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Quality Assessment of open well water of Makhdumpur Block Town

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Abstract : Water samples from ten Open wells of Makhdumpur block town were collected and analysed for different Physiochemical parameters like pH, Conductivity, hardness, alkalinity, dissolved Oxygen (D.O.), Chemical Oxygen Demand (C.O.D.), Biochemical Oxygen Demand (B.O.D.), Chloride, Nitrogen, and Phosphorus and heavy metals. On the basis of these pollution parameters water quality index (WQI) for the quality index rating was carried out to quantify overall open well water quality status of the entire block town. The values of WQI of the different open well water samples have been found in the range of 62.73 to 73.00 revealing that samples collected from open wells near polluted effluent zones is in medium quality range while those open wells locating far from the affected area are of good quality.

(Keywords: Water quality index (WQI), Physio-chemical Parameters, Bureau of Indian Standard)

Introduction

Open well water is the prime source of drinking water in various towns and particularly villages of our country. Ground water makes about 20 percent of world fresh water supply and about 0.61% of the entire worlds water including Oceans and permanent Ice. The source of ground water is replenished by surface water from precipitation. Streams, runway and Other run off particularly in rainy season[1, 2]. According to a recent report[3] about 95% of rural population living in India depends on ground water for domestic use and other purposes[4]. Water constitute about 70% of the body weight of almost all living organism. Life is not possible on this planet without water ground water is highly valued because of certain properties not possessed by surface water[(5)]. The temporal changes in the origin and constitution of the reacharged water, hydrological human factors may cause periodic changes in ground water quality and its suitability for drinking purposes[(6)]. The rapid growth of the urban as well as the rural areas has further affected the ground water quality due to over exploitation of resources and waste disposal practices. Ground water is an important water resource in both the urban as well as rural areas, these resources are under threat from pollution from human life style manifested by the low level of hygiene practices[(7-9)]. Environmental health involves all the factors circumstances and condition on the environment or surroundings of human that can influence health and well being.

The concept of water quality index to represent the gradation in water quality was introduced, which indicates a single number like a grade that expresses the over all water quality at a certain area and time based on several water quality parameters[10]. It serves the understanding of water quality issues by integrating completes data and generating a score that describe water quality status[11].

In present study, we have derive and reported the water quality index of quality assessment of open well water of Makhdumpur block town.

1. Study areas

The Makhdumpur block is an important block of Jehanabad district under Bihar State. The geographical area of entire block is 59970.91 acre with a total population of 2148 with 116032 male 98841 female. The headquarter of the block is in Makhdumpur town which is situated on Patna-Gaya main road NH-83. The block town has maximum tube well of hand-pumps to meet the water requirement but just decide the block town there is a Makhdumpur deeh village, where water requirement depends on open well water, so it was thought pertinent and important to make the study of water quality index of the village.

Experimental

Material and Methods

The ground water samples of open wells, bore wells and tube wells from Makhdumpur block town and Makhdumpur deeh during the year 2013-14 covering the post monsoon. The water samples were collecyed in sterilized glass bottles for bacteriology and for physiochemical analysis of the samples, the pre-cleaned plastic polyethene bottle were used. Prior to sampling all the sampling containers were washed and rinsed thoroughly with ground water to be taken for analysis. The samples were brought to the lab and analysed for different physical, chemical and bacteriological parameters including nine parameters of water quality index which are B.O.D., D.O., pH, Temperature Change, T.D.S., Turbidity, Total Phosphate, Nitrate and Coliforms[12-15]. The analysis were done using standard methods[16]. D.O., pH and temperature were measured at the point of collection itself[17-19]. In Bacteriological estimation total coliform (28°C) for 24 hrs. and faecal coliform (24.5°C) for 24 hrs. were determine by membrane filtration technique and average values were recorded[20-21]. The TC(Total Count) was enumerated by M-Endo.Agar which appeared as metallic sheen color colonics.

Results and Discussion

The WQI was calculated using standard Q-value of each Parameter and weighting factor by using NSF information software and compared with standard water quality rating. Table-1. The minimum maximum and average of total 22 values of WQI rating for the post monsoon, summer and winter season are presented in table-2. The graphical representation of WQI rating in different season is given in figure-1.

Table – 1
Water Quality Index Scale recommended by NSF

Source		Post monsoon	Summer	Winter
	Min	46	47	55
	Max	65	66	59
Dug well	Average	52.5	55.37	61
	Min	59	59	61
	Max	63	62	64
Bore well	Average	61	60.5	62.5
	Min	46	53	59
	Max	55	60	70
Hand Pump	Average	49	57.5	66.25

Table – 2
Average WQI rating of groundwater sources in different season.

WQI Rating	Quality of Water
91-100	Excellent water quality
71-90	Good water quality
51-70	Medium or average water quality
26-50	Fair water quality
0-25	Poor water quality

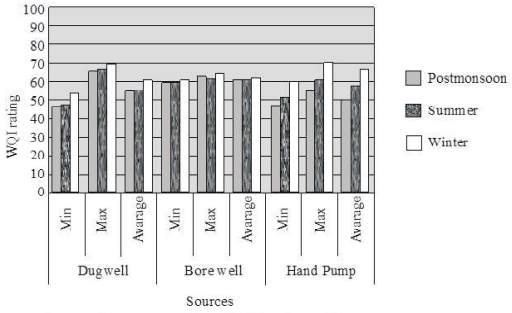

Figure – 1 : Representation of WQI rating in all season.

The observed range of WQI in Post monsoon was 52.5, 61 and 49 in dug wells, bore wells and hand pumps respectively. In Summer it was 55.4, 60.5 and 57.5 in dug wells, bore wells and hand pump respectively and in winter it was found 61, 62.5 and 66.25 in dug wells, bore wells and hand pump respectively. The water at almost all the sites showed the increasing trend of the WQI index in the post monsoon, summer and winter Table-1.

Conclusion

On the basis of the above discussion, it may be concluded that the underground drinking water at almost all the sites at Makhdumpur town block was highly polluted as indicated by WQI. In few sites, it was moderately polluted in the catchments study area. The drinking water is polluted with reference to almost all the water quality physicochemical parameters studied. The quality of IM2 water was found better than the water of ordinary hand pumps. Therefore, the use of ordinary hand pumps should be discharged. The drinking water quality was found to start deteriorating after the onset of monsoon, people dependent on this water are often prone to health hazards due to polluted drinking water. Therefore some effective measures are urgently required to enhance the drinking water quality by delineating an effective water quality management plan for the Makhdumpur town block.

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