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Research Article

Site Analysis of Effluents of Tanneries in Shanarapatti Block, Dindugal District

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Urban migration due to population growth and economic growth leads to various environmental problems. The provision of infrastructure cannot meet the request for access to city development. It is creating a shortage of urban infrastructure, which ultimately undermines the first level of medical facilities that include air, water, land, vegetation, marine animals. Some commercial pollution in big cities is having consequences for people's lives. Existing observations aimed at assessing the development of the city and its impact on groundwater. Analysis of the growth of Shanarapatti Block, Dindigul region and its impact on groundwater quality using a common graphical method. This study shows that transmissibility transmission plays a more critical role than dispersion, indicating that the migration event is primarily caused by advection rather than dispersion. The area is spread over 250.9 sq. km. Since 1970 the area has not been upgraded but due to population growth. To measure the level of water below the samples taken from the city and surrounding areas are also analyzed. The result showed that samples close to 80 tanneries exceeded the limit and were analyzed compared to WHO and Indian standards.

Keywords: Tanneries, Effluents, Shanarapatti Block, Water Quality.

1. Introduction

An essential requirement for human life is to get out of the water, it is a gift to mankind. It is found in various forms such as rivers, lakes, streams, etc. Many parts of India are subject to groundwater pollution. Such types of impurities are enriched with various chemical parameters such as nitrate, hardness, sodium, calcium, magnesium, chloride, sulfate, etc. Study area, Shanarapatti block in Dindigul Province, Tamil Nadu, India has underground power. The worst possible contamination of both surface water and groundwater has been reported in this area due to the uncontrolled spill of uncooked dirt in eighty long-term tanneries.

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They suffer from occupational diseases and asthma, ulcers, and skin. Most drinking water is contaminated with chemical pollutants that can be harmful to human health in the hotspots of agriculture, turn sewage into densely populated areas, or to sources such as irrigated land.

1.1. Ground water

Groundwater is a substrate that is found beneath groundwater pits and within the cracks in rock formations. A stone unit or non-slip deposit is known as an aquifer while it may produce a useful amount of water. The depth at which holes in the ground or cracks and voids in the rock appear to be filled with water is called a water table. Groundwater is replenished from, and eventually flows to, bottom clearly; natural emissions occur frequently in springs and waterfalls and can form oases or wetlands. Groundwater is also being diverted for agricultural, municipal, and commercial uses through mining and operational resources. Observing the movement and distribution of groundwater hydrogeology, the groundwater is a view of liquid water flowing into shallow water, but theoretically it can also incorporate soil moisture, permafrost, stagnant water in all inaccessible areas, and oil-rich or deep geothermal waters.

Groundwater is thought to provide a softening potential that may harm flow. A large part of the earth's crust likely contains some water, which may sometimes come in contact with different liquids. Shanarapatti block is located in Dindigul district, Tamilnadu, India. It covers over an area of about 279.6 sq. km and is categorized by the elevation of the hilly areas found in the southern hemisphere, running north and northwest. No endless streams are flowing out of the area, except for short-distance streams that cover the second and third consecutive water flows. The flow from the rainwater into the canal is limited to small streams flowing into the main river, the Kodaganar. The depth at which holes in the ground or cracks and voids in the rock appear to be filled with water is called a water desk. Groundwater is replenished from, and eventually flows to, bottom obviously; eclipses often occur in springs and waterfalls and can form oases or wetlands. Groundwater is also extracted for agricultural, municipal, and commercial uses through the construction and use of mining resources. An examination of the distribution and movement of groundwater hydrogeology, also known as groundwater hydrology. Groundwater is naturally filled with surface water from streams, streams, and rivers where this charge reaches the water. The normal flow of water under the shallow aquifer is always to the northwest and north. The groundwater level of the study area was taken two times a year from the 5 existing boreholes available (of depth 14.00-24.85 m) for a time period from 1988' January to 1995' July and was monitored by PWD, Tamil Nadu Government. A field of focused TDS sources was identified in the field at five wells dug in 1988' January.

