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Impact of cyclonic storm Ockhi on the quality of water in two famous temple tanks located along the banks of Pazhayar River, Kanyakumari district, South India

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Abstract: The aim of the current study was to evaluate the impact of cyclonic storm Ockhi on the quality of water in Arulmigu Nagaraja temple tank in Nagercoil and Arulmigu Sthanumalaya Swamy temple tank in Suchindrum of Kanniyakumari district with respect to different physicochemical parameters.

Key words: water, temple tanks, physicochemical parameters, Ockhi.

INTRODUCTION

Ockhi - an unknown name before 29th November 2017, destroyed the whole life fabric of the people of Kanniyakumari district on that day and now the people frequently pronounce the name Ockhi. Heavy flood in Pazhayar River due to that cyclonic storm swept many lives along the riverbanks. It also caused some impact on the water quality in two big and famous temple tanks which are located along the river banks. Pilgrims normally take a holy dip in these temple tanks. Washing of temple idols and utensils associated with temple activities are also carried out in these temple tanks. The present study was carried out to assess the actual status of water in these two famous temple tanks viz., Arulmigu Nagaraja temple tank (tank 1) and Arulmigu Sthanumalaya Swamy temple tank (tank 2) after Ockhi cyclone. For this purpose the observed results were compared with the results of previous studies carried out by Maria Pushpam in December 2010. It may be noted that after December 2010, no studies of similar nature were carried out in these tanks concerned.

MATERIALS AND METHODS

Water samples collected in pre-cleaned polyethylene bottles on 15th December 2017were immediately brought to laboratory and analysed for various physicochemical parameters. The standard methods of APHA - 2005 were followed for the analysis. The result was tabulated in Table 1 and was compared with previous studies (Table 2).

Table 1: Result of present study (December 2017)

Tank No.	Physicochemical parameters						
	EC (mS/cm)	TH (ppm)	Ca (ppm)	Mg (ppm)	CO_2 (ppm)	HCO_3 (ppm)	TDS (ppm)
Tank 1	2.44	365	72.14	45.07	40	115	1516
Tank 2	1.29	175	38.08	19.49	21	75	829

Table 2: Result of previous study (December 2010)

Tank No.	Physicochemical parameters						
	EC (mS/cm)	TH (ppm)	Ca (ppm)	Mg (ppm)	CO_2 (ppm)	HCO_3 (ppm)	TDS (ppm)
Tank 1	2.02	360	50.0	34.72	13.9	255.8	1249
Tank 2	0.54	107	25.2	6.82	15.8	103.7	334

*** EC – Electrical Conductivity, TH – Total Hardness, Ca – Calcium, Mg – Magnesium, CO_2 – Carbon Dioxide, HCO_3 – Total Alkalinity, TDS – Total Dissolved Solids**

RESULTS AND DISCUSSION

1. Electrical conductivity: Conductivity is a measure of the capacity of substances or solutions to conduct electrical flow. Electrical conductivity in tank 1 (2.44mS/cm) was high compared to tank 2 (1.29mS/cm). But it was above the permissible limit of WHO. Maria Pushpam[4] found the values as 2.02mS/cm in tank 1 and 0.54mS/cm in tank 2 during the previous investigation in December 2010.

2. Total hardness: Hardness is an important parameter in the detection of water pollution due to calcium and magnesium. Hardness value was high in tank1 (365ppm). Previously reported values are 360ppm and 107ppm in tanks 1 and 2 respectively in the month of December 2010[4]. An increase of hardness in water was due to agricultural runoff and washing clothes [17].

3. Calcium and Magnesium: Calcium and Magnesium are the measure of hardness of water. The result of the present studies showed that the values are high (72.14ppm and 45.07ppm) in tank 1. In tank 2 these values were 38.06ppm and 19.49ppm respectively. These values are well above the values of previous result obtained for the month of December 2010 by Maria Pushpam[4]with calcium content was 50ppm in tank 1 and 25.2ppm in tank 2. Magnesium content was 34.72ppm in tank 1 and 6.82ppm in tank 2 in the previous studies. Calcium in temple tank water was due to the deposition of residual and unused Pooja materials such as flowers and fruits[15]. High amount of calcium and

magnesium in water was also due to washing of clothes and addition of bathing soapy materials by devotees during mandatory bathing etc. [12].

4. Carbon dioxide: The content of carbon dioxide in water depends upon water temperature, depth, decomposition of organic matters and chemical nature of river beds and geographical features of terrain surrounding the water body. Reported values of carbon dioxide are 40ppm (tank 1) and 21ppm (tank 2); which are very high compared with the results of previous studies (13.9ppm in tank 1 and 15.8ppm in tank 2) during December 2010[4]. Higher carbon dioxide was due to rain, plant roots, decaying of vegetation and more organic matter [11] and related to high rate of decomposition [16].

5. Total alkalinity: Phenolphthalein alkalinity was absent in all samples collected during this study. Reports of Maria Pushpamwere compared and Phenolphthalein alkalinity was found to be absent[4]. Alkalinity in the water samples was due to bicarbonate only. Maximum value was reported at tank 1 (115ppm), while in tank 2 the value was 75ppm. Comparatively the previous result was high as 255.8ppm in tank 1 and 103.7ppm in tank 2. High alkalinity was due to the use of soaps and detergents [9]; low water table and lower temperature bringing down the rate of decomposition of salts to minimum, thus pushing up the alkalinity[14]. High alkaline water is unpalatable and is not suitable for domestic purposes [6].

6. Total dissolved solids: Total dissolved solids were due to the presence of bicarbonates, chlorides, calcium, magnesium and sodium [8]. Excess amount of total dissolved solids in water disturbed the ecological balance and caused suffocation of aquatic fauna [10]. Water containing high total dissolved solids may cause constipation [7]. During the study period, in tank 1 total dissolved solids was measured as high as 1516ppm but in tank 2 it was measured at829ppm. These values were well above the results of Maria Pushpam (1249ppm in tank 1 and 334ppm in tank 2) in 2010[4]. Total dissolved solids are due to improper sanitation of the surroundings [13]. Another reason for high total dissolved solids is due to the disposal of wastes around the temple tank [5].

CONCLUSION

The present comparative study reveals that physicochemical parameters of Nagaraja temple tank located in Nagercoil was highly altered due to cyclonic storm Ockhi. The reasons behind the changes were mainly due to agricultural runoff caused by the flood water due to Ockhi, washing, bathing and discharge of temple wastes by the devotees and public into the temple tank. Another reason is stagnancy of the water in the temple tank due to the blockage of its inlet and outlet by encroachments, thus increasing the level of pollution.

It is suggested based on the present comparative studies that there is an urgent need to bring down the pollution level. Sanitation of tank surroundings, collection and disposal of garbage, waste etc.; after Pooja times on daily basis is suggested. Draining and refilling of temple tank water before and after annual temple car festivals.By adopting the above measures and creating awareness among the public and devotees will definitely aid in bringing down the pollution level and thus creating a safe environment.

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