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# Assesment of Total Dissolved Solids and $p^H$ of Wastewater, Musi River Study Area

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**Abstract:** *The present paper deals with the Total Dissolved solids and p H of the Musi River study area. Due to rapid industrialization and over exploitation of ground water resources, there is a drastic change taking place in the Hyderabad urban environment. Now a day's water pollution is a major problem of many wastes discharging in to the Musi River. It is completely contaminated. This water is percolating in the soil and contaminating ground water also. The physicochemical parameters were studied for Musi area of Kachavani Singaram water samples by using Hach multi parameter instrument pH and TDS were analyzed. These parameters indicate the quality of waste water. From the study of above parameters and observed that most of the samples are in the permissible limits of BIS standards and Central pollution control board(CPCB) standards So Musi river water is can be used for the irrigation, but It is unfit for drinking purpose.*

**Keywords:** *TDS, pH, Musi River, waste water, irrigation.*

## 1. Introduction

Ground water is precious and the most widely distributed resource of the earth. About 70% of the earth's surface is occupied with water i.e., hydrosphere. The suitability of ground water for domestic, industrial and irrigational purposes is determined by its quality. The activities of human beings have adverse effects on the quality.

Water pollution is the introduction into fresh or ocean waters of chemical, physical, or biological material that degrades the quality of the water and affects the organisms living in it. This process ranges from simple addition of dissolved or suspended solids to discharge of the most insidious and persistent toxic pollutants such as pesticides, heavy metals, and non-biodegradable, bio accumulative, chemical compounds. Groundwater is valuable only when its quality is suitable for the purpose for which it is being explored. Suitability of groundwater is for particular purpose depends upon the standards of acceptable quality.

### 1.1. Environmental Effects

Groundwater can be contaminated by many different kinds of sources. Harmful chemicals or biological materials are usually deposited into the soil above the aquifer, seeping into the groundwater from there. There are many different sources of groundwater contamination.

Groundwater becomes contaminated when anthropogenic, or people-created, substances are dissolved or mixed in waters recharging the aquifer. Examples of this are road salt, petroleum products leaking from underground storage tanks, nitrates from the overuse of chemical fertilizers or manure on farmland, excessive applications of chemical pesticides, leaching of fluids from landfills and dumpsites, and accidental spills. Contamination also results from an overabundance of naturally occurring iron, sulphides, manganese, and substances such as arsenic. Excess iron and manganese are the most common natural contaminants. Another form of contamination results from the radioactive decay of uranium in bedrock, which creates the radioactive gas radon. Methane and other gases sometimes cause problems. Seawater can also seep into groundwater and is a common problem in coastal areas. It is referred to as saltwater intrusion.

These contaminants can originate from a point source or non-point source meaning they can come from a single source (or point) or, that they don't have one specific source and come instead from the cumulative effect of any number of factors or activities (Cherry et al 1987).

### 1.2. Study Area

The study area is at Kachavanisingaram near Peerzadiguda. The river Musi originates in Anantagiri Hills near Vikarabad, Ranga Reddy district, 90 kilometers to the west of Hyderabad and flows due east for almost all of its entire course. It joins the Krishna River at Wadapally in Nalgonda district after covering a total distance of about 240 km. Generally Musi flows with waste water along with main canal. These waste water using for irrigation around main canal of Musi River. These waste water usage affects the agriculture field. The study area is to determine the excess contaminants.

