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## A Study on Drinking Water Quality Parameters in Palashbari Area, Kamrup District (Rural), Assam

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#### Abstract

The study was carried out to assess the drinking water quality of Palashbari area of Kamrup (Rural) District of Assam. Drinking water samples were collected from dug wells and tube wells of different sampling locations of the area during investigations carried out in the year 2013-2014. The quality was assessed in terms of physico-chemical parameters. The physico-chemical parameters such as pH, temperature, conductivity, alkalinity, total dissolved solid (TDS), DO, total hardness (TH), calcium, magnesium, chloride, sulphate, phosphate, iron and fluoride were analyzed to know the present status of ground water quality. Phosphate, iron and fluoride were found more than permitted limits in the study area. From the present study it is found that the water in this area is more or less free from any harmful effects.

**Keywords:** Drinking, Kamrup, Palashbari, Parameter, Water quality.

#### Introduction

Water is absolutely essential for life on this planet. It is a natural resource of fundamental importance. The atomic structure and unique properties of water seem to be specially designed for the biosphere. Water is the most important element in the biosphere because on one hand it is vital for the maintenance of all forms of life and on the other hand it helps in the movement, circulation and cycling of nutrients in the biosphere. Water is also essential for power generation, navigation, irrigation of crops, disposal of sewage etc. It is a universal solvent in which practically all the minerals, present in soil, may be dissolved. It supports life system and its shortage has been the main concern of human beings. It is the availability of water which determines the nature, composition and abundance of terrestrial life. Water transports dissolved materials, silt, debris, nutrients and pollutants etc. from upland areas to low lying regions. Nearly, 90% of world population is, therefore, concentrated in these areas. Water also plays an important role in reducing the atmosphere burden of particulate matters and gaseous pollutants. Without water life as it exists on our planet is impossible.

Groundwater constitutes about 20 percent of the world's fresh water supply, which is approximately 0.61% of the entire world's water, including oceans and permanent ice. Global groundwater storage is roughly equal to the total amount of freshwater stored in the snow and ice caps, including the north and south poles. In India more than 90% of the rural population and nearly 30% of the urban population depend on groundwater for drinking purpose (NRSA, 2008). Till recently it had been considered a dependable source of uncontaminated water. Ground water is less susceptible to bacterial pollution than surface water because the soil and rocks through which ground water flows screen out most of the bacteria. But freedom from bacterial pollution alone does not mean that the water is fit to drink. Many unseen dissolved mineral and organic constituents are present in ground water in various concentrations. The quality of water resources is a subject of ongoing concern. The problem of groundwater pollution has now raised concerns all over the globe and results reported by various researchers have been alarming. Contaminated ground water can have serious effects on health.

Needless to say drinking water has a vital role in public health and this is a major driver for the development of standard to ensure the safety of drinking water and to safeguard public health. Water quality determines the 'goodness' of water for particular purposes. Water quality tests will give information about the health of the waterway. It is becoming an emerging issue in the water supply and health sectors of Northeastern India. By testing water over a period of time, the changes in the quality of the water can be seen. Rural dwellers of Palashbari Area, like their thousands of counterparts elsewhere in the country, rely basically on tube wells and dug wells for potable water supply. The Palashbari area under the Guwahati sub-division is located in the Southern part of Kamrup (Rural) district of Assam. The presence of high iron, fluoride and

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arsenic content has been reported in some parts of Assam. The need of monitor drinking water quality is universally recognized is a necessary safeguard against a large number of health hazard. The study was hence conducted to determine the drinking water quality of the region.

**Study Area**

The present study has been carried out in the Palashbari area of southern part of Kamrup (Rural) district of Assam, popularly known as ‘South Kamrup’. The south Kamrup is situated between 25°45’ and 26°12’ North Latitude and between 90°55’ and 92°10’ East Longitude with an elevation of 40-744m MSL. In the present study, fourteen physico-chemical parameters of the drinking water has been analyzed which was collected from dug wells and tube wells within Palashbari Revenue Circle (geographical area- 279803 B - 4K - 0L) under Guwahati Sub-Division.

**Materials and Methods**

A field survey of a total number of 186 households which constitute 10% of total households of 19 villages of Palashbari Revenue Circle including the below mentioned sampling villages was carried out to have a better understanding of the scenario about the water sources used by the people inhabiting in these areas. For determining the physico-chemical

parameters of study area, a total of ten villages from Palashbari were chosen which are shown in Table 1.

