

## **Analysis of Eachnur Tank Water for Drinking and Domestic Purpose in Tiptur, Tumkur Dist., Karnataka, India**

**Prakasha<sup>1</sup>, Dr. J. Narayana<sup>2</sup>, Dr .S.B.Basavaraddi<sup>3</sup>, G. C. Mallikarjuna Swamy<sup>4</sup>, M. B. Shylaja<sup>5</sup>**

<sup>1</sup>Department of Botany, Kalpataru First Grade Science College, Tiptur

<sup>2</sup>Dept of P G Studies and Research in Environmental Science, Kuvempu University  
Shankara Ghatta, Karnataka

<sup>3</sup>Department of Physics, Kalpataru First Grade Science College, Tiptur

<sup>4</sup> Department of Zoology, Kalpataru First Grade Science College, Tiptur

<sup>5</sup> Department of Chemistry, Kalpataru First Grade Science College, Tiptur

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**Abstract:** *Water is basic pre-condition for life. Water of good drinking quality is of basic importance to human physiology and the existence of human being is very much depends on its availability. The assessment of Eachnur tank water quality for suitability for drinking and domestic purpose was carried out during November 2014 to April 2015. Evaluation of the water quality was carried out by selecting some important water quality parameters like AT, WT, P<sup>H</sup>, TDS, EC, TA, TH, Ca, Mg, Cl, DOM, Salinity, and DO. The results were compared with BIS Standards. The results revealed that most of the parameters were well with permissible limits showing suitability for drinking and also for domestic purposes after suitable treatment..*

**Keywords:** *Eachnur tank, water quality, Human physiology, physicochemical parameters, suitability, BIS and WHO.*

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### **1. INTRODUCTION**

Water is indispensable and one of the precious natural resources of our planet. Water is one of the major constituents of life supporting system. Water is essential for existence of life on earth. Water, indeed a wonderful medium, which has unique properties of dissolving and carrying in suspension of huge varieties of materials. Surface water is about 2% of the global water resources and out of this only 1% of freshwater is in river, streams, lakes, ponds tanks and reservoirs is available to all forms of living beings [P K Goel, 2006]. Quality and quantity of water at a place plays a vital role in health, wealth and prosperity of the region. The modern civilization, rapid industrialization, modern agriculture and increased population have led to rapid degradation of our water bodies.

Lack of awareness, unscientific methods of waste disposal, improper water management and negligence damaged not only the aquatic systems but also its biological composition. According to WHO [1984] 30% to 40% of human diseases occurred due to impurities of water.

Any physicochemical characteristics of water not only alters its quality but also disturbs aquatic environment and affects aquatic life [Pawar and Panderkar, 2011]

### **2. STUDY AREA**

Tiptur tank is about 75 KM from Tumkur, district, Karnataka. It is in southern peninsular India having east latitude of 13° 23' degree and north longitude 76° 29' degree at an altitude of 850.3 m above sea level. It covers an area of 758.5 sq Km. The Eachnur Tank is located 7 Km from Tiptur, spread over 250 acres. The tank holds 450 million gallons of water, not only the prime source of drinking water for Tipturians but to replenish the dreaded ground water in around the feeding area. Eachnur tank is one of the important, major water supply resources to Tiptur and Arasikere towns for the human domestic and even for drinking purposes. The present aim of the research work is to carry out hydro chemical analysis of water quality of Eachnur tank so as to examine whether it is suitable for drinking and other domestic purposes or not.

### **3. MATERIALS AND METHODS**

Water samples were collected from Eachnur tank on monthly basis from November 2014 to April 2015. Samples were collected in two liter capacity polythene containers which were acid treated and

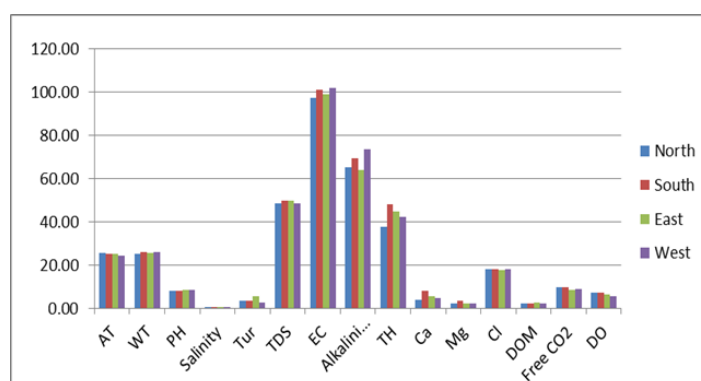
dried previously. The parameters like AT, WT, P<sup>H</sup>, TDS, EC were measured at the spot and samples were brought to the laboratory where other parameters were determined by following the standard methods of APHA [1995] and Trivedy and Goel [1986]. TDS and EC were measured using digital conductivity meter. Salinity and turbidity were analysed using micro-controlled water analyzer Kit 371.

