https://dx.doi.org/10.24001/ijaems.3.2.10 *ISSN : 2454-1311*

Study of Ground Water Quality of Raichur in Industrial Zone in Concern to Effect of Industrial Discharges on Water Quality

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Abstract— *This paper gives the information of the groundwater quality of Raichur industrial area. Different areas were selected for the study and comparison. The parameters studied were temperature, pH, total alkalinity, total hardness, chloride, sulphate, fluoride, total dissolved solids and conductivity. It was observed that there was a minor fluctuation in the physico-chemical parameters among the water samples studied from overall analysis. The groundwater is highly contaminated and account for health hazards for human use from the Comparison of the physico-chemical parameters of the water sample with WHO and ICMR limits.*

Keywords— water quality, WHO, ICMR.

I. INTRODUCTION

On earth, one of the important natural resources is water. For every human being the safe drinking water is the primary need. Due to over exploitation and pollution of water fresh water has become a scarce commodity. In both urban and rural areas the major source of drinking water is groundwater. The most important source of water supply for drinking, irrigation and industrial purposes is the groundwater. The deterioration of surface and sub-surface water is due to the increasing population and its necessities. Water is polluted on all the surfaces of earth and Raichur is no exception to this phenomenon. To interconnect information on the quality of water to the concerned citizens and policy makers Water quality index is one of the most effective tools. Hence it becomes an important parameter for the assessment and management of groundwater. The composite influence of different water quality parameters is defined as a rating reflection by the WQI. The suitability of groundwater for human consumption is calculated from the point of view by WQI.

II. MATERIALS AND METHODS

After a period of time sufficient to permit constant reading the thermometer was immersed directly in the water body to measure the temperature. At a particular depth the temperature of a water body should be measured by thermometer immersed directly in the water body. Allow the thermometer to come to the exact temperature of the water after sufficient time and note down the readings. In water chemistry one of the most important and frequently used tests is measuring the pH. Acid-base neutralization, water softening, precipitation, coagulation, disinfection and corrosion control are some of the waste water treatment. These waste water treatment and water supply depends on pH at every phase, practically. The intensity of the acidic or basic character of a solution is indicated by pH or Hydrogen ion activity at a given temperature.

The ability of an aqueous solution to carry an electric current is measured by the conductivity. Most inorganic compounds solution are relatively good conductors. Very poor current conductors are the conversely molecules of organic compounds that do not dissociate in aqueous solution. Due to water acid-neutralizing capacity the alkalinity of water occurs. Alkalinity is significant in many uses and Treatments of natural and waste waters. The primarily function of Carbonate, bicarbonate and hydroxide content is due to the alkalinity of water. The contribution from borates, phosphates, silicates or other basic ions if there are present are also included. The sum of calcium and magnesium concentration is defined as the total hardness. amount of hardness equivalent to the total alkalinity is called “Carbonate hardness” when hardness numerically is greater than the sum of carbonate and bicarbonate alkalinity. “Non- Carbonate hardness” is when the amount of hardness in excess. Due to passage of water through or over deposits of limestone, dolomite, gypsum and gypriferrous and hale leads to the presence of calcium. Due to the contribution of calcium to the total hardness of water,

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chemical softening treating, reverse osmosis, electro dialysis or ion exchange are done and also to reduce calcium and the associated hardness is to be used.

The widely distributed in nature is sulphate and also present in natural water in concentrations ranging from few to a thousand milligrams per liter. Large amounts of sulphate through pyrite oxidation are due to mining drainage wastes. Reduction of sulphate to sulphur is done in the presence of organic matter by bacteria. Heavily polluted or contamination samples must be stored at 4ºC to avoid this reduction. Nitrates are present in enormous quantities in the synthetic fertilizer wastes. The end products of the aerobic stabilization of organic nitrogen are nitrate. Fluoride many occur naturally in water or it may be added in controlled amounts. A fluoride concentration of approximately 1.0 mg/L in drinking water effectively reduces dental carries without harmful effects on health. The matter suspended or dissolved in water or waste water is referred to as solids. In many number of ways adversely solids may affects waste or effluent quality Water with high dissolved solids generally is non-potable and may induce an unfavorable physiological reaction is the transient consumer. For these reasons a limit of 500mg TDS/l. is desirable for drinking water. Dissolved Solids is the Portion of solids that passes through a filter of 2.0µm(or smaller) pore size under specified condition.

