GROUND WATER QUALITY ASSESMENT OF BLOCK CHECHAT, KOTA DISTRICT, RAJASTHAN

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Abstract

The groundwater quality assessment is a significant issue in recent studies. Kota district is treated as blessed district in comparison to rest of Rajasthan state. During past two decades of present century many parts of Kota district experienced degradation of groundwater quality due to rapid urbanization and industrialization. Block Chechat is well known for its mining operations. For present study ten ground water samples were collected randomly from 6 different area of Block Chechat, from different hand pumps to study the physicochemical parameters, such as pH, Conductivity, TDS, Total Hardness with the help of standard method of APHA during one year (October 2017 to September 2018). Present study shows that underground water quality of Block Chechat is not average and can be used for household works.

Introduction

Groundwater is one of the primary sources for drinking and irrigation in rural area of Kota district of Rajasthan, India. Humans and other organisms need water to survive. Clean water is most important for drinking and for other purposes. The quality of water is significant 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. **Chechat** is a 700 year old town situated near Takali River. Chechat represents a conglomerate of more than 36 villages surrounding it and these villages are integrated by the economy of Chechat town. Block Chechat (Longitude: 75°53'17.09"E; latitude: 24°45'55.64"N), well known for its Kota-stone mining industry of Rajasthan is one of the fastest growing area in the state, is undergoing 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.

Review of Literature

Various workers in our country have carried out extensive studies on Water Quality. Abbasi [1] et al and Jagdap Jyashri [6] et al have studied water quality of different rivers. Shriniwas [17] et al and Jha [8] et al studied water quality in Hyderabad and Bihar, respectively. Patnaik [10] 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. Machiwal and Jha [9] , studied Groundwater Contamination in a Hard-Rock Aquifer System Using Multivariate Statistical Analyses and GIS-Based Geostatistical Modeling Techniques. Singaraja [16]et al Geochemical Evaluation of Fluoride Contamination of Groundwater in the Thoothukudi District of Tamilnadu. Tiwari and Singh [18] studied groundwater quality assessment of Pratapgarh district, Uttar Pradesh. Verma [19] et al studied Brahmaputra River Basin Groundwater. Vetrimurugan [21] et al studied"Human exposure risk to heavy metals through groundwater used for drinking. Verma [20] et al studied "Heavy metal contamination of groundwater. Bouderbala [3] et al studied "Application of multivariate statistical techniques for characterization of groundwater quality.

Materials and Methods

During study period (October 2017 to September 2018) 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-liter 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 was analyzed titrimetrically, using standard EDTA. Total Alkalinity (TA) as $CaCO_3$ was estimated by titrating with H_2SO_4.

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 7.9 to 8.0. 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 975 to 1098 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 519 to 634 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 hardness of water is defined 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.

Table-1: showing values of various parameters (site1, site2) of tehsil Chechat

Parameter\ sites	Site 1	Site 2	Average
pH	8	7.9	7.95
EC	1098	975	1036.5
TDS	634	519	576.5
TA	421	360	390.5

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