The chemical data of PWD hydro show that large minerals such as magnesium, sodium, chloride, sulfate, and total strength are also high, and have high TDS. This data may be included in the current study.

1.2. Ground water contamination

The interaction between groundwater and groundwater is complex. Therefore, groundwater contamination, also known as groundwater pollution, is not simply categorized as surface water pollution. With its own help, groundwater sources are often contaminated by materials that may not openly disturb the surface water in our bodies, and the point difference compared to a non-abstract source may be off-site. A continuous chemical emission or a spill or a substance that contaminate the radionuclide in the soil will not cause points or contamination of the supply element, but may contaminate the flowing aquifer, which is known as a contaminant pipeline.

Plume front, which is defined as the movement of the plume, can be analyzed by a water transportation model or an underground water version. Groundwater infection tests can also be identified for geology, soil characteristics, hydrology, hydrogeology and pollution status. Groundwater refers to any groundwater that occurs under the groundwater table and various geologic papers. Rural populations, who draw their water from wells, also rely on groundwater. Groundwater means water that occurs in lakes, rivers, streams, or other sources of freshwater used for drinking water resources. Every water supply has a certain set of pollutants; groundwater stores pesticides and nitrates while groundwater contains many microorganisms and other micro-organisms. due to the contact of groundwater and groundwater, that pollution can be shared between two resources. Any waste may be completely released from the water pollutants.

Groundwater is usually stored in underground cisterns covered with rocky outcrops filled with water. These channels receive water as soil that receives or supplies water alternately as its width increases. Throughout this process water flows constantly between surface and groundwater sources, sharing contaminants.

1.3. Objectives for the Analysis of water

- To study about the graphical conventional method on analysis of groundwater.

- To identify the chemical contaminants responsible for developing certain effect with respect to colour odor and taste.
- To examine the effect of pumping on well water, especially when wells are situated near the tannery
- To know the quality of water for public domestic and irrigation purpose
- To find out the chemical responsible for the spreading of the water bone diseases.

1.4. Impurities in water samples

Different types of contaminants are present in groundwater. They are physical pollution, chemical pollution. It is impossible to find clean water in nature. The water of the spring as it descends to the surface of the earth absorbs the atmosphere. It is also reflected in the living story on the surface of the earth and in time, it reaches the water source, and various other pollutants are found.

1.5. Classifications of Impurities

- Physical impurities
- Chemical impurities
- Bacteriological or Biological impurities

1.6. Tests carried out for Impurities

Table 1. Tests carried out for impurities

Physical Test	Chemical Test	Biological Test
Color Taste & Odor Temperature Turbidity	Total hardness Chlorides PH value Alkalinity Acidity Nitrite nitrogen Total solids Iron TDS Magnesium Sulphate Sodium Potassium Silica Fluoride	BOD COD

2. Properties of water

2.1. Taste of water

The taste of water is determined by the presence in it of the herbal or female substance (depending on its original location) or the substances used in its therapeutic properties. Groundwater usually contains salts such as flavorings (chlorides and carbonates of iron, magnesium, sodium, potassium, and many others.). Dirty water is brought to drinking water after tasting much organic matter. The taste of the water is determined by the organoleptic method (preferably for a group of people with no taste perceptions).

The four simple flavors of water are categorized: salt, sweet, spicy, and sour in a variety of flavors and active flavors (iron, alkaline, mint, etc.). Taste is determined by the water temperature during sampling, at room temperature, and at temperatures of about 40ºC. To try this, the examiner takes 10 to 15 ml of water into his mouth, holds it in an empty mouth for a few seconds without swallowing it, and then spits it out. The taste and flavor of the water can be predicted in the same measure as the odor.

