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Study of Physico-Chemical and Comparative analysis of Surface Water in Summer and Winter Season of Rewa District, MP, India

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Abstract

In this research present study of physico-chemical and comparative analysis of surface water in summer and winter season of Rewa district Madhya Pradesh (M.P.), India. At most of the water samples for drinking purpose are suggested by the World Health Organization (WHO) and Indian Standard (ISI) and BIS organization. Season wise changes in physical and chemical parameters like Colour, Odour, Taste, Turbidity, pH value, Hardness, calcium, magnesium, Alkalinity, Chloride, TDS, sulphate, etc. Surface water parameters were analyzed for a period of summer and winter season in the year of 2014. Some parameters were found on the basis of the data analysis.

Keywords: Physico-chemical analysis, Comparative, water, Madhya Pradesh India.

Introduction

India is endowed with rich water resources. Surface water found in an earth surface, it is called surface water. The Rewa district surface water quality evaluated on the basis of dissolved some minerals, and salts. Surface water, thus contains many dissolved minerals and surface water dissolved some types of impurities and quantity of impurities are deepened as the source of water. In this paper, we are analyzing surface water of Hardi pound, Rani pound and Sundar Nagar area for the analysis of Colour, Odour, Taste, Turbidity, pH, Total hardness, calcium, magnesium, Total alkalinity, Chloride, TDS, Sulphate etc. in summer and winter season 2014 of Rewa district Madhya Pradesh, India. At most of the water samples for drinking purpose, permissible limit is suggested by the World Health organization (WHO),Indian Standard (ISI) and BIS**.** Some parameters found in some limits in a sample of water.

Material and Methods

Surface water samples taken during the summer season in the year of 2014 in summer and winter season from Rewa district. All samples of water are collected from same day and collect in a plastic bottle, and washed with 10% HNO_3 and hydrochloric acid. The plastic bottles were labeled and add this time few drops of HNO_3 for the control of order and bacteria and fungi growth and PH of water is also determined at the time of sampling. All determination, repeated one or two times. Colour of water is determined in water sample of surface water with the help of dissolved salt, iron, Taste of water is determined in water sample of surface water with the help of oral taste, Odour of water is determined in water sample of surface water with the help of odour of water, Turbidity in water were determined in water sample of surface water by nephelometric method with sample cells using hydrazine sulfate, distilled water, hexamethylenetetramine, pH value of water is determined in water sample of surface water using a pH meter, Total hardness of water is determined in water sample of surface water by EDTA complex metric titration method with the help of pure, dry $caco_3$ dilute hydrochloric acid, water bath, EDTA crystal $Mgcl_2$, distilled water, EBT indicator, alcohol, ammonium chloride, ammonium solution, buffer solution, burette, pipette, conical flasks, beaker etc., Calcium in surface water is determined by EDTA titrimetric method using sodium hydroxide, ammonium purpurate, standard EDTA solution, standard calcium solution, Magnesium in surface water is determined by using calculation from total hardness and calcium by EDTA method, Total alkalinity in surface water isanalized by titration method with the help of hydrochloric acid and with the help of phenolpthalin and methyl orange indicators, Chloride in surface water is analized by Argent metric titration method with the help of potassium chromate indicator and silver nitrate titrant, standard NaCl solution etc., TDS in surface water is determined by TDS measurement apparatus, Sulphate in water is determined by Nephelometry method using Nephelometric turbidity meter with sample cells, magnetic stirrer, timer within dictator of second etc[1-10].

Results and Discussion

Water sample analysis has been done on season wise period from 2014 in summer and winter season. Water sample of surface water of the Hardi pound and one of the Rani pound and Sundar Nagar area has been fixed for taking sample throughout the summer and winter season in the year of 2014. The analysis done using standard method obeying WHO, ISI and BIS water quality Parameters as well (see table-3 and 4) For the overall water pollution of the study area the main reason responsible are

