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Water Quality Analysis of Water Bodies of Karwi Chitrakoot

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Abstract: ***Water has the ability to dissolve most substances and all living organisms depend on it in their living whether these organisms are plants or animals. Groundwater is the cheapest and most practical means of providing water to small communities and it is superior to surface water because the ground itself provides an effective filtering medium. The present study focused to assess the probable ground water predicts zone of defined area as Karwi Block part of Chitrakoot District, Uttar Pradesh India. This study assessed groundwater quality across selected stations. pH ranged from 6.82 to 7.80 (WHO limit: 6.5-8.5), and EC from 695-1800 mg/l, with only S2 exceeding the BIS limit (800 mg/l). Turbidity varied from 0-9.9 NTU. Total hardness (332-884 mg/l) and calcium hardness (53.1-505.1 mg/l) were within BIS limits, while magnesium exceeded the limit (35 mg/l) at S2 and S4. Chloride (40.52-325.3 mg/l), sulphate (61-113.62 mg/l), total solids (440-1410 mg/l), and total dissolved solids (435-1400 mg/l) met permissible standards. The groundwater is mostly safe for consumption, except for elevated magnesium levels at some stations.***

Keywords: Physico-Chemical, Water Analysis, Water Quality112

I. INTRODUCTION

Water quality analysis is one of the most important aspects in groundwater studies. The hydro chemical study reveals quality of water that is suitable for drinking, agriculture and industrial purposes. Further, it is possible to understand the change in [1, 2] quality due to rock water interaction or any type of anthropogenic influence. Ground water quality depends on the quality of recharged water atmospheric precipitation inland surface water and sub-surface geochemical processes. Temporal change in the origin and constitution of the recharged water, hydrological and human factors may cause periodic change in ground water quality. Water pollution not only affects water quality but also threats human health, economic development and social prosperty. Ground water is a source of drinking water and even today more than half of the word population depends on ground water for survival. The assessment of water quality is very important for knowing the suitability for various purpose. Assessment of ground water for drinking and irrigation has become a necessary and important task for present and future ground water quality monitoring and evaluation for domestic and agricultural activities around the world. Water is prime need for human survival ad industrial development. For many rural and small communities ground water is the only source of drinking water [3-4]. For groundwater monitoring, of hand pumps are one of the important tools for evaluating ground water quality. Considering these aspects of water pollution the present study of ground water monitoring was undertaken to investigate physico-chemical characteristics of some ground water sample from different location in Karwi city Chitrakoot

II. MATERIAL AND METHOD

Selected Station	Station Code	Latitude/ Longitude
C.I.C	S1	25°12′46.056″
		80°55′14.952″
Allahabad Road	S2	25°12′ 13.0″
		80°55′ 55.2″
SDM Colony	S3	25°12′ 49.278″
		80° 55′ 21.34″
Railway Station	S4	25°12′ 50.288″
		80°55′ 25.300″
Kacheri	S5	25°12′ 51.9″
		80° 55′ 15.04″
Tehsil	S6	25°12′ 48.638″
		80°55′ 24.018″
Mandi Bazar	S7	25°12 ′30.630″
		80°12′ 40.640″
J M Colony	S8	25°12′ 35.357″
		80°54′ 45.366″
G.G.I.C	S9	25°°° 12′40.9	80°54′ 45.396″

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Ground water samples were collected for a period of one month from 9 hand pumps of Karwi city. The sample was collected from the hand pumps after drawing water for ten minutes by pumping out. After the collection, the bottles were tightly closed, marked and labelled. The samples were brought to the laboratory for the chemical analysis. The sampling was done at fortnight interval. The water sample was analysed for physical and chemical parameters. The physical parameter to in order to check the acceptability of water. In the selected stretch of groundwater nine sampling stations were selected. Nine sampling station namely C.I.C, Allahabad Road, S.D.M Colony, Railway Station, Kacheri, Tehsil, Mandi bazaar, J.M Colony, G.G.I.C. Collection of water samples were collected from the hand pumps, used for domestic or irrigation purpose from the karwi Chitrakoot India. Determination of pH, Turbidity, Conductivity, Total Hardness, Determination of Calcium, Determination of Magnesium, Determination of Chloride, Alkalinity, Total Solid, Total Dissolved Solid, Determination of Sulphate.

III. RESULTS & DISCUSSION

The present investigation ground water quality of nine different hand pumps or different sites of Karwi city, district Chitrakoot. Understanding the ground water quality is important as it is the main factor determining its suitability for drinking; Domestic, Agricultural, and industrial purpose. Table- illustrates the physico-chemical parameters of groundwater in Karwi city, indicating the average values.

A. pH

The pH was observed ranged from 7.2-7.10. The minimum value was observed 6.82 at S3 and maximum was observed 7.80 at S8. All selected stations were found within the permissible limit prescribed by WHO (6.5-8.5). The study showed that the groundwater of the selected station was generally neutral to slightly alkalinity. Althose pH has no direct effect on the human health, it shows close relationship with some parameters of water.

B. *Electrical Conductivity (EC)*

The electric conductivity is the capacity of water to carry an electrical current and varies both with number and types of ions the solution (Dohare et.al, 2014). The total EC was found ranged from 695-1720 mg/l. The minimum value was observed 695 at S7 while maximum value was observed 1800 mg/l at S2. All selected stations were found within the permissible limit prescribed by BIS (800 mg/l). Electric conductivity value use can be used to estimate the dissolved solids concentration which may affect the test of water and suitability for various uses. Higher the conductivity value indicates higher the dissolve solid in water.