III. RESULTS AND DISCUSSIONS

Temperature

Effluent of Thermal Power Plants, hydro electrical power plants and other industries pollute water bodies by increasing temperature. Due to this, dissolved oxygen in water gets reduced, causing damage to aquatic plant and animal life. It is found that the temperature of the ground water (bore well water) near by the Industries Belts are within the permissible limit as per IS:10500-2012. As the result in figure shows the temperature of the Bore Well water collected from industrial area i.e., samples 40 to 49

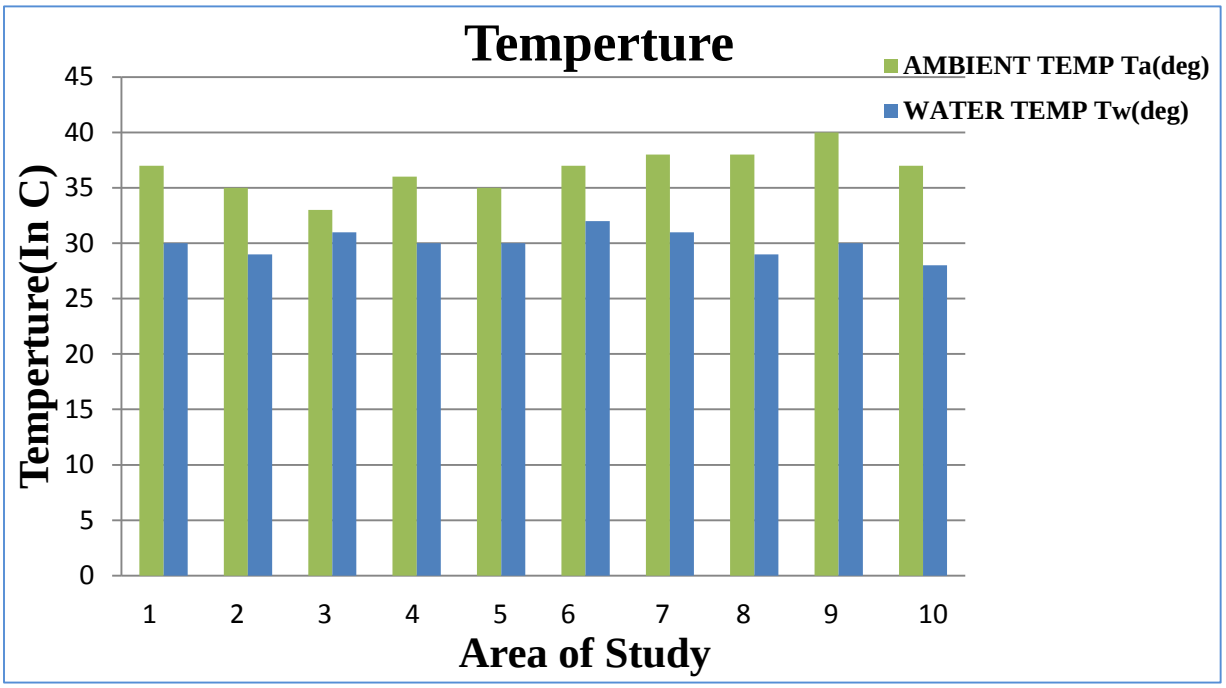

Fig. Average Temperature of the water samples from different areas

The temperature of collected samples of different areas is shown in the above graph. The ambient temperature or atmospheric temperature is colored in green and the temperature of water samples collected is colored in blue. By the help of the temperature the water sample temperature.

pH value

The degree of acidity or alkalinity of water is measured by the pH value. The value can range from 0-14. Maximum acidity is indicated by pH value and maximum alkalinity is indicated by 14 and measures the concentration of Hydrogen ions in water. There is no direct adverse effect on health, sour taste is produced when there is a low value, below 4.0 and alkaline taste is produced when there is higher value above 8.5. As per guidelines suggested by ISI a pH range of 6.5 – 8.5 is normally acceptable. The fluctuation of pH in the samples is from 7.5 to 8.4 in the recent study.

