Status of Ground water Quality in Identified Areas of Karwi City, Utter Pradesh, India

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Abstract— Ground water is the primary source of water for human consumption, as well as for agricultural and industrial uses in many regions all over the world. District Chitrakoot lies between Lat. 24^0 48' to 25^0 12' N and Lang. 80^0 58' to 81^0 34' E. Distance covered by district from east to west is 62 Km and North to South is 57.5Km. The present study includes residential areas such as Purani Bazar, Nayee Bazar, Sankar Bazar, Sonepur, Allahabad Road Civil Lines, Laxmanpuri and Purani Kotwali. To effectively regulate potential sources of contamination, we must understand the behaviour of contaminations in the surface. So we can predict the environmental impact. The pH, Chloride, Sulphate and Nitrate are found below the limit at all the sampling stations, but color is not found in any of the samples.

Keywords— *Ground Water; Water Quality Analysis; Karwi City; Utter Pradesh.*

1. Introduction

District Chitrakoot lies between Lat. 24^0 48' to 25^0 12' N and Lang. 80^0 58' to 81^0 34' E. Distance covered by district from east to west is 62 Km and North to South is 57.5Km. It is bounded in the north by Kaushambi, in the south by satna (MP) & Rewa (MP), in the east by Allahabadand and in west by Banda. The district is linked with Roadways to all adjoining district of Banda, Allahabad, Satna, Rewa and Kaushambi. Total geographical area of District is about 345291Sq. Km. Chitrakoot is the 'Hill of many wonders'. The Chitrakuta region includes Chitrakoot district of Uttar Pradesh and Satna district of Madhya Pradesh. Chitrakoot Mountain range includes Kamad Giri, Hanumaan Dhara, Janki Kund, Lakshman pahari, and Devangana famous Religious Mountains. The major part of the district is found to be rocky and stripped forested upland called the Patha that inhabited by Kol tribals.

Ground water is the primary source of water for human consumption, as well as for agricultural and industrial uses in many regions all over the world. Ground water contributes 0.6% of total water resources on earth. It accounts for nearly 80% of the rural domestic water needs and 50% of the urban water needs in the developing countries in India [1, 2]. Study of chemical budget of the major ions gain importance since it explains the level of the ions in ground water and the level of the contamination by natural as well as anthropogenic sources [3, 4]. Several studies have reported that the release of nitrates and other minerals from agricultural activities contaminated the groundwater [5]. In developing countries, like India, around 80% of all diseases are directly related to poor drinking water quality and unhygienic conditions .It indicate that growth and development in the form of industrialization, urbanization may be essential for development of country but it is also essential to analyze and protect our basic environmental and health hazards. In the present work, characterization of different water resources from Karwi City, Utter Pradesh Carried Out.

2. Methodology

Ground water sampling is conducted to provide information on the condition of subsurface water resources. Whether the goal of the monitoring effort is detection or assessment of contamination, the information gathered during sampling efforts must be of known quality and be well documented. The most efficient way to accomplish these goals is by developing a sampling protocol and the hydrogeology of the site or region under investigation. This sampling protocol incorporates detailed description of sampling procedures and other techniques than, of them, are not sufficient to document data quality or reliability. Sampling protocols are central parts of network or investigator strategies. The ground water monitoring was performed in ten stations to know the actual condition of ground water at some area of karwi. The quality of ground water was further interred pouted against the prescribed BIS norms the drinking water. To ensure collection of sample from the upper shallowest water table the sampling location was identified on hand pumps. The Procedures followed to analyze the physico-chemical parameters were from Standard Methods [6].

3. Sampling Network

In the present study some sampling areas include residential area, as Purani Bazar, Nayee Bazar, Sankar Bazar, Sonepur, Allahabad Road Civil Lines, Laxmanpuri and Purani Kotwali. The first water table tapped in this area occurs generally at 25-35 m depth below ground level. The in dividable sampling location are described as per below in table1.

