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CASE REPORT **OPEN ACCESS**

PHYSICO-CHEMICAL BEHAVIOUR OF SHIVNATH RIVER AT MADKU DWEEP DISTRICT MUNGELI (C.G.)

***[1]Sarita Chandrawanshi, [2]Singh R.K. and [3]Sahu, K.R.**

[1]Ph.D Research Scholar Department of Zoology Dr. C. V. Raman University Kargi Road Kota Bilaspur (C.G.)-495113
[2]Head, Department of Zoology, Dr. C. V. Raman University Kargi Road Kota Bilaspur (C.G.)-495113
[3]Professor of Zoology, Govt. E.R.R.P.G. Science College Bilaspur (C.G.)-495001

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ABSTRACT

H_2O is one of the most important natural resources in earth. The objective of present research paper to provide Information on the Physico-Chemical behaviour of Shivnath River at MadkuDweep dist. Mungeli (C.G.). During study seasonal variations of water sample directly Influence the abiotic and biotic factors of such particular area. Under study the Physico-chemical parameter are pH, Temperature , Conductivity, TDS, Turbidity , Chloride , Iron, Silica, BOD, COD, DO, Total hardness, Calcium hardness, Magnesium hardness, Alkalinity, Total Alkalinity.

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INTRODUCTION

Madkudweep is situated near village MADKU in Pathria Block in Mungeli Dsitrict (C.G.) lacated 38 km towards south from Bilaspur city. As per legend MadkuDweep was originally called Madku Dweep, was named so because Madku Rishi established this ashram here and composed the Madku Upanishad. Veteran archaeologist told that there are 19 shiv temples of which 9 are 'Smatak ling' all belonging to Ratanpur Kings of Kalturi period. Madku Dweep is one of the most valuable and religious monument for Chhattisgarh. The physic-chemical parameter of water were analysed by standard method devised by Trivedi and Goel (1984) Atoni (1985) and American Public Helth Association (APHA 1989) are as follows:- Physical Parameter. The water temperature and atmospheric temperature of the river were seasonal variation recorded with the help of maximum and minimum temperature thermometer water (IJESRT).

***Corresponding author: Sarita Chandrawanshi,**
Ph.D Research scholar Department of zoology Dr. C. V. Raman University Kargi Road Kota Bilaspur (C.G.)-495113

MATERIALS AND METHODS

The study area Shivnath river at Madkudweepdistt. Mungeli (SRMDM) was visited at monthly interval during the one year period (December 2016 to December 2017). The water sample containing pH, Temperature , Conductivity, TDS, Turbidity , Chloride , Iron, Silica, BOD, COD, DO, Total hardness, Calcium hardness, Magnesium hardness, Alkalinity, Total Alkalinity were collected at the surface of study sites at four stations namely Location -1 to Location-4 and sample was collected between 9 A.M. to 11 A.M. For the collection of planktons glass bottles are preferred. Glass bottles are tightly sealed. The bottles are soaked with 10%HCL for 24 hours and then thoroughly clean and rinse with distilled water. Sampling will do on monthly interval. Water sample will be collected from different locations with the help of ruddiness sampler. Samples will be fixed in the field and are later analyzed in the laboratory. Four location sample of one ml. for each replicate were examined under a compound microscope of various magnifications using a Sedgwick-Raftr counting cell.

S. No.	Characteristics	Method of Testing	Unit
01	pH	pH Meter	pH Unit
02	Turbidity	Turbidity Meter	NTU
03	Temperature	Temperature sensitive probe	ºC
04	Calcium	Titrimetric Method	Mg/L
05	Magnesium	Hy. Calcution [TH-(CaH)]* 0.243	Mg/L
06	Total Alkalinity	Titrimetric Method	Mg/L
07	Total Hardness	Titrimetric Method	Mg/L
08	TDS	TDS Meter	Mg/L
09	DO	Winkler's iodometric method	Mg/L
10	BOD	Dilution Method	Mg/L
11	COD	Acidic Oxidation + Potassium dichromate	Mg/L
12	Iron	Spectro-photometric method	Mg/L
13	Chloride	Titration Method	Mg/L
14	Silica	Colorimetric method	Mg/L
15	Conductivity	Multimeter	S/m

DATA ANALYSIS

Location wise /month wise ph value variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	pH	6.65	7.52	7.01	6.54
2	Feb	pH	7.74	8.42	8.03	7.84
3	March	pH	8.35	9.05	8.99	9.04
4	April	pH	8.5	8.4	8.4	8.3
5	May	pH	8.75	8.9	8.8	8.3
6	June	pH	8.35	9.05	8.99	8.35
7	July	pH	8.5	8.5	7.7	7.5
8	Aug	pH	8.42	8.03	7.84	7.74
9	Sep	pH	8.1	8.09	8.2	8.25
10	Oct	pH	8.5	8.4	8.4	8.3
11	Nov	pH	8.75	8.9	8.8	8.7
12	Dec	pH	8.35	9.05	8.99	8.35

Location wise /month wise turbidity variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	Turbidity	3.85	3.45	3.54	3.9
2	Feb	Turbidity	2.5	0.9	2.8	6.7
3	March	Turbidity	1.5	1.8	3.6	2.8
4	April	Turbidity	2.5	2.8	3.5	3.5
5	May	Turbidity	3.14	3.1	3.1	3.13
6	June	Turbidity	3.6	3.4	3.4	3.3
7	July	Turbidity	11.2	4.4	5.4	6.4
8	Aug	Turbidity	12.6	5.4	6.4	6.6
9	Sep	Turbidity	12.1	6.5	6.3	6.3
10	Oct	Turbidity	4.5	3.8	5.5	9.4
11	Nov	Turbidity	4.6	3.1	5.1	3.13
12	Dec	Turbidity	5.2	3.4	6.4	3.3

Location wise /Month wise calcium temperature variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	TEMPERATURE	24	23	24	26
2	Feb	TEMPERATURE	25	25	23	23
3	March	TEMPERATURE	26	27	26	28
4	April	TEMPERATURE	34.5	33	33.5	32
5	May	TEMPERATURE	36	36	38	37
6	June	TEMPERATURE	39.5	38.5	39.5	40
7	July	TEMPERATURE	28.5	29.5	30	30
8	Aug	TEMPERATURE	29	29	28	28
9	Sep	TEMPERATURE	31	31	30.5	30
10	Oct	TEMPERATURE	29	29	28	28
11	Nov	TEMPERATURE	22	21	21	22
12	Dec	TEMPERATURE	21	22	22	21

Location wise /month wise calcium hardness variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	Calcium Hardness	110	99	110	95
2	Feb	Calcium Hardness	109	100	99	109
3	March	Calcium Hardness	98	86	87	90
4	April	Calcium Hardness	100	98	98	99
5	May	Calcium Hardness	105	103	105	104
6	June	Calcium Hardness	102	102	99	94
7	July	Calcium Hardness	63	65	65	63
8	Aug	Calcium Hardness	85	85	88	85
9	Sep	Calcium Hardness	92	94	94	90
10	Oct	Calcium Hardness	100	98	98	93
11	Nov	Calcium Hardness	105	104	105	105
12	Dec	Calcium Hardness	102	103	99	99

Location wise /month wise magnesium hardness variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	Magnesium Hardness	40	35	39	40
2	Feb	Magnesium Hardness	19	18	17	19
3	March	Magnesium Hardness	18	16	17	16
4	April	Magnesium Hardness	30	28	27	27
5	May	Magnesium Hardness	33	30	30	32
6	June	Magnesium Hardness	29	29	27	26
7	July	Magnesium Hardness	32	34	34	32
8	Aug	Magnesium Hardness	35	36	36	33
9	Sep	Magnesium Hardness	45	45	42	42
10	Oct	Magnesium Hardness	30	28	27	27
11	Nov	Magnesium Hardness	34	30	30	32
12	Dec	Magnesium Hardness	30	29	27	26

Location wise /month wise total alkalinity variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	TOTAL ALKALINITY	145	125	145	128
2	Feb	TOTAL ALKALINITY	160	148	144	148
3	March	TOTAL ALKALINITY	134	128	126	124
4	April	TOTAL ALKALINITY	142	140	140	141
5	May	TOTAL ALKALINITY	145	144	140	140
6	June	TOTAL ALKALINITY	143	140	142	145
7	July	TOTAL ALKALINITY	116	115	118	118
8	Aug	TOTAL ALKALINITY	119	122	122	119
9	Sep	TOTAL ALKALINITY	123	126	126	123
10	Oct	TOTAL ALKALINITY	142	140	140	141
11	Nov	TOTAL ALKALINITY	145	144	140	140
12	Dec	TOTAL ALKALINITY	143	140	142	145

Location wise /month wise alkalinity (p) variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	ALKALINITY(P)	0	12	9	9
2	Feb	ALKALINITY(P)	0	0	0	19
3	March	ALKALINITY(P)	0	16	17	16
4	April	ALKALINITY(P)	0	8	8	9
5	May	ALKALINITY(P)	10	8	7	7
6	June	ALKALINITY(P)	9	6	6	8
7	July	ALKALINITY(P)	0	0	0	0
8	Aug	ALKALINITY(P)	0	0	0	0
9	Sep	ALKALINITY(P)	0	0	0	0
10	Oct	ALKALINITY(P)	0	8	8	9
11	Nov	ALKALINITY(P)	10	8	7	7
12	Dec	ALKALINITY(P)	9	6	6	8

Location wise /month wise total hardness variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	Total Hardness	120	110	130	99
2	Feb	Total Hardness	128	118	116	128
3	March	Total Hardness	116	102	104	106
4	April	Total Hardness	110	116	113	113
5	May	Total Hardness	102	102	105	106
6	June	Total Hardness	104	104	108	108
7	July	Total Hardness	94	92	98	98
8	Aug	Total Hardness	111	110	113	115
9	Sep	Total Hardness	114	116	117	118
10	Oct	Total Hardness	110	116	113	119
11	Nov	Total Hardness	102	103	105	106
12	Dec	Total Hardness	104	105	108	105

Location wise /month wise tds variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	TDS	182	223	224	228
2	Feb	TDS	295	313	314	321
3	March	TDS	320	310	316	314
4	April	TDS	205	220	220	210
5	May	TDS	220	230	245	216
6	June	TDS	245	245	235	225
7	July	TDS	123	125	125	123
8	Aug	TDS	145	140	140	135
9	Sep	TDS	155	150	150	154
10	Oct	TDS	205	220	220	210
11	Nov	TDS	220	230	245	216
12	Dec	TDS	245	245	235	225

