

Comparative Study of Eutrophication in Urban Lakes of Bangalore

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ABSTRACT: This research paper is about to the rapid increase of populace alongside urbanization has resulted in the deterioration of lake water particularly in developing city like Bengaluru and human beings are blamable for choking numerous lakes to death. Excess nutrients, specifically phosphorus and nitrogen are the primary pollutants that contribute to the cultural eutrophication of lakes. In addition to eutrophication, warming in the past half century has also extensively influenced harmful algal blooms communities in lake ecosystems. A large quantity of sewage from the households is regularly discharged into the water bodies. Several limiting factors namely, level, temperature, PH, light, and dissolved oxygen are known to affect eutrophic water bodies.

KEYWORDS: Eutrophication, Lakes, Algae.

I. INTRODUCTION

In this paper Eutrophication is known as (dystrophication or hypertrophication,) when a frame of water turns into overly enriched with minerals and nutrients which result in immoderate growth of algae. This method might also bring about oxygen depletion of the water body after the bacterial degradation of the algae. One example is an "algal bloom" or outstanding growth of phytoplankton in a pond, lake, river or coastal quarter as a response to increased ranges of nutrients. Lakes age certainly and this evolution usually happens over hundreds or hundreds of years. This phenomenon known as eutrophication is the gradual process of nutrient enrichment of a lake, because it adjustments from an oligotrophic country (nutrient- poor) to a eutrophic state (nutrient-rich).

This enrichment enhances biological productivity, ensuing in improved abundance of microscopic algae (phytoplankton) and aquatic plants. Lake eutrophication has grow to be a worldwide problem of water pollutants. Chlorophyll-a, total nitrogen, general phosphorus, biological or chemical oxygen call for and secchi

intensity are the primary indicators to assess lake eutrophication level. Eutrophication Frequently brought on by way of the release of nitrate or phosphate containing detergents, fertilizers, or sewage into an aquatic device. This multiplied productivity is associated with a trade in lake characteristics including a more accumulation of sediments and natural matter, a discount in dissolved oxygen, and the substitute of living organisms through species higher tailored to the new conditions. Eutrophication, or the advertising of the boom of plants, animals, and microorganisms in lakes and rivers, has been a totally sluggish, herbal method. If this is allowed to arise uninterrupted, it effects in an excessive deficiency of oxygen in the water. As a consequence organisms that thrive under anaerobic situations are desired an increasing number of on the cost of cardio organisms (mengel&kirkby, 1996). In floor waters, phosphorus concentrations exceeding zero.05 mg l⁻¹ can also motive eutrophic conditions (hinesly&jones, 1990). Eutrophication of drainage ditches by overfertilization with nitrogen and phosphorus reasons a shift particularly from submerged aquatic plant life to a dominance of floating duckweeds. This outcomes in anoxic situations, loss of biodiversity, and hampering of the agricultural capabilities of such ditches (janse&puijenbroek, 1998). The exchange in eutrophic conditions is contemplated within the incidence, patten of distribu- tion, and diversity of the biotic community (tiwari, 1998 discharge of human wastes from settlements and immoderate fertilizers from agricultural lands brings down the water our bodies below an undesirably expanded price of eutrophic

1.1 SCOPE OF THE WORK

The scope of the work are as follows

- Collection of water samples in Ulsoor Lake and its related data.
- Collection of water samples in Yelachanahalli Lake and its related data.

- Evaluation of water quality for various parameters was conducted with sophisticated instruments and Standard operating procedures.
- Data compilation
- Graphical representation of data
- Interpretation of results
- To check whether the waste water is entering into the lake or not.

1.2 OBJECTIVES

- To analysis The water great of ulsoor lake and yelachanahalli lake.
- ↓ □ To compare the water pleasant of both ulsoor lake and Yelachanahalli lakes (reference to pH,

temperature, total nitrogen and total phosphorous).

- To study the feasibility condition for eutrophication in lake

II .MATERIALS AND METHODOLOGY

Cleaning of the equipments are very much important and instruments should be kept turned on at least for 15mins to get heated up before conducting the test. Generally it is not necessary to clean the equipments in every sample, instead, it is rinsed with distilled water.