2.2. Chemical Computation

The sample measures pH, EC, and temperature immediately because the sample bucket is full of water. Results and stopwatch time are recorded on a sample sheet. The pattern is also collected to look for aquatic habitats (shade, trembling, and odor). The houses of the bodies are recorded on parallel paper. The pattern is discarded after the actual structures have been recorded.

Fig.1. Effluents Discharge Pool

Fig.2. Effluents wastage

Fig.3. Lake near the Tennary

Fig.4. Ground Water Collection

3. Testing of sample

3.1. pH Value

pH value or H-ion concentration present in the water is to measure the water's alkalinity or acidity. Pure water contains well-charged hydrogen or H-ions with poorly charged hydroxyl or OH-ions. But the separation process takes place in pure water and therefore contains well-mixed unmixed H-ions and poorly charged OH-ions. Water becomes acidic when H-ions are properly charged then OH-ions are improperly charged and become alkaline in that case. In natural water, the concentration of H-ions and OH-ions is equivalent to using a 7.0 bath, set the meter to 7.0 to read. Note the pH of baths 9.2 and 4.0.make the pH with the sample. B = (H of 7.00 buffer; c = pH of 9.2 buffer; d = pH of sample**.**

PH=If (D>B,(7+((D-B)/(C-B)×2.2)),(7-(B-D)/(B-A))×3)))

3.2. Conductivity

Electrical conductivity is a complete parameter of soluble solvents and solids. If almost any chemical composition is known, equal amounts of ionic conductance allow for a better selection of the appropriate element for the transition from compound to concentrated dissolved minerals. The testing process includes,

Replace the CAL / READ switch with the CAL switch. Immerse the cell in a standard solution, the process of precisely determining the temperature of the solution. Set the CAL / READ position and open the range. switch to get an interconnected reading range. Click the cell in the solution that should measure the conductivity of a certain conductivity after cleaning and rinsing in clear water. Open the wide switch to get readings on the digital panel meter.

EC = AT + [((CO-AO)/(BO-CO))×(BT-AT)]

3.3. Alkalinity

Take the sample of 25/50 ml Sample (V) Apply 2-3 drops of phenolphthalein indicator to barometer. If the pH is greater than 8.3, it becomes pink. Titrate by N / 50 H2SO4. pink color. Note first and middle values (T1 & T2). Continue the titration with the mixed indicator (If you do not have a pink color from the first section, add the mixed index to the same flask and continue the titration; in this case, both T1 and T2 will be the same). With a mixed indicator, the last point is the change in color from blue to yellow-green. Note the final tariff (T3).

Control Level (1ml = 1mg): For each batch of samples, take 20ml, control standard sodium Carbonate (1ml = 1mg), titrate with N / 50 H2SO4mg only a mixed indicator of the final point. Note the title values (First-T4 and Last -T5).

Alkalinity- HIn = (T2-T1)×(20/(T5-T4))×(1000/V)

Alkalinity - Total = (T3-T1) × (20/(T5-T4))×(1000/V)

3.4. Total Hardness

Sample: Take 50ml or diluted aliquot in 50 ml of samples (If the hardness is low, take 100 ml of titration sample) (V). Add 1ml buffer + 1 ml

Sodium Sulphide inhibitor + 1ml indicator for Calmagite. Titrate against standard EDTA. The last point is the transition from light pink to blue. Note the first and last titer readings (T1 & T2).