#### 4. RESULTS AND DISCUSSION

The results obtained from analysis of Eachnur tank water are given in table –(1,2) showing minimum, maximum and average of hydro chemical analysis of water parameters during the study period. The results were compared with W H O 1963, BIS 1991 drinking water standards.

**Table1.**

| <i>An Average values of Hydro chemical Parameters From Nov 2014-April 2015</i> |       |       |      |          |      |       |        |            |       |      |      |       |      |          |      |      |
|--|-------|-------|------|----------|------|-------|--------|------------|-------|------|------|-------|------|----------|------|------|
|  | AT    | WT    | PH   | Salinity | Tur  | TDS   | EC     | Alkalinity | TH    | Ca   | Mg   | Cl    | DOM  | Free CO2 | DO   | BOD  |
| North  | 25.80 | 25.30 | 8.20 | 0.069    | 3.30 | 48.50 | 97.40  | 65.40      | 37.90 | 3.90 | 2.20 | 18.29 | 2.40 | 9.70     | 7.80 | 2.10 |
| South  | 25.20 | 26.20 | 8.20 | 0.073    | 3.40 | 49.70 | 101.10 | 69.60      | 48.30 | 7.90 | 3.70 | 18.26 | 2.10 | 9.70     | 7.70 | 1.90 |
| East   | 25.00 | 25.70 | 8.50 | 0.068    | 5.40 | 49.80 | 99.20  | 63.80      | 44.90 | 5.70 | 2.40 | 17.73 | 2.50 | 8.70     | 7.80 | 2.00 |
| West   | 24.30 | 26.20 | 8.30 | 0.069    | 2.54 | 48.40 | 102.00 | 73.50      | 42.10 | 4.70 | 2.10 | 17.99 | 2.20 | 8.90     | 8.10 | 1.80 |
| Average  | 25.08 | 25.85 | 8.30 | 0.070    | 3.66 | 49.10 | 99.93  | 68.08      | 43.30 | 5.55 | 2.60 | 18.07 | 2.30 | 9.25     | 7.85 | 1.95 |



Graph showing the average values of hydrochemical analysis as per table no 1s

**Table2.**

| SL NO | MONTH PARAMETER | 14-Nov | 14-Dec | 15-Jan | 15-Feb | 15-Mar | 15-Apr | AVERAGE |
|-------|-----------------|--------|--------|--------|--------|--------|--------|---------|
| 1     | AT              | 37.4   | 19.9   | 29.5   | 28.8.6 | 22.6   | 26.3   | 27.1    |
| 2     | WT              | 24.3   | 24.8   | 26.4   | 26.3   | 26.2   | 26.9   | 25.8    |
| 3     | PH              | 9.0    | 9.1    | 9.5    | 9.4    | 9.4    | 8.0    | 9.1     |
| 4     | TDS ppm         | 34.8   | 40.3   | 45.3   | 45.6   | 59.8   | 68.8   | 49.1    |
| 5     | EC              | 70.6   | 81.6   | 91.1   | 92.0   | 119.9  | 144.3  | 99.9    |
| 6     | TURBIDITY NTU   | 0.6    | 0.7    | 0.8    | 0.8    | 30.0   | 4.3    | 6.2     |
| 7     | SALINITY ppt    | 0.0    | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    | 0.1     |
| 8     | FREE CO2        | 6.9    | 7.5    | 12.6   | 13.1   | 7.8    | 7.7    | 9.3     |
| 9     | TH              | 35.8   | 37.7   | 42.1   | 47.4   | 47.4   | 49.4   | 43.3    |
| 10    | TA              | 61.3   | 63.4   | 78.9   | 62.8   | 63.1   | 79.1   | 68.1    |
| 11    | Ca              | 3.8    | 3.8    | 4.9    | 5.1    | 8.1    | 7.3    | 5.5     |
| 12    | Mg              | 2.2    | 2.1    | 3.1    | 2.6    | 2.2    | 3.6    | 2.6     |
| 13    | Cl              | 15.7   | 16.3   | 18.0   | 18.2   | 20.3   | 19.9   | 18.1    |
| 14    | DOM             | 1.9    | 2.0    | 2.4    | 1.9    | 2.2    | 3.1    | 2.3     |
| 15    | DO              | 6.1    | 7.1    | 8.42   | 8.7    | 8.2    | 8.3    | 7.8     |
| 16    | BOD             | 1.16   | 1.35   | 1.5    | 3.73   | 2.5    | 1.43   | 1.95    |

