

DRINKING WATER QUALITY ANALYSIS OF DIFFERENT SOURCES OF RAJOURI TOWN, JAMMU AND KASHMIR

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Abstract : *Water Quality Analysis of Different Sources of Rajouri Town in Jammu and Kashmir was done to know weather water which the people are drinking in this area is fit or not. Three water samples were collected in July from different locations and then analysed in Public Health Engineering (PHE) Division Rajouri lab using the method recommended by Indian Standard Drinking Water-Specification (Second revision). The average value of the three was considered as the value of particular parameter. The analysis was done for some important physical and chemical parameters like colour, taste & odour, and turbidity, pH, TDS, Alkalinity, Hardness, Chloride Content, Calcium, Copper, Iron, DO, manganese, sulphates, and nitrates and fluorides. The values were than compared with the limits set by Indian Standard Drinking Water-Specification (Second revision). It was found that water on the whole for Rajouri Town was found to be safe on most of the locations except (L4) location near Abdullah bridge at Bela Colony, here almost all the parameters except TDS were exceeding the acceptable limit prescribed by IS code. The locations which was safest for drinking purposes among all was the Eidgah hand pump (L7) followed by spring near Power house (L3) and then the spring near Rajouri Airport (L8). However at some location where certain parameters like TDS hardness and iron etc were exceeding the prescribed limit the water to be should be boiled before being used for drinking purpose.*

Key Words: *Water Quality, Rajouri Town, Parameters, Springs, Tube wells, Hand Pumps, Drinking.*

I. INTRODUCTION:

Water is one of the most important gift from God and is necessary for survival for all the living beings which includes plants, humans and animals[1]. Majority of earth (nearly 80%) is covered by water[1]. Out of this about 97% is covered by sea and is used for industrial and agricultural uses only because sea water is too salty and one cannot drink it. 2.4% of total water forms giant glaciers and polar icecaps. Nearly 1% quantity of water is available for drinking purposes out of this percentage in areas not covered by sea this water have to be used for agriculture, domestic and industrial uses as well[2]. Due to rise industrialization and population, the water supply demand is also increasing[3]. But sad part of the fact is that even this small quantity of water is also getting polluted due to activities of man himself and that around 780 million people do not have access to clean and safe water and around 2.5 billion people do not have proper sanitation [4]. The throwing of wastage in river bodies in un scientific way is prime example of that[5]. Dumping of waste in non engineered landfill also pollutes groundwater through leachate [6-7]. Before water is supplied to general public it is necessary that water is free from any impurities like physical, chemical and bacteriological which may effect their health in different ways like several water borne diseases like fever, headache, chicken pox, diarrhea, jaundice, cold cough, dysentery, Pneumonia, kidney related diseases etc [8]. Different tests recommended by Indian standard guidelines for different parameters needs to be carried out to check if water is fit for drinking or not[9]. Studies all over the world in this regard have been Carried out regarding checking impurities of water. [10-14]

In the rural and most urban areas of Jammu and Kashmir like Rajouri spring, surface, ground and rainwaters are the main sources of drinking water[15]. Since Rainwater is the purest form of water no analysis was carried out on that[16]. Most of water used for drinking purposes here in Rajouri Town is from bore wells, hand pumps, springs. The surface water from rivers is supplied to general public for different domestic purposes like washing, cooking, bathing etc and may be used for drinking at some places after proper treatment like boiling or aquaquad[17]. So an attempt here has been made to carry out analysis of water of Rajouri Town and know weather it is fit for drinking or not. The analysis was conducted on both physical as well as some chemical parameters which includes colour, taste & odour, and turbidity, pH, TDS, Alkalinity, Hardness, Chloride Content, Calcium, Copper, Iron, DO, manganese, sulphates, and nitrates and fluorides.

II. STUDY AREA

Rajouri is also known as Rajapuri or the land of kings. As per survey of india Rajouri lies between latitudes 330000'00" & 330035'20" North and longitudes 740008'00" & 740042'30" East. It is located at an elevation of about 562-4800m above

mean sea level and is surrounded by famous pir-panjal hills. Rajouri town is the head quarter of the Rajouri district. Rajouri district is located in the south western part of state of Jammu and Kashmir. Rajouri town is located on the Jammu Poonch highway, 154km away from Jammu and about 85 km away from Poonch district. Rajouri is bordered by Poonch, Mirpur (Pakistan occupied Kashmir), Udhampur and Jammu districts. Temperature on the average varies from 7 degree Celsius to 40 degree Celsius. The average annual rainfall is 769 mm. The river flowing through Rajouri town comes from Darhal and Thanamandi, meeting each other near Darhali Bridge at Kheora. Population of the district as per census of 2012 is 642,415 out of which 28% falls in town i.e. 179876 souls. Water is supplied from rivers where pipes have been dugged deep and from there water is supplied to different areas, Dhanidhar filtration plant is also a source of water supply in this area. Water from here is pumped to main water tank located in Rajouri main market and from there it is supplied to people in the town. Elsewhere drinking water sources here includes springs, tube wells, dug wells, hand pumps etc. Figure 1 shows image of Rajouri Town.

