Assessment of Ground Water Quality in Bachigudam Village near Patencheru in Medak District in Month of July

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Research Article

Abstract: Rapid industrialization has resulted in pollution of ground water recourses. Patencheru in Medak district is one such industrial hub near Hyderabad. The treated industrial waste in released into stream nakkavagu which joins river manjeera a tributary of river Godavari. Bachigudem village was selected for ground water assessment as it lies in the nakkavagu catchment area. Parameters from eight sources were analyzed for parameters such as color, turbidity, pH, total alkalinity, total dissolved solids, total hardness, chlorides, sulphates, nitrates, fluorides and electrical conductivity. The sampling was done in month of july which is a peak rainy season. The results showed gross contamination of the ground water in bachigudem village. Fresh water is one of the essentials for life on earth. The Indian subcontinent is one of the wettest places on the earth with annual precipitation of over 4000 km^3 with a river flow of 1880 km^3 and potential ground water resources of about 431 km ^{3} besides water glaciers, ponds and lakes. But still we have the demand for good quality water because of growing population and use and abuse of existing resources.

Introduction

(1) Ground water is one of the essential components for the sustenance of life on earth. Among the various sources of water, ground water is said to be the safest water for drinking and domestic purposes. The quality of ground water is influenced by the nature of the sub surfaces as well as the environment where recharge takes place. Water used for Industries, agricultural and human needs add continuously contaminants to the ground water. It is reported that two third of all illness in India are related to water borne diseases. (2) Industrialization and unprecedented population increase have resulted in the generation of large volume of wastes that are poorly disposed and managed. The impact of indiscriminate waste disposal on the environment has raised concern in recent times. Improper disposal of chemicals from agricultural, industries, and mining activities have negative implications on aquatic life and water quality. (3) Industrial estate at patencheru was established in the year 1975 by the Andhra Pradesh industrial infrastructure corporation ltd., (APIIC). Patencheru is located on Mumbai-hyderabad highway around 35km from Hyderabad in medak district. Around 350 industries are located here. A common effleuent treatment plant was commissioned in the year 1990, to treat industrial waste water. There are two natural water corses in the area namely nakkavagu and is ukavagu and normally for most part of the year they are dry with no fresh water flowing into them. After treating the the industrial effluents the water is discharged into nakkavagu stream. The entire patencheru industrial area provided with all the necessary infrastructural facilities except the much needed sewer system. The study has been done in bachigudem village in the nakkavagu catchment area in the month of july which is a peak rainy season.

Materials and Methods

A systematic survey of bachigudem village was conducted in month of july 2012. Eight locations having bore wells were identified and assigned identity numbers. Water samples were collected from the bore wells on a single day.

S-1: Hanuman temple bore well
S-2: S.C colony bore well
S-3: Chinta pentayya house bore well
S-4: kotta basti bore well
S-5: Vittal reddy house borewell
S-6: Narasimha reddy house near school bore well
S-7: Karunakar Reddy home bore well
S-8: narasimha reddy home near mosque bore well

Parameters Analysed

Parameters analyzed are color, turbidity, total hardness, pH, electrical conductivity, total alkalinity, total dissolved solids, chlorides, fluorides and sulphates. All the samples were analyzed as per Standard Method *APHA 1998*. (4) The results thus obtained have been compared with WHO guidelines for drinking water as in the absence of supplied water bore well water is being used for drinking and other house hold purposes.

Results and Discussion

The analytical results thus obtained are averaged for rainy season:

pH – In only S6 sample pH is in the desirable limit, other than these all samples are below the standards.
Color – It is well within the standards in the rainy (desirable limit 5 Hazen Units).
Turbidity It is well within the standards in all the samples (desirable limit 5 NTU).

Total Hardness

Total hardness, an important property indicating the quality of groundwater is mainly
caused by calcium and magnesiumcations and is defined as the sum of their concentrations expressed inmg/l. Basically, it is the soapconsuming property of water(5).In all the bore well samples total hardness has exceeded the standard value in the rainy season (desirable limit 300 mg|l)

Total Alkalinity

In all the samples total alkalinity in all the samples is well within the standard limit, (desirable limit 200 mg|l).

Total Dissolved Solids

In the rainy all the bore well samples have shown the trend of exceeding the standard limit (desirable limit 500mg|l)

Chlorides

The WHO limit for chloride in groundwater is < 250mg/l. In all the bore well water sample it is above the standards (desirable limit 250mg|l)

Fluorides

In rainy s all the samples are well within the standards (desirable limit 1.0 mg/l) According to UNESCO specifications, water containing more than 1.5 mg/l of fluoride can cause mottled tooth enamel in children. Excess fluoride may also lead to flourosis that can result in skeletal damage.

Sulphates

In S4.S5 samples are within the standards and remaining samples (S1, S2, S3, S6 and S7) are above the standards. (250mg|l). Concentrations exceeding 500–600 mg/limpart a bitter taste and may cause laxative effects in some individuals (6).

Nitrate

Nitrate in natural water is due to organic sources or from industrial and agricultural chemicals (7).All the bore well water sample are well within the standards in rainy season (desirable limit 45 mg|l)

Electrical Conductivity (EC)

Depends up on temperature, ionic concentration and types of ions Present in the water (8). Thus the EC gives a qualitative picture of the quality of groundwater. The electrical conductivity exceeded the upper limit in all the samples.
From the Tables 1 t is observed that other than color, turbidity and fluorides which are within the drinking water standards, all other parameters are exceeding the drinking water standards desirable limit. It is necessary to intervene and see that the ground water does not get polluted further more.

Table 1: Physico - Chemical Analysis of Rainy Season (Average of two Samples)

Sr. No.	Color	Turbidity	pH	EC	TDS	Alkalinity	T. Hardness	NO3	Sulphates as SO4	Chlorides as Cl	Fluorides as F
S1	<5	0.4	6.3	309	200	87	1053	1.02	562.0	609.40	0.64
S2	<5	0.3	6.4	2699	1769	73	824	2.6	570.4	458.52	0.86
S3	<5	0.2	6.2	3170	2099	97	1068	37.38	645.3	512.28	0.70
S4	<5	0.5	6.3	2831	1838	56	739	4.016	239	577.4	0.80
S5	<5	0.5	6.4	2727	1757	67	708	1.9	190.4	583.92	0.56
S6	<5	0.2	6.5	2900	1877	80	879	12.58	502.6	487.8	0.66
S7	<5	0.4	6.3	2904	1948	65	886	1.938	324.3	592.88	0.88
S8	<5	0.32	6.2	2929	1900	85	658	22.0	358.4	430.16	0.8
Standard	5	5	6.5-8.5	2500	500	200	300	45	250	250	1.0

Conclusion

The ground water obtained from the above sources in the month of july appears grossly contaminated. The effluents should be treated properly before releasing them into streams. Quality checks should be performed in the existing effluent treatment plants. People should be advised not to use the ground water for drinking purposes. Regular checks should be done to assess the water quality in the susceptible areas.

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