



Research paper

## An investigation into value of Eutrophication in Hosur Lakes

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### ABSTRACT

Our current concern is that nitrogen and phosphorus amounts are rising rapidly. Otherwise, to limit the growth of algae and biomass, it exists in relatively low concentrations in unmodified natural waters. This investigation aims to attempt to measure the level of eutrophication in the Hosur Lakes. For this research, we chose three lakes named Chandrakudi Lake, Doddan Lake and Kelavarapalli dam. For dissolved orthophosphate, chemical oxygen need, organic nitrogen, free ammonia, inorganic nitrogen whole phosphorus and soluble oxygen, etc. some exemplars were gathered and examined. The onsite research as transparency, facts on killing fish and deterioration of the lakes conditions, etc. was also accomplished. The eutrophication rate in the lakes was measured using the Wetzel's plan. The results showed that the rate of eutrophication was very high in all three lakes, i.e. more than enough to very rich in nutrients that cause excessive plant growth, which chokes out the animal life in the water.

### Introduction

The expression eutrophication has been derived from eutrophic, a Greek term which means large or rich. For the first time, Naumann (1919), utilized the term eutrophication in scientific study of lakes, to show that how poor conditions and rich conditions in having nourishing qualities (poor lakes in nutrients) and (rich lakes in nutrients) affect the extension of various algal connections. According to the 2001 census, Hosur town, where the research was done there, was over 71.11 square kilometers and had a population of 84,318 people. The city is 45 km from Bangalore Hosur has seven tanks, each with an area of 40 hectares and above. It also has a tank and six tank channels with a length of 13 km for irrigation Kelavarapalli reservoir along the Ponnaiyar River, supplies its water from small pond in Hosur with an area of 63107863. In the months of January and February which the rainfall level is 18/7mm, for Hosur, it is 822.4 mm., from March to May it is 182/5mm; within the southwest monsoon the rainfall level is 34908mm and within the northeast monsoon, it is 271/4mm. there is significant rainfall in Hosur. In 1971, when SIPCOT

town was created, the Tamil Nadu government predicted that the developing city of Hosur will become a satellite industrial city in Bangalore (Sreenivasan 1977). This idea has now become a great success. Houser Town now has 1,500 large and medium industries. Currently, water scarcity is a problem that Hessor faces. In this research, we are going to examine the eutrophication rate in some of the main lakes in the Hosur town. And inform the responsible authorities so that they can take the necessary measures.

### Materials and Methods

In this study, three lakes were investigated, the results of which are detailed in Table 1. The compound exeplars were gathered from each lake in sterilized 2 litres polyethylene containers, and were immediately taken to a laboratory for testing and examination. The exemplars were retained and analyzed using standard procedures to examine water, (Croome and Tyler 1988). According to table 2, Wetzel's plan was used to measure the amount of eutrophication. Main Words: Eutrophication, Nutrients, Nitrogen, Phosphorus, Hosur town lakes.

## Results and Discussion

the results of this research are shown in Table 3. Using Wetzel plan, the rate of eutrophication in lakes was measured and the results are evident in Table 4.

**Soluble Oxygen:** since Oxygen is poor soluble, and does not react with water chemically, its solubility is directly related to the trivial pressure. The Oxygen solvability is very different from temperature the solvability of pneumatic Oxygen in freshwater ranks from 14.6 mg/L at 0°C to about 7 mg/L at 35°C under the pressure of 1 atmosphere. Poor Oxygen solubility plays an effective role in limiting natural water filtration. The main resources of soluble oxygen in water are atmospheric effluence due to the process of photosynthesis. Nevertheless, the reduction of soluble Oxygen totally, is because of decomposition of organic material the predominant span of the temperature and the content of water of body. In this research It was found that in all the lakes, the soluble Oxygen within the allowed range was from 6.5 mg/L to 8.5 mg/L (Chandrakudi lake 6.89 mg/L, Doddana lake 6.91 mg/L and This could be due to algal growth and photosynthetic action in the lakes. Many researchers including (Deshmukh, Phadke et al. 1964, Kaul, Handoo et al. 1980, Zutshi and Khan 1988, Swarnalatha and Narasingrao 1993), strongly believe that soluble oxygen and the quality of water with lower soluble Oxygen levels are very important.

**COD:** The Chemical Oxygen Demand test is a useful test that detects the existence of organic matters. In this research, the amount of Chemical Oxygen demand in Chandrakudi Lake was 102 mg/L, in Doddana Lake 204 mg/L and in Kelavarapalli dam 86 mg/L. The main reason for the higher level of COD in Lake Doddana is the evacuation of home sewage into the lake.

