

STUDY OF SEASONAL VARIATION PHYSICO-CHEMICAL CHANGE OF SHIVNATH RIVER AT MADKU DWEEP DISTRICT MUNGELI (C.G.)

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ABSTRACT:-

H₂O 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.

Key words: Water sample physico-chemical analysis, pH, temperature, TDS, turbidity, BOD, COD, DO, Conductivity, Mg, Ca, Ir, Chloride, Alkalinity, total Alkalinity (water quality), Shivnath river.

INTRODUCTION:-

Madkudweep is situated near village MADKU in Pathria Block in Mungeli District (C.G.) located 38 km towards south from Bilaspur city.

As per legend Madku Dweep 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 Kulturi period.

Madku Dweep is one of the most valuable and religious monument for Chhattisgarh.

The physico-chemical parameter of water were analysed by standard method devised by Trivedi and Goel (1984) Atoni (1985) and American Public Health 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).[1]

MATERIALS AND METHODS:-

The study area Shivnathriver at Madkudweepdistt. Mungeli (SRMDM) was visited at monthly interval during the one year period (December 2017 to December 2018). 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 analysed 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	°C
04	Calcium	Titrimetric Method	Mg/L
05	Magnesium	Hy. Calculation [TH-(CaH)]* 0.243	Mg/L
06	Total Alkalinity	Titrimetric Method	Mg/L
07	Total Hardness	Titrimetric	Mg/L

		Method	
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	Spectrophotometric 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,18	pH	6.54	7.83	7.2	6.25
2	Feb,18	pH	6.74	8.35	8.32	8.65
3	Mar 18	pH	8.34	8.99	8.82	8.35
4	Aprl, 18	pH	8.5	6.75	8.61	7.62
5	May 18	pH	8.77	6.82	8.91	7.14
6	June, 18	pH	8.7	7.92	7.85	7.2
7	July,18	pH	8.32	8.65	7.62	8.05
8	Aug, 18	pH	7.82	8.28	7.84	8.39
9	Sep,18	pH	7.82	7.64	7.91	8.19
10	Oct,18	pH	8.5	7.82	8.28	8.5
11	Nov, 18	pH	8.64	8.92	8.91	7.75
12	Dec,18	pH	8.76	8.76	8.1	7.82

LOCATION WISE /MONTH WISE TURBIDITY VARIATION

S. No	Month	Parameter	Location - 1	Location - 2	Location - 3	Location - 4
1	Jan, 18	Turbidity	3.7	3.4	3.8	3.5
2	Feb, 18	Turbidity	3.9	2.1	2.6	2.5
3	Mar, 18	Turbidity	2.7	3.2	2.1	2.5
4	April, 18	Turbidity	3.1	3.5	2.6	3.1
5	May, 18	Turbidity	3.1	3.7	3.1	3.4
6	June, 18	Turbidity	4.1	3.9	3.8	3.2
7	July, 18	Turbidity	5.4	4.6	9.2	4.7
8	Aug, 18	Turbidity	6.5	5.7	9.5	5.6
9	Sep, 18	Turbidity	6.3	6.3	10.1	5.7
10	Oct, 18	Turbidity	7.3	5.5	4.1	3.7
11	Nov, 18	Turbidity	3.1	5.1	4.2	3.1
12	Dec, 18	Turbidity	3.3	4.2	5.1	3.2

LOCATION WISE /MONTH WISE TEMPERATURE VARIATION

S. No	Month	Parameter	Location - 1	Location - 2	Location - 3	Location - 4
1	Jan18	Temperature	26	24	26	23
2	Feb 18	Temperature	24	26	23	25
3	Mar 18	Temperature	25	25	28	27
4	April 18	Temperature	36.5	33.5	32	33
5	May 18	Temperature	37.2	39	37	36
6	June 18	Temperature	40.5	38.5	40	38.5
7	July 18	Temperature	29.5	30.6	30	29.5
8	Aug 18	Temperature	32.2	29.2	28	29
9	Sep 18	Temperature	33.1	30.5	30	31
10	Oct 18	Temperature	22.2	28	28	29
11	Nov 18	Temperature	21.6	22	22	21
12	Dec 18	Temperature	21.5	21	21	20.5

**LOCATION WISE /MONTH WISE CALCIUM
HARDNESS VARIATION**

S. No.	Month	Parameter	Location - 1	Location - 2	Location - 3	Location - 4
1	Jan,18	Calcium Hardness	96	102	98	99
2	Feb,18	Calcium Hardness	110	100	97	102
3	March,18	Calcium Hardness	89	88	89	98
4	April,18	Calcium Hardness	100	99	98	100
5	May,18	Calcium Hardness	105	105	102	101
6	June,18	Calcium Hardness	94	104	104	104
7	July,18	Calcium Hardness	73	65	82	75
8	Aug,18	Calcium Hardness	86	88	86	89
9	Sep,18	Calcium Hardness	89	92	93	92
10	Oct,18	Calcium Hardness	92	97	98	100
11	Nov,18	Calcium Hardness	102	99	105	102
12	Dec,18	Calcium Hardness	99	96	101	103

**LOCATION WISE /MONTH WISE MAGNESIUM
HARDNESS VARIATION**

S. No.	Month	Parameter	Location - 1	Location - 2	Location - 3	Location - 4
1	Jan,18	Magnesium Hardness	33	38	39	38
2	Feb,18	Magnesium Hardness	17	18	18	17
3	Mar,18	Magnesium Hardness	15	18	18	15
4	April,18	Magnesium Hardness	27	28	32	27
5	May,18	Magnesium Hardness	30	32	30	33
6	June,18	Magnesium Hardness	29	27	29	26
7	July,18	Magnesium Hardness	33	34	32	31
8	Aug,18	Magnesium Hardness	36	35	36	32
9	Sep,18	Magnesium Hardness	40	41	42	40
10	Oct,18	Magnesium Hardness	27	26	29	27
11	Nov,18	Magnesium Hardness	29	29	32	33
12	Dec,18	Magnesium Hardness	30	27	30	25

