

**STUDY OF DRINKING WATER QUALITY IN RAINY SEASON IN VARIOUS
GOVERNMENT SCHOOLS OF ELURU MUNICIPAL CORPORATION, WEST
GODAVARI DISTRICT, A.P: A COMMUNITY RESPONSIBILITY**

K.S.V.K.S. Madhavi Rani¹, R. Indira^{*2}, N. Lakshmi Prasanna³, N. Nirmala⁴ and S. K. Masarat Jaha Begam⁵

^{1,2}Associate Professors, Department of Zoology, Ch.S.D.St. Theresa's College for Women (A), Eluru.

^{3,4,5}Assistant Professors, Department of Zoology, Ch.S.D.St. Theresa's College for Women (A), Eluru.

***Corresponding Author: Dr. R. Indira**

Associate Professors, Department of Zoology, Ch.S.D.St. Theresa's College for Women (A), Eluru.

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ABSTRACT

Next to air, water is the most essential element to human life. It is essential to the functioning of every single cell and organ system in the human body. It is evidently clear that water is one of the prime elements responsible for life on earth. Our drinking water today, far from being pure, contains some two hundred deadly commercial chemicals and is unsuitable for human consumption. This study on Potable water analysis is to ensure safe drinking water available at government schools, identify problems and bring responsibility towards water resources and to learn the water quality technologies. Water samples were assessed during rainy season on physico-chemical parameters like pH, EC, Turbidity, TDS, Alkalinity, Hardness, Calcium, Magnesium, Sulphate, Iron, DO and COD by using standard methods.

KEYWORDS: Water Quality, Physico- Chemical parameters.

INTRODUCTION

Water is called elixir of life and is a basic commodity on the planet. It is difficult to visualize the sustenance of any life form without this resource. Water circulates through the land just as it does through the human body transporting, dissolving, replenishing nutrients and organic matter, while carrying away waste material in the body. It regulates the activities of fluids, tissues, cells, lymph, blood and glandular secretions. Just because of a small loss of water, a person suffers from dehydration, displaying symptoms of irritability, fatigue, nervousness, dizziness, weakness, headache and consequently reach state of unconsciousness. True health cannot occur without proper hydration of the body.

Knowing this fact, the human race continues to pollute this resource both by its actions and deeds. Globally, it is estimated that 89% of people have access to water suitable for drinking.^[6] According to UNDP report, one out of six people do not have access to clean water, that is, about 1.1 billion people lack access to safe drinking water. 36% of urban and 65% of rural Indians are without access to safe drinking water. Our drinking water today, far from being pure, contains deadly commercial chemicals and is unsuitable for human consumption. Water pollution is one of the major and most critical issues in India, as almost 70 per cent of the surface water resources and various groundwater reserves are

contaminated by biological, toxic, organic and inorganic pollutants. Contrary to the past, our recently developed technological society has become indifferent to this miracle of life. Our natural heritage (rivers, seas and oceans) has been exploited, mistreated and contaminated.

The drinking water quality has a great impact on people's health and longevity.^[4] Being a basic need of human development, health and wellbeing, safe drinking water is an internationally accepted human right^[10], which has been enlisted as one of the ten targets in the Millennium Development Goals (MDGs). As the safe & potable drinking water is needed, various treatment methods are adopted to raise the quality of drinking water. Water should be free from the various contaminations viz. Organic and Inorganic pollutants, Heavy metals, Pesticides etc. as well as all its parameter like pH, Electrical Conductivity, Turbidity, Total Dissolved Salts, Alkalinity, Hardness, Calcium, Magnesium, Sulphates, DO, COD should be within a permissible limit.^[3,5] As the children are the future citizens of India, it is our responsibility to look after their health. For this purpose it is necessary to maintain water quality. The present study aims at studying water quality and seasonal variation in Government Schools of Eluru.

In this regard, water samples were collected from 53 schools of Eluru and are analysed using standard techniques. Awareness programmes were organized for children to create awareness on water resources, efficiency measures in the adoption of self management strategies towards sustained practices and resources.

