

WATER QUALITY STUDIES IN SAMUDRAM LAKE, THANJAVUR, TAMILNADU

¹A. Jenita Arokiamary, ²D. Merin Emerald, ³A. Alagappa Moses, ⁴M. Sukumaran, and ⁵M. Soundararajan.

1, 2, 4, 5. PG and Research Department of Zoology, Rajah Serfoji Govt. College
(Autonomous), Thanjavur, Tamil Nadu, S. India

3. PG and Research Department of Environmental Sciences. Bishop Heber college
(Autonomous), Puthur. Tiruchirappalli.

ABSTRACT: A study was carried out in Samudram Lake, Thanjavur. The lake is used for irrigation, potability, washing and bathing activities. The lake is surrounded by agricultural fields, human settlement, and sewage treatment plant. The lake provides a habitat for aquatic organisms especially fishes. The results of the analysis of water samples collected from the eastern side shows that the parameters are well within the limits, whereas the samples collected from western side are well above the standard limits. This shows that the discharge of sewage from residential areas, seepage and leakage from the existing Sewage Treatment Plant located on the western side and open defecation all around the lake. The restoration of the lake is the need of the hour.

Index Terms: Water quality, Samudram Lake.

I. INTRODUCTION

Water is important for all kind activities in the present world. Water resource has strong relation with urban development, domestic development, commercial, industrial sector growth and agricultural development. And a secure water supply is essential for public health, society and economy, therefore it is critically important to manage water resources effectively¹.

One of the major crises faced in the recent times is the strain on the potable water resources. The villages in deltaic region of Tamil Nadu originally met its water demand from the ponds and lakes which were constructed around the villages. The lakes that were once a source of water for irrigation, drinking, fishing etc., are now used as dumping sites for industrial effluents, domestic sewage and solid wastes². In this research Samudram lake is chosen as the study area. The lake is bounded by Sewage Treatment Plant (STP) in the West and an Amman temple in the East. The main sources of pollution are wastewater from households, municipal sewage and untreated sewage from the adjoining residential area. The North East bank of the lake is affected by high degree of anthropogenic activities like open defecation and mixing of sewage from underground aquifers.

II. MATERIALS AND METHODS

Study area:

The study area geographically lies between 10° 78' N and 79° 19' E. Samudram Lake is situated in Thanjavur district about 7 km to the East of Thanjavur town. The lake is formed in view of providing the local residents with clean water for irrigation, domestic use, fisheries etc. the quality of the lake has

drastically changed over the years. The image of the Samudram lake and a diagrammatic view of the lake is shown in Fig. 1 & 2.

Water samples were collected from the lake on the eastern and western side. The sampling stations were fixed on the basis of the human habitation, sewage outfall and location of the sewage treatment plant. Water samples collected from the eastern side is considered as unpolluted and western side as polluted. The parameters such Turbidity, Electrical conductivity, pH, TDS, TSS, Total Hardness, Calcium, Magnesium, Nitrate, Chloride, Total Nitrogen, Phosphate, Sodium, Potassium, BOD and COD were analysed using APHA³.

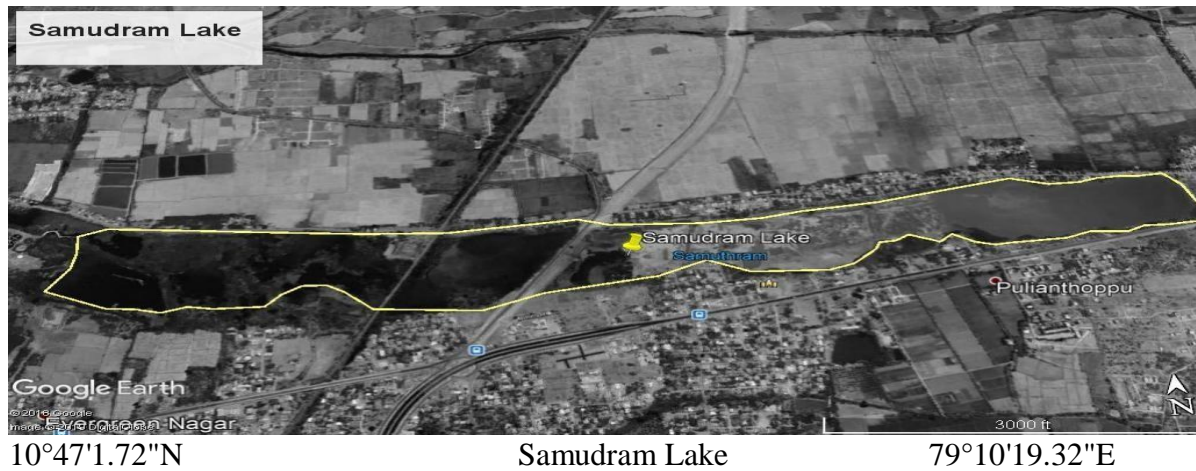


Fig. 1 Samudram Lake – A Google Earth view.