#### 5. WATER TEMPERATURE

Water temperature of the samples were varied from a minimum of 19.9 °C to a maximum of 29.5 °C with an average of 27.1°C. Minimum temperature was observed in the month of December and maximum was observed in the month of January.

## **6. P<sup>H</sup>**

Biochemical and chemical reactions occurring in water are determined by p<sup>H</sup>. In the studied period sample P<sup>H</sup> was from 8 to 8.5 with an average of 8.2 indicating slight lyalkaline nature of the samples. Anyhow P<sup>H</sup> was within the permissible limit of BIS [1991].

## **7. ELECTRICAL CONDUCTIVITY**

Electrical conductivity is the important parameter of water and it depends on the nature and concentration of ionized salts .Electrical conductivity is used to measure the ability of water to carry an electric current. More the conductivity of water ,lesser in its resistance to electric flow ,there by indicating higher concentration of dissolved salts higher tropic status of the system [Kumar and Siddique 1997] . Absolutely pure water is a poor conductor of electricity. water shows higher conductivity when dissolved salts are present .The conductivity is proportional to the amount of the salts dissolved in water.During investigation, conductivity values were ranged from 70.6 μs /cm to 144.3μs/cm within the desirable limit 1500μs /cm of BIS [ 1991].

## **8. TOTAL DISSOLVED SOLIDS**

In water, total dissolved solids are composed mainly of carbonates, bicarbonates, chlorides, phosphates and nitrates of calcium, magnesium, sodium, potassium and organic matter, salts and other particles. High values of T D Sand sulphates in drinking water may affect those persons who are suffering from kidney and heart diseases. [Gupta *et al.*, 2004]

Analysis of solids is important in the control of biological and physicochemical treatment processes [APHA, 1995]

The drinking water containing more than 500 mg /l of TDS is not considered desirable and it can cause excessive scaling in water pipes, water heaters and house hold appliances. [Ashwin G Godghats et al may 2013] .During investigation ,TDS values of the samples were found in the range of 34.8 mg/l to 68.8mg/l with an average of 49.1mg/l and falling within the desirable limit [500mg/l] of BIS

### **8.1. Dissolved Oxygen**

D O is one of the important factors influencing the quality of water, therefore it is considered as one of the parameters to assess the quality of water. Dissolved oxygen is a remarkable indicator of pollution [ Basavaraddi *et al.*,2012]. The concentration of the D O regulates the distribution of flora and fauna of the water body and it also reflects the physical and biological processes prevailing in the water. Oxygen saturated water has pleasant taste while the water lacking oxygen has an insipid taste.The un polluted water is normally saturate with D O ,while presence of oxygen demanding pollutants causes rapid depletion of D O. The D O value ranged from 6.1mg/l to maximum of 8.78 mg/l .In present study higher value of D O was observed in the month of February due to higher photosynthetic activities. In the present study the DO value is above the standard value of both W H O and B IS ie 5 mg /l.

### **8.2. Biological Oxygen Demand**

BOD is a parameter to assess the organic load in a water body. The amount of oxygen required for chemical degradation of organic material .It determines the strength of sewage effluents and other polluted water[Mahindra ,1981] .High BOD indicates higher consumption of oxygen and a higher pollution in water .BOD values ranged from minimum of 1.35 mg/l to 3.73 mg/l .In the present study the values of BOD were with in the permissible limits of B I S standards .

### **8.3. Salinity**

The measure of the salt content of water is called salinity .It is an important factor in determining many aspects of chemistry of water and of biological process with in it. Salinity of water samples were ranges from 0.04ppt to 0.1 ppt /l .

