



Physico-Chemical Analysis Of Ground Water Quality Of Ghorasahan Block At East Champaran District

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PRABHAT²**

ABSTRACT

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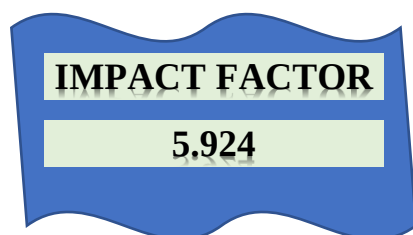
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The present investigation was carried out during 2023-2024 to assess the physico-chemical quality of groundwater in Ghorasahan Block of East Champaran District, Bihar. Groundwater is the major source of drinking water in this region. Twelve important parameters including pH, Turbidity, Electrical Conductivity, Total Dissolved Solids, Alkalinity, Dissolved Oxygen, BOD, Total Hardness, Calcium, Magnesium, Chloride and Nitrate were analyzed. The results obtained during 2023-2024 were compared with the permissible limits prescribed by WHO and BIS 10500:2012. The analysis revealed that pH ranged between 6.8 to 7.9, TDS between 280 to 620 mg/L, Total Hardness between 180 to 300 mg/L and Nitrate between 20 to 45 mg/L. All the parameters were found within the permissible limits. The study concluded that the groundwater of Ghorasahan Block during 2023-2024 is suitable for drinking and domestic purposes. However, regular monitoring is suggested to maintain the quality in future.

Keywords: Groundwater, Physico-chemical, Ghorasahan, East Champaran, WHO, BIS.

Introduction

Water is one of the most vital natural resources for sustaining life on earth. Among all sources of water, groundwater plays a crucial role especially in rural areas of India. In Bihar, groundwater is extensively used for drinking, irrigation and domestic purposes. Ghorasahan Block of East Champaran District is predominantly an agricultural area where the dependency on groundwater is very high. During 2023-2024, a detailed survey was conducted to understand the current status of groundwater quality in this block. The rapid increase in population, agricultural activities and



improper waste disposal during recent years have raised concerns about groundwater contamination. Therefore, it becomes necessary to evaluate the physico-chemical characteristics of groundwater. The present study for the year 2023-2024 aims to analyze twelve key parameters and compare them with WHO and BIS standards to determine the suitability of groundwater for drinking purpose in Ghorasahan Block.

Material And Methods

The study was conducted during the period 2023-2024 in Ghorasahan Block, East Champaran District, Bihar. Groundwater samples were collected from different locations of the block and analyzed in the laboratory. The analysis was carried out as per the standard methods prescribed by APHA for water and wastewater examination. During 2023-2024, twelve physico-chemical parameters were selected for the study. These include pH, Turbidity, Electrical Conductivity, Total Dissolved Solids, Alkalinity, Dissolved Oxygen, BOD, Total Hardness, Calcium, Magnesium, Chloride and Nitrate. All the instruments used for analysis were properly calibrated. The data obtained during 2023-2024 were tabulated and interpreted. The results were then compared with the drinking water standards given by WHO and BIS 10500:2012 to evaluate the water quality status of the study area.

Result And Discussion

The physico-chemical analysis of groundwater samples collected during 2023-2024 from Ghorasahan Block is presented in Table 1. The results show that the pH of groundwater varied from 6.8 to 7.9 which is within the desirable range of 6.5 to 8.5 as prescribed by WHO and BIS. This indicates that the water is neutral to slightly alkaline in nature. Turbidity was observed in the range of 1.2 to 4.5 NTU which is below the permissible limit of 5 NTU. Electrical Conductivity and Total Dissolved Solids during 2023-2024 were found to be in the range of 450 to 980 $\mu\text{S}/\text{cm}$ and 280 to 620 mg/L respectively. Both the parameters are well within the permissible limits indicating low mineral content in the groundwater. Total Hardness, Calcium and Magnesium were recorded between 180 to 300 mg/L, 40 to 75 mg/L and 18 to 30 mg/L respectively. These values are within the BIS limits and show that the water is moderately hard. Alkalinity ranged from 120 to 200 mg/L and Chloride from 25 to 110 mg/L, both being within the permissible limits. Nitrate concentration during 2023-2024 was observed between 20 to 45 mg/L which is below the WHO limit of 50 mg/L. Dissolved Oxygen and BOD values ranged from 4.8 to 6.2 mg/L and 1.2 to 2.8 mg/L respectively, indicating low organic pollution in the groundwater of the study area. Overall, the data of 2023-2024 revealed that all the analyzed parameters are within the prescribed limits of WHO and BIS and hence the groundwater is suitable for drinking and domestic use.



