



CHECKING WATER QUALITY OF PUTTENAHALLI LAKE BY INVESTIGATING DIFFERENT PARAMETERS AND STEPS TO BE TAKEN FOR ITS REJUVENATION

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ABSTRACT:

Puttenahalli lake is located in puttenahalli near yelahanka, spread over 34 acres in north Bengaluru. It is declared as a **bird conservation reserve** in 2015 & known for housing **120 species of birds**. It's alarming to prevent it from pollution. This lake is surrounded by large number of small scale industries and slums. The waste from the industries and surrounding localities is directly discarded into the lake. To evaluate the water quality of this lake, study was carried out for the period of **three months (August 2023 to October 2023)**. Monthly water samples were collected to analyse different physical and chemical parameters and obtained results were compared with standard values. The pollution status was investigated on the basis of obtained results of physical and chemical parameters of water.

High level of variation was recorded during analysis which was as a result of human activity and discharge of waste water to the lake. Very soon Puttenahalli Lake will become biologically inactive if the similar condition will be continued for longer period of time.

INTRODUCTION:

Ground water contains different kinds and amounts of dissolved salts (minerals). These salts originate from the small amounts dissolved in rainwater, particles in the air and from the dissolution of soils and rocks as water moves through the ground. Small quantities of salts are essential to good health and improve the taste of the water. Excessive amounts of some can be hazardous to health. The term "potable" water refers to water that meets the standards for drinking water and includes physical, biological, inorganic, organic, and radiological parameters.

KEY WORDS: Hardness, Total Dissolved Solids, Pollution, Water Quality

MATERIALS REQUIRED:

- a.) **Test strips:** are small, single use strips that change colour to indicate the concentration of a specific chemical. We can compare the test strip colour with a colour chart to read the concentration of the chemical.
- b.) **Colour disk test kits:** are available for a wide range of chemical tests, we can add a powder packet or a few drops of a liquid reagent to a water sample in a reusable plastic tube, then place the tube in a small plastic viewing box with a colour gradient printed on it. Then the colour disk is rotated to find the part that best matches the colour of the sample.
- c.) **Hand held digital instruments:** Lightweight and portable digital meters, colorimeters, and photometers are available for water testing. These instruments require batteries and calibration.

METHODS USED:

Checking of Water Column Profile (Dissolved Oxygen & Temperature), Total Alkalinity, pH, Turbidity, Total Nitrogen, Total Phosphorus, Chloride, Pesticides, Redox potential & Electrical conductivity.

WATER QUALITY TESTS PERFORMED:

Dissolved Oxygen Test:

Measures the amount of oxygen dissolved in water. Without this, aquatic life is unable to conduct cellular respiration and is thus a key indicator of water health.

**Temperature Testing:**

Testing the temperature of water helps to determine the rate of biochemical reaction in an aquatic environment. If the water temperature is increased, this can limit the water's ability to hold oxygen and reduce the organisms capacity to resist particular pollutants.

pH Testing:

Measures the acidity of water. Most aquatic organisms are only able to survive within a pH range of 6 to 8.

Salinity Testing:

Measures the total of all non-carbonate salts dissolved in water. Measuring groundwater salinity indicates how salty the topsoil may become if the water-table rises.

Turbidity Test:

Measures the amount of particulate matter that is suspended in the water, or more simply, how clear the water is. If high levels of turbidity are present, photosynthesis is affected as light is unable to penetrate, increasing water temperature.

Nitrate and Phosphate:

The presence of these essential nutrients is a good indicator of strong plant life. However, the addition of artificial nitrates and phosphates through detergents, fertilisers or sewage can be harmful and result in eutrophication, generally in the form of unwanted algal blooms.

Pesticides:

We measure whether any pesticides are present and their concentration levels.

Redox potential:

The measurement of the reduction-oxidisation potential of a solution, which indicates the electron activity. Micro-organism growth is highly dependent on these levels.

Electrical Conductivity:

Estimates the total amount of solids dissolved in the water. This can be a good indicator of the level of salinity.

Chloride Test:

Chloride is usually present in fresh and salt water. However, its levels can be elevated as a result of minerals dissolving and industrial pollution.

