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A Study on Quality of Drinking Water in Kamrup District, Assam

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ABSTRACT

Water quality of Kamrup district in Assam has been analysed and it was found that the water in this area is more or less free from any harmful effects. Iron and fluoride were found more than permitted limits.

INTRODUCTION

Water is arguably the most precious and the most used natural resource on Earth. Our planet is a water planet, unlike any other in our solar system; and water is the main reason why life is possible here.

The supply of pure and safe drinking water is inadequate in the town areas of Assam and almost non-existent in the rural areas. The people living in the villages mostly use tube well and ring well water for their drinking and cooking purposes.

The problem has been accentuated much by the absence of proper medical facilities to fight the menace of unsafe and contaminated drinking water. All the water borne diseases has therefore very much affected the people in the district. Lack of properly trained persons, absence of equipments and other infrastructural facilities and feeble public awareness have resulted in a very slow growth of environmental awareness in Kamrup district of Assam. The few studies undertaken so far have revealed that the contamination level of water bodies is worrisome.

METHODS AND MATERIALS

Water samples were collected in pre-cleaned polythene container of 2 litre capacity. The containers were pre-washed with chromic acid solution, rinsed with distilled water several times and dried thoroughly before use. For bacterial analysis water samples were collected in sterilized glass bottles. The containers were filled and tightly stopered to avoid contact with air or to prevent agitation during transportation.

Water samples collected in this study area were of integrated ones. A number of grab samples were collected and then mixed together to obtain an integrated sample. Storage and preservation of samples were done following standard procedures (APHA, 1998). Parameters like pH, conductivity and turbidity were measured immediately after collection. Dissolved Oxygen (DO) and temperature were determined at the time of collection itself. For estimation of the metals, the samples were acidified with nitric acid to pH 2.0 and then kept at 40C in a refrigerator. The analysis were carried out within 3 months. The bacteriological analysis were done immediately after collection of the samples to prevent death of micro organisms.

RESULTS

The physico-chemical characteristics of water from 46 (forty six) sampling stations in Kamrup district of Assam were analyzed in order to assess their potability. The water samples were collected mainly from tubewells, deep tubewells, ringwells and supply waters. The experimental findings show wide variations. Although, the water samples were numbered serially from 1 to 46 with respect to location, for convenience of discussion, they have been grouped together as follows:

a) Tube well water (sampling stations 1,3,4,5,6,7,11,12,13,14,17,18,19,21,23,24,27, 29,32,34,36,38,41,42,43,44,45,46 = 28 nos.)
b) Deep tube well water. (sampling stations 10,16,22,33,35,37 = 6 nos.)
c) Ring well water. (sampling stations 2,8,9,15,20,25,31,40 = 8 nos.)
d) Supply water (sampling stations 26,28,30,39 = 4 nos.)

Table .1 Table showing physical parameters analysed during winter and pre-monsoon season in 2010-2011.