**LOCATION WISE /MONTH WISE TOTAL
ALKALINITY VARIATION**

S. No.	Month	Parameter	Location - 1	Location - 2	Location - 3	Location - 4
1	Jan 18	Total Alkalinity	127	130	135	139
2	Feb 18	Total Alkalinity	140	160	140	130
3	Mar 18	Total Alkalinity	124	148	128	132
4	April 18	Total Alkalinity	140	144	130	141
5	May 18	Total Alkalinity	138	148	144	145
6	June 18	Total Alkalinity	142	134	140	140
7	July 18	Total Alkalinity	117	128	116	118
8	Aug 18	Total Alkalinity	118	124	125	120
9	Sep 18	Total Alkalinity	122	120	121	123
10	Oct 18	Total Alkalinity	140	121	140	142
11	Nov 18	Total Alkalinity	142	122	144	145
12	Dec 18	Total Alkalinity	143	124	135	143

**LOCATION WISE /MONTH WISE ALKALINITY (P)
VARIATION**

S. No.	Month	Parameter	Location - 1	Location - 2	Location - 3	Location - 4
1	Jan,18	Alkalinity (P)	8	10	12	10
2	Feb,18	Alkalinity (P)	9	13	2	1
3	March,18	Alkalinity (P)	12	11	15	1
4	April,18	Alkalinity (P)	8	9	8	4
5	May,18	Alkalinity (P)	6	7	8	9
6	June,18	Alkalinity (P)	7	6	6	8
7	July,18	Alkalinity (P)	0	0	1	1
8	Aug,18	Alkalinity (P)	0	1	2	1
9	Sep,18	Alkalinity (P)	2	1	0	2
10	Oct,18	Alkalinity (P)	7	6	9	1
11	Nov,18	Alkalinity (P)	8	7	8	11
12	Dec,18	Alkalinity (P)	8	7	8	9

LOCATION WISE /MONTH WISE TOTAL HARDNESS**VARIATION**

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan,18	Total Hardness	100	132	110	120
2	Feb,18	Total Hardness	125	115	119	127
3	March, 18	Total Hardness	108	103	104	113
4	April, 18	Total Hardness	112	114	112	110
5	May, 18	Total Hardness	106	108	105	103
6	June, 18	Total Hardness	108	103	104	106
7	July, 18	Total Hardness	99	100	94	98
8	Aug 18	Hardness	112	120	115	113
9	Sep, 18	Total Hardness	115	117	112	114
10	Oct, 18	Total Hardness	119	113	110	120
11	Nov, 18	Total Hardness	105	105	103	104
12	Dec,18	Total Hardness	106	108	105	103

LOCATION WISE /MONTH WISE D O(dissolved**oxygen) VARIATION**

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan, 18	Dissolved Oxygen	8.6	8.2	7.9	7.6
2	Feb, 18	Dissolved Oxygen	7.7	8.7	7.2	7.9
3	March, 18	Dissolved Oxygen	7.3	7.1	8.7	7.5
4	April, 18	Dissolved Oxygen	6.4	7.4	6.4	6.8
5	May 18	Dissolved Oxygen	4.8	5.5	6.5	5.6
6	June 18	Dissolved Oxygen	5.6	6.5	4.1	5.3
7	July, 18	Dissolved Oxygen	6.9	4.7	6.2	6.8
8	Aug, 18	Dissolved Oxygen	6.4	6.6	6.6	6.6
9	Sep, 18	Dissolved Oxygen	7.1	6.8	6.7	7.2
10	Oct, 18	Dissolved Oxygen	7.9	6.4	7.8	8.1
11	Nov, 18	Dissolved Oxygen	7.3	7.9	7.1	7.6
12	Dec, 18	Dissolved Oxygen	8.8	8.2	7.9	8.8

LOCATION WISE /MONTH WISE TDS VARIATION

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan,18	TDS	230	223	192	219
2	Feb,18	TDS	310	235	290	312
3	March, 18	TDS	314	302	320	310
4	April,18	TDS	212	220	208	220
5	May,18	TDS	216	240	210	230
6	June,18	TDS	225	230	245	242
7	July,18	TDS	123	125	123	125
8	Aug,18	TDS	136	140	145	140
9	Sep,18	TDS	155	150	155	150
10	Oct,18	TDS	210	220	208	220
11	Nov,18	TDS	215	235	220	230
12	Dec,18	TDS	223	245	240	245

LOCATION WISE /MONTH WISE B O D VARIATION

S. No.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan,18	BOD	2.2	3.2	2.4	2.2
2	Feb,18	BOD	2.1	3.3	2.3	4.2
3	March, 18	BOD	3.4	4.4	4.2	4.1
4	April, 18	BOD	3.6	4.6	3.8	4.2
5	May, 18	BOD	4.6	5.4	4.5	4.3
6	June, 18	BOD	4.2	3.8	4.4	4.2
7	July, 18	BOD	5.8	5.7	4.2	5.6
8	Aug, 18	BOD	6.9	6.7	4.8	5.2
9	Sep,18	BOD	6.7	5.6	3.2	4.2
10	Oct,18	BOD	2.1	2.1	2.01	5.4
11	Nov, 18	BOD	3.9	3.8	2.1	2.3
12	Dec, 18	BOD	3.7	1.7	2.7	2.1

