

Water Quality Analysis on Yercaud Lake

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Abstract - The water quality index is a single number that expresses the quality of water by integrating the water quality variables. Its purpose is to provide a simple and concise method for expressing the water quality for different usage. The present work deals with the monitoring of variation of seasonal water quality index of some strategically selected surface water bodies. The Index improves the comprehension of general water quality issues, communicates water quality status and illustrates the need for and the effectiveness of protective practices. It is found that in all cases the change in WQI value follow a similar trend throughout the study period. The lake water is found of not good quality during summer seasons (WQI-100 to 200). However, it is found that water quality of lake deteriorates slightly from winter to summer season on account of the increase in microbial activity as well as increase in pollutants concentration due to water evaporation.

I. INTRODUCTION

Globally, there is increasing awareness that the water will be one of the most critical natural resource in future. Water scarcity is increasing worldwide and pressure on the existing water resources is increasing due to growing demand of different sectors such as domestic, agriculture and industrial etc. Therefore evaluation of water quality is important research topic in recent years. Water quality index is one of the most effective tools to communicate information on the quality of water to the concerned citizens and policy makers. It thus becomes an important parameter for the assessment and management of surface water.

Water quality index is an arithmetic tools used to transform large water quality data into a single cumulatively derived number .It represent a certain level of water quality while eliminating the subjective assessment of such quality to summarized the vast amount of analytical data regarding water quality into useful, easy to understand and convenient management tools for the assessment of water quality, the concept of WQI was developed and proposed first by Horton. It is a single number like a grade that express the overall water quality at a certain area and time based on several water quality parameters. When theirs specific characterization and limitations are considered. In present paper we evaluate the WQI of Yercaud Lake.

II. OBJECTIVES OF THE PRESENT WORK

1. To examine the level of contamination of the lake water by physico - chemical parameter evaluation.
2. To assess the water quality via WQI value.
3. To establishes the parameter those are most important causing pollution in the lake by multivariate analysis.

Parameters of water quality analyzed

For the assessment of water pollution status of the water bodies, the following water quality parameters were analyzed:

- (1) PH
- (2) specific conductance
- (3) temperature
- (4) total dissolved solid
- (5) total solids
- (6) total alkalinity
- (7) dissolved oxygen
- (8) chemical oxygen demand
- (9) biochemical oxygen demand
- (10) Total hardness

III. MATERIALS AND METHODS

Study area

The study was carried out at lake. This is to serve water requirement for irrigation in region. Yercaud is a block of Salem district. The temperature never rises above 29°C and below 13°C. The climate of yercaud is moderate. Winters are fairly mild, starting in September and ending in December. During winter, the hills are covered in mist. Winters range from 12°C to 24°C and summers from 16°C to 30°C. Rainfall is 1500mm to 2000mm. The climate is also particularly pleasant. yercaud lake surrounded by gardens and well-wooded trees. A kiliyur falls contains 90foot (27m) high waterfall. The nearest city or town is Salem 36km away.

Materials required

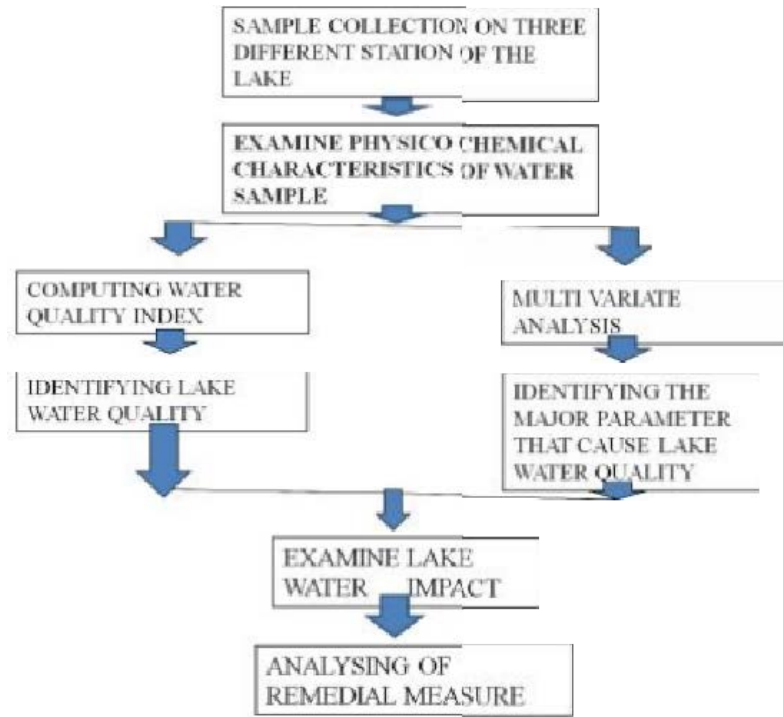
1. In present investigation 3 samples taken from different places will be collected.
2. The water samples were collected in polythene bottles which were cleaned with acid water, followed by rinsing twice with distilled water. The water samples are chemically analyzed.
3. The analysis of water will be done using procedure of standard methods.