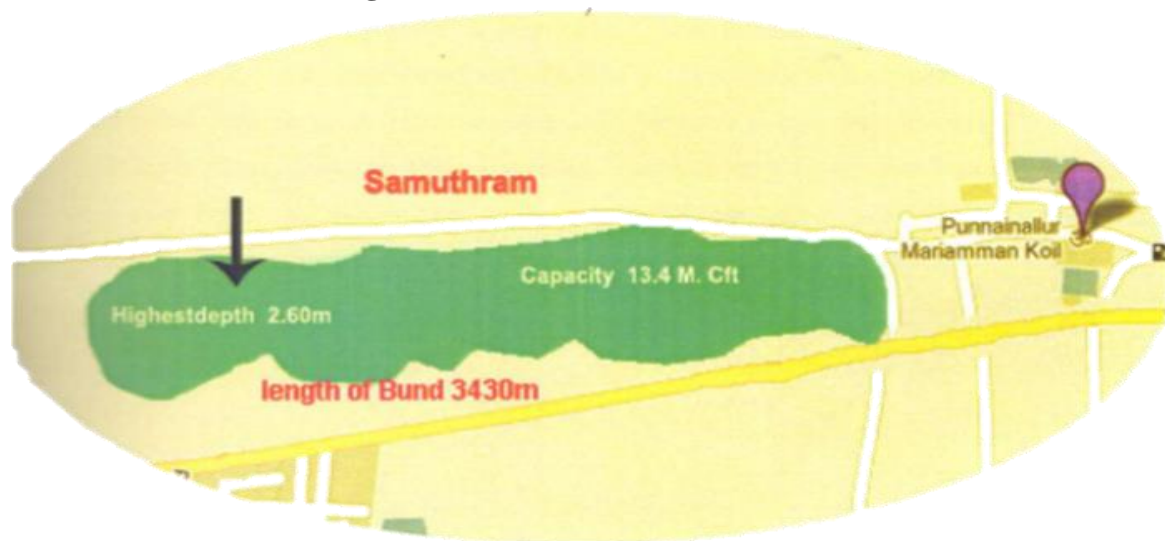


Fig. 2. Diagrammatic view of Samudram Lake

III.RESULTS

The pollution sources around the Samudram lake including both point and non-point were noted down by visual inspection around the lake. Potential pollution sources include a Municipal sewage treatment plant on the western side, agricultural fields on the northern side, sewage out fall was noticed partly from northern and southern bank along with open defecation along the banks of the lake.

Based on the visual observations, it has been concluded that the discharges of partially treated and untreated sewage along with open defecation are the major factors contributing to the pollution of the lake. The pollution of the lake water has led to the decrease in the groundwater quality in the area around the

Samudram lake. The results of the analysis of the lake water samples are given Table 1.

Table 1 Results of analysis of Physico-Chemical Parameters

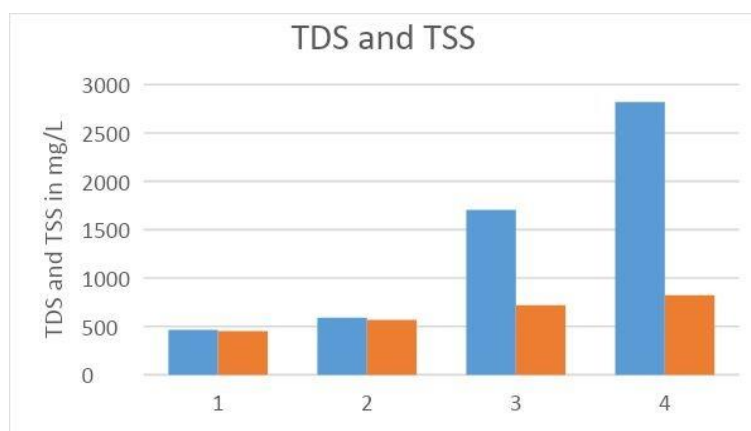
Sl. No.	Parameter	Unit	1 Normal	2 Normal	3 Drainage	4 Drainage	BIS IS 2296
1.	pH		7.36	7.36	8.60	8.80	6.5 – 8.5
2.	TDS	mg/L	465	590	1704	2819	2000
3.	TSS	mg/L	450	568	719	822	-
4.	Total Hardness	mg/L	225	215	675	735	600
5.	Calcium	mg/L	44.12	36.07	94.14	104.20	80
6.	Magnesium	mg/L	18.12	18.22	35.87	50.37	25
7.	Nitrate	mg/L	5.20	6.40	33.80	27.80	20
8.	Chloride	mg/L	74.44	69.48	279.40	274.44	250
9.	BOD	mg/L	6.10	8.10	24.10	20.20	2
10.	DO	mg/L	4.0	3.8	2.0	1.0	6