METHODOLOGY

Water samples were collected from different government schools of Eluru municipality, ones in a week for a period of two months and assessed in the zoology lab for physico- chemical parameters like pH, EC, Turbidity, TDS, Alkalinity, Hardness, Calcium, Magnesium, Sulphate, Iron, DO and COD by using standard methods.

Sampling Method

The drinking water tap opened fully to allow the water flow. Water collected in the sterilized water bottles of 250 ml. The lid is firmly closed and kept the container in cool bin, then transferred to the lab, water sampling containers were analyzed within 24 hrs in the laboratory of zoology department.

Table 1: All Physico-Chemical Parameters of Ground Water Sample Were Determined By Adopting Standard Analytical Methods Which Are Listed Below.

Parameters	Standard Analytical Methods
PH	Eutech- 2700 pH meter
EC	Systronics-304 EC meter
TDS	Eco tester TDS low meter
Turbidity, sulphate	Nepheloturbidity-132
Alkalinity	Volumetrically by H ₂ SO ₄
TH, Ca+2, Mg+2	Complexometrically by EDTA
DO, COD	Standard methods (winklers method)

RESULTS AND DISCUSSION

Physico- chemical analysis during Rainy season

The present study is focused on the drinking water quality of selected schools of Eluru Municipal Corporation. The physico-chemical and biological parameters were analysed for 53 samples of the study area during rainy season using standard techniques and the results are incorporated in Tables. These results were correlated to similar studies.^[2,7,8,9] The values are compared with the standard values given by the Indian (BIS(10500:1991)^[1] and WHO standards as in Table 6.

Table 2: Drinking Water Standards of BIS (IS: 10500: 1991).

S.No	Parameters	Desirable limits mg/l	Permissible limits mg/l
1	pH	6.5-8.5	No relaxation
2	TDS	500	2000
3	Total Hardness	300	600
4	Total alkalinity	300	600
5	Calcium	75	100
6	Magnesium	35	75
7	Chloride	250	1000
8	Fluoride	1.0	1.5
9	Sulphate	200	400
10	DO	5	-
11	COD	10	-
12	BOD	5	30

Table 3: Physical Parameters During Rainy Season.

Sample No	pH	EC (µS/cm)	Turbidity (NTU)	TDS (mg/L)
1	7.46	0.6	0	280
2	7.89	0.6	0	270
3	7.67	0.7	0	240
4	7.67	0.6	0	280
5	7.65	0.5	0	260
6	7.64	0.6	0	250
7	7.35	0.5	0	240
8	7.87	1.5	1	900
9	7.6	1.9	0	1050
10	7.8	1.3	0	720
11	7.99	1.6	0	540
12	7.46	0.6	0	260
13	7.56	0.6	0	240
14	7.74	1.1	1	860

15	7.84	0.6	0	280
16	7.64	0.6	0	310
17	7.64	0.8	0	290
18	7.86	0.7	1	290
19	7.24	0.7	0	314
20	7.64	2.4	0	1480
21	7.54	0.6	0	270
22	7.64	0.7	0	280
23	7.65	0.6	0	240
24	7.64	0.6	0	240
25	7.4	2.6	0	1490
26	7.54	0.8	0	260
27	7.64	0.6	0	260
28	7.34	2.6	0	1390
29	7.64	0.6	0	260
30	7.6	0.6	0	260
31	7.84	1.4	1	600
32	7.3	1.1	0	540
33	7.24	0.7	0	360
34	7.46	0.8	0	360
35	7.64	2	0	1120
36	7.64	2.1	0	1250
37	7.34	0.5	0	260
38	7.06	0.6	0	340
39	7.56	0.6	0	280
40	7.8	0.6	1	280
41	7.64	0.6	0	320
42	7.62	0.5	0	310
43	7.4	0.5	0	280
44	7.53	1.6	0	890
45	7.46	0.6	0	260
46	7.9	1.6	0	980
47	7.26	0.6	2	270
48	7.5	1.2	0	740
49	7.64	1.8	0	1100
50	7.68	0.5	0	280
51	7.54	0.7	0	280
52	7.54	0.5	0	250
53	7.45	0.5	0	240

Table 4: Chemical parameters during rainy season.

