**STUDENT STUDY PROJECT ON**

# AN ASSESSMENT OF WATER QUALITY IN WARDHANNAPET LAKE, WARANGAL (RURAL) DISTRICT.


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## ABSTRACT

Water is an essential component for living organisms. The Warangal district has a large number of fresh water bodies such as canals, reservoirs, lakes, tanks and ponds. The water resources are of critical importance to both natural ecosystems and human development. Hence, an attempt made to calculate water quality in our nearby water body, Wardhannapet lake. We have collected water samples from different areas of the lake and calculated different physico-chemical parameters using standard methods and also to observe the distribution of zooplanktons in different seasons in the lake. The results of the present study showed that all the parameters are at nearly permissible limits. So it is concluded that, this lake is most suitable for Fish culture practices and agriculture purposes.



Key words: Water pollution, Water analysis, Distribution of zooplankton.


## INTRODUCTION

Water is universal solvent, occupies the first place in the priority list of the life. In sovereign India, the state of Telangana, Warangal district is geographically, centrally located in the northern Telangana region. This district has large number of fresh water bodies such as canals, reservoirs, lakes, tanks and ponds. Which have rich flora and fauna, however the recent reports revealed that some species found in this region have gradually started disappearing. It may be due to the destruction of natural aquatic environment due to human activities. There is a talk on pollution everywhere as clear natural fresh bodies are being converted into polluted water. Due to rapid growth in industrialization, deposition of chemical, industrial effluents, domestic wastes and agricultural pestisides, sources of heavy metals chemical transformations occur in water leading to

the decrease in the quality of water affecting the human health. During Idol immersion, the chemical paints used to decorate the idols increases heavy metal concentration and acidity of the water. Therefore there is a need for proper assessment, monitoring and precautionary measures to overcome the pollutant load in Fresh water body. The zooplankton species are not only useful as bioindicators, but are also helpful for ameliorating polluted water.

## AIM

Now a day's water pollution playing a vital role in affecting zooplankton. Hence, the present study is taken up to analyse the water quality of Wardhannapet lake, whether it is polluted or not with the following objectives

## OBJECTIVES

- To analyse Physico-Chemical parameters.
- To analyse the distribution of Zooplankton
- To analyze the Pollution load in the Lake.

## REVIEW OF LITERATURE

Several of the important concepts in ecology have been developed from studies of the aquatic ecosystem and organisms. Hutchinson (1941 and 1967); Welch (1948); Needham and Needham (1962); Odum (1971); Macan (1974); Wetzel (1975); Golterman (1978); Goldman and Home (1983) have studied on physico-chemical factors influenced the aquatic biota. Alam *et al.*, (1995) studied physico-chemistry of four lentic freshwater bodies with emphasis on the impact and causes of proliferation of dominant biota. Singh (1995) observed impact of human activities on the physico-chemical conditions of two fish ponds at Patna in Bihar. Tillman (1996) studied on biodiversity of ecosystem. Gushing (1997) assessed climatic changes in fresh water ecosystem.

Wetzel and Likens (2000) worked on fresh water ecology. Pavan & Benarjee (2017) worked on Studies on the evaluation of toxicants, Eutrophication and Bio-monitoring of tropical lakes with special emphasis on the Bio-diversity of Fish fauna.

The change in physico - chemical parameters can easily accessed by some aquatic invertebrates and some bio indicators.The healthy aquatic ecosystem is dependent on the physico –chemical and biological characteristics (Venkatesharaju et al., 2010). The parameters influence each other and govern the distribution and abundance of flora and fauna (Shinde et al, 2010).

Several investigators have done important studies on the physico-chemical and biological parameters of water during early 2000. Singh (2000) worked on evaluation of physico-chemical parameters in Ox-bow Lake. Bhalerao and Khan (2000) have worked on Fluorine and Sulphur contents in the lakes of tribal area, Marathwada. Prapurna and Shashikanth (2002) observed pollution level in Hussain Sagar Lake. Shanthi *et al*.,(2002) extensively studied on the hydrological studies of Singanallur Lake with reference to physico-chemical characteristics and water pollution. Dwivedi and Pandey (2002) investigated on physic-chemical factors and algal diversity of Jinja Kund and Maqubara Pond. Shaikh and Yeragi (2003) have stated that the seasonal temperature changes and their influence on free Carbon Dioxide, Dissolved Oxygen and pH in Tansa river of Thane District. Khedkar and Dixit (2003) have studied physic-chemical analysis of domestic waste water of Amravathi. Jakher and Rawat (2003) worked on physico-chemical parameters of a tropical lake, Jodhpur, Rajasthan.Khanna and Bhutiani (2003) have observed ecological status of Sitapur pond at Hardwar, (U.P.). Chavan *et al.*, (2004) have contributed for the study of water quality of Manjara project reservoir, Beed. Yeole and Patil (2005) worked on physic-chemical status of Yedshi Lake in relation to water pollution. Dhere and Gaikwad (2006) studied physico-chemical characteristics of Karpara reservoir. Meena *et al.*,(2007) studied tropic status in relation to physic-chemical characteristics of Lake Pichola.