Sampling Station	Season	Temp.	pH	EC	TS	TDS	TSS	Turbidity
Naukata	A	23.00	6.70	4.80	184.00	132.00	52.00	2.10
Rangia	A	22.50	6.84	4.20	120.00	85.00	35.00	1.50
Karara	A	22.00	6.50	6.00	92.00	62.00	30.00	.60
Kendukonaa	A	23.00	7.25	8.00	177.00	159.00	18.00	1.50
Kamalpur	A	22.50	7.05	4.00	184.00	65.00	25.00	.70
Puthimari	A	23.00	7.42	4.40	184.00	160.00	24.00	1.60
Baihata Chariali	A	22.00	7.65	4.20	120.00	70.00	50.00	1.50
Hajo	A	23.00	6.74	7.00	190.00	80.00	110.00	2.30
Changsari	A	23.00	7.43	11.60	95.00	50.00	45.00	3.60
North Guwahati	A	24.00	7.80	16.40	110.00	100.00	10.00	2.30
Sualkuchi	A	24.00	7.04	7.60	90.00	76.00	14.00	2.70
Palashbari	A	22.00	7.10	8.40	130.00	70.00	60.00	4.00
Chhaygaon	A	23.50	7.10	8.40	130.00	70.00	60.00	4.00
Sonapur	A	23.50	6.90	3.60	300.00	256.00	44.00	1.20
Chandrapur	A	23.00	6.80	2.60	190.00	70.00	20.00	3.30
Khetri	A	23.00	6.33	4.80	256.00	230.00	20.00	2.20
Narengi1	A	23.00	6.90	4.60	90.00	77.00	13.00	1.50
Boko	A	23.00	6.05	20.20	146.00	120.00	26.00	1.50
Dumu-nichowki	A	24.50	7.69	4.00	170.00	141.00	29.00	2.80
Dimu	A	23.50	6.70	4.80	184.00	132.00	52.00	2.10
Maligaon	A	22.50	7.57	4.40	90.00	60.00	30.00	1.40
Boragaon	A	22.00	7.30	6.60	26.00	23.50	25.00	2.80
Tetelia	A	22.00	6.90	8.60	176.00	137.00	39.00	4.00
Lokhra	A	24.00	7.20	5.40	90.00	56.00	34.00	2.30
Bezera	A	23.00	6.25	12.80	176.00	100.00	30.00	4.00
Noonmati	A	22.50	7.49	4.20	256.00	196.00	60.00	1.20
New Guwahati	A	23.00	6.91	8.40	250.00	180.00	70.00	1.80
Pan Bazar	A	24.50	6.80	8.00	260.00	220.00	40.00	2.70
Narengi2	A	23.00	7.85	4.00	90.00	120.00	45.00	2.20
Dispur	A	23.50	6.05	20.20	146.00	120.00	26.00	1.50
Silpukhuri	A	23.00	6.55	20.40	176.00	150.00	26.00	3.50
Bhangagarh	A	22.00	7.20	20.44	165.00	121.00	44.00	2.80
Kamakhya	A	22.00	6.50	20.60	165.00	90.00	75.00	2.10
Gauhati Universty	A	23.50	6.50	13.20	184.00	140.00	44.00	4.50
Basistha	A	23.00	6.50	13.20	184.00	140.00	44.00	4.50
Khanapara	A	21.00	6.45	14.40	177.00	140.00	37.00	4.10
Bharalumukh	A	22.00	6.20	11.60	170.00	80.00	90.00	1.80
Chandmari	A	23.00	6.85	10.00	250.00	220.00	30.00	1.20
Fancy Bazar	A	23.00	6.75	20.50	110.00	99.00	11.00	4.50
Panjabari	A	23.00	6.57	20.20	176.00	136.00	30.00	2.30
Azara	A	24.00	6.80	4.00	250.00	190.00	60.00	1.40
Lankeswarr	A	23.00	6.80	4.00	250.00	190.00	60.00	1.40
Satmile	A	24.00	7.10	20.60	170.00	135.00	35.00	1.50
Jalukbari	A	23.00	6.50	20.60	170.00	135.00	35.00	1.50
Satgaon	A	24.50	6.75	6.60	146.00	90.00	56.00	1.50
Panikhaiti	A	23.00	6.30	4.80	200.00	133.00	67.00	1.80

Table .2 Table showing physical parameters analysed during summer and post-monsoon season in 2010-2011.