C. Turbidity (NTU)

The turbidity is measure by digital turbidity meter. Turbidity value of water samples varied between 00-9.9 NTU. Minimum value was found 000 at S1while maximum value was 9.9 at S9.

D. Total Hardness

The total hardness is the measure of the capacity of water to precipitate soap the hardness is more than 50 mg/l cause the RENAL CALCULI formation of kidney store. Hardness levels have a bearing on the toxicity of some metals. In general, these toxic effects are markedly less in waters with significant degree of hardness. The total hardness was found ranged from 332-884 mg/l. The minimum value was observed 332 mg/l S9 and maximum was observed 884. mg/l at S2. All selected stations were found within the permissible limit prescribed by BIS (600 mg/l).

E. Calcium Hardness

The calcium hardness range was observed 53.1-505.1 mg/l. The minimum value was observed 53.1 mg/l S7 and maximum was observed 505.1 mg/l at S2.

F. Magnesium

Magnesium is abundant and a major dietary requirement for humans. It is the second major constituent of hardness. Magnesium sulphate is used medicinally as "Epsom Salts," a laxative. The Magnesium was found ranged from16.7 – 95.64mg/l. The minimum value was observed 16.7 mg/l S7 and maximum was observed 95.64mg/l at S6. All selected stations were found within the permissible limit prescribed by BIS (35 mg/l) except S2 and S4.

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G. Chloride

The chloride was found ranged from 40.52 -325.30mg/l. The minimum value was observed 40.52 at S7 while maximum value was observed 325.30 mg/l at S7. All selected stations were found within the permissible limit prescribed by BIS (1000 mg/l.)

H. Sulphate

The sulphate was found ranged from 61-113.62 mg/l. The minimum value was observed 61 at S6 while maximum value was observed 113.62 mg/l at S2. All selected stations were found within the permissible limit prescribed by BIS (1000 mg/l.)

I. TS

TS includes ionized and nonionized matter. The total solids were found ranged from 440-1410mg/l. The minimum value was observed 440 mg/l S7 and maximum was observed 1410 mg/l at S2. All selected stations were found within the permissible limit prescribed by WHO (2000 mg/l).

J. TDS

TDS includes ionized and nonionized matter. The total dissolved solids were found ranged from 435-1400 mg/l. The minimum value was observed 435mg/l S7 and maximum was observed 1400 mg/l at S2. All selected stations were found within the permissible limit prescribed by WHO (2000 mg/l)

S.No.	Sample	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	pH	7.2	6.85	6.82	6.96	6.87	7.16	7.47	7.30	7.10
2	EC	1039	1800	1172	1265	1347	1077	721	1330	1040
3	Turbidity	2.1	6.7	3.8	6.5	2.1	1.7	4.5	5.3	9.9
4	Total Hardness	432	884	686	626	758	580	378	514	334
5	Calcium	59.2	505.6	454.4	144	192	75.2	54.4	67.2	62.4
6	Magnesium	69.296	19.52	56.12	64.904	67.832	95.648	59.048	84.424	43.432
7	Alkalinity	589	655.5	479.75	536.75	441.75	603.25	612.75	494	589
8	Chloride	81.56	325.32	188.76	185.76	228.18	80.14	40.54	105.6	89.58
9	Sulphate	33.625	113.625	82.125	85.125	72.25	63	33.5	141.25	75.875
10	Total Solid	800	1280	1040	1000	1080	840	520	1040	880
11	TDS	760	1400	960	960	800	600	440	880	760

Table-1: Physico-chemical characteristics of Ground water of Karwi city

S.No.	Sample	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	pH	8.10	7.85	7.60	7.56	7.35	7.95	7.82	8.10	7.41
2	EC	1003	1720	1028	1226	1036	1021	695	1254	1008
3	Turbidity	431	883	682	621	754	575	375	510	332
4	Total Hardness	58.2	505.3	454.1	140	182	74.1	53.1	64.1	61.2
5	Calcium	68.29	19.50	56.10	63.90	67.83	95.64	59.04	84.42	43.43
6	Magnesium	68.29	19.50	56.10	63.90	67.83	95.64	59.04	84.42	43.43
7	Alkalinity	574	644.4	478.74	536.74	441.73	603.2	612.7	490	584
8	Chloride	81.54	325.30	188.59	185.7	228.17	80.10	40.52	105.4	89.54
9	Sulphate	33.621	112.62	82.121	85.122	72.23	61	33.1	191.2	75.84
10	Total Solid	779	1278	1038	999	1079	837	519	1038	875
11	TDS	755	1399	978	948	798	599	435	878	761

Table-2: Physico-chemical characteristics of Ground water of Karwi city

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S.NO.	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	7.2	6.85	6.82	6.96	6.87	7.16	7.47	7.30	7.10
2	Feb2	8.10	7.85	7.60	7.56	7.35	7.95	7.82	8.10	7.41
3	Mean	7.65	10.775	7.21	7.26	7.11	7.555	7.645	7.7	7.255
4	SD	0.636	0.707107	0.551543	0.424264	0.339411	0.558614	0.247487	0.565685	0.219203
	Min	7.2	6.85	6.82	6.96	6.87	7.16	7.47	7.30	7.10
	Max	8.10	7.85	7.60	7.56	7.35	7.95	7.82	8.10	7.41