Location wise /month wise d o(dissolved oxygen) variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	Dissolved Oxygen	7.6	7.8	8.7	8.7
2	Feb	Dissolved Oxygen	7.9	7.2	7.1	7.7
3	March	Dissolved Oxygen	7.5	8.7	7.4	7.3
4	April	Dissolved Oxygen	6.8	6.4	6.5	6.6
5	May	Dissolved Oxygen	5.5	5.6	5.5	5.4
6	June	Dissolved Oxygen	5.3	4.9	4.7	4.8
7	July	Dissolved Oxygen	6.9	6.2	6.4	6.4
8	Aug	Dissolved Oxygen	6.2	6.5	6.6	6.9
9	Sep	Dissolved Oxygen	7.1	6.7	6.4	7.1
10	Oct	Dissolved Oxygen	8.1	7.8	7.9	7.7
11	Nov	Dissolved Oxygen	7.6	7.1	7.1	7.2
12	Dec	Dissolved Oxygen	8.8	7.9	8.2	8.9

Location wise /month wise b o d variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	BOD	2.2	2.4	3.1	3.4
2	Feb	BOD	4.2	3.3	3.2	3.3
3	March	BOD	5.1	4.2	4.3	4.4
4	April	BOD	4.6	3.8	4.6	4.7
5	May	BOD	6.5	5.4	5.4	4.5
6	June	BOD	5.2	4.4	3.8	3.5
7	July	BOD	4.2	4.2	5.8	5.7
8	Aug	BOD	5.8	4.8	6.9	6.7
9	Sep	BOD	2.1	3.4	5.7	4.3
10	Oct	BOD	2	2.01	3.1	3.1
11	Nov	BOD	3	3.1	3.8	3.8
12	Dec	BOD	3.9	3.9	3.7	3.8

Location wise /month wise c o d variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	COD	21	23	23	24
2	Feb	COD	20	23	25	24
3	March	COD	22	24	24	25
4	April	COD	28	27	27	29
5	May	COD	26	25	24	24
6	June	COD	29	28.2	28	24
7	July	COD	27.3	27.1	26	25
8	Aug	COD	30	31	32	32.1
9	Sep	COD	30.2	31	28.9	29.3
10	Oct	COD	32	34	33.5	32.5
11	Nov	COD	36	35	35	36
12	Dec	COD	34	34.5	32	35.25

Location Wise /Month Wise Iron Variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	IRON	0	0.0099	0.0099	0.0082
2	Feb	IRON	0.0142	0.0424	0.0142	0.0714
3	March	IRON	0	0.0087	0.0087	0.0017
4	April	IRON	0	0.009	0.0092	0.0085
5	May	IRON	0.014	0.0325	0.0143	0.0404
6	June	IRON	0.002	0.0075	0.0079	0.0027
7	July	IRON	0.0102	0.0105	0.0102	0.0105
8	Aug	IRON	0.0094	0.0099	0.0098	0.0094
9	Sep	IRON	0.0091	0.0091	0.0093	0.0097
10	Oct	IRON	0	0.009	0.0092	0.0086
11	Nov	IRON	0.014	0.0325	0.0148	0.0404
12	Dec	IRON	0.002	0.0075	0.0079	0.0024

Location wise /month wise choloride variation

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	CHOLORIDE	45.56	39.7	45.65	45.65
2	Feb	CHOLORIDE	38.34	41.18	41.18	38.34
3	March	CHOLORIDE	35.5	34.08	41.18	41.18
4	April	CHOLORIDE	40.2	39.85	40.2	41.15
5	May	CHOLORIDE	42.05	41.7	41.5	41.15
6	June	CHOLORIDE	42	40	41.35	40.25
7	July	CHOLORIDE	48	48	47	46
8	Aug	CHOLORIDE	51	52	51	52
9	Sep	CHOLORIDE	56	53	53	54
10	Oct	CHOLORIDE	40.2	39.85	40.2	41.15
11	Nov	CHOLORIDE	48.05	41.7	41.5	41
12	Dec	CHOLORIDE	43	40	41.35	40.25

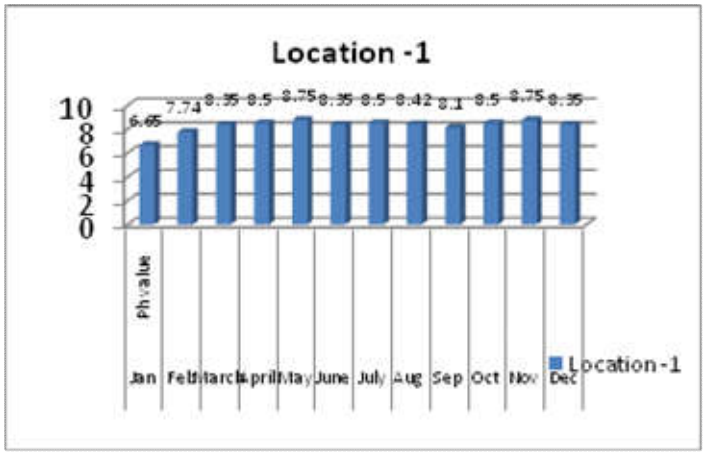
Location wise /month wise silica variation

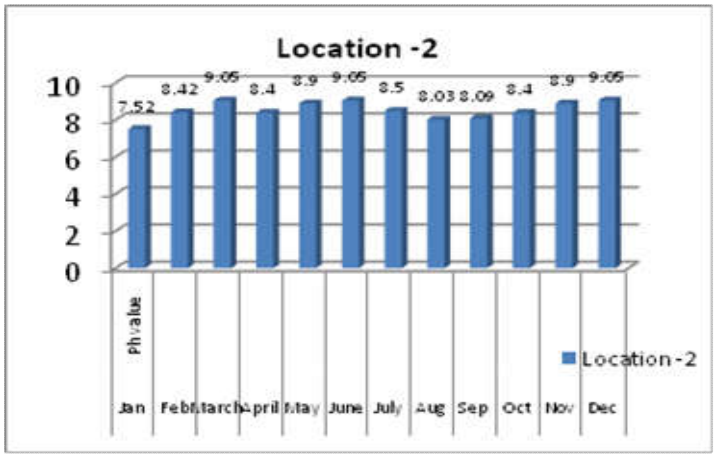
S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	SILICA	9.5	9.5	8.85	8.85
2	Feb	SILICA	5.42	4.74	4.91	5.058
3	March	SILICA	7.12	6.61	7.45	6.61
4	April	SILICA	8.1	8.4	8.45	8.85
5	May	SILICA	8.05	7.3	7.5	8
6	June	SILICA	6.95	7.25	7.45	6.91
7	July	SILICA	3.72	3.89	3.38	3.22
8	Aug	SILICA	4.61	3.94	3.94	4.72
9	Sep	SILICA	6.8	5.4	5.4	4.5
10	Oct	SILICA	7.8	7.9	7.8	7.7
11	Nov	SILICA	7.12	6.61	7.45	6.61
12	Dec	SILICA	5.42	4.74	4.91	5.08

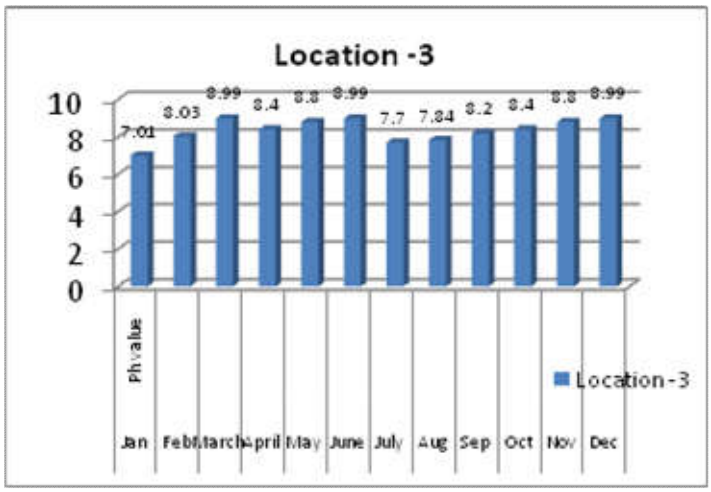
Location wise /month wise conductivity variation

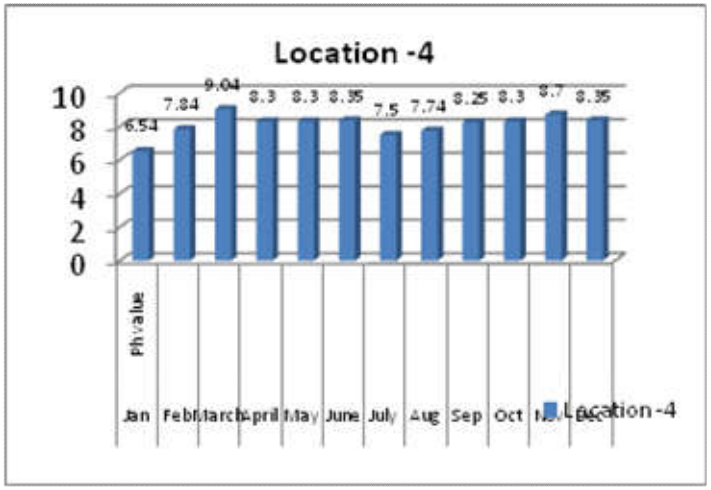
S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan	Conductivity	352	368	372	379
2	Feb	Conductivity	442	469	472	481
3	March	Conductivity	480	465	474	460
4	April	Conductivity	208	210	205	210
5	May	Conductivity	250	210	250	205
6	June	Conductivity	302	300	300	305
7	July	Conductivity	270	260	260	260
8	Aug	Conductivity	280	280	265	265
9	Sep	Conductivity	300	300	305	304
10	Oct	Conductivity	208	210	205	210
11	Nov	Conductivity	250	210	250	205
12	Dec	Conductivity	302	300	300	305

