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Assessment of Ground Water Quality in Karur Town, Tamil Nadu, India

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Abstract : The Karur town depends on the Amaravathi River and ground water resources for their domestic, agricultural and industrial purpose. Urbanization and industrialization leads to disposal of solid waste, textile effluent and sewage which contaminate the ground water resources in this area. 40 water samples were collected from 40 different locations in Karur Town during summer and rainy seasons. Their physio-chemical characteristics such as pH, turbidity, electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH), calcium (Ca^{2+}), magnesium (Mg^{2+}), sodium (Na^{+}), and potassium (K^{+}) are analysed and the result is compared with the WHO standards of drinking water quality. The study indicates that groundwater near Amaravathi river basiin area are not fit for human with consider to many parameters.
Keywords : Physio-Chemical Analysis, Ground Water Samples, Drinking Water Quality Parameters.

Introduction

Fresh water is predetermined resource, essential for agriculture, industry and human existence. In fact life on earth is possible only because of the presence of abundant water. 97% of water is in the oceans and not generally useful without treatment. The remaining 3% fresh water is found in rivers, lakes and underground aquifers and locked up as ice.

Some centuries ago, water from rivers, lakes, man-made reservoirs and undergroundwater was clean and potable. Today, most of the countries are facing drinking water problems and conditions are very severe especially in developing countries. The world is facing formidable challenges in meeting rising demands of clean water as the available supplies of fresh water are depleting due to extended droughts, population growth, more stringent health based regulations and competing demands from a variety of users. In developing countries such as India, 80% of the diseases are due to bacterial contamination of drinking water (Suryawanshi et al., 2016).

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Safe drinking water is essential to human and other life forms for safe metabolic activities and functioning of all organs of the body. Historically, surface water has accounted for most of the human consumption, because it is easily accessible with the exception of arid and semi-arid regions, where groundwater may be the only reliable source of water. Modern development and population growth, however, has greatly increased water demands. With the growing inter and intra sectorial competition for water and dealing fresh water resources, the utilization of poor and marginal quality water for potable purposes in rural areas has posed a new challenge for the management of limited water resources. In water scarce areas, there are competing demands from different sectors on the limited available water resources. Access to safe drinking water has impounded over the last decades in almost every part of the world (Ramamohan et al., 2014).

Physico-chemical characteristics

Temperature

The mean temperature values are found to be in the range of 25.6-28.3°C and 23.1 - 25.5°C for ground water samples in summer and rainy seasons respectively (Table 1& 2)

The temperature values are found within the permissible limit of 40°C (WHO 2011) in the all sampling stations for ground water samples in summer and rainy seasons. The maximum value of the temperature is found at station 1B and 2D in summer season and rainy seasons respectively. The variation of the water temperature affects directly or indirectly all processes life (Rajdeep Kaur et al., 2011). The solubility of oxygen is reduced, causing deoxygenation due to increasing temperature.

pH

The mean pH values are recorded within the range of 7.1 to 7.7 and 6.8 to 7.6 for groundwater samples in both summer and rainy seasons respectively (Table 1& 2).

pH is an important parameter in a water body since most of the aquatic organisms are adapted to an average pH and do not withstand abrupt changes (Chandra Mohan et al., 2014). pH value is an important factor in maintaining the carbonate and bicarbonate levels in water.

The pH values are found within the permissible limit of 6.5 - 8.5 (WHO 2011) in all the groundwater sampling stations in summer and rainy season. There are no abnormal changes in both the seasons. (Narsimha et al., 2012). Hence the present study indicates that there is no harmful effect of pH in this study area for both seasons.

Electrical Conductivity

The mean EC values are within the range of 1425-7023 μmhocm^{-1} and 1553-7333 μmhocm^{-1} for the groundwater samples in summer and rainy seasons respectively (Table 1& 2).

EC is the numerical expression of ability of an aqueous solution that carries electric current (Matini Laurent et al., 2010). EC is a measurement of all soluble salts in samples and the most significant water quality standard on crop productivity, which is the water salinity hazard.