Table1: Sampling Sources

S. No.	Sampling Station	Detail Description of sampling Location
1	Purani Bazar (S-1)	In front of Mandakini Takies Karwi
2	Purani Bazar (S-2)	In front of Govt.Hospital
3	Purani Bazar (S-3)	In front of Dhush Ka Maidan, Ramlila Ground
4	Nayi Bazar(S-4)	Near of Railway Crossing
5	Shankar Bazaar (S-5)	Inside Chakrehi Chauraha
6	Sonepur (S-6)	Near Hindustan Petrolium
7	Sonepur (S-7)	In front of Residense of Ram Sajeevan Patel (Sansad)
8	Allahabad Road Civil Lines (S-8)	Tahseel Compound
9	Purani Kotwali (S-9)	In front of Residence C.O.
10	Laxman Puri (S-10)	Near of Bus Stand

4. Results and Discussion

The estimated physic-chemical parameters were compared with standard water quality indices, like WHO and BIS. These analyzed parameters were tabulated along with the standard values in table 2 and all the result is compared in figure 1.

4.1 pH

Most ground water has pH values between 5.8 and 8.0 very high pH values. Above 8.5 are usually associated with sodium carbonate, bicarbonate waters, moderately high pH values are commonly associated with waters high in bicarbonates. Very low pH values are commonly associated with waters high in bicarbonates; very low values may be associated with small amounts of mineral acids from sulphide sources or with organic acid. In the present study is varied from 7.0 to 7.12. The maximum concentration of pH was found (7.12) at sampling station S_5 purani Bazar. Rao et al., studied physic- chemical and biochemical characterization of ground water near point sources for assessing their quality for user and application and concentration of pH was reported range from 6.5 to 8.4 [7].

4.2 Conductivity

Conductivity of water is due to presence of ions or in other words it is a measure of concentration of ions in a given water sample. In the current study highest value of conductivity was found 1768 µs/cm and lowest was found 408 µs/cm. The higher conductivity might be due to the geological formation, domestic wastes, agricultural formation, domestic wastes, agricultural practices, urbanization and industrialization [8]. Physic-chemical studies on water in Thirukattupalli near Thanjavur, detected the conductivity in the range 0.36 to 2.59 m.mho/cm.

4.3 Chloride

Chloride naturally occurs in all kind of water. It appears as a soluble content in water and moves freely through soil and rocks. Salty taste to water shows salts in excess of 100 mg/l. In recent studies, the chloride concentration was found highest 69.4 mg/l and lowest value is 7.4 mg/l. The Excessive chloride content in water is always injurious to the people which cause kidney and heart problems. Tripathi et al.2013 studied the categorization of diffuse chemical pollution in Satna District of Vindhya Region, India, Chloride concentration was analyzed and found the chloride content ranged between 5.0 to 82.0 mg/l [9].

4.4 Total Dissolve Solid

In natural waters ,total dissolved solid (TDS) are composed mainly of carbonate, bicarbonate, chloride, sulphate, phosphate, nitrate, Ca, Mg, Na, K, Fe, Mn etc.,(Esmaeili and Johal,2005) [10]. In current research work highest value of TDS was found at sampling station S_9 (1180 mg/l) and lowest value of TDS was found at sampling station S_2 (334 mg/l). All the samples of TDS are higher than the permissible limit prescribed by BIS [11] as 250 mg/l. Mohanty et al., studied assessment of ground water quality due to coal mining at tilapia-I coal mine, Sumbalpur, odisha and TDS values was reported varied from 183 to 251 mg/l [12].

4.5 Sulphate

Sulphate is natural anion in all type of natural waters. It is an important constituent of hardness with calcium and magnesium. Sulphate produces an objectionable taste at 300-400 mg/l above 500 mg/l it is laxative. In the present study its concentration is under the prescribed limit 200 mg/l. In the present study sulphate content was found ranged between 16.0 to 176 mg/l. Maximum concentration of sulphate was found in the study area 176.0 mg/l at sampling station S8(Allahabad Road Civil Lines Karwi).All the results of sulphate were obtained below the permissible limit as 200 mg/l.

4.6 Chemical Oxygen Demand

In the current study highest value of COD was found 21.0 mg/l. and lowest value was found 1.3 mg/l. Values of COD at sampling stations S2(21.0),S3 (14.7), S4 (10.3), S5(12.3 mg/l) are higher than the permissible limit prescribed by WHO as 10 mg/. Higher values of COD due to occurs discharge of sewage waste and different domestic activities. Pradhan et al., studied assessment of physico Chemical parameters of Chilika Lake water and recorded the Chemical oxygen Demand to be 16.0 to 416 mg/l [13].