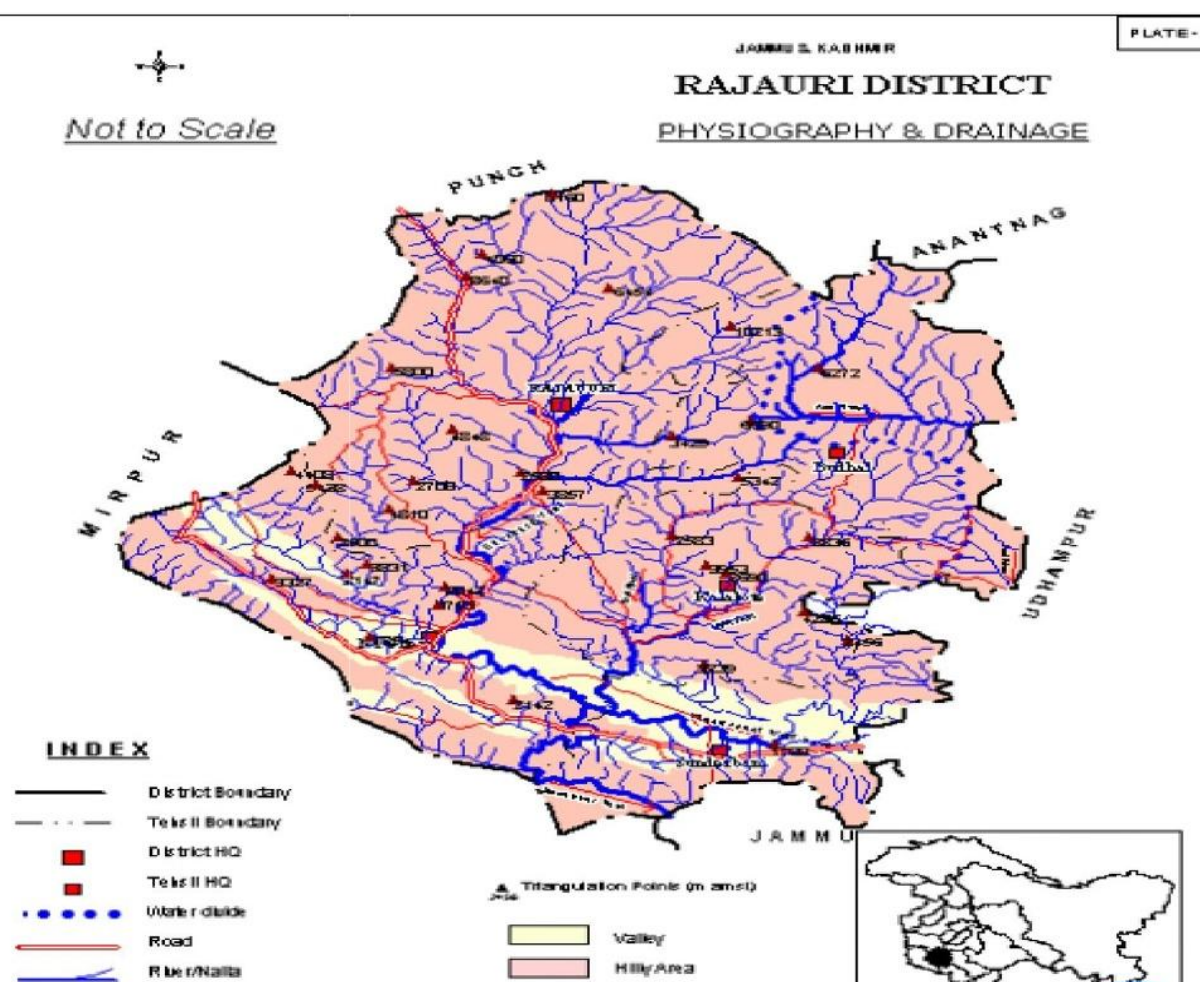


Figure 1: Map of Rajouri Town(Source : CGWB Booklet)

