

Water Quality Analysis and Environmental Impact Studies on Varthur Lake

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Abstract: The study was conducted to assess the surface and groundwater quality values of varthur lake which is a major tank in the south taluk. Samples were collected in clean and sterilized plastic bottles of 2-liter capacity. The samples were collected to examine the water quality in the month of February 2018 of Varthur lake and brought to the laboratory for physico-chemical parameters analysis. Selected Parameters were analyzed by standard methods of CENTRAL POLLUTION CONTROL BOARD OF INDIA. The surface and groundwater quality of Varthur Lake has exaggerated due to the consequent changes and urbanization which indicated the physicochemical concentrations of lakes found in high levels.

I. INTRODUCTION

Water is a prime natural resources, A basic human need and a precious national asset. Planning, Development and management of water resources need to be governed by national perspectives. All life depends on water and exists in nature in many forms like an ocean, river, lake, clouds, rain, snow and fog etc. However, strictly speaking chemically pure water does not exist for any appreciable length of time in nature. A lake is a large body of water surrounded by land, inhabited by various aquatic life forms for all practical purpose, pure water is considered to that which has low dissolved or suspended solids and obnoxious gases as well low in biological life. Such high quality of water may be required only for drinking purposes while for other uses like agriculture and industry, the quality of water can be quite flexible and water polluted up to a certain extent in a general sense can be regarded as pure. The lakes are also subjected to various natural processes taking place in the environment like the hydrologic cycle, with unprecedented developmental activities; human beings are responsible for choking several lakes to death. Storm water runoff and discharge of sewage into the lakes are a few of the common causes where various nutrients enter the aquatic ecosystems resulting in their death. Of all the water quality issues facing lakes everywhere, Eutrophication is of great concern. Eutrophication is a term used to describe the aging of a lake, resulting due to the accumulation of nutrients, sediments, silt and organic matter in the lake from the surrounding watershed (sulekhct al., 2012). The pace of urbanization is increasing globally, putting more pressure on local water quality. In addition to discharges untreated sewage of urban and industrial wastewater, urban areas add to poor water quality in number ways. The high concentration of impervious surfaces increases runoff from roads and can carry numerous pollutants such

as oils, heavy metals, rubber, and other automobile pollution into waterways and streams. The reduction in water percolation into the ground can also affect the quantity and quality of groundwater, and storm water runoff can overwhelm wastewater treatment systems when high volume flows exceed treatment capacities. India is facing a serious problem of natural resource scarcity, especially that of water in view of population growth and economic development. Most of fresh water bodies all over the world are getting polluted, thus decreasing the potability of water. Bangalore city does not have any perennial river. It is dependent on river cauvery which is about 140km away to provide water to its residents pumping water is an expensive business as the the population of Bangalore increases the demand for water to increase.

Sample collection

Samples were collected in clean and sterilized plastic bottles of 2 litre capacity. The samples were collected to examine the water quality in the month of February 2018 of Varthur lake and brought to the laboratory for physico-chemical parameters analysis. Selected Parameters were analysed by standard methods of CENTRAL POLLUTION CONTROL BOARD OF INDIA. The surface and ground water quality of Varthur Lake has exaggerated due by the consequent changes and urbanization which indicated the physico-chemical concentrations of lakes found in high levels. Despite of some conservation efforts made by the authorities this lake is threatening immeasurably. Continuous monitoring of lakes should be enacted properly as from the origin point at the end to overcome these situations.

II. MATERIALS AND METHODS

Study area : varthur lake is one of the largest lake located in bangalore south It has a large surface area and is the

main irrigation source to the nearby agricultural fields this lake has played an important role in maintaining water resources for irrigation since its construction over the centuries. The lake is surrounded by small farms that grow rice, ragi, coconut and flowers and variety of fruits and vegetables. The total land irrigated by the lake water amounts to 625 hec. The largest town in the immediate area in the varthur, which had a population of 5431 as per 1981 census. Varthur lake which has an area of 180.40 hec (445.8 acres) is the most largest lake in the Bangalore city.