Location wise /month wise phvalue variation graph







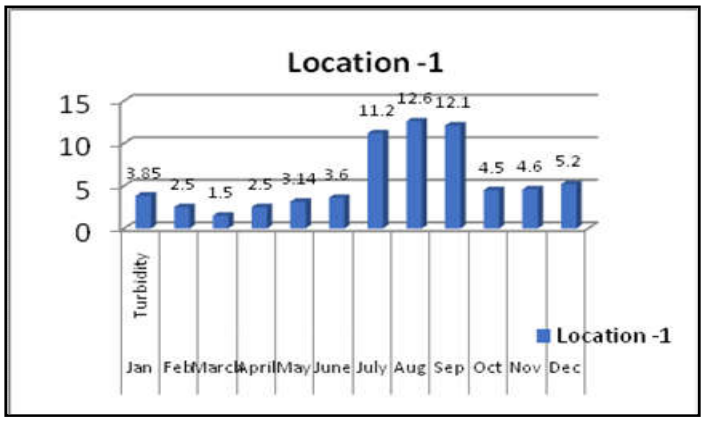


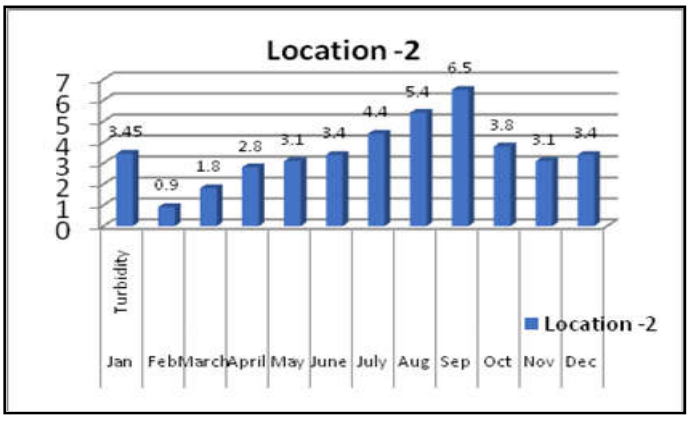
RESULT AND DISCUSSION

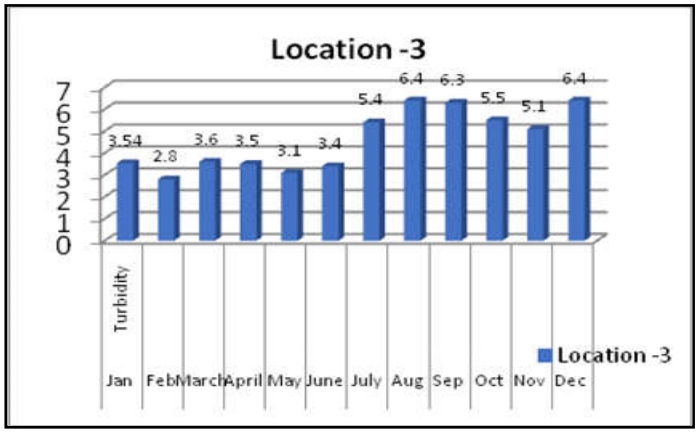
Shivnath River at Madkudweep dist. Mungeli (SRMDM) was visited at monthly interval during the one year period (December 2016 to December 2017).

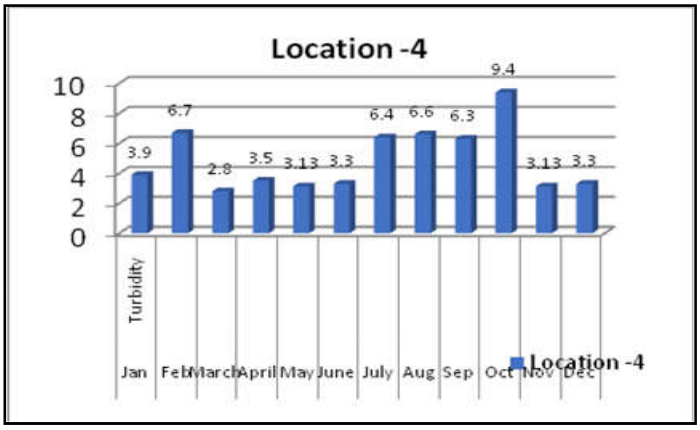
The water sample containing pH, Temperature , Conductivity, TDS, Turbidity , Chloride , Iron, Silica, BOD, COD, DO, Total hardness, Calcium hardness, Magnesium hardness, Alkalinity, Total Alkalinity there location wise graph is shown above.