the problem of dissolved salts, minerals, foaming and industrial effluents. The flow rates of surface water has also been taken into account while reaching at certain results because of the concentration of various pollutants differs throughout the summer and winter season. Table-1 shows alternate value of surface water of Hardi pound and Rani pound in summer season Colour; colorless, colorless, Odour; Odorless, Odorless, Taste; Unpleasant, Unpleasant, Turbidity; 3.6, 8.2, pH; 7.8, 7.8, Total hardness; 338, 220, Calcium; 140, 120, Magnesium; 198, 100, Total alkalinity; 316, 160,Chloride; 32, 40, TDS; 368, 114 Sulphate; 42, 82. Table 1 shows alternate value of surface water of Rani pound and Sunder Nagar area in winter season Colour; colorless, colorless, Odour; Odorless, Odorless, Taste; Unpleasant, Unpleasant, Turbidity; 0.1, 0.1, pH value; 7.2, 7.8, Total hardness; 200, 580, Calcium; 1.6, 10.4, Magnesium; 1.44, 0.72, Total alkalinity; 100, 346, Chloride; 38, 65, TDS; 145, 740.

Table–1
Average value of all parameters of surface water in summer and winter season-2014

Units	Parameters	Summer Season (Hardi Pound)	Summer Season (Rani Pound)	Winter Season (Rani Pound)	Winter Season (Sunder Nagar)
Hazen Units	Colour	Colourless	Colourless	Colourless	Colourless
NIL	Odour	Odourless	Odourless	Odourless	Odourless
NIL	Test	Odourless	Odourless	Odourless	Odourless
NTU	Turbidity	3.6	8.2	0.1	0.1
pH Scale	pH	7.8	7.8	7.2	7.8
Mg/l	Total Hardness	338	220	200	580
Mg/l	Calcium	140	120	1.6	10.4
Mg/l	Magnesium	198	100	1.44	0.72
Mg/l	Total Alkalinity	316	160	100	346
Mg/l	Chloride	32	40	38	65
Mg/l	TDS	368	114	145	740
Mg/l	Sulphate	42	82	NIL	NIL

Table–2
Range of hardness in various units

Classification of Hard Water	Hardness (Mg/L)	Hardness (Mmol/L)	Hardness (DGH/ dH)	Hardness (GPG)	Hardness (PPM)
Soft water	0 to 60	0 to 0.60	0 to 3.37	0 to 3.50	Less than 60
Moderately hard water	61 to 120	0.61 to 1.20	3.38 to 6.74	3.56 to -7.01	60 to 120
Hard water	121 to 180	1.21 to 1.80	6.75 to 10.11	7.06 to 10.51	120 to 180
Very hard water	≥ 181	≥ 1.81	≥ 10.12	≥ 10.57	> 180

Table-3
Water quality parameters and drinking water standards

Parameters	Units	Drinking water WHO (1984) and ISI (1991)	
		Desirable	Maximum
pH value	NIL	6.5to8.5	No relaxation
Dissolved Solids	Mg/l	500	2000
Colour	Hazen units	5	25
Odour	NIL	Unobjectionable	NIL
Turbidity	NTU	5	10
Taste	NIL	Agreeable	NIL
Total hardness (as $CaCO_3$)	Mg/l	300	600
Alkalinity	Mg/l	200	600
Ca^{2+}	Mg/l	75	200
Mg^{2+}	Mg/l	0.1	0.3
NO_3^-	Mg/l	50	No relaxation
Cl^-	Mg/l	250	1000
Sulphate	Mg/l	200	400