III. SITE DESCRIPTION

The different locations which were used in analysis of water quality covering whole of the town were tube well in Kheora(L1), hand pump near darhali bridge (L2), Hand Pump in PWD colony (L3), Rajouri Tawi River near Abdullah Bridge Bela Colony (L4), Spring near Power House Rajouri(L5), Hand Pump Govt P.G. college Rajouri (L6), Hand Pump Jamia Masjid Eidgah Rajouri(L7) , Spring near Airport Rajouri(L8), Tube Well Jawahar Nagar (L9), Hand Pump near CEO office Rajouri(L10) and Tube well Near Tariq Bridge (L11). Figure 2 shows satellite image of selected locations.

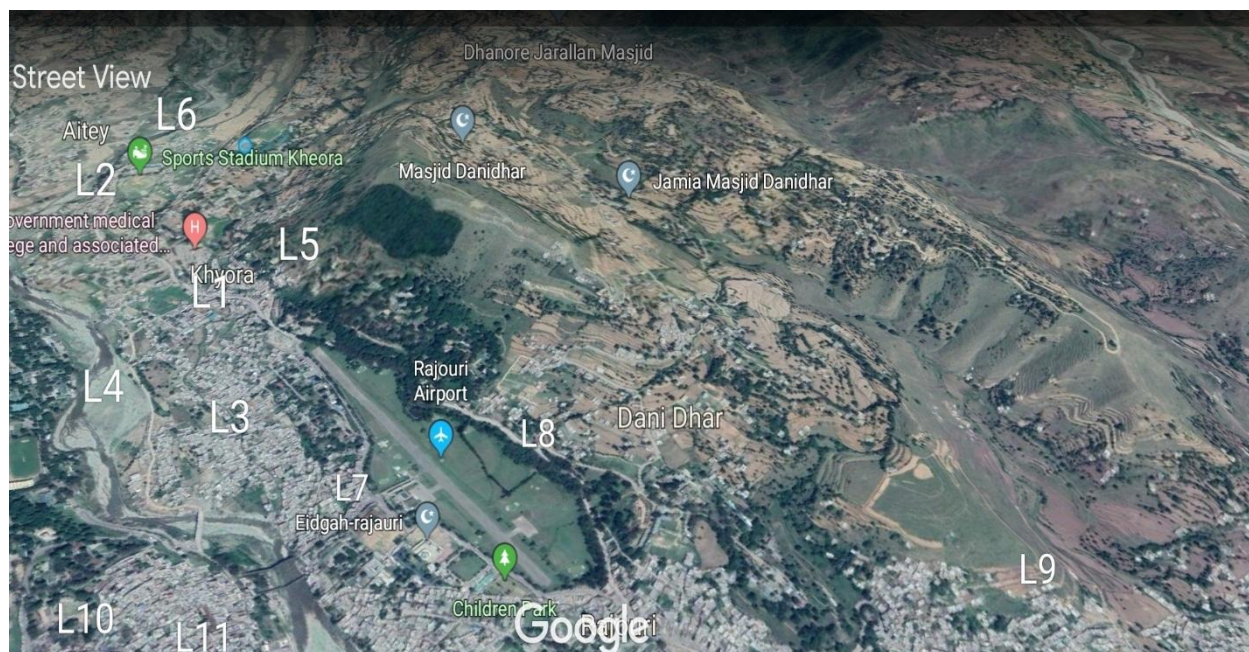


Figure 2: Satellite image of selected locations. (Source: Google Earth)

IV. METHODOLOGY:

Different physical and chemical parameters of samples collected from different locations were analysed using the Indian Standard code [9] and then comparison was made. The physical parameters includes colour, taste & odour, and turbidity. The chemical parameters includes pH, TDS, Alkalinity, Hardness , Chloride Content, Calcium, Copper, Iron, DO, manganese, sulphates, and nitrates and fluorides. The tests were carried in Water Quality lab of Public Health Engineering (PHE) Division Rajouri lab after taking out three samples in July in clean sterile glass bottles of 100 to 1000 ml capacity. The average of the three values have been taken as the value of a particular parameter.