Table-3: pH at different sampling stations

S.NO.	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	1039	1800	1172	1265	1347	1077	721	1330	1040
2	Feb2	1003	1720	1028	1226	1036	1021	695	1254	1008
3	Mean	1021	1760	1100	1245.5	1191.5	1049	708	1292	10241
4	SD	25.45584	56.56854	101.8234	27.57716	219.9102	39.59798	18.38478	53.74012	22.62742
	Min	1003	1720	1028	1226	1036	1021	695	1254	1008
	Max	1039	1800	1172	1265	1347	1077	721	1330	1040

Table-4: EC at different sampling stations

S.NO.	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	2.1	6.7	3.8	6.5	2.1	1.7	4.5	5.3	9.9
2	Feb2	000	004.1	000.3	002.0	000.0	000.5	000.6	002.3	012.6
3	Mean	1.05	3.4	2.05	4.25	1.05	1.1	2.55	2.8	5.013
4	SD	1.484924	1.838478	2.474874	3.181981	1.484924	0.848528	2.757716	2.12132	1.909188
	Min	000	004.1	000.3	002.0	000.0	000.5	000.6	002.3	012.6
	Max	2.1	6.7	3.8	6.5	2.1	1.7	4.5	5.3	9.9

Table-5: Turbidity at different sampling stations

S.NO.	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	432	884	686	626	758	580	378	514	334
2	Feb2	431	883	682	621	754	575	375	510	332
3	Mean	431.5	883.5	684	623.5	756	577.5	376.5	512	333
4	SD	0.707107	0.707107	2.828427	3.535534	2.828427	3.535534	2.12132	2.828427	1.414214
	Min	431	883	682	621	754	575	375	510	332
	Max	432	884	686	626	758	580	378	514	334

Table6: Total Hardness at different sampling stations

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S.NO.	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	59.2	505.6	454.4	144	192	75.2	54.4	67.2	62.4
2	Feb2	58.2	505.3	454.1	140	182	74.1	53.1	64.1	61.2
3	Mean	58.7	505.45	454.25	142	187	74.65	53.75	65.65	61.8
4	SD	0.707107	0.212132	0.212132	2.828427	7.071068	0.777817	0.919239	2.192031	0.848528
	Min	58.2	505.3	454.1	140	182	74.1	53.1	64.1	61.2
	Max	59.2	505.6	454.4	144	192	75.2	54.4	67.2	62.4

Table 7: Calcium at different sampling stations

S.NO.	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	69.29	19.52	56.12	64.9	67.8	95.6	59.0	84.4	43.432
2	Feb2	68.29	19.50	56.10	63.90	67.83	95.64	59.04	84.42	43.43
3	Mean	68.79	9.755	56.11	64.4	67.815	95.62	59.02	84.41	43.431
4	SD	0.707107	0.014142	0.014142	0.707107	0.021213	0.028284	0.028284	0.014142	0.001414
	Min	68.29	19.50	56.10	63.90	67.8	95.6	59.0	84.4	43.43
	Max	69.29	19.52	56.12	64.9	67.83	95.64	59.04	84.42	43.432

Table8: Magnesium at different sampling stations

S.NO.	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	589	655.5	479.75	536.75	441.7	600.2	610.7	494	589
2	Feb2	574	644.4	478.74	536.74	441.73	603.2	612.7	490	584
3	Mean	581.5	649.95	479.245	536.745	441.715	601.7	611.7	492	586.5
4	SD	10.6066	7.848885	0.714178	0.007071	0.021213	2.12132	1.414214	2.828427	3.535534
	Mn	574	644.4	478.74	536.74	441.7	600.2	610.7	490	584
	Max	589	655.5	479.75	536.75	441.73	603.2	612.7	494	589

Table9: Alkalinity at different sampling stations

S.NO	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	81.56	325.32	188.59	185.76	228.1	80.14	40.54	105.6	89.58
9	Feb2	81.54	325.30	183.59	185.7	228.17	80.10	40.52	105.4	89.54
3	Mean	81.55	325.31	186.09	185.73	456.27	80.12	40.53	105.5	89.56
4	SD	0.014142	0.014142	3.535534	0.042426	0.049497	0.028284	0.014142	0.141421	0.028284
	Min	81.54	325.32	183.59	185.7	228.1	80.10	40.52	105.4	89.54
	Max	81.56	325.30	188.59	185.76	228.17	80.14	40.54	105.6	89.58

Table 10: Chloride at different sampling stations

S.NO	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	33.625	113.62	82.12	85.12	72.25	63	33.5	141.2	75.87
2	Feb2	33.621	112.62	82.121	85.122	72.23	61	33.1	191.2	75.84
3	Mean	33.623	113.12	82.1205	85.121	72.24	62	33.3	166.2	75.855
4	SD	0.002828	0.707107	0.000707	0.001414	0.014142	1.414214	0.282843	35.35534	0.021213
	Min	33.621	112.62	82.12	85.12	72.23	61	33.1	141.2	75.84
	Max	33.625	113.62	82.121	85.122	72.25	63	33.5	191.2	75.87

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S.NO	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	800	1280	1040	1000	1080	840	520	1040	880
2	Feb2	760	1410	960	960	800	600	440	880	760
3	Mean	780	1345	1000	980	940	720	480	960	82033
4	SD	28.28427	91.92388	56.56854	28.28427	197.9899	169.7056	56.56854	113.1371	84.85281
	Min	760	1280	960	960	800	600	440	880	760
	Max	800	1410	1040	1000	1040	840	520	1040	880

