RESEARCH REVIEW JOURNALS
Volume-02
Issue-09
September-2017

ISSN: 2455-3085 (Online)
RESEARCH REVIEW International Journal of Multidisciplinary
www.rrjournals.com

Ecology of Alkalinity in Freshwater Pond at Chapra Bihar

Manoj Kumar Pandey

P G Dept of Zoology, J P University Chapra, Bihar

ARTICLE DETAILS

Article History
Received: 05 August 2017
Accepted: 10 Sep 2017
Published Online: 15 Sep 2017

Keywords
carbonate alkalinity, lentic environment, bicarbonate alkalinitys

ABSTRACT

At site I, the carbonate alkalinity ranged from 6.5mg/L (September,2012 to 12.6 mg/L March 2012) durning the first annual cycle. In second year, it varied from 4.9 mg/L (June, 2013) to 11.9mg/L (February, 2013) At site 2, of the lentic environment the minimum value was observed in July, 2012 (9.4mg/L) and maximum in December, 2011 (20.2mg/L) in the first year of study. During the second year the lowest value was in April, 2013 8.4 mg/L) and the hightest in February, 2013 (22.3 mg/L). The carbonate alkalinity in lentic environments did not depict any definite seasonality. At site I, the amplitude of variation of bicarbonate alkalinity was recorded from 186.1 mg/L (December, 2011) to 240 mg/L (June, 2012) and from 163.9 mg/L (February, 2012 to 258.8 mg/L (June, 2013) during the first and second year of investigation.

1. INTRODUCTION

Water is a necessity for all living organisms without this elixir there would be no life. Life originated in water and the ultimate basis of it, the protoplasm is colloidal solution of complete organic molecules in water medium (70-90% water). Moreover, where water exists in nature it always holds life. So the study of a water body is the study of life as well. Water is essential at all levels of life, cellular to ecosystem

Nature has an innate mechanism to maintain its purity after every natural use. But it is unable to do this at this at the rate at modern humans add dirt to it. Nature does not know how to deal with several toxins and pollutants that are flowing from industrial and other wastes therefore, humans are bound to monitor the import of this activity on natural freshwater continuously. Among the fresh water resources of the world ponds, lakes, reservoirs and wetlands are important because they supply water for the population in the whole year. All the developmental activities have immediate effects on various water quality parameters including biology. Studies on fresh water ponds and reservoir in our country have gained momentum in recent years. In India reservoirs which cover three million hectares of surface area considered the prime resources with regard to aquatic production potentials Ecological studies gives humans a deep insight into principles of life, its forms and levels of existence and immortality on earth. Ecology reveals to us the truth that there is only own life exists infinitely in interrelations of diverse species in space and time. Ecology provides us with the wisdom that supremacy and freedom, which humans enjoy ones the diverse form of life, are subject to the limits of natural constitutions. Nature shows no special concerns for any individual species human or otherwise unless and until the quest for stability and substances of life on earth. Therefore, the primary social need of every sustainable society is to protect and utilize all their natural resources in a wise manner. Freshwater ecologist has recognized the importance of biological, a physico- chemical and environmental factor, which varies greatly with the water bodies. Among these the temperature has most profound effect on the ecology of the amount of acid required to titrate the bases in water is measure of the alkalinity of water. The alkalinity of water often reflects carbonates contents of rocks and soil of watersheds and bottom muds. Bicarbonate alkalinity buffers water against sudden changes in hydrogen ion concentration. The alkalinity and acid combining capacity of freshwater system may be caused by carbonate and bicarbonate of calcium and magnesium. Carbonate and bicarbonate alkalinity along with Fco2 form an equilibrium system in the aquatic environment. aquatic bodies.

2. RESULT AND DISCUSSION

At site I, the carbonate alkalinity ranged from 6.5mg/L (September,2012 to 12.6 mg/L March 2012) durning the first annual cycle. In second year, it varied from 4.9 mg/L (June, 2013) to 11.9mg/L (February, 2013) At site 2, of the lentic environment the minimum value was observed in July, 2012 (9.4mg/L) and maximum in December, 2011 (20.2mg/L) in the first year of study. During the second year the lowest value was in April, 2013 8.4 mg/L) and the hightest in February, 2013 (22.3 mg/L). The carbonate alkalinity in lentic environments did not depict any definite seasonality.

