

## ORIGINAL RESEARCH ARTICLE

## Hydrobiological study of Ramanathapuram Chakarai Kottai Tank

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Received 04 Sep 2013; Revised 02 Dec 2013; Accepted 12 Dec 2013

**ABSTRACT**

The present study was carried out to determine the physico-chemical parameters of water in Ramanathapuram Chakarai Kottai Tank (RCKT), Ramanathapuram District, Tamilnadu, India during October 2012 to March 2013. The minimum and maximum values of atmospheric and surface water temperatures (°C), pH and EC ( $\mu\text{mhos cm}^{-1}$ ) were: 28-31; 26-29; 7.2- 7.8 and 600-720 respectively. The ranges of alkalinity, salinity, phosphate, calcium, magnesium, total hardness, dissolved oxygen and biological oxygen demand were: 80-115; 90-176; 10-14; 52-65; 20-54; 80-125; 2.5-3.4; 5.4-7.0; (8M) respectively.

**Key words:** physico-chemical parameter, Chakarai Kottai Tank, Ramanathapuram.**INTRODUCTION**

Water the life's matter and matrix and without it life cannot exist. The presence of safe and reliable drinking water is an essential prerequisite for a stable community. So quality of water is to be determined for a locality of various purposes. The world's water resources are under pressure and must be managed for human survival. It is, therefore, necessary to have most relevant information for arriving at rational decisions that will result in the maximum benefit to most people. Accurate and reliable information on the water resource system can, therefore, be a vital aid to strategic management of the resources (Gupta and Deshpande, 2004). The increased demand for water as a consequence of population growth, agriculture and industrial development has usurped environmentalists to determine the chemical, physical and biological characteristics of natural water resources (Sawant and Telave, 2009).

Tanks have been used since time immemorial as a traditional source of water supply in India. However, the water of the tanks, lakes and river are polluted mainly due to discharged waste water from residential areas, sewage outlets, solid wastes, detergents, automobile oil wastes, fishing facilities and agricultural pesticides from farmlands (Srivastava et al., 2003; Usha et al., 2006; Hasan et al., 2007). In recent years, their

importance has somewhat declined due to technological advancements leading to more centralized water supply systems. There is a relationship among ecologists and microplanners about the importance of conservation of ponds as sustainable source of water for rural communities (Park and Park, 2005).

**MATERIALS AND METHODS****Study Area**

The study area RCKT is situated in the Tuticorin bypass road about 0.5 km away from Ramanathapuram bus stand. This is the oldest tank in this region and lies between +9<sup>0</sup>20'44.10" N (latitude) and +78<sup>0</sup>49'37.14" E (longitude). This tank gets water from Ramanathapuram Big Tank (A biggest fresh water body). It also receives domestic effluents from Ramanathapuram town and surface run off from agricultural field. During rainy season, this tank water is used for irrigating and occasionally used for bathing.

**Analysis of Physico-Chemical Parameters:**

For studying physico-chemical parameters of water, monthly sampling was done from October 2012 to March 2013. Water samples were collected in plastic water samplers of 2 litres capacity. Measurement of parameters like Air temperature, Water temperature, pH, Electrical conductivity(EC), Alkalinity, Salinity, Pho

sphate, Calcium, Magnesium, Total hardness, Dissolved oxygen (DO) and Biological oxygen demand (BOD) was done on the spot while rest were determined within two hours of water sample collection in the laboratory by standard methodology (Adoni and APHA 1985).

## RESULTS AND DISCUSSIONS

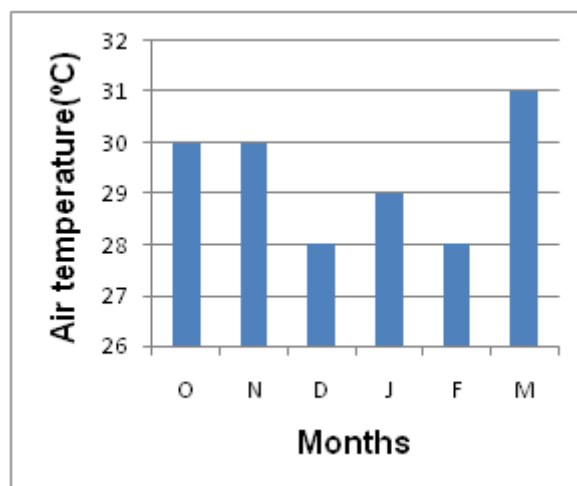
In the present investigation, the monthly variation of physico-chemical parameters of RCKT water are depicted in Table 1 and the relationship between the parameters in the water showed in the (Figure 1). The level of air temperature ranged from 28 to 31°C and water temperature from 26 to 29 °C. Kumar and Kakrani (2000) opined that the rise in temperature of water elevates the metabolic activity of organisms. It also influences the growth and distribution of plankton. Welch (1952) has observed that smaller the water body, more quickly to react the changes in atmospheric temperature. The pH of the water body showed alkaline in nature it is ranged from 7.2 to 7.8. This range is good for growth of aquatic organisms (Lendhe and Yeragi, 2004). Jhingran (1991) reported that pH ranges between 6.0 to 8.5 indicates medium productivity, more than 8.5 highly productive and less than 6.0 low productive nature of water body.