Table 12: Total Solid at different sampling stations

S.NO	Month	S1	S2	S3	S4	S5	S6	S7	S8	S9
1	Feb 1	760	1400	960	960	800	600	440	880	760
2	Feb2	755	1399	978	948	798	599	435	878	761
3	Mean	757.5	1399.5	969	954	799	599.5	437.5	879	760.5
4	SD	3.535534	0.707107	12.72792	8.485281	1.414214	0.707107	3.535534	1.414214	0.707107
	Min	755	1399	960	948	798	599	435	878	760
	Max	760	1400	978	960	800	600	440	880	761

Table 13: Total Dissolved Solid at different sampling stations

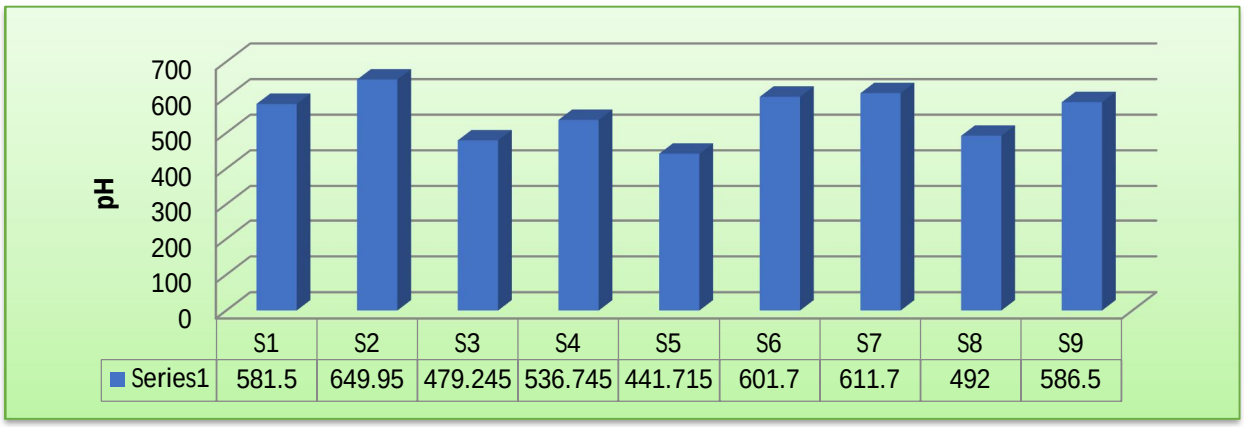


Figure1: Mean Value of pH

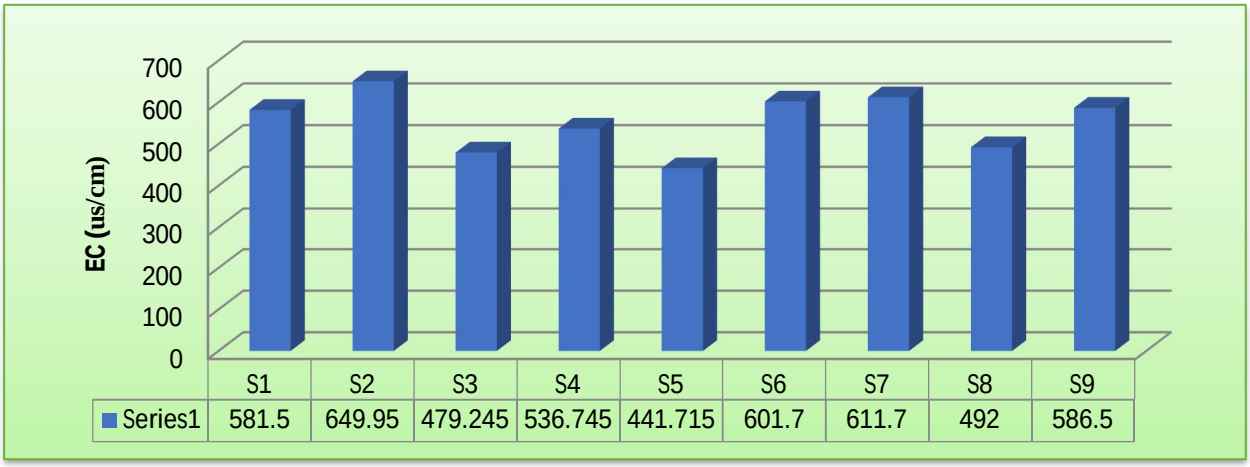


Figure 2: Mean Value of EC

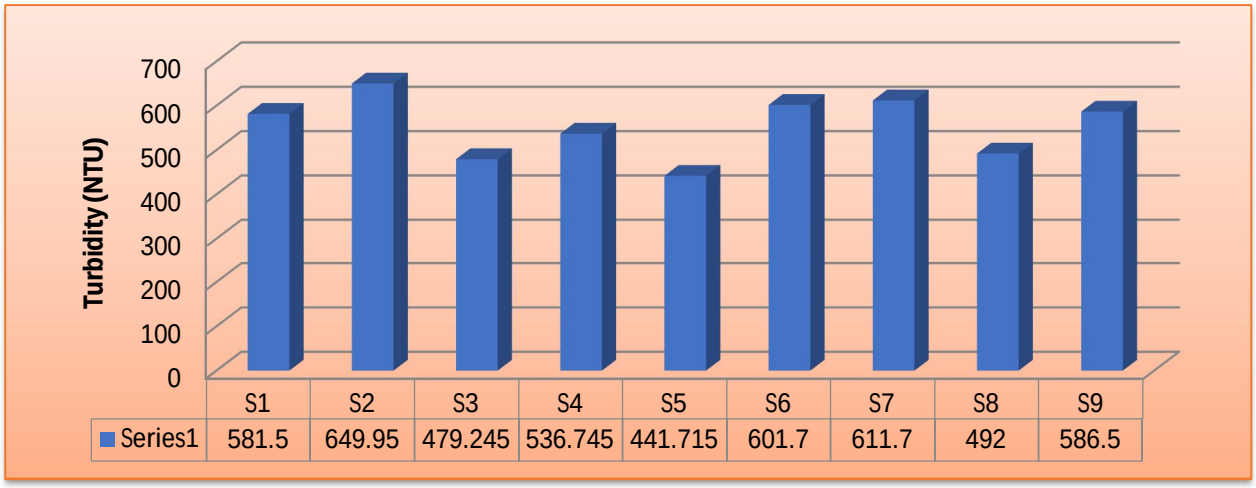


Figure 3: Mean Value of Turbidity

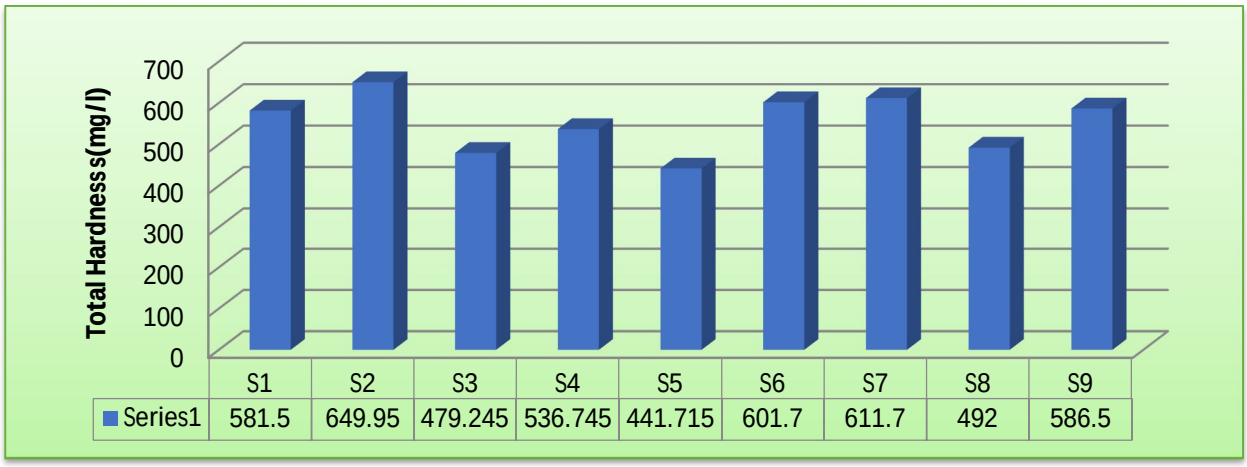


Figure 4: Mean Value of Total Hardness