Vishnoi *et al.,* (2008) investigated on water quality Ganga River in respect to physico-chemical characteristics at Kangri Village, Hardwar.

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## RESEARCH METHODOLOGY

The water samples were collected in 250ml pre-cleaned polythene bottles and then brought them to laboratory for the determination of samples, from four different stations over the study area per month regularly. The Physico Chemical Parameters were analysed by using standard laboratory methods and procedures. APHA(2009), Kodarkar (1992), Bhalerao (1998) and Khana (2004).

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rapid growth in industrialization, deposition of chemical, industrial effluents, domestic wastes and agricultural pestisides, sources of heavy metals chemical transformations occur in water leading to the decrease in the quality of water affecting the human health. During Idol immersion, the chemical paints used to decorate the idols increases heavy metal concentration and acidity of the water. Therefore there is a need for proper assessment, monitoring and precautionary measures to overcome the pollutant load in Fresh water body. The zooplankton species are not only useful as bioindicators, but are also helpful for ameliorating polluted water.

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**Fig.1: The overall view of Wardhannapet Lake and collected water samples**


## Physico – Chemical parameters (APHA, 2009 )

- Temperature :Mercury thermometer
- pH : Digital pH meter- standard method
- Dissolved oxygen : Winkler's method
- Total Hardness :EDTA Titration method
- Chlorides : Argentometric method

### STATISTICAL ANALYSIS

The statistical analysis was carried out by using Mean and Standard Deviation.

## Zooplankton

In the present investigation, zooplankton was studied under four groups viz. Rotifera, Cladocera, Copepoda and Ostracoda. Among the four groups, Rotifera, showed its dominance at all the stations. Total zooplankton showed its higher concentration during winter season and low during monsoon season. The maintainance of healthy aquatic environment is dependent on the

Physico-chemical parameters and Biological diversity. Plankton were collected with the help of plankton net ,filtered and preserved for further analysis. We have taken photographs with the help of Binocular Microscope with a camera attached. These zooplankton species are useful as bio indicators.

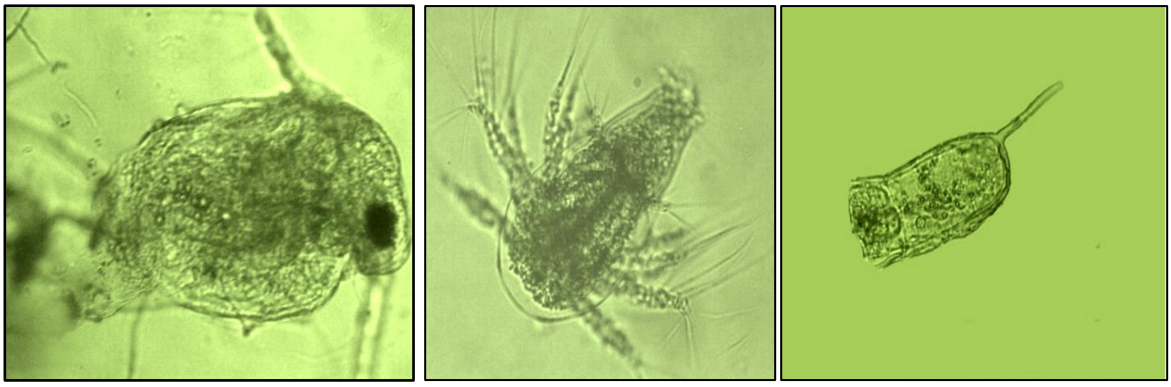
The Identified Zooplankton were categorised into 3 classes as follows

**Rotifera:** *Brachionus caudatus, B.calciforus, B.fulcatus, Keratella tropica, Asplancha brightwelli.*

**Cladocere:** *Daphnia carinata, Ceriodaphnia cornuata.*

**Copepoda:** *Nauplius lava, Cyclops viridis.*

**Fig.3: Photographs of Zooplankton**



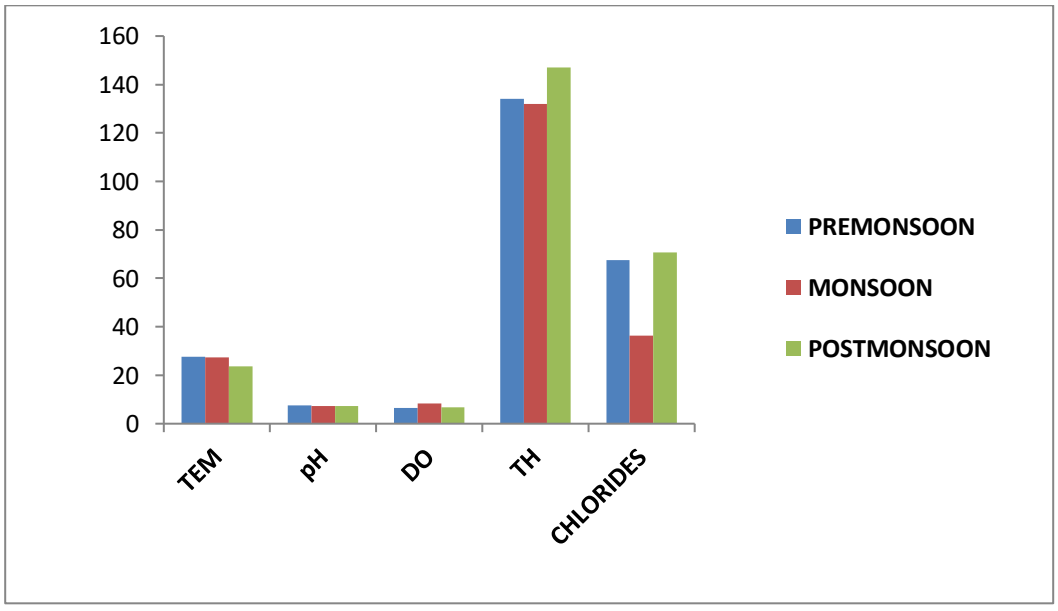
*Ceriodaphnia* sp *Nauplius larva* *Keratella tropica*