Fig pH Conductivity Apparatus

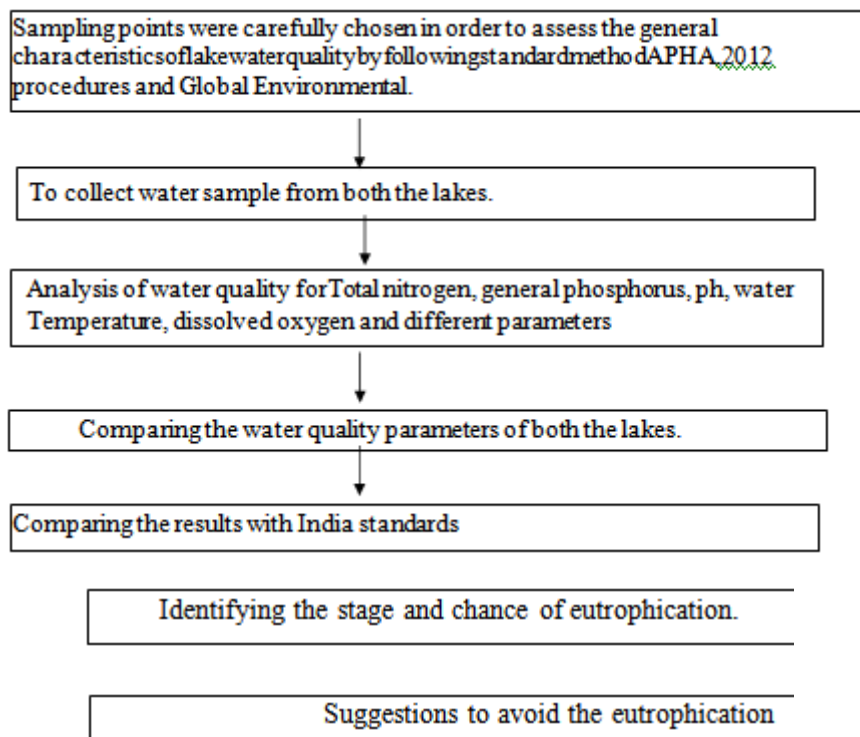


Fig Electrical Conductivity Apparatus



Fig Titration Apparatus

2.1 METHODOLOGY



III. TESTING

The gradual increase of lake productivity from oligotrophy to eutrophy is called lake aging or eutrophication. Lake eutrophication is a natural process resulting from the gradual accumulation of nutrients, increased productivity, and a slow



filling in of the lake basin with accumulated sediments, silt, and muck. Human activities can greatly speed up this process by dramatically increasing nutrient, soil, or organic matter input to the lake.

Measuring a lake's water quality and eutrophication is not an easy task. Lakes are a complex ecosystem made up of physical, chemical, and biological components in a constant state of action and interaction.



Plant growth in lakes is not constant throughout the summer. Some species mature early in the season, die back, and are replaced by other species in a regular succession. Anthropogenic eutrophication is often a much more rapid process in which nutrients are added to a water body from any of a

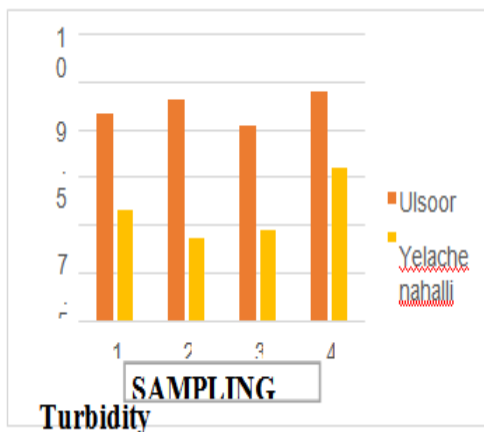
wide variety of polluting inputs including untreated or partially treated sewage, industrial wastewater and farming practices. Nutrient pollution, a form of water pollution, is a primary cause of eutrophication of surface waters, in which excess nutrients, usually nitrogen or phosphorus, stimulate algal growth. Lake aging process is known as cultural eutrophication. A primary objective of most lake management plans is to slow down cultural eutrophication by reducing the input of nutrients and sediments to the lake from the surrounding land.

Given these factors, observers of lake water quality must train themselves to recognize the difference between short-term, normal

Analyses were done in the laboratory for the samples collected from March to May 2021 for physicochemical parameters, microbial parameters and following are the results obtained. These results are compared with the standard limits as specified by Bureau of Indian Standards (BIS).

pH

The source for pH is natural like biological activities and temperature. The desirable pH range is 6.5 – 8.5. Lower values cause corrosion and metallic taste and higher values cause bitter/soda taste and deposits over the pipes and fixtures.