Sample No	Alkalinity (mg/L)	Hardness (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sulphate (mg/L)
1	190	200	38	85.6	56
2	240	208	36	82.2	54
3	190	210	18.6	100.2	45
4	190	210	12.6	102.8	46
5	200	230	16	120	46
6	208	190	18.6	100.21	45
7	202	198	16	96	40
8	408	412	78	172	84
9	440	426	67	210	82
10	460	310	28	164.2	60
11	304	296	48	142.34	86
12	202	212	20	108.12	64
13	224	200	18	136	65
14	480	420	48	210	64
15	264	186	14	105.9	62

16	234	216	12.2	130.2	61
17	210	220	39.6	67.4	62
18	216	224	26	106.4	68
19	254	210	28.2	89.2	74
20	652	346	48.6	156.2	198
21	198	224	21.2	112.6	76
22	216	212	18.5	106.4	64
23	200	202	22.4	108.6	68
24	196	200	22.6	96.4	64
25	640	456	64.5	176.5	164
26	212	240	28	86.4	86
27	196	192	28.6	84.3	64
28	640	540	82.6	210.2	196
29	160	198	17.2	96.4	78
30	224	212	14.6	106.8	72
31	340	380	48.6	182.6	48
32	346	296	86	138.2	72
33	212	230	22	106.4	32
34	242	276	23.4	142.5	72
35	460	410	62.2	764.5	196
36	560	340	54.5	160.4	156
37	210	196	24.6	96.4	64
38	246	212	26.4	106.4	56
39	202	246	21.2	86.4	64
40	224	196	22.2	97.57	64
41	246	226	14	110.2	96
42	212	202	28.2	96.49	84
43	226	196	21.6	106.49	64
44	514	426	100.2	112.6	175
45	202	208	36.2	79.11	96
46	478	276	56	136.2	176
47	196	242	32.2	108.2	112
48	522	332	32	164.2	104
49	604	480	54.6	216.25	202
50	256	208	25.6	94.94	86
51	242	212	22.4	102.85	74
52	220	216	19.6	110.76	75
53	248	228	22.4	113.4	146

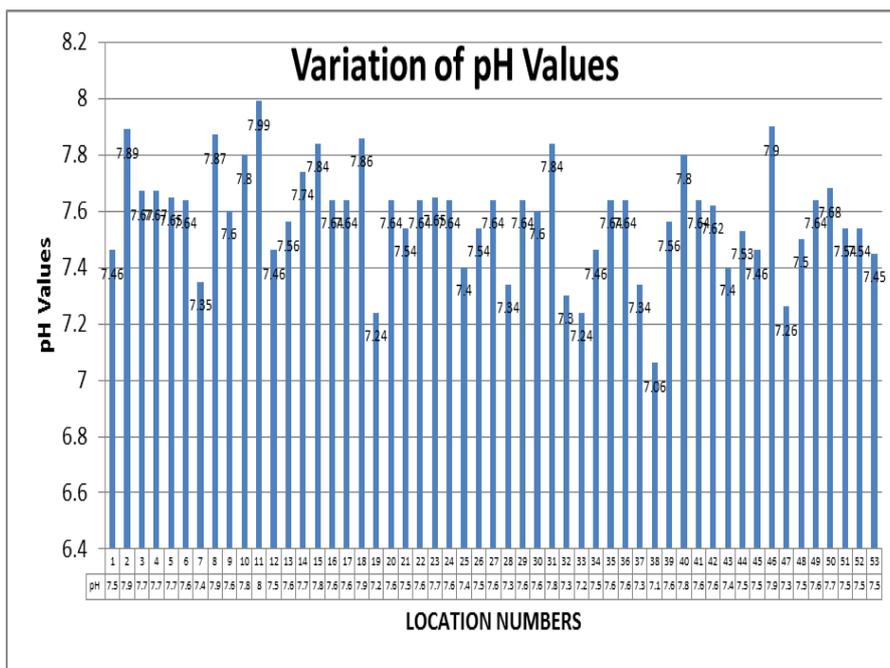
Table 5: Biological Parameters During Rainy Season.