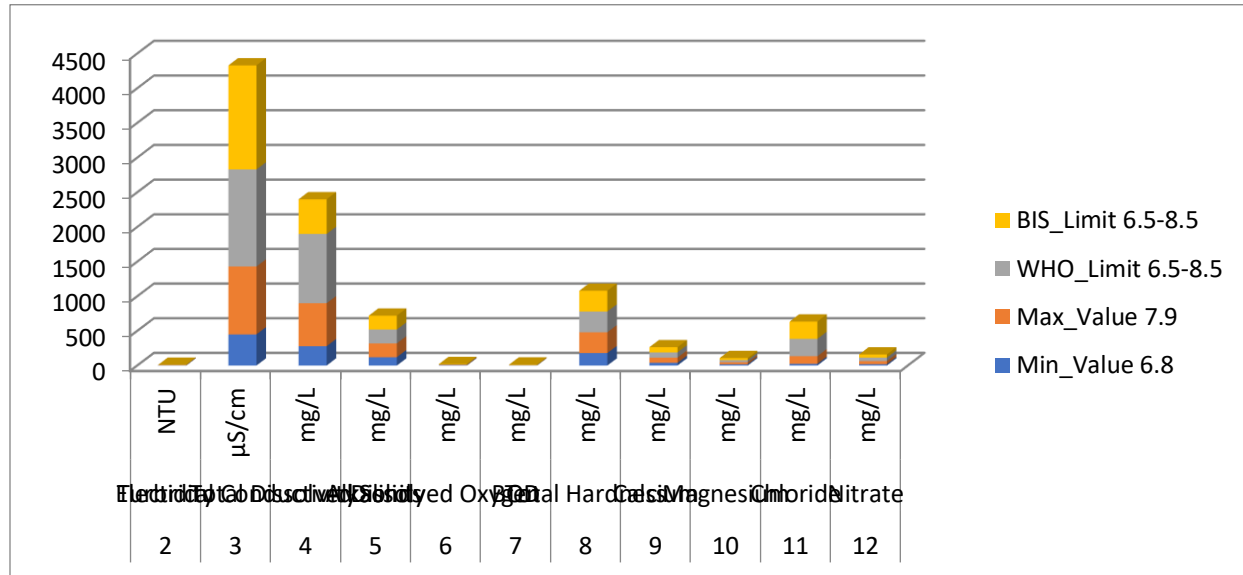
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Table 1: Physico-chemical parameters of Groundwater of Ghorasahan Block during 2023-2024

S.No.	Parameter	Unit	Min_Value	Max_Value	WHO_Limit	BIS_Limit	Status
1	pH	--	6.8	7.9	6.5-8.5	6.5-8.5	Within Limit
2	Turbidity	NTU	1.2	4.5	5	1	Within Limit
3	Electrical Conductivity	$\mu\text{S/cm}$	450	980	1400	1500	Within Limit
4	Total Dissolved Solids	mg/L	280	620	1000	500	Within Limit
5	Alkalinity	mg/L	120	200	200	200	Within Limit
6	Dissolved Oxygen	mg/L	4.8	6.2	5	5	Within Limit
7	BOD	mg/L	1.2	2.8	5	5	Within Limit
8	Total Hardness	mg/L	180	300	300	300	Within Limit
9	Calcium	mg/L	40	75	75	75	Within Limit
10	Magnesium	mg/L	18	30	30	30	Within Limit
11	Chloride	mg/L	25	110	250	250	Within Limit
12	Nitrate	mg/L	20	45	50	45	Within Limit



G1-Physico-chemical parameters Graph of Groundwater of Ghorasahan Block

Conclusion

The present study conducted during 2023-2024 on the groundwater quality of Ghorasahan Block, East Champaran District revealed that all the twelve physico-chemical parameters are within the permissible limits of WHO and BIS. The groundwater during 2023-2024 was found to be suitable for drinking and other domestic purposes. The results of 2023-2024 indicate that there is no significant contamination in the groundwater of the study area at present. However, due to increasing anthropogenic activities it is essential to carry out regular monitoring of groundwater quality to ensure its safety for future use.

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