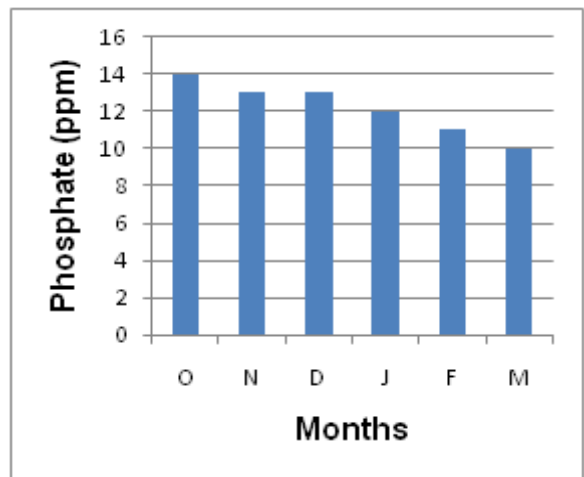
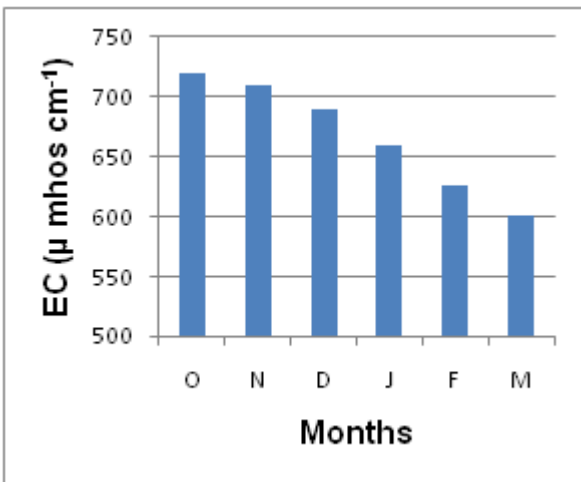
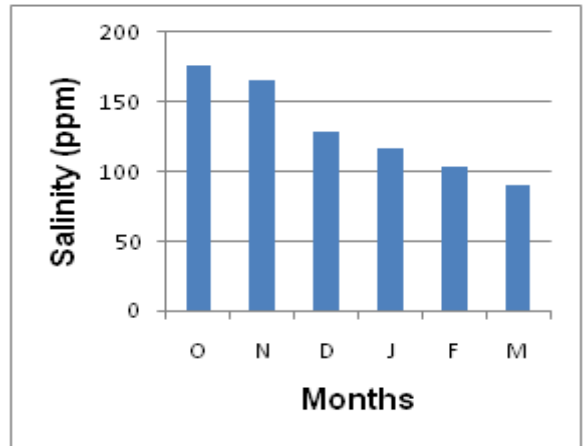
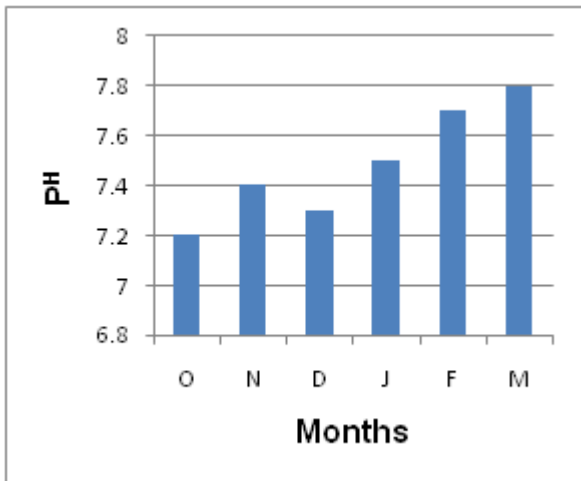
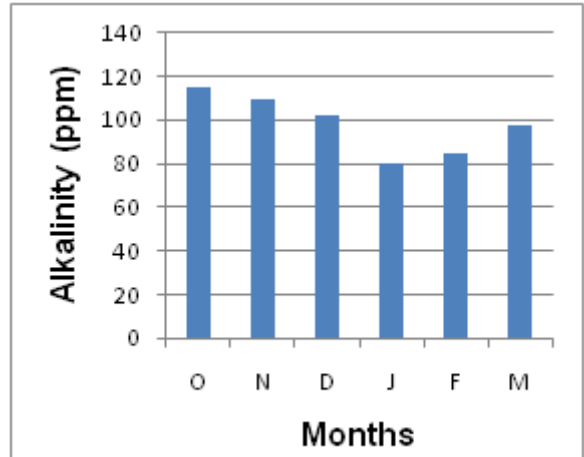
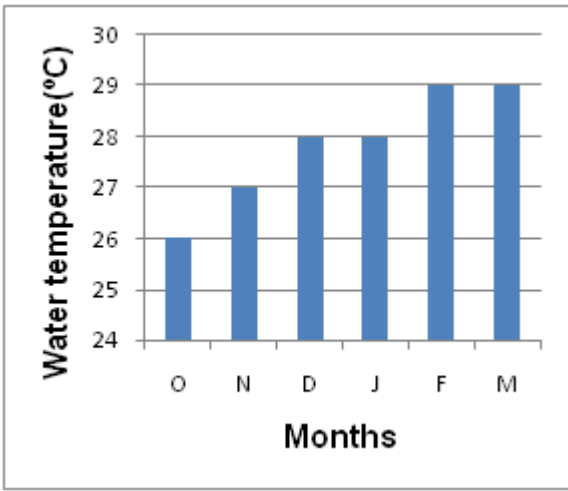
EC values of the study area ranged from 600 to 720. The maximum level in the month of October 2012 and the minimum level recorded during March 2013, which indicate the less amount of salts in pond water (Dhembare, 2002). The total alkalinity was ranged from 80 to 115 ppm. In the water body, the alkalinity is imparted by number of bases viz., carbonates, bicarbonates, hydroxides, phosphates, nitrates, silicates, borates etc., (Kumar and Kakrani, 2000). Baskaran *et al.* (1988) observed a decreasing trend of total alkalinity from 115 ppm to 80 ppm. The salinity was fluctuated between 90 to 176 ppm. The minimum level was recorded during March 2013 and maximum level recorded during October 2012. The present study agrees earlier observations (Ray *et al.*, 1996 and Shastri, 2000).

