

# ASSESSMENT OF DRINKING WATER QUALITY IN TAMULPUR SUB-DIVISION OF BAKSA DISTRICT OF ASSAM

**Hemen Kr. Barman,**  
Assistant Professor,  
Department of Chemistry,  
Barama College, Barama, Assam, India

**Abstract** - From September 2015 to May 2016, eleven physico-chemical parameters of groundwater were analyzed in order to evaluate the water quality of Baksa district's Tamulpur subdivision. An appropriate and conventional method was used to analyze the parameters. Each parameter was compared to the standard desirable limits of that parameter in drinking water, as advised by the World Health Organization, in order to evaluate the quality of groundwater. It was discovered that there are essentially no negative effects on the water in this area after the water sample was analyzed. Permitted values were found to be exceeded for iron and sulphate.

**Index Terms** – Groundwater, Quality, Sulphate, Tamulpur Sub-Division.

## I. INTRODUCTION:

The Baksa district is located between 26°25' north latitude and 26°48' north latitude, and between 90°55' and 91°46' east longitude. The district's northern region is home to the Tamulpur subdivision. It has a humid-meso-thermal climate. Seasonal variations in rainfall are observed in the district. In every area of the district, the humidity is high and never drops below 75 percent. The pollution of groundwater is a result of human activity. Water bodies are continuously being replenished with fertilizers, pesticides, processing waste, animal waste, and other waste products from both urban and rural areas that are dumped into them.

The study area consists primarily of the Tamulpur subdivision of the Baksa district. Patkijuli, Daranga, Paharpur, Kumarikata, Bherakhat, Jamuguri, Kalakuchi, Kochubari, Kauli, and Ulubari were chosen as study villages. Tamulpur Circle has a total land area of 348191 Bigha, 1 Kotha, and 12.5 Lessa. According to the 2001 Census, the circle has a total population of 1,25,498 people. Thus, the 11 selected physico-chemical parameters of ground water from the study area was attempted to analyse to know the quality of drinking water.

## II. REVIEW OF RELATED WORK:

Deka, P.K., and Sarma, C. (2006) have studied the pHysics and chemical parameters of some groundwater sources in the Bajali area, Barpeta distinct. 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.

## III. METHODOLOGY:

Water samples were collected in a pre-cleaned five-liter polythene container. To avoid contact with air or agitation during transport, the container was packed as tightly as possible, and water samples were collected from tube wells and ring wells in all cases. Tube wells serve as sampling locations for Kumarikata, Jamuguri, Kochubari, Kalakuchi, and Ulubari, with RingWell providing the remaining sampling sources. Temperature, pH, and TDS are measured immediately after the samples are collected. The spectrophotometric method was used to examine the parameters arsenic, lead, and iron. Fluoride was determined using a photometric method, whereas chloride, nitrate, and sulphate were determined using appropriate methods in the laboratory.

## IV. RESULT AND DISCUSSION:

**Temp:** The temperature range lies between 20°C– 32°C during the three seasons of the water samples.

**pH:** The pH values varied widely but were mostly within an acceptable range. The pH value at Paharpur was recorded at 5.9 in the post-monsoon season. This value is not acceptable according to WHO guidelines, and this water is rejected for drinking purposes. Seasonal variation in pH values is not large, but an increase is noticeable during the winter and a lowering during the post-monsoon period.

**TDS:** The value of TDS in the water samples lies between 37–398 mg/l. The values of the water samples are within WHO standards. A low value of 37 mg/l was recorded at Paharpur, and a high value of 398 mg/l was recorded at Kumarikata.

**Fluoride:** The range of F<sup>-</sup> concentration of the water samples lies between BDL and 0.14 mg/l. The fluoride concentration is below the permissible limits set by the WHO for all the water samples.

**Iron:** The iron concentration was highest at Bherakhat and Patkijuli at 0.36 mg/l, respectively, and lowest at Paharpur at 0.06 mg/l. This may be due to the soil's origin. The date exceeded the WHO guidelines for the three water samples.

**Sulphate:** The sulphate concentration of water samples is in the range of 282 mg/l to 358 mg/l. Most of the water samples have a high sulphate concentration, and the value exceeded the desirable limits of 200 mg/l recommended by ICMR (205).

**Chloride:** The chloride concentrations of the water samples are in the range of 0.7 mg/l to 32.5 mg/l. The values do not exceed the WHO guideline value of 250 mg/l.

Nitrate: The nitrate concentration lies between 0.6 and 5.8 mg/l in the water samples; the values are within the prescribed limits of WHO.

Lead: The concentration of lead in all the water samples was found to be nil.

Cadmium: The concentration of cadmium was found to be nil in all the water samples.

Arsenic: The arsenic concentration was found below the detectable range in all the water samples.