At site I, the amplitude of variation of bicarbonate alkalinity was recorded from 186.1 mg/L (December, 2011) to 240 mg/L (June, 2012) and from 163.9 mg/L (February, 2012 to 258.8 mg/L (June, 2013) during the first and second year of investigation. At site 2 the lowest and highest bicarbonate alkalinity was recorded in December, 2011(150.3mg/L) and March 2012 (226. 5 mg/L) in the first year of study, whereas, during second year in July, 2013 (157.3mg/ L) and April, 2013 (228.7mg/L) Free carbon dioxide is highly soluble in water and its solubility very often depends upon the existing atmospheric pressure. In an aquatic ecosystem decomposition of carbonic acid liberates carbon dioxide which also influences the pH of the water. Anaerobic decomposition of dead macrophytes leaves

increases free carbon dioxide accumulation and depletes dissolved oxygen in water system.

Table;1 Showing variation in the Free carbon dioxide, Carbonate alkalinity and Bicarbonate alkali nity at SITE 1

Months	*Free carbon dioxide*	*Carbonate alkalinity*	*Bicarbonate alkalinity*
OCT 11	**0.000**	**7.800**	**210.400**
NOV.11	**0.000**	**8.300**	**192.300**
DEC. 11	**0.000**	**8.100**	**186.100**
JAN .12	**0.000**	**9.800**	**189.900**
FEB.12	**0.000**	**10.500**	**202.700**
MARCH12	**0.000**	**12.600**	**209.600**
APRIL 12	**0.000**	**9.200**	**221.900**
MAY 12	**0.000**	**8.700**	**236.400**
JUNE 12	**3.900**	**7.000**	**240.100**
JULY 12	**5.700**	**0.000**	**213.700**
AUG. 12	**0.000**	**0.000**	**220.300**
SEP. 12	**0.000**	**6.500**	**204.800**
OCT.12	**0.000**	**8.400**	**214.100**
NOV.12	**0.000**	**7.900**	**204.500**
DEC.12	**0.000**	**8.700**	**192.400**
JAN.13	**0.000**	**9.600**	**176.700**
FEB.13	**0.000**	**11.900**	**163.900**
MARCH 13	**0.000**	**9.100**	**181.200**
APRIL 13	**0.000**	**7.500**	**196.700**
MAY 13	**0.000**	**5.800**	**224.100**
JUNE 13	**0.000**	**4.900**	**258.800**
JULY 13	**0.000**	**8.800**	**227.000**
AUG 13	**5.400**	**0.000**	**243.900**
SEPT.13	**7.100**	**0.000**	**224.200**

Table;2 Showing variation in the Free carbon dioxide, Carbonate alkalinity and Bicarbonate alkali nity at SITE 2

Months	*Free carbon dioxide*	*Carbonate alkalinity*	*Bicarbonate alkalinity*
OCT 11	**0.000**	**7.800**	**210.400**
NOV.11	**0.000**	**8.300**	**192.300**
DEC. 11	**0.000**	**8.100**	**186.100**
JAN .12	**0.000**	**9.800**	**189.900**
FEB.12	**0.000**	**10.500**	**202.700**
MARCH12	**0.000**	**12.600**	**209.600**
APRIL 12	**0.000**	**9.200**	**221.900**
MAY 12	**0.000**	**8.700**	**236.400**
JUNE 12	**3.900**	**7.000**	**240.100**
JULY 12	**5.700**	**0.000**	**213.700**
AUG. 12	**0.000**	**0.000**	**220.300**
SEP. 12	**0.000**	**6.500**	**204.800**
OCT.12	**0.000**	**8.400**	**214.100**
NOV.12	**0.000**	**7.900**	**204.500**
DEC.12	**0.000**	**8.700**	**192.400**
JAN.13	**0.000**	**9.600**	**176.700**
FEB.13	**0.000**	**11.900**	**163.900**
MARCH 13	**0.000**	**9.100**	**181.200**
APRIL 13	**0.000**	**7.500**	**196.700**
MAY 13	**0.000**	**5.800**	**224.100**
JUNE 13	**0.000**	**4.900**	**258.800**
JULY 13	**0.000**	**8.800**	**227.000**
AUG 13	**5.400**	**0.000**	**243.900**
SEPT.13	**7.100**	**0.000**	**224.200**