The phosphate content varied between 10 to 14 ppm. The phosphate was found to be maximum during October 2012 and minimum was found to be March 2013. Earlier studies revealed such low

levels of phosphate content in many of the Indian aquatic systems (Jakhar *et al.*; 1981, Devaraj *et al.*, 1998). Calcium concentration has varied from 52 to 65 ppm. Minimum calcium value has been recorded in the month of January 2013 and maximum in the month of October 2012. The magnesium concentration was fluctuated between 20 to 54 ppm. The highest magnesium value has been recorded in the month of October 2012 and the minimum has been recorded in the month of February 2013. Calcium and magnesium play an important role in antagonizing the toxic effects of various ions in neutralizing excess acid produced (Munawar, 1970).

Total hardness ranged between 80 ppm in January 2013 and 125 ppm in October 2012. Fishes have been found to susceptible to diseases when hardness is below 20 ppm. If it ranged more than 300 ppm, it affects fish production due to more pH as reported by Das (1996). Dissolved oxygen content in the water sample ranged from 2.5 to 3.4 ppm. Minimum DO value has been recorded in the month of October 2012 and maximum in the month of March 2013. Mustafa and Ahmad (1985) opined the partial of O<sub>2</sub> dissolved in water depends upon the partial pressure of gas in the air close to water, rate of photosynthesis and oxygen holding capacity of water. Tarzwell (1957) reported that for supporting life, minimum of 3mg/l DO is required. BOD concentration has varied from 5.4 to 7.0 ppm. Minimum BOD value has been recorded in the month of January 2013 and maximum in the month of February 2013.