LOCATION WISE /MONTH WISE C O D VARIATION

S. No .	Mont h	Para mete r	Locat ion -1	Locat ion -2	Locat ion -3	Locat ion -4
1	Jan,18	COD	25	24	23	21
2	Feb,18	COD	24	26	24	20
3	March ,18	COD	25	23	27	24
4	April, 18	COD	29	27	25	26
5	May, 18	COD	24	23	28	22.3
6	June, 18	COD	25	28	27	30.1
7	July, 18	COD	30	26	22	32
8	Aug, 18	COD	29	32	30	34
9	Sep,18	COD	33	28	27	30.5
10	Oct,18	COD	31	30	33	32.1
11	Nov, 18	COD	30	32	30	27.2
12	Dec, 18	COD	32	31	29	34

LOCATION WISE /MONTH WISE CHLORIDE VARIATION

S. N o.	Mont h	Paramet er	Loc atio n -1	Locati on -2	Loca tion - 3	Loca tion - 4
1	Jan, 18	Choloride	42.25	41.2	39.7	45.5
2	Feb, 18	Choloride	37.32	40.1	41.2	38
3	Marc h,18	Choloride	40.15	39.2	36.09	34
4	April, 18	Choloride	38.1	37.15	38.08	35.2
5	May, 18	Choloride	41.2	42.52	41.09	40.1
6	June, 18	Choloride	40.25	43.25	40.05	39.2
7	July, 18	Choloride	47	48.1	48.07	39.4
8	Aug, 18	Choloride	54	50.1	51.06	45.1
9	Sep, 18	Choloride	51	45.09	40.08	48.09
10	Oct, 18	Choloride	42.2	43.5	54.02	52.02
11	Nov, 18	Choloride	43	42.1	41.08	51.1
12	Dec, 18	Choloride	44.25	45.2	46.02	53.02

LOCATION WISE /MONTH WISE IRON VARIATION

S. N o.	Month	Parame ter	Locatio n -1	Locati on -2	Locati on -3	Locati on -4
1	Jan,18	IRON	0.0072	0.0098	0.0097	0.0089
2	Feb,18	IRON	0.0613	0.0328	0.0143	0.0242
3	March, 18	IRON	0.0016	0.0032	0.0086	0.0078
4	April, 18	IRON	0.0075	0.009	0.0094	0.008
5	May, 18	IRON	0.0505	0.0325	0.0141	0.0225
6	June, 18	IRON	0.0037	0.0065	0.0078	0.0097
7	July,18	IRON	0.0106	0.0102	0.0102	0.0104
8	Aug, 18	IRON	0.009	0.0095	0.0097	0.0098
9	Sep,18	IRON	0.009	0.0098	0.0091	0.0091
10	Oct,18	IRON	0.0086	0.008	0.0091	0.0081
11	Nov, 18	IRON	0.0139	0.0225	0.0138	0.0142
12	Dec,18	IRON	0.0026	0.0065	0.0089	0.0097

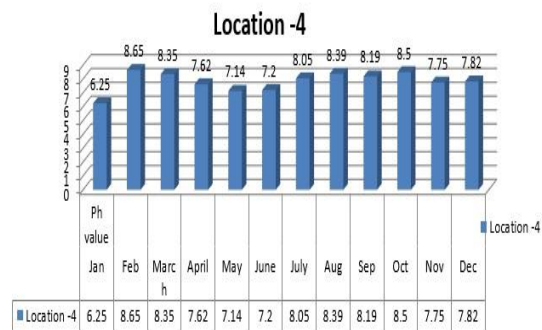
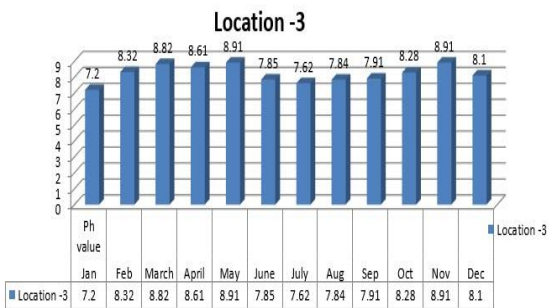
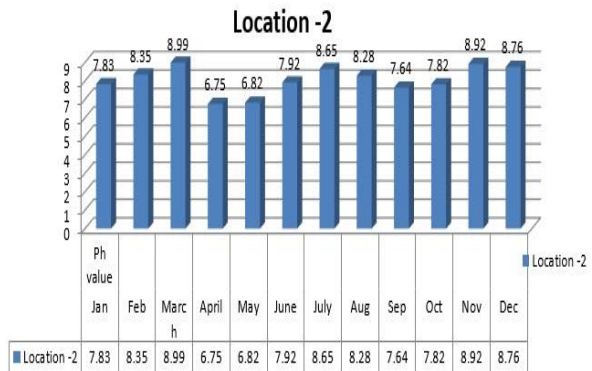
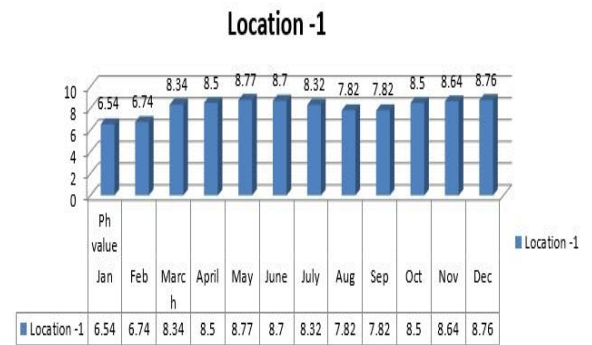
LOCATION WISE /MONTH WISE SILICA VARIATION