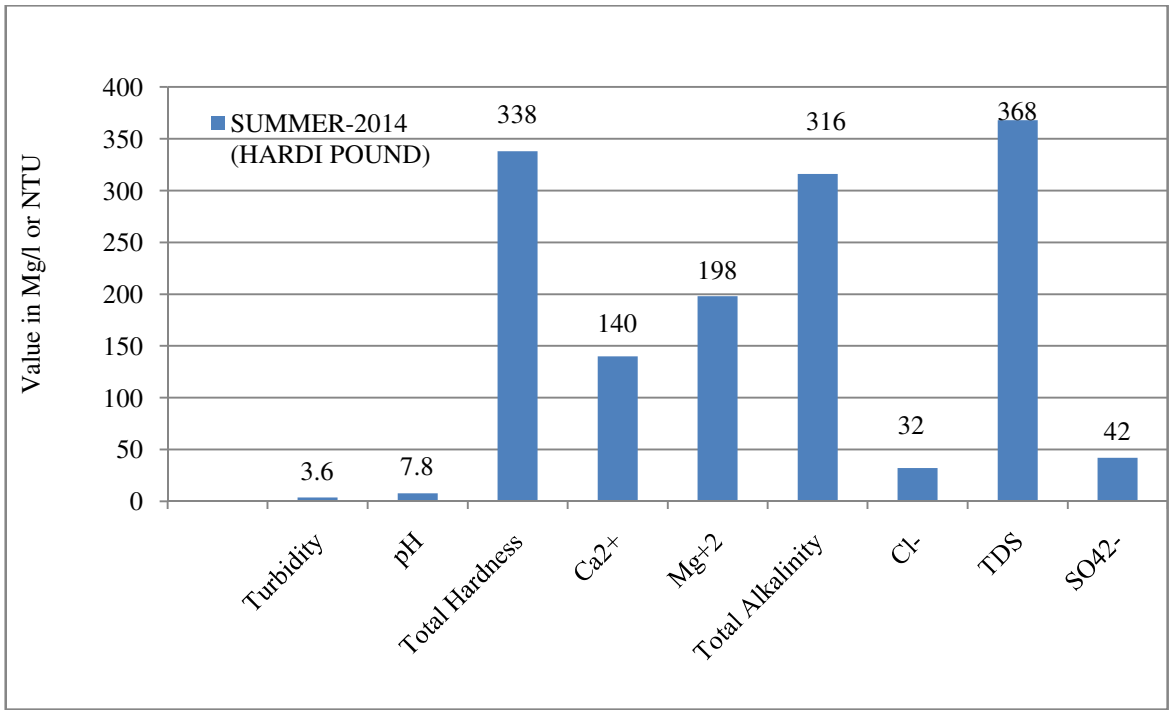

Figure - 1
Average value of all parameters of surface water

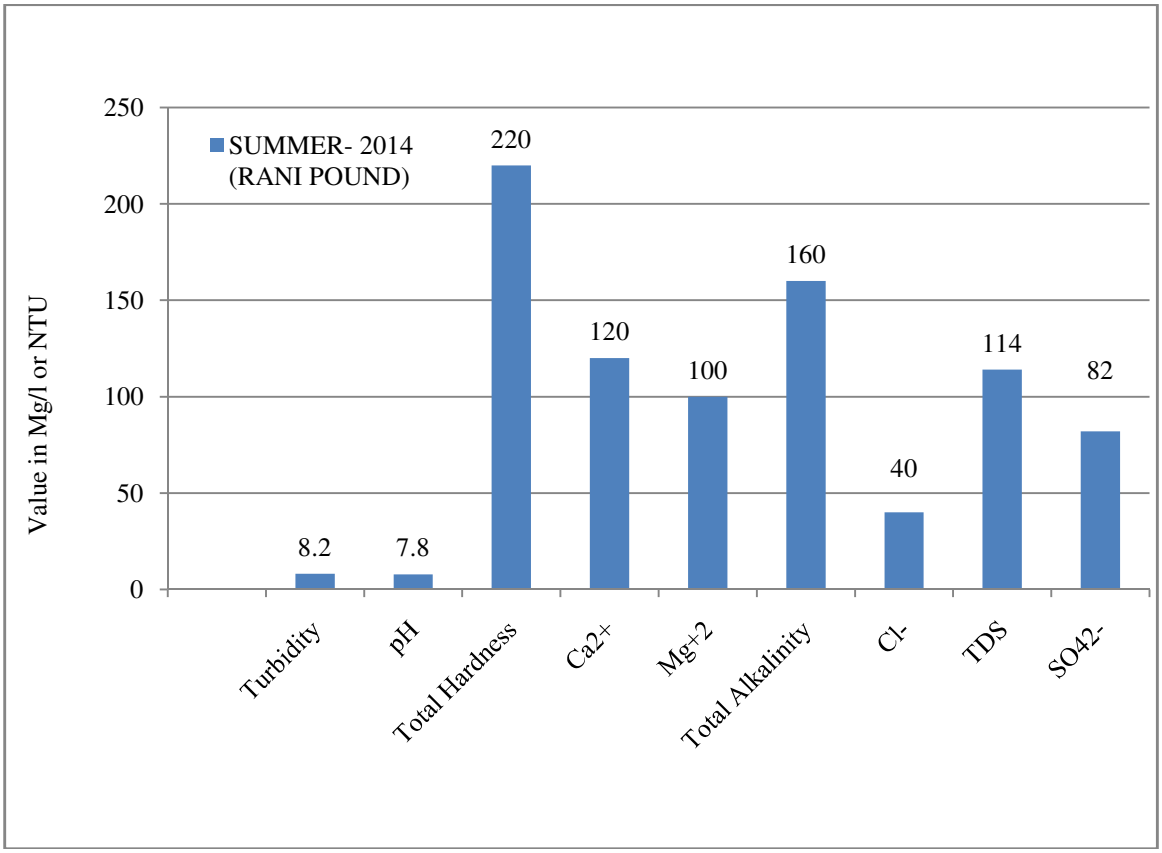

Figure - 2
