

# CONTAMINATION OF DRINKING WATER FROM SANITATION SYSTEM: A CASE STUDY OF THE ADIVASHI WOMEN OF BAGULAMARI NC VILLAGE UNDER BAKSA DISTRICT OF ASSAM.

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**ABSTRACT:** Ground water quality assessment study and a sanitary survey as well as on – site inspection was done in the 20(Twenty) habitats of Bagulamari NC village is one of the most rural area of Baksa district of Assam where maximum no.s of habitats are Adivasi . Ground water is the preferred choice for drinking purposes for this rural areas. 20(Twenty) Ground water sources like Hand Tube Well and Ring Well water samples were collected and analyzed for some water quality parameters, specially for Bacteriological quality. Poor environmental sanitation and unsafe drinking water has been one of the major health problems in India. The mean daily intake of water by man is estimated to be 3.1% of the body weight. Water and sanitation has been accepted today as priority issue in rural health Sector. According to World Health Organization (WHO), approximately 80% of all sickness and diseases are caused by unsafe water and poor sanitation. As per the article 25 of universal declaration of human rights,(UDHR), everyone has the rights to a standard of living of adequate for the health and well being of himself and of his family including food, clothing, housing and medical care and necessary social service. Both bacteriological and chemical contamination of drinking water cause deleterious effect on human health. The maximum nos of Women in Bagulamari area are prone to water related diseases which are caused by pathogens. Except Iron and sulphate, other chemical contaminants are in acceptable limit. Maximum women in this particular area has been suffering from diseases like Diarrhoea, Dysentery, Typhoid fever, Tuberculosis , Jaundice etc. A sanitary survey for potential drinking water sources for a community is an essential step in source selection. Contaminated drinking water weakens women’s ability to survive and makes them more prone to infections. Specially Diarrhoeal diseases caused by a variety of excreta viruses, bacteria and protozoa.

**KEY WORDS :**Ground Water, Drinking water Quality, Sanitation, Health, Hygiene, Diseases, Adivasi Women.

## INTRODUCTION

Water is essential for the survival of any form of life. On an average, a human being consumes about 2 liters of water every day. Water accounts for about 70% of the weight of a human body. About 80% of the earth surface is covered by water. Much of the health in developing countries is largely due to lack of the safe drinking water. According to World Health Organization(WHO), about 600 million cases of diarrhea and 46,00000 childhood deaths are reported per year because of contaminated water and lack of sanitation. Water born diseases continue to be the dominant cause of morbidity into health benefits. In rural areas mostly on-site sanitation is practiced. The Ground water sources may be contaminated through this system. Water and sanitation has been accepted today as a priority issue in health sector. Healthy women can fulfill their multiple rolls – Generating income, ensuing their family’s nutrition and having healthy children more effectively and thereby help to advance the Country’s socio – economic development. Waste, solid excreta from human bodies and decomposable organic matter of sewage are the best medium for the development of bacteria in water. Bacterial pollution is caused by the excretory products of warm blooded mammals including man, wild and domestic animals. The main pollutants belongs to colliform group. Biological pollution is also brought about by bacteria, viruses, algae, protozoa etc. Contaminated water frequently create infections of the essential tract ( like dysentery, cholera, typhoid and gastro enteritis), polio and infectious hepatitis.

## REVIEW OF LITERATURE

Water is a scarce and fading resource (Wetzel 1992, Niamann, 1996) and its management on impact on the flow and the biological quality of rivers and streams ( Walmsley, 1995 ; Tricot 1993) In Mediterranean areas, Water has been one of the limiting factors of economic quality for many years ( Gleic, 1993, Hamdy et al 1995) even in the large rivers ( Conway et al, 1996). Ground water is only source of water supply throughout the world. For many rural and small communities, Ground water is the only source of drinking water (Canter 1987). The Geology of a particular area has a greater influence on quality of water and its movement. Changes in Ground Water quality with the passage of time have a hydrologic significance. Well, Tanks, Ponds and Rivers are main source of water in rural India. But due to the short supply of municipal water, majority of City or Town people are to depend on these sources. Screening of literature reveals that many workers have studied the ground water quality (Kritler and Jones 1975; Murrel 1975 ;Brooks And Cite 1979 ;Hontrone and Bough 1989 ; Part and Munne , 2000 ; Reddy and Lin 2000 ; Choudhury et al 2001 ; Gyananath et al , 2001 ) The WHO has given a set of guideline values for drinking water qualities. The guideline values for each water quality parameter sets out a level of concentration of the constituents ensuring aesthetically pleasant water without any significance risk to human health (WHO, 1984; Helmer et al 1991). These guideline values . along with tolerance limits prescribed by the Indian Standard Institute (Trivedy 1990 ) and EPA standards USA (Train, 1979 ). Disposal of sewage water and effluent from various Industries in to fresh water aquifers is the main cause of ground water pollution (Patel. 1999).