S. No .	Month	Paramete r	Locatio n -1	Locatio n -2	Locatio n -3	Locatio n -4
1	Jan,18	SILICA	7.85	8.25	8.95	9.5
2	Feb,18	SILICA	6.2	7.04	6.75	8.2
3	March,1 8	SILICA	6.61	7.45	6.9	8.1
4	April, 18	SILICA	8.72	7.95	6.2	8.05
5	May, 18	SILICA	8.03	7.65	5.01	7.12
6	June, 18	SILICA	8.1	8.2	5.2	6.9
7	July,18	SILICA	7.5	6.1	3.9	4.72
8	Aug, 18	SILICA	6.1	6.2	3.94	4.61
9	Sep,18	SILICA	5.75	7.4	5.45	6.8
10	Oct,18	SILICA	6.85	7.8	7.8	7.2
11	Nov, 18	SILICA	7.92	7.45	7.02	7.12
12	Dec,18	SILICA	7.04	7.9	5.2	6.42

LOCATION WISE /MONTH WISE CONDUCTIVITY VARIATION

S. N o.	Month	Parameter	Location -1	Location -2	Location -3	Location -4
1	Jan,18	Conductivity	306	360	368	302
2	Feb,18	Conductivity	225	385	320	250
3	March,18	Conductivity	223	390	392	209
4	April,18	Conductivity	210	205	253	270
5	May,18	Conductivity	304	250	260	280
6	June,18	Conductivity	268	305	300	302
7	July,18	Conductivity	260	250	365	250
8	Aug,18	Conductivity	310	275	280	208
9	Sep,18	Conductivity	315	295	275	380
10	Oct,18	Conductivity	213	278	310	342
11	Nov,18	Conductivity	308	255	351	318
12	Dec,18	Conductivity	304	292	315	302

LOCATION WISE /MONTH WISE pHVALUE VARIATION GRAPH



RESULT & DISCUSSION :-

ShivnathRiver at Madkudweep dist. Mungeli (SRMDM) was visited at monthly interval during the one year period (December 2017 to December 2018). 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 below-

LOCATION WISE /MONTH WISE TURBIDITY VARIATION GRAPH

Location -1



Location -2



Location -3

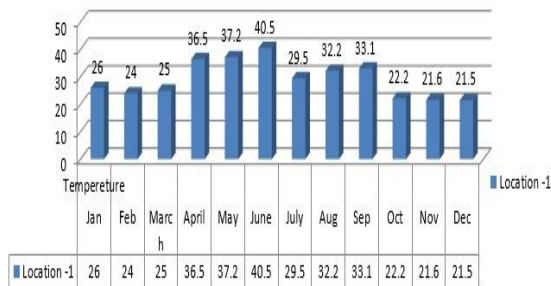


Location -4

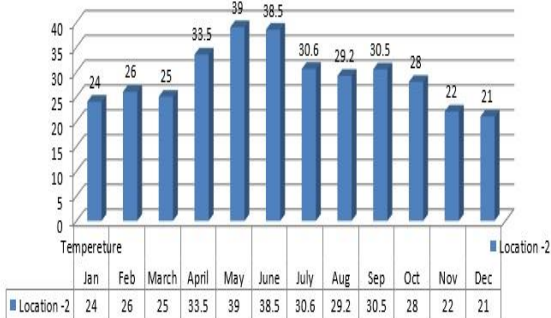


LOCATION WISE /MONTH WISE TEMPERATURE VARIATION GRAPH

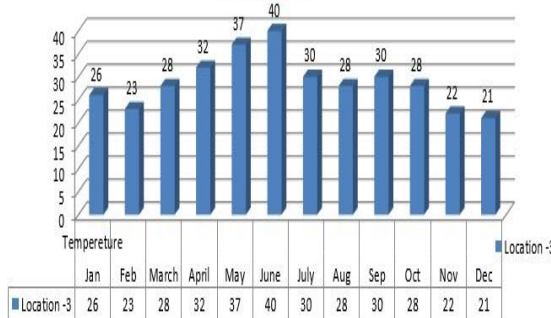
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Location -2