**Table 1:** Water sampling location

Sample No.	Source	Sampling Villages
I	Tube Well	Sadilapur
II	Tube Well	Rampur No. 1
III	Tube Well	Solesala
IV	Tube Well	Rani Khamar
V	Dug Well	Kamargaon
VI	Dug Well	Kandulimari
VII	Dug Well	Dhantula Rangamati
VIII	Dug Well	Sathikarpa
IX	Dug Well	Charaimari
X	Dug Well	Futuri No. 1

Water samples were collected during 2013-2014. Composite water samples were collected in pre-cleaned high-density polyethylene (HDPE) bottles (500 ml capacity) from each sampling locations. P<sup>H</sup>, temperature and conductivity were determined quickly after sampling. After collection, the samples were immediately transported to the laboratory and stored in the refrigerator at 4°C prior to analysis. The different parameters selected for this study and the methods adopted for analysis are shown in the Table 2.

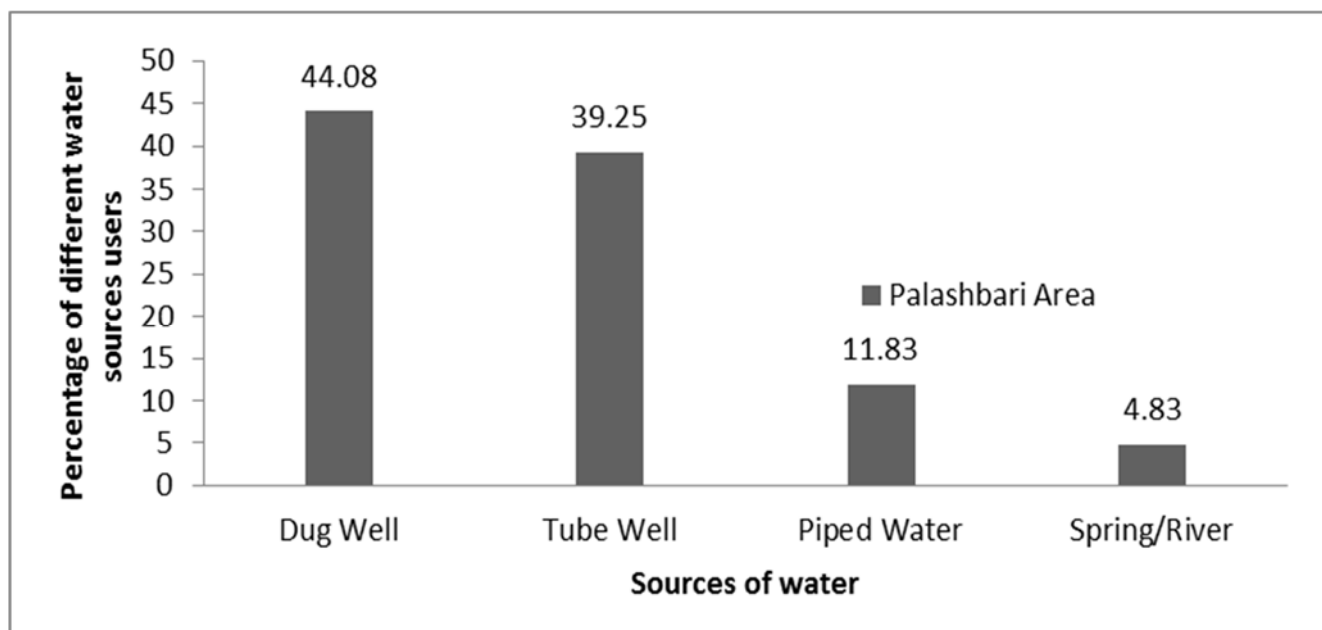
**Table 2:** Methods adopted for analysis of different water quality parameters

Parameter	Method/ Instrument used
pH	Digital pH meter (Systronics μ pH system 361)
EC	Systronics Conductivity meter 360
TDS	Gra vimetric method
Turbidity	Nephelometry (Systronics Nephelo-Turbidity Meter 230)
DO	Wrinkler’s Iodometric Method
TH, Ca, Mg,	EDTA Titrimetric method
Cl	Argentometric method
SO <sub>4</sub> , PO <sub>4</sub> , F	UV-Vis Spectrophotometer (Shimadzu UV mini 1240)
Fe	Atomic Absorption Spectrometry (Perkin Elmer Analyst 200 with FIAS)
Alkalinity	Titration method

**Results and Discussion**

The average results of the physico-chemical parameters for water samples are presented in Table 3. Figure 1 gives a

transparent picture about the percentage of households using different sources of drinking water in the study area.