IV.DISCUSSION

The results shows that samples collected from western side are well above the standard limits. The lake is considered to be of great importance as it caters to the agriculture and potable uses. TDS is recorded above the limits in sample 4, chloride and BOD were also

24.10 and 20.20 mg/l⁴. The odour of the lake water is objectionable due to discharge of domestic and municipal sewage. The pH of sample 3 & 4 were 8.60 and 8.80 which is above the standard limits and the water is considered to be alkaline⁵. Total Dissolved solids ranges from 465 to 2819 mg/L, the samples collected from the unpolluted zone is 465 and 590 mg/L. The samples where sewage out fall is seen is 1704 and 2819 mg/l, which is well above the standard limits. The chloride, nitrate, and hardness were also high in sample 3 & 4. The overall result shows that, the lake is receiving sewage from the domestic and municipal sector, the groundwater is also contaminated and ads to the pollution of the lake⁶.

Fig. 3. TDS and TSS



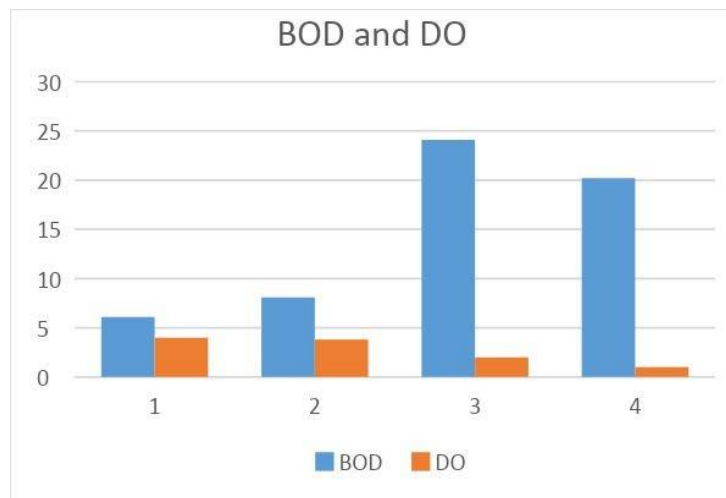


Fig 4. BOD and DO

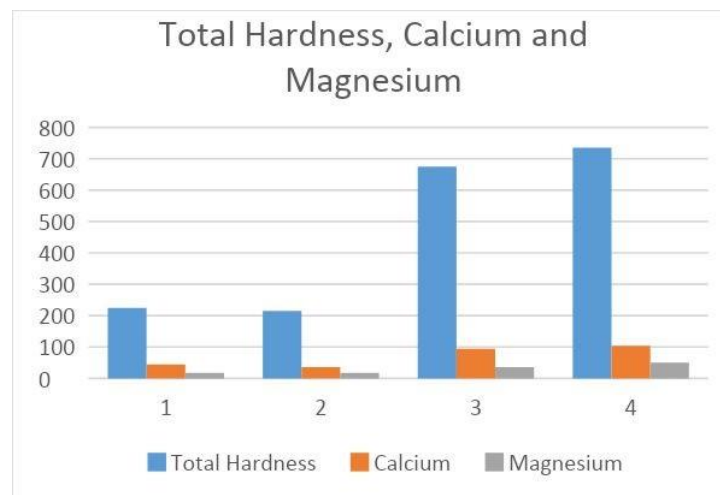


Fig. 5 Total Hardness, Calcium and Magnesium

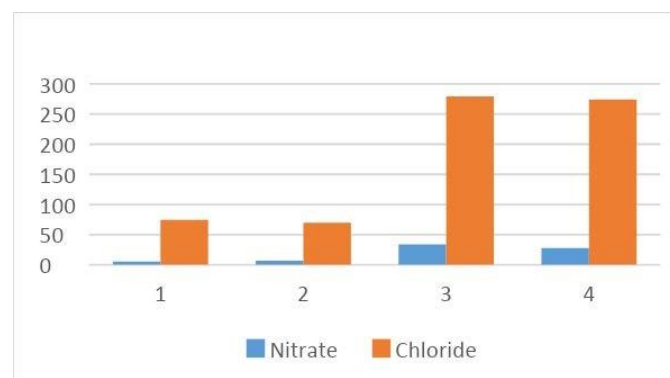


Fig. 6 Nitrate and Chloride

V. CONCLUSION

It has been observed that the BOD is beyond the prescribed limits and the DO is low in sample 3 and 4. This clearly indicates that the water is polluted with organic matter. An increase in the concentration can pose a threat to the wellbeing of the people residing around the lake. Therefore, it is suggested that the discharge of sewage should be intercepted and diverted and treated in the sewage treatment plant so that the water quality of the lake could be restored and would help the aquatic life.

VI. ACKNOWLEDGEMENTS

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