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Distribution of Water Parameters Present in the Ashtamudi Lake, Kollam District, Kerala

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***Abstract*: Water is the most precious resource on the earth, covering almost seventy per cent of the earth surface. India, in particular, has a great potential of water resources, both fresh and marine and a great variation in environmental conditions provide a wide range of habitat. In order to know the distribution of water parameters along the Ashtamudi Estuary, 20 water samples were collected. The different physical and chemical parameters were analysed in the geochemical lab. The water samples were analysed for alkalinity, pH, chloride, calcium, magnesium, sodium, potassium, electrical conductivity, total dissolved solids, salinity, nitrate, phosphate, sulphate and silicate. The water chemistry of the lake indicates alkaline, very hard in condition.**

***Keywords*: Ashtamudi lake, water parameters**

1. Introduction

Water is essential to sustain life, and a satisfactory (adequate, safe and accessible) supply must be available to all. Improving access to safe drinking-water can result in tangible benefits to health. Water is very essential for human life especially the quality of water is of vital concern for mankind since it is directly linked with human health and welfare. In recent times, demand for freshwater has increased due to population growth and intense agricultural activities. Water is the elixir of life, vital natural resources of life on the earth and source of energy that governs the evolution (Abbasi, 1996). Water is indeed a wonderful chemical which has unique property of dissolving and carrying in suspension a huge variety of chemicals. Thus it can be contaminated easily. Water is the most important component for the survival of organisms and primary basis for all primary life activities. Water maintains an ecological balance between various groups of living organisms and their environment (Abbasi, 1996).

Water pollution may be defined as the alternation of physical, chemical and biological properties of water or any addition of foreign materials and the natural water which may harmfully affect the living beings, agricultural or biological either directly or indirectly, immediately or after sometime or after long time. Input from agricultural and urban runoff and from sewage outfalls can enrich phosphorous and nitrogen concentration in estuarine waters (Conley, D.J. et al., (1995), Sin, Y. et al., (1999), Callender, E. and Hammond, D.E. (1992)). Anthripogenic inputs frequently cause excessive eutrophication in the aquatic environments, especially where the circulation is restricted, such as in estuaries and coastal regions (Kemp, M.W. and Boynton, W.R. (1984), Zwolsman, J.J.G. (1994)).The effects of man made changes in mangrove ecosystem of Ashtamudi were reported by Mohandas et al. (1994).

2. Study area

The study area, Ashtamudi Lake situated in the Kollam district, part of a Southern Kerala. The lake is located between the latitudes of 8º 31'–9º 02' N and 76º 31'–76 º 41' E respectively. It has near about of 32km2 water spread area and known as second largest estuarine system in Kerala. It is characterised by its palm shaped wider water body. It consist of eight prominent arms. The major source for fresh water discharging to the lake is the Kallads river. This fresh water river originates from Western Ghats with an annual discharge of 75 x109 m3 of water. The lake meet with the Arabian Sea at the location called Neendakara. Some of the major and minor drainage channels loaded with waste products from municipal and industrial sources join the lake at the southern end.

3. Materials and methods

The water samples were collected at regular intervals from twenty different locations across the lake in the plastic containers. The sample locations are given in the Fig.1 and its geographic coordinates are represented in Table no. 1. The water samples were analysed for alkalinity, pH, chloride, calcium, magnesium, sodium, potassium, electrical conductivity, total dissolved solids, salinity, nitrate, phosphate, sulphate and silicate. The analyses of water samples for different physico-chemical parameters were followed from Apha (1985). The conductivity and pH of the lake water was measured in the field during the sampling. The pH analysis was done using digital pH meter (model No.101 E) and conductivity was found out using digital conductivity meter (Model No.601). The remaining physicochemical parameters of the water samples were further analyzed in the Water Quality Lab, Department of Geology, and University of Madras. Titrimetric analysis was used for finding the values of alkalinity, chloride content, sodium, potassium, calcium and magnesium in the water samples. Nitrate and phosphate analysed in the flame photometer.