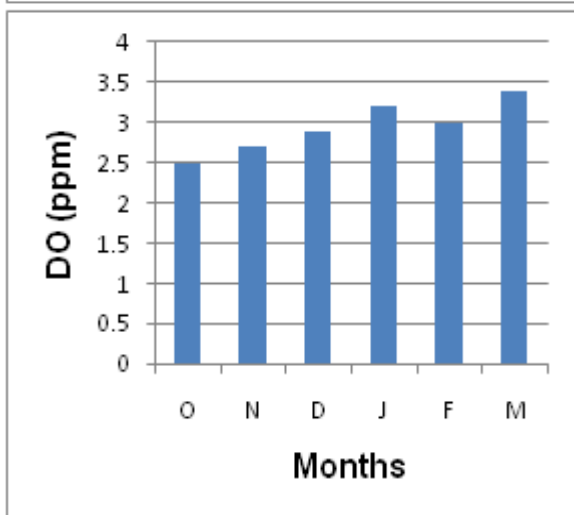
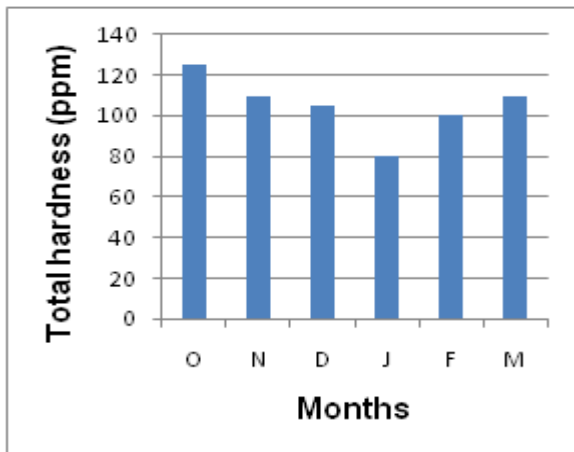
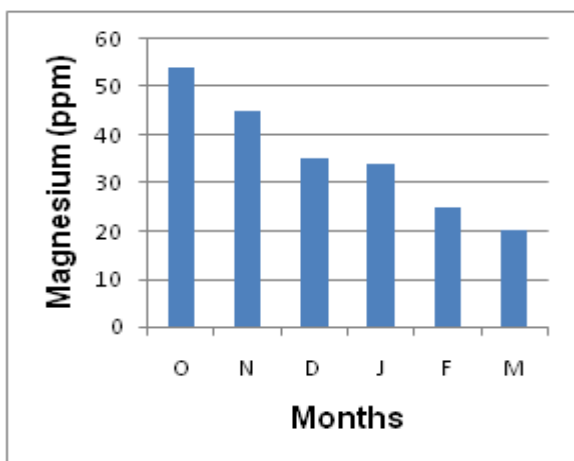
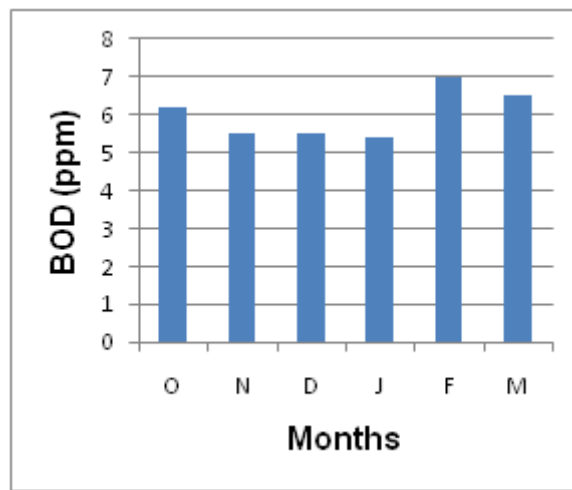
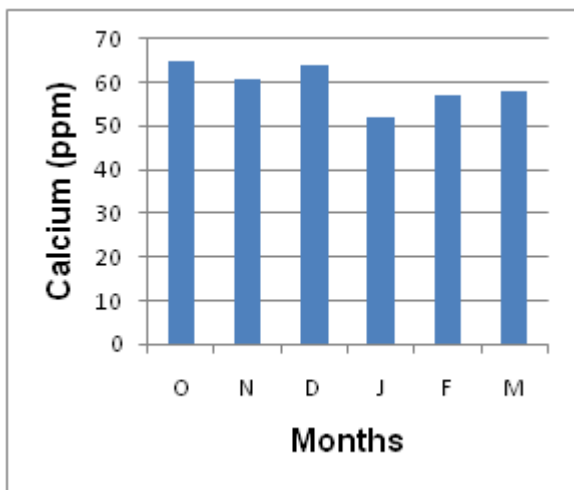


Figure 1: Showing the level of physico-chemical parameters recorded during Oct 2012 to Mar 2013

**CONCLUSION**

Water quality regulates biotic diversity and trophic level of an ecosystem. The present investigation involves the analysis of physico-chemical and biological parameters which reflect an abiotic status of an ecosystem. This in turn, helps in planning exploitation, antipollution or conservation strategies. The results of this study, some of the parameters are well within the permissible limit of WHO (1978) and ISI while some are exceeded beyond the limit. It shows the water is unfit for drinking and cooking purpose but is more suitable for fish culture. But with adequate treatment processes the water could be made available for drinking purpose.

**ACKNOWLEDGEMENT**

Authors are indebted to Mohamed Sathak Educational Institutions, Kilakarai and the Principal, Syed Hameedha Arts and Science College, Kilakarai for providing all the financial/technical/ practical support and friendly guidance for this experimentation.

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