V. RESULTS AND DISCUSSION:

Table 1 shows the results of different parameters analysed and the recommended/acceptable /Permissible values of IS code of these parameters[9]. After carrying out the analysis water on the whole for Rajouri Town was found to be safe on most of the locations except (L4) location near Abdullah bridge at Bela Colony, here almost all the parameters except TDS were exceeding the acceptable limit prescribed by IS code[9]. Colour was 14 Hazen units, turbidity 5 NTU, pH value 9 , Total hardness was 300mg/ltr, Calcium 100 mg/ltr, Iron 0.7 mg/ltr and chloride 265mg/ltr. Sulphates was found to be 215 mg/ltr. If this water at this location (L4) is used for drinking then the effect would be very severe not only on humans but animal too. The consequence of pH on hydrogen making from glucose from mixed culture was studied by [18] showed that assortment of germs enhances with increase in pH value. TDS lessens the moistness and causes gastro-intestinal problems in human beings [19]. Hardness is generally considered to be dangerous for drinking because excessive calcium and magnesium results stones in kidney and laxative problems respectively but the deficiency of these essentials may lead to utilitarian problems. Chloride absence is providentially less, if not looked after and treated well can cause death but if it is in excess it may lead to health risks to people going through heart related diseases and kidney problems[19] Nitrate is important for both plants and animals but the unnecessary nitrate content is disadvantageous to the both [19] like it may cause blue baby disease. Osmotic Diarrhea results due to excess Sulphate present in ground water. Existence of iron alters the color of water[20]. The locations which was safest for drinking purposes among all was the Eidgah hand pump (L7) followed by spring near Power house (L3) and then the spring near Rajouri Airport (L8). At these locations all the parameters were within the prescribed limit of IS code[9] however at all other locations like some parameters like iron, hardness etc were exceeding the prescribed limit not by much but little bit. So that can be managed if water collected from these samples is properly boiled before being used for drinking purpose. The bold values shown in table 1 indicates those values of parameters which are exceeding the acceptable limit. However as far as permissible limits of the code [9] is concerned all limits were within the range. So over all water in Rajouri Town is safe for drinking except for L4 location, however water at this location can be used for domestic purposes like washing bathing etc.

Table 1: Analysis (Physical & Chemical) of Water samples collected from different locations (L1-L11) of Rajouri Town

Parameter	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	Acceptable	Permissible
Physical													
Colour	7	12	9	14	3	9	2	3	6	7	4	5	15
Turbidity	2	3	2	5	0.9	2	0.8	0.9	1	1	1	1	5
Taste & Odour	U	U	U	U	U	U	U	U	U	U	U	Agreeable	Agreeable
Chemical													
pH	7.9	8.3	8.0	9	6.6	7.6	6.5	6.6	7.5	7	7	6.5-8.5	No relaxation
TDS	290	390	360	470	150	350	135	155	270	250	190	500	2000
Total Hardness	210	235	225	300	115	225	100	120	180	160	140	200	600
Calcium	57	70	64	100	20	60	16	18	33	27	22	75	200
Copper	0.02	0.04	0.02	0.05	N	0.01	N	N	0.01	N	N	0.05	1.5
Iron	0.4	0.5	0.4	0.7	N	0.3	N	N	0.1	N	N	0.3	NR
Manganese	0.05	0.07	0.06	0.1	N	0.04	N	N	N	N	N	0.1	0.3
Chlorides	175	235	235	265	105	220	95	98	155	145	135	250	1000
Sulphates	155	195	185	215	95	175	85	100	120	120	105	200	400
Nitrates	14	23	17	37	10	17	8	16	24	24	21	45	NR
Flourides	0.03	0.04	0.03	0.9	N	0.02	N	N	N	N	N	1.0	1.5

Note: Colour in Hazen units, Turbidity in NTU and all chemical parameters except pH value in mg/ltr. pH, Taste and odour are unit less. N indicates Nil and U indicates Unobjectionable, NR stands for not recommended.

VI. CONCLUSION

The study revealed that water on the whole for Rajouri Town was found to be safe on most of the locations except (L4) location near Abdullah bridge at Bela Colony, here almost all the parameters except TDS were exceeding the acceptable limit prescribed by IS code. Colour was 14 Hazen units, turbidity 5 NTU, pH value 9, Total hardness was 300mg/ltr, Calcium 100 mg/ltr, Iron 0.7 mg/ltr and chloride 265mg/ltr. Sulphates was found to be 215 mg/ltr. If this water of Location(L4) is used for drinking then the effect would be very severe not only on humans but animal too. The locations which was safest for drinking purposes among all was the Eidgah hand pump (L7) followed by spring near Power house (L3) and then the spring near Rajouri Airport (L8). At these locations all the parameters were within the prescribed limit of IS code[9] however at all other locations like some parameters like iron, hardness etc were exceeding the prescribed limit not by much but little bit. So that can be managed if water collected from these samples is properly boiled before being used for drinking purpose.

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