Average value of all parameters of surface water

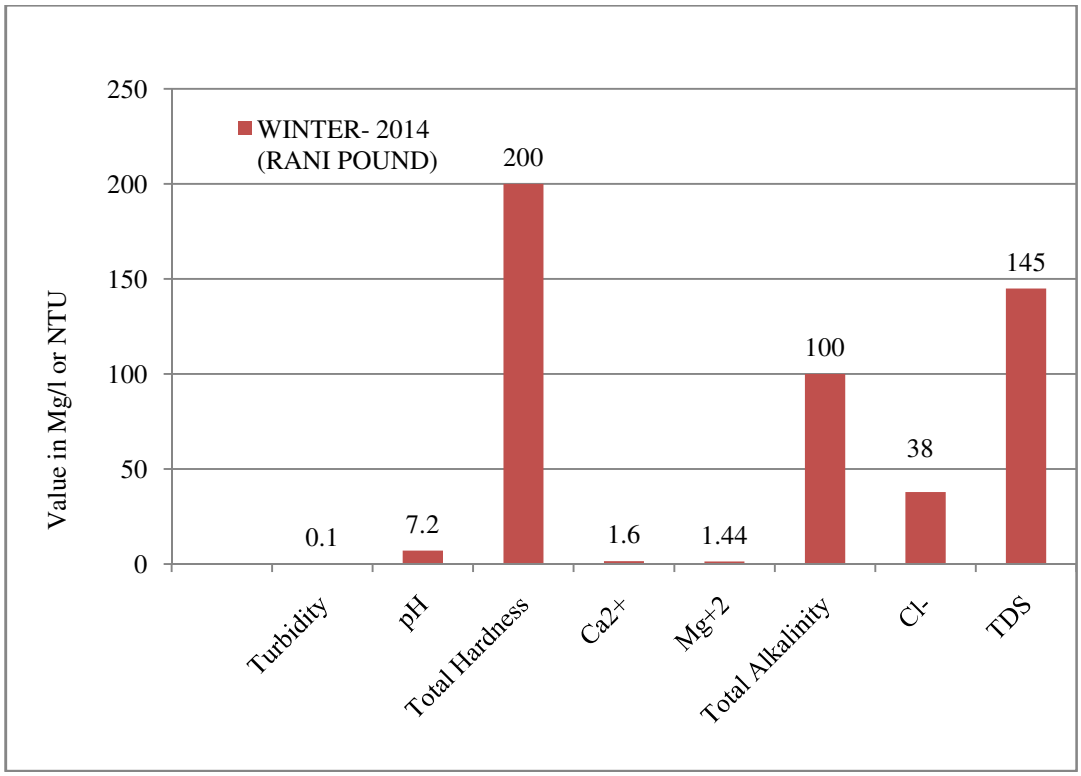

Figure-3
Average value of all parameters of surface water

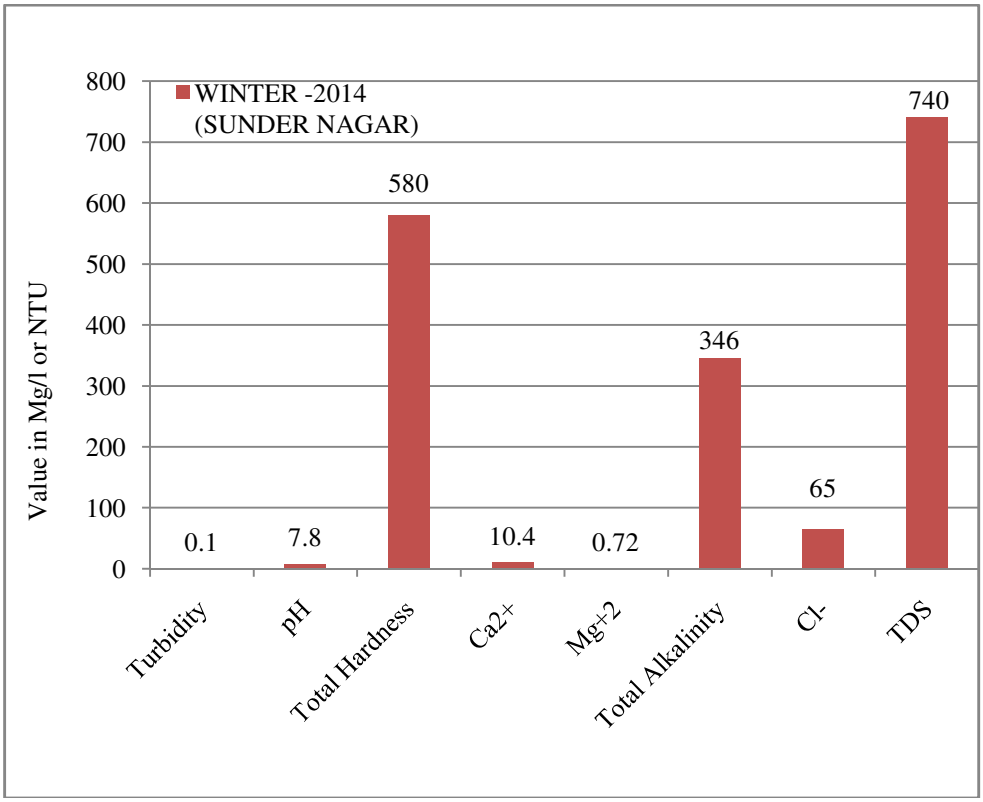

