Analysis of Ambazari Lake Water of Nagpur City, Maharastra, India

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ABSTRACT

One of the essential requirements of human species is water. The present manuscript deals with the contemplation of Ambazari lakelet. Ambazari Lake water is degraded as abundant discharge of tarnished things after hunky-dory operation to annihilate malicious commixtures. Water condition analyzes as well as reconsiders and has performed considering multifarious physico-chemical characteristics. The particular contents are: Potential of hydrogen, Electric Conductivity, Dissolved Oxygen, Biochemical oxygen demand, Chemical oxygen demand, Phosphate, Suspended solid, Nitrate and Coliforms consequently. Correlation coefficients between attributes and Clustering are accomplished to cognize the nearness of the attributes. The obtained values of each attributes has compared with the standard values set by the World Health Organization (WHO). The results attained show that most of the attributes does not satisfy the permissible limit recommended by WHO. Hence the lake water is not suitable for drinking purposes.

Keywords: Ambazari lakelet, Nitrate, Coliforms, Phosphate, Clustering, Correlation coefficients.

INTRODUCTION

Water is one of the invaluable things to save life\(^1\). Water is deteriorated by human activity. The increase of population and industrial headlong has escort immense worriment and salaciousness of situation; alchemical, noxious morphemes are mixing toward the cloacae runnel and unshed area interconnecting the factory-made space. Since many industries find water bodies as the best place for their waste discharge, the water condition is getting poor and the uniformly occurring equilibrium of the ecosystem getting disturbed\(^2\).

Lakes are one of the important water resources used for irrigation, drinking, fisheries and flood control prospect. The present study ruminates on determining the physical, chemical and bacteriological profile of Ambazari lakelet to find the pollution sources and causes of concerning variations in water quality.

A number of scientific methods and tools have been developed to assess the water contaminants. These methods include the analysis of different attributes such as Potential of hydrogen, Electric conductivity, Dissolved oxygen, Biochemical oxygen demand, Chemical oxygen demand, Phosphate, Suspended solid, Nitrate and Coliforms.
The results of each attribute has compared to the guidelines set by World Health Organization.

**MATERIALS AND METHODS**

**Study area of the samples**

Nagpur is one of the wonderful city in Maharashtra, India. This city is surrounded by so many lakes. Ambazari Lake is one of these lakes. Ambazari Lake is made by Raja Bhosle and is spanning up 60 acres. It is one of the wonderful lakes in Nagpur, Maharashtra. The condition of the lake is reported to be precarious and needs urgent remedial measures for conservation.

**Collection of Samples**

All the samples were taken from the chosen point of the lake in resilient bottle to bypass fluky changes in temperament as per standard procedure\(^7\).\(^11\).

**Exploration of Samples**

The selected samples were scrutinized for distinctive attributes such as Potential of hydrogen (pH), Electric conductivity (EC), Dissolved oxygen (DO), Chemical oxygen demand (COD), Biochemical oxygen demand (BOD), Phosphate (TP), Suspended Solid (SS), Nitrate (TN) and Coliforms (TC) as per the standard methods (APHA, 1998)\(^12\). pH is calculated using pH meter, Electric conductivity is measured using conductivity meter. Closed reflux titrametric method is used for COD. Approved borderline of drinking water condition are shown in Table 1.

**RESULTS AND DISCUSSION**

The dissimilarity of numerous attributes of Ambazari Lake water are recorded in Table 2 and presented in Fig. 2. Some attributes has crossed the permissible limit prescribed by WHO for drinking purposes. Hence the lake water is not suitable for drinking purposes.

| Parameters               | WHO          |
|--------------------------|--------------|
| pH                       | 6.5 – 8.5    |
| Electricity Conductivity Mho/cm | 400         |
| Nitrate                  | 50           |
| Phosphate                | 0.1          |
| Dissolved Oxygen         | 5 – 6        |
| BOD                      | 6.0          |
| COD                      | 10.0         |

