindusthan Publishing Corporation (India) Ltd. New Delhi, India.

11) Nath, S. and Dey, S. C. (2008): *The Ecology and Fisheries of Barak River System of India*, 1st Edn. Narendra Publishing House, New Delhi.

12) Saha, R. K. (2010): *Soil and water quality management for sustainable aquaculture*. Narendra publishing house. pp 20-21.

13) Sarma JN, (2008): *Asamar Nad-Nadi*, 2nd ed. Kiran Prakashan, Dhemaji.

14) Whitney, R. J. (1942): Diurnal fluctuation of oxygen and pH in two small ponds and stream. *J. Exp. Biol.* 19: 92-99.