The EC values are well above the permissible limit of 600 μmhocm^{-1} (WHO 2011) for all the groundwater samples in summer and rainy seasons. The high value of EC is found at stations 2B, 5A, 5B, 6A and 7A in summer and rainy seasons respectively. This may be due to increase the number of ions which is supported by salinity values of all the ground water samples. This may be due to concentrated colloids in water (Verma et al., 2012).

Total Dissolved Solids

The mean values of total dissolved solid values are in the range of 940-3877 ppm and 973 - 3970 ppm for ground water samples in summer and rainy seasons respectively (Table 1& 2).

Total dissolved solid describes all solids, commonly mineral salts that are dissolved in water (Al Dahaan et al., 2016). The mean TDS values of the study area are above the permissible limit of 500ppm (WHO

2011) for the ground water samples in summer and rainy seasons. All the groundwater sampling stations are located nearer to the river and percolation of dumping wastes and sewage may enhance the TDS values.

There is a close relation between TDS and the electrical conductivity (Al Dahaan et al., 2016). The high TDS values are observed at stations 5A, 5B and 6A for groundwater samples in rainy seasons. This may be due to dissolution of minerals that lead to increase in high TDS values. These samples may affect the soil porosity. The majority of solids, which remain in the water after filtration, as dissolved ions. Water with high dissolved solid content would be expected to pose problems like taste and laxative and other associated problems with the individual minerals (Sunitha et al., 2014).

Total Hardness

The mean TH values are found within the range of 502-1733 ppm and 360-1203 ppm for the groundwater samples in summer and rainy seasons respectively (Table 1& 2).

Natural sources of hardness are limestones, which are dissolved by percolating rainwater made acidic by carbon dioxide (Madhusmita Sahoo et al., 2016). The principle cations that impart hardness are Ca and Mg ions. The anions responsible for hardness are mainly carbonate, bicarbonate sulphate and chloride ions.

The TH values are found above the permissible limit of 500 ppm (WHO 2011) in most of the groundwater sampling stations in summer and rainy season. This may be due to the presence of divalent cations of calcium and magnesium, which are most abundant in groundwater. The high value of total hardness is observed at stations 4A and 5A during summer season for groundwater samples. It could be due to the low water level and high rate of evaporation during summer (Mahmoud et al., 2016).

Alkalinity (Carbonate and Bicarbonate)

The carbonate values are not detectable for groundwater and river water samples in both seasons (Table 1& 2). The observed values of pH is below 8.6 and the carbonate values of not detectable in all the groundwater and river water samples throughout the study period.

The bicarbonate values are within the permissible limit of 500 ppm (WHO 2011) in all the groundwater sampling stations in summer and rainy seasons respectively.

The value of alkalinity in water provides an idea of natural salts present in the water. The cause of alkalinity is the minerals, which dissolve in water from the soil (Khwaja et al., 2014). The various ionic species that contribute to alkalinity include bicarbonate, hydroxide, phosphate, borate and organic acids. These factors are characteristics of the source of water and natural processes taking place at any given time (Ashok Kumar et al., 2014).

Chloride

The mean values of chlorides are found in the range of 271-540 ppm and 218-410 ppm for ground water samples in summer and rainy seasons respectively (Table 1& 2).

The chloride values exceed the permissible limit of 250 ppm (WHO 2011) in all the ground water sampling station in summer and rainy seasons. All the sampling stations are surrounded by industries and agricultural field. Percolation of waste water and agricultural runoff may lead to increase the concentration of chloride (Nayan et al., 2012). The high chloride concentration attributes from septic tanks and sewage lines (Sameer et al., 2011).

The chloride values exceed the permissible limit of 250 ppm (WHO 2011 in all the river water samples in summer and rainy seasons. The regular addition of domestic sewage, industrial wastes and agricultural runoff, increase the chloride concentration in the river water samples. Chloride in excess (1000 mg/l) imparts a salty taste to water and people, who are accustomed to high chloride may be subjected to laxative effect. High chloride concentration is also an indicator of large amounts of organic matter (Shanmugapriya et al., 2017).