Sample No	DO (mg/L)	COD (mg/L)	Sample No	DO (mg/L)	COD (mg/L)
1	3.2	64	31	2.56	64
2	5.2	32	32	4	64
3	5.2	64	33	3.52	96
4	4	64	34	2.52	96
5	5.2	96	35	2.24	96
6	5.2	64	36	2.24	96
7	3.52	96	37	2.24	96
8	4	92	38	2.24	64
9	3.84	64	39	2.56	64
10	2.24	96	40	2.24	64
11	2.56	64	41	2.24	64
12	2.56	64	42	1.92	64
13	2.56	64	43	2.24	96
14	2.86	96	44	2.56	96
15	2.86	96	45	2.24	64
16	2.56	64	46	1.92	64
17	2.86	64	47	2.24	96
18	2.86	64	48	1.6	64

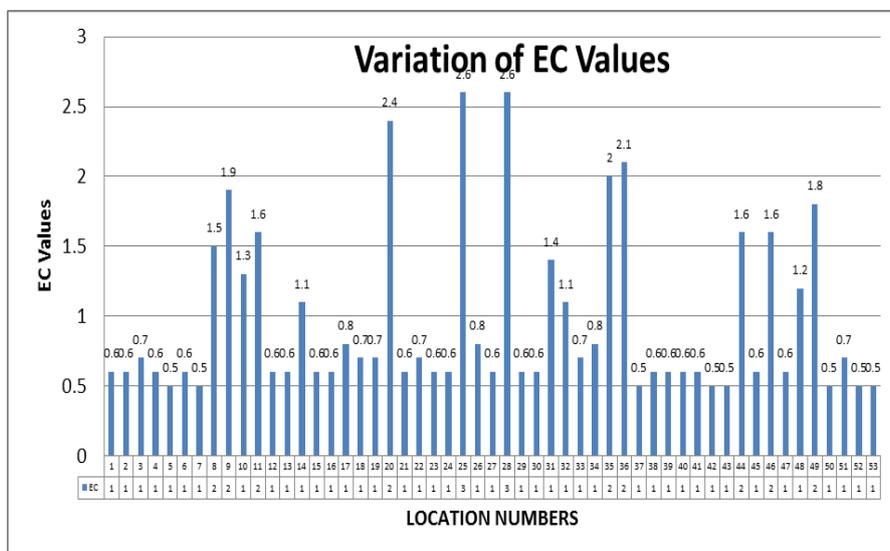
19	2.86	32
20	2.24	64
21	1.92	64
22	2.24	32
23	2.56	32
24	2.56	32
25	2.86	64
26	2.86	64
27	2.24	96
28	2.24	96
29	3.52	32
30	2.88	64

49	1.92	96
50	2.24	96
51	2.88	64
52	2.88	96
53	2.88	64

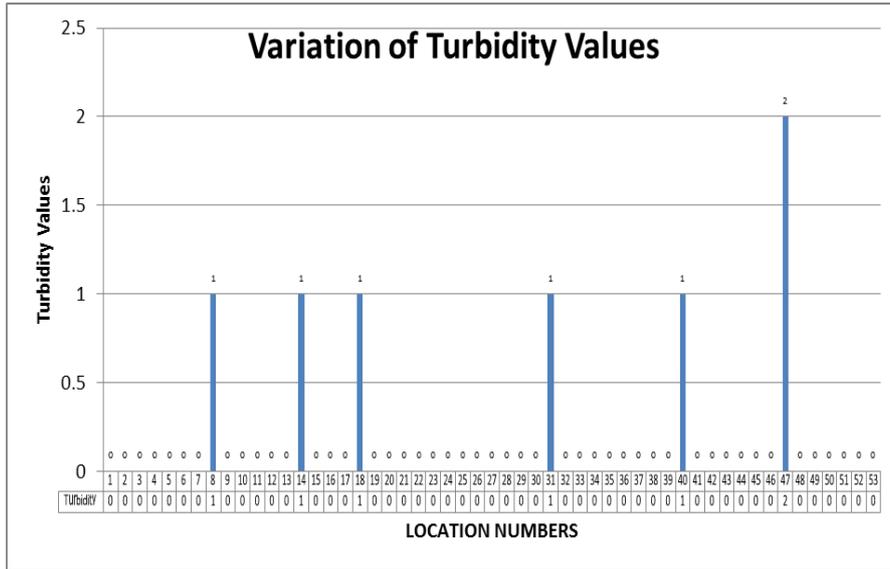
Graphical representation of Parameters during rainy season
Graph 01.