4. Results and discussions

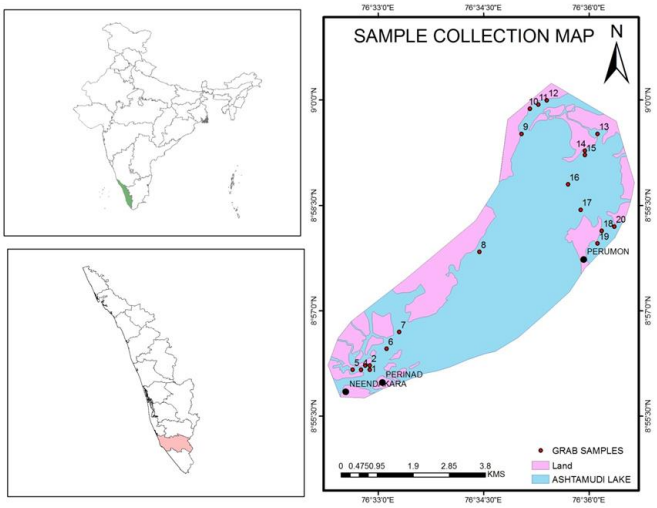


Fig. 1. Sample locations of Ashtamudi estuary

Table 1
Geographic coordinates of the collected samples

S. No.	Latitude	Longitude
1	$8^0$56'9.6"N	$76^0$32'53"E
2	$8^0$56'12.65'N'	$76^0$32'53"E
3	$8^0$56'13.2''N	$76^0$32'49"E
4	$8^0$56'9.6''N	$76^0$32'46"E
5	$8^0$56'9.6''N	$76^0$32'38"E
6	$8^0$56'26.02''N	$76^0$32'7.7"E
7	$8^0$57'42''N	$76^0$32'18"E
8	$8^0$57'50.4''N	$76^0$32'26"E
9	$8^0$59'31.2''N	$76^0$32'2.4"E
10	$8^0$59'52.8''N	$76^0$32'9.6"E
11	$8^0$59'56.4''N	$76^0$32'17"E
12	$8^0$0'0''N	$76^0$32'24"E
13	$8^0$59'31.2''N	$76^0$32'7.2"E
14	$8^0$59'16.8''N	$76^0$32'56"E
15	$8^0$59'13.2''N	$76^0$32'56"E
16	$8^0$58'47.18''N	$76^0$32'43"E
17	$8^0$58'27.01''N	$76^0$32'53"E
18	$8^0$58'9.35''N	$76^0$32'12"E
19	$8^0$57'59.31''N	$76^0$32'6.8"E
20	$8^0$58'10.3''N	$76^0$32'22"E

Results of water parameters are shown in Fig. 2, 3, 4 and 5. The pH of the lake water was 7.10 to 7.78 indicating its alkaline nature. The concentration of bicarbonate also supports its alkaline nature which ranges in between 12.20 to 286.70 ppm. The lake water was moderately hard. The high value of alkalinity can be attributed to the increased discharge of detergents, soaps and animal waste in the lake. The electrical conductivity ranges from 7.88 ms to 23.35 ms. The total dissolved solids varies from 5.04 to 14.95 ppt. Salinity varies in between 2.01 ppt to 5.33 ppt. The concentration of chloride varies from 2076.75 to 7877.13 ppm. Also analysed major ions like Ca, Mg, Na and K. In that, Calcium ranges in between 96 to 444 ppm. The concentration of magnesium varies from 40 to 120 ppm. Same time, concentration of sodium and potassium varies from 1240 to 4529.30ppm and 150 to 580 ppm respectively. The concentration of nitrate ranges in between 12.95 to 25.52 ppm. The concentration of sulphate and silicate ranges from 1.74 to 6.87 ppm and 0.98 to 6.40 ppm respectively. The concentration of phosphate also ranges in between 0.03 to 0.74 ppm. The nitrogen concentrations of the lake indicate the eutrophic status of Ashtamudi Lake that may be attributed to human activities in and around the lake. The levels of phosphorous in lake water clearly indicate the impact of human activity (fertilizer, animal waste, soil erosion etc.).

