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Research paper

Physico-chemical characteristic of gorewada lake water in Nagpur, India

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Abstract

The proper control and appraisal of lake water condition and its purification is very crucial for appropriate care and management purposes. Water quality checking and investigation of the Gorewada Lake was implemented for numerous physico-chemical parameters in the month of June, 2016.These components are: (i) pH, (ii) Temperature, (iii) Electric Conductivity, (iv) Dissolved Oxygen, (v) Biochemical Oxygen Demand, (vi) Chemical Oxygen Demand, (vii) Total Phosphorous, (viii) Suspended Solid (ix) and Total Nitrogen respectively. The lake water is not suitable for drinking, bathing and other life supporting activity.

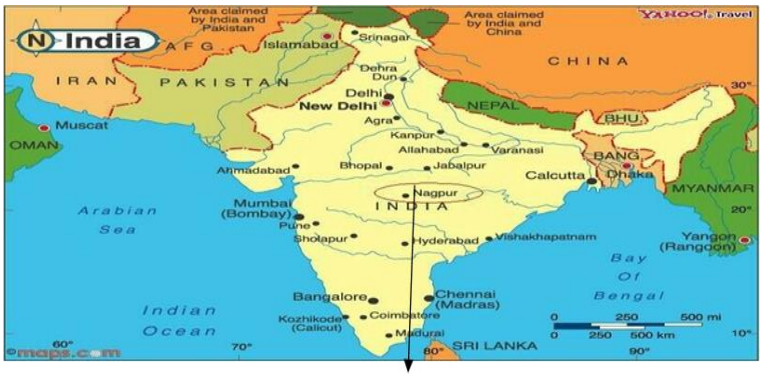
Keywords: *Gorewad Lake; American Public Health Association; Nagpur.*

1. Introduction

Water is considered absolutely essential to sustain life[7,8,9]. It is estimated that two-thirds of the human body is constituted of water. Water is the dominant environment of these ecosystems. Water gets contaminated with microbe through intestinal discharge of human and animals .The rapid growth of population and technological and industrial boom has brought enormous problems and degradation of environment chemical and toxic elements are being let into the drain streams and even open spaces adjoining the industrial areas without any check.

2. Study area

Gorewada Lake is positioned on the north-west corner of Nagpur city .It is the most alluring lake to visit. This lake is the affluent cultural heritage of the Maharashtra state. It is 10 km from Nagpur city. It is constituted with a dam 2,350 feet long. In 1912, Gorewada lake was developed by the water works department as the primary drinking water source for Nagpur's population. Circumscribed by thick forest, Gorewada lake and its neighboring is the habitation for flapping species and some wild life.
Location map of the study area



3. Sample collection

Water samples were collected in the morning hours from the selected sites of the lake in plastic container to avoid unforeseeable changes in characteristic as per standard procedure American Public Health Association (APHA, 1998)[1,2,5].

4. Investigation of samples

The collected samples were analyzed for different physico-chemical parameters such as pH, Temperature(T), Electric Conductivity(EC),Dissolved Oxygen(DO), Chemical Oxygen Demand(COD), Biochemical Oxygen Demand (BOD), Total Phosphorous(TP), Suspended Solid(SS) and Total Nitrogen(TN) as per the standard methods (APHA, 1998)[10,11]. Parameters of water quality characterization and standards are shown in table 1.

Table 1: Parameters of Water Quality Characterization and Standards

Parameters	WHO	ICMR	USPH	ISI
pH	6.5 – 9.2	7.0 – 8.5	6.0 – 8.5	6.5 – 8.5
Electrical conductivity Mho/cm	300	300	300	-
Nitrate	45	20	45	45
Phosphate	-	-	-	-
Dissolved O2	4 – 6	-	4.6	3.0
BOD	6.0	-	5	-
COD	10	-	4	-

All units except pH and Electrical Conductivity are in mg/l
WHO - World Health Organization
ICMR - Indian Council of Medical Research
USPH - United States public drinking water standard
ISI - Indian Standard Institution

5. Results and discussion

The diversification of various attributes such as pH, Temperature(T), Electric Conductivity(EC),Dissolved Oxygen(DO), Chemical Oxygen Demand(COD), Biochemical Oxygen Demand (BOD), Total Phosphorous(TP), Suspended Solid(SS) and Total Nitrogen(TN) concentrations along the Gorewada Lake water are listed in Table 2 and shown in Fig.1. The results reveal that water samples cannot be used for drinking purposes. Correlation matrix has performed within the studied attributes using Microsoft Excel 7 software and tabulated in Table 2 for determining the relationship between the physico-chemical variables.[9,10] The analysis provided positive correlations occurred between some attributes and negative correlations occurred between some attributes.

Table 2: Water Quality at Different Months of Rengepar Kotha Lake Water (Laboratory Analysis)

Name of Station	pH	T	EC	DO	COD	BOD	TP	SS	TN
S1	7.7	30.1	935	4.3	45	19	0.22	66	0.29
S2	7.4	30.9	690	2.8	50	15	0.14	54	0.21
S3	7.0	30.4	590	3.5	37	12	0.16	35	0.12
S4	7.5	30.7	480	4.7	60	26	0.62	29	0.38

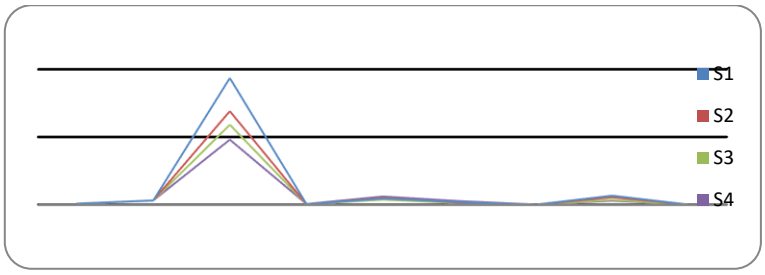


Fig. 1: Graphical Representation of Samples

Table 3: Pearson Correlation Matrix for the Samples

	pH	T	EC	DO	COD	BOD	TP	SS	TN
pH	1								
T	-0.1941	1							
EC	0.53949	-0.62977	1						
DO	0.481781	-0.44182	-0.07077	1					
COD	0.552826	0.544141	-0.38437	0.433827	1				
BOD	0.654463	0.094368	-0.23677	0.813293	0.874929	1			
TP	0.320779	0.200252	-0.56073	0.787415	0.812392	0.925976	1		
SS	0.577134	-0.39616	0.962687	-0.23082	-0.25765	-0.23866	-0.58612	1	
TN	0.785061	0.06003	-0.06957	0.766278	0.869923	0.98145	0.837051	-0.05276	1

6. Conclusion

It is concluded that the water of Gorewada Lake is unfit for drinking purposes.

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