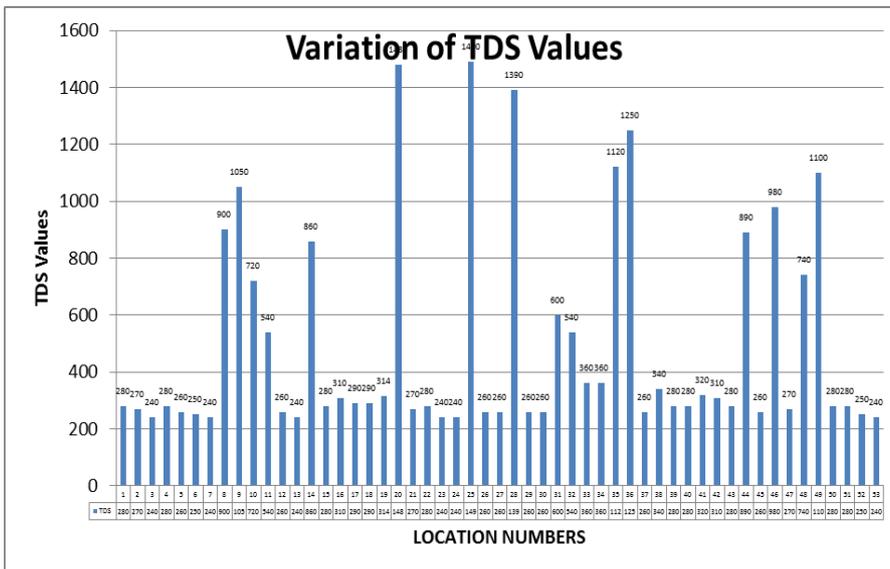
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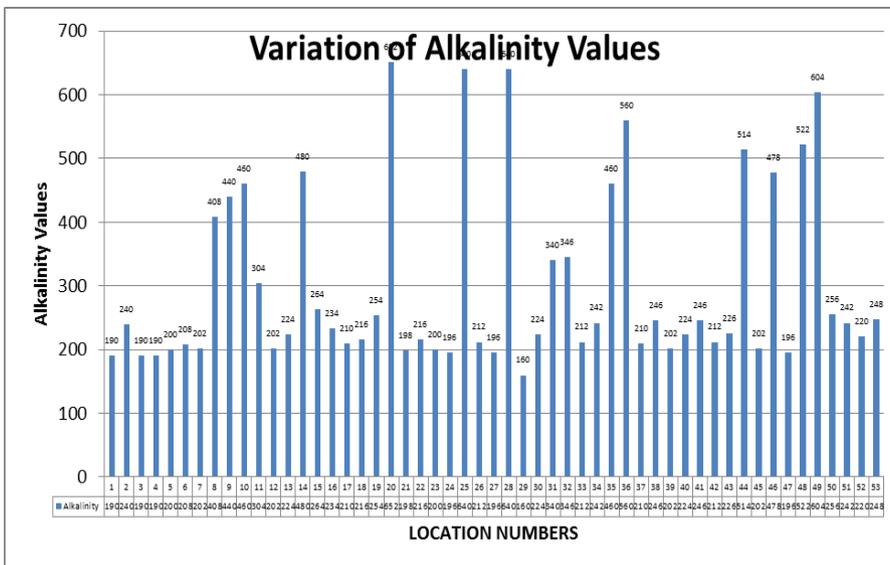
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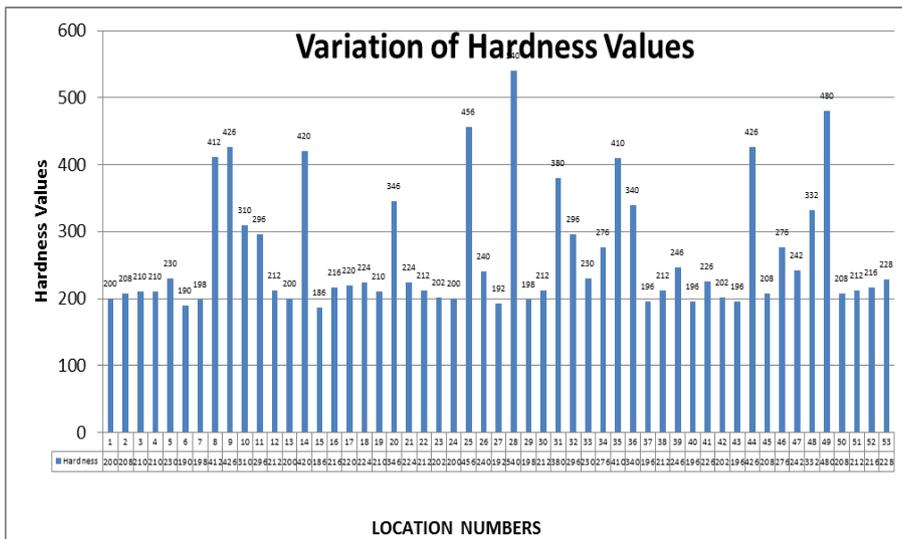
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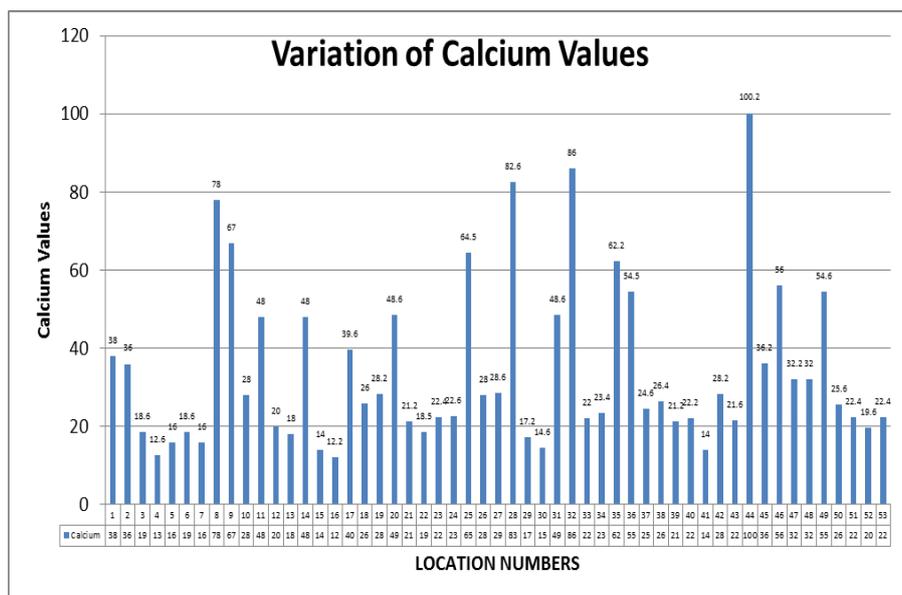