The extent of pollution of ground water depends upon several factors :

- a. Soil property such as texture, structure and the infiltration rate ,
- b. Depth of water table.
- c. Rainfall pattern .
- d. Distance from the source contamination

## OBJECTIVES

For this purpose , 20 water sources are selected for analysis specially of Adivashi families where there is no literate person. They have no knowledge about the quality of water. Again their sanitation systems are also monitored. Since women are responsible for producing and preparing food for the households, so their knowledge about quality of water, hygiene is very important. An unhealthy women is likely to bear low birth-weight babies who are more likely to die in infancy. Women generally play a key role in ensuring the quality and safety of what the family members take water.

## METHODOLOGY

The parameter Temperature and  $P^H$  is measured immediately after collection using mercury Thermometer and digital  $P^H$  meter respectively. Calcium and Magnesium were determined by EDTA Titrimetric method. Chloride is determined by Argentometric method.

Water samples were collected in clean plastic bottles of 2000 ml capacity from each sampling point, having stoppers. These bottles were cleaned with distilled water and rinsed with the source water of each sampling point. All the samples were taken immediately to laboratory for examination. The Turbidity is measured with Nephelometer. The most probable number (MPN) was also determined by the methods of APHA (1992).

**RESULTS:**

The values of different parameters of ground water sources in 20 numbers of locations of the area are given in the following table.

Sampling Point No.	Type of Water source	Value of Parameters					Calcium	Magnesium	Total Coliform
		pH	Temperature	Turbidity	Chloride	Iron			
1	2	3	4	5	6	7	8	9	10
1	HTW	6.88	20	3	10	0.56	30	14	52
2	HTW	6.34	21	129	8	2.4	50.2	20	60
3	HTW	6.24	20	4	12	0.02	37	14	50
4	HTW	6.30	20.5	18	10	2.8	52	18	46
5	HTW	6.35	21	134	6	2.0	34	12	51
6	HTW	6.66	19	97	40	3.5	40	14	57
7	HTW	6.7	21	187	138	2.7	32	15	60
8	RW	6.6	20	119	34	0.03	30	12	24
9	RW	6.23	20	249	40	0.01	35	16	57
10	HTW	6.45	20.5	135	46	5.02	39	12	30
11	HTW	6.5	21	119	39	0.90	45	14	59
12	RW	6.0	21	187	75	0.3	37	20	21
13	HTW	6.8	20	4	135	1.0	51	19	54
14	HTW	6.5	21	107	201	0.01	34	17	30
15	RW	6.0	20	100	150	0.43	30	10	61
16	HTW	6.7	21	5	18	4.0	36	12	68
17	HTW	6.6	21	19	23	5.0	46	20	26
18	HTW	6.0	20	4	140	0.9	37	16	28
19	HTW	6.8	21	6	34	0.82	39	14	67
20	RW	6.7	21	6.6	40	0.03	30	23	19

