

# Assessment of Water Quality using Physico- Chemical Parameters in Hussain Sagar Lake, Hyderabad

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**Abstract**—Physico-chemical parameters of Hussain Sagar lake have been investigated. The water samples were collected from a point near the middle of the lake and analyzed for water quality parameters like pH, Electrical conductivity (EC), Alkalinity, Total hardness, Calcium & Magnesium hardness, Total dissolved solids (TDS), Dissolved oxygen (DO), Biological oxygen demand (BOD), Chemical oxygen demand (COD), Phosphate and sulphate. The results were compared with values prescribed by WHO and other standards for drinking water quality. EC exceeds the limit as per European standard. Alkalinity exceeds the limit prescribed by WHO. The BOD exceeds the permissible limit of 6mg/l prescribed by WHO. The phosphate and sulphate were within the prescribed limit

**Keywords:** Physico-chemical parameters, Hussain Sagar Lake, TDS, Total hardness, Biological oxygen demand

## 1. INTRODUCTION

Water is one of the best gift given by nature to all living things and it is necessary for the growth and maintenance of human body [1]. It plays an important role for the survival of all forms of life on earth and works as a universal solvent [2, 3]. It also performs unique and indispensable activities in earth ecosystem, biosphere and biogeochemical cycles [4, 5].

Good quality drinking water means keeping away public from dangerous water related diseases [6, 7]. Lakes are the important resources for water but due to increase in population, rapid industrialisation and injudicious use affected the quality of water [8, 9].

There is always a necessity of monitoring lake water at regular time interval as use of contaminated drinking water, living organism suffers from various water borne diseases [10]

## 2. MATERIALS AND METHODS

Hussain Sagar is a lake in Hyderabad, Telangana, India, built by Hazrat Hussain Shah Wali in 1562, during the rule of Ibrahim Quli Qutub Shah. It is spread across an area of 5.7 square kilometers and is fed by River Musi. A large monolithic statue of the Gautama Buddha, erected in 1992

stands in an island in the middle of the lake. Maximum depth of the lake is 32 feet. The Latitude and Longitude of Hussain Sagar Lake is 17.4239299 and 78.4738385 respectively. Sampling was made once during the study period between 11.00 AM to 17.00 PM on each sampling day. The water samples for physical and chemical water quality were taken from a point near the middle of the lake. The samples for the routine analysis of parameters were collected in 500ml polyethylene bottles. The DO samples were collected in 250ml glass bottles and fixed in field with Winkler's reagent. The samples for determining the BOD were collected in 250ml dark bottles. The pH and conductivity ( $\mu$  mho/cm) were determined in the field. The methods used for determining Total hardness, Total alkalinity, COD, Phosphate, Sulphate, Total dissolved solids were adopted from APHA 1995[11]

**Table 1: Physico- Chemical Parameters of Water in Hussain Sagar Lake**

Parameters	Range	Standard	Source
pH	7.54 – 8.12	6.5 – 9.2	WHO
EC ( $\mu$ mho/cm)	941 – 1024	400	European Standard
Total Alkalinity (mg/l)	412 – 556	120	WHO
Total Hardness (mg/l)	290 – 2117.3	500	WHO
CaH	192 – 496	---	---
MgH	165 - 1758	----	-----
TDS (mg/l)	495 - 936	500	WHO
DO (mg/l)	2.0 – 4.90	5.0 – 10.0	CHAPMAN & KIMSTIACH
BOD (mg/l)	9.0 – 252	6.0	WHO
COD (mg/l)	34 – 540	10	WHO
Phosphate (mg/l)	0.05 – 0.1	0.1	----
Sulphate (mg/l)	8.5 – 2480	25	WHO

### 3. RESULTS AND DISCUSSION

pH indicates the alkaline nature of lake and varies from 7.54 to 8.12. high pH levels are undesirable since they may cause a bitter taste to the water [ 11].

The availability of an aqueous solution to carry an electric current is known as electrical conductivity [ EC]. This ability depends upon the presence of ions, their total concentration, mobility, valence and temperature [11]. The EC values ranges in between 941 to 1024  $\mu$  mho/cm.

Alkalinity ranges from 412 mg/l to 556mg/l. The high alkalinity is due to ions exchange, that is calcium ions are replaced by sodium ions and then contributed to alkalinity [12].

The total hardness is the total soluble bicarbonate, chloride and sulphate of magnesium and calcium salts present in water. The total hardness ranges from 290 mg/l to 2117.3mg/l.

Dissolved solids in water are generally carbonates, bicarbonates chlorides, sulphates, phosphates, nitrates, calcium magnesium, sodium potassium and iron [13]. TDS values ranges from 495mg/l to 936 mg/l which exceeded the limit prescribed by WHO.

Dissolved oxygen analysis measures the amount of gaseous oxygen dissolved in an aqueous solution. The DO ranges from 2.0 mg/l to 4.90 mg/l.

Biological oxygen demand (BOD) is most important parameter used to assess the quality of water. The BOD values indicate high concentration of biodegradable matter and high oxygen consumption by heterotrophic organism. The BOD values observed in the range 9.0 mg/l to 252 mg/l which exceeded the limit prescribed by WHO.

Chemical oxygen demand (COD) is used as a measurement of pollutants in natural water. Both organic and inorganic component are to be analyzed by these method. The COD values are within the range of 34 mg/l to 540 mg/l. The phosphate and sulphate ranges from 0.05 mg/l to 0.1 mg/l and 8.5 mg/l to 248 mg / respectively.

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