Sodium

The mean sodium values are observed within the range of 211-320 ppm and 166-273 ppm in the groundwater samples in summer and rainy seasons respectively (Table 1& 2).

Sodium is used in the normal functioning of some biological processes in the human body and it is one of an essential elements. But its high concentration may adversely affect the cardiac, renal and circulatory functions (Akhilesh Jinwal et al., 2008).

The sodium value exceeds the desirable limit of 250 ppm (WHO 2011) for most of the groundwater samples except 2B, 2C, 2D, 3C, 3D, 4B, 4C, 4D, 6C, 6D, 8C and 8D in summer seasons and 1A, 1B and 9A in rainy seasons. This may be due to rock weathering as well as irrigation return flow (Rajmohan et al.,2000). The feldspar of igneous rocks is a good source of sodium in ground water.

Potassium

The mean potassium values are observed within the range of 13-28 ppm and 12-25 ppm for all the ground water samples in summer and rainy seasons respectively (Table 1& 2).

The values of potassium exceed the permissible limit of 12 ppm (WHO 2011) in most of the groundwater samples in summer and rainy seasons. The potassium values are very high at stations 1A, 1B and 5A during summer and rainy season respectively. The natural sources of potassium in water are the minerals of local igneous rocks such as feldspars, mica sedimentary rocks silicate and clay minerals (Howari and Banat et al., 2002). Mica and clay minerals are responsible for the availability of potassium in ground water by weathering. Lower value of potassium in ground water is due to greater resistance to its weathering and fixation in the formation of clay minerals.

Natural water normally contains low concentrations of potassium. Higher values of potassium should be looked upon with some suspicion as these may indicate pollution (Akhilesh Jinwal et al., 2008). High potassium values may cause nervous and digestive disorder (Ambrina Sardar Khan et al., 2012).

Calcium

The mean value of calcium is recorded in the range of 100-283 ppm and 137-257 ppm for ground water samples in summer and rainy seasons respectively (Table 1& 2).

Calcium is an important determinant of water hardness and it also function as a pH stabilizer, because of its buffering qualities. Calcium also gives water to bitter taste. Water hardness influences aquatic organisms concerning metal toxicity (Faizanul Mukhtar et al., 2014).

The calcium values are within the permissible limit of 200 ppm (WHO 2011) in most of the groundwater samples. The calcium values are very high at stations 2B, 4A, 5B and 7A.These stations are surrounded by agricultural field. The excessive fertilizers and manures used for cultivation lead to high concentrations of calcium.

Magnesium

The mean value of magnesium is recorded in the range of 43-77 ppm and 46-106 ppm for all the ground water samples in summer and rainy season respectively (Table 1& 2).

Magnesium is a relatively abundant element in the earth's crust, ranking eighth in abundance among the elements. It is found in all natural water and its source lies in rocks, generally present in lower concentration than calcium. It is also an important element contributing to hardness.

The magnesium values are observed within the permissible limit of 150 ppm (WHO 2011) in all the ground water samples in summer and rainy seasons. The large number of minerals contains a high loading of magnesium and it is related to the weathering of ferro magnesium minerals and anthropogenic sources (Jothivenkatachalam et al., 2011).

Nitrate

The mean nitrate values are observed within the range of 48-69 ppm and 42-59 ppm for all the ground water samples in summer and rainy seasons respectively (Table 1& 2).

The values of nitrate exceed the permissible limit of 45 ppm (WHO 2011) for most of the ground water samples in summer and rainy seasons. High nitrate values are observed at stations 2B, 5A, 5B, 6A and 7A in summer and rainy seasons respectively. The ground water samples, which are nearer to the river have maximum nitrate values. This may be due to percolation of river water, dumping of garbage and animal wastes enhance the nitrate values (Mohamed Sheriff et al., 2012).