Turbidity

Turbidity is triggered by clay particles, sewage solids, silt, organic and biological sludges. The value of turbidity as per BIS is 1-5 NTU. It was found to be the least value of 10.5 NTU during April at station 4 and maximum of 22.8 NTU during April at station

Biochemical Oxygen Demand

This occurs due to natural or introduced organic matter within the water. It shows the general best of

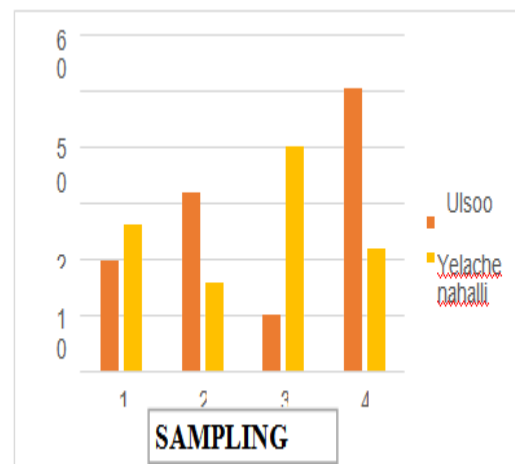
fluctuations and long-term changes in lake productivity (eutrophication). The visible effect of eutrophication is often nuisance algal blooms that can cause substantial ecological degradation in the water body and in the streams flowing from that water body. This process may result in oxygen depletion of the water body after the bacterial degradation of the algae.

IV RESULTS

Analyses of Various Physicochemical

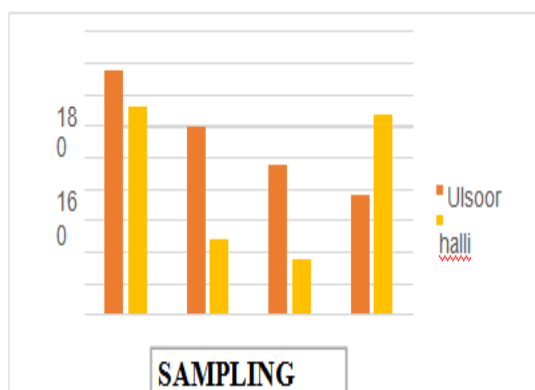
Parameters

the water. BIS value for BOD in a water sample is 30 mg/l. In the current study, maximum and minimum values are found 40 mg/l and 12 mg/l during April at station 3 and March at station 3 respectively.



Chemical Oxygen Demand

These sources are natural or more probably the dead or organic matter. It denotes the overall quality of the water sample. The BIS value for COD is 250 mg/l. maximum and minimum values of COD are 40 mg/l and 20 mg/l during March at station 4 and March at station 2 respectively.



Dissolved Oxygen

The Degree of how much oxygen is dissolved in the water - the amount of oxygen to be had to residing aquatic organisms. The quantity of dissolved oxygen in a flow or lake can tell us a lot approximately its water pleasant. The BIS value for DO is 5-8 mg/l. maximum and minimum values of DO are 14.28 mg/l and 10.9 mg/l during April at station 4 and April at station 2 respectively.

Nitrate

It occurs due to the oxidation of Ammonia from agricultural runoff. BIS standard for Nitrate is 45 mg/l. It is hazardous to infants if above 11 mg/l N. The maximum and minimum values were found to be 0.10 mg/l during March at station 3 and 0.001 mg/l during April at station 2 respectively.

MPN

Total coliform bacteria encompass a extensive variety of aerobic and facultative anaerobic, gram-negative, non-spore-forming bacilli able to growing within the presence of enormously excessive concentrations of bile salts with the fermentation of lactose and production of acid or aldehyde within 24 h at 35–37 c. This check is first in line to micro-organic evaluation. The BIS value for MPN is 250 mg/l. maximum and minimum values of MPN are 55.2 mg/l and 32.1 mg/l during April at station 2 and March at station 1 respectively.

V CONCLUSION

The samples were Accumulated for the analysis of physical, chemical and biological parameters at four region in and across the lake. The sampling is carried out at some stage in March nineteenth and April 9th. The evaluation of DO, TN, TP, BOD, COD and other parameters has accomplished as according to its techniques.

The results of analysis of water sample reveal that lake is categorized under Hyper Eutrophication thus, water is found to be unfit for drinking and irrigation purposes. The lake is said to have Heavy algal blooms feasible during the summer, dense macrocytic beds, however restrained light penetration.

Water bodies located close to large towns are probable to receive more phosphorus from domestic effluents containing detergents. However, urban water bodies also get hold of principal portions of phosphorus from fertilizers and other agriculture-associated activities. Eutrophication of smaller water bodies reduce the water-recharging potential in those areas, so groundwater is possibly to end up depleted partly due to eutrophication and partially because of exploitation via pumping.

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