Control - standard (1ml = 1mg): Take 20 ml Control standard (Calcium 1ml = 1mg); Add 1ml buffer +1 ml of sodium sulphide inhibitor +1 ml Calmagite index. Titrate against common EDTA. The final point is the color change from punishment red to blue. Note the reading of the first and last articles (T3 and T4).

$$(T_2 - T_1)\times (20/ (T_4 - T_3)) \times (1000/ V)$$

3.5. Total Dissolved Solids (TDS)

Pour a clean porcelain vase into the muffle and after cooling slightly in the air, cool in the DESICCATOR and weigh (w1). Take 100ml of the filtered sample and place it in a container. Cool in DESICCATOR and weigh.

$$(W_2- W_1) \times (1000/V) \times 1000$$

3.6. Calcium

Take a 50 ml sample or diluted aliquot into a 50 ml sample (If the calcium content is low, take a 100 ml sample for titration) (V). Add 1 ml 1N HC l. Heat and boil for one minute. Cool and add 2 ml of NaOH. Add 1g Eriochrome blue black R indicator. Mix and titrate with standard EDTA.A final point for red to blue color change. Note first and last wheel readings (T1 and T2).

$$(T_2 - T_1) \times (20/T_4-T_3)) \times (1000/V)$$

Note: T4 and T3 readings obtained normal control in TH tests

3.7. Chlorides

Take a 20ml sample in a China container and adjust the pH between 7 and 8. Add 1ml of potassium chromate for a bright yellow color. Normal silver nitrate against sodium chloride. For better accuracy, titrate filtered water in the same way. Note down the amount of silver nitrate used in the sample.

3.8. Nitrate / Nitrogen

If the specimen contains solid solids, filter with a 0.45 hole filter. Up to 50ml clear sample neutral to pH 7, or in a diluted part of 50ml, add sulfanilamide ml solution. Let the reagent react for 2 to 8 minutes. Add 1.0ml NED solution and mix immediately. Measure the absorption after 10 minutes but no later than 2 hours at 543 nm. Prepare the empty in the same way by replacing the sample with water.

3.9. Fluorides

It is found that the fluoride concentration of about 1 P.P.M. water causes tooth decay in young children. It also reduces tooth decay and tooth decay. For such purposes, fluoridation is the norm.

3.10.Iron

Pipette out 0.1,0.2,0.3,0.4ml etc. It is a standard metal solution in 100ml tubes. Pipette remove 20ml of water sample from 100ml tube. Add a few ml of distilled water to each tube. Add 2 drops of potassium permanganate solution to the tubes and wait 5 minutes. If the color does not persist add extra potassium permanganate. Compare the color made in the sample with the temporal scale.

3.11. Sodium

Sodium is not a toxic metal, 5,000 to 10,000 milligrams per day consumed by healthy adults without any side effects. The sodium intake in water is only a portable fraction of that spent on a regular diet. People suffering from certain medical conditions such as high blood pressure may need a diet low in sodium, where sodium intake in drinking water may be significant. Sodium is the main factor in testing water for irrigation and irrigation of plants. High sodium levels affect soil composition and the plant's water absorption ability.

3.12. Sulphate

A concentration of more than 500 mg / l can be harmful to some people and animals. Sulfate levels above 500 mg / l may be a concern for livestock that are undernourished. High sulfate levels are associated with certain mental disorders in cattle and pigs.

3.13. Magnesium

It causes "stiffness" in the water. They are not dangerous to health but are not needed because they can be harmful to households such as washing, bathing, and washing. Also included are kettles, coffee makers, and water heaters.

Groundwater in the phreatic waters of the Dindigul region is, in general, colorless, odorless, and slightly alkaline. Special hydropower management of groundwater in the phreatic region (Micro Seimens at 25o C) in May 2006 was between 97 and 4340 in the region. It is between 750 and 2250µS / cm at 25oC for most of the region. Behavior below 750 µS / cm was observed in groundwater in parts of Kodaikanal, in the Perumalmalai area, while operations above 2250 µS / cm were observed in the Dindigul block section.

It is noteworthy that groundwater should be drunk and used at home for almost all components except complete solidification and Nitrate in more than 90 percent of the samples tested. Total Concentration as CaCO3 appears to be above the permissible limit of approximately 36 percent of the analyzed samples while Nitrate is available more than 45 mg / l in 32% of samples. Incidence of total degradation is caused by the formation of organ units that form aquifers in the region, while Nitrate pollution is most likely due to the use of agricultural pesticides. Regarding the suitability of irrigation based on specific electricity consumption and Sodium Adsorption Ratio (SAR).

