Foam Formation In Bellandur Lake North-East Region, Bangalore

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Abstract- *The major source for drinking and other domestic use in rural and urban population in India is the Lake water. A Representative sample was collected from twelve different locations based on their importance from Bellandur Lake North-East Region, Bangalore. Analysis of water sample was carried out for various Physico-Chemical parameters, Heavy Metals and Microbiology to identify the cause for foam formation. Foam sample was also collected and the analysis of the foam sample was carried out. The interference of Effluent from sewage treatment plants and effluent treatment plants was checked. Various possible ways to reduce the formation of foam in the lake is suggested in this paper.*

Keywords- BOD, COD, Foam Formation

I. INTRODUCTION

Safe water should not enforce any kind of threat to life of human beings. The need of drinking water which is safe is essential to human beings. Waste water is released into the environment in the developing countries with rapid industrial development such as pesticide industry, paper industry, fertilizer industry, mining operations, metal plating operation, etc. Pollutants enter the body of living organisms through air, water, food or through absorption by skin. Although some of the heavy metals are required for human life, increased amount of the metals can have bad impact on human life. The heavy metals are non biodegradable, unlike the general organic pollutants in water that are mostly biodegradable in nature. Hence, from time to time they tend to accumulate inside the body. Many of these metals are harmful. Research studies have reported the acute and chronic illness of different pollutants based on the amount inhaled or ingested during specific period of time. It is very much essential to treat polluted wastewater prior to discharge of pollutants into the environment.

The fate of the lakes in Bangalore city is very bleak. In the ground water table restoration Lakes play a vital role. Bellandur Lake is one such heavily polluted lake which is the oldest big tank in Varthur situated in Bangalore's southern tale. For better infrastructure and lake restoration the socio - economic conditions of the people must be improved. The poor and the labor class people use the lake water for bathing and washing, leading to pollution which affects the environment. The lake is choking with weeds and is silting on all the sides. It is shrinking the capacity of the lake in size with loss of varied flora, fauna, deterioration in quality and some other resources. The lake is under serious threat due to some destructive land use practice in Bellandur Lake catchment area. As most of the pollutants are slowly leaching into the ground water table, now the lake is a health hazard and the crisis is enhanced since there is no other source of water except the ground water.

Study Area: The study was carried out on heavily polluted lake the Bellandur Lake. It is located at a latitude 12º45'0"N and longitude 77º40'0"E. It is a major tank in Varthur of Bangalore South Taluk. The lake catchment area, annual rainfall is 32 inches. The total catchment area of the lake is 110.94 Sq. miles. Lake has a submerged area of 915 acres.

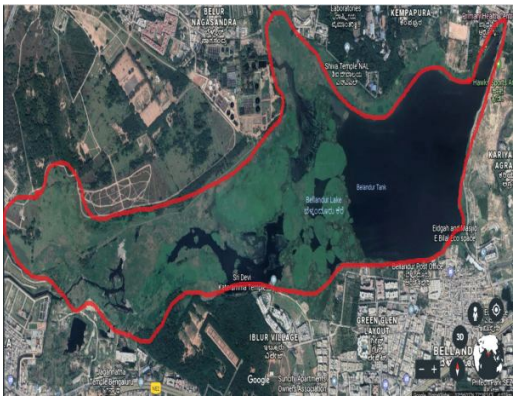

Fig. 1: Bellandur Lake, Bengaluru

Fig. 2: Bellandur Lake North-East Region,Bengaluru

II. METHODOLOGY

Twelve stations were selected in North-East region of the Bellandur Lake. For investigation surface water samples were collected during January-April 2018. Grab samples of water was collected In Polyethylene bottles (2000 ml). After collection the samples were transferred to the laboratory for analysis. By using standard methods the analysis of physico-chemical parameters, Heavy Metals, Microbial tests and Foam analysis was carried out. Any interference of Effluent from sewage treatment plants and effluent treatment plants from Apartments, Commercial Buildings and Industries into the Bellandur Lake, Bangalore was checked.

Fig. 3: Sample Collection Stations in Bellandur Lake North-East Region, Bengaluru

Sample Collection: Collection of the sample was done in clean and sterilized plastic bottles of 2 litre capacity. The samples were collected in the month of January to April 2018 to determine the water quality of Bellandur Lake. At a depth of 30 cm below the surface of water the samples are collected and the samples were brought to the laboratory for analysis of Physico-chemical parameters, Heavy metals and Microbial Analysis. Foam samples were collected and then taken to laboratory for analysis.

III. RESULTS AND DISCUSSION

It is found that there is no notable excess of physicochemical parameters in the analysis of samples. Some of the parameters such as oil and grease, sulphate, phosphate, are found to be in lower concentration which may lead to formation of foam. Through various sources such as industrial wastes, biomedical wastes, agricultural wastes, untreated sewage and surfactants, toxic chemicals enter the lake water which increases the nutrient content in the lake water and further raise the growth of algae.