High nitrate concentrations in drinking water is an environmental health concern because it can harm infants by reducing the ability of blood to transport oxygen. In babies, especially those under six months old, methaemoglobinaemia, commonly called "blue-baby syndrome," can result from oxygen deprivation caused by drinking water high in nitrate (Muzafar et al., 2014).

Sulphate

The mean sulphate values are found in the range of 161-291 ppm and 177-272 ppm for all the groundwater samples in summer and rainy seasons respectively (Table 1& 2).

Sulphates occur naturally in water as a result of leaching from gypsum and other common minerals. Sulphates may also come from numerous industrial wastes such as tanneries, paper, and textile industries.

In the present study, the sulphate values are below the permissible limit of 250 ppm (WHO 2011) in all the ground water samples in summer and rainy seasons. The maximum values of sulphate are found at station 1A, 1B, 1C, 2A, 2B, 3A, 10A and 10 B in summer and rainy seasons. High concentration of sulphate is due to the accumulation of soluble salts in soil, anthropogenic activity and addition of excessive sulphate fertilizer in the study area. This may percolate into the groundwater, which leads to increase the high concentration of sulphate values.

Phosphate

The mean phosphate values are observed within the range of 1.9 -4.9 ppm and 1.9-4.2 ppm for all the ground water samples in summer and rainy seasons respectively (Table 1& 2).

The phosphate values are observed more than the permissible limit of 0.10 ppm (WHO 2011) in all the sampling stations for groundwater in summer and rainy seasons. The phosphate values are very high at stations 1A, 9A and 9C. The high values of phosphate in summer may be due to phosphate containing percolation of sewage, agricultural fertilizers and industrial waste water. This may lead to enhance the high phosphate values.

Fluoride

The mean fluoride values are observed within the range of 0.8 – 1.4 ppm and 0.3 -1.2 ppm for all the groundwater samples in summer and rainy seasons respectively (Table 1& 2).

The fluoride values are found to be within the permissible limit of 1.5 ppm (WHO 2011) in all the groundwater sampling stations in both seasons. Fluoride is dissolved in small to minute quantities from rocks and soils such as fluorspar and cryolite.

Biochemical Oxygen Demand (BOD)

The mean BOD values are observed within the range of 4.4-6.5 ppm and 4.1-6.1 ppm for all the ground water samples in summer and rainy seasons respectively (Table 1& 2).

The values of BOD exceed the permissible limit of 5.0 ppm (WHO 2011) in all the groundwater sampling station in summer and rainy seasons. The BOD values are very high at stations 1A, 3B and 7A.High values of BOD are recorded in summer seasons, which may be attributed to the maximum biological activity at elevated temperatures, whereas the lowest BOD in rainy season may indicate lower biological activity.

There is an inverse relationship between DO and BOD (Mohamed Sihabudeen et al., 2016). The waste water from nearby industry entering into the groundwater, make the oxygen depleted, resulting in the alteration of the water quality.

Chemical Oxygen Demand

The mean COD values are observed within the range of 46 -67 ppm and 39-73 ppm for all the ground water samples in summer and rainy seasons respectively (Table 1& 2).

Chemical oxygen demand is the measure of oxygen equivalent to the organic content of the samples that is susceptible to oxidation by a strong chemical oxidant. The values of COD exceed the permissible limit of 10ppm (WHO 2011) in all the ground water sampling stations in summer and rainy seasons. The values are very high at stations 1A and 10A in summer and rainy seasons. High values of COD indicate the pollution by the discharge of effluents house wastes, dumping of garbage, sewage, and surface runoff. This is an indication of increased organic loads due to increase the household wastewater and textile waste discharges (Purushottam et al., 2010).

Dissolved Oxygen (DO)

The mean values of DO are recorded in the range of 4.0-5.5 ppm and 3.5-5.2 ppm for groundwater samples in summer and rainy seasons respectively (Table 1& 2).