4. Effect of Impure Water

Table 2. Water Borne diseases (by Bacterial organisms)

S.No	Diseases	Bacteria
1	Cholera	Vibrio cholera
2	Typhoid	Salmonella typosa
3	Paratyphoid	Salmonella paratyphi
4	Dysentery	Shigelldysenteriae
5	Diarrhea Perfringens	Escherichia coil, streptoccus, Clostridium
6	Weil's diseases(Leptospirosis)	Leptospiraantrrogans
7	Tuberculosis	Mycobacterium bevies

5. Study Area

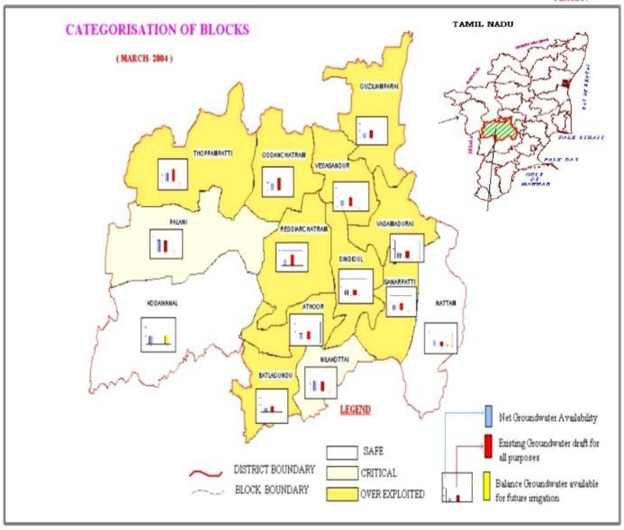

Fig.5. Blocks in Dindugal

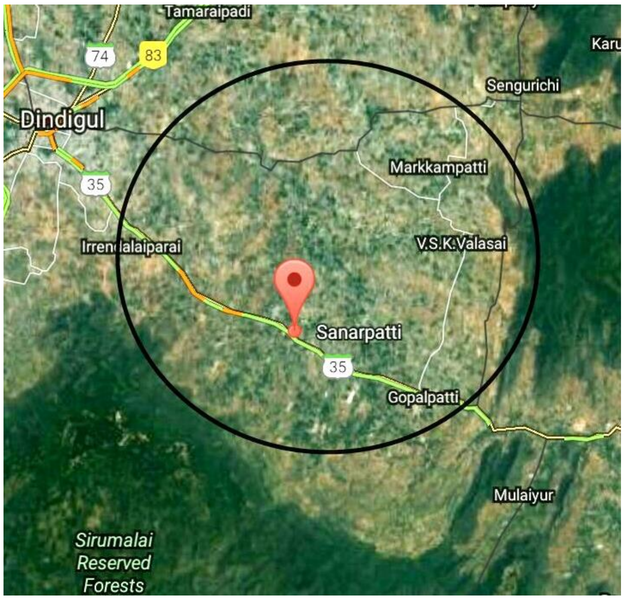

Fig.6. Satellite view of Shanarapatti Block

6. Test Results

Table 3. Comparisons of test report Analysis

Location	TDS	Total Hardness	NH3	Description
Anjukulipatti	1149	477	0.53	Potable
Avilipatti	484	183	0.37	Potable
Emmakalapuram	1897	721	4.61	Not potable
Kambiliyampatti	1778	386	2.39	Not potable
Kanavaipatti	1232	386	1.26	Not potable
Kombaipatti	566	219	0.20	Potable
Koovanuthu	448	179	0.04	Potable
Madur	2051	579	2.88	Not potable
Marunoothu	2856	904	7.96	Not potable
Ragalapuram	1939	741	5.69	Not potable
Rajakkapatti	2590	863	9.10	Not potable
Sengurichi	764	183	0	Potable
Shanarapatti	1160	325	0.51	Potable
Silluvathur	1232	386	0.56	Potable
T.Panchampatti	3023	722	2.88	Not potable

6.1. Sodium Percentage

Sodium in irrigation water is usually defined as the sodium percentage and can be determined using the following formula.