Location -3



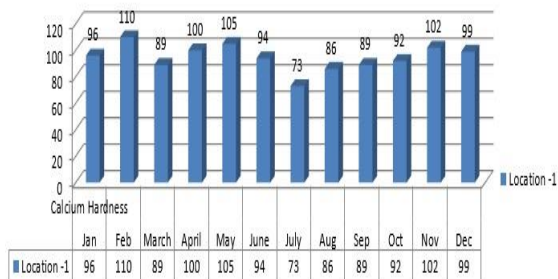
Location -4



LOCATION WISE /MONTH WISE CALCIUM HARDNESS VARIATION GRAPH

LOCATION WISE /MONTH WISE MAGNESIUM HARDNESS VARIATION GRAPH

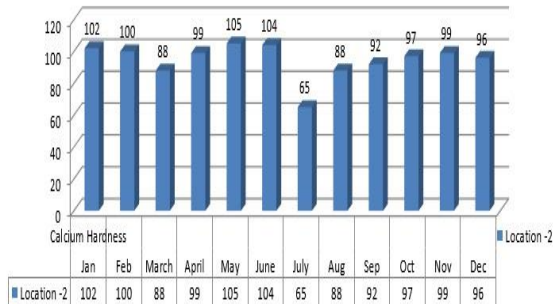
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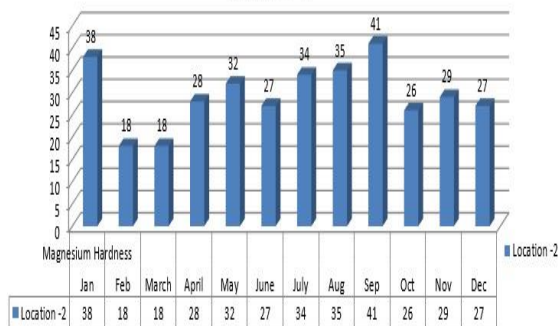
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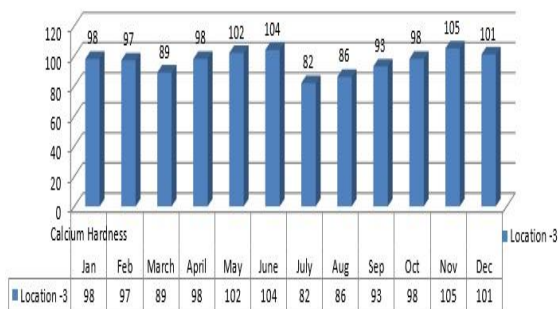
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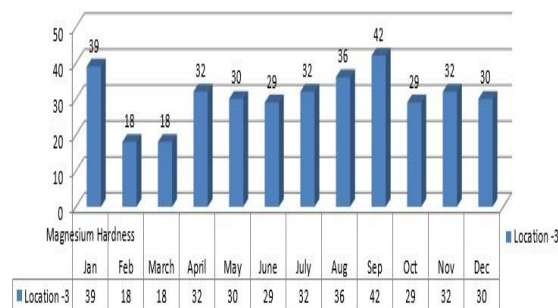
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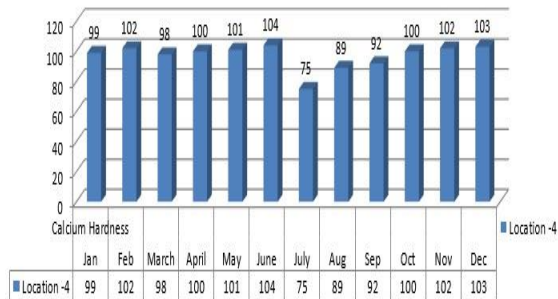
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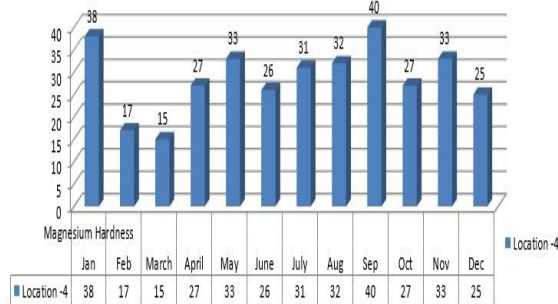
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Location -4



