

Pollution due to Industrial Effluents at Dindigul Block in Dindigul District, Tamilnadu

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Abstract

This Project aims to study the Ground water quality at DINDIGUL district in DINDIGUL block. The ground water is carried out in around the tanneries. The overexploitation of ground water in some parts of the country induces water quality degradation. The untreated industrial effluents discharged on the surface so the ground water may polluted at this block. This make a problems of supply of impurities free drinking water in the rural parts of the country. There are about 61 tanneries operating in and around the DINDIGUL block. The untreated effluents from the tanneries have considerably affected the quality of ground water in this area. So the parameters (physical and chemical (cations, anions)) of ground water have been studied and analyzed. Then the parameters of physical and chemical constituents in the water sample were compared with the water quality parameters and drinking water standards (IS: 10500 – 1991) to know the suitability of water for drinking.

Keywords: IS 10500: 1991, Ground water quality, Parameters, Dindigul

I. INTRODUCTION

Most parts of India are facing ground water pollution. Water is the most important source for living organisms. In our world content 71% of the water. Particularly availability of Ground water is 30%. Now a days there is no regular seasonal rainfall. So our only hope is ground water. When it is used for both drinking, domestic and industrial purpose. Such types of pollution are mainly enrichment of various chemical parameters such as Nitrate, Hardness, and Etc., so collect the ground water sample in around the dindigal district. These water samples are testing in water testing laboratory these ground water samples are collected from dindigul block in dindigul town. Ground water often consists of several physical and chemical elements. The study area dindigul block in dindigul district, Tamilnadu, India possesses poor groundwater potential. The health of the rural farming community and people working in the tanning industries has been seriously affected. The environmental protection agency, in the United States, has identified in 1993 more than 200 chemical compounds in ground water, some of these are extremely hazardous to human health. Water is a volatile source of our life. The groundwater is contaminated mainly by the discharge of domestic water, livestock waste, and effluents from industry, change in climate, precipitation and soil type. The major problem with the ground water is that once contaminated, it is difficult to restore its quality. India is facing a serious problem of natural resource scarcity, especially that of water in view of population growth and economic development.

All life is depend on water and exists in nature in many forms like ocean, river, bore well, clouds, rain, snow and fog etc. Such high quality of water may be required only for drinking purposes while for other uses like agriculture and industry, the quality of water can be quite flexible. The people lives in dindigul rural areas suffer from occupational diseases such as Asthma, Ulcer and Skin diseases. The over exploitation of ground water in some parts of the study area induces water quality degradation. Hence there is a need and concern for the protection and management of ground water quality

A. Parameters to be Analyzed

The following parameters are given below:

- 1) Physical parameter: Colour, Odour, Temperature, Turbidity
- 2) Chemical parameters: PH value, Carbonate, Bi Carbonate, Chloride, Phosphate, Sulphate, Silicate, Nitrate, Nitrite, Fluoride, Aluminium, Calcium, Magnesium, Sodium, Pottasium, Zinc, Copper, Iron, Manganese, Chromium, Lead, COD, EC.

B. Study Area

DINDIGAL District in Tamil Nadu is geographically situated between 10°13' and 10°26' N and 77°53' and 78°01' E Longitudes. The District is bounded by Erode, Coimbatore, Karur and Trichy Districts on the north, by Sivagangai, Karur and Trichy Districts

on the East, by Madurai and Theni District on the South and by Coimbatore District and Kerala State on the West. It is spreads over the area of 4217.36 sq.km. According to 1991 census, the total population of the District is 17,60,601 which covers the male population of 8,90,783 and Female population of 8,69,818, The Dindigul taluk population is: 6,41,378. Dindigul Block is located in the Sourthern. Boundary of Dindigul. Its Northern boundary is the Vedesandur and Vadamudurai Block and the the Western boundary are Reddiyarchatram, Attur and Nilokkottai Block. The Block covers on area of about 82237 hectares. In Dindiugl Block, number of cultivators are 10111 and Net cultivatable area is 69 percent of the total area. Then the 61 tanneries are functioning in and around the dindigul block.

