



Case Study

Assessment of Drinking Water Quality: A Case Study

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A B S T R A C T

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Drinking Water, Water Quality, Physico-chemical parameters

In the present study work has been done to assess the groundwater quality in the Aligarh city from Shah Jamal to Quarsi. Groundwater samples were collected from different sampling locations covering uniformly the entire study area of the city and were analyzed for various physico-chemical parameters to assess the groundwater quality. The physico-chemical parameters such as pH, TDS, alkalinity, turbidity, total hardness, and chloride were analyzed. The results showed that the various parameters were within the permissible limits of BIS. The values for different physico-chemical parameters were found to be 7.35 for pH, 7.4 NTU for turbidity, 470 mg/L for total hardness, 1225 mg/L for TDS, 665 mg/L for chlorides and 450 mg/L for alkalinity.

Introduction

The modern civilization, industrialization, urbanization and increased population are the main causes of fast degradation of our environment. Water is indispensable and one of the precious natural resources of this planet (Shahnawaz and Singh, 2009). Water is important to the mechanics of the human body and the body cannot survive without it. Water quality is essential for the well-being of all people; the quality of water can be affected by different pollutants such as, chemical, biological and physical. Contaminates such as bacteria, viruses, heavy metals, nitrate and salt have found their way into water supplies, the water pollution occurs when a body of water is adversely affected due to the addition of large amounts of materials to the water (Atta and Razzak, 2008).

Ground Water is the major source of drinking water in both urban and rural areas. The importance of ground water for the existence of human society cannot be over emphasized. Ground water crisis is not the result of natural factors. It has been caused by human action much of ill health which effects humanity, especially in the developing countries can be traced to lake of safe and whole some water supply (Shyamala et al., 2009). Prolonged discharge of industrial effluents, domestic sewage and solid waste dump causes the groundwater to become polluted and created health problems (Raja et al., 2002). Ground water contains high amount of various ions, salts etc. so if we were using such type of water as potable water then it leads to various water-borne diseases (Mishra et al., 2010).

Unsafe drinking water contributed to numerous health problems in developing countries such as the one billion or more incidents of diarrhea that occur annually (Mark et al., 2002). The present work is an attempt to measure the water quality of various water sources of fifteen locations of Aligarh district, Uttar Pradesh, India.

Study Area

The Aligarh district of UP has a total area of 3700.4 sq. km. District lies on the planes of the rivers Ganga and Yamuna. The district is situated towards the south-east of Delhi. Its shares a common boundary with Bulandshahr in North, Etah in East, Mathura in West and Hathras (Mahamayanagar) in South. The entire district falling in Upper-Ganga doab represents flat topography. Basic Information of surface water irrigation is 15% while that of ground water is 85%. The economy of the district mainly depends upon agriculture. The district receives a normal rainfall of 708 mm with 46 rainy days and experiences sub-tropical climate.

The district is mainly drained by river Ganga & Yamuna and their tributaries of which Karwan, Sirsa & Sengar hold importance. (MSME, Govt. of India) Aligarh District is one among 71 Districts of Uttar Pradesh State, India. It is Located at Latitude-27.8, Longitude-78.0. It is in the 201 meters to 176 meters elevation range. It is hot in summer. During summers the highest day temperature is in between 26°C to 47°C. Average temperatures of January is 14°C , February is 16°C , March is 24°C , April is 32°C , May is 37°C .

Materials and Methods

The samples were collected in plastic canes of two liter capacity without any air bubbles as per standard procedure. The samples were

kept in refrigerator maintained at 4°C. Analysis was carried out for various water quality parameters such as pH, total dissolved solids (TDS), turbidity, total alkalinity (TA), total hardness (TH), chloride (Cl⁻), using standard method. The reagents used for the analysis were AR grade.

Results and Discussion

pH

The significance of pH is related to the H⁺ and OH⁻ concentration of drinking water. The physico-chemical parameters of ground water samples were analyzed in which pH value of water samples ranges between 5.2-8.1 against the standard of WHO and IS 10500:1991 that are 6.5- 8.5.