Huge formation of foam in the lake may cause fire hazard. Due to variations in the elevation, wind and heavy rainfall may lead to formation of froth by phosphorous. Filamentous bacteria also cause formation of froth in water.

- **Total Dissolved Solids**

TDS comprise of inorganic salts and a small amount of organic matter which is dissolved in *water*. Permissible limit is 500 mg/l-2000 mg/l according to Bureau of Indian Standards. In the present study the maximum value of 499, 498, 578, 575 in mg/l are recorded and a minimum value of 423, 413, 514, and 514 in mg/l are recorded in the month of January, February, March and April respectively. Higher values of TDS results in corrosion, staining, and deposition on pipes.

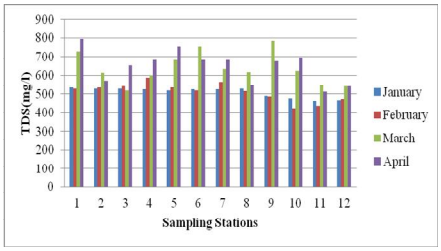

Fig. 4: Graphical Representation of TDS

- **Biochemical Oxygen Demand**

BOD is caused by natural and introduced organic matter which is present in lake water. BOD determines the quality of water. The Permissible limit of BOD is 30 mg/l as per Bureau of Indian Standards. In the present study the maximum value of 49, 40, 68, and 123 in mg/l are recorded and a minimum value of 26, 20, 6 and 24 in mg/l is recorded in the month of January, February, March and April respectively.

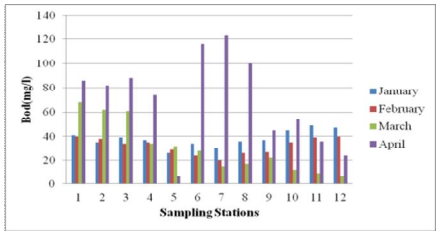

Fig. 5: Graphical Representation of BOD

- **Chemical Oxygen Demand**

COD determines the overall quality of the lake. COD is due to natural or introduced organic matter. The permissible limit of COD is 250 mg/l as per Bureau of Indian Standards. In the present study the maximum values of 295, 295, 589 and 765 in mg/l are recorded and a minimum value 143, 103, 32 and 132 in mg/l are recorded in the month of January, February, March and April respectively. This indicates the presence of chemical oxidizing matter which includes maximum of non biodegradable matter. Higher COD values which is recorded is due to sewage flow, effluent discharges and lean flow in the river.

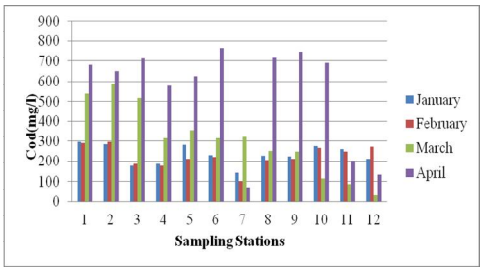

Fig. 6: Graphical Representation of COD

- **Analysis of Microbial Parameters**

The pH of the foam sample analyzed was found to be 6.9. When focused under 100X oil immersion Gram Positive Cocci(purple color) was found. Cocci were found in cluster and some were found in chains.

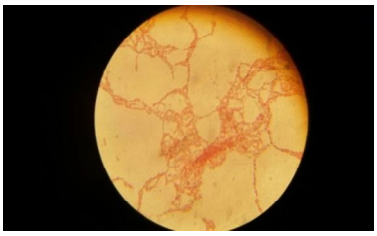

Fig. 7: Slide 1 of Microbiological Analysis

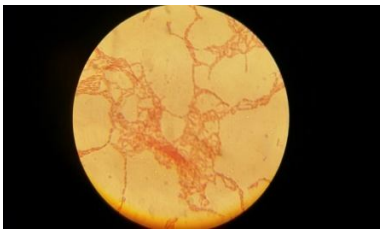

Fig. 8: Slide 2 of Microbiological Analysis

IV. CONCLUSIONS

The environmental study on Bellandur Lake is not systematically carried out. Due to consequent changes and urbanization the quality of water in Bellandur Lake has amplified with pollution concentration. It was found that Physico-chemical concentrations in Bellandur Lake was high. Due to degradation of water bodies, quality and quantity of water is directly or indirectly affected. Industrial wastes contain heavy metals and harmful chemicals which accumulate in the nature. When natural environmental factors like air, water and land is disturbed beyond self sustainable capacity limit various human activities are obstructed. Major issue concerned with Bellandur Lake is fire catching and formation of foam. Due to interference of large quantity of pollutants, assimilation capacity of the lake is decreasing.

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