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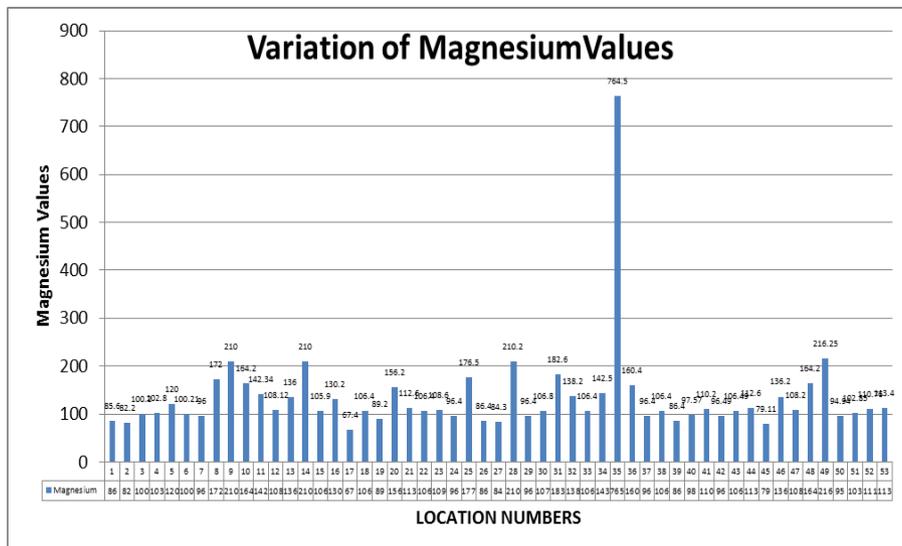
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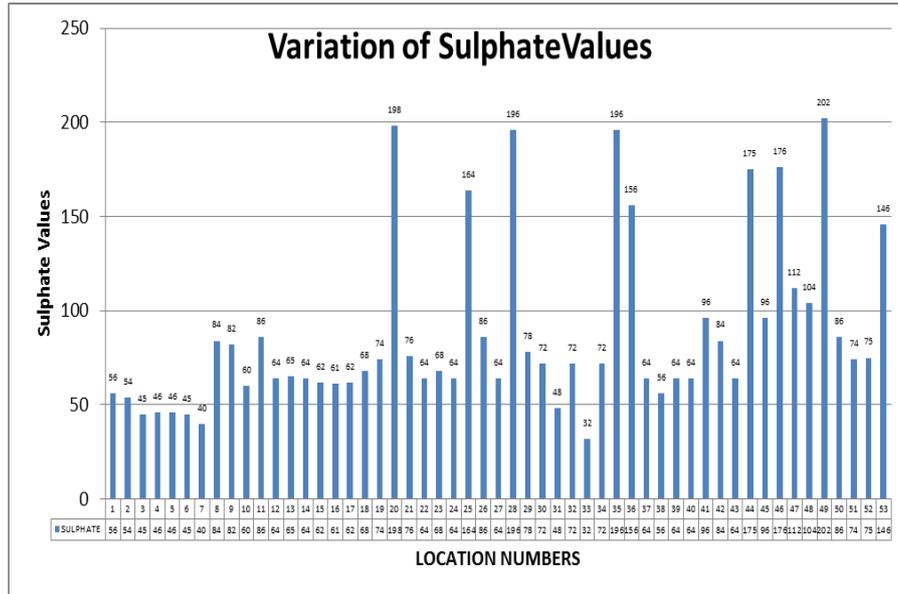
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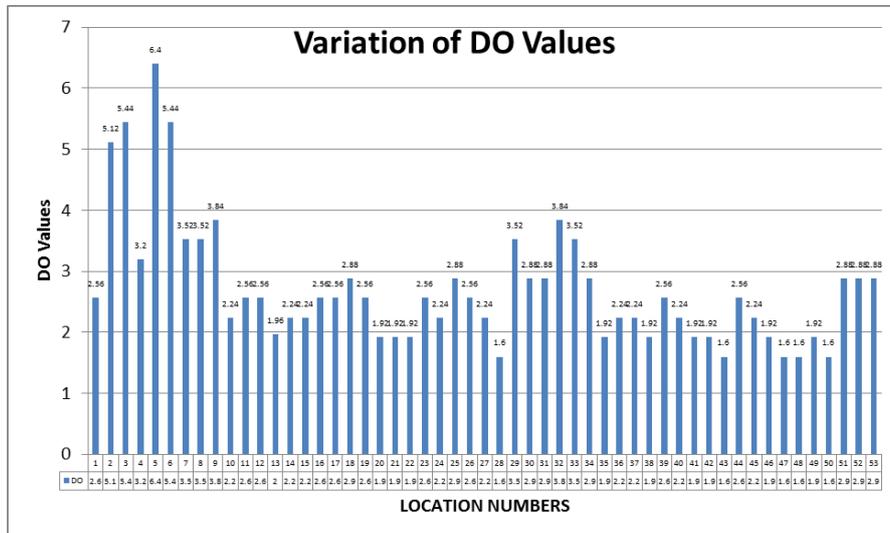
Graph 08.