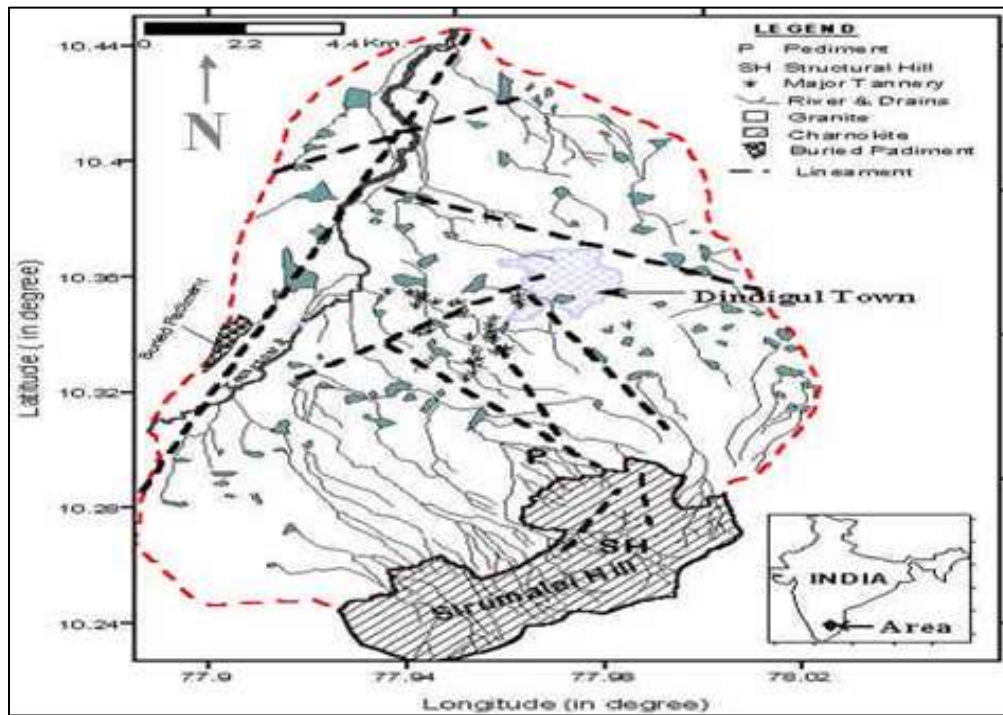
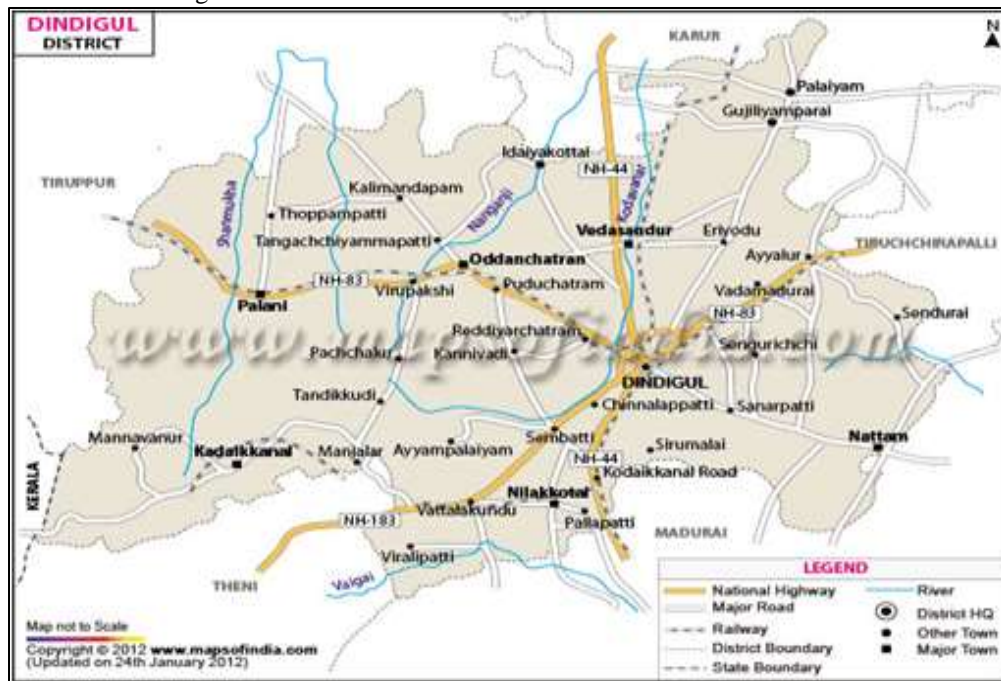


Fig. 1: Topographical View of Dindigul Map

1) Study Area - Dindigul Block

Ground Water Sample Location in My Study Area.