### **8.4. Total Hardness**

Total hardness of water is the sum of concentration of alkaline earth metal cations such as Ca<sup>++</sup> and Mg<sup>++</sup>, it is the total soluble magnesium and calcium salts presents in water expressed as its Ca Co<sub>3</sub>

equivalent .The total hardness up to 200mg/l is desirable as per the standards set by BIS for drinking water. The hardness beyond this limit cause encrustation of water supply structure and adversely affects the domestic use [Raghavendran, 1992]

The hardness values of the samples were ranged from a minimum of 35.8 mg/l to maximum of 49.4 mg/l with an average value of 43.3 mg/l and were within the desirable limits [200mg/l] of BIS.

As the hardness values of the water samples were in the range of 35.8 mg/l to 49.4 mg/l and it could be under ‘soft’ class as per Handa’s [1965] classification [Basavaraddi *et al.*, 2014]

Calcium content of water in the present study was found in the range of 3.8 mg/l to 8.1 mg/l with an average value of 65.5 mg/l .The value is well below the desirable limit [75mg/l] of BIS 1991 guideline. Similarly, Magnesium content varied from 2.1 mg/l to 3.6mg/l with an average value of 2.6mg/l .C

Ca<sup>++</sup> and mg<sup>++</sup> are both essential minerals for living organisms ,both the minerals occur in all kinds of natural water with Mg<sup>++</sup> concentration generally lower than the calcium [Jamrakar chirika shova ,April 2014]

### 8.5. Total Alkalinity

The alkalinity of the water samples was ranged from 61.3 mg/l to 79.1 mg/l with an average value of 68.1 mg/l and were in the desirable limit level [200mg/l] of BIS

### 8.6. Chloride

Chloride is often associated with sodium since Nail is a common constituent of water .chloride is an important parameter in assessing water quality .it controls the salinity of water and osmotic stress on biotic communities .chlorides increases the level of eutrophication [Goel *et al.*, 1980]

Chloride concentration higher than 200mg/l is considered as risky for human consumption and causes unpleasant taste of water. Chloride ion concentration of water sample is known to depend upon the characteristics of sediments and the pollution load of the water body [shivanna *et al.*,2012]

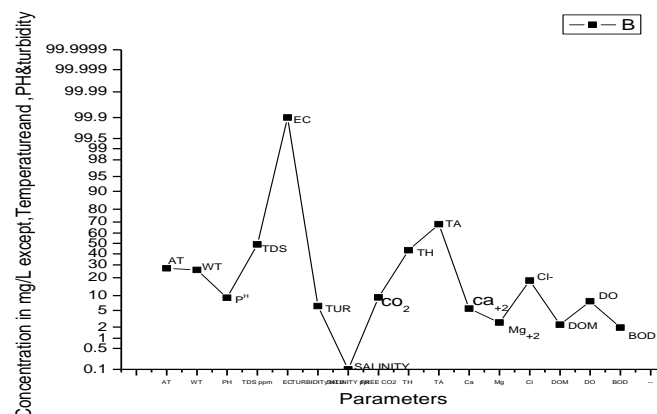
In the present study the chloride content was found in the range of 15.7 mg /l to 2o.3mg/l with an average value of 18.1mg/l .The values are well below the WHO guidelines for drinking water.

### 8.7. Free CO<sub>2</sub>

It is an important aspect in aquatic environment .The CO<sub>2</sub> is highly soluble in water.CO<sub>2</sub> is a byproduct of respiration and it also provides a carbon source for photosynthesis .Free CO<sub>2</sub> helps in buffering the aquatic environment against rapid fluctuation in acidity or a CO<sub>2</sub>-alkalinity and also regulates biological process of aquatic communities [Prasanna Kumari *et al .*, 2003] . Free CO<sub>2</sub> values ranged from 6.9 mg/l to 13.1mg/l with an average value of 9.3 mg/l.

### 8.8. Dissolved Organic Matter

D O M comprises of soluble organic materials derived from the partial decomposition of organic materials including soil ,organic matter ,plant residues and soluble particles released by living organisms including bacteria ,algae, and other plants .D OM provides carbon rich nutrients to microbes helps in nutrient cycle .DOM is measure of organic pollution .water bodies containing low DOM utilize less dissolved oxygen for decomposition .DOM values ranged from a minimum of 1.9 mg/l to a maximum of 3.1mg/l with an average value of 2.3 mg/l.



## **9. CONCLUSION**

- Water quality analysis reveals that Eachnur tank water is safe for drinking and domestic purposes
- Hydro chemical analysis parameters as per the standards set by BIS.
- P<sup>H</sup> level indicating tank water was slightly alkaline.
- Water must be used for drinking purpose only after treatment by town municipality.

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