Figure - 4
Average value of all parameters of surface water

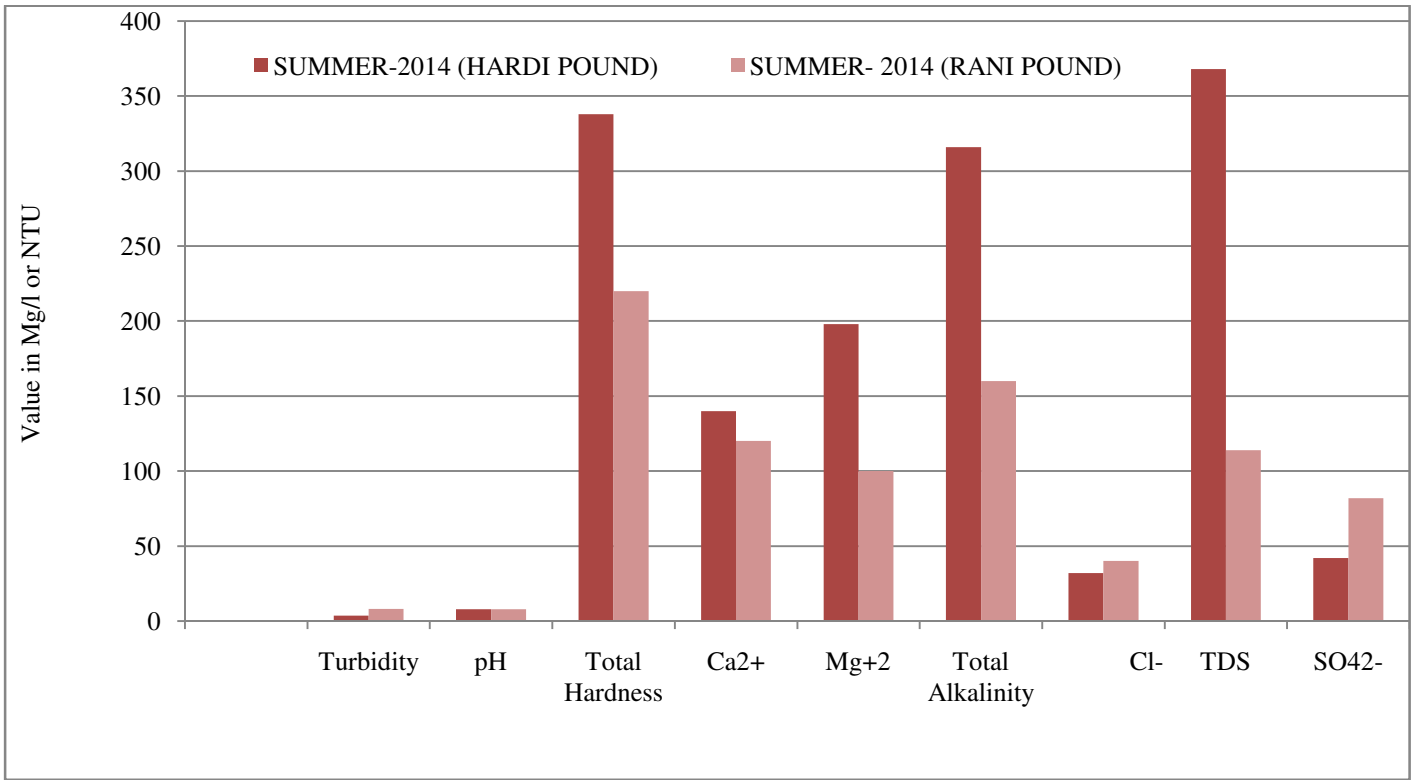

Figure - 5
Comparative average value of all parameters of