Research Paper

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Seasonal PH, Temperature and Electrical Conductivity of Pond Water in and Around Motera, Ahmedabad

Ecology

KEYWORDS : Seasonal, habitat, conductivity, temperature.

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ABSTRACT

The physico-chemical characteristics of water have direct impact on prevailing organism as well as on human being. Expanding population and industrial settlements, the demand of fresh water is increasing day by day. In India 80% of the surface water is vulnerable to pollution as more than 95% of the sewage in the country is not treated. Lentic water bodies play a very important role in maintaining the biodiversity and overall ecological balance in nature. The present study is attempted to characterize the water quality of ponds with respect to their pH, Temperature and Electrical Conductivity (EC). Four different ponds were selected such as Motera, Chandkheda, Amiyapur and Sughad pond. The seasonal mean pH of observed water sample of selected ponds ranges between 7.27 and 7.63. pH value goes to 7.63 in late summer and 7.27 in winter. Seasonal mean temperature of all sites ranges from lowest 21.32 in winter to 28.120C in late summer. The EC mean ranged between 0.98 to 1.81 µS/cm. Maximum EC is observed during late summer and minimum in late monsoon

Introduction

Unplanned urban development has posed gigantic problems of environmental pollution. Due to this water of natural water bodies are getting polluted at an alarming rate. The physico-chemical characteristics of water have direct impact on prevailing organism as well as on human being using such water (Barua et al. 1984, chona, 1991). Due to over expanding population and industrial settlements, the demand of fresh water is increasing day by day. In India 80% of the surface water is vulnerable to pollution as more than 95% of the sewage in the country is not treated (Manjappa et al 2008). Lentic water bodies play a very important role in maintaining the biodiversity and overall ecological balance in nature. The increase of pollution is caused by population growth and increasing urbanization. Related to this is the industrialization that also causing huge environmental problem (Nirmal, 1997; Jain et al, 1998, Prajapati 2006). To check the influence of human habitation on water quality four ponds are selected for study. Ahmadabad is located 23.03^{0}N 72.58^{0}E, covering an area of 205 sq. km. at an average altitude of 53 m above mean sea level (AMSL). The present study is attempted to characterize the water quality of ponds with respect to their pH, Temperature and Electrical Conductivity (EC).

Study area

Four different ponds were selected and called as site I Motera village pond which is located at outskirts of village, II Chandkheda pond situated in adjacent to village, III Amiyapur pond located in centre of village and IV Sughad pond located at outside of village. All the sites are actually now rapidly developing area in outskirts of Ahmedabad.

Materials and method

The sampling is done at four sites as site I Motera village pond, II Chandkheda pond, III Amiyapur pond and IV Sughad pond. Samples were collected in every morning in every season in a glass bottle to measure different parameters immediately on the site itself. Samples were analyzed for physico-chemical characteristics using method prescribed by M. M. Saxena (1998) and by methods given in APHA (1998).

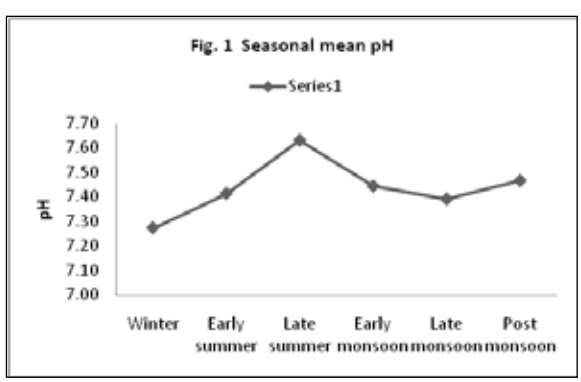
Result and discussion

pH

pH is a measure of the acidity and alkalinity of water, expressed in terms of its concentration of hydrogen ions. The pH scale ranges from 0 to 14. The term pH was derived from the manner in which the hydrogen ion concentration is calculated - it is the negative logarithm of the hydrogen ion (H+) concentration. The pH of water determines the solubility (amount that can be dissolved in the water) and biological availability (amount that can be utilized by aquatic life) of chemical constituents such as nutrients (phosphorus, nitrogen, and carbon) and heavy metals (lead, copper, cadmium, etc.). The seasonal mean pH of observed water sample of selected ponds ranges between 7.27 and 7.63. pH value goes to 7.63 in late summer and 7.27 in winter. Which is desirable pH of water, ranged between 7.14 to 8.5 according to WHO. Generally pH of water is influenced by geology of catchments and buffering capacity of the water. In urban centers, pH of water is also highly influenced by nature of pollution in the form of sewage and industrial effluents (Kodarkar, 1995). The data on pH of water with respect to the seasons and ponds are summarized in Table1, Fig.1.