– Place of Visit - Dindigul block

Areas of Collecting Samples:

- 1) Begambur
- 2) Paraipatti
- 3) Puthupatti
- 4) Guruvappanayakkanpatti
- 5) Chinnalapatti
- 6) Near lake
- 7) Kuttiapatti
- 8) Ponmandurai
- 9) Muthalapatti
- 10) Kuttiapatti north
- 11) Theni bye pass
- 12) PMR without treatment water
- 13) Final waste settlement of 64 tanneries in single lake
- 14) PMR Outlet
- 15) Pallapatti

II. METHODOLOGY

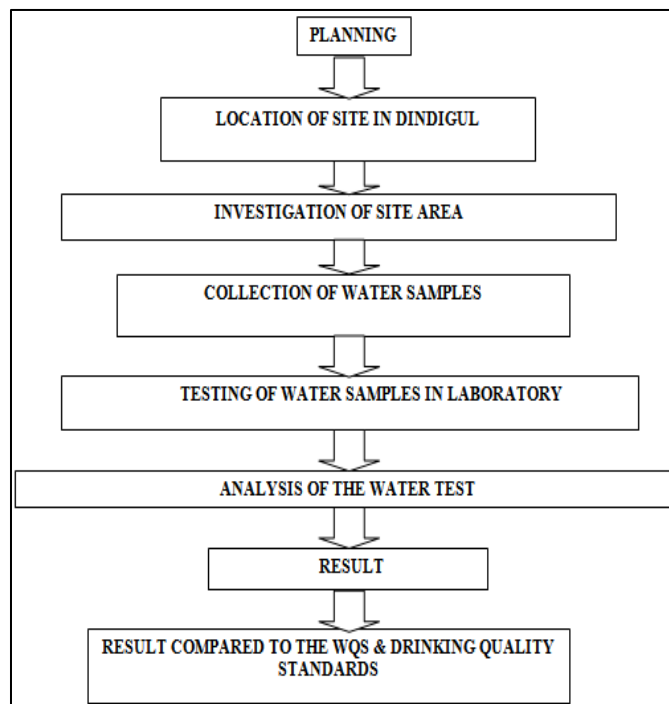


Fig. 2 Methodology

III. INVESTIGATION

A. Sources of Water

- Bore water, well water.
- Ground water

B. Reasons for the Analysis of Water

Following are the reasons for carry out the analysis of water.

- To identify the characteristics of the water.
- To analyses the pollution of the water sample.
- To identify the organisms responsible for developing certain effects on with respect to color, odor, taste, etc.,
- To find out the organisms responsible for the spreading of the water borne diseases.
- To know the quality of water.
- To study the self-purification of the water sample.

C. Impurities in Water Samples

- Physical impurities
- Chemical impurities
- Bacteriological impurities


IV. RESULT AND DISCUSSION

The physicochemical parameters of water quality were analyzed using standard methods given in. The observation and graphical representations of physicochemical characteristics of collected water samples are given. It should be recognized that, like dissolved oxygen, pH also varies in reservoir naturally throughout the day due to the photosynthesis and respiration cycles in the presence of algae in water bodies. The pH is measure of the intensity of acidity or alkalinity and the concentration of hydrogen ion concentration

pH has no direct adverse effects on health; however, higher values of pH hasten the scale formation in water heating apparatus and also reduce germicidal potential of chloride. High pH induces the formation of tri halo methane which is toxic. pH is one of the most important factors that sever as an index for the pollution.

The values of Water Quality Standard showed the higher percent of poor category of reservoir water was found in the sampling site. It may be due to the effective ionic leaching, over exploitation and anthropogenic activities such as discharge of effluents from industrial, agricultural and domestic uses. It is found that the 50 % of reservoir water on the sampling location are of very poor quality. This clearly indicates that water samples for this region are highly polluted. They are not suitable for drinking purpose and other useful human activities.

pH is an important parameter which determines the suitability of water for various purposes.