PYSICO CHEMICAL ANALYSIS

Table 1: Result of physico- chemical analysis of ground water

| PARAMETERS | WHO STANDARD | GROUND WATER SAMPLE | | | | |
|---|--------------|---------------------|-----------|-----------|-----------|-----------|
| | | SAMPLE(1) | SAMPLE(2) | SAMPLE(3) | SAMPLE(4) | SAMPLE(5) |
| COLOUR | - | - | - | - | - | - |
| TDS (mg/l) | 500 | 1160 | 1241 | 1570 | 1300 | 1612 |
| pH | 5.5-9.0 | 7.49 | 7.36 | 7.32 | 7.42 | 7.14 |
| CONDUCTIVITY (µS/cm) | 600 | 1818 | 1955 | 2460 | 2054 | 2550 |
| TOTAL HARDNESS (mg/l of CaCO ₃) | 500 | 460 | 236 | 540 | 568 | 532 |
| CALCIUM(mg/l) | 200 | 141.08 | 75.35 | 107.41 | 72.144 | 134.66 |
| MAGNESIUM(mg/l) | 100 | 26.24 | 11.664 | 66.09 | 94.28 | 47.628 |
| CHLORIDES(mg/l) | 250 | 310 | 302 | 352 | 280 | 320 |
| SULPHATE(mg/l) | 200 | 22 | 28 | 32 | 24 | 22 |
| NITRATES(mg/l) | 10 | 105 | 98 | 58 | 110 | 125 |
| FLORIDES(mg/l) | 0.6-1.2 | 1.8 | 1.5 | 1.2 | 1.9 | 2.2 |
| IRON(mg/l) | 1 | 0.32 | 0.8 | 1.2 | 1.5 | 0.56 |
| COD(mg/l) | 250 | 58 | 68 | 72 | 70 | 24 |
| DISSOLED OXYGEN(mg/l) | 4 | 4.11 | 4.82 | 4.12 | 3.11 | 2.10 |
| SODIUM(Mg/l) | - | 22 | 28 | 32 | 24 | 20 |
| POTASSIUM(mg/l) | - | 2 | 1 | 3 | 4 | 2 |
| ALKALINITY(mg/l) | 200 | 484 | 484 | 404 | 436 | 372 |

HEAVY METALS

| | | | | | | |
|-----------------|------|-------|-------|------|-------|------|
| CHROMIUM (µg/l) | 0.05 | 1.946 | 89.03 | 00 | 50.03 | 0 |
| ZINC(µg/l) | 5 | 0.0 | 00 | 00 | 206.6 | 0 |
| COPPER(µg/l) | 1.5 | 0.02 | 0.05 | 0.04 | 0.00 | 0.01 |

Table 2: Results of physico-chemical analysis of surface

| SURFACE WATER SAMPLE | WHO standards |
|-------------------------------|---------------|
| TURBIDITY(NTU) | 158 |
| pH | 7.52 |
| CONDUCTIVITY(µS/cm) | 2000 |
| TOTAL DISSOLVED SOLIDS (mg/l) | 1270 |
| ALKALINITY(mg/l) | 508 |
| TOTAL HARDNESS | 308 |
| CALCIUM(mg/l) | 8.93 |
| MAGNESIUM(mg/l) | 33.05 |
| CHORIDE(mg/l) | 350 |
| SULPHATE(mg/l) | 22 |
| NITRATE(mg/l) | 52 |
| FLORURIDE(mg/l) | 1.8 |
| IRON(mg/l) | 0.2 |
| BOD(mg/l) | 120 |
| COD(mg/l) | 180 |
| SODIUM(mg/l) | 45 |
| POTASSIUM(mg/l) | 4 |
| HEAVY METALS | |
| CHOMIUM(µg/l) | 00 |
| ZINC(µg/l) | 00 |
| COPPER(µg/l) | 0.15 |
| LEAD(µg/l) | 0.00 |
| CADMIUM(µg/l) | 0.05 |
| MERCURY(µg/l) | - |
| ARSENIC(µg/l) | 0.0 |
| NICKEL(µg/l) | 0.254 |

III. CONCLUSION

Water quality studies can bring sharp focus about the definite changes in different chemical constituents this include details of the result obtained from the analyses of 5 bore wells and 1 sewage samples from varthur lake surface sample high concentration of Chloride, Fluoride, Nitrate, Alkalinity and Total dissolved solids above permissible limit the surrounding varthur lake alkali concentration is high because of untreated industrial effluents and sewage water leaving into stream is the only reason for the increase of alkalies in ground water of the study area.

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