Table 1- Seasonal mean pH

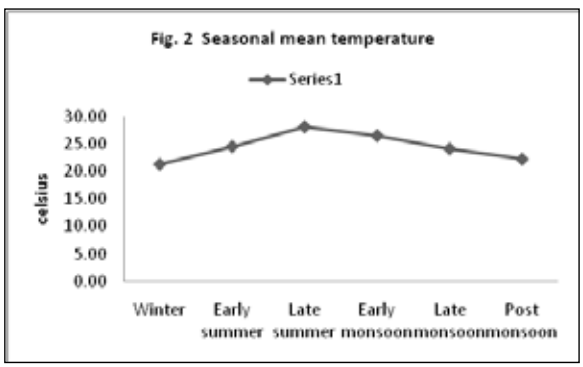
Seasons	Sites				Mean
	I	II	III	IV	
Winter	7.62	7.40	6.64	7.43	7.27
Early summer	7.98	8.04	6.87	6.76	7.41
Late summer	8.13	8.27	6.89	7.23	7.63
Early monsoon	7.73	7.80	7.04	7.20	7.44
Late monsoon	7.14	7.83	7.25	7.34	7.39
Post monsoon	7.68	7.80	6.98	7.40	7.47
Mean	7.71	7.86	6.95	7.23	



Temperature

Temperature is a measure of the average heat or thermal energy of the particles in a substance. Temperature is a measure in units of degree Celsius (ºC). The temperature of water has extremely important ecological consequences. Temperature exerts a major influence on aquatic organisms with respect to selection / occurrence and level of activity of the organisms. In general, increasing water temperature results in greater biological activity and more rapid growth. All aquatic organisms have preferred temperature in which they can survive and reproduce optimally. Temperature is also an important influence on water chemistry. Rates of chemical reactions also generally increase with increasing temperature. Temperature is a regulator of the solubility

of gases and minerals in water. The solubility of important gases, such as oxygen and carbon dioxide increases as temperature decreases. Inversely the solubility of most minerals increases with increasing temperature. Seasonal movements and spawning are regulated strongly by temperature. Temperature varies on a geologic timescale and it also varies locally and over short timescales in freshwater aquatic systems. As light energy is converted to heat, the top portion of the water column warms first and to the great extent. Sudden fluctuation in air temperature usually does not have any immediate effects on the water temperature of pond, due to the lack of water movement and the establishment of a thermocline (Hutchinson, 1967). Seasonal mean temperature of all sites ranges from lowest 21.32 in winter to 28.12^{0C} in late summer (fig.2).

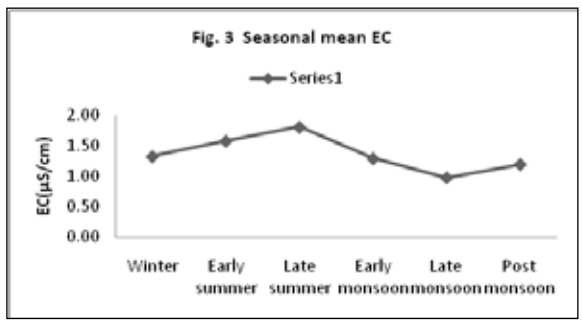


EC

Electrical conductivity is the measure of total concentration of dissolved salts in water. When salts dissolve in water, they give off electrically charged ions that conduct electricity. The more ions in the water the greater electrical conductivity it has. Because there are almost no ions in distilled water, it has almost no electrical conductivity. Hard water contains more salts, and therefore more ions and so has a high electrical conductivity. Electrical conductivity (EC) estimates the amount of total dissolved salts (TDS), or the total amount of dissolved ions in the water. There are a number of sources of pollutants, which may be signaled by increased EC. Evaporation of water from the surface of a pond concentrates the dissolved solids in the remaining water - and so it has a higher EC. These are the units for electrical conductivity (EC). The EC mean ranged between 0.98 to 1.81 µS/cm. Maximum EC is observed during late summer and minimum in late monsoon (fig. 3).

Table 2- Seasonal mean conductivity

Seasons	Sites				Mean µS/cm
	I	II	III	IV	
Winter	1.84	1.98	0.76	0.72	1.33
Early summer	1.91	2.08	1.21	1.12	1.58
Late summer	1.98	2.66	1.36	1.23	1.81
Early monsoon	1.03	1.34	1.43	1.37	1.29
Late monsoon	0.87	1.38	0.85	0.82	0.98
Post monsoon	1.23	1.43	1.02	1.11	1.20
Mean	1.48	1.81	1.11	1.06	



Conclusion

While studying physiochemical parameters of the urban and village pond it was observed that there is no much difference in relation to pollution levels are concerned. If we want to conserve the diversity of organisms present in pond water and maintain healthy ecosystem we have to inadvertently check kind of effluents we discharge in it.

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