Dissolved oxygen is an important parameter in water quality assessment and reflects the physical and biological processes prevailing in the water. The low value of DO concentration or of anaerobic conditions is reflected in an unbalanced ecosystem, fish mortality, odors and other aesthetic nuisances.

The DO values are observed below the permissible limit of 6.0 ppm (WHO 2011) in the most of the groundwater sampling stations of groundwater in summer and rainy seasons. Dissolved oxygen increases with decrease in water temperature. Further DO content of water is enhanced by the decomposition of organic matter by the microorganisms (Karthikeyan et al., 2002).

Table 1. The mean values of Physico-chemical parameters of groundwater samples during April 2012, 2013 and 2014.

Stations	Temp	pH	EC	TDS	TH	CO_3	HCO_3	Cl	Na	K	Ca	Mg	NO_3	SO_4	PO_4	F	BOD	COD	DO
1A	27.2	7.7	2582	1637	843	ND	471	365	293	28	203	70	59	284	3.9	1.3	6.5	67	5.2
1B	28.3	7.5	2555	1311	770	ND	400	350	307	26	197	70	55	266	3.6	1.3	6.0	58	5.1
1C	27.5	7.2	2512	1043	670	ND	353	298	253	23	176	62	51	255	3.1	0.9	5.9	60	4.6
1D	27.0	7.3	2455	1027	590	ND	320	303	253	21	167	60	52	250	3.1	1.2	5.7	49	4.6
2A	26.2	7.4	3093	1574	665	ND	398	407	258	27	218	76	59	282	2.8	1.3	5.3	63	5.5
2B	28.0	7.5	4659	1838	932	ND	371	437	232	22	260	71	63	291	2.9	1.2	4.9	65	5.1
2C	28.0	7.2	2427	1367	553	ND	258	347	231	18	188	68	56	228	2.7	0.8	4.5	60	4.2
2D	26.7	7.2	2876	1376	637	ND	312	368	211	16	130	63	54	216	2.8	0.9	4.4	59	4.0
3A	26.8	7.4	3447	1714	900	ND	244	358	280	23	221	60	64	263	2.9	1.3	5.7	64	4.9
3B	25.6	7.5	3097	1528	840	ND	230	451	230	19	213	53	56	215	2.9	1.2	6.4	58	5.1
3C	26.7	7.2	2285	1594	767	ND	201	377	241	20	203	47	52	161	2.3	1.1	5.1	51	4.7
3D	26.2	7.3	2734	1485	737	ND	203	393	217	16	197	49	52	194	2.8	1.0	5.4	47	5.0
4A	27.1	7.4	5632	2504	1252	ND	307	470	266	24	283	60	63	245	2.6	1.3	6.0	58	3.6
4B	26.3	7.4	2272	1497	882	ND	316	480	233	24	217	70	55	229	2.7	1.4	5.0	54	3.8
4C	26.7	7.2	2335	1796	883	ND	227	366	225	19	207	52	50	201	2.4	1.2	5.1	49	4.2
4D	26.4	7.1	1561	1371	767	ND	233	540	212	20	175	58	49	195	2.5	1.0	4.7	46	4.9
5A	27.2	7.5	7023	3878	1733	ND	358	477	270	27	203	65	67	249	3.1	1.2	5.7	58	3.9
5B	26.3	7.4	4630	3185	1057	ND	404	337	290	20	255	52	69	229	3.2	1.2	6.0	51	3.5
5C	26.4	7.2	1892	1325	547	ND	252	347	243	18	160	57	50	214	2.7	1.1	5.7	48	4.8
5D	26.4	7.2	1565	1096	524	ND	357	271	243	15	134	69	60	191	1.9	1.0	5.8	49	5.2
6A	25.8	7.4	3973	2331	1003	ND	339	358	320	22	116	46	65	244	2.7	1.2	5.6	53	4.1
6B	26.6	7.3	2417	1642	760	ND	400	367	290	19	120	74	59	249	2.4	1.2	5.1	65	4.4
6C	26.8	7.1	1425	1100	509	ND	263	299	232	20	100	69	57	188	2.1	1.0	4.8	46	5.1
6D	27.2	7.2	2282	1462	640	ND	260	295	216	13	104	66	50	207	2.2	1.1	4.7	56	5.0
7A	26.6	7.6	4360	1670	882	ND	321	450	277	25	248	60	63	241	2.9	1.1	6.4	63	5.5
7B	26.7	7.3	2652	1644	857	ND	365	415	283	22	220	55	61	216	3.2	1.2	5.5	67	4.6
7C	27.3	7.3	1792	1232	787	ND	270	510	258	20	155	56	54	188	2.8	1.0	5.7	57	5.2
7D	27.5	7.2	2282	1479	748	ND	284	390	242	18	194	43	56	201	2.9	0.8	5.2	61	4.4
8A	26.6	7.7	2908	1819	751	ND	297	480	310	24	190	77	55	243	3.4	1.2	5.5	55	5.5
8B	25.8	7.7	3297	2085	813	ND	289	447	280	22	106	67	53	215	3.7	1.1	5.2	59	5.0
8C	26.3	7.3	2707	1664	687	ND	241	403	237	20	180	73	48	215	3.3	1.1	5.1	52	5.1
8D	27.0	7.3	2014	1371	633	ND	229	342	223	19	190	57	48	208	3.5	0.9	5.0	56	4.9
9A	26.6	7.4	1991	1413	680	ND	249	360	291	20	220	75	57	271	4.9	1.2	5.7	62	5.2
9B	26.3	7.6	2165	1337	753	ND	259	343	268	18	217	61	54	249	3.5	1.2	5.4	58	5.5
9C	26.3	7.2	1852	940	623	ND	186	322	250	17	179	59	51	238	4.4	1.2	5.3	56	4.8
9D	25.7	7.2	2015	997	623	ND	182	280	236	14	155	56	49	225	2.3	1.1	5.1	53	4.9