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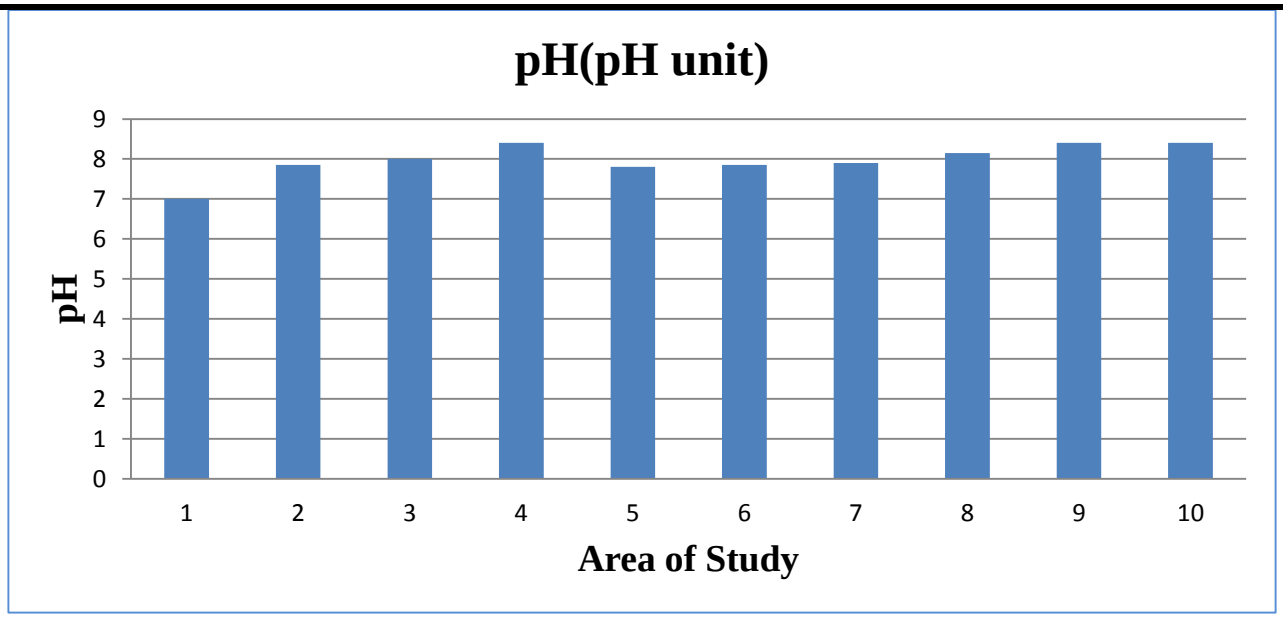

Fig. Average pH of the water samples from different areas.

Conductivity

The ability of an aqueous solution to carry an electric current is measured by the conductivity. This ability on the presence of ions, on their total concentration, mobility and valence and on the temperature of measurement. Solutions of most inorganic compounds are relatively good conductors. .conversely molecules of organic compounds that do not dissociate in aqueous solution. Conduct current very poorly, if at all. There are Samples which high in Conductivity they are 42,43, 49 and remaining the Sample within Standard limit.