Location-4



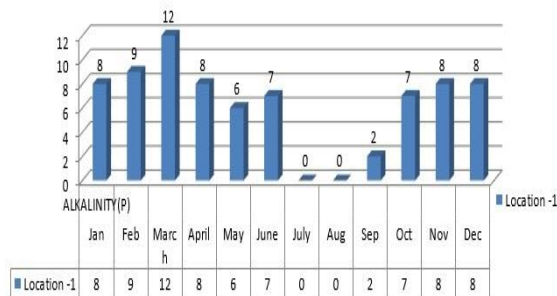
LOCATION WISE /MONTH WISE TOTAL ALKALINITY VARIATION GRAPH

Location -1

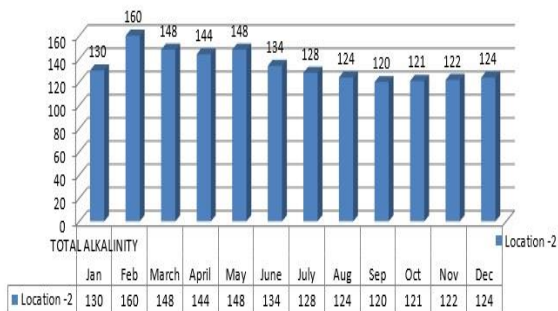


LOCATION WISE /MONTH WISE ALKALINITY (P) VARIATION GRAPH

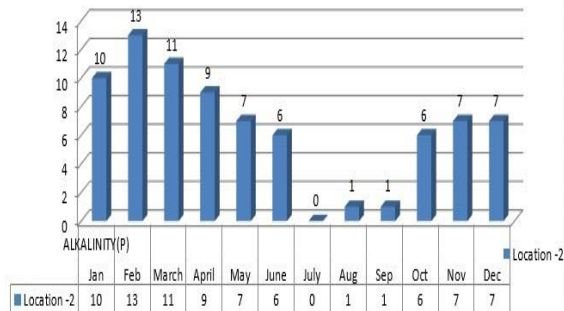
Location -1



Location -2



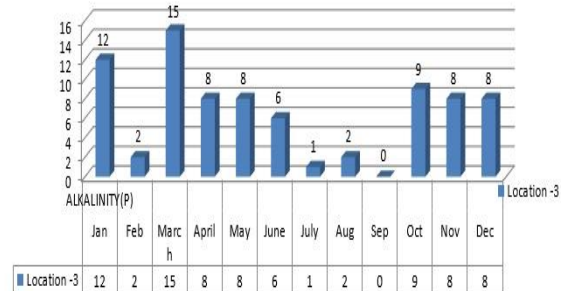
Location -2



Location -3



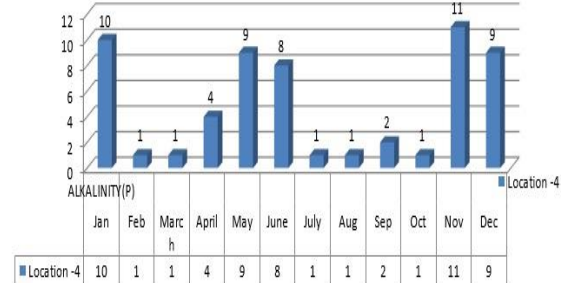
Location -3



Location -4

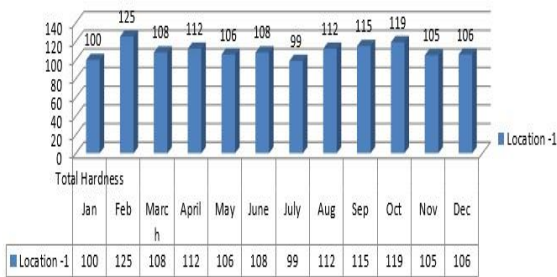


Location -4



LOCATION WISE /MONTH WISE TOTAL HARDNESS VARIATION GRAPH

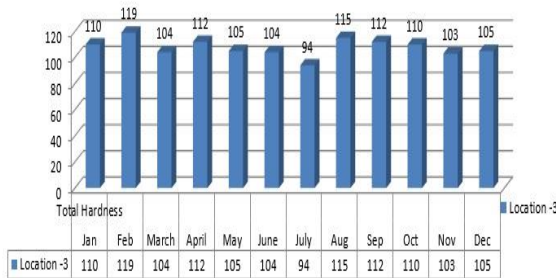
Location -1



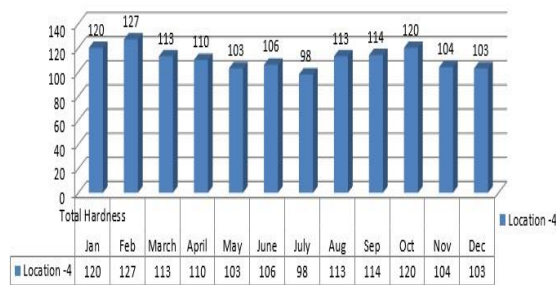
Location -2



Location -3



Location -4

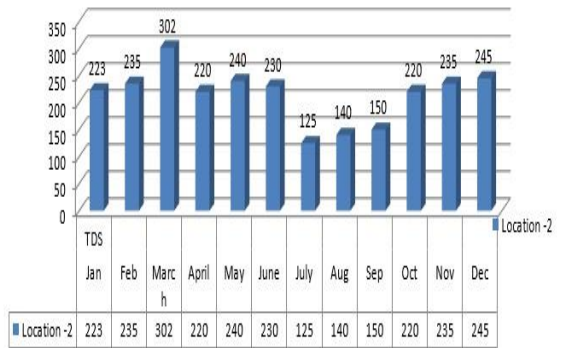


LOCATION WISE /MONTH WISE TDS VARIATION GRAPH

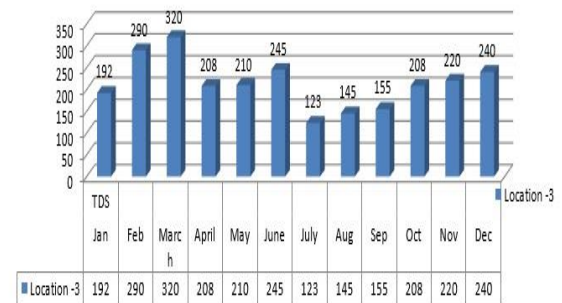
Location -1



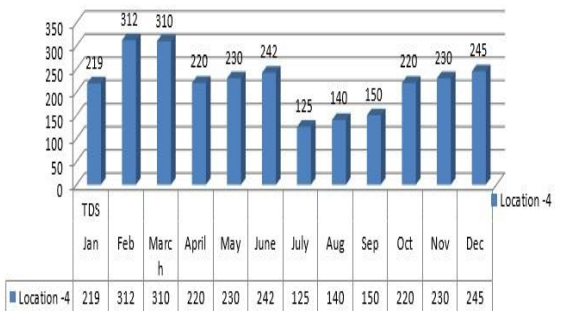
Location -2



Location -3



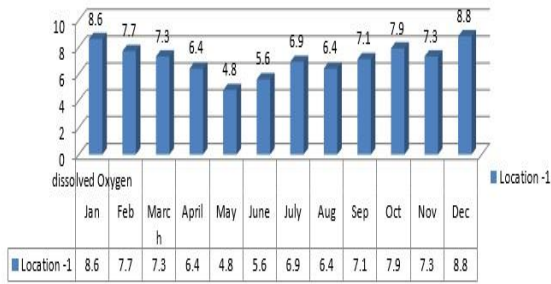
Location -4



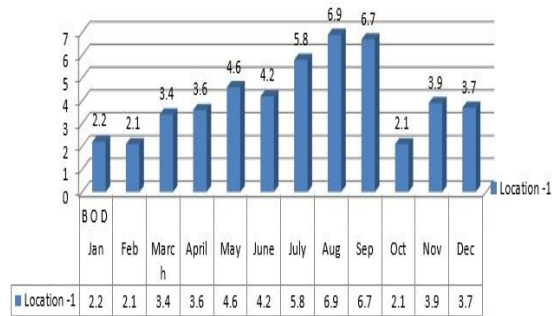
LOCATION WISE /MONTH WISE D O(dissolved oxygen) VARIATION GRAPH