VALUES OBTAINED BY PHYSICO-CHEMICAL PARAMETERS:

Sampling Month	August-2023	September-2023	October-2023
NAME OF THE LAKE	PUTTENAHAL LI LAKE	PUTTENAHAL LI LAKE	PUTTENAHAL LI LAKE
Dissolved O ₂ (mg/L)	4.2	5.2	5.4
pH	7.2	7.5	7.7
Conductivity (μ mho/cm)	390	497	456
BOD (mg/L)	4	6	5
Nitrate N (mg/L)	2	2	2
Carbonate (CO ₃ ⁻) (mg/L)	96	NA	79
Bicarbonate (HCO ₃ ⁻) (mg/L)	9.5	3	16
Turbidity (mg/L)	19.6	11.2	NA



Phenolphthalein	48	12.8	3
Alkalinity (mg/L)	40	5	18
Total Alkalinity (mg/L)	0.62	11.2	2.8
COD (mg/L)	120	56	60
Ammonical- Nitrogen (mg/L)	64	0.41	22
Ca as CaCO₃ (mg/L)	56	124	48
Mg as CaCO₃ (mg/L)	13	68	17
Sulphate (mg/L)	36	56	39
Sodium (mg/L)	268	140	193
Total Dissolved Solids (mg/L)	0.55	33	2.2
Phosphate (mg/L)	0.5	3.8	2.1
Boron (mg/L)	12	0.34	6.2
Potassium (mg/L)	0.2	0.7	0.9

METALS AND THEIR HAZARDS:

- Heavy metals like Aluminium, Antimony, Arsenic, Beryllium, Bismuth, Copper, Cadmium, Lead, Mercury, Nickel, Uranium, Tin, Vanadium and Zinc are known to harm kidneys, liver, nervous system and bone structure.
- In humans, Lead poisoning can cause problems in the synthesis of haemoglobin, affecting the functions of kidneys, gastrointestinal tract, joints, reproductive system and acute or chronic damage to the nervous system.
- Long-term exposure of cadmium leads to renal dysfunction, lung cancer and osteo-dystrophy. Nickel toxicity causes inhibition of DNA repair and exhibiting allergic effects.
- Exposure to mercury can lead to tumours. Mono methyl mercury causes damage to the brain and central nervous system, congenital malformations.
- Vanadium causes toxic effects on the liver, kidney, nervous, cardiovascular systems and blood forming organs.

CONCLUSION:

The results of the current study indicated that the lake of puttenahalli, yelahanka is in bad condition in terms of its water quality as they are in closer proximity to the Bengaluru city thus, affecting all the life forms linked to it.

Impurities in the lake water causes degradation of water quality. In summer, lake spoiling parameters increases while it decreases/dilutes in rainy season. This increases the nitrogen content causing more microbial growth and leads to the depletion of oxygen in water which kills the fishes that feed on malarial larvae causing outburst of Malaria disease. Also, the microbes at the bottom of lake cannot degrade the waste as there is lack of oxygen in water.

These are very common problems for every lake ecosystem, mostly due to human activities and sometime due to natural ageing; lakes die. To overcome these problems serious steps need to be taken like proper treatment of waste water before releasing it into water bodies, regular checking of



water quality and aquatic life in water. **Strict laws and rules** must be implemented to prevent water pollution, to prohibit any kind of waste into water bodies.

Different activities required for the lake rejuvenation process are:

- Fencing around the lake helps to prevent land encroachment.
- Prohibition of dumping the garbage into the lake.
- Preventing the loss of wetland area.
- Educating the public by awareness programmes.
- Developing tourism since the lake is a Bird conservation reserve.
- Welcoming the voluntary groups like NGO, NSS and NCC wings of nearby colleges for cleaning the lake, preventing the pollution and taking care of the lake.

DISCUSSION:

Lakes are the main source of fresh water and many microbes, plants and animals thrive on its water. These natural or man-made water bodies are in plenty in number [>167 (BBMP report)] in the city of Bangalore, but it is a matter of concern that most of them are not in a good condition. The increasing population and rapid urbanization of the city is posing a serious threat to the lakes, some of them have been completely killed (filled up with mud) in order to provide space to make residential building; thus the health of lakes have become a serious issue.

The Study of puttenahalli lake near yelahanka, Bangalore was carried out to check the water quality by performing certain examinations on water samples. Since the above mentioned lake is inside the city; it is prone to industrial pollution. So taking care of the lake and make sure to prevent the lake from water pollution is a need of the hour.

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