Location wise /month wise turbidity variation graph

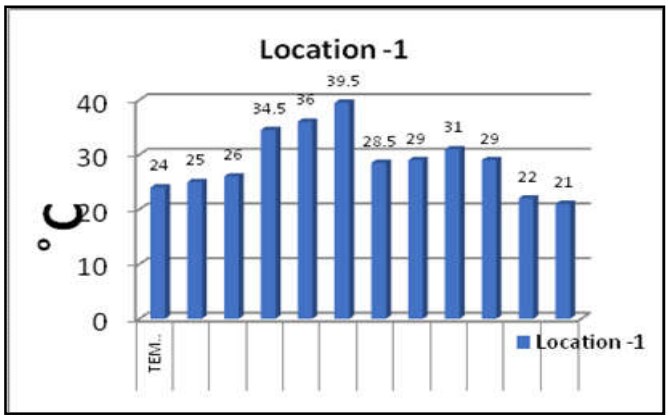


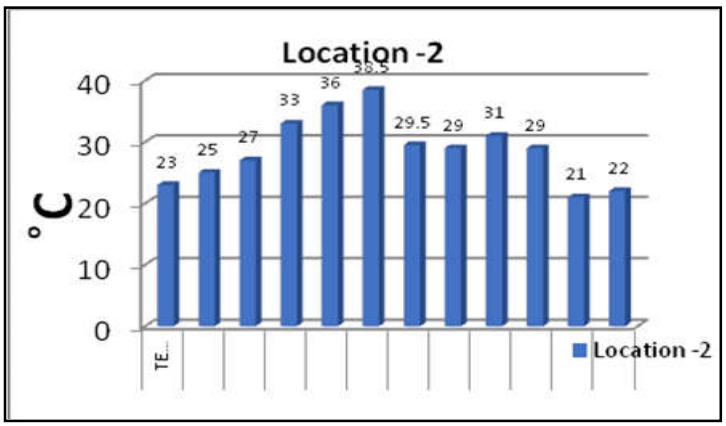


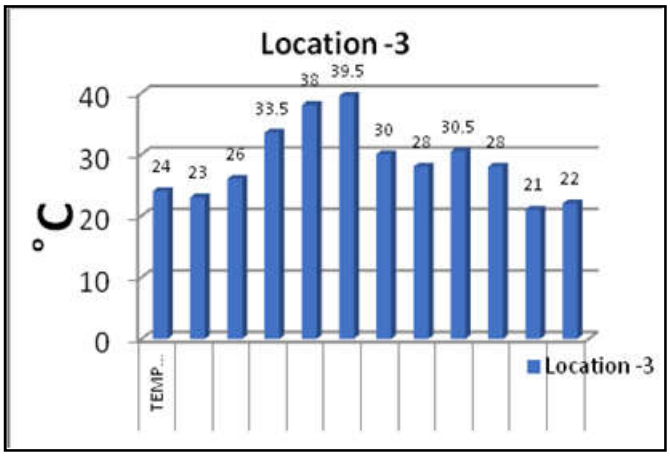


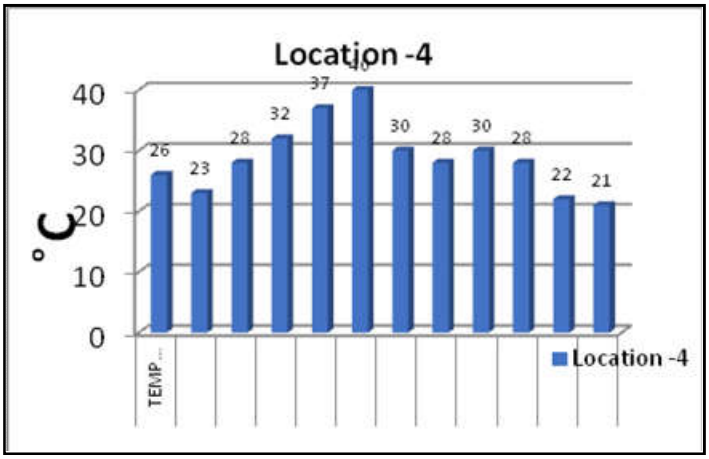


Location wise /month wise temperature variation graph

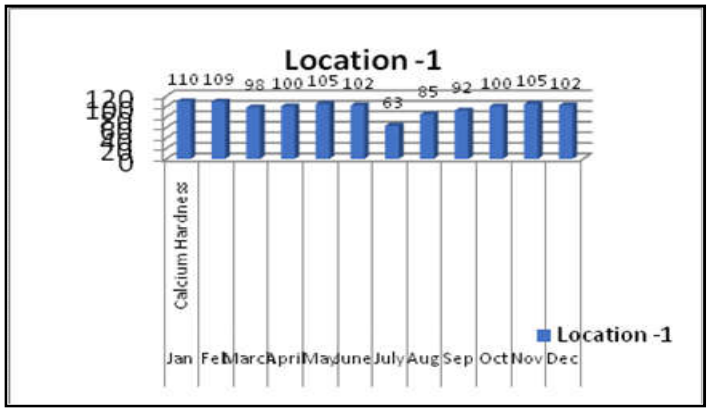


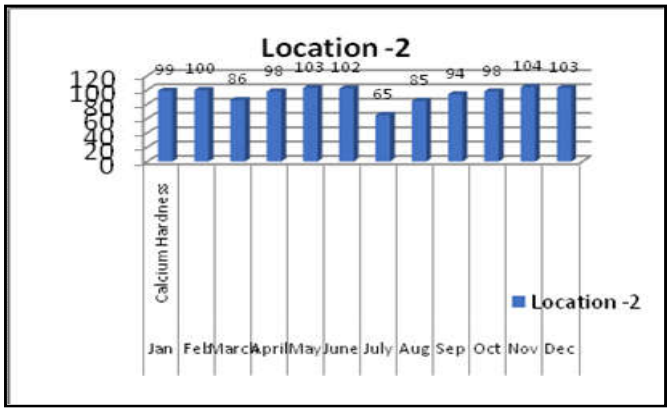


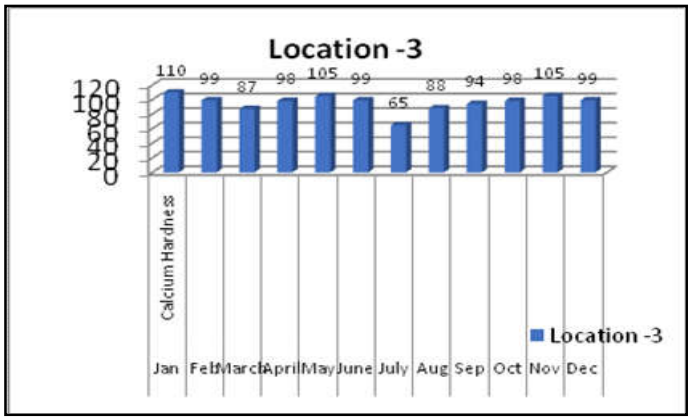


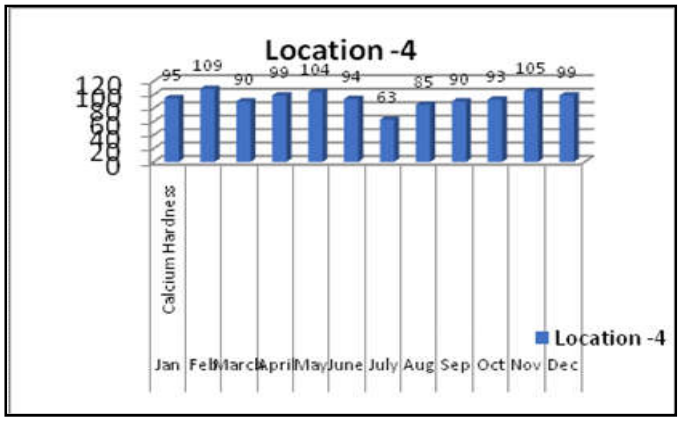


Location wise /month wise calcium hardness variation graph

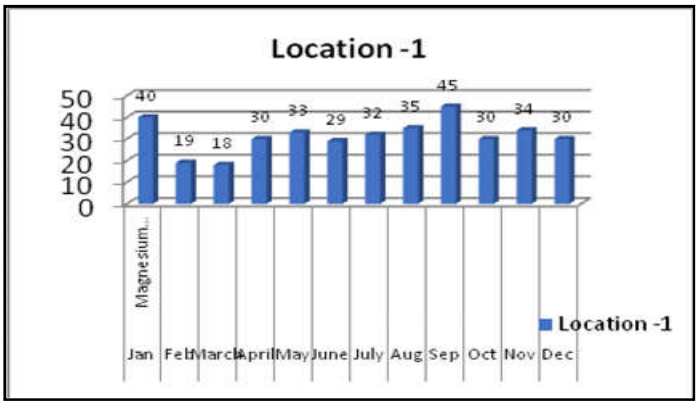


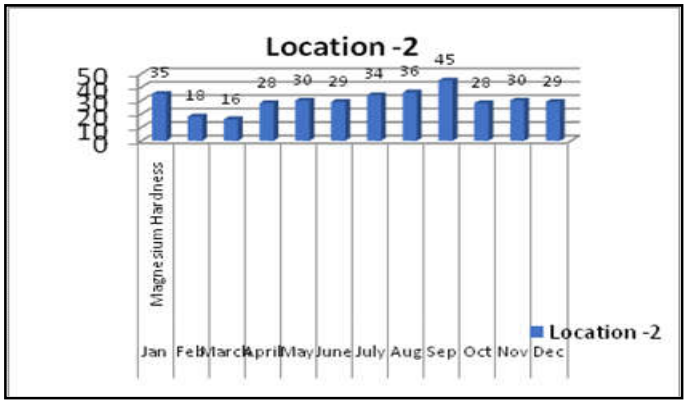


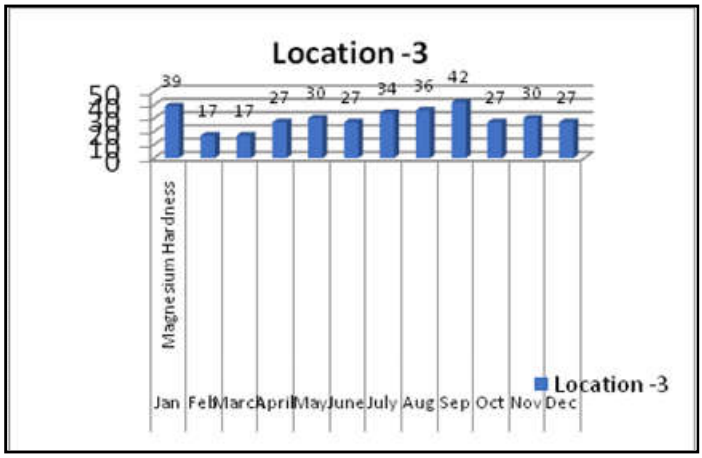


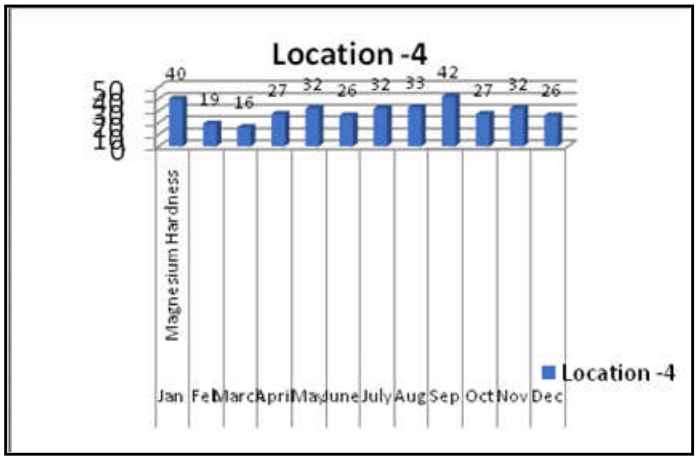


Location wise /month wise magnesium hardness variation graph

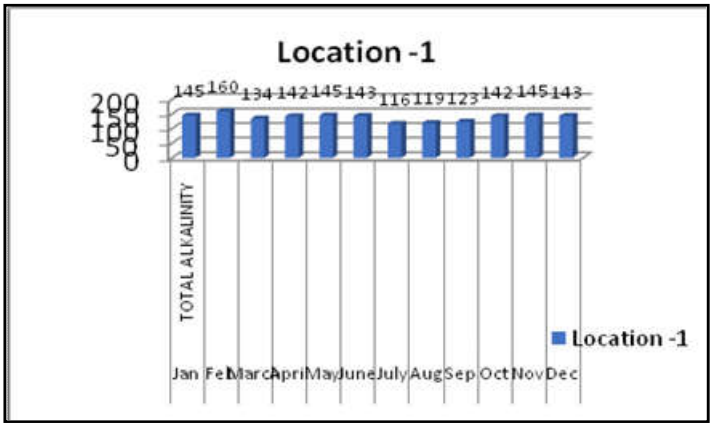


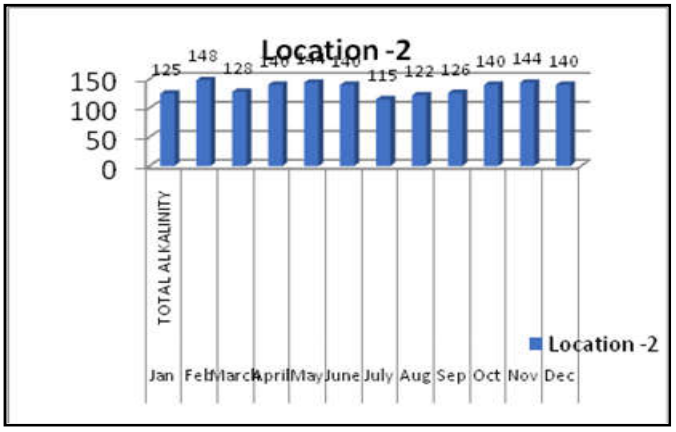


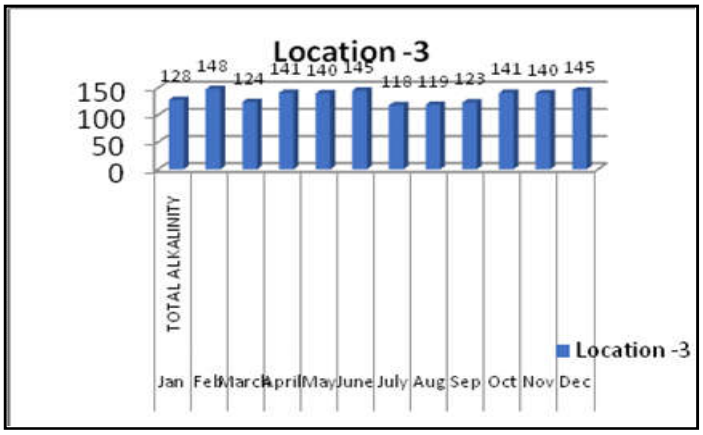


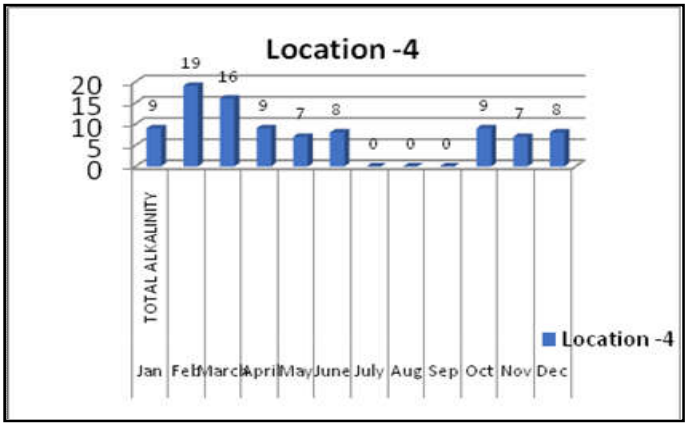


Location wise /month wise total alkalinity variation graph

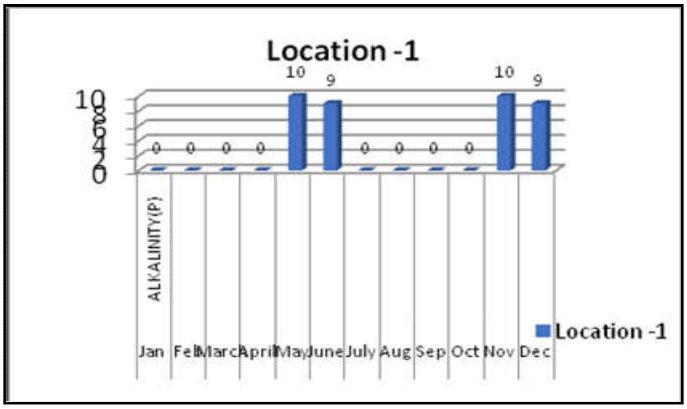


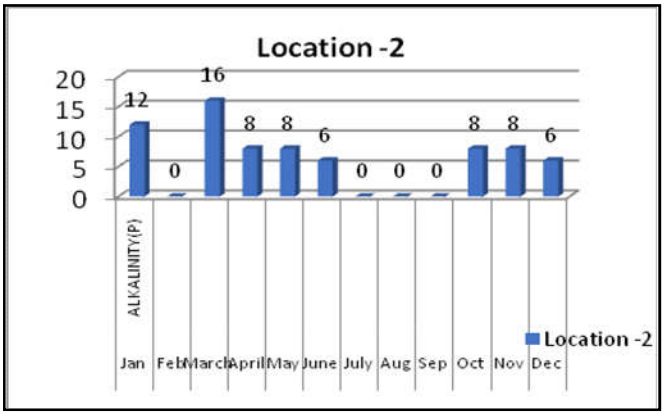


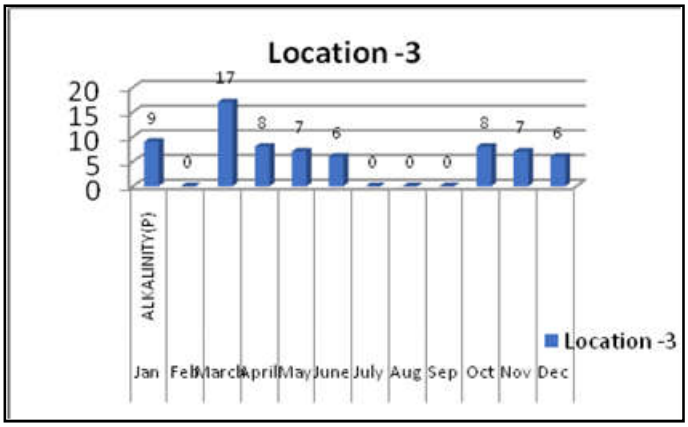