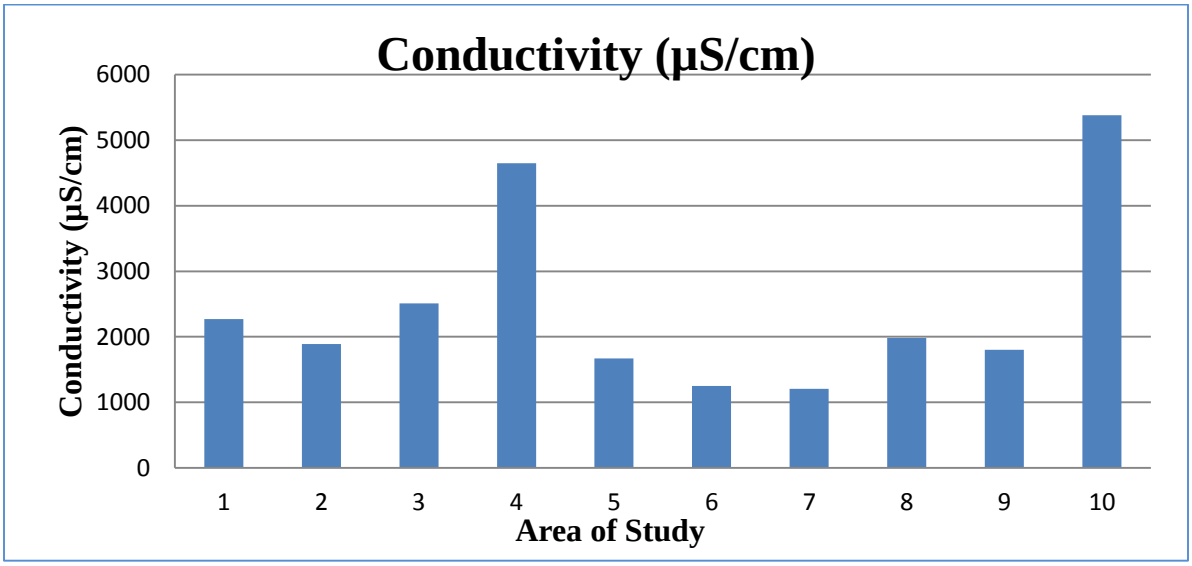

Fig. Average Conductivity of the water samples from different areas.

Total Alkalinity

Because the pH Sample is with prescribe limit and Methyl Orange Alkalinity was ranged from 296 mg/l to 880 mg/l, Phenolphthalein Alkalinity was absent in all samples in the present study. The presence of Hydroxyl and Carbonate in Samples 43, 47, 48, 49 is indicated by this. The total Alkalinity is 600 mg/l as in prescribed limit and in the sample bicarbonate is absent.

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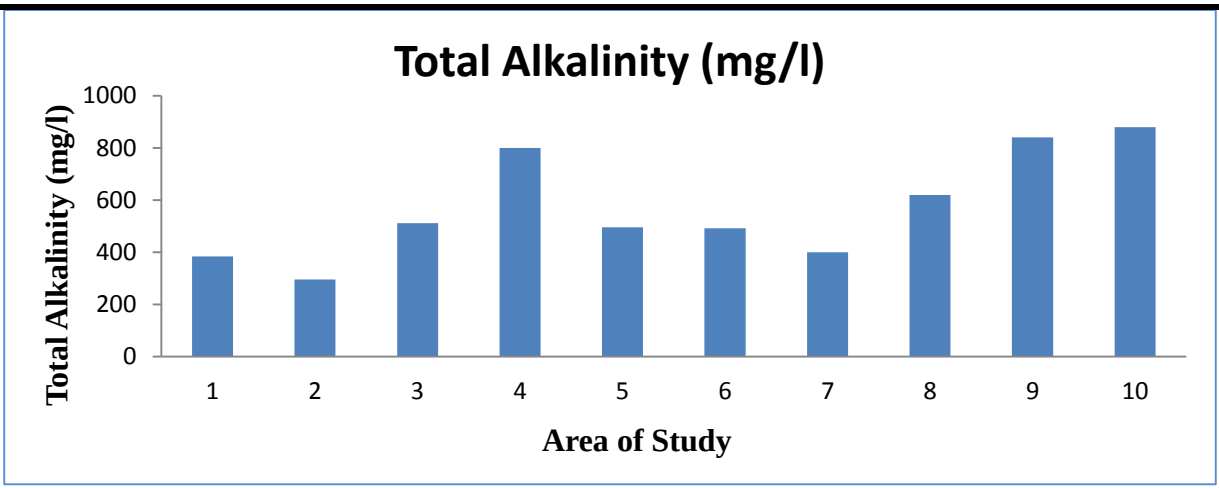

Fig. Average of Alkalinity the water samples from different areas

Total Hardness

Due to the presence of dissolved chloride, bicarbonate and sulphate salt of Ca and Mg, and the bicarbonate salt of Fe the water becomes hard. Hardness is expressed in mg/l. Hardness due to the bicarbonate salts of Ca, Mg, and Fe is known as carbonate hardness or temporary hardness and that due to the Chloride and sulphate salts of Ca and Mg is known as non-carbonate hardness or permanent hardness. According to Hardness classification (Durfor and Backer,1964), the no of water samples of the study area can be classified as given in below table.

