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Study of Ground Water Pollution in Roha, District Raigad, Maharashtra, India

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ABSTRACT

Roha is a small city & taluka in the Raigad District of the Maharashtra State of India and is situated on the banks of river Kundalika. Ground water is major source of drinking water & In Roha taluka availability of ground water is much more. Samples at Raigad District were collected during Pre-Monsoon Season i.e. from March 2016 to May 2016. The 10 sampling Sites were selected for sampling that are located in Roha, Killa, Tambdi Khurd,Muthavde, Furgarewadi, Ghosale, Muthawali, khari, Pingalsai, and Tareghar. 27 water quality parameters were determined as per the standard procedure as prescribed by APHA AWWA and BIS. It was found that the physical parameters like pH, Colour, odour, Turbidity, were Acceptable. The presence of chloride may be due to discharge of sewage, industrial water in water body, Chloride values are in well within the limits. Also Higher concentration of TDS was found which may cause heart & kidney diseases, TDS concentration In Ground water of Roha & nearby villages are within the standard limits.

Key words: Roha, Water quality, TDS, Industrial water

I. INTRODUCTION

Groundwater is the water found underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers. Ground water is the Most Major source of fresh water for drinking, Agriculture & Industrial desires, Groundwater is often cheaper, more convenient and less vulnerable to pollution than surface water. Therefore, it is commonly used for public water supplies. For example, groundwater provides the largest source of usable water. Many municipal water supplies are derived solely from groundwater. Polluted groundwater is less visible, but more difficult to clean up, than pollution in rivers and

lakes. Groundwater pollution most often results from improper disposal of wastes on land. Major sources include industrial and household chemicals and garbage landfills, excessive fertilizers and pesticides used in agriculture, industrial waste lagoons, tailings and process wastewater from mines, industrial fracking, oil field brine pits, leaking underground oil storage tanks and pipelines, sewage sludge and septic systems.

II. STUDY AREA & PERIOD

The samples were collected around the Roha town. Roha is a small city & taluka in the Raigad District of the Maharashtra State of India and is situated on the banks of river Kundalika. Ground water is major source of drinking water & In Roha taluka availability of ground water is much more. Samples at Raigad District were collected during Pre Monsoon Season i.e. from March 2016 to May 2016. The ten sampling Sites are located in 1.Roha 2.Killa 3.Tambdi Khurd

4.Muthavde 5.Furgarewadi 6.Ghosale 7.Muthawali 8.khari 9.Pingalsai 10.Tareghar.

The Map of RAIGARH District Roads, Rivers Railway Tracks, Taluka.

Figure 1

III. METHODOLOGY

The samples were collected in Pre- Monsoon. the samples were collected in Plastic (polypropylene) container (capacity: 2 litre). The collection, transportation and preservation were done as per the Standards & as per CPCB guidelines. The various water quality parameters such as, Colour, Odour, pH, TDS, Iron, Sulphate, Fluoride, Nitrate, Salinity, Hardness, EC, Boron, Free Residual Chlorine, Turbidity, Phenolic compounds, cyanide) & heavy metals Cu, Zn, Cr^{+6}, Nickel, Lead, Cadmium.

Instruments :

3.1 Atomic Absorption Spectrophotometer (Make Chemito now takeover by Thermofisher) Model No. AA203: For Heavy metals

3.2 UV-Visible Spectrophotometer (make Chemline): For Sulphate, Nitrate, Fluoride, Boron, Phenolic compounds.

3.3 Methods used: APHA 22nd Edition & IS 3025.

Depth to Water Level :Premonsoon (Average Level)

The Average depth to water levels in the district during premonsoon ranges between 0.55 m bgl (Nagothan) and 8.60 m bgl (Chinchwad). Depth to water levels during Pre monsoon is Shallow water levels i.e., less than 2 m bgl are seen in the central part of the district. The water levels5 to 10 m bgl are seen in the southern part of the district i.e. around Poladpur and Mahad and also as scattered patches across the district. In the major part of the district water level ranges from 2 to 5 m bgl.

Ground Water Development

Physiographic, geology and rainfall of the district plays a major role in the Ground water resource availability and sustainability. The high, steep hill ranges, isolated hillocks, undulation etc give rise to high run off. The predominance of hard rock formation in the form of basaltic lava flows facilities the run off rather than natural recharge due to the poor ground water storage and transmission capabilities. The formation due to poor storage and transmission characteristics gets fully saturated during monsoon and a situation of rejected recharge is resulted. These aquifers then are drained naturally due to slopping and undulation topography.