**Phosphate:** In environmental engineering, phosphate detection is done rapidly, because engineers have found many ways to show the effect of phosphorus composites on the events, they are interested in. Sometimes the entry of waste into surface water causes changes that lead to density Manures or contaminants are other sources of phosphate that enter the lake through agricultural drainage and enter a complex cycle that involves various physical, chemical, and biological processes. These processes hold phosphorus in the inorganic or dissolved form in the lake water. Surface water resources promote the growth of aquatic life. The planktons contain zooplankton and phytoplankton. Phytoplankton basically includes

different kinds of algae and cyanobacteria, and because these organisms contain chlorophyll, the elements of manure in water have a significant effect on their growth According to studies, the growth of algae and cyanobacteria requires nitrogen and phosphorus, and limiting the amount of these elements is effective in their growth. Where nitrogen and phosphorus levels are high, algal blooms occur, causing a variety of annoying conditions. In this research, phosphate proportion varies in different lakes. In the Chandrankudi Lake it was 0.154 mg/L, Doddana Lake 2.735 mg/L, and in Kelavarapalli dam 1.690 mg/L. Many researchers (Croome and Tyler 1988, NAIDU, Naidu et al. 1990, SALER and KARAKAYA 2016) have witnessed such conditions in water bodies. Verduin (1954) believes that phosphorus is an element that malfunctions and it is found in very low densities in natural surface waters. Sreenivasan (1977), have the same opinion. They believe that phosphate is used to propagate plankton in polluted waters. Home waste may be the cause of higher phosphate levels. Another reason is the use of phosphate manures in agriculture in the catchment area of the lake.

**Nitrogen:** Nitrogen composites are very important because they are very effective in the life process of all animals and plants. The chemistry of nitrogen is complicated due to several oxidation states that contain nitrogen and the fact of change in oxidation by living organisms. In addition, changes in the oxidation state caused by bacteria may be positive or negative, depending on the aerobic or anaerobic present terms. In this research, the amount of ammonical nitrogen and total Kjeldahl nitrogen in different lakes are various. The ammonical nitrogen and total Kjeldahl nitrogen in Chandrakudi lake are 16.25 mg/L and 17.37 mg/L, Doddana lake 29.69 mg/L and 34.18 mg/L, and Kelavarapalli Dam 22.41 mg/L and 27.45 mg/L respectively. The high amounts of ammonical nitrogen and total Kjeldahl nitrogen in all the lakes are because of evacuation of home waste and farming runoff from the farms. Prasad (1990) believes that a body of water that is constantly receiving household waste has a large amount of ammonia nitrogen in it.

**Eutrophication level:** In this research, Wetzel's plan was utilized to determine the extent of eutrophication in the lakes of Hosur. According to the research, the eutrophication amount in all the three lakes is very high, for example More than enough or pertaining to proper nutrition condition. Amount of eutrophication in Doddana Lake is more rather than Chandrankudi and Kelavarapalli dam. This is because of the influx of domestic sewage from the city of Hosur.

Table 1. Details of the lakes selected for the study.

NO	Name of the lake/dam	Name of the Panchayat	Capacity	Ayacut
1	Chandrambigai Eri	Hosur - PWD	209750 m <sup>3</sup>	123.48 hectare
2	Doddana Eri	Hosur	11338 m <sup>3</sup>	6.7 hectare
3	Kelevarapalli Dam	Hosur	481 Mcft	1080 acres

Table 2. Trophic classifications of water bodies on the basis of nitrogen and phosphorus in water (Wetzel 1975).

Trophic category	Inorganic-N mg/m <sup>3</sup>	Total phosphorus-P mg/m <sup>3</sup>
Ultra-oligotrophic	<200	<5
Oligo-mesotrophic	200-400	5-10
Meso-eutrophic	300-650	10-30
Eutrophic	500-1500	30-100
Hyper-eutrophic	> 1500	> 100

Table 3. Water sample analysis results of the lakes

NO	Parameters	Chandrakudi lake	Doddan lake	Kelavarapalli dam
1	Soluble Orthophosphate, mg/L	0.95	2.041	1.473
2	Chemical Oxygen Demand, mg/L	102	204	86
3	Organic Nitrogen, mg/L	16.25	29.69	22.41
4	Free Ammonia, mg/L	8.91	16.28	12.29
5	Inorganic Nitrogen, mg/m <sup>3</sup>	17370	34180	27450
6	Total Phosphorus, mg/m <sup>3</sup>	154	2735	1690
7	Dissolved Oxygen, mg/L	6.89	6.91	6.78
8	Transparency, meters	0.15	0.10	0.35

Table 4. Eutrophication levels of lakes using Wetzel's scheme

Trophic Category	Inorg-N	Total P	ChandraKudi		Doddana Lake		Kelavarapalli	
			N	P	N	P	N	P
Hypereutrophic	> 1500	> 100	17370	154	34180	2735	27450	1690

## Conclusion

According to the results and analyzes performed in this research, It can be inferred that the three lakes including Chandrakudi lake, Doddan lake and Kelavarapalli dam, are strongly contaminated. The amount of eutrophication in all the lakes is very high. This can be because of influx of waste from residential lineament of Hosur town, farming runoff and leakage of water from the surrounding irrigation operations. So, in these circumstances, the reconstruction of the lakes is necessary and it is praised in present situation.

## Conflict of interest

The authors declare that they have no conflict of interest.

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