Laboratory Analysis

Collected samples were subjected to filtration prior to chemical analysis while temperature was determined in the field. For the assessment of water pollution status of the water bodies, the following water quality parameters were analyzed. 1.pH 2. Specific conductance

3. Temperature 4. Total dissolved solids 5. Total solids 6. Total alkalinity 7. Dissolved oxygen 8. Chemical oxygen demand 9. Biochemical oxygen demand 10. Total hardness.

IV. METHODOLOGY



Calculation of WQI

The Water Quality Index was calculated using the weighted Arithmetic Index method. The quality rating scale for each parameter was calculated by using this expression.

Quality rating, $Q_i = 100 [V_n - V_i] / [V_s - V_i]$ Where,

V_n = Actual amount of nth parameter

V_i = the ideal value of this parameter $V_i = 0$, except for pH and D.O.

$V_i = 7$ for pH; $V_i = 14.6$ mg/L for D.O.

Relative weight is calculated by using following expression

$W_i = 1 / S_i$ Where,

S_i = standard value of corresponding parameter.

In this study the WQI for human consumption is considered and permissible WQI for the drinking water is taken as 100. The overall WQI was calculated by

using this expression.

$$\text{Water quality index (WQI)} = \frac{\sum Q_i W_i}{\sum W_i}$$

$$\begin{aligned} \text{WQI} &= \frac{\sum Q_i W_i}{\sum W_i} \\ &= 42.51 / 0.60 \\ \text{WQI} &= 70 \end{aligned}$$

The water quality indices that were found in two different seasons have been tabulated. Table 1 represents calculation of water quality index (WQI) of upstream. Winter and summer which is shown in table 2. Also, Table II explains

This in turn, indicates that WQI of all sampling locations is within category of good water (150-100) and only one sample is poor water in summer season.

TABLE I WATER QUALITY INDEX (WQI) OF UPSTREAM

Parameter	Mean test results (Vi)	Unit	Standard permissible value (Vs)	Relative weight Wi	Quality Rating Qi	Weighted Qi value
pH	7.2	mg/L	8.5	0.1176	13.33	1.568
BOD	1.8	mg/L	6	0.1667	30	5.001
COD	16	mg/L	10	0.1000	160	16
TS	230	mg/L	500	0.0020	46	0.0092
TDS	204	mg/L	500	0.0020	40.8	0.0816
DO	5.7	mg/L	5	0.2000	92.708	18.541
Total alkalinity	95	mg/L	200	0.005	47.5	0.2375
conductivity	329	mg/L	300	0.0033	109.67	0.3619
Chlorides	41	mg/L	250	0.0040	16.4	0.0656
Total hardness	84	mg/L	300	0.0033	28	0.0924
				$\sum W_i = 0.60$		$\sum Q_i$ $W_i = 42.04$

TABLE II WQI OF ALL SAMPLING LOCATIONS

WQI value	Water Quality
<50	Excellent
50-100	Good water
100-200	Poor water
200-300	Very poor water
>300	Water unsuitable for drinking

TABLE III COMPUTED WQI VALUES

SUMMER		WINTER	
Month	WQI	Month	WQI
April	75	September	88.53
May	102.46	October	75.87
June	89.06	November	74.85

From the comparative analysis of WQI values for all sampling location in both summer and winter season, it was observed in the month of April, may, June that WQI values of 75, 102.46, And September to November WQI values are 88.53, 75.87, 74.85.

Hence, it can be seen that water quality of lake system around deteriorates slightly from winter season to summer season. This could be due to the fact that the microbial activity get reduced due to low temperature, thereby keeping DO level at a very satisfactory range during entire winter season. Also during summer, the water quality deteriorates on account of the increase in microbial activity as well as increase in pollutants concentration due water evaporation.

V. CONCLUSION

In this study we have analyzed two years water samples from Yercaud lake. The results observed that some parameter shown higher values and which don't within the limits of WHO standards also water quality index of one sample shown that bad in water quality. So highest priority should be given to water quality monitoring and there indigenous technologies should be adopted to make water fit for domestic and drinking purpose after treatment.

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