GOVERNMENT OF TAMILNADU
DEPARTMENT OF AGRICULTURE
 Name of the Sample: **SHANARAPATTI BLOCK**
Water Samples Analytical Report-I

Sl.No	NAME OF THE PARAMETER	SAMPLE DETAILS				
		1	2	3	4	5
PHYSICAL PARAMETER						
1.	Colour	>1hue	>1hue	<1hue	<1hue	<1hue
2.	Odour	Unpleasant	Agreeable	Agreeable	Unpleasant	Agreeable
3.	Turbidity	15 NTU	20 NTU	15 NTU	10 NTU	20 NTU
4.	Total dissolved solids (mg/l)	2343	2153	859	1236	759
5.	pH	4.92	4.53	7.32	6.63	7.62
6.	Electrical conductivity (dsen/l)	3.67	3.36	1.34	1.93	1.19
7.	BOD (mg/l)	270	75	74	176	82
8.	COD (mg/l)	145	42	49	86	46
ANIONS						
9.	Carbonate (mg/l)	Nil	Nil	Nil	Nil	Nil
10.	Bi Carbonate (mg/l)	156	129	148	126	136
11.	Chloride (mg/l)	856	846	136	420	126
12.	Sulphate (mg/l)	58	59	62	63	67
13.	Phosphate (mg/l)	0.02	0.03	0.02	0.03	0.05
14.	Silicate (mg/l)	5.36	5.21	5.10	5.24	5.03
15.	Nitrate (mg/l)	0.05	0.08	0.09	0.07	0.02
16.	Nitrite (mg/l)	Nil	Nil	Nil	Nil	Nil
17.	Fluoride (mg/l)	3.25	3.65	3.27	3.19	3.48
18.	Aluminium (mg/l)	6.36	7.26	Nil	4.36	Nil
CATIONS						
19.	Calcium (mg/l)	152	142	163	148	156
20.	Magnesium (mg/l)	89	85	84	86	83
21.	Sodium (mg/l)	223	226	128	229	124
22.	Potassium (mg/l)	0.13	0.12	0.15	0.19	0.21
HEAVY METALS						
23.	Zinc (mg/l)	0.03	0.02	0.05	0.03	0.05
24.	Copper (mg/l)	0.01	0.02	0.03	0.01	0.02
25.	Iron (mg/l)	0.04	0.03	0.05	0.03	0.04
26.	Manganese (mg/l)	0.03	0.02	0.03	0.02	0.03
27.	Chromium (mg/l)	2.36	2.09	Nil	Nil	Nil
29.	Lead (mg/l)	0.46	0.52	Nil	Nil	Nil




 Agricultural Officer,
 Soil Testing Laboratory,
 Tiruchirappalli-20

Fig. 3.1: Report 1


GOVERNMENT OF TAMILNADU
DEPARTMENT OF AGRICULTURE
 Name of the Sample: **DINDIGAL BLOCK**
Water Samples Analytical Report-II

Sl.No	NAME OF THE PARAMETER	SAMPLE DETAILS				
		6	7	8	9	10
PHYSICAL PARAMETER						
1.	Colour	< 1Hue	< 1Hue	< 1Hue	< 1Hue	< 1Hue
2.	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	Turbidity	15 NTU	20 NTU	15 NTU	10 NTU	15 NTU
4.	Total dissolved solids (mg/l)	1625	1856	356	1770	1549
5.	pH	8.24	7.30	8.82	8.12	6.9
6.	Electrical conductivity (µm/s)	9.54	2.92	0.59	2.74	2.32
7.	BOD (mg/l)	56	48	74	59	56
8.	COD (mg/l)	25	29	32	35	28
ANIONS						
9.	Carbonate (mg/l)	Nil	Nil	Nil	Nil	Nil
10.	Bi Carbonate (mg/l)	123	145	126	143	129
11.	Chloride (mg/l)	145	156	147	159	165
12.	Sulphate (mg/l)	65	68	57	49	58
13.	Phosphate (mg/l)	0.02	0.03	0.03	0.02	0.01
14.	Silicate (mg/l)	4.56	4.25	4.19	4.17	4.36
15.	Nitrate (mg/l)	0.05	0.06	0.04	0.08	0.03
16.	Nitrite (mg/l)	Nil	Nil	Nil	Nil	Nil
17.	Fluoride (mg/l)	2.39	2.65	2.48	2.47	2.65
18.	Aluminium (mg/l)	Nil	Nil	Nil	Nil	Nil
CATIONS						
19.	Calcium (mg/l)	80	75	74	86	79
20.	Magnesium (mg/l)	59	51	54	59	52
21.	Sodium (mg/l)	36	25	33	20	21
22.	Potassium (mg/l)	0.13	0.14	0.16	0.12	0.16
HEAVY METALS						
23.	Zinc (mg/l)	0.02	0.02	0.02	0.03	0.03
24.	Copper (mg/l)	0.01	0.02	0.01	0.02	0.03
25.	Iron (mg/l)	0.05	0.06	0.02	0.03	0.04
26.	Manganese (mg/l)	0.01	0.03	0.02	0.04	0.03
27.	Chromium (mg/l)	Nil	Nil	Nil	Nil	Nil
29.	Lead (mg/l)	Nil	Nil	Nil	Nil	Nil

