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Assessment and Evaluation of Water Quality of Thorapalli lake

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ABSTRACT

Water provides for the basic essentialities of human existence. Water of good quality is essential for socioeconomic growth. Besides it also sustains various species of plants and animals by regulating their metabolic activities. Chemical, biological and physical characteristics of water define its quality for use. The lake is located on the banks of the Ponnaiyar River, about 6 km south-east of Hosur, close to the Hosur Krishnagiri road. The lake issituated on the other side of the reservoir. The water samples of Thorapalli lake were collected and analyzed for its physico chemical characteristics for the period from January 2018 to December 2018. The present study was undertaken to characterize the physicochemical parameters such as Temperature (T), pH, Total Alkalinity (TA), Electrical Conductivity (EC), phosphates, Nitrates, Total Hardness (TH), Dissolved oxygen (DO), Turbidity (TY), Total Dissolved Solids (TDS), Biochemical oxygen demand(BOD), and Chemical oxygen Demand(COD). Each parameter was compared with its standard permissible limit as prescribed by World Health Organization (WHO). The study reveals that few of the parameters have values beyond the desirable limit prescribed by WHO.

Key words: *Physicochemical parameters, Chemical oxygen demand, Biological oxygen demand, Thorapalli lake*

Introduction

Since water is an important resource to man, it needs to be safe guarded from various impurities and made availability for various activities of daily life. Lake monitoring is an important aspect of lake management policies providing litmus indications of ecological degradation of lakes. Water provides for the basic essentialities of human existence. Water of good quality is essential for socioeconomic growth. Besides, it also sustains various species of plants and animals by regulating their metabolic activities (Chauhan and Verma, 2015). Chemical, biological and physical characteristics of water define its quality for use. Polluted water becomes turbid, foul smelling and inadequate for potable causes (Siddamallayya and Pratima, 2008). Physico-chemical aspects of water contamination in the form of nutrient addition, sediment runoff, and overuse of the resource can be ascertained. By monitoring the physical, chemical, and biological status of a lake, contaminants can be eliminated, lakes can be restored, and its ecology preserved. Land practices can also exert a strong influence on lakes. Therefore it becomes imperative to protect and conserve this rich natural resource in terms of its water quality. Therefore the present study investigates the quality of water, of Thorapalli lake, Tamil Nadu, and its impact on climate change.

Study Site and its Environmental Conditions

The present study was carried out in Thorapalli

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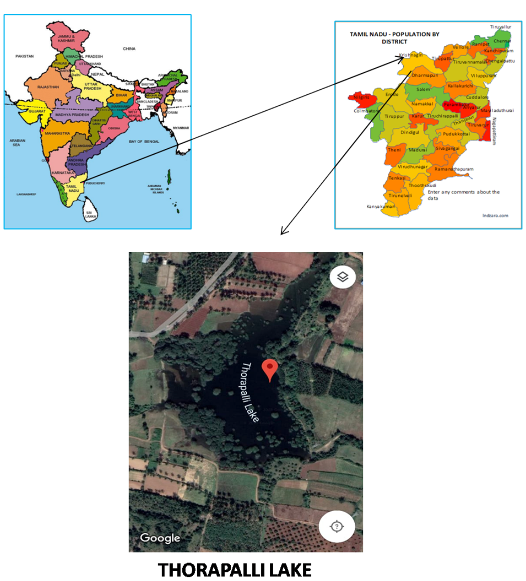
Lake, Hosur town which falls under the north-western region of Krishnagiri district of Tamil Nadu. It is bordered on either side by both Karnataka and Andhra Pradesh. Thorapalli Agra haram is a village in Hosur Taluk, Krishnagiri District, Tamil Nadu. It is located on the banks of the Ponnaiyar River, about 6 km south-east of Hosur, close to the Hosur Krishnagiri road. The lake is situated on the other side of the reservoir Krishnagiri district has a pleasant climate with dry atmospheres. The dry season lasts from January to March, summer falls between April and May, southwest monsoon season starts from June to Sept and from October to December is the northeast monsoon season. The major water supply towards Hosur taluk comes from river Ponnaiyar that basically originates in Nandidurg hills in Karnataka, where it is referred to as Dhakshina Pinakini'. Travelling from Devanahalli and Hoskote taluks of Karnataka, Ponniyar river enters Tamil Nadu state near Bagalur village of Hosur taluk. Location wise Hosur falls in the coordinates 12.735°N 77.829°E with an elevation of 880m (2,890ft) and total area of 72.41 km^2 (27.96sqmi). It has a total population of 245,354 with population density of 3,400/km^2 (8,800/sq mi). Hosur receives rainfall from both the northeast and the southwest monsoons. It has an average rainfall of 822.4 mm and month-wise distribution is around 18.7 mm during January-February, 182.5 mm - March to May; 349.8 mm - southwest monsoon and 271.4 mm during the northeast monsoon. The present study aims



Location of Thorapalli lake on Map

to investigate the water quality of the selected water body, that provide for activities such as irrigation, industrial and human consumption in the region. The main objective of the study is to evaluate the water quality of sewage contamination received.