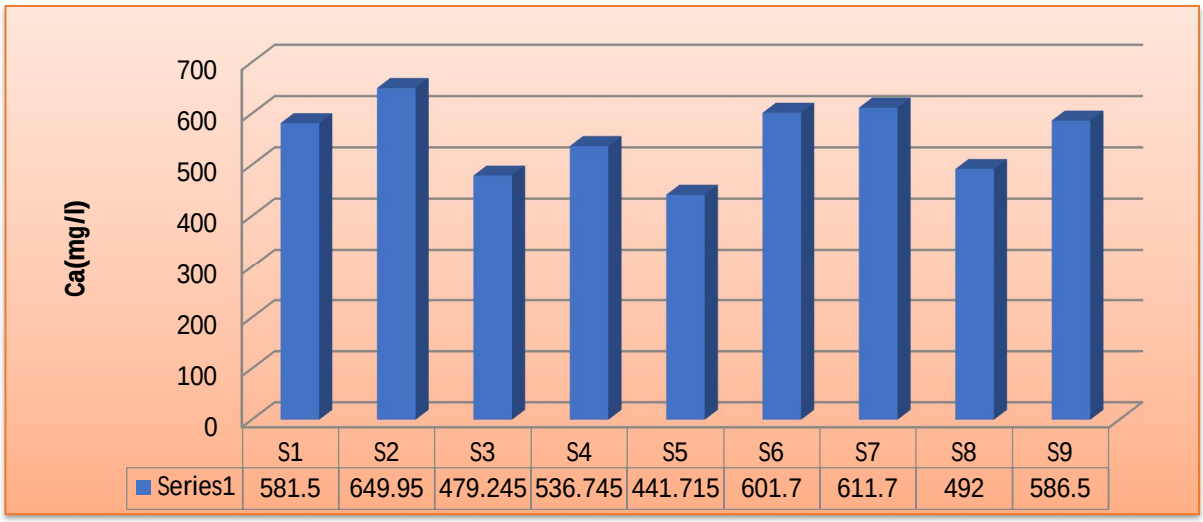


Figure 5 : Mean Value of Calcium

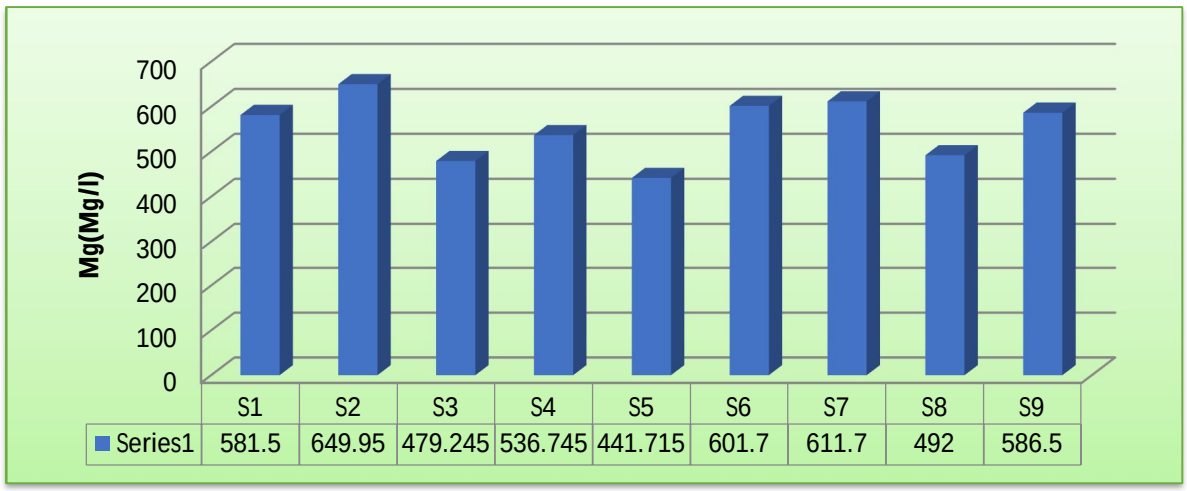


Figure 6: Mean Value of Magnesium

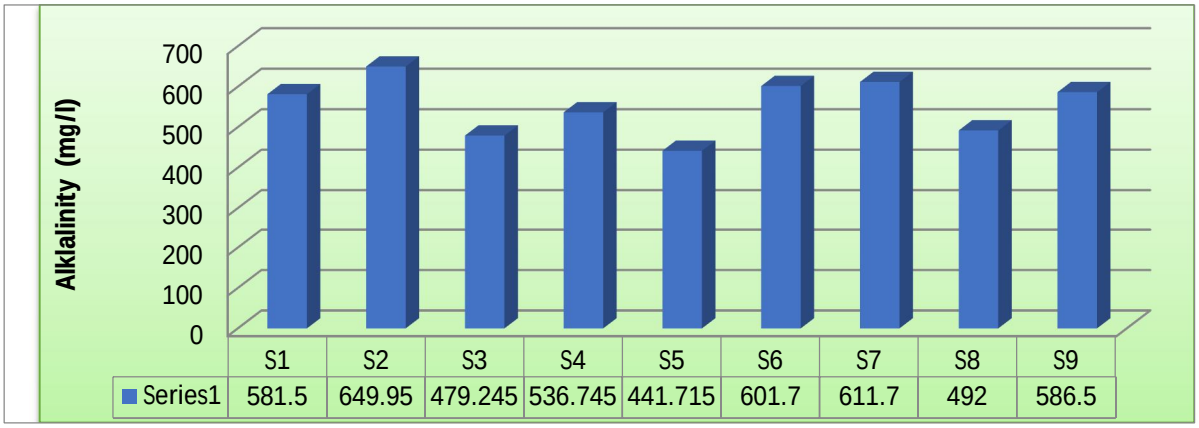


Figure 7: Mean Value of Alkalinity

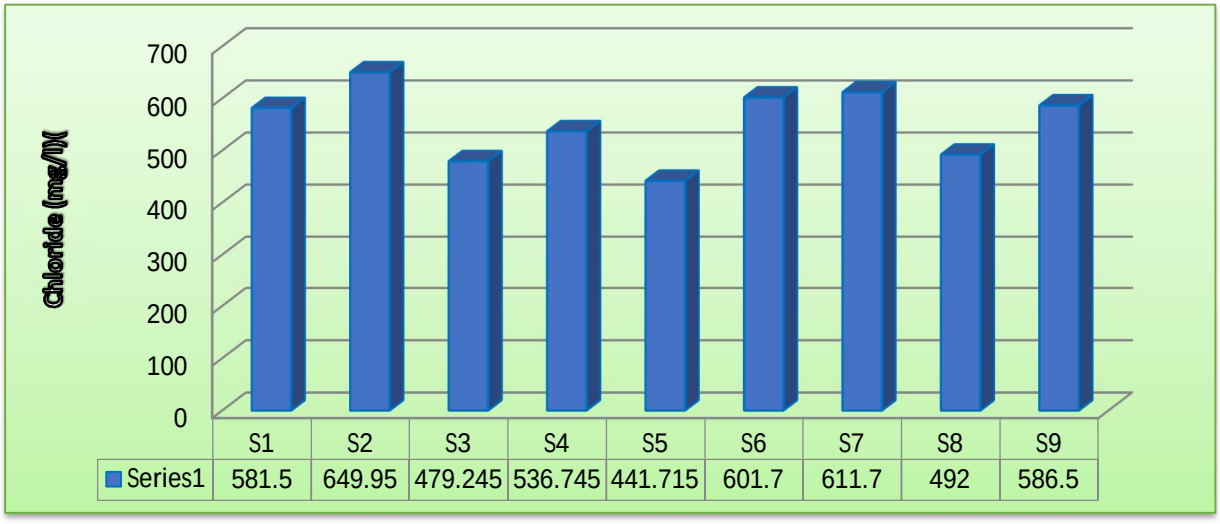


Figure 8: Mean Value of Chloride

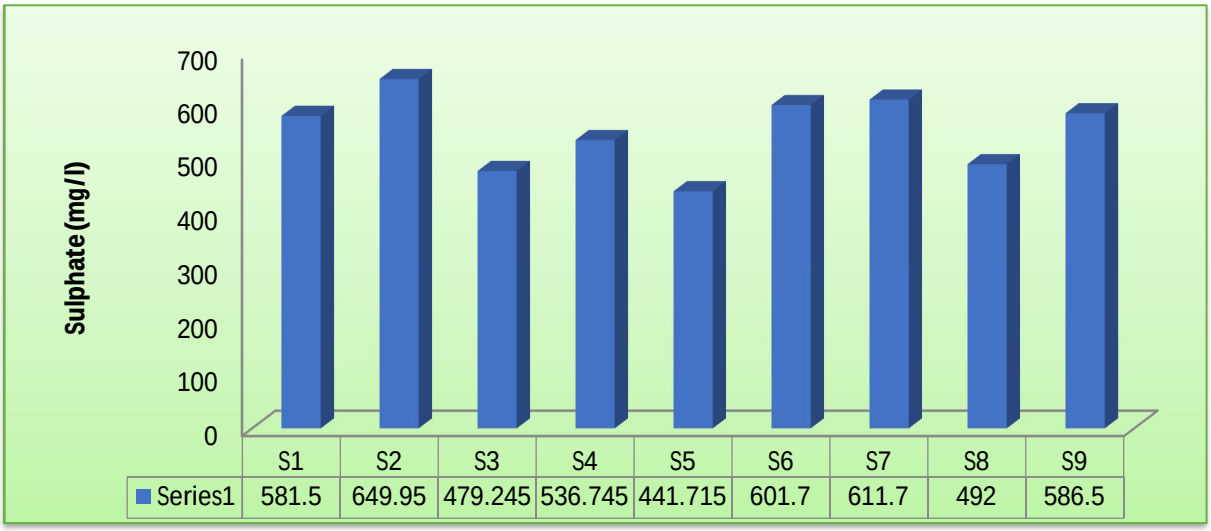


Figure 9: Mean Value of Sulphate