%Na=(Na^+) x 100/((Ca^2+)+(Mg^2+)+(Na^2+)+(K^+))

%Na =(Na+K) * 100 / (Ca +Mg+ Na+K)
Na =223
K =13
Ca =152
Mg =89
%Na = (223 +13) * 100/ (152+89+223+13)
= 49.47% (Shanarapatti)

6.2. Sodium Absorption Ratio (SAR)

The sodium adsorption ratio is the average amount of sodium (Na) compared to calcium (Ca) and magnesium (Mg).

SAR =(Na+) / (((Ca2+ + Mg2+)/2)^1/2)
Na+ =223
Ca2+ =152
Mg2+ =89
SAR =13.701 (Shanarapatti)

Like similarly another 15 samples are determined % of sodium and SAR value using the above formula.

7. Result and Discussion

After conducting comparison between the Indian standards and the test results for the irrigation purposes,

Table 4. Overall Comparison for Irrigation Purpose

Location	% of Sodium	SAR Value	Description
Anjukulipatti	58.47	17.14	Good
Avilipatti	60.22	13.51	Good
Emmakalapuram	65.07	23.02	Doubtful
Kambiliyampatti	48.02	23.65	Unsuitable
Kanavaipatti	58.46	20.91	Doubtful
Kombaipatti	51.76	13.52	Good
Koovanuthu	50.69	9.55	Good
Madur	52.72	32.7	Unsuitable
Marunoothu	61.33	31.6	Unsuitable
Ragalapuram	55.46	23.3	Doubtful
Rajakkapatti	62.81	29.01	Unsuitable
Sengurichi	52.45	22.09	Doubtful
Shanarapatti	49.47	13.701	Good
Silluvathur	51.42	15.2	Good
T.panchampatti	53.56	36.94	Unsuitable

Na % =Permissible(11Samples)
=(73.33%)
=Doubtful (9samples)
=(26.67%)
SAR =Excellent (1Samples)
=(6.25%)
=Good (4 Samples)
=(25%)
=Doubtful(7Samples)
=(43.75%)
=Unsuitable(4Samples)
=(25%)