surface water in summer season-2014

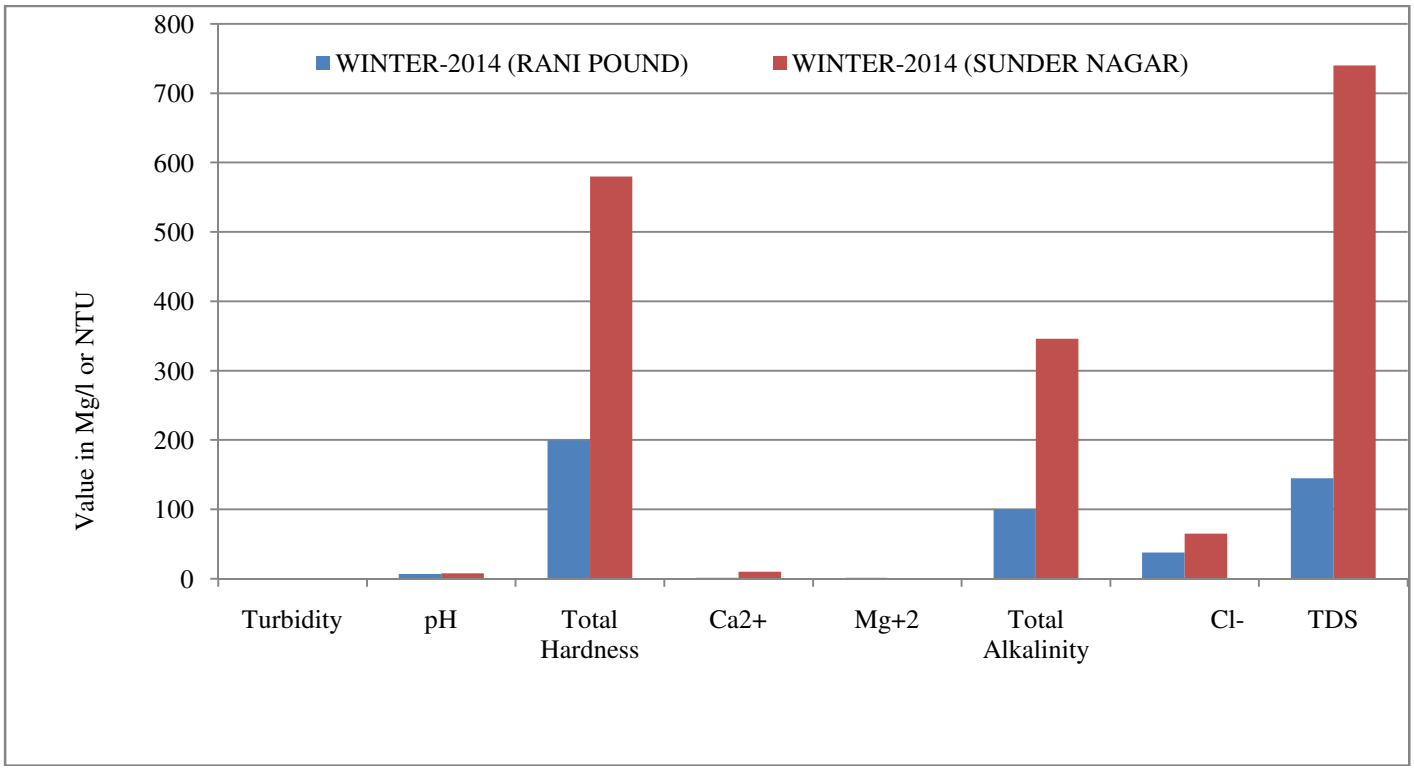

Figure - 6
Comparative average value of all parameters of surface water in winter season-2014