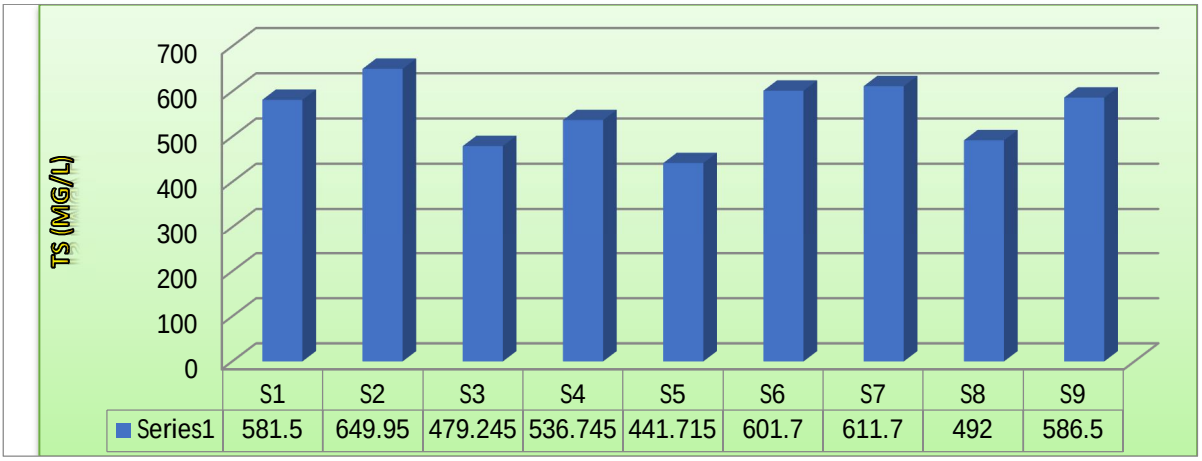


Figure 10: Mean Value of Total Solid

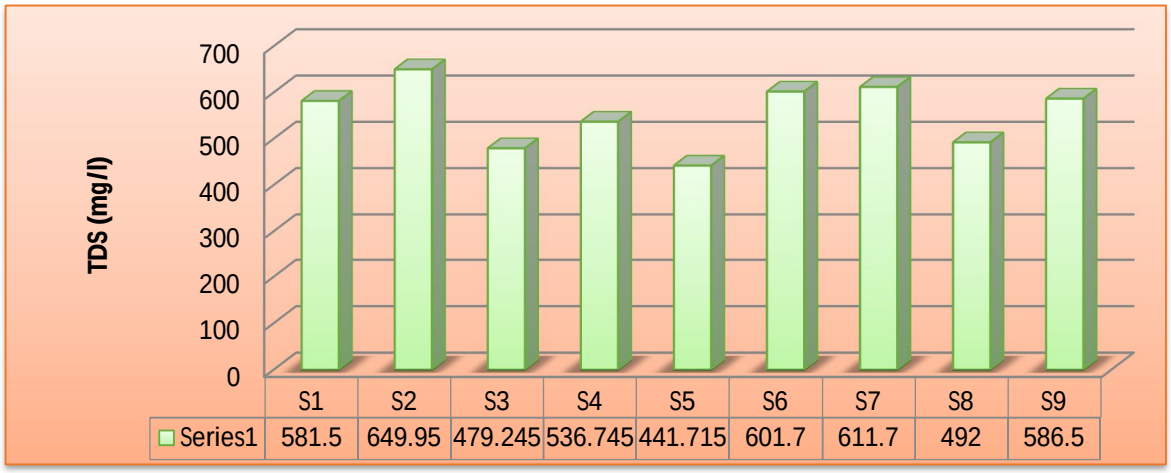


Figure 11: Mean Value of Total Dissolved Solid

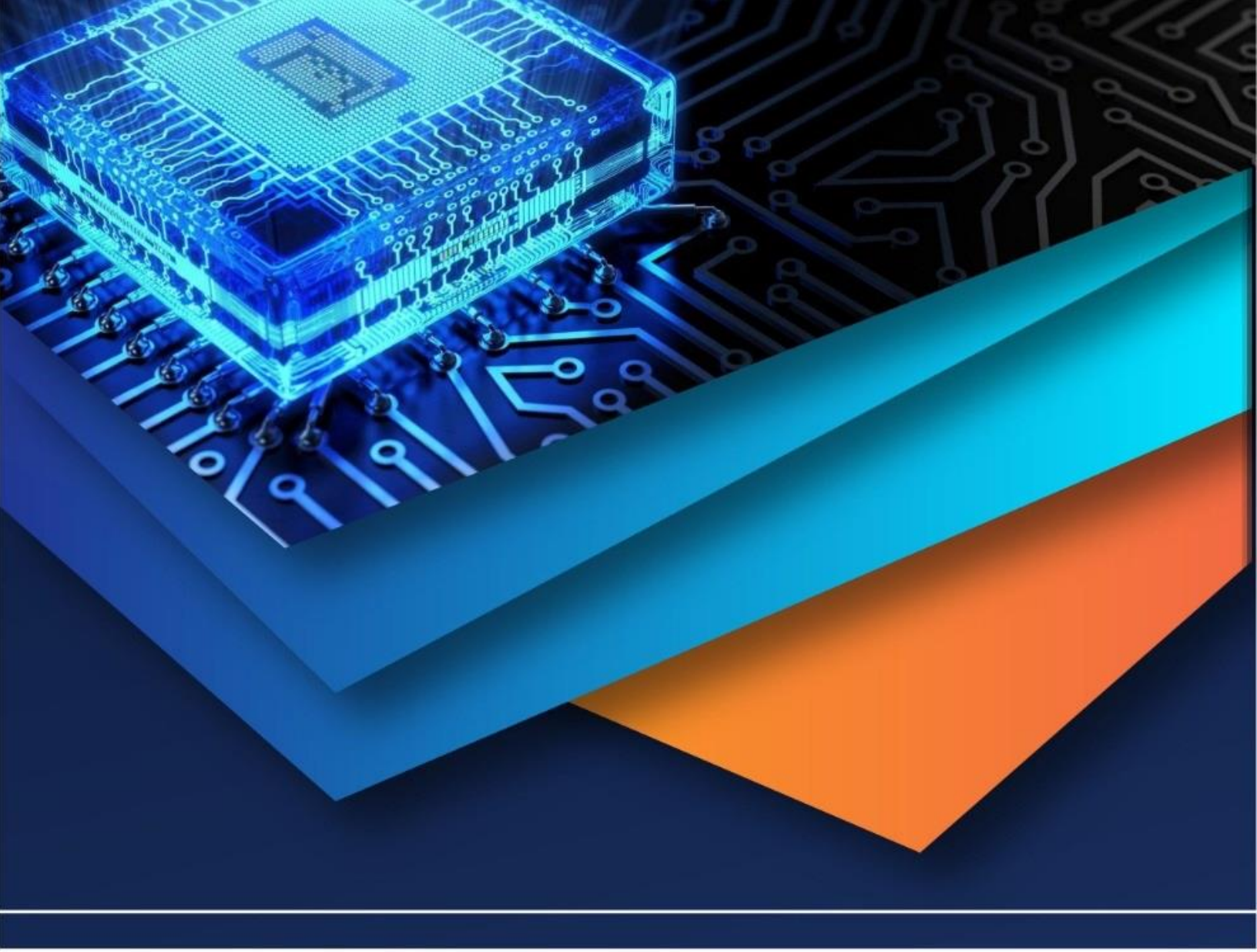
IV. CONCLUSION

Total Nine groundwater sample were selected for study of Physico-chemical quality of water at Karwi city. From the study it was conclude that all ground water samples were observed within the limit prescribed by BIS/WHO except Mg hardness at S6 (95.64 mg/l) & S8(84.42 mg/l) and Ca at S2 (505.0 mg/l) & S3 (454.4 mg/l). Hence, these samples of water absolutely fit for drinking propose sum essential treatment needed to Ca hardness & Mg hardness to convert in drinkable water.

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