In the present study, bicarbonate and carbonate both were responsible for the alkalinity at all the sites. While, occasionally when free carbon dioxide was detected then only carbonate alkalinity was not detected. The presence of

alkalinity due to bicarbonate was reported by Jana(1974) and George(1976). The present result indicate that the bicarbonate concentrations are slightly higher at site 2, m only due to the entry of organic matter from the catchment areas, whereas, the organic compounds together with sulphate and nitrogen were subsequently converted into free carbon-dioxide by bacterial activity and finally from bicarbonate and carbonate. Similar observation was reported by Sharma and Ghose (1987). During the present investigation, carbonate and bicarbonate alkalinity fluctuated in between 4.9-12.6 mg/L and 176.0-258.4 mg/L at site 1; whereas 8.4-22.3 mg/Lan d 150.3-228.7 mg/L at site 2. Different range of carbonate, bicarbonate and total alkalinities were reported by many investigations. Husainy(1966) recorded the alkalinity fluctuations in between 50 to 60 mg/L. Michael (1969), reported the range of total alkalinity between 196 to 335.3 mg/L. Nasar(1977) observed the range of alkalinity from 46-196 mg/l in some of the ponds of Bhagalpur. Bajkhi e t.al.(1987) reported the range of alkalinity from 39-111.5 mg/L in the Anchar lake. The present results indicate that the bicarbonate alkalinity was generally low during the monsoon months, at all the sites. This could be attributed to the rainfall which diluted the concentrations of bicarbonates. Similar observations were also reported by Chakrabortyet.al (1959), Laksh minarayana(1965), Sreenivasan(1966), Pahwa and Mehrotra (1966), Michael(1969), Sharma(1976), and George(1976).

RFERENCES

[1]. Bharati,A., R.P.Saxena and G.N.Pandey. 1980. Microflora in the assessment of pollution level of River Ganga at Kanpur. Journal of the Institution of Engineers. (India), 60(EN2):f27-34.

[2]. Bhatangar,G.P. 1982. Limnology of lower lake Bhopal with reference to sewage pollution and eutrophication. Technical report submitted to Man and Biosphere programme, Department of Environment, Govt. of India, New Delhi, 78pp.

[3]. Bhatt,S.D., Y.Bisht and U.Negi. 1985. Hydrology and phytoplankton population in river Koshi of the western Himalaya (Utter Pradesh). Indian J.Eco., 12(1):141-146.

[4]. Bhowmick,B.N. and A.K.Singh. 1985. Phytoplankton population in relation to physic-chemical factors of River Ganga at Patna. Indian J.Ecol., 12(2): 360-364.

[5]. Bilgrami,K.S., J.S.Datta ,Munshi, R.N.Yadava and B.N.Bhowmick. 1985. Limnological studies of thermal springs of Bihar, India. Proc.Nat1. Sci.Acad., 51 B(1):70-77.

[6]. Chacko, P.1. and S.V.Ganapati. 1949. Some observations on the Adyar River, with special reference to it's hydrobiological conditions. Indian Geogr.J., 24(3):35-49.

[7]. Chacko,P.I. 1951. Report of the Madras rural piscicultural scheme for 1950-51. Madras Govt. Press.

[8]. Chacko,P.I. 1953. Report of the Madras rural piscicultural scheme for 1951-52. Madras Govt. Press.

[9]. Das,S.M. and V.K.Srivastava. 1956a. Quantitative studies on fresh water plankton.I. Plankton of a Fish tank in Lucknow, India. Proc.nat. Acad. Sci. India B., 26:85-92.

[10]. Das, S.M. and J.C. Upadhaya. 1979. Studies on qualitative and qualitative fluctuations of plankton in two Kumaun Lakes, Nainital and Bhimtal (India). Acia.hydrobiuol., 21(1):9-17.

[11]. Datta, N.C., N. Mandal and B. K. Bandyopadhyay. 1984. Seasonal variations of primary productivity in relation to some physic-chemical properties of a freshwater pond, Calcutta. Int. J. Acad. Icthyol. (Proc.N.AISI), 5:113-120.

[12]. Davies,R.W. 1971. A key to the freshwater Hirudinoidea of Canada. J.Fish. Res. Ganapati, S.V. 1941. Studies on the chemistry study of a garden pond containing abundant zooplankton. Proc.lnd.Acad.Sci.B., 17(2): 41-58.

[13]. Ganapati,S.V. 1956. Hydrobiological investigations of the Hope reservoir and of the Thambaraparani river at Papanasam, tirunelveli district, Madras State, Indian geogr. J., 31 (1&2): 1-20.

[14]. Board can., 28:543-552

[15]. George,J.P. 1976. Hydrobiological studies on the lower lake of Bhopal with special reference to the productivity of economic fishes. Ph.D. Thesis. Bhopal University, Bhopal.