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Fig. 3.2: Report 2


GOVERNMENT OF TAMILNADU
DEPARTMENT OF AGRICULTURE
 Name of the Sample: **DINDIGAL BLOCK**
Water Samples Analytical Report-III

Sl.No	NAME OF THE PARAMETER	SAMPLE DETAILS				
		11	12	13	14	15
PHYSICAL PARAMETER						
1.	Colour	< 1Hue	< 1Hue	< 1Hue	< 1Hue	< 1Hue
2.	Odour	Agreeable	Agreeable	Disagreeable	Disagreeable	Agreeable
3.	Turbidity	25 NTU	15 NTU	10 NTU	15 NTU	20 NTU
4.	Total dissolved solids (mg/l)	1879	2016	1478	1856	1289
5.	pH	6.95	7.32	7.45	7.73	7.23
6.	Electrical conductivity (µm/s)	2.94	3.15	5.43	2.93	2.02
7.	BOD (mg/l)	195	189	187	184	72
8.	COD (mg/l)	136	135	139	134	38
ANIONS						
9.	Carbonate (mg/l)	Nil	Nil	Nil	Nil	Nil
10.	Bi Carbonate (mg/l)	126	138	142	126	125
11.	Chloride (mg/l)	546	689	986	239	124
12.	Sulphate (mg/l)	30	183	149	148	43
13.	Phosphate (mg/l)	0.03	0.05	0.04	0.03	0.03
14.	Silicate (mg/l)	3.31	4.13	4.25	4.16	4.05
15.	Nitrate (mg/l)	0.08	0.06	0.05	0.03	0.04
16.	Nitrite (mg/l)	0.05	0.06	0.08	0.23	Nil
17.	Fluoride (mg/l)	3.69	3.48	5.25	4.36	4.12
18.	Aluminium (mg/l)	Nil	Nil	Nil	Nil	Nil
CATIONS						
19.	Calcium (mg/l)	120	136	142	120	130
20.	Magnesium (mg/l)	89	87	62	86	84
21.	Sodium (mg/l)	239	237	235	231	136
22.	Potassium (mg/l)	0.12	0.13	0.14	0.13	0.15
HEAVY METALS						
23.	Zinc (mg/l)	0.02	0.03	0.02	0.04	0.02
24.	Copper (mg/l)	0.02	0.01	0.03	0.02	0.01
25.	Iron (mg/l)	0.04	0.04	0.06	0.04	0.03
26.	Manganese (mg/l)	0.01	0.02	0.01	0.01	0.02
27.	Chromium (mg/l)	0.06	0.82	0.53	0.39	Nil
29.	Lead (mg/l)	0.13	0.18	0.22	0.15	Nil