TDS Range	Description
0-60	Soft
61-120	Moderately hard
121-180	Hard
>180	Very hard

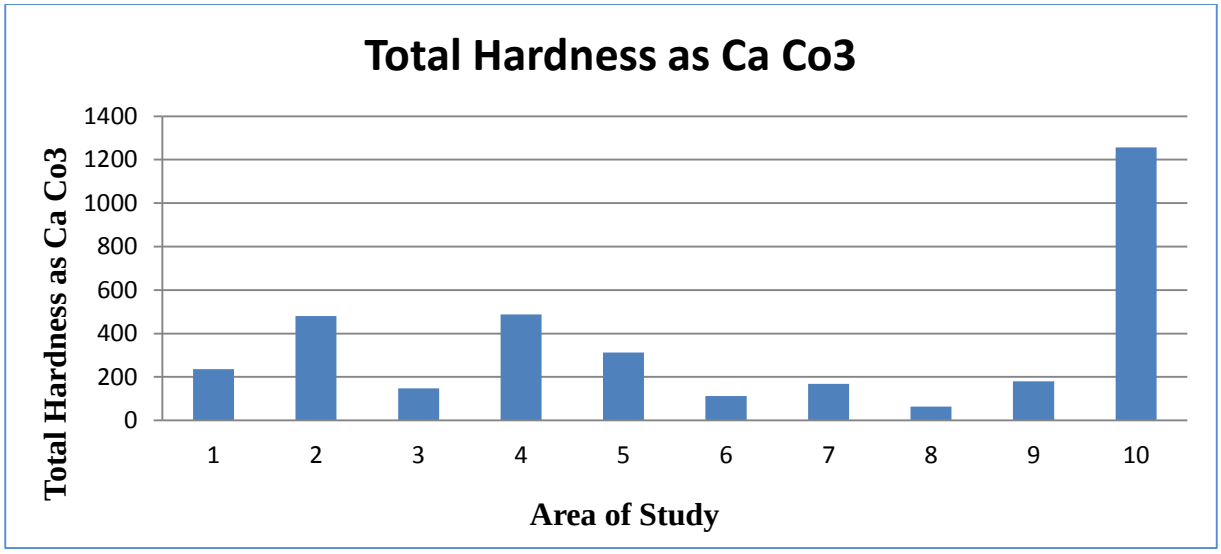

Fig. Average of Total Hardness the water samples from different areas

The samples collected are within permissible limits of 600mg/ltr. This we can see in the above graph. But in the sample i.e., at sample 49 the total hardness of water is more. Scaling and even bursting of boilers and water pipes is resulted by the hard water.