[16]. Goel,P.K., S.D.Khatavkar, A.Y.Kulkarni and R.K.Trivedy. 1986. Limnological studies of a few freshwater bodies in south western Maharashtra with special reference to their chemistry and phytoplankton. Polln.Res., 5(2):79-84.

[17]. Golterman,H.L. 1975. Physiological Limnology. Elservier, Amsterdan Oxford & New York, 453 pp.

[18]. Golterman, H.L., R.S.Clymo and M.A.M.Ohnstad. 1978. Methods for Physical and Chemical Analysis of Fresh Waters. I.B.P.Handbook No.8, Blackwell Scientific publications, Oxford, London, 172 pp.

[19]. Gupta D.C and G.N Pandey 1980. Enviornmental pollution of rivers pandu at Kanpur J.Inst. Engg. India., 2(6):42-45.

[20]. Hosmani,S.P. and S.G.Bharati. 1980a. Limnological studies in ponds and lakes of Dharwad,comparative phytoplankton ecology of four water bodies. Phykos, 19:27-43.

[21]. Jana, B.B. and H.L.Sarkar. 1971. The limnology of 'swetganga'- a thermal spring of Bakreswar, West Bengal, India. Hydrobiologia,. 37:33-47.

[22]. Kannan,V. and S.V.Job. 1980. Diurnal, seasonal and vertical study of primary production in Bathiar Reservoir.Hydrobiologia, 70:171-178.

[23]. Kar .G.K.7 P.C Mishra M.C.Dash and R.C Das. 1987 Pollution studies in river Ib III: Plankton population and primary productivity. Indian J.Environ Health., 29(4):332-329.

[24]. Kashi Prasad. And M.Chaudhari. 1982. Coliform bacteria survival in the River Ganges. J.Inst. Engn. India, 62(EN 3): 108-110.

[25]. Khan A.A and A.G Siddiqui 1971. Primary production in a tropical fish pond at Aligarh, India Hydrobiologra, 37(3-4):447-456.

[26]. Khan,A.A. and A.Q.Siddiqui. 1974. Seasonal changes in the limnology of a perennial fish pond at Aligarh. Ind. J.Fish.,21(1):463-478.

[27]. Krishnamurthy.K.N. 1971. Preliminary studies on the bottom biota of Pulicat Lake. J.Mar.biol.Ass.India, 13(2):264-269.

[28]. Kumar,M.D., G.A.Birasia, L.M.Bhandari, B.C. Rana and V.sharma. 1974. Ecological studies on algae isolated from the effulent Ind.J.Environ. Hilth., 16:274-235.

[29]. Lakshminarayana, J.S.S. 1965a. Studies on the phytoplankton of the River Ganges, Varanasi. Part II. Seasonal growth and succession of the plankton Algae in river Ganga Hydrobiologia, 25:138-165.

[30]. Lampert,W.1978. A field study on the dependence of the fecundity of Daphnia sp. on food concentration. Oecologia, 36:363-369.
[31]. Michael R.G 1930. A historical review of Indian limnology Hydrobiologia 72:15-20.
[32]. Mishra G.P and A.K Yadav 1978. A comparative study of physico-chemical characteristics of river and Lake water in central India Hydrobiologia 59(3):257-278.
[33]. Mishra A., T.D Sootta and A.chowdhury 1983. On some polychaetes from Gangetifc delta West Bengal India Rec zool surv. India 31:41-54.
[34]. Munawar, M. 1974. Limnological studies on freshwater ponds of Hyderabad, India IV. The biocoenose periodicity and species composition of unicellular and colonial phytoplankton in polluted and unpolluted environments.. Hydrobiologia, 45:1-32.
[35]. Nandan,S.N. and R.J.Patel. 1983. Study of algal communities in river Vishwamitri, Baroda, as indicators of organic pollution. Indian J.Ecol., 10(1):11-15.
[36]. Verma S.R. A.K. Tyagi and R.C Dalela 1978. Physico-chemical and biological characteristics of kadrabad drain in uttar Pradesh. Indian J.Environ. H1th 20(1):1-13.
[37]. Vijayaraghavan S. 1971. Seasonal variations in primary productivity in three tropical ponds. Hydrobiologia 38:395-403.
[38]. Villadolid. D.V P.Panganiban and T.G. Megia. 1954. The role of Ph in pond fertilization Indo Pac.Fish counc. Proc Sect.11.5:109-111.