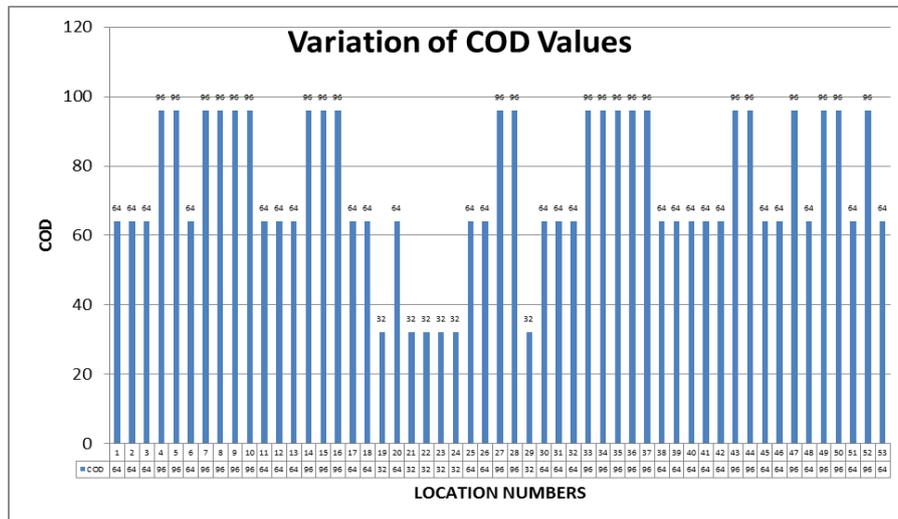
Graph 09.