Calcium

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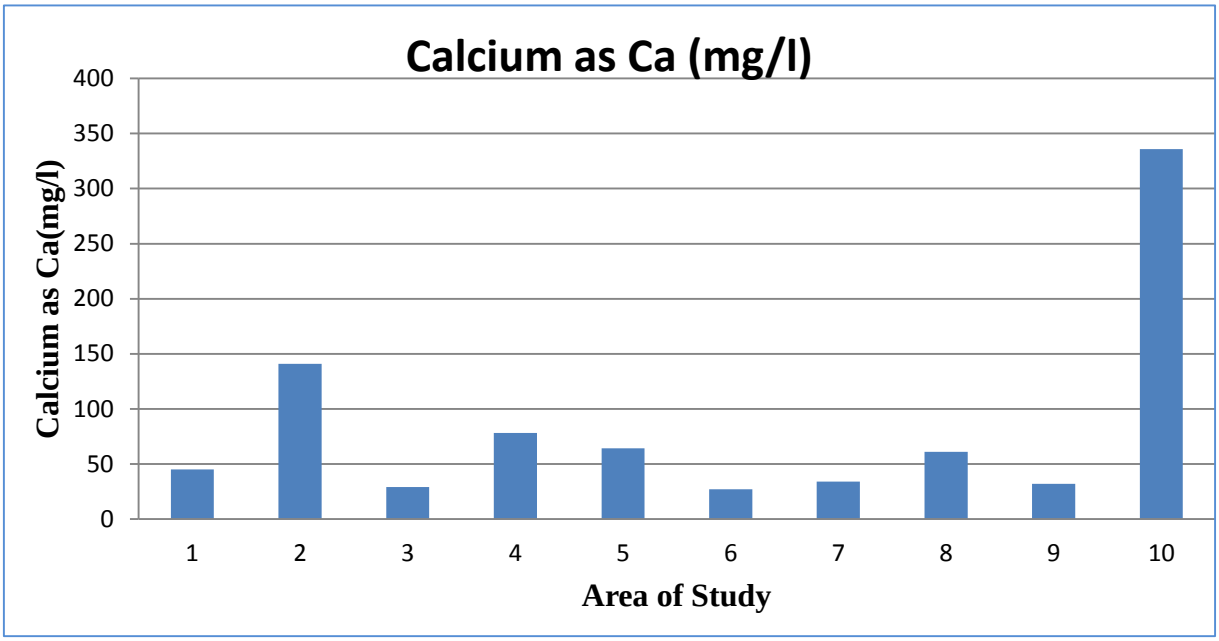
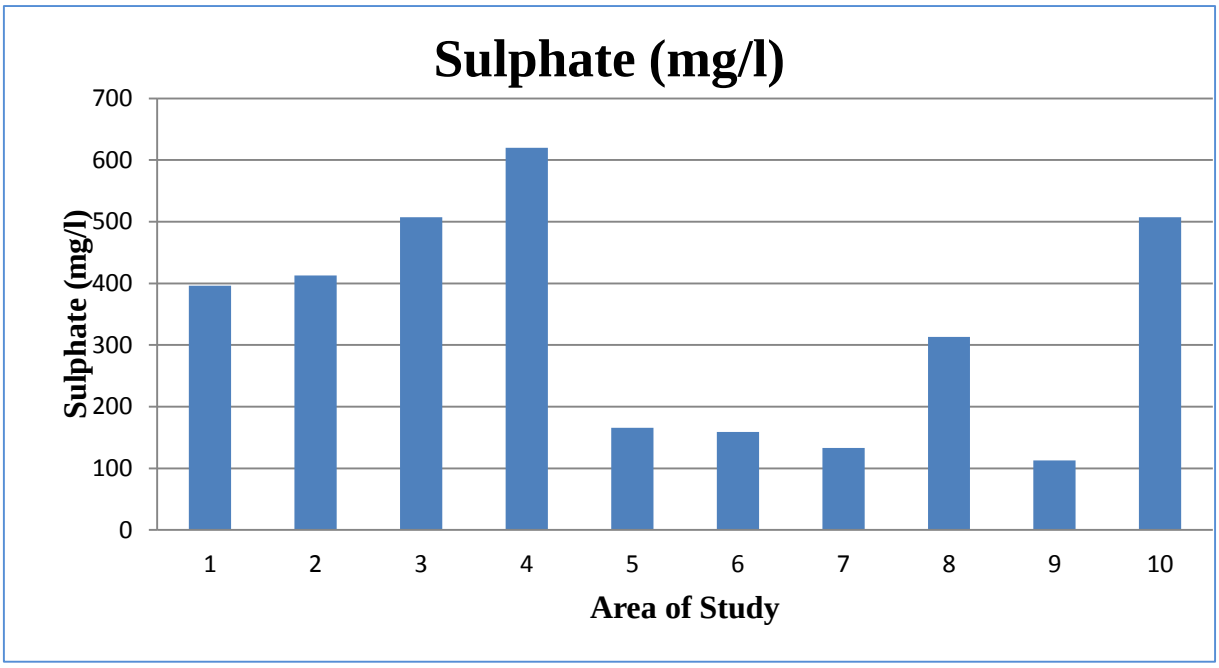
Due to the passage of water through or over deposits of limestone, dolomite, gypsum and gypriferrous and hale the presence of calcium occurs. It is found that the Samples are within permissible limit but Sample 49 is more than permissible limit.



Suplhate

Sulphate is widely distributed in nature and may be present in natural water in concentrations ranging from few to a thousand milligrams per liter. There are samples which are not in permissible limit 42, 43, 49 and remaining are within permissible limit as graph shown below.



Nitrate

The inorganic chemical Nitrate (NO_3).is one of the Potential Ground Water contaminant. It is found that Nitrate of the ground water (bore well water) near by the Industrial Belt are within the permissible limit as per IS:10500-2012. As the result in figure shows the temperature of the BoreWell