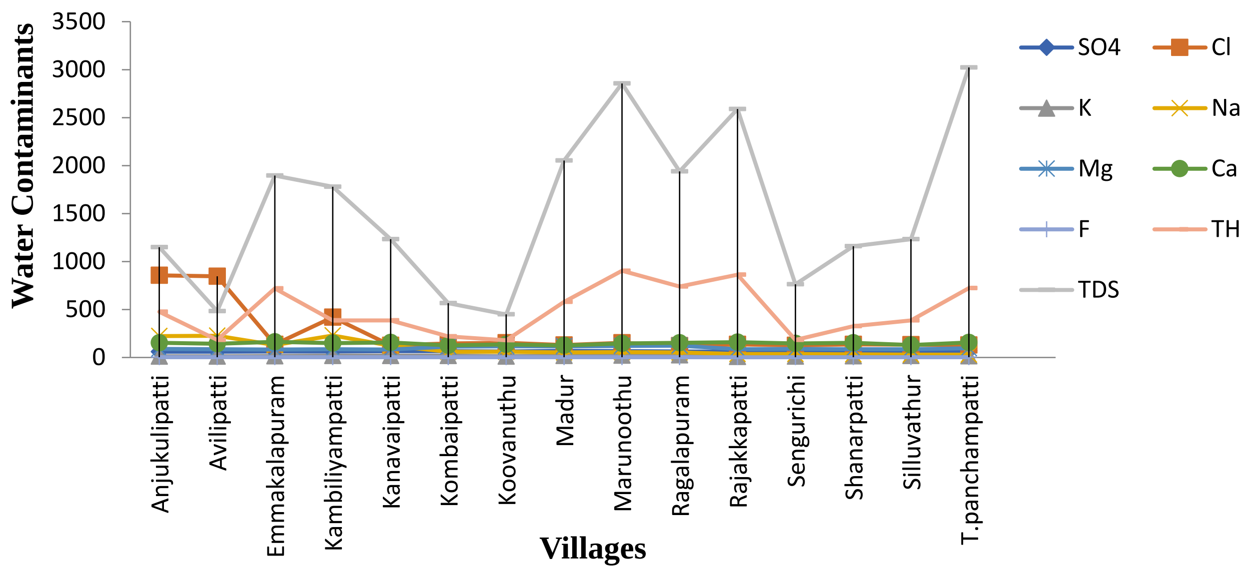

Fig.7. Graphical Representation of the values by using the conventional method Bar Chart

8. Conclusion

The total hardness (TH) of the study area were hard and very hard categories.

The amount of TDS more in Madur area. The following contents are pH.

Calcium, alkalinity, magnesium, sodium, potassium, chloride, fluoride, sulphate test values preferable for irrigation purpose.

Water quality for irrigation in this area is nearly suitable except some villages according to SAR, SODIUM% values.

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Annexure 1 – Sample Test Results

GOVERNMENT OF TAMILNADU
DEPARTMENT OF AGRICULTURE

Name of the Sample: SHANARAPATTI 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	20 NTU	5 NTU	15 NTU	20 NTU	5 NTU
4.	Total dissolved solids (mg/l)	678	691	736	742	723
5.	pH	7.23	7.26	7.28	7.29	7.16
6.	Electrical conductivity (dsm^{-1})	1.06	1.08	1.15	1.16	1.13
7.	BOD (mg/l)	95	98	97	89	85
8.	COD (mg/l)	65	63	62	64	68
	ANIONS					
9.	Carbonate (mg/l)	Nil	Nil	Nil	Nil	Nil
10.	Bi Carbonate (mg/l)	129	145	126	135	138
11.	Chloride (mg/l)	145	152	129	152	123
12.	Sulphate (mg/l)	65	64	68	67	62
13.	Phosphate (mg/l)	0.03	0.02	0.05	0.03	0.05
14.	Silicate (mg/l)	5.16	5.23	5.28	5.37	5.46
15.	Nitrate (mg/l)	0.05	0.06	0.03	0.04	0.09
16.	Nitrite (mg/l)	Nil	Nil	Nil	Nil	Nil
17.	Fluoride (mg/l)	3.15	3.26	3.19	3.16	3.26
18.	Aluminium (mg/l)	Nil	Nil	Nil	Nil	Nil
	CATIONS					
19.	Calcium (mg/l)	126	136	125	145	153
20.	Magnesium (mg/l)	113	116	115	120	123
21.	Sodium (mg/l)	59	58	52	56	54
22.	Potassium (mg/l)	0.19	0.13	0.19	0.23	0.26
	HEAVY METALS					
23.	Zinc (mg/l)	0.02	0.03	0.02	0.03	0.05
24.	Copper (mg/l)	0.01	0.02	0.06	0.03	0.03
25.	Iron (mg/l)	0.06	0.05	0.05	0.04	0.06
26.	Manganese (mg/l)	0.02	0.02	0.02	0.03	0.02
27.	Chromium (mg/l)	Nil	Nil	Nil	Nil	Nil
29.	Lead (mg/l)	Nil	Nil	Nil	Nil	Nil

14/8/17

Agricultural officer,
Soil Testing Laboratory,
Tiruchirapalli- 20

Similar report for water samples I, II and III given by Agricultural officer, soil testing laboratory, Tiruchirappalli District were compared and analyzed.