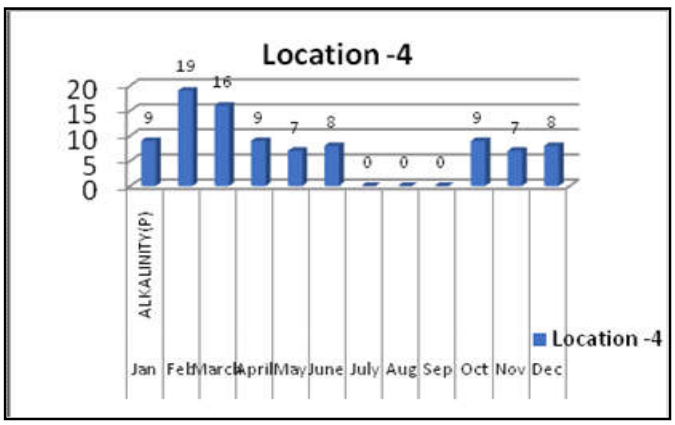


Location wise /month wise alkalinity (p) variation graph

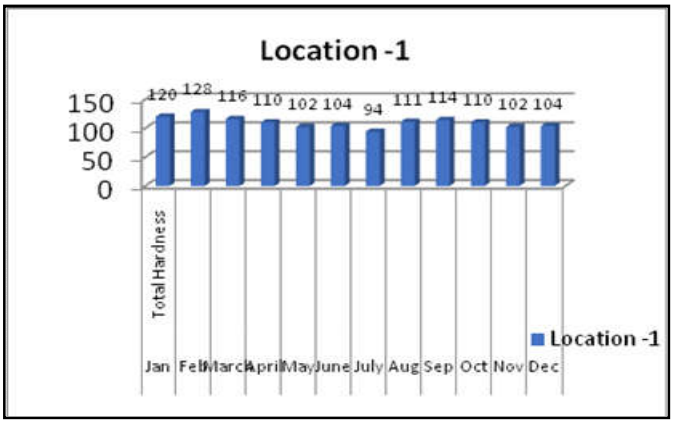


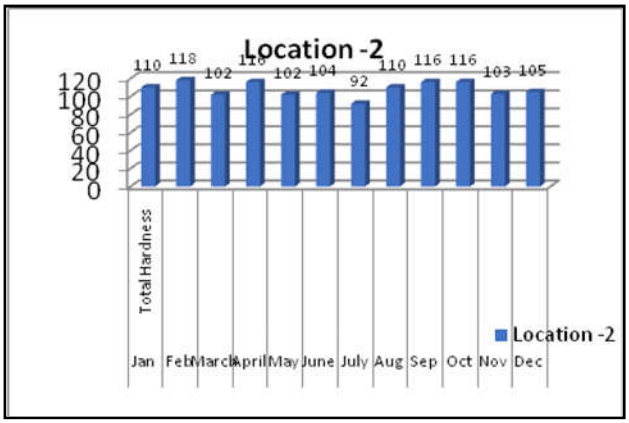


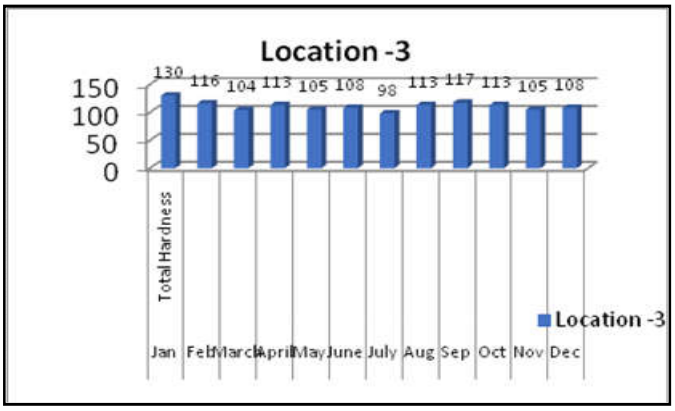


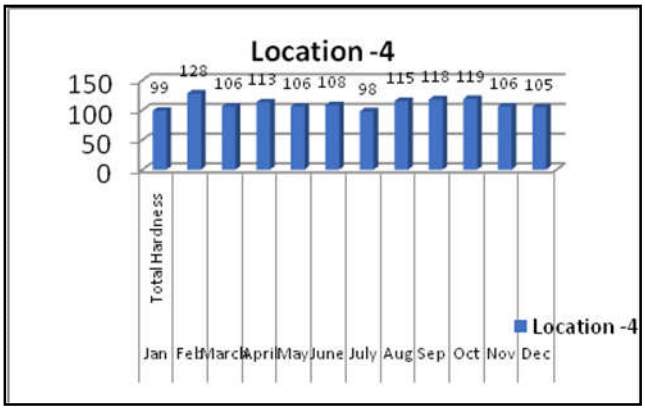


Location wise /month wise total hardness variation graph

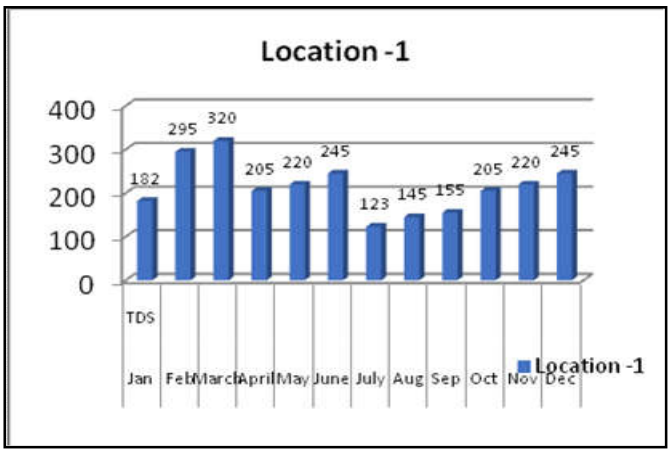


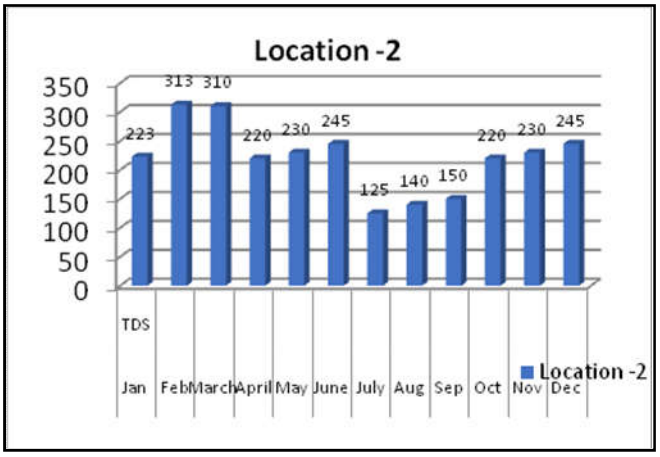


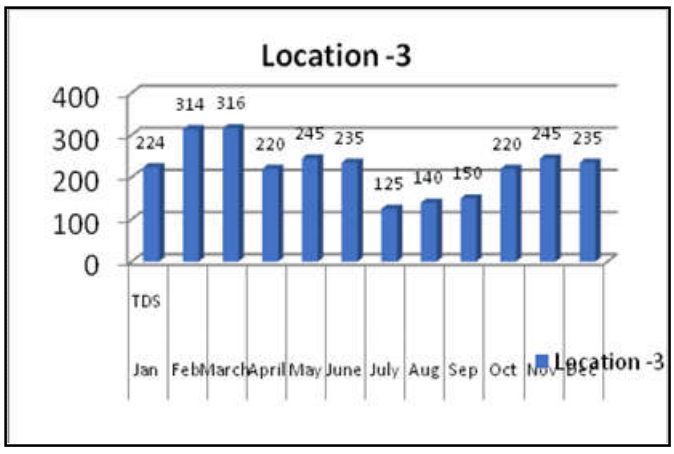


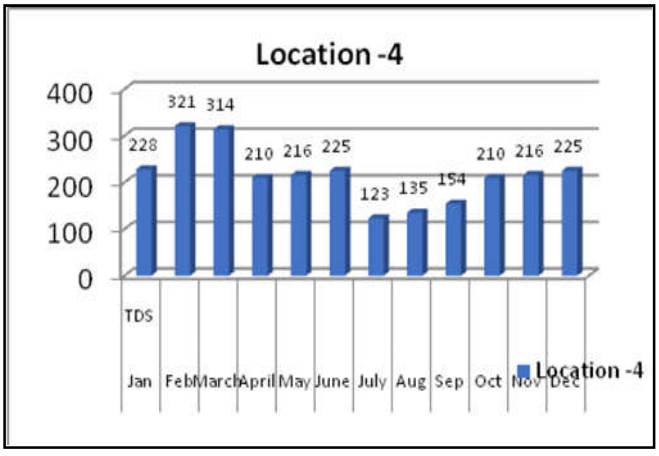


Location wise /month wise tds variation graph

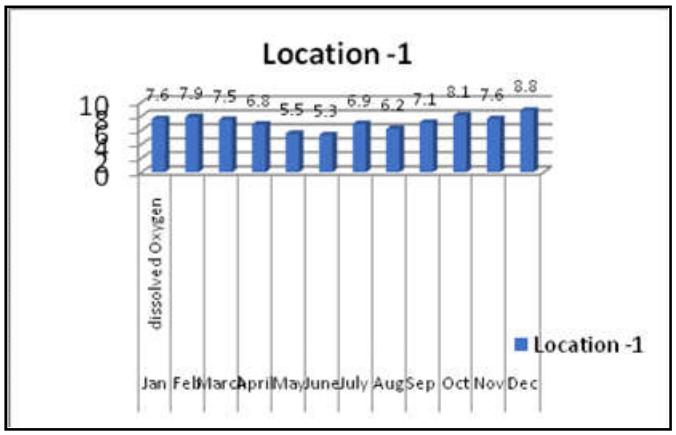


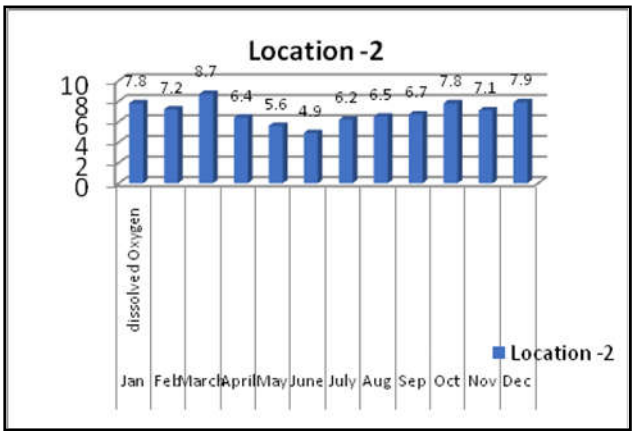


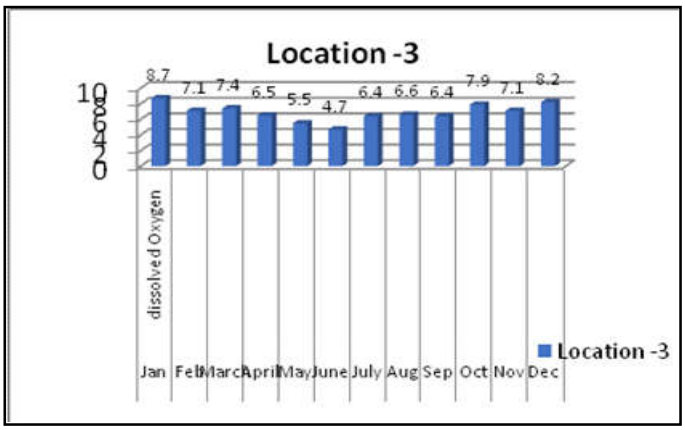


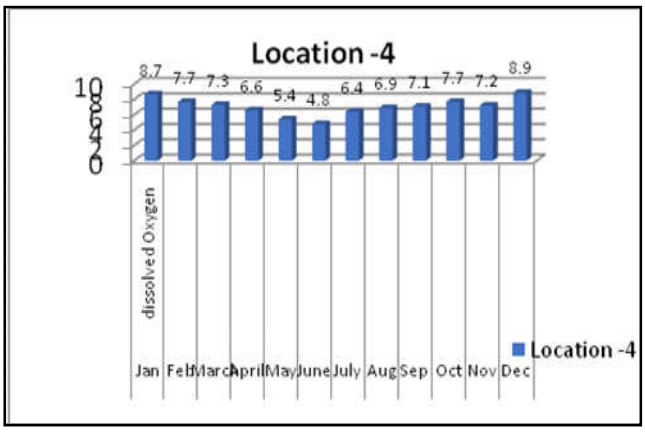


Location wise /month wise d o(dissolved oxygen) variation graph

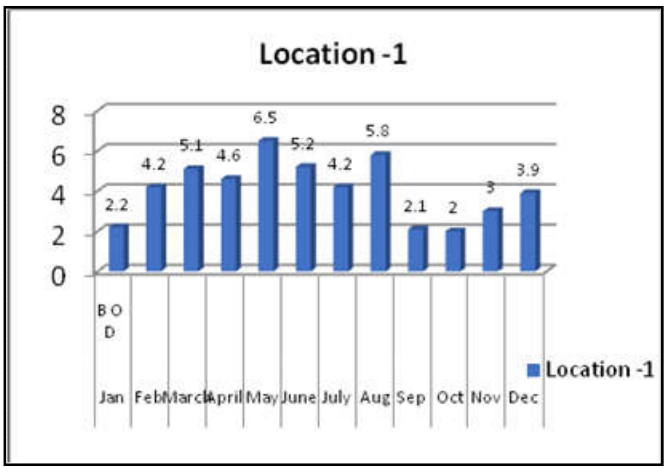


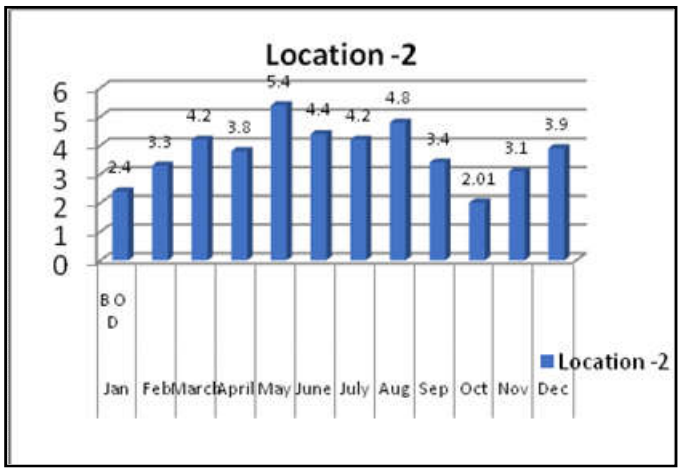


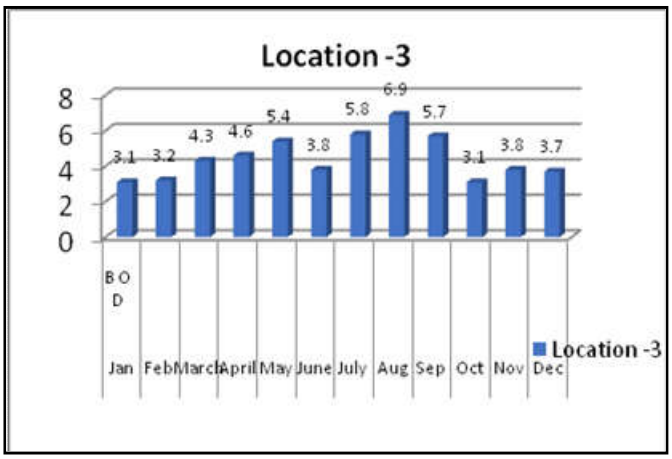


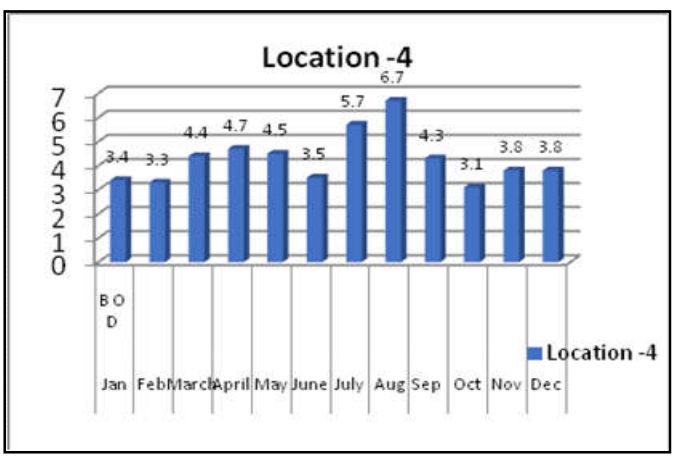


Location wise /month wise b o d variation graph

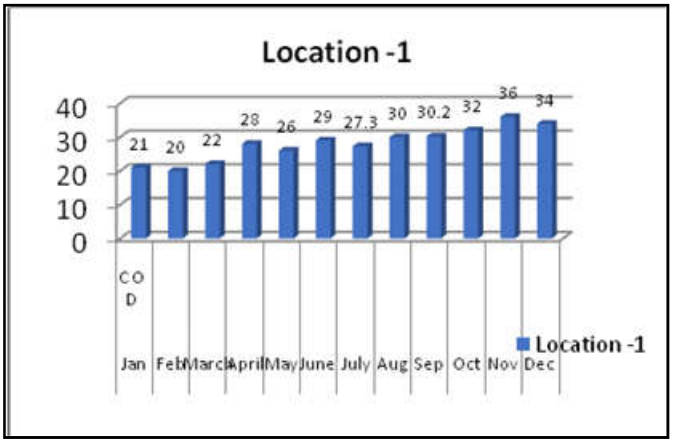


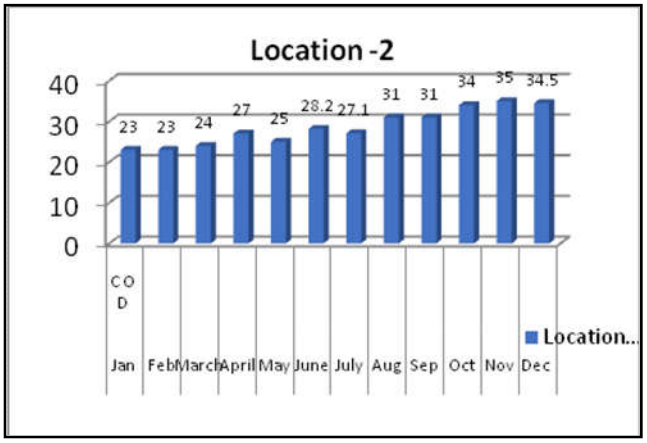