The district despite of high rainfall of (1500 – 3500 mm) faces water scarcity situation following January or February month. Development of ground water has taken place on a limited scale in Deccan Trap Basalt area. However, ground water development for

irrigation purpose has taken place on a good scale in the alluvial area of coastal tract.

IV. METHODS

Methods used for analysis of samples are as per APHA 22nd Edition & IS 3025

Table 1

Sr. No	Name of the Water Quality Parameter	Bureau of Indian Standard (IS-10500:1994)	Pre Monsoon march 2016 to may 2016 (Parameters Range)
1	pH	6.5 - 8.5	6.63 – 7.28
2	Total Hardness mg/l	200	72 - 179
3	TDS mg/l	500	111- 433
4	Chlorides (as Cl) mg/l	250	32 - 54
5	Sulphates (as SO4) mg/l	200	19 - 51
6	Nitrates as (NO3) mg/l	45	0.22 – 0.46
7	Fluorides (as F) mg/l	1.0	<0.2 – 0.75
8	Cu mg/l	0.05	0.030 -0.037
9	Fe mg/l	0.3	0.23 – 0.28
10	Zn mg/l	5	0.31 – 0.58

V. RESULTS AND DISCUSSION

The suitability of ground water for drinking purpose is determined keeping in view the effects of various chemical constituents in water on the biological System of human being. The classification of water was carried out as per the Bureau of Indian Standards (BIS) for drinking water to assess the suitability of Ground water.

a. pH value :

The pH value of water is indication of its quality. pH values usually changes due to contamination from industrial waste, carbonate and bicarbonate. The pH values for the samples Collected at Ten Locations the Minimum pH was Recorded 6.63 at **GW 10** and the maximum value recorded was 7.28 at **GW1.**

b. Electrical Conductivity:

It indicates mineral, geological effect and organic pollution. It increases as dissolved salt concentration increases. The minimum conductivity in the Study region was 0.125 mS/cm recorded at **GW8** and the Maximum Value 0.493 mS/cm was recorded at **GW9**.

c. Total Hardness:

The total Hardness value of water is due to the calcium and magnesium salts. The total Hardness values for samples are within the range of permissible limit. Minimum Value Observed was 72mg/l at **GW8** and the Maximum Value was 179mg/l at **GW6**

d. Total Dissolved Solids:

Total dissolved solids values does not cause harm to human but higher concentration may cause heart and kidney diseases. Total dissolved solids values for all sampling sites are within the range of permissible limit. The lowest value observed was 111mg/l at **GW8** and the maximum value 433mg/l at **GW4.**

e. Turbidity:

The turbidity is due to existence of many types of pathogenic organisms. It is an indicator of pollution. All samples were within the Standards.

f. Chloride:

The presence of chloride is an indicator of organic pollution. The presence of chloride in water body is mainly due to discharge of sewage, industrial effluents and agricultural fertilizers .The values for all samples are well below the standard limit. The minimum value recorded was 32mg/l at **GW1** and the Maximum Value was 54mg/l at **GW10**

g. Sulfate:

The sulfate in water is due to leaching of gypsum and other minerals. The values of the present study lie below the standard limit. The minimum value recorded was 19mg/l at **GW8** and the maximum Value recorded was 51mg/l. at **GW4.**

h. Heavy Metals:

Heavy Metals are also the important factor, at all the ten locations the parameters analyzed were. Heavy metals Cu, Zn, Cr^{+6}, Nickel, Lead, Cadmium. Fe, Cyanide, Boron, Aluminum, Arsenic & Mercury. So all the Heavy Metals in the Study region were below the detectable limits.

VI. CONCLUSION

The presence of chloride may be due to discharge of sewage, industrial water in water body, Chloride values are in well within the limits. Also Higher concentration of TDS may cause heart & kidney diseases, TDS concentration In Ground water of Roha & nearby villages are within the standard limits.

Ground water quality for 10 locations for Roha & villages coming under Roha Block were analyzed for physical & chemical parameters. It was observed that ground water quality is satisfactory in Roha.

Ground water Collection at Industrial Area.

The ground water sample was collected at MIDC Industrial area, at Dhatav Village, Roha, Raigad District. The physical parameters like pH, Colour, odour, Turbidity, were Acceptable. Being Chlorides with in limit but at the higher side of 104.7mg/l when compared to the ground water collection at 11 locations during the pre-monsoon period. Also the Total dissolved solids was Beyond the limits 1586 mg/l which was on a higher side. The calcium was also crossing the limits with a value of 87.13 mg/l. Magnesium with a value of 56.1 mg/l was crossing the limits. Heavy metals were not detected at this location.

Micro Biological Parameters like MPN (Most Probable Number) & E.coli were analysed but were not detected.