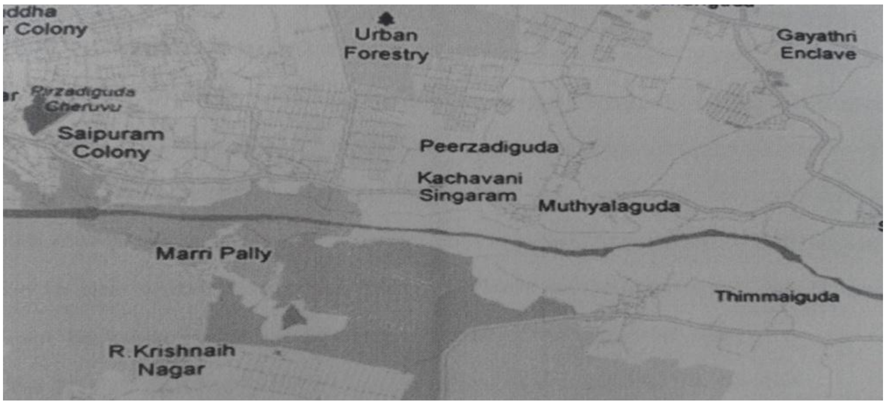


**Fig.** *Kachavani Singaram area map*

## 2. METHODOLOGY

### 2.1. Sample Collection

Decreasing of water levels in the ground as well as use of water is high with increasing population. Fresh water unavailability is a major problem of urban area than rural area because the industries located around the city effect ground and surface water quality. The musi water is used for irrigation. This is 2.8 km away from the musi main river, collected different sources four water samples such as (canal, domestic, dug well water, ground water (irrigation), groundwater domestic) from the area. Samples were collected at regular intervals of 15 days from November 1 to January 1. One liter polyethylene bottles are cleaned with $HNO_3$ and rinsed with deionized water were used for sample collection. Total 20 water samples were collected during the study period.

## 3. LABORATORY WORK

For all the water samples parameters like PH, E.C are analyzed in laboratory with the help of Hach multi parameter instrument. It consists of ph probe and E.C probe. Rinse the probes with distilled water and wipe it clean. First take 100ml of water sample in a beaker and dip the ph probe in the water sample and press the read button and note down the ph value in that sample. Similarly follow the same for the remaining samples. Rinse the E.C probe with distilled water and wipe pit clean take 100ml of water sample in a beaker and dip the E.C probe in the water sample and press the read button and note down the E.C values in that sample. E.C can be converted to TDS using the following calculation:

TDS(ppm)=0.64*EC this relation provides an estimate only.

pH is the logarithm of reciprocal of hydrogen ion activity in moles per liter. In water solution, variations in pH value from 7 are mainly due to hydrolysis of salts of strong bases and weak acids or vice versa. Dissolved gases such as carbon dioxide, hydrogen sulfide and ammonia also affect the pH of the water. The overall pH range of natural water pH is 7. Higher value of pH hastens the scale formation in water heating apparatus and reduces the germicidal potential of chlorine. pH below 6.5 starts corrosion in pipes, there by releasing toxic metals such as Zn, Pb, Cd, Cu etc. the quantity pH is defined in terms of the activity of hydrogen(H+) ions in solution: pH=log(H+). The pH of the agriculture water plays a critical role in plant health and it influences the efficiency of pesticides and growth regulators. Plants grow best in a slightly acidic (pH 6.0 to 6.5) soil solution, and the pH of the water used to mixed growth regulators and pesticides controls the chemicals half-life.

A total dissolved solid (TDS) is the term used to describe the inorganic salts and small amounts of organic matter present in solution in water. The principle constituents are usually calcium, magnesium, sodium and potassium cations and carbonate, hydrogen carbonate, chlorides, sulfate and nitrate anions. The presence of dissolved solids in water may affect its taste. The portability of drinking water has been rated by panels of tasters in relation to its total dissolved solids is considered as excellent if less than 300mg/litre. Water with extremely low concentrations of TDS may also be unacceptable because of its flat insipid taste. TDS may consist mainly of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, calcium, magnesium, sodium, potassium, iron, manganese, etc. TDS effects on plants solution with a high concentration of dissolves salts will prevent plants roots from absorbing water and nutrients. A solution high in saline concentration contributes to poor plant growth. Additionally some salts may enter the plant and cause a toxic effect.