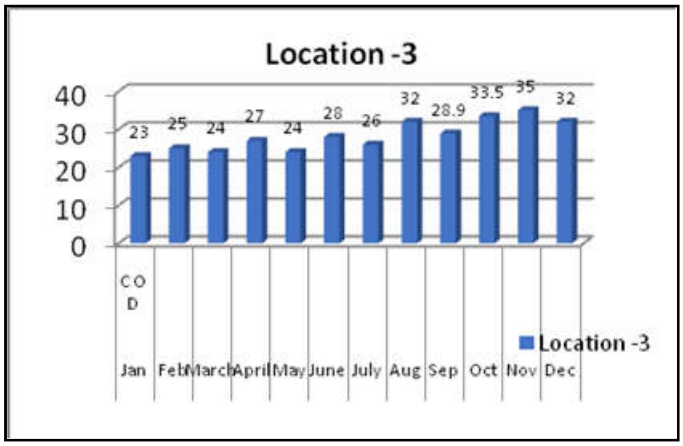


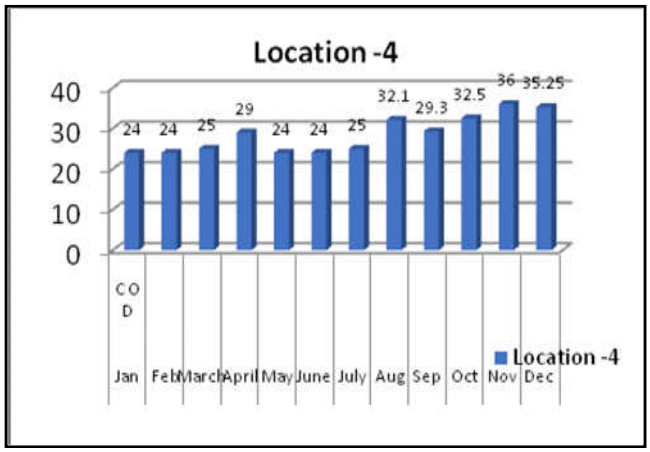


Location wise /month wise c o d variation graph

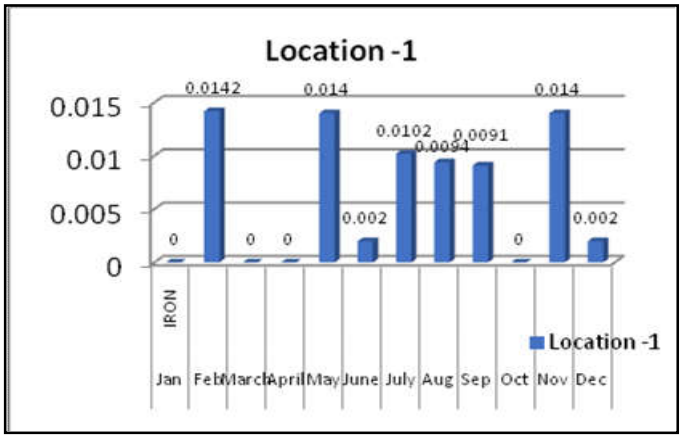


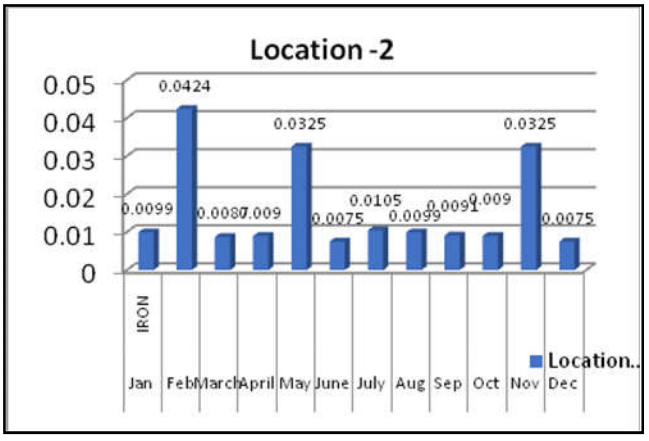


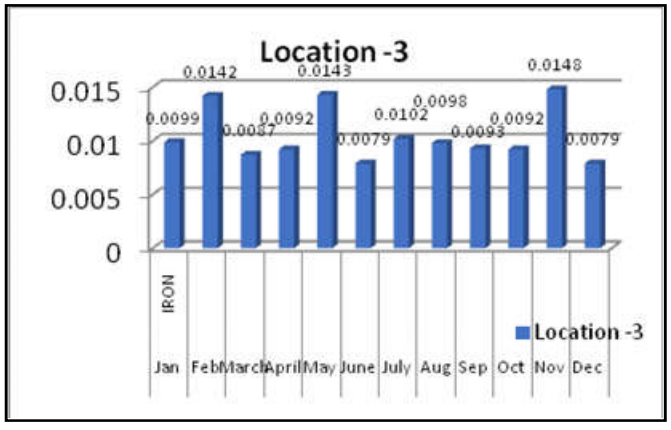


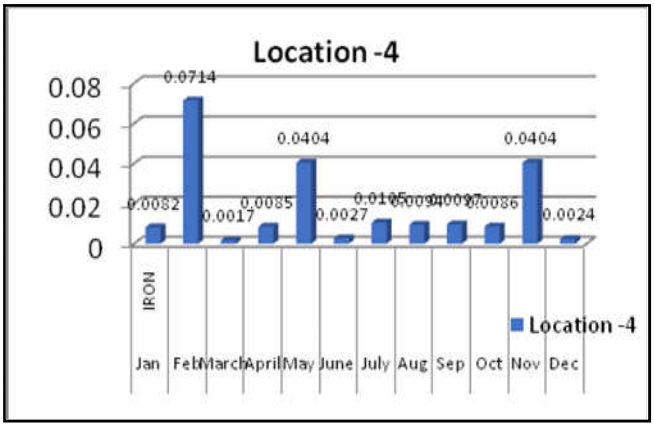


Location wise /month wise iron variation graph

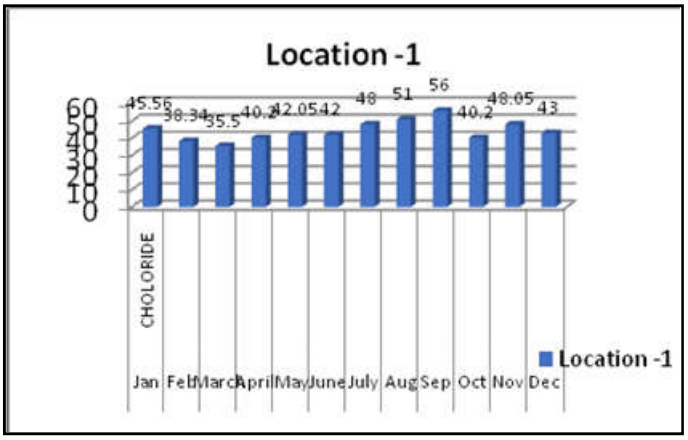


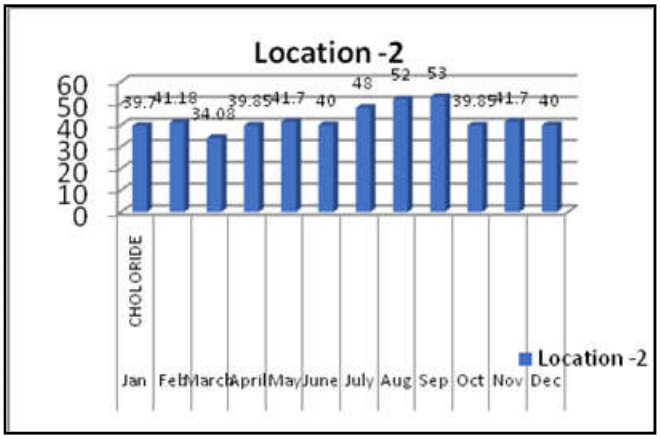


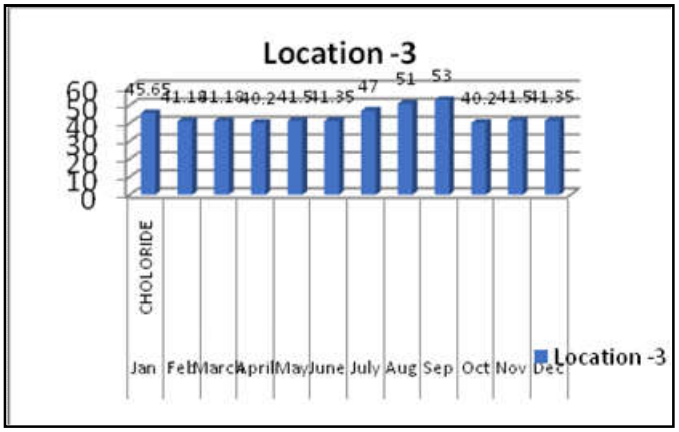


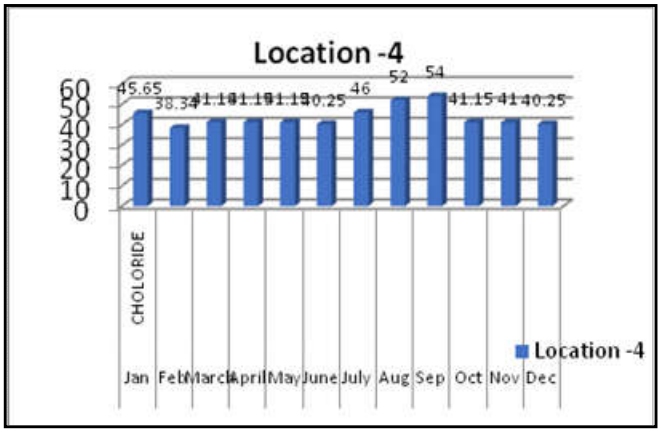


Location wise /month wise choloride variation graph

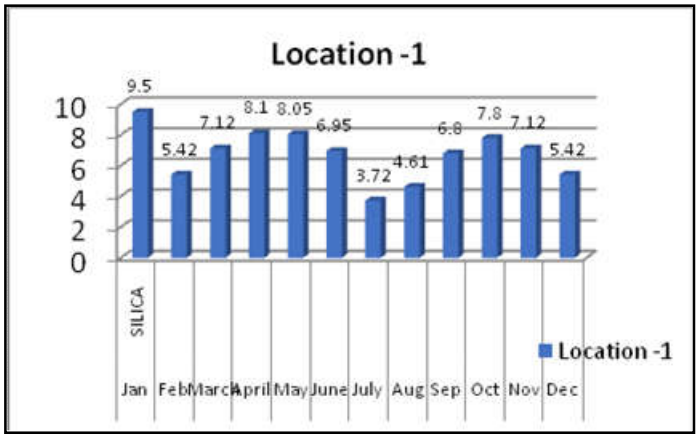


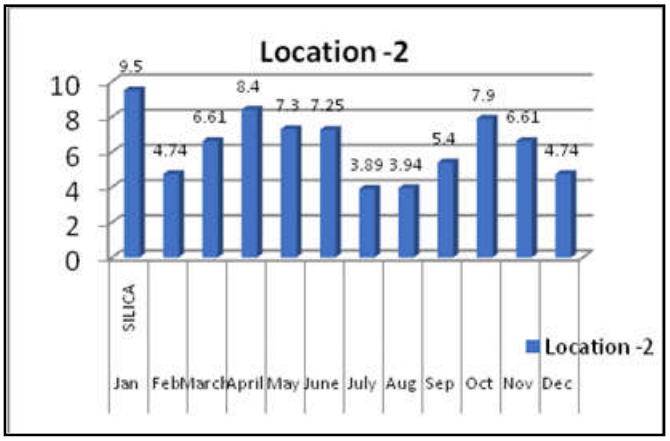


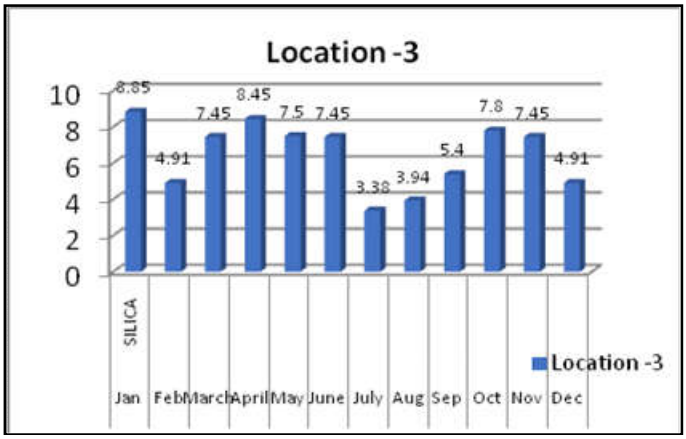


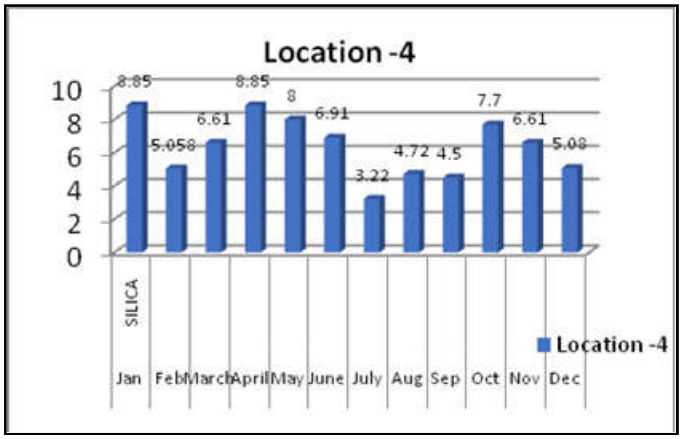


Location wise /month wise silica variation graph

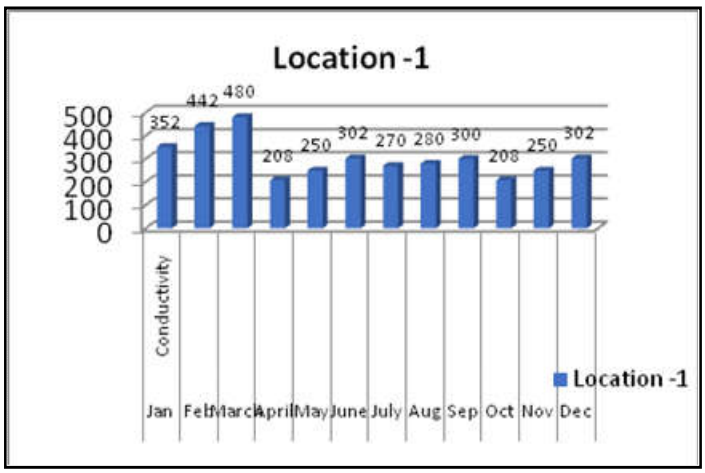


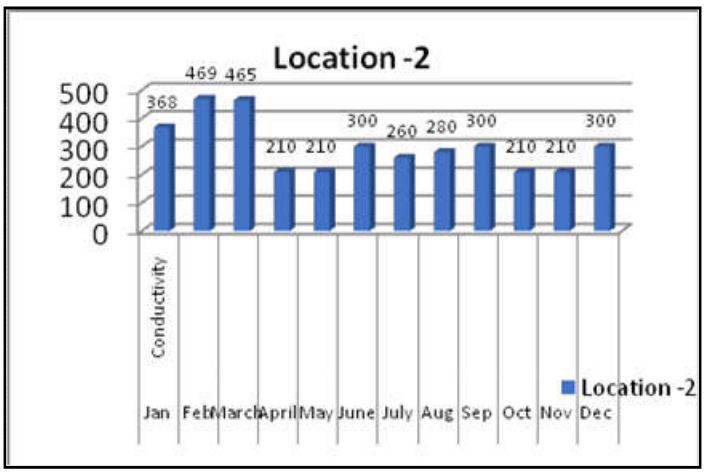


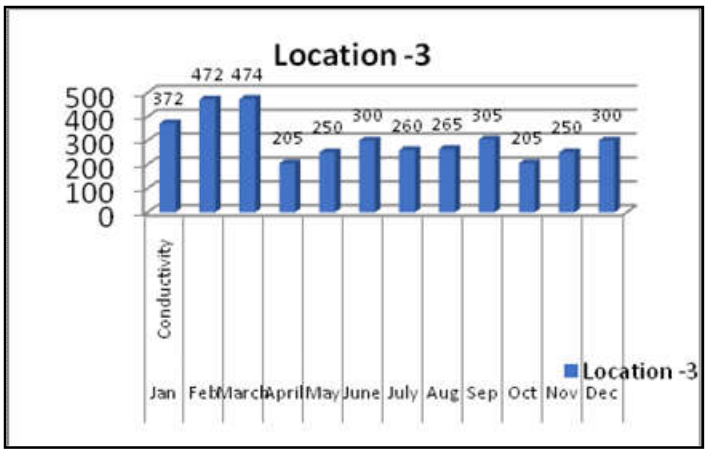


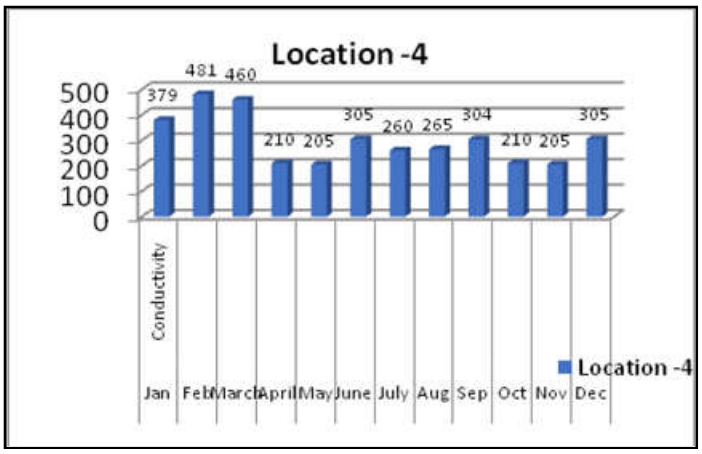


Location wise /month wise conductivity variation graph