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Fig. 3.3: Report 3

A. Water Quality Parameter Standard IS10500-1991

WATER QUALITY PARAMETERS AND DRINKING WATER STANDARDS				
DRINKING WATER				
SL. NO.	PARAMETERS	UNITS	IS: 10500 - 1991	
			DESIRABLE	MAXIMUM
1.	Colour	Hazen units	5	25
2.	Odour	-	Unobjectionable	
3.	Taste	-	Agreeable	
4.	Turbidity	NTU	5	10
5.	pH value	-	6.5 to 8.5	No relaxation
6.	Total hardness (as CaCO ₃)	mg/l	300	600
7.	Iron	mg/l	0.3	1.0
8.	Chlorides	mg/l	250	1000
9.	Residual, free Chlorine	mg/l	0.2	-
10.	Dissolved Solids	mg/l	500	2000
11.	Calcium	mg/l	75	200
12.	Copper	mg/l	0.05	1.5
13.	Manganese	mg/l	0.1	0.3
14.	Sulphate	mg/l	200	400
15.	Nitrate	mg/l	50	No relaxation
16.	Fluoride	mg/l	1.0	1.5
17.	Phenolic compounds	mg/l	0.001	0.002
18.	Mercury	mg/l	0.001	No relaxation
19.	Cadmium	mg/l	0.01	No relaxation
20.	Selenium	mg/l	0.01	No relaxation
21.	Arsenic	mg/l	0.05	No relaxation
22.	Cyanide	mg/l	0.05	No relaxation
23.	Lead	mg/l	0.05	No relaxation
24.	Zinc	mg/l	5	15
25.	Anionic detergents	mg/l	0.2	1.0
26.	Chromium	mg/l	0.05	No relaxation
27.	Polynuclear aromatic hydrocarbons	mg/l	-	-
28.	Mineral oil	mg/l	0.01	0.03
29.	Pesticides	mg/l	Absent	0.001
30.	Radioactive materials			
	(a) Alpha emitters	Bq/l	-	0.1
	(b) Beta emitters	Pci/l	-	0.037
31.	Alkalinity	mg/l	200	600
32.	Aluminium	mg/l	0.03	0.2
33.	Boron	mg/l	1	5

