A Study of chemical contaminants of ground water in the Baksa district of Assam

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Abstract :

The present study is to identify the Principal Chemical contaminants of ground water in the Baksa district of Assam, The chemical contaminats such as As, F^-, Cl^-, NO_3^-, SO_4^{2-} and Pb were investigated from seven sampling stations. The parameters were analysed by standard and appropriate method All the parameters were compared with desirable limits of drinking water as recommended by WHO.

Permitted values were found to be executed for sulphate only.

Index terms : Ground water, sulphate, contaminant, Baksa district.

Introduction : The Baksa district is located between $26^0 25'$ north latitude and $26^0 48'$ north latitude and between $90^0\ 55'$ and $91^0 46'$ east longitude. The study area is mainly Mushalpur and Tamulpur subdivision of the district, It has a humid meso thermal climate. Seasonal variations of rainfall are observed in the district, In every area of the district the humidity is very high and never drops below 75%. The people chiefly use ground water for drinking purpose. Both tube well and ring well are used by the people. The seven important places were selected for study namely Tamulpur, Kumarikata, dranga N.k., Parkijuli, Hastinapur, Subankhata and Nayabasti.

The ground water is now polluted due to human activities at an alarming rate, The sources of contamination in ground water are domestic wastes, industrial wastes, agricultural wastes, run off from urban areas, soluble effluents etc.

Solid wastes are the potential source of contamination as they are partly burned and partly incorporated into the soil and pose serious danger to the ground water. Most industries produce wastes containing toxic heavy metals and contaminate the ground water and seriously pollute it.

Fertilizers, Pesticideis, insecticides, herbicides, processing to water and animal waste etc, are constanty added to water, Leachates from agricultural land containing nitrate, phosphates and potash moved downward with percolating water and join the aquifers below posing danger to ground water. Rainfall could pickup substantial contaminants from dust and air and join the aquifer below The infiltration of liquids containing toxic pollutants may cause pollution in Sunday soils and well waters.

Review of related work :

Deka, P.K., and Sarma, C. (2006) have studied the physico and chemical parameters of some groundwater sources in the Bajali area, Barpeta district. They found that the pH of water samples is alkaline in most cases. The mean value was 8.2, which prescribes the desirable limits of the pH range of drinking water by WHO (1984). The mean value of arsenic in groundwater in the Bajali area is 0.02 ppm, within the prescribed desirable limits by the WHO. Deka, D.K., and Talukdar, S. Dept. of Env. Science, Gauhati University (2008) studied drinking water quality characteristics in and around Nalbari town, Assam. They analyzed 10 water samples from different locations and showed the different parameter results as follows: pH is higher in the monsoon season than in the winter season. The iron content of water samples ranges from 0.33 mg/L to 1.18 mg/L in winter and 0.23 mg/L to 0.98 mg/L in monsoon season. Fluoride ranges are 1.31 mg/L to 2.4 mg/L in the winter period and 1.01 mg/L to 2.2 mg/L in the monsoon season.

Materials and Methods :

The water samples were collected in pre cleaned polythene container of five liter capacity The container in all cases were filled with air or to prevent agitation during transport. Water sample were collected from tube wells and ring wells.

The chemical parameters were analysed in the laboratory by standard and appropriate methods.

Table (1) (Showing chemical parameter analysed during winter session in 2008.)

Sl. No	Sampling Site	Source	As mg/l	F^- mg/l	Cl^- mg/l	NO_3^- mg/l	SO_4^{2-}	Pb mg/l
1	Tamulpur	Ring well	BDL	0.05	21.7	4.0	320	NIL
2	Kumarikata	Tube well	BDL	.05	15	2.4	286	NIL
3	Darange N.K	Tube well	BDL	BDL	21	3.9	345	NIL
4	Parkijuli	Ring well	BDL	BDL	07	1.4	289	NIL
5	Subankhata	Deep Tube well	BDL	0.40	1.0	1.6	186	.004
6	Hastinapur	Ring well	BDL	.01	06	1.4	332	.021
7	Nayabasti	Ring Well	BDL	.25	09	1.8	232	NIL

(BDL = Below Detectable Limit)

Table 2 (showing Chemical Parameter analysed During post Monsoon Session in 2008)

Sl. No	Sampling Site	Source	As mg/l	F^- mg/l	Cl^- mg/l	NO_3^- mg/l	SO_4^{2-}	Pb mg/l
1	Tamulpur	Ring well	BDL	.08	27.2	5.5	337	NIL
2	Kumarikata	Tube well	BDL	.08	18	2.6	295	NIL
3	Darange N.K	Tube well	BDL	.12	27	4.8	354	NIL
4	Parkijuli	Ring well	BDL	.08	12	1.65	298	NIL
5	Subankhata	Deep Tube well	BDL	.45	1.7	1.82	195	.005
6	Hastinapur	Ring well	BDL	.03	10.5	1.7	340	.0214
7	Nayabasti	Ring Well	BDL	.05	11.2	2.1	253	NIL

(BDL= Below Detectable Limit)

Result and Discussions :

1. Arsenic : Arsenic was found to be below detectable range in all the water samples during the two session.
2. Fluoride : The range of F^- concentration of the water samples lies between BDW 0.45 mg/l during the two session. The F^- concentration is below the permissible limits set the WHO for all the water samples.
3. Chloride : The Cl^- concentration of the water samples lies between 1 mg/l 27.2 mg/l during the two session. The values do not exceed the WHO guidelines value of 250 mg/l.
4. Nitrate : The NO_3^- concentration of the water samples lies between 1.4 mg/l – 5.5 mg/l during the two session. The values are within the Prescribed limits of WHO.
5. Sulphet : The SO_4^{2-} concertration of the water samples lies between 186 mg/l – 354 mg/l during the two session. Most of the water samples exceeds the highest desirable limits of 200 mg/l sulphate recommended by ICMR (205).
6. Lead : The Pb concentration of the water samples lies between NIL- .214 mg/l during the two session. The lead concentration of water samples were within acceptable limits Prescribed by WHO.

Conclusion: From the present study, it can be of concluded that the sulphate concentration of most of the water samples in the study area are high as the desirable limits prescribed by WHO. Sulphate

has a laxative effect on human being. The sulphate can be removed from water by filtration and reverse osmosis process.

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