**Table. 1: Seasonal Variation and Mean & Standard Deviation of Physico – Chemical Parameters of Wardhannapet Lake during 2020 -2021**

| S.NO | PARAMETERS | RANGE | PRE MONSOON | MONSOON | POST MONSOON | FEPA | WHO |
|---|---|---|---|---|---|---|---|
| 1 | Water Temperature( °C) | 21.22 - 30.35 | 27.58 ±2.42 | 27.28 ±0.87 | 23.61 ± 2.29 | 27˚C | <35˚C |
| 2 | pH | 7.2 - 7.6 | 7.45 ±0.12 | 7.36 ± 0.17 | 7.30 ± 0.07 | 6-9 | 6.5-8.5 |
| 3 | Dissolved Oxygen(mg/l) | 6.1 - 8.9 | 6.51 ± 0.79 | 8.45 ± 0.35 | 6.79 ± 0.23 | 8-10mg/l | 8-10mg/l |
| 4 | Total Hardness(mg/l) | 93 - 212.75 | 134 ± 26.68 | 132 ±9.98 | 147.31 ± 12.30 | 180mg/l | 200mg/l |
| 5 | Chlorides(mg/l) | 32.82 - 77.05 | 67.52 ± 2.65 | 36.44 ± 5.61 | 70.65 ± 8.85 | 150mg/l | 250mg/l |

**FEPA**-Fedaral Environmental Protection Agency
**WHO**-World Health Organisation

**Graph.1: Seasonal Variation and Mean & Standard Deviation of Physico – Chemical parameters of Wardhannapet Lake during 2020 -2021**



## RESULTS &DISCUSSION

This detailed investigation enabled a comprehensive and systematic analysis of the seasonal physico-chemical and biological characteristics of this fresh water pond in Warangal district in three different seasons such as pre-monsoon, monsoon and post monsoon in one year and compare the results. The analytical data of the water samples are presented in Table 1.

**Water temperature:** It is an important factor to consider when assessing water quality. In addition to its own effects, temperature influences several other parameters and can alter the Physical & Chemical properties of water. Water temperature can affect the metabolic rates and biological activity of aquatic organisms. In the present study, temperature was ranging from 21.22 to 30.35˚C. It is within the permissible limit.

**pH:** It is one of the most important parameter in water chemistry and is defined as log $[H^+]$. The pH of 6.5-8.5 is the most suitable for aquatic organisms. If the pH of water is too high or too low, the aquatic organisms living within it will die. pH can also affect the solubility and toxicity of chemicals and heavy metals in the water. The pH was recorded in this lake from 7.2 to 7.6. It is within the permissible limit.

**Dissolved Oxygen:** It refers to the level of free, non compound oxygen present in water or other liquids. It is an important parameter in assessing water quality because of its influence on the organisms living within a body of water and necessary to many forms of life in respiration. In the present study DO ranging from 6.1 - 8.9mg/l. It is within the permissible limit.

**Total Hardness:** Hardness is an important parameter to detect water pollution. In the present investigation, the maximum hardness recorded during immersion period was 147.31 mg /l and it became lowered after post-immersion period was 123.27 mg/l. The total hardness of lake is the

sum of calcium and magnesium. Hardness concentrations were found to be significantly higher after idol immersion.

**Chlorides:** The presence of chlorides in natural waters can mainly be attributed to dissolution of salt deposits in the form of ions ($Cl^-$). Otherwise, high concentrations may indicate pollution by sewage, industrial wastes. It is the major form of inorganic anions in water for aquatic life. High chloride content has a deleterious effect on aquatic organism, as well as agricultural plants. In this study chlorides recorded from 32.82 to 77.05 mg/l. So this parameter is nearly within the permissible limit.

## CONCLUSION

From the present study, it may be concluded that all the physico-chemical parameters are at nearly permissible limit at all stations. The overall lake is not considered as polluted one. The lake is having rich diversity of flora and fauna. The lake is precious to all life on the earth. Therefore, it is suggested that the measures are necessary to avoid further contamination of lake in future due to Anthropological activities. At present this fresh water lake is most suitable for irrigation purpose. This data certainly highly useful for making further planning on this lake for water utilization and conservation.

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