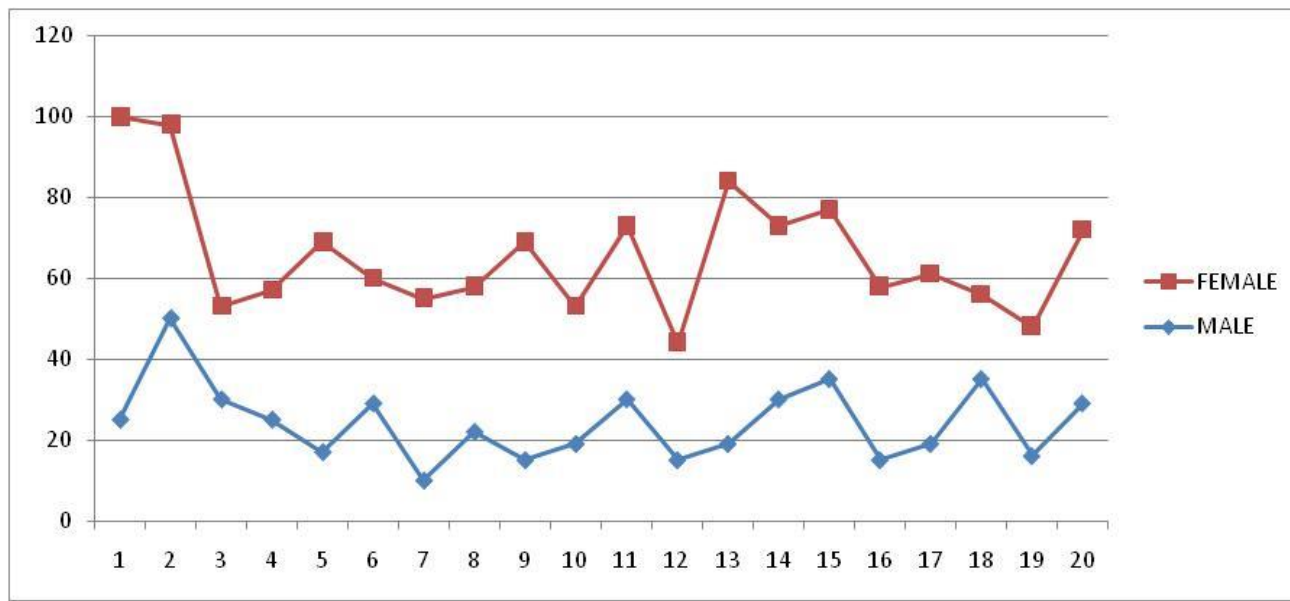


Fig- Sources Vs Consumers.

**DISCUSSION**

The value of temperature ranges from 19 -21. As Water temperature increases the rate of chemical reactions generally increases together with the evaporation and volatilization of substances from the water. Increased temperature also decreased the solubility of gases in the water such as O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub>, CH<sub>4</sub> and others.

P<sup>H</sup> is the measure of the intensity of acidity or alkalinity. It is generally measured on a log scale and equals to the negative logarithm of Hydrogen Ion concentration.

$$P^H = - \log_{10} [ H^+ ]$$

For effective disinfection with chlorine, the P<sup>H</sup> should preferably be less than 8 P<sup>H</sup> of the water entering the distribution system much be controlled to minimize the corrosion of water mains and pipes in house hold water system. The ranges of P<sup>H</sup> 6.0 up to 6.8 which is within the permissible limit.

Turbidity is an indication of the clarity of water and is defined as the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through a sample of water. Turbidity makes the water unfit for domestic purposes, food and beverage Industries and many other Industrial uses. Highly coloured water are objectionable for drinking water and other uses and are aesthetically unacceptable. Iron is one of the element that make up earth’s crust. Anaerobic ground water may contain Ferrous Iron at concentrations up to several mg/l without discolouration or Turbidity in the water when directly pumped from a well. On exposer to the atmosphere, however, the Ferrous Iron oxidizes to Ferric Iron, giving an objectionable reddish brown colour to the water. Iron also promotes the growth of Iron bacteria which derive their energy from the oxidization of Ferrous Iron to Ferric Iron and in the process deposit a slimy coating on the piping. The value of Iron ranges from 0.01 to 5.02. The important sources of Chloride in the water are the discharge of domestic sewage. High concentration of Chloride

can make water unpalatable and therefore unfit for drinking. Calcium has no hazardous effects on human health. In fact, it is one of the important nutrients required by the organism. The prominent source of Magnesium in Ground Water is through dissociation of dolomite ( $\text{CaMg}(\text{CO}_3)_2$ )

## **POLICY IMPLIFICATION**

Provision of safe drinking water is a basic necessity. Rural drinking water supply is a state subject and has been included in the Eleventh Schedule of the Constitution of India. In order to address the major issues like sustainability, water availability and supply, poor water quality, etc., the Rural Drinking Water Supply Guidelines have been revised w.e.f. 1.4.2009. The revised program known as National Rural Drinking Water Programme (NRDWP). To meet the emerging challenges in the rural drinking water sector relating to availability, sustainability and quality, the components under the programme are NRDWP( COVERAGE), NRDWP ( Sustainability), NRDWP ( Quality), NRDWP ( DDP areas), NRDWP (Support). In accordance with the policy of Government of India, the Department of Drinking Water Supply has earmarked 10% of the total Central outlay for the programme for the North East States. There are many Support activities for which States would require funds to achieve the long term goal of the sector. Thus support for information, education and communication, human resource development, water quality monitoring and surveillance, setting up water testing laboratories, engaging State Technology Agency and National Expert Groups for preparation of Projects and evaluation of rural water supply schemes can be taken up under the 5% Support fund of NRDWP. Regarding Sanitation Nirmal Bharat Abhiyan (NBA) previously called Total Sanitation Campaign (TSC) is a community led total sanitation programme initiated by Govt. of India in 1999. The main goal of TSC is to eradicate the practice of open defecation by 2017. The Concept of Sanitation was expanded to include personnel hygiene, home sanitation, safe water garbage disposal and waste water disposal. Financial incentives were provided to below poverty line (BPL) households for construction and usage of individual house hold latrines in recognition of their achievement For encouraging TSC Govt of India also launced the Nirmal Gram Puraskar (NGP) which recognizes the achievements and efforts made in ensuring full sanitation coverage. The objective of Nirmal Bharat Abhijan is to accelerate the sanitation coverage in the rural areas so as to comprehensively cover the rural community through renewed strategies and saturation approach