All units are in mg/l except pH and Electric Conductivity

**Treatment of data using statistically**

Clustering has accomplished by Systat\(^13\) and a Dendogram is presented in Fig. 3. There...
are two statistical conceivable clusters are shaped. Current consideration proclaims that there dissimilarities in the physico-chemical properties of cluster 2 and cluster 1. Factor analysis is accomplished and data matrix is shown in Fig. 4. From data matrix it shows that there is differences between the attributes. Correlation matrix has accomplished using Microsoft Excel 13 software and presented in Table 3 to see the relationship between the physico-chemical attributes.\textsuperscript{13} The correlation analysis of measured water parameters (Table 3) execute strong positive correlations between PH-EC, EC-TN, DO-TN, SS-BOD. Positive relationship between the components can be explained due to homogeneity in their distribution pattern or they are sourced from same origin.\textsuperscript{14}

Table 2: Water Quality of Ambazari Lake water (Laboratory Analysis)

| Name of Sample Sites | pH  | EC (µmhos/cm) | DO (mg/L) | COD (mg/L) | BOD (mg/L) | TP (mg/L) | SS (mg/L) | TN (mg/L) | TC |
|----------------------|-----|---------------|-----------|------------|------------|-----------|----------|-----------|----|
| S1                   | 6.2 | 998           | 3.2       | 128        | 43         | 0.35      | 198      | 1.66      | 1108 |
| S2                   | 8.5 | 786           | 2.7       | 80         | 34         | 0.20      | 208      | 1.26      | 988  |
| S3                   | 8.2 | 743           | 2.9       | 36         | 16         | 0.21      | 72       | 1.34      | 640  |
| S4                   | 6.5 | 618           | 2.7       | 78         | 30         | 0.78      | 98       | 0.90      | 1280 |

pH—potential of hydrogen, EC—electric conductivity, DO—dissolved oxygen, COD—chemical Oxygen demand, BOD—biochemical oxygen demand, TP—phosphate, SS—suspended solid, TN—nitrate, TC—coli forms.

Table 3: Pearson Correlation Matrix for the Samples

|         | pH  | EC  | DO  | COD | BOD | TP  | SS  | TN  | TC  |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| pH 1    |     |     |     |     |     |     |     |     |     |
| EC -0.24832 | 1   |     |     |     |     |     |     |     |     |
| DO -0.48931 | 0.867344 | 1   |     |     |     |     |     |     |     |
| COD -0.69003 | 0.69523 | 0.557035 | 1   |     |     |     |     |     |     |
| BOD -0.56532 | 0.629837 | 0.398621 | 0.976974 | 1   |     |     |     |     |     |
| TP -0.68933 | -0.51329 | -0.27219 | 0.170369 | 0.136834 | 1   |     |     |     |     |
| SS -0.04381 | 0.67972 | 0.257343 | 0.750961 | 0.844417 | -0.34232 | 1   |     |     |     |
| TN -0.07864 | 0.957501 | 0.881127 | 0.463903 | 0.379147 | -0.66788 | 0.500848 | 1   |     |     |
| TC -0.71939 | -0.06751 | -0.10842 | 0.669924 | 0.899774 | 0.778747 | 0.322824 | -0.34275 | 1   |     |

CONCLUSION

The results attained show that most of the attributes does not satisfy the permissible limit recommended by World Health Organization. This study determines the importance of multivariate statistical techniques in the analysis and interpretation of important data sets, in identifying pollutant sources, and in understanding variations in water quality for effective lake water management.
It is concluded that Ambazari Lake water is contaminated as well as not thoroughly camouflaged for drinking expectation. It is desirable to important survey and useful plans to restraint the freeing of dispersal. It shows that the desecration is by virtue of uncovering, industrialized discharge, domestic discharge.

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Conflict of interest
No conflict of interest regarding this research paper.

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