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Pollution in Saryu River and Ground water Flanking Chapra Town, India and its impact on Human beings and Fishes Diversity

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Abstract

Chapra is situated at the bank of the Ghaghara (Saryu) river. There is a huge population of Chapra town depend on this river. The Ghaghara River is the habitat of more than 30 varieties of fishes. The infirmity of fishes indirectly affected the population of this town. Groundwater is major source of drinking for the people of Saran district. It is less susceptible to contamination in comparison of surface water bodies. 90 percent people of this area are used to drink shallow ground water due to availability of groundwater at a little depth. PH, Fluoride and TDS are physiochemical factors that play a vital role on the health of people and also affected the fish's diversity. Hence, the present study was undertaken to characterize the change in the physicochemical nature (parameters) of ground water and Saryu River water flanking Chapra Town due to pollution. Water samples are collected from 05 different sites in monthly basis. Evaluation of physicochemical parameters (i.e.PH- 6.5 to 8.9, TDS-450-1200mg/lit, fluoride-0.2- 1.2 ppm of Ground water and PH- 6.5 to 8.9, TDS-95-480mg/lit, fluoride-1-3 ppm of river water) was carried out to assess the quality. A systematic calculation was made to determine the physico-chemical nature of ground water and Saryu River water. The observed data of all the parameters are showing that critical condition of water quality. Suitable suggestions were made to improve the quality of groundwater and river water to take a proper care and health of people and cleanness of Saryu River.

Keywords: Physico-chemical parameters, Saryu river, Ground water, fishes diversity, health.

Introduction

Water is the most essential compound for all living beings. Nothing is possible without water. Rivers and Ground water are playing the vital role for flourishing of Fauna and Flora.Rivers is also the habitat of a large number of fresh water fishes. Fishes are also an important foodstuff for human balance diet. Water pollution is precursor of many diseases in fishes and further human beings. The modern civilization and urbanisation frequently discharging industrial effluent, domestic sewage and solid waste dump is the major cause of river and groundwater pollution. The fresh water crisis is not only the result of natural factors but also it is manmade. Fish's diversity also badly affected by the water pollution due to large no of drains and untreated water of town are directly discharge into the river. The present work is an attempt to measure the water quality of various water sources of 05 Sites River flanking Chapra Town, Bihar, India. The objective of this work is to assess the quality of water and fishes diversity in Saryu River of flanking Chapra town and aware the people for their illness due to consuming polluted water and fishes.

Table-1
Drinking Water Quality Standards

Parameters	ISI(1983)		WHO(2003)		ICMR(1975)		BIS(1999)	
	HDL	MPL	HDL	MPL	HDL	MPL	HDL	MPL
pH	6.5-8.5	-	7.0-8.5	6.5-9.5	7.0-8.5	8.5-9.2	7.0-8.3	8.5-9.0
TDS mg/l	500	2000	-	1000	500	1500	500	2000
Fluoride (F^-) mg/l	0.6	1.5	-	1.5	1.0	1.5	1.0	1.5

HDL-Highest desirable level, MPL-maximum permissible level, BIS-Bureau of Indian Standard, ICMR- Indian Clinical of Medical Research, WHO-World Health Organization, ISI-Indian Standard Institute

Material and Methods

The district of Saran is situated between $25^0$36'and $26^0$13' North latitude and $84^0$24'and $85^0$15' East longitude in the southern part of the north Bihar (figure-2). The geographical area of the district is 2641 square km. The total population of the district is 39, 43,098 (2011census) and population density increase 1231 to 1500 per square km. The Saryu (Ghaghara) constituting a natural boundary of south part of Chapra town (figure-3). The Saryu River passes through the southern part of the Chapra town. Thousands of people survive and do their livelihood on the bank of this river. A large number of people are totally depend on the river water and fishes e.g. fisheries and farming on the river bank.