LOCATION WISE /MONTH WISE B O D VARIATION GRAPH

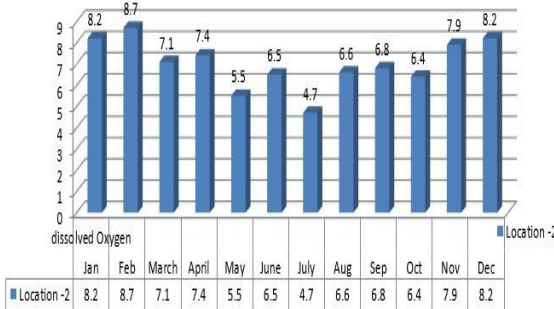
Location -1



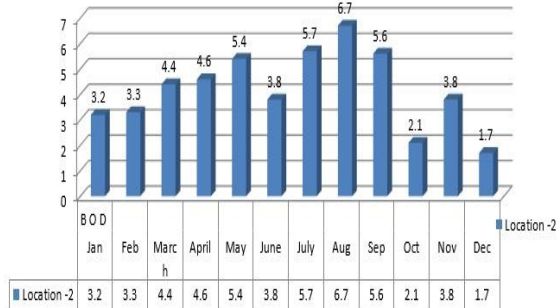
Location -1



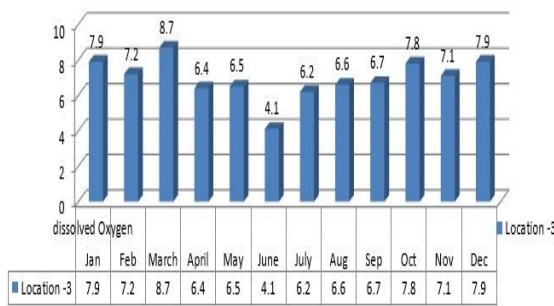
Location -2



Location -2



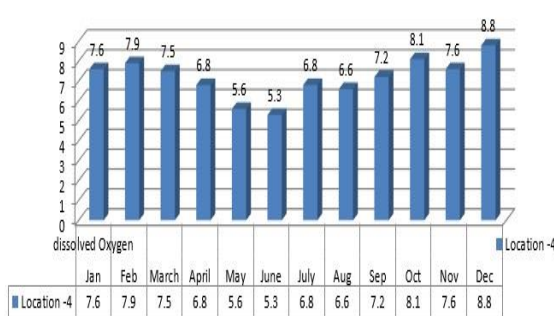
Location -3



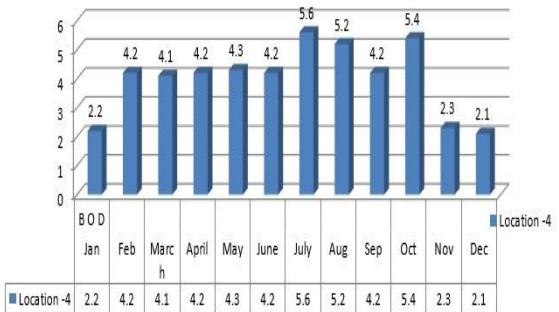
Location -3



Location -4



Location -4



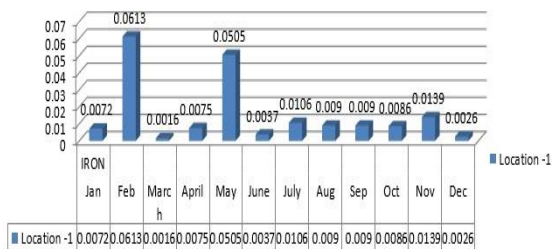
LOCATION WISE /MONTH WISE C O D VARIATION GRAPH