The water samples containing pH, Temperature, Conductivity, TDS, Turbidity , Chloride , Iron, Silica, BOD, COD, DO, Total hardness, Calcium hardness, Magnesium hardness, Alkalinity, Total Alkalinity were collected at the surface of study sites at four stations namely Location -1 to Location-4 and sample was collected between 9 A.M. to 11 A.M. In these all locations some of them are too much polluted and that locations of water are not suitable for use as drinking or household purposes also, because that locations of water containing heavily exceeds of pH, TDS, turbidity, BOD, COD, Mg, Ca, Ir and Chloride that locations are-

1. Temperature- highest- (40 ℃)loc. 4
   Lowest- (21℃)loc. 1&4
2. pH- highest- (9.05) loc. 2
   Lowest- (6.54)loc. 1&4
3. Conductivity- highest- (481) loc. 4
   Lowest- (205) loc. 3
4. Total Hardness- highest- (330) loc. 3
   Lowest-(92) loc. 2
5. Calcium Hardness- highest- (110) loc. 1
   Lowest-(63) loc. 4
6. MagnesiumHardness- highest- (45) loc. 2
   Lowest-(16) loc. 4
7. TDS- highest- (321) loc. 4
   Lowest- (123) loc. 1
8. Turbidity- highest- (12.6) loc. 1
   Lowest- (0.9) loc. 2
9. Alkalinity (P)- highest- (10) loc. 1
   Lowest-(6) loc. 2
10. Total Alkalinity- highest- (160) loc. 1
    Lowest-(115) loc. 2
11. Chloride- highest- (56) loc. 1
    Lowest- (39.7) loc. 2
12. Iron- highest- (0.0148) loc. 3
    Lowest- (0.0017) loc. 4
13. Silica-highest- (9.5) loc. 1
    Lowest- (3.94) loc. 3
14. BOD-highest- (6.9) loc. 3
    Lowest- (2.1) loc. 1
15. COD- highest- (35.25) loc. 4
    Lowest- (20) loc. 1
16. DO- highest- (8.9) loc. 4
    Lowest- (6.2) loc. 1

Conclusion

In above study it was found that maximum parameters were not under allowable BIS limits. pH, temperature, TDS, turbidity, BOD, COD, DO, Conductivity, Mg, Ca, Ir, Chloride, Alkalinity, total Alkalinity exceeded the BIS limits. The amount of pH, TDS, turbidity, BOD, COD, Mg, Ca, Ir and Chloride was very high and sometimes very low which makes the water unsuitable for use. These all show that the quality of the river water is below the prescribed standards and it is unsuitable for drinking or household purposes without any disinfection process.

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