**Table (1):** Showing physico-chemical parameters analyzed during winter season, 2015

1	2	3	4	5	6	7	8	9	10	11	12	13
Sampling site	Source	As mg/l	Temp <sup>r</sup> °C	pH	TDS mg/l	Fe mg/l	F <sup>-</sup> mg/l	Cl <sup>-</sup> mg/l	NO <sub>3</sub> <sup>-</sup> mg/l	SO <sub>4</sub> <sup>2-</sup> mg/l	Cd mg/l	Pb mg/l
Kumarikata	Tube well	BDL	20	7.2	377	0.12	0.05	15	2.4	286	NIL	NIL
Jamuguri	Tube well	BDL	20.2	7.1	352	0.15	BDL	17	4.2	275	NIL	NIL
Ulubari	Tube well	BDL	20	6.9	332	0.16	0.02	19.5	4.0	282	NIL	NIL
Bherakhat	Ring well	BDL	21	6.6	175.5	0.14	0.05	21.7	4.0	321	NIL	NIL
Kalakuchi	Tube well	BDL	21.3	6.5	181	0.17	0.04	21	3.8	310	NIL	NIL
Kochubari	Tube well	BDL	21	6.7	180.4	0.14	0.04	21.5	3.84	322	NIL	NIL
Kauli	Ring well	BDL	21.2	6.7	175	0.13	0.05	22.5	4.5	315	NIL	NIL
Daranga	Ring well	BDL	20	6.5	149	0.10	BDL	21	3.9	345	NIL	NIL
Patkijuli	Ring well	BDL	21	6.8	130	0.12	BDL	07	1.4	289	NIL	NIL
Paharpur	Ring well	BDL	20	6.2	38.5	0.09	BDL	7.7	0.6	321	NIL	NIL

(BDL= Below Detectable Limit)

**Table (2):** Showing physico-chemical parameters analyzed during post-monsoon season, 2015

1	2	3	4	5	6	7	8	9	10	11	12	13
Sampling site	Source	As mg/l	Temp <sup>r</sup> °C	pH	TDS mg/l	Fe mg/l	F <sup>-</sup> mg/l	Cl <sup>-</sup> mg/l	NO <sub>3</sub> <sup>-</sup> mg/l	SO <sub>4</sub> <sup>2-</sup> mg/l	Cd mg/l	Pb mg/l
Kumarikata	Tube well	BDL	32	7.0	396	0.09	0.27	19	2.8	297	NIL	NIL
Jamuguri	Tube well	BDL	31.7	6.9	391	0.06	0.21	18.5	2.5	278	NIL	NIL
Ulubari	Tube well	BDL	31.7	6.5	172	0.07	0.21	18.2	2.4	282	NIL	NIL
Bherakhat	Ring well	BDL	31.4	6.6	189	0.09	0.36	29.4	5.8	339	NIL	NIL
Kalakuchi	Tube well	BDL	31.2	6.8	185	0.05	0.31	28	5.4	331	NIL	NIL
Kochubari	Tube well	BDL	31.4	6.9	152	0.04	0.30	27.8	5.1	303	NIL	NIL
Kauli	Ring well	BDL	31.1	6.9	382	0.045	0.22	20	2.9	282	NIL	NIL
Daranga	Ring well	BDL	31	6.4	156	0.14	0.24	29	4.9	357	NIL	NIL
Patkijuli	Ring well	BDL	32	6.5	148	0.08	0.36	12	1.8	292	NIL	NIL
Paharpur	Ring well	BDL	32.3	5.9	37	0.07	0.06	11	1.5	332	NIL	NIL

(BDL=Below Detectable Limit)

**Table (3):** Showing physico-chemical parameters analyzed during Pre-monsoon season, 2016

1	2	3	4	5	6	7	8	9	10	11	12	13
Sampling site	Source	As mg/l	Temp <sup>r</sup> °C	pH	TDS mg/l	Fe mg/l	F <sup>-</sup> mg/l	Cl <sup>-</sup> mg/l	NO <sub>3</sub> <sup>-</sup> mg/l	SO <sub>4</sub> <sup>2-</sup> mg/l	Cd mg/l	Pb mg/l
Kumarikata	Tube well	BDL	30.6	7.0	398	0.14	0.07	17.8	2.5	330	NIL	NIL
Jamuguri	Tube well	BDL	30.7	6.9	294	0.16	0.04	19	2.1	325	NIL	NIL
Ulubari	Tube well	BDL	31.5	6.9	198	0.29	0.05	23	2.4	321	NIL	NIL
Bherakhat	Ring well	BDL	31.5	6.3	191.8	0.30	0.06	32.5	4.5	329	NIL	NIL
Kalakuchi	Tube well	BDL	31.6	6.5	187	0.32	0.04	31	4.8	318	NIL	NIL
Kochubari	Tube well	BDL	31.7	6.6	185	0.33	0.03	32	4.1	313	NIL	NIL
Kauli	Ring well	BDL	30.9	6.5	252	0.19	0.04	18	2.8	337	NIL	NIL
Daranga	Ring well	BDL	30.8	6.4	157	0.16	0.09	31.5	4.5	358	NIL	NIL
Patkijuli	Ring well	BDL	31.2	6.6	152	0.27	0.05	11	1.89	318	NIL	NIL
Paharpur	Ring well	BDL	31.7	6.0	43.4	0.10	0.04	10.7	1.2	342	NIL	NIL

(BDL= Below Detectable Limit)

## V. CONCLUSIONS

From the present study, it can be concluded that the iron and sulphate concentrations of some of the water samples in the study area are as high as the desirable limits prescribed by the WHO. Sulphate has a laxative effect on humans. The excessive concentration of iron may cause stains on clothes and utensils. It may also cause vomiting. Iron can be removed by filtration of the trace metallic elements; lead and cadmium were found absent in all the water samples.

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