The values founded by the samples:

**Table1.** *pH levels in the samples*

| Location | 1st November | 15th November | 1st December | 15th December | 1st January |
|---|---|---|---|---|---|
| Canal water | 7.43 | 7.44 | 7.46 | 7.44 | 7.42 |
| Domestic dug well water | 7.68 | 7.62 | 7.56 | 7.435 | 7.31 |
| Ground water(irrigation) | 7.9 | 7.54 | 7.26 | 7.605 | 7.65 |
| Groundwater (domestic) | 6.79 | 6.76 | 6.68 | 6.76 | 6.84 |

**Table2.** *TDS levels in the samples*

| Location | 1st November | 15th November | 1st December | 15th December | 1st January |
|---|---|---|---|---|---|
| Canal water | 854.4 | 843.2 | 832 | 831.36 | 830.72 |
| Domestic dug well water | 1600 | 1564.8 | 1529.6 | 1571.2 | 1612.8 |
| Ground water(irrigation) | 971.52 | 991.04 | 1010.56 | 977.6 | 944.64 |
| Groundwater (domestic) | 472.96 | 461.76 | 450.56 | 447.04 | 443.52 |

## 4. RESULTS AND DISCUSSIONS

**pH:** From the graphs the pH values are found to be varied 6.68 to 7.95. Individually the pH of canal water varied between 7.42 to 7.46. The domestic dugwell water pH is varied between 7.31 to 7.68. in groundwater (irrigation) varied between 6.68 to 6.79. in the graph irrigation groundwater pH decreases in the first half of the January. During the study period, the pH values of four sampling points were found to be within the permissible limits of BIS (1993) standards and central pollution board standards. The pH water saplles related to natural to mild alkaline. Plants grow best in slightly acidic pH (6.0-6.5). if pH decreases too high or too low, plants will no longer able to survive. Overall acidic water creates more common problems than high alkalinity (Beuder et al 1989). The normal pH range for irrigation water is from 6.5 to 8.5. irrigation water with a pH beyond the normal range may cause a nutritional imbalance or may contain a toxic ion.

**TDS** From the graph the TDS values are varied from 447 to 1612.8 mg/l in the first half of the month November to January and TDS values are 447 to 1571.2 mg/l in the second half of the month November to December. Individually. The TDS of canal water varied between 830.72 to 854.4 mg/l. the TDS of domestic dugwell water varied between 1529.6 to 1612 mg/l. the TDS of groundwater (irrigation) varied between 944.64 to 1010.56 mg/l. and the TDS of groundwater (domestic) varied between 443.52 to 476.96mg/l. due to similar differences in TDS of irrigation groundwater graph is linear. The values of TDS in water samples are found to be within the permissible limits of BIS and central pollution control board standards, so this water can be used for irrigation purpose but it unfit for drinking. The water containing high concentration of TDS, if used for irrigation may result in crop damage or low yield (Ayers et al 1985). Damage often occurs at relatively low ion concentrations for sensitive crops. It is usually leaf burn and chlorosis.

### 4.1. Discussion

- During the study the canal water pH was found little variations (November to January).
- The domestic ground water pH was very low when compared to other water samples, this may be due to the influence of Musi river.
- The domestic dugwell water pH was observed to decreasing from November to January.
- The irrigation ground water TDS was found to be decrease from December to January may be due abrupt rainfall.

- The canal water TDS was observed with little variations thought the study.
- The domestic groundwater TDS was found to decrease from November to January. The TDS of water samples are within the permissible limits, this may be due to their location away from Musi river

## 5. CONCLUSIONS

It was observed that Groundwater and surface water are slightly contaminated during the study. The pH of ground water (irrigation) was found to be acidic, so the water is unsuitable for irrigation purposes. The domestic groundwater pH is slightly acidic it suits for irrigation purposes. The TDS of domestic dug well water is high, hence unsuitable for irrigation purposes and TDS of domestic ground water was found to be within the permissible limits so this water is suitable for irrigation purposes as well as drinking purposes.

It is recommended that wastes from industries and effluent treatment plants, should be handled properly check the contamination water before they enter the river water. Usage of toxic chemicals percolates into the the ground with rain water and contaminates groundwater, so it is recommended to reduce the use of pesticides and chemical fertilizers. The pollution control board should make the people aware bout water pollution and guide them to use safe drinking and irrigation water. Proper care should be taken to minimize the disposal of waste into nearby water bodies. The water resources should be preserved so that the future generation can get fresh water and live in clean and safe environment.

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