Materials and Methods

This study was for one year (January 2018-December, 2018). Water quality was assessed for both physical and chemical parameters of the water and results were summarized by using the Pearson's correlation studies to determine the quality of water. Samples were either refrigerated at 4°C or immediately analyzed as per the requirement. Physical or chemical (organic/inor ganic) constituents of water were analyzed following protocols from standard procedures APHA, 2005; Trivedy and Goel, 1986; APHA, 1995; Sawyer *et al.,* 1994; Jenkins and Moore, 1977:

Results and Discussion

Analysis of the aquatic physico-chemical characteristics lends credence to the quality of water and the characteristic of the aquatic biota in terms of chemical and biological processes such as algal bloom and oxygen solubility. Physico-chemical analysis is reflective of the extent of pollution in the water body and therefore should be investigated at first priority (De, 2002; Jayaraman *et al.,* 2003). On comparing the water temperatures from the lake during the study period, it was found that the maximum temperature of 31 °C was recorded during the month of May. Variation in the temperature range could be because of the variation in evaporation rate and therefore change in the water levels. On analysis of the pH ranges from the three water body it was found that maximum pH of 8.4 was recorded from the lake during the month of May in 2018 and the minimum pH of 6.9 was recorded during the months of January November during 2018. Maximum pH was recorded during the summer months and minimum pH was from the winter season. The variation in the recorded pH could be attributed to the variations in the water level of the lakes and the concentration of the nutrients that were present there Manjare *et al.*, (2010). The lake reported maximum EC during the summer month of April.

Higher EC values of the lake in the summer months could be correlated with the annual average

Table 1. Physico-chemical properties of Thorappali lake 2018

Parameters	Unit	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Water Temp	^{0}C	28.4	29	29.9	30	31	29	29	28	27	26	26.9	28
pH	^{o}C	7.4	7.6	7.6	7.9	8.4	8.2	7.1	8.4	7.1	7.5	6.9	7.1
Turbidity	FAU	18	14	21	18	24	31	36	41	56	31	44	40
TDS	mg/l	358	400	200	348	600	500	416	248	400	317	250	300
EC	µmhos/cm	590	625	500	790	600	550	400	315	400	320	300	5.8
DO	mg/l	4.5	3.8	2.1	2.6	4.1	5.8	7.1	8.9	7.4	6.1	4.5	4.9
BOD	mg/l	5.8	4.9	6.4	7.1	8.8	4.2	4.4	2.6	3.1	2.4	4.1	36
COD	mg/l	8.9	8.4	22	19	44	12	9.1	8.8	11	10	24	36
Chloride	mg/l	99	141	130	150	121	200	194	156	120	300	150	130
Alkalinity	mg/l	101	120	88	112	128	156	218	78	65	68	102	112
HARDNESS	mg/l	200	134	185	190	200	130	168	100	94	86	112	144
Phosphate	mg/l	1.8	2.7	2.4	1.8	3.1	2.4	7.6	9.1	9.9	8.8	5.1	2.4
Nitrate	mg/l	10.1	8.8	11.8	12	13	10	24	34	16	11	10	14
SULPHATE	mg/l	19	21	18.1	14	22	32	29	19	21	16	14.1	18

Table 2. Showing correlation matrix of Physico-chemical parameters of Thorapalli lake 2018

Temp	1													
pH	0.55	1												
TUR	-0.67	-0.38	1											
TDS	0.39	0.38	-0.15	1										
EC	0.77	0.42	-0.76	0.43	1									
DO	-0.58	-0.01	0.73	0.03	-0.66	1								
BOD	0.87	0.30	-0.62	0.39	0.71	-0.74	1							
COD	0.37	0.11	-0.01	0.22	0.02	-0.36	0.65	1						
CHL	-0.42	0.03	0.07	-0.03	-0.31	0.28	-0.52	-0.34	1					
ALK	0.40	-0.02	-0.17	0.48	0.19	0.02	0.24	0.01	0.08	1				
HAR	0.83	0.18	-0.67	0.27	0.67	-0.64	0.90	0.39	-0.50	0.40	1			
NIT	-0.08	0.24	0.43	-0.20	-0.41	0.74	-0.39	-0.24	0.04	0.08	-0.25	0.61	1	
SUL	0.18	0.23	0.07	0.64	0.07	0.35	-0.05	-0.20	0.11	0.69	0.06	0.03	0.15	1

temperature. Mustapha and Abdu, (2012), has studied the physico-chemical parameters in reference to the EC in aquatic bodies. Analysis of the data revealed that the minimum DO levels were found in the lake. Minimum levels of hardness was recorded during the study. Maximum nitrate levels of 34.1 mg/l during the month of August. Higher nitrate value may be due to surface run off and domestic sewage and activities. Other authors like Rajashekhar *et al*. (2007) have reported similarly. The lake showed medium level of contamination as per BIS. BOD range (2.4-8.8 mg/l). COD levels were slightly higher.

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