## **CONCLUSION**

Physical, bacteriological and chemical analysis can be helpful in providing useful information about the source and the condition under which it will be developed. Again the sanitary survey for potential drinking water sources is an important step. Systematic and periodic monitoring of the water may prove to be useful in achieving the goal of safe drinking water. In the Bagulamari NC village area, a large number of families use open field sanitation. Where the ground water sources are not maintain in a safe distance from the sanitation site. These sources can be contaminated through this system. Ring Well with proper cover, pumping system, drain will protect it from faecal contamination. If faecal coliform persist, pot or drip chlorination may be resorted to for reduction of bacteriological

contamination. Open latrine should be located at least 10 m distance from the drinking water source.” Safe Water for All “ cannot be achieved if we do not give sufficient attention towards sanitation. It is clear that the good health cannot be achieved by a simplistic policy of only supplying clean water. Only carefully designed programmers that integrate water quality improvements with improvement in water availability, sanitation and hygiene .Education will achieved substantial reduction in the transmission of water and excreta related infection. It is advisable to test the potability of ground water before using it for drinking / cooking purposes. A long term environmental planning is also essential to blunt the danger from such pollution. Despite tremendous advances in medical knowledge and practice, morbidity and mortality due to water and excreta related communicable diseases continue to remain a heavy burden for all government in the developing countries. Providing sufficient knowledge of harmful effects due to contaminated drinking water can lead to a healthy family. Pandit Jawaharlal Nehru famously said that “If you educate a man, you educate an individual; however, If you educate a women, you educate a whole family”.

## REFERENCES

1. WHO , Guideline for Drinking water Quality ; 3<sup>rd</sup> edition ; World Health Organization , Geneva .
2. APHA, 1992 , Standard Methods for the Examination of Water and Waste Water . APHA, AWWA, WPCE, 8<sup>th</sup> Edition , Washington .
3. APHA ,1995 ; Standard Methods for the examination of Water and Waste water , [ 19<sup>th</sup> ed, American Health Association , Washington, DC
4. Dey, A,K. 1996 ; Environmental Chemistry , 3<sup>rd</sup> edition.New Age International Publishers , New Delhi , P. 355 .
5. WHO , Guideline for Drinking water Quality ; 3<sup>rd</sup> edition ; World Health Organization , Geneva .
6. APHA, 1992 , Standard Methods for the Examination of Water and Waste Water . APHA, AWWA, WPCE, 8<sup>th</sup> Edition , Washington .
7. APHA ,1995 ; Standard Methods for the examination of Water and Waste water , [ 19<sup>th</sup> ed, American Health Association , Washington, DC
8. Dey , A,K. 1996 ; Environmental Chemistry , 3<sup>rd</sup> edition.New Age International Publishers , New Delhi , P. 355 .
9. Tyagi S.K., Datta P.S. and Pruthi N.K., Hydrochemical appraisal of ground water and its suitability in the intensive agricultural area of Mirzaffarnagar Dist- Uttar Pradesh, India. Environmental Goel. , 2009, 56, 901-912, DOI 10.1007 / s 00254 – 008 – 1190 -
10. Meenakshi and Maheshwari R .C., Fluoride in Drinking Water and its
11. Asthana, D.K. and Meera Asthana 1999, Environmental Problems and solution, S.Chand and Co. Ltd. Publication, Chapter – Fresh water, PP 65-70.
12. Bundschuh, J., Nath, B., Bhattacharya, P., & Arsenic Mitigation and Safe Water Network. (2011). Arsenic in Groundwater: Occurrence, Implications, and Remedy. Springer