Location -1



LOCATION WISE /MONTH WISE IRON VARIATION GRAPH

Location -1



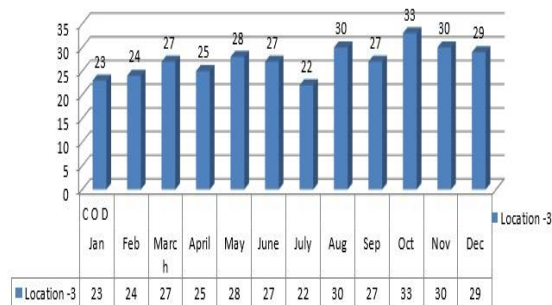
Location -2



Location -2



Location -3



Location -3



Location -4

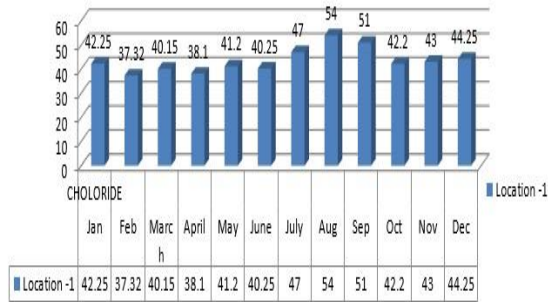


Location -4

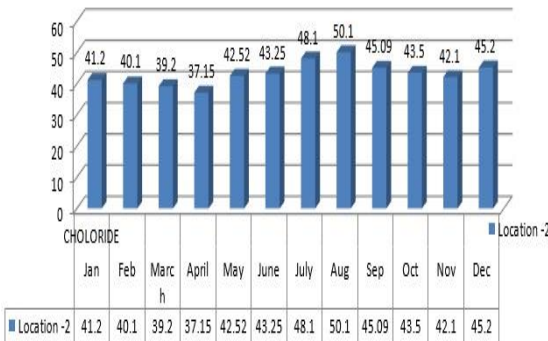


LOCATION WISE /MONTH WISE CHOLORIDE VARIATION GRAPH

Location -1



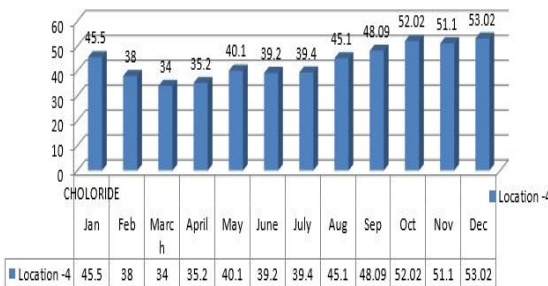
Location -2



Location -3

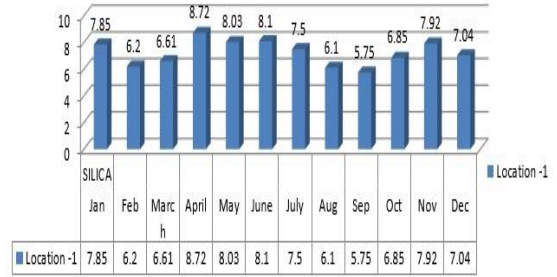


Location -4

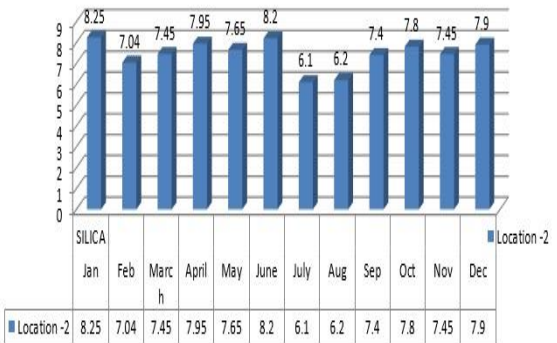


LOCATION WISE /MONTH WISE SILICA VARIATION GRAPH

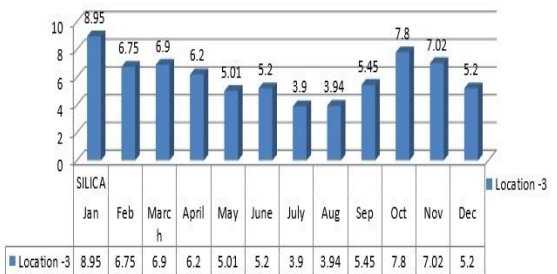
Location -1



Location -2



Location -3

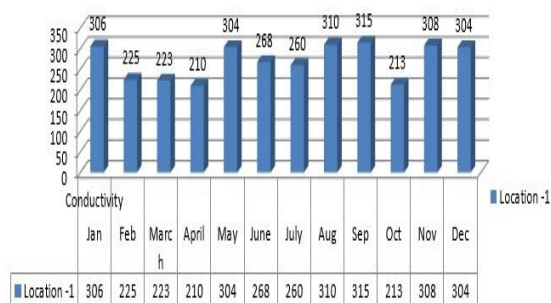


Location -4

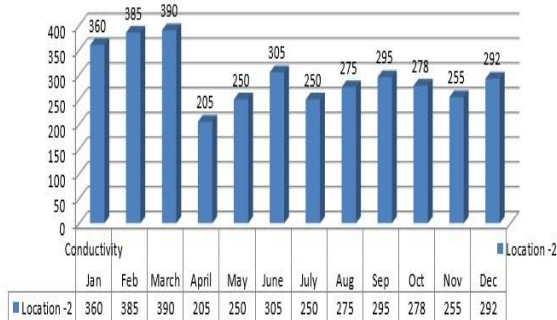


LOCATION WISE /MONTH WISE CONDUCTIVITY VARIATION GRAPH

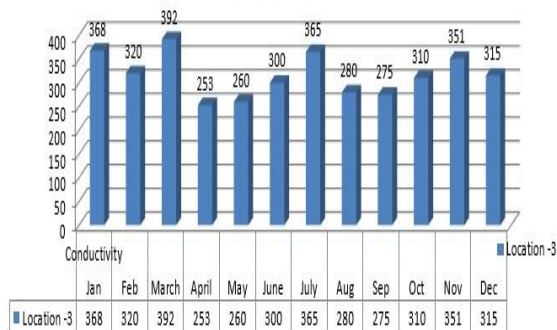
Location -1



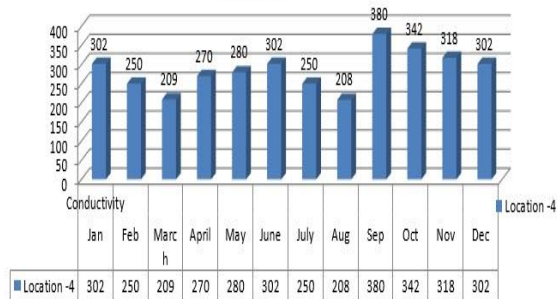
Location -2



Location -3



Location -4



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-

- Temperature-**
Highest-(40.5° C) location I-June
Lowest-(20.5°C) location IV-December
- pH-**
Highest-(8.91) location III- November
Lowest-(6.25) location IV- January
- Conductivity –**
Highest (392) location III- March
Lowest (208) location IV- August
- Chloride-**
Highest(54.02) location III October
Lowest (34) location IV March
- Silica -**
Highest(9.5) location IV January
Lowest (4.61) location IV August
- Turbidity-**
Highest (9.5) location III August
Lowest (2.1) location II February
- Calcium hardness -**
Highest(110) location I-February
Lowest (65) location II July
- Magnesium hardness-**
Highest (42)- location III September
Lowest (15) location I March
- Total alkalinity-**
Highest(148) location II May
Lowest (120) location II-IV August, September
- Alkalinity-**
Highest (13) location II February
Lowest(01) location II, III, IV July, August
- Total hardness-**
Highest (132) location II January
Lowest(94) location III July
- TDS-**
Highest(314) location I March
Lowest (123) location I, III July
- Do-**
Highest(8.8) location I,IV December
Lowest(4.8) location I May
- BOD-**
Highest(6.9)Location I August
Lowest (2) location IV December
- COD-**
Highest (33) location I,III September, October
Lowest(2) location IV February
- Iron-**
Highest(0.0143) location III February
Lowest (0.009) location I, III August, April

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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