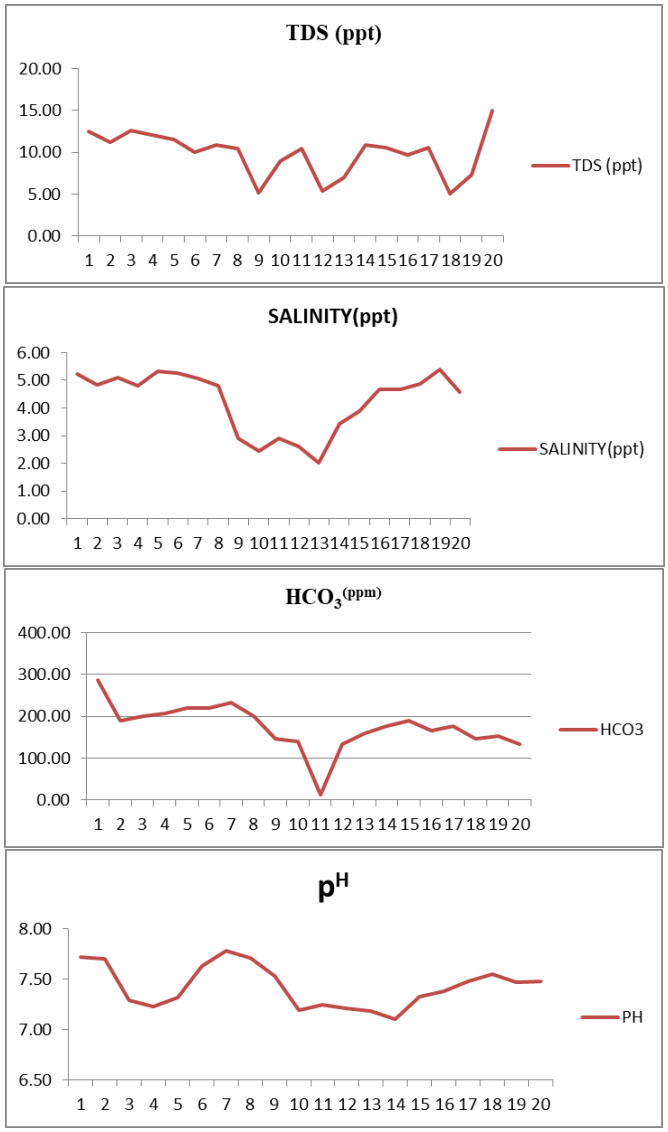
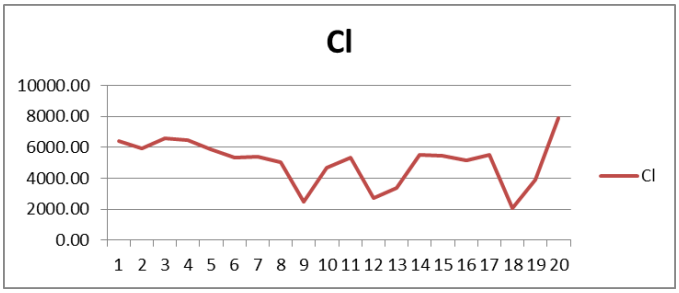


Fig. 2. Showing the parameters of water samples



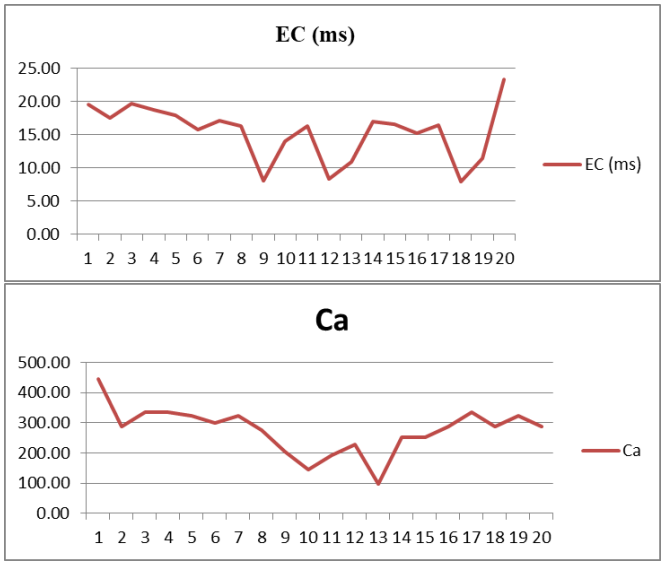


Fig. 3. Showing the parameters of water samples (values are in ppm)