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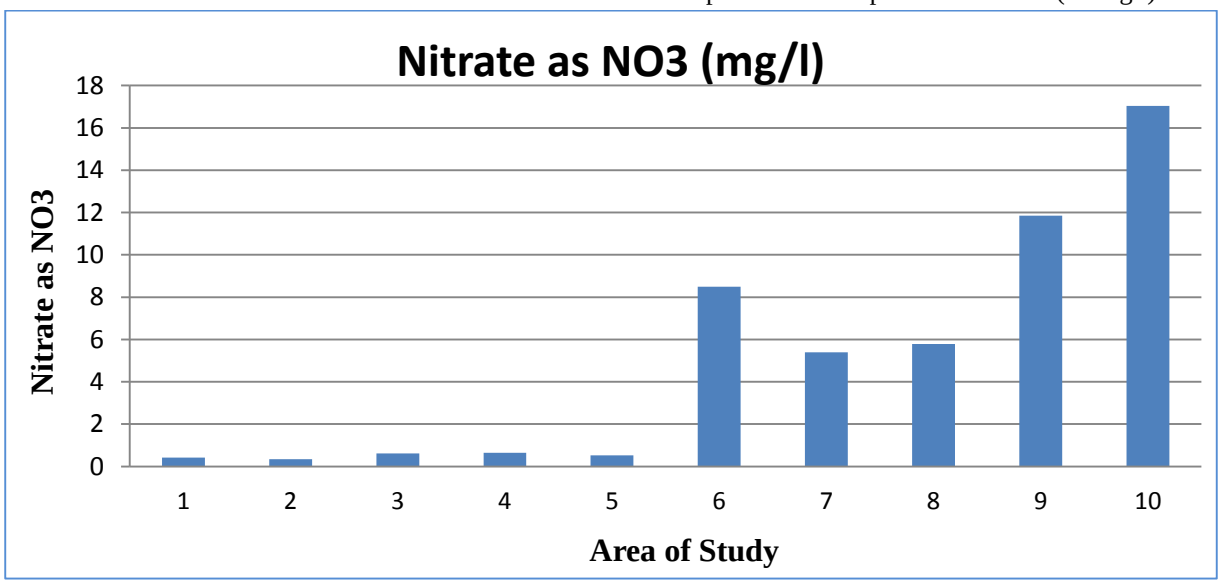
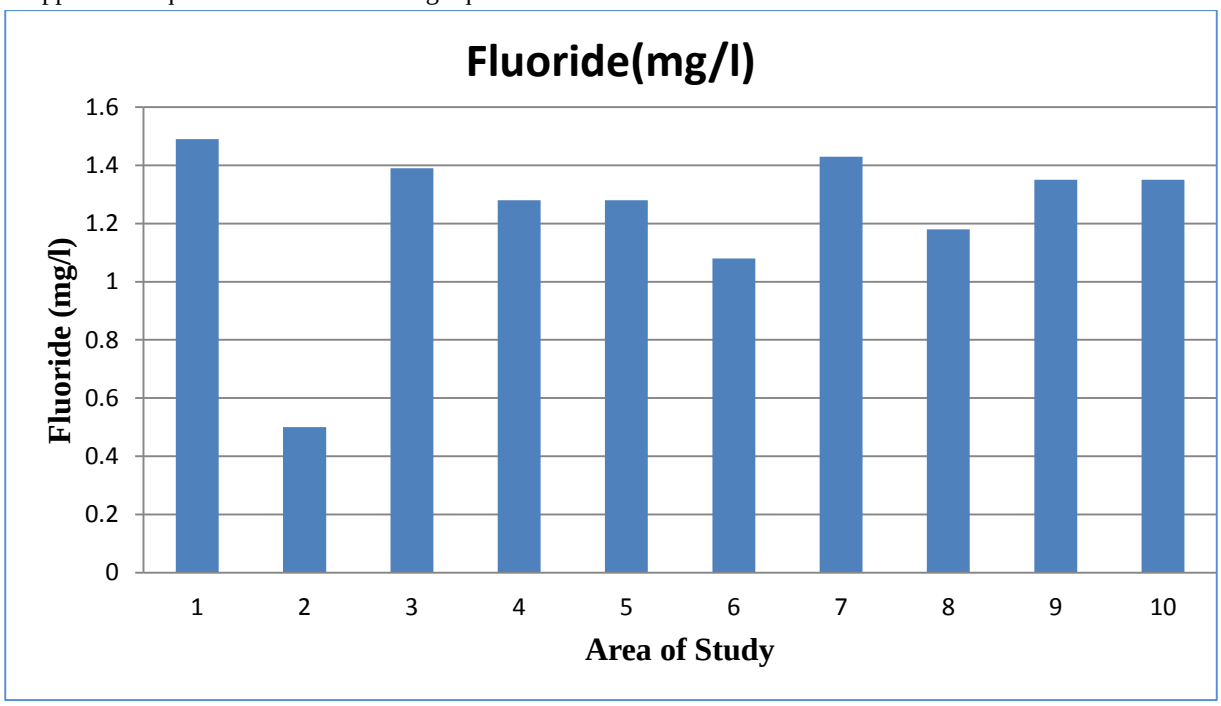
water collected from Different industrial belts .The taken Samples are within permissible limit (45 mg/l)