TDS

This is a significant parameter for the utilization of water. The water with high TDS value indicates the higher mineralization of water. The standard limit for TDS is 500 mg/L and maximum limit is 2000 mg/L prescribed for drinking purpose (Maruthi and Rao, 2004). The concentration of TDS in present study was observed in the range of 152 mg/l to 1920 mg/l.

Total Hardness

The total hardness is the measure of the capacity of water to precipitate soap. Usually the hardness is not harmful to health but it has been suspected to play some role in heart diseases. In this study, total hardness of all samples found to be within the permissible limit of 300- 600 mg/L for drinking water. The minimum and maximum values recorded were 266 and 576 mg/L respectively.

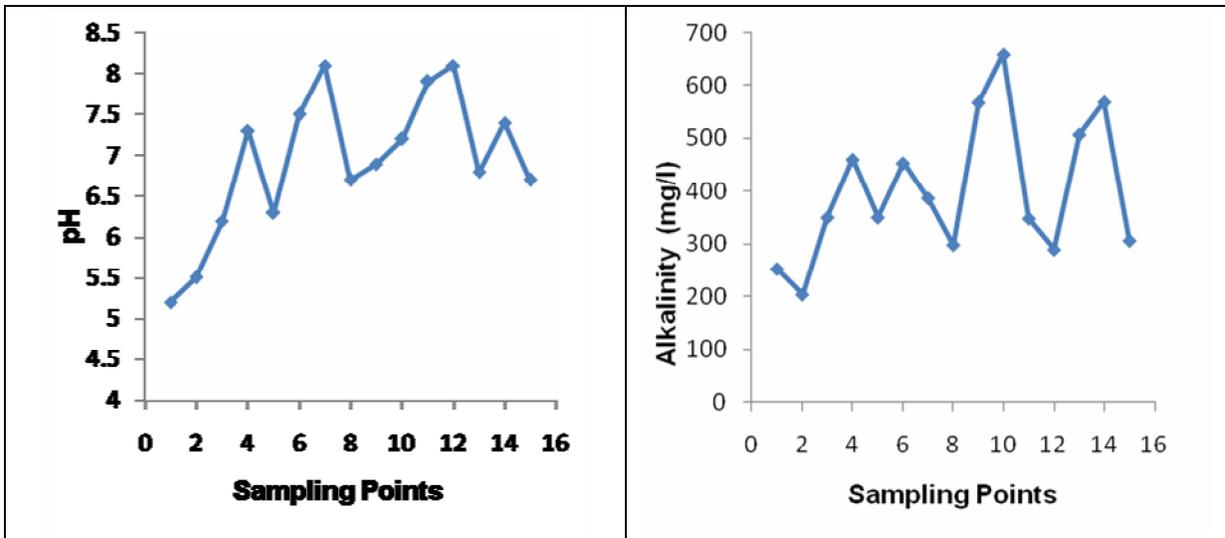


Fig 1: Variation of pH

Fig 2: Variation of Alkalinity

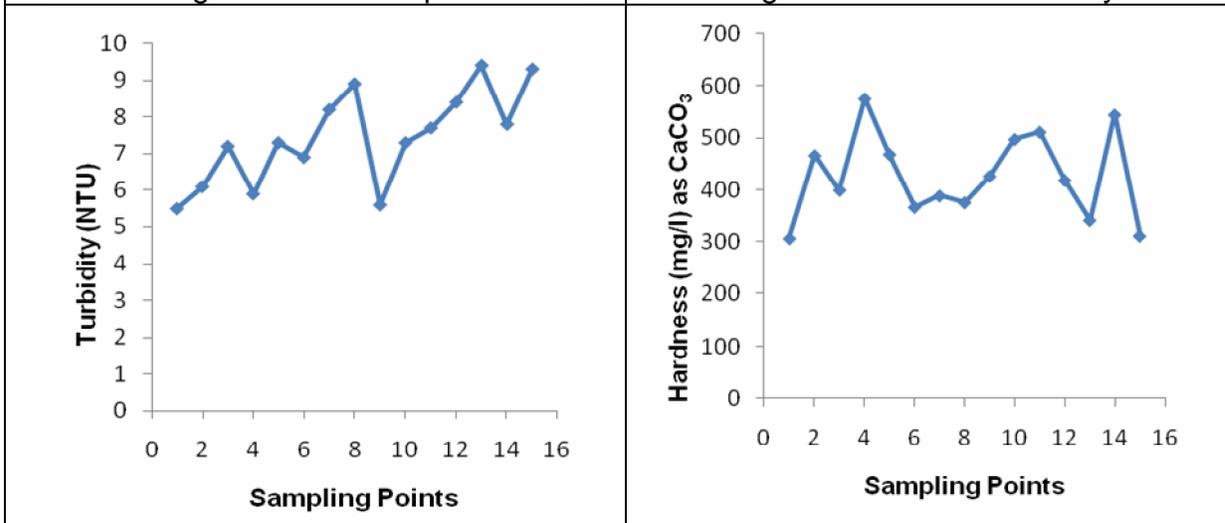


Fig 3: Variation of Turbidity

Fig 4: Variation of Hardness

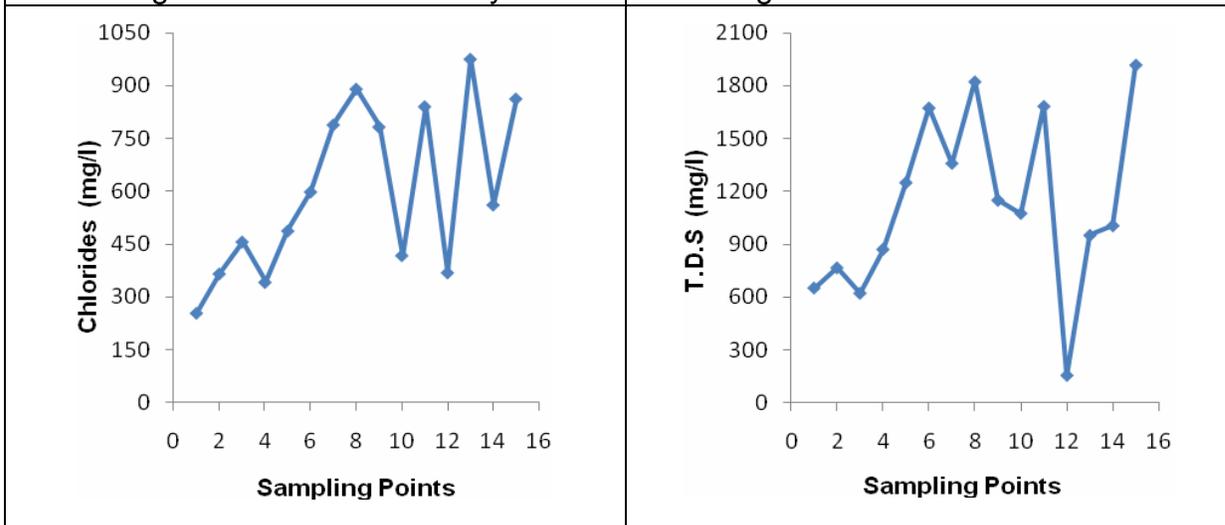


Fig 5: Variation of Chlorides

Fig 6: Variation of T.D.S

Total Alkalinity

The alkalinity of water is the capacity to neutralize its acidic nature and is characterized by the presence of hydroxyl ions. The range of alkalinity in the study area has found to be 203- 659 mg/L while the standards are 200- 600 mg/L.

Chloride

All the natural types of water contain chlorides. Chloride is added to water due to the agricultural activities, industries and chloride rich rocks. High concentration of chloride is due to the invasion of domestic wastes and disposals by human activities (Jha and Verma, 2000). The chloride level in the study area is found to be within the permissible limit of WHO which is 250-1000 ppm that indicates a lesser contamination of chloride. The maximum and the minimum levels of chlorides in the study area are found to be 253- 976 mg/L.

Turbidity

Turbidity is caused due to the presence of suspended matters, clay silt, colloidal organic particles, plankton and other microscopic organisms. The recommended values are between 5 NTU and 10 NTU. The minimum and maximum in the present study are found to be 5.5 NTU and 9.4 NTU respectively.

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