Sampling and Sampling Sites: The Saryu River flows start near the Chapra town from Bhrampur and meet into the Ganga Riverat the Doriganj. Samples are collected from 05 different spots from the currents of the river water. These are 1- Enai, Satdharwa Ghat, 2-Dharmnath Mandir Ghats, 3-Dahiyawa Ghats, 4-Khanua Nala, Sahebganj, 5-currents far from town, Diyara (figure 6 and 7). A fluorinated plastic bottle of capacity 1 liter has been used to collect the sample[1]. Fresh ground water (Drinking water) collected from hand pump in selected sites. The selected sampling sites are flanking area of Chapra town. A map view of Saran district as site 1,2,3,4 and 5. The sampling has been carried out in different months of 2013-14 of the flanking of Chapra town for study as mentioned in above figure. The average boring depth of the district is 10-12 meter (32-40 feet). The water samples are chemically analyzed (figure-4 and 5). The analysis of water was done using procedure of standard methods. Total health relating data were also collected from people.

Methodology: The analysis was carried out for water quality parameter such as pH, TDS and fluoride as per standard procedures[2].pH is measured by pH meter. The TDS was observed with the help of digital TDS meter. Fluoride was measured by SPANDS methods.

Results and Discussion

More than 200 water samples and fishes species were collected in monthly basis of 2013-14 from Saryu River and hand pumps nearby bank of Saryu River. The results indicate that the quality of water considerably varies from location to location. The species of fishes are also varies from monthly and location to location due to exceed of physico-chemical variation. Hand pump is a simple device used to intake of ground water for utilising of water in this area. Generally the ground water available at the depth of 40-60 feet, which is used as a water resources for drinking and other activities because the water table is too high in this region.

Nine Orders of fishes i.e. Beloniformes, Channiformes, Clupeiformes, Cypriniformes, Mastacembeliformes, Mugiliformes, perciformes, Siluriformis and Symbranchiformes are found in Saryu River. The numbers of fishes of species in order Beloniformes, Cypriniformes, and Mugiliformes decreasing rapidly due to pollution and physico-chemical parameters variation time to time (table-2 and 3). After analyzing of above mentioned data in different months of research period evaluated that the people of this area are suffering from different types of diseases due to variation in above physico-chemicals parameters of water.

Table-2
Result of analysis of samples collected in 2013-14 from hand pumps

Site No.	Name of Site	Parameters		
		TDS mg/l	pH	Fluoride mg/l
1	Enai, Satdharwa Ghat	600	7.3	1
2	Dharmnath Mandir Ghats	785	7.5	1.5
3	Dahiyawa Ghats	830	8.1	1.5
4	Khanua nala, Sahebganj	1200	8.5	2
5	currents far from town, Diyara	500	7	1.5

Table-3
Result of analysis of samples collected in 2013-14 from Saryu river

Site No.	Name of Site	Parameters		
		TDS mg/l	pH	Fluoride mg/l
1	Enai, Satdharwa Ghat	110	8	2
2	Dharmnath Mandir Ghats	328	7.8	2.5
3	Dahiyawa Ghats	435	8.2	2.5
4	Khanua nala, Sahebganj	445	8.6	2.5
5	currents far from town, Diyara	280	7.2	1.5

Effects on health: Meyers D[3]. Mortality and water hardness Lancet, 1975, 1:398-399 reported relationships between TDS concentrations in drinking water and the incidence of cancer, coronary heart disease, arteriosclerotic heartdisease, and cardiovascular disease. However, in this region it is matter for a profound research work. Gastrointestinal diseases found in 80% people of study area and Fluorosis[4] found in 25% people in this region. Skin diseases also found due to water contamination of river and consuming of fishes.

Discussion: A comparative study of both type of water i.e. River water and hand pumps (Chapakals) was carried out by taking certain important parameters like pH, total dissolved solid, and Fluoride. In this present investigation it was found that parameters like Fluoride and TDS are increasing undesirable level. The results showed that shallow hand pump water very poor quality physico-chemically.

The results from this study clearly demonstrate that the water quality[5] obtained from hand pumps and river are unfit for human consumption. The species of fishes also affected due to polluted water and they also indirectly affect the health of people of this area.

Therefore, first of all when we use the drinking water regularly we would tested our water carefully into the water laboratory.

Conclusion

There is the need for greater community participation in water management where the study was conducted. More of water quality analysis should be carried out in time to time. Government and regional social charities (savyam sevi sanstha) should be worked together for proper water supply, cleaning of Garbage and drainage system. It must be noted that a regular physico-chemical analysis must be done to insure that the quality of water in this area is safe for all purpose.

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