Fluoride

In surface water as well as in ground water , fluoride is present in appreciable quantities.Fluoride in large quantities is toxic to humans and animals. Here Samples are within permissible limit 45 mg/l.



Total Dissolved Solid

Solids consist of organic or inorganic particles present in water both in suspended and dissolved forms. Inorganic Solids include clay, minerals, and metals while organic solids include fiber and organic domestic waste. In below graph it can understood that taken 8 samples are within permissible limit and two Samples are high in TDS.

Water with high concentration of suspended or dissolved solids can create unpleasant taste and odour, hardness , corrosion and scaling problems

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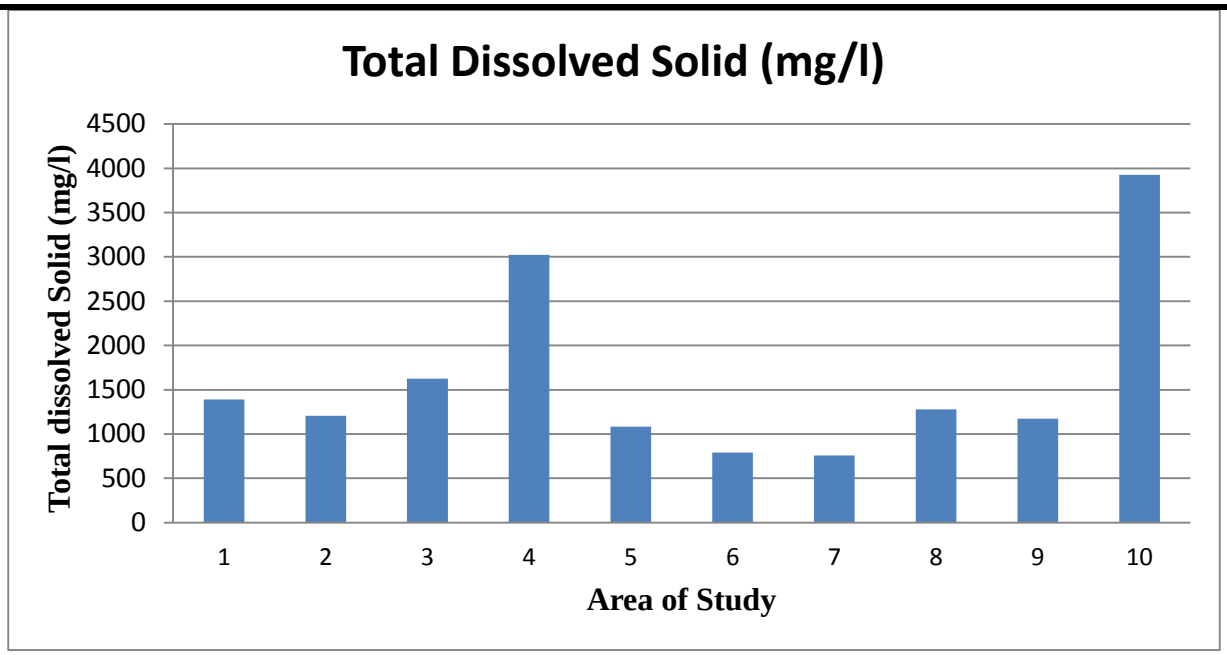

IV. CONCLUSION

According to the recent examination the water quality index was advanced for Raichur district. The WQI presented water quality change from good to medium in post monsoon season at few areas which obviously indicated seasonal dissimilarity and weakening in groundwater quality in the district, leading to health threats to locals. Further studies are essential to understand whether the weakening in groundwater quality is provisional or a progressive occurrence. This would help to avoid the permanent damage to the overall groundwater system. Remediation measures should be adopted to restore the already contaminated groundwater sites.

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