4.7 Total Hardness

In the present research work maximum concentration was recorded 338 mg/l and minimum concentration was recorded 139 mg/l. The high TH may cause encrustation on water supply distribution system. The long term of human consumption of extremely hard water (≥500mg/l) might lead to an increased incidence of urolithiasis, gallbladder disease, urinary stones, arthritis, anencephaly, arthropathies, parental mortality, some types of cancer and cardio-vascular disorders [14, 15]. Tripathi et al., quality and assessment of ground water in Satna, Madhya Pradesh have reported total hardness to be 320 to 760 mg/l [16].

4.8 Color

Color in ground water mainly results from degradation process in the natural environment. It may occur due to the presence of humic acid, chromium, Fluoric acids. Metallic ions such as iron and manganese suspended matter, industrial waste etc. In the present research work (Ground water) color) color in not found in any samples. In my study of ground water sampling is present only re colors less in one samples (H.Units) sampling point other samples. Rai et al. carried out status of ground water quality in and around steel and power industry, reported the color contents all the samples are found below the permissible limit set by WHO [17, 18].

4.9 Nitrate Nitrogen

Nitrate in natural water can be traced to percolating nitrate from sources, such as decaying plant and animal materials, agricultural fertilizers, domestic sewage [19]. In the present study nitrate concentrations varied between NT to 11.7 mg/l, its concentration is under the prescribed limit 45 mg/l. Dwivedi et al. carried out assessment of soil and ground water quality in rewa district of vindhya plateau (India), observed the nitrate content varied between 0.7 to 7.9 mg/l [20].

Table 2: Physico-chemical characteristics of Ground Water Samples in and Around Karwai City, Utter Pradesh

| Locations	pH	Conductivity	Chloride	TDS	Sulphate	COD	TH	color	Nitrate
Purani Bazar (S-1)	7.01	566	20	407	25	4.9	145	ND	1.65
Purani Bazar (S-2)	7.12	408	7.4	334	16	21.0	169	ND	NT
Purani Bazar (S-3)	6.98	657	7.9	412	29.1	14.7	139	ND	0.24
Nayi Bazar (S-4)	7.01	802	8.2	521	31.2	10.3	154	ND	11.7
Shankar	7.00	815	49.9	530	104	12.2	366	ND	0.021
Sonepur (S-6)	7.09	761	54.6	340	76	6.5	268	ND	NT
Sonepur (S-7)	7.03	1265	52.7	870	130	1.3	148	ND	NT
ARC (S-8)	7.01	1767	69.4	1150	176	7.09	338	ND	5.21
Purani Kotawali(S-9)	6.94	832	58.3	1180	65	1.4	270	ND	0.14
Laxman Puri(S-10)	7.04	640	36.0	410	46	6.1	190	ND	0.78
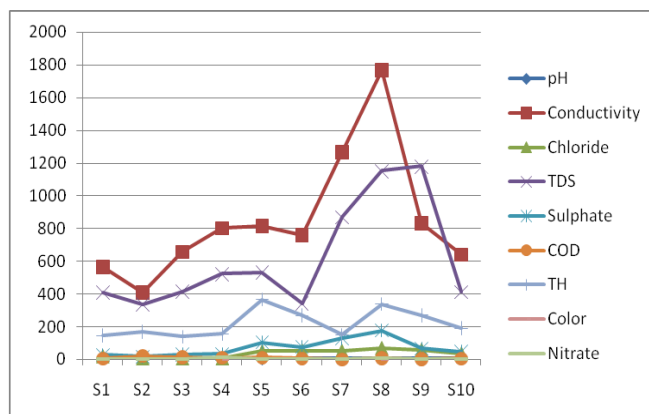
Fig.1: Comparative diagram of all the results of ground water in all the sampling Stations of Karwi City

5. Conclusion

With ongoing industrialization, the process of ground water contamination will continue, but its impact can be reduced. The role of Hydro-geologists and regulatory agencies should be strengthened to provide proper evaluation of potential sources of contamination and to aid in remedial action when ground water is contaminated co-operative efforts to develop strategies will ensure proper handling of future emergencies. The case studies indicate that the ground water from contamination is essential. To effectively regulate potential sources of contamination, we should understand the behavior of contaminations in the surface. So we can also predict the impact of the environment. The conclusions drawn from study are summarized below,

*pH, Chloride, Sulphate and Nitrate are found below the limit in all sampling stations, but color is not found in any of the samples.

**TDS was found at all the samples are more than the limit prescribed by WHO and COD values were found at sampling stations S_2, S_3, S_4 and S_5 are higher than the limit.

***Chlorides occur naturally in all types of water the most important source of chlorides in the water is the discharge of domestic sewage.

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