Fig. 4: Water Quality Parameter Standard IS10500-1991

B. Highly Affected Area of Water Sample

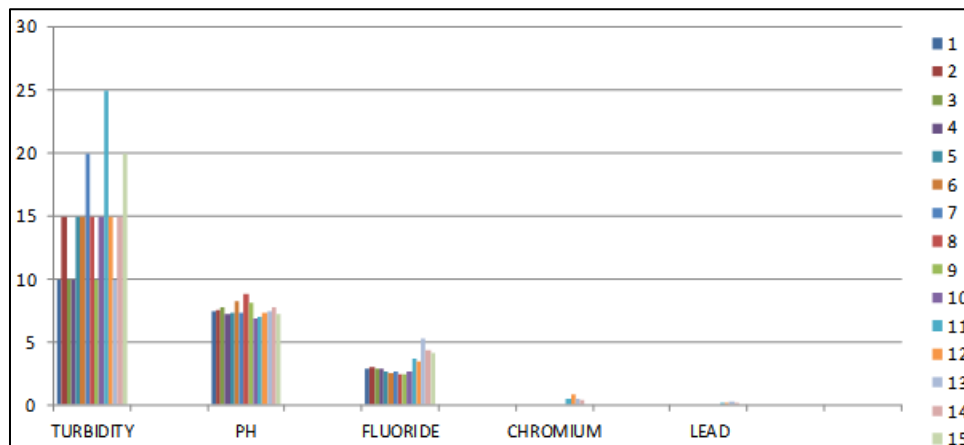


Fig. 5: Highly Affected Area of Water Sample

- Turbidity
- TDS
- PH
- Chloride
- Fluoride
- Calcium
- Chromium
- Lead

C. Graphical Representation pH

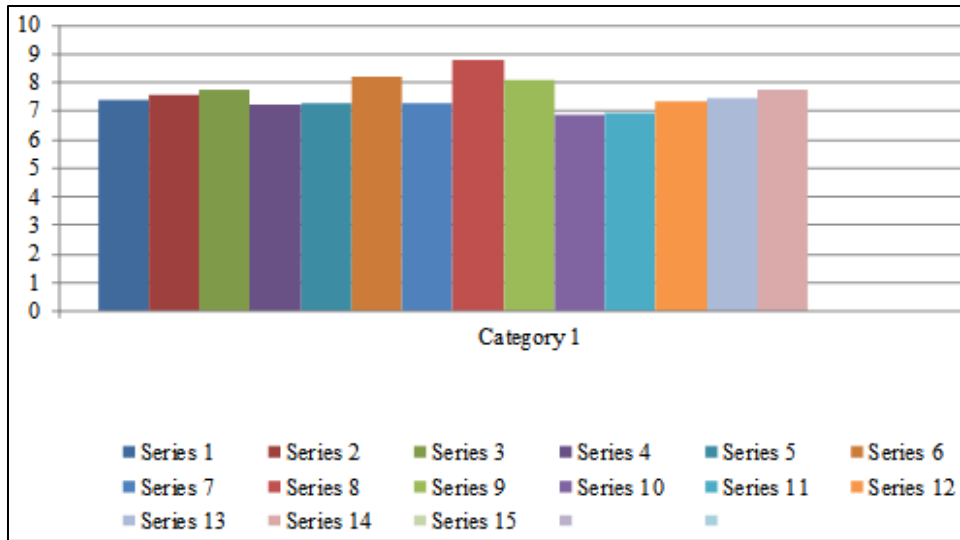


Fig. 6: Graphical Representation pH

D. Fluoride

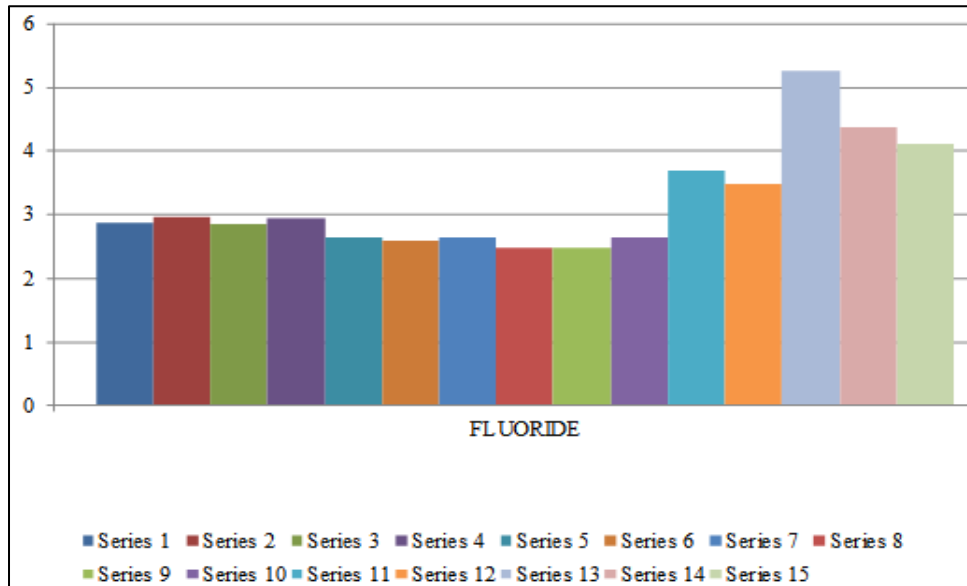


Fig. 7: Fluoride

1) Pure or Potable Water:

When the water is used for drinking purpose (Taste and Clear) is called pure or potable water.

2) Polluted or Non Potable Water:

When the water is not used for drinking purpose is called polluted or non-potable water.

3) PH:

Standard value: 6.5 – 8.5 (mg/l)

Then the samples 8 are not used for drinking purpose. It's also known as non-potable.

4) Fluoride:

Standard value: 1 – 1.5 (mg/l)

Then the all samples water quality standard values are highly increased. Particularly sample 15, 14, 13 values are highly increased. So these water samples are not suitable for drinking purpose.

E. Health Effect Due to Chemical Parameters

- PH :Bitter taste, Corrosion, and others
- Ca & Mg: Poor lathering, Scale forming, Dot formation, Deterioration of forming.

- IRON: Poor taste, color and turbidity, bitter taste, and etc...
- ALUMINIUM: Neurological disorders, Alzheimer's disease.
- COPPER: Liver damage, mucosal irritation, kidney damage.
- ALKALINITY: Boiled rice yellowish and hard.
- ZINC: Astrigent taste, vomiting, gastrointestinal irritation, dehydration, pain, and etc..
- AMMONIA: Indicates pollution, growth of algae.
- NITRATE: Blue baby disease.
- SULPHATE: Taste affected, irritation.
- CHLORIDE: Taste affected, corrosive.
- FLUORIDE: Dental affected and skeletal fluorosis and other dental problems.

V. CONCLUSION

The observation in this study indicates the higher values of some parameters of the ground water. They minimize the suitability of the water for drinking purpose without prior treatment. Higher values of Water Quality Standard clearly show that the status of water body is entropic. Due to the presence of higher PH value (above 8 & below 6.5) in our study areas like ponmandurai, muthalapatti, kuttiapatti. So that the water is not suitable for drinking purpose and the near lake areas are also not suitable for drinking purpose. Then the guruvappanayakkanpatti water is potable and no need for treatment process. The remaining Area needs primary treatment for drinking purpose especially in Ponmandurai and puthupatti.

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