**Fig 1:** Percentage of different water source users in the Palashbari Area

**Table 3:** Results of physico-chemical analysis of drinking water samples of the study area

Sl. No.	Source	pH	Temp. °C	EC $\mu\text{S/cm}$	Alkalinity mg/L	TDS mg/L	DO mg/L	TH mg/L	Ca Hardness mg/L	Mg Hardness mg/L	Cl mg/L	SO <sup>4</sup> mg/L	PO <sup>4</sup> mg/L	Fe mg/L	F mg/L
1	Tube Well	7.14	27	2.14	75	40	5.15	65	42.05	22.95	29.5	6.59	0.51	0.47	1.57
	Tube Well	7.07	28	2.13	65	70	6.16	70	48.06	21.94	38.1	6.93	0.56	0.38	1.51
3	Tube Well	6.59	27	3.23	70	50	6.25	90	56.03	43.97	26.6	7.78	0.43	0.57	2.57
4	Tube Well	7.05	28	3.20	65	80	5.18	92	49.94	42.06	35.2	9.3	0.26	0.41	1.52
5	Dug Well	6.69	30	3.09	70	110	6.22	60	31.03	28.97	40.35	8.37	0.66	0.39	0.96
6	Dug Well	6.53	31	3.14	75	104	6.33	70	54.02	15.98	43.6	13.1	0.45	0.4	2.54
7	Dug Well	7.77	27	2.63	60	50	6.28	90	56.05	33.95	43.9	5.61	0.58	0.74	1.63
8	Dug Well	7.10	26.50	3.17	80	106	5.2	81	43.00	38.00	32.3	5.81	0.65	1.04	1.80
9	Dug Well	6.93	26	3.14	85	100	6.80	100	55.12	44.88	39.3	5.72	0.52	0.93	1.97
10	Dug Well	7.02	29	3.32	80	110	6.40	80	53.11	26.89	23.9	4.91	0.46	1.29	2.35

The results of the water quality analysis of the study area can be summarized as follows. No detailed description of the analysis of water quality of the sources has been described here.

pH is a numerical expression that indicates the degree to which a water is acidic or alkaline and is an operational parameter. An acceptable range for drinking water pH is from 6.5-8.5 (WHO, 2005). In the present study, the pH values of all the samples are found within the prescribed limit. The pH of the study area varies from 6.53 to 7.77. The DO content of the water samples are sufficient to sustain life which varies from 5.15-6.80 mg/L. A limit of 250 mg/L chloride has been recommended for drinking water supplies (BIS, 1983; WHO, 1984). The chloride content of the water found much lower than the desirable limit in the study area. Total dissolved solids indicate the general nature of water quality and salinity. 500 mg/L of TDS is considered as desirable limit and 1500 mg/L of TDS as the maximum permissible limit of drinking water as suggested WHO (1971). TDS value varies from 40-110 mg/L in the study area which is less than 500 mg/L in all sites. The iron content of the water found higher than the tolerable limit. The iron content of the study area varies from 0.38 to 1.29 mg/L; it exceeds the desirable limit which is 0.3mg/L (BIS, 1983). The phosphate contents are also found large in all of the sampling points. The maximum permissible limit of drinking water is 0.1 mg/L as suggested BIS (1983). The value varies from 0.26 to 0.66 mg/L in the study area. The calcium and magnesium along with their carbonates, sulphates and chlorides make the water hard both temporarily and permanently. Total hardness contents found less the limit (i.e.40 to 110 mg/L) in all sources than permissible limit (300mg/L) (BIS (1983). The sulphate content is lower than the desirable limit which is 150mg/L (BIS (1983) in study area. The fluoride concentration are found more than permissible limit (>1.5 mg/L) except only one sample which may cause mottling of teeth, skeletal fluorosis (bone disorder) in the human body.

### Conclusion

The analysis of the water quality parameters of groundwater from ten different stations in Palashbari area of southern part of Kamrup (Rural) district of Assam, shows that the pH, electrical conductivity, Dissolved Oxygen, Total Dissolved Solids are within the permissible limits. Concentrations of Phosphate, Iron and Fluoride were found more than permitted limits in the study area. Anthropogenic disturbances have had and continue to have an impact on the drinking water sources of the study area. Systematic and periodic monitoring of the water may prove to be useful in achieving the goal of safe drinking water for all. The values generated through the study could provide useful information for water quality assessment

and sustainable water management in Palashbari area in near future.

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