Assessment of ground water quality in Bachigudam village near Patencheru in Medak district in month of September

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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 analysed 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 September which is almost end of rainy season. The results showed gross contamination of the ground water in bachigudem village.
Keywords: ground water quality, pH.

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Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 11 June 2014

INTRODUCTION

As the distribution of surface sources of water is so uneven as to be inadequate, in many parts of the country the dependence on groundwater is almost total. This is especially true in regions of arid to semi-arid type of climate where average annual rainfall is less than 100 cm and the scope of aquifer recharge is limited. Thus, groundwater continues to be exploited at ever increasing rates, especially in the rapidly expanding urban areas of the country. But rapid urban sprawl and industrialization have the unfortunate fallout of environmental pollution. In the absence of appropriate waste management strategies, many human activities and their by-products have the potential to pollute surface and subsurface water. Industrial effluents, and wastes from urban infrastructure, agriculture, horticulture, transport and discharges from abandoned mines and deliberate or accidental pollution, all eventually affect the water quality. The pollutants from the stream may move slowly in to the ground, thus affecting the quality of groundwater. Depending on various natural and cultural factors, the quality of groundwater in terms of its physical, chemical and organic characteristics is variable, determining its suitability for different purposes– domestic, agricultural or industrial[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 adds continuously contaminants to the ground water. It is reported that two third of all illness in India are related to water borne diseases.[2] The major problem with the ground water is that once contaminated, it is difficult to restore its quality. Hence there is a need and concern for the protection and management of ground 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 Jsukavagu and normally for most part of the year they are dry with no fresh water flowing into them. After treating 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.

MATERIAL AND METHODS

A systematic survey of Bachigudem village was conducted in month of September 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 bore well
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.

RESULT AND DISCUSSION

The analytical results thus obtained are averaged for rainy season:

pH: In all the samples pH is in the desirable limit. This is due to dilution because of rain.

Colour: It is well within the standards (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 magnesium cat ions and is defined as the sum of their concentrations expressed in mg/l. Basically, it is the soap consuming property of water(5).In all the bore well samples total hardness has exceeded the standard value in the rainy season (desirable limit 300 mgll)

Total Alkalinity: In all the samples total alkalinity in all the samples is well within the standard limit, (desirable limit 200 mgll).

Total Dissolved Solids: all the bore well samples have shown the trend of exceeding the standard limit (desirable limit 500mgll)

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 250mgll)

Fluorides: 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. (250mgll). 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 (desirable limit 45 mgll)

Electrical Conductivity (EC): depends upon 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.

Table 1: Physio-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	0.7	6.7	3290	2140	97	1083	1.06	564.0	625.4	0.64
S2	<5	0.7	6.8	2759	1777	79	840	2.64	576.4	470.52	0.80
S3	<5	0.4	6.6	3310	2113	103	1092	37.78	653.1	538.67	0.60
S4	<5	0.7	6.9	2855	1863	64	773	4.03	243.3	618.2	0.79
S5	<5	0.7	6.8	2743	1799	77	756	1.94	196.6	599.32	0.53
S6	<5	0.6	6.7	2924	1909	88	905	12.94	525.3	502.12	0.60
S7	<5	0.6	6.7	3120	1990	79	906	1.998	332.3	594.45	0.84
S8	<5	0.37	6.6	2961	1928	99	694	22.21	380.4	436.18	0.76
Standard	5	5	6.5-8.5	2500	500	200	300	45	250	250	1.0

From the Tables 1 t is observed that other than color, turbidity, alkalinity 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

CONCLUSION
The ground water obtained from the above sources in the month of september 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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