



## Testing and Analysis of Drinking Water Quality of Underground Water located near Rural Area of Risali Chhattisgarh, India

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### Abstract

Water is an essential constituent for all types of living beings. In present study, Drinking Water Quality, were determined in February 2014 from Rural Area of Risali near Risali Pond Chhattisgarh, India. The result showed that in Underground water of this rural area contain High value of TDS and amount of Hardness was found to be 450 mg/l. pH value was found to be 8.17. And also analyzed Physico-chemical parameters calcium hardness, magnesium hardness, permanent hardness, temporary hardness, dissolved oxygen(DO), chloride, total alkalinity, bicarbonate alkalinity, biochemical oxygen demand(BOD), turbidity, calcium and magnesium. The value of total dissolved solid was found to be 1170 mg/l, dissolved oxygen 24.8 mg/l and chloride was found to be 213 mg/l. Value of calcium was found to be 144 mg/l and magnesium was found to be 21.87 mg/l.

**Keywords:** Drinking water, water quality parameters, underground water.

### Introduction

Water has been vital to man and nature since the beginning of time. The planet earth is abundantly rich in water, which constitute 71.11 of its surface. Besides, being an essential ingredient of animal and plant life. Water made about 65% of human body. Out of the total water consumed by human beings, more than 50 % of it is consumed for industrial activity and only a small proportion is used for drinking purposes.

Ground water is the major sources of drinking water in both urban and rural areas<sup>1</sup>. Underground water contains high amount of various ions and salts etc., which are soluble in water. And directly affect the quality of water, only 1% pure water available for drinking purpose, remain are present in oceans and iceberg which are not usable for drinking purpose. Underground water is the most important source of water supply for drinking, irrigation and other domestic purpose<sup>2-3</sup>. Rural areas people basically depend on hand pumps (ground water) for portable water<sup>4</sup>. The three basic needs in human life are food, air and water<sup>5-6</sup>. Good Quality of Drinking water is very necessary for improving the life of people and to prevent from diseases<sup>7</sup>. Water crisis due to Industrialization, Urbanization, Development activities and population explosion<sup>8-9</sup>. Ground water gets polluted due to increased human population, agriculture runoff, domestic sewage, industrial effluents and other activities<sup>10</sup>. Aim of the study is to analyze the Water Quality Parameters from Rural area because large number of people live in rural area and use this water for drinking purpose and fully depend on this water for all domestic purpose. Qualities of water directly affect the human beings health, and causes of various types of diseases.

**Study Area:** The underground Water sample was taken from Risali Village, Risali Bhilai, Chhattisgarh, India. Map of Risali Village show in figure 1.

**Water Quality Parameter:** The Underground water Sample from Rural area of Risali was analyzed in the laboratory of Chhattisgarh Engineering College, and determine the Physico-chemical parameters like Temperature, pH, Total Hardness (TH), Turbidity, Calcium Hardness, Magnesium Hardness, Chloride, Temporary Hardness, Permanent Hardness, Total Alkalinity (TA), Bicarbonate Alkalinity, TDS (Total Dissolved Solid), DO (Dissolved Oxygen), Calcium, Magnesium and BOD (Biochemical Oxygen Demand) by using standard methods. Distilled Water used for Preparation of Standard Solutions, and for determination of water Quality Parameters we use Standard Chemical and Regents.

### Material and Methods

The water sample was collected in February 2014, from Rural Area of Risali Bhilai, Chhattisgarh India. And sample collect in plastic bottle and immediately transported to the laboratory of Chhattisgarh Engineering College and avoid any changes in Water quality Parameters. All parameters determined using standard methods. pH of water Sample measured by pH meter using standard solutions; Value of Total Hardness, Temporary Hardness, Permanent Hardness, Calcium and Magnesium of water Sample determined by EDTA method; Total Alkalinity and Value Bicarbonate determined by Acid-Base titration method; Turbidity of water sample measured by Turbidity meter; TDS (Total Dissolved Solid) measured by TDS meter; Dissolved Oxygen determine by Winkler method; BOD also analyzed using BOD incubator.