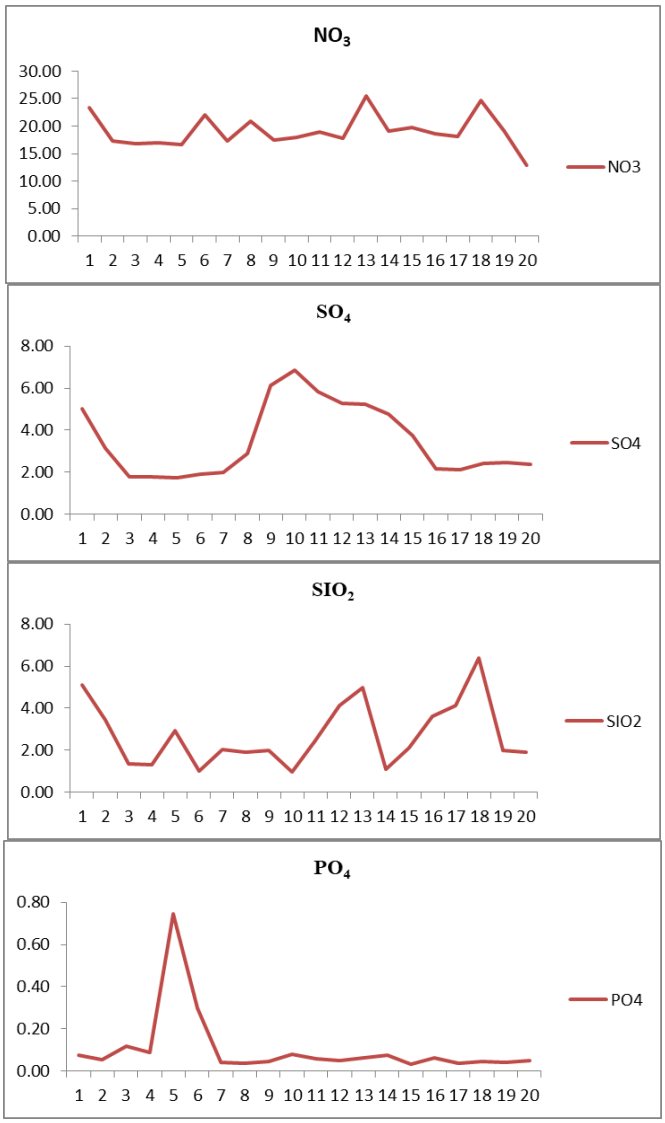


Fig. 4. Showing the parameters of water samples (values are in ppm)

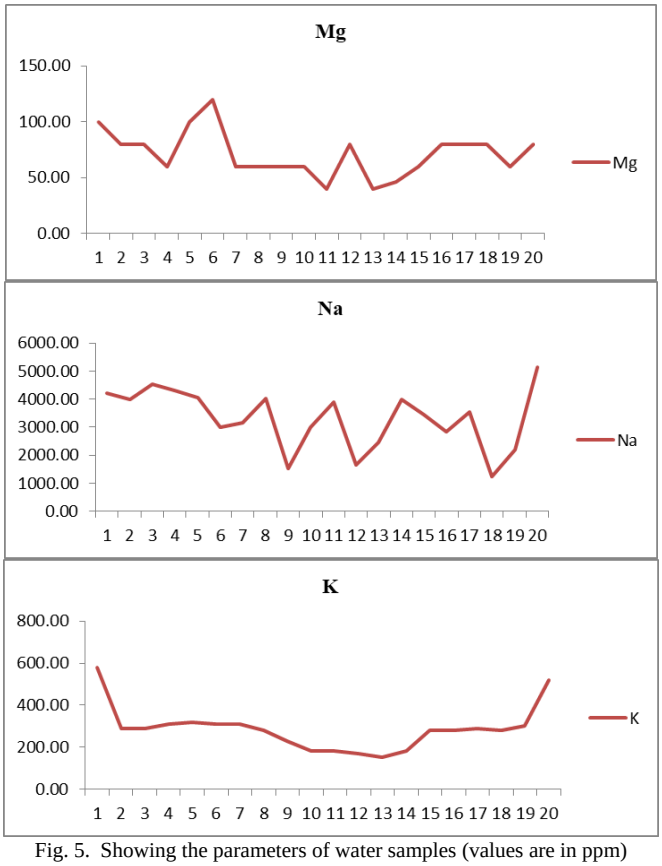


Fig. 5. Showing the parameters of water samples (values are in ppm)

5. Conclusion

The hydrochemical analysis of the lake water shows alkaline nature because of the suspended bicarbonate released from the domestic and human activities. The highest concentration of phosphate and nitrate shows the poor quality of the lake water. The nutrients enriching in river due to the decomposition of organic waste and resulting depletion in dissolved oxygen due to the overgrowth of phytoplankton. The other physicochemical parameters such as electrical conductivity, chloride, calcium, sodium and potassium were crossing the permissible limit prescribed by ISI standards, 2012 except the concentration of magnesium.

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