Sampling Station	SEASON	Temperature	pH	EC	TS	TDS	TSS	Turbidity
Naukata	B	25.00	6.80	4.20	120.00	100.00	20.00	2.80
Rangia	B	26.00	6.90	5.80	112.00	99.00	19.00	2.60
Karara	B	25.00	7.20	7.00	96.00	65.00	30.00	.70
Kendukona	B	24.00	7.30	9.00	140.00	125.00	15.00	2.90
Kamalpur	B	25.00	6.90	6.00	80.00	70.00	10.00	1.70
Puthimari	B	23.00	7.48	6.80	160.00	150.00	10.00	2.30
Baihata Chariali	B	25.00	6.80	6.40	110.00	60.00	50.00	2.30
Hajo	B	26.00	7.20	20.40	175.00	70.00	105.00	2.30
Changsari	B	25.00	7.20	4.80	100.00	60.00	40.00	2.60
North Guwahati	B	25.00	6.80	7.60	160.00	150.00	10.00	2.90
Sualkuchi	B	26.00	7.30	8.40	90.00	66.00	36.00	2.70
Palashbari	B	25.00	7.10	8.40	145.00	110.00	35.00	1.80
Chhaygaon	B	25.50	6.90	3.60	290.00	280.00	10.00	2.80
Sonapur	B	25.00	6.80	7.60	160.00	150.00	10.00	2.90
Chandrapur	B	25.00	6.62	3.00	270.00	250.00	20.00	1.20
Khetri	B	25.00	6.90	4.60	175.00	170.00	5.00	1.30
Narengi	B	26.00	7.12	7.20	120.00	100.00	20.00	2.70
Boko	B	24.50	7.20	5.80	270.00	250.00	20.00	1.20
Dumu-nichowki	B	25.00	7.72	6.00	225.00	190.00	35.00	1.50
Dimu	B	26.00	6.80	4.40	90.00	60.00	30.00	1.50
Maligaon	B	24.50	7.40	82.00	220.00	200.00	20.00	1.80
Boragaon	B	24.60	6.70	6.40	100.00	80.00	20.00	.80
Tetelia	B	25.00	7.40	5.00	300.00	170.00	130.00	2.80
Lokhra	B	23.00	7.15	8.40	145.00	35.00	35.00	1.80
Bezera	B	24.00	7.60	6.80	144.00	24.00	24.00	.50
Noonmati	B	25.00	6.81	1.60	160.00	10.00	10.00	2.90
New Guwahati	B	25.00	6.88	4.80	110.00	50.00	50.00	1.30
Pan Bazar	B	23.00	7.50	2.80	140.00	15.00	15.00	2.90
Narengi2	B	25.00	7.12	7.20	120.00	20.00	20.00	2.70
Dispur	B	26.00	7.10	3.20	135.00	55.00	55.00	1.60
Silpukhuri	B	26.50	7.14	20.38	195.00	15.00	15.00	1.80
Bhangagarh	B	27.00	6.53	20.00	320.00	130.00	130.00	2.10
Kamakhya	B	26.00	6.50	20.60	165.00	75.00	75.00	2.10
Gauhati University	B	25.50	6.70	13.80	225.00	35.00	35.00	1.50
Basistha	B	25.50	6.75	12.40	195.00	15.00	15.00	1.80
Khanapara	B	25.00	7.30	12.60	290.00	10.00	10.00	2.80
Bharalu-mukh	B	25.00	7.10	13.50	240.00	40.00	40.00	2.20
Chandmari	B	27.00	6.66	13.20	135.00	55.00	55.00	1.60
Fancy Bazar	B	26.00	7.50	8.80	100.00	20.00	20.00	2.60
Panjabari	B	24.50	7.58	20.40	80.00	10.00	10.00	2.70
Azara	B	24.50	6.71	3.00	100.00	5.00	5.00	1.50
Lankeswarr	B	24.60	6.80	4.00	250.00	60.00	60.00	1.40
Satmile	B	25.00	7.20	20.90	100.00	40.00	40.00	.50
Jalukbar	B	25.00	6.82	18.00	144.00	24.00	24.00	.50
Satgaon	B	25.00	6.75	6.20	146.00	56.00	56.00	1.50
Panikhaiti	B	25.00	7.42	3.00	175.00	105.00	105.00	.80

Discussion

The supply of liquid water is replenished by precipitation. Obviously amount and rate of rain fall, run off and evaporation are important factors in the control of natural-water composition. The temperature of the system also is of obvious importance. These are all components of regional climate.

The supply of naturally occurring solid reactance is ultimately controlled by geologic processes. The processes of rock weathering are strongly influenced by temperature and by amount and distribution of precipitation. The influence of climate on water quality goes beyond these direct effects, however. Climatic patterns tend to produce characteristics plant communities and soil types, and the composition of water of streams draining such areas could be thought of as a product of the ecologic balance. Certain of the major ionic constituents of natural water are influenced more strongly then others by climatic effects. Bicarbonate, for example, tends to predominate in water in areas where vegetation grows profusely. Some metals are accumulated by vegetation and may reach peak concentration when plant decay cycles cause extra amounts of these metals to enter the circulating water. Humid temperate climate and warm, wet climates generally are the most favourable for growth of vegetation. Run off from tropical rain forest areas, commonly is low in dissolved solids concentration. Climates characterized by alternating wet and dry season may favour weathering reactions that produce considerably larger amounts of soluble inorganic matter at some season of the year than that other seasons. The influence of climate on water quality may thus be displayed not only in amounts and kinds of solute ions, buts also in annual regime of water quality fluctuation.

Conclusion

The modern civilization, industrialization, urbanization and increase in population have led fast degradation of water resources. Considering the present situation of water quality degradation there is a need for a systematic and careful study about the water quality to build up a reliable data base. Since water is directly related to human health, it is necessary to bring awareness among the present and future generation about the causes and consequences of water pollution.

Based on above results the following recommendations are given to improve the quality of drinking water in the district: (a) High turbidity and iron can be removed by alum treatment and filtration technique atleast in rainy season.

(b) Hardness can be softened by boiling. This process also kills bacteria.
(c) Disinfection with chlorine should be done to minimize bacteriological contamination.

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