Table -4
Water quality parameters and drinking water standards

Parameters	BIS Desirable limit of drinking water
PH Value	6.5–8.5
TDS (Mg/l)	500
Total hardness (Mg/l)	300
Total alkalinity (Mg/l)	200
Ca^{2+} (Mg/l)	75
Mg^{2+} (Mg/l)	100
Na^{+} (Mg/l)	60
No_3^{-} (Mg/l)	45
Cl^{-}(Mg/l)	250
So_4^{2-} (Mg/l)	200
Co_3^{2-} (Mg/l)	NIL
HCo_3^{-} (Mg/l)	250

Conclusion

The result of physico-chemical analysis of surface water samples indicates overall hard water and alkaline nature. The surface water pH desirable limit. About some water samples TDS less than 1000 mg/l; and water are suitable for drinking purposes according to analyzed data of total dissolved solid. All samples of water are normal chloride, sulfate and very hard, hence some water sample suitable or not suitable for drinking purposes according to analyzed data of hardness. Analyzed data compared with WHO (1984), BIS and ISI (1991).All surface water data indicate, samples are more or less suitable for drinking purpose. Some sample quantity dissolved in water of permissible category. The whole study was under study throughout the year, including summer and winter season and sample taken from three sites for the analysis. The analysis of the water sample done as per the analytical methods for the various parameters illustrated in table-1. The threshold limit for various parameters has been consistent according to the WHO, ISI and BIS norms fixed in drinking water (table-3 and 4).

References

1. Manoj Kumar Solanki, Gupta O.P., Shukdeo Prasad Ahirwar and Mukesh Singh, Physico-chemical and Comparative analysis of Underground Water in Summer and Winter Season 2014 of Rewa city, MP, India, *Int. Res. J. Environment Sci.,* **4(5),** 73-79 **(2015)**

2. Manoj Kumar Solanki, O.P. Gupta, D.K Singh., Shukdeo Prasad Ahirwar, Comparative Physico-Chemical Analysis of River Water and underground Water in Winter Season of Rewa City, MP, India, *Int. Res. J. Environment Sci,* **3(3),** 59-61 **(2014)**

3. Manoj Kumar Solanki and O.P. Gupta, Physico-chemical and comparative analysis of river Water underground water and surface water of Rewa city MP, India, *Poll Res.,* **32(2)**, 235-237 **(2013)**

4. AjithaV., Rajathy Sivalingam, Rojith G. and Syamkumar R., Physico-Chemical Characterization of Coir Pith Black Liquor and Coir Pith Effluent, *Int. Res. J. Environment Sci.,* **4(2),** 46-49 **(2015)**

5. Manoj Kumar Solanki, Gupta O.P. and Shukdeo Prasad Ahirwar, Study of Yearly Variation and Physico-Chemicalstudy of River Water, Underground Water and Surface Water of Rewa City, MP, India, *Int. Res. J. Environment Sci,* **2(9),** 1-4 **(2013)**

6. W.H.O., Guidelines for drinking water quality, Vol. 1, Recommendations WHO, Geneva **(1984)**

7. APHA-AWWA-WPCF, Standard methods for the Examination of Water and Wastewater, Editor A.D. Eaton, 18th Ed., American Public Health Association, Washington, **(2005)**

8. Hemant Pathak and S.N. Limaye, Study Seasonal Variation in Groundwater Quality of Sagar City (India) by Principal Component Analysis**,** *E-Journal of Chemistry,* **8 (2011)**

9. Ndubi D. 1, Oyaro N. 2, Githae E.3 and Afullo. A.4, Determination of Physico-Chemical Properties Of Sources of Water In Narok North Sub- County, Kenya, *Int. Res. J. of Environment Sciences,* **4(1),** 47-51, **(2015)**

10. Neelesh Shrivastava, Mishra D.D., Mishra P.K. and Avinash Bajpai, A study on the sewage disposal into the machna river in Betul City, Madhya Pradesh, India, *Advances in Applied Science Research,* **3(5),** 2573-2577 **(2012)**