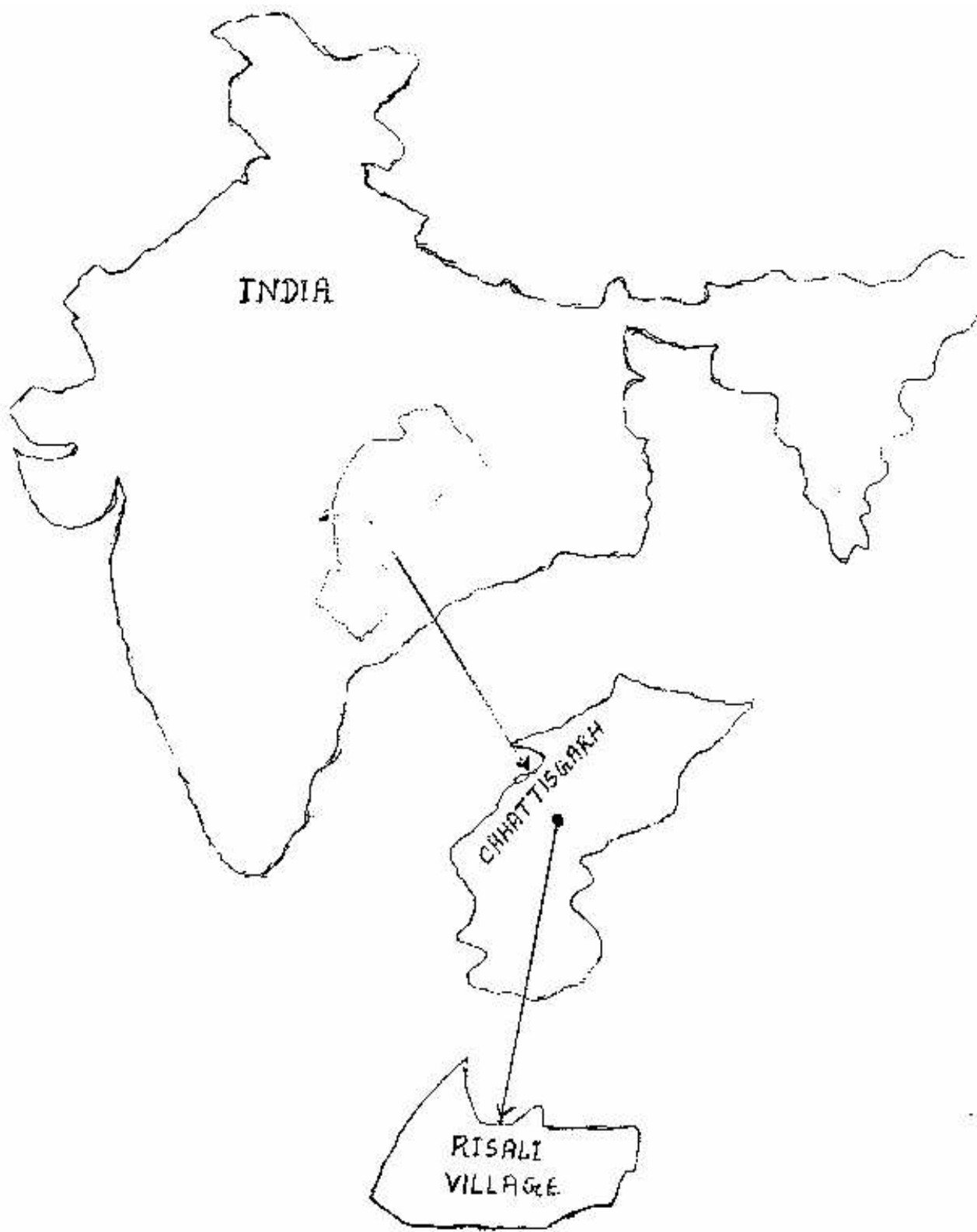


Figure-1  
Map of Risali Village Bhalai and sample of underground water taken from this place

**Table-1**  
**Water Quality Parameters of ground water sample from study area, and comparison with Permissible values as per IS: 10500-1991**

S. No.	Water Quality Parameters	Ground Water Sample	Permissible Values(Requirement desirable limit) as per IS: 10500-1991
1	Taste	Normal	Normal
2	Colour	Transparent	Transparent
3	Temperature	29 °C	-
4	Odour	Unobjectionable	Unobjectionable
5	pH	8.17	6.5 to 8.5
6	Total Hardness	450 mg/l	300 mg/l
7	Turbidity	3NTU	5NTU
8	Calcium Hardness	360 mg/l	-
9	Magnesium Hardness	90 mg/l	-
10	Chloride	213 mg/l	250 mg/l
11	Temporary Hardness	180 mg/l	-
12	Permanent Hardness	270 mg/l	-
13	Total Alkalinity	400 mg/l	200 mg/l
14	Bicarbonate Alkalinity	400 mg/l	-
15	TDS	1170 ppm	500 ppm
16	DO	24.8 mg/l	-
17	Calcium	144 mg/l	75 mg/l
18	Magnesium	21.87 mg/l	30 mg/l
19	BOD	4.32 mg/l	5 mg/l

## Results and Discussion

The observed value of water quality parameters from Risali Village has been mentioned in the given table and the value of water quality parameters compared with standard permissible values as per IS: 10500-1991. The value of total hardness of water was found to be very high 450 mg/l, and causes of human health problems. Due to High value of Hardness various type of disease may be occurred some of these are cardiovascular disease, Risk of gastric cancer, affect Malformations of central nervous system, Alzheimer’s disease, Diabetes, affect Kidney stones. The value of pH was found to be 8.17. Turbidity was found to be 3 NTU, Value of TDS also found to be very high 1170 mg/l and causes of some disease coronary heart disease, arteriosclerotic heart disease and cardiovascular disease. Dissolved Oxygen found to be 24.80 mg/l. value of chloride found to be 213 mg/l. Total Alkalinity was found to be 400 mg/l and causes of digestion problem and acidification is needed. The value of calcium and magnesium also found to be high as compare to Indian standard specification for drinking purpose. And BOD found to be 4.32 mg/l.

## Conclusion

The observation of study strongly suggest that ground water of Rural area of Risali Bhalai Chhattisgarh is of very high TDS, causes of dehydrate the skin of animals and due high TDS water is not potable, if we use this water for drinking purpose value of TDS should be lower down. Amount of Total Alkalinity in water is also very high, causes of digestion

problem and acidification must require before using it for drinking purpose. Acidification also reduces the value of pH. Total Hardness is also very high in this water sample and by boiling Hardness of water lower down. Otherwise the water from rural area Risali is not good enough to be used for drinking purposes.

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