Graph 10.



Graph 11.



pH

The maximum pH was recorded as 7.99 at sampling station 11 and the minimum was 7.06 at sampling station 38. When compared with the standard values of WHO and BIS i.e. 6.5-8.5., the water samples are found to be in the permissible limit at all locations.

Electrical conductivity

Conductivity is the measure of mineral content. The maximum E.C was recorded as 2.6 at sampling station 25 and 28 and the minimum was only 0.5 at many station locations which included 5,37,42,43,50,53. In most of these samples, Electrical conductivity values are within desirable limits.

Turbidity

The maximum turbidity recorded was 2.0 at station 47. The minimum value was 1.0 at stations 8,14,18,31,40. At all other stations, the turbidity values are zero indicating that all the samples are clear in appearance.

TDS

TDS values in the study area range from a minimum of 240 mg/l to a maximum of 1490 mg/l. When compared with the standard values, the water samples are found to be in the permissible limit at all locations. The values ranged from 1050 mg/l to 1490mg/l at station numbers 9,20,25,28,35,36,49

Total alkalinity

Total alkalinity of all the samples was found to be within the permissible limit 300-600 mg/l except at station 49(604mg/l), stations 25,28(640mg/l), station 20(652mg/l). It may be due to the presence of slightly higher values of carbonates, bicarbonates, chlorides, sulphates in these samples.

Total Hardness

The total hardness values of the present study ranged from 186mg/l -540mg/l. The values were within the permissible limit. In most of the samples 1-7,11-13,15-19,21-24,26,27,29,30,32-34,37-43,45-47,50-53, values are less than desirable limits.

Calcium

Calcium values ranged from 12.2mg/l (Station 16) to 100.2mg/l(Station 44).

In all samples, the values are within the permissible limit.

Magnesium

The minimum value observed was 79.11mg/l at station 45 and the maximum value of 764.5mg/l was observed at station 35. In all stations, the values are very high and not in the permissible limit.

Sulphate

The values range from 48mg/l at station 48 to 202 mg/l at station 49.

All samples are in desirable limit except sample 49.

D.O.

In the present study, DO ranged from 1.6 mg/l to 5.2 mg/l.

COD

In the present study, the COD ranged from 32mg/l to 96mg/l.

Physico-chemical parameters indicate the quality of water. In the present study, it was found that most of the parameters were within the permissible limit of WHO, so that the water in the study area is suitable for drinking purpose.

CONCLUSION

The average values of all samples are within permissible limits in all seasons. The results showed that as alkalinity increases, hardness increases. It is also seen that as calcium increases, magnesium decreases or vice versa when compared seasonally. The quality of water is suitable for Drinking. It is better to carry out water analysis from time to time to monitor the rate and kind of contamination and provide remedial measures for the benefit of the children.

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