Ground Water Quality Assesment of Jaipur City, Rajasthan (India)

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Abstract:**The groundwater quality assessment is a significant issue in ground water studies. Jaipur city experienced degradation of groundwater quality due to rapid urbanization and industrialization. Eighteen ground water samples were collected randomly from 6 different area of Jaipur City, from different hand pumps to study the physicochemical parameter, such as pH, Conductivity, TDS, Total Hardness, Chloride with the help of standard method of APHA during monsoon (1September to 30 September 2014). Present study shows that underground water quality of Jaipur city is not good**

Keywords: Jaipur City, ground water, monsoon, physico-chemical parameter.

I.INTRODUCTION

Water is one of the most important substances on earth. All plants and animals must have water to survive. If there was no water there would be no life on earth. It is most important that the water which people drink and use for other purposes is clean water. The quality of water is of upper most importance compared to quantity in any water supply planning and especially for drinking purpose. The chemical, physical and bacterial characteristics of ground water determine its usefulness for municipal, commercial, industrial, agricultural, and domestic water supplies.

Jaipur City (Longitude: 95°24' E; latitude: 27°18N), the capital city of Rajasthan is one of the fastest growing cities in the country, is undergoing rapid urbanization and industrialization. Urbanization has led to immense pressure on ground water resources and has resulted in quality deterioration of ground water as well. The area experiences semi-arid to arid climate characterized by a hot and dry summer and pleasant winter.

II. REVIEW OF LITERATURE

Various workers in our country have carried out extensive studies on Water Quality. Abbasi [1] et al and Jagdap Jyashri [5] et al have studied water quality of different rivers. Shriniwas [14] et al and Jha [7] et al studied water quality in Hydrabad and Bihar, respectively. Patnaik [8] et al reported water pollution in industrial area. Fluoride level in drinking water from various sources in and around Jaipur and in many villages and trace metals have been carried out in our laboratory [6–11] earlier. Studies of industrial wastewater and ground water and pollution problem in ground water have also been studied in our laboratory [12–13] recently.

The objective of the scientific investigations is to determine the hydrochemistry of the ground water and to classify the water in order to evaluate the water suitability for drinking, domestic and irrigation uses and its suitability for municipal, agricultural and industrial use.

III. MATERIALS AND METHODS

During monsoon period (1September to 30 September 2014) ground water samples from eighteen sampling points were collected. Before collection from tube wells, the water was left to run for 5 to 7 minutes to get a representative sample. Samples were collected in good quality polyethylene bottles of one-litre capacity. Sampling has been carried out without adding any preservatives in well-rinsed bottles. Geographical coordinates of each sampling location was recorded using a handheld Magellan Triton global positioning system (GPS). Various physicochemical parameters like temp., pH, Conductivity, Turbidity, Total Hardness and Chloride test were determined at the Environmental lab.

Unstable hydro chemical parameters including pH, electric conductivity (EC) and total dissolved solids (TDS) were measured in situ with the help of digital portable water analyzer kit (CENTURY–CK–710). Total hardness (TH) as CaCO3 were analyzed titrimetrically, using standard EDTA. Total Alkalinity (TA) as CaCO3 were estimated by titrating with H2SO4 and Chloride was determined by standard argentometric titration.

IV.RESULTS AND DISCUSSION

pH is the measure of the acidity or alkalinity of solution. A pH of 7 is neutral; lower number indicates acidity whereas higher indicates alkalinity. During present investigation, It was observed from the pH value that water samples were varying from 7.0 to 7.9 .Lowest pH value is recorded in Vaishali nagar and the highest was found in Pratap nagar. In general, pH of groundwater samples of the study area is within the permissible limit.

The electrical conductivity at 25ºC of water is due to the presence of various dissolved salts.

EC of the groundwater is varying from 687.5 to 3162.5 µS/cm at 25°C.

A high total dissolved solid (TDS) reduces utility of water for drinking, irrigation and industrial purposes [15]. TDS varied from 412.5 to 1739 mg/L. According to Indian standards, 94.5% of the samples has exceeds the permissible limit and 5.5% of samples are within the permissible limit.

Higher value of TDS can be attributed to the contribution of salts from the subsurface lithology and further due higher residence time of groundwater in contact with the aquifer [2,3,4].

The chloride (Cl-) concentration varies between 72 to 367 mg/l. From the results, it is observed that in 16% samples chloride content is higher than permissible limit (250 mg/l). High concentration of chloride in drinking water gives a salty taste to the water and produces a laxative effect on people not habituated to it. Moderate quantities have little effect on the usefulness of water for most purposes.

The hardness of water is define as the soap consuming capacity of water. It is determined by the concentration of multivalent cations in water .Its permissible limit is 300 mg/l. From the results, it is observed that Hardness content is higher than permissible limit in 44 % samples.

The Turbidity is the cloudiness or haziness of a fluid caused by large numbers of individual particles that are generally invisible to the naked eye. From the results, it is observed that all the water samples are within the permissible limit.

From the investigation, it has been concluded that excess concentration of chloride, EC and TDS as well as the presence of water hardness, make the groundwater unfit for drinking.

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S.No.	LOCATION	SAMPLE NO	pH	EC (µS/cm)	TDS	TURBIDITY (NTU)	CHLORIDE (mg/l)	TOTAL HARDNESS (ppm)	N	E
1	Sitapura	1	7.4	1650	907.5	4.5	367	304	26.7582	75.8596
2		2	7.2	1320	726	4.3	355	210	26.7685	75.8506
3		3	7.3	1292.5	710.8	4.2	366	260	26.7708	75.8549
4	Pratap nagar	1	7.6	1732.5	952.6	4.6	230	121	26.8364	75.7743
5		2	7.7	1237.5	680.6	4.6	172	115	26.8339	75.7743
6		3	7.9	1129	620.9	4.7	205	210	26.8384	75.7788
7	Mansarovar	1	7.4	687.5	412.5	3.2	128	310	26.8594	75.7659
8		2	7.3	1512.5	831.8	3.5	210	500	26.8668	75.7701
9		3	7.2	1402.5	771.1	3.3	175	460	26.8658	75.7624
10	Jhotwara	1	7.6	3162.5	1739	4.1	215	425	26.9421	75.7603
11		2	7.1	2700	1485	4.3	170	250	26.943	75.7648
12		3	7.5	2826	1554.3	4.0	168	400	26.9443	75.7661
13	Vaishali nagar	1	7.4	1100	605	2.9	90	225	26.9127	75.7436
14		2	7.5	1155	635.25	3.1	83	231	26.916	75.7435
15		3	7	1320	726	3.1	72	195	26.9077	75.7433
16	Ajmeri gate	1	7.4	1540	847	4.2	105	125	26.9247	75.8267
17		2	7.6	1815	998.2	4.0	235	620	26.9228	75.8223
18		3	7.3	1595	872.2	4.2	215	610	26.9175	75.8213