10A	26.5	7.6	3648	1252	677	ND	244	480	286	23	215	74	59	262	2.9	1.1	5.8	67	5.2
10B	26.2	7.6	2745	1193	593	ND	229	420	282	22	200	73	57	264	2.7	1.3	5.4	66	5.5
10C	26.5	7.3	1937	1057	508	ND	187	470	259	16	173	61	54	235	2.6	0.9	5.3	63	4.8
10D	26.4	7.4	1723	960	502	ND	182	415	239	13	156	57	50	240	2.3	0.8	5.1	61	4.4

All the values are expressed in ppm except pH and EC
EC in micromhocm^{-1}
Temperature in ^{o}C
ND – Not Detectable

Table 2. The mean values of physico-chemical parameters of groundwater samples during December 2012, 2013 and 2014.

Stations	Temp	pH	EC	TDS	TH	CO_3	HCO_3	Cl	Na	K	Ca	Mg	NO_3	SO_4	PO_4	F	BOD	COD	DO
1A	24.2	7.4	2727	2027	773	ND	390	337	260	25	198	66	56	270	3.6	1.1	6.1	62	4.9
1B	25.4	7.2	2947	1845	737	ND	320	330	273	22	187	65	49	268	3.4	1.0	5.7	53	4.5
1C	24.7	7.1	2617	1880	612	ND	265	295	242	21	174	57	50	247	3	0.7	5.4	54	3.5
1D	24.1	7.0	2727	1623	498	ND	233	290	231	17	157	55	46	222	2.8	0.5	5.4	43	3.6
2A	24.7	7.4	3417	1930	543	ND	290	367	241	24	193	65	59	255	2.8	1.1	4.9	73	4.7
2B	25.0	7.2	4873	1960	625	ND	195	355	220	22	243	63	51	272	2.6	0.9	4.6	70	4.5
2C	24.9	7.0	2767	1729	465	ND	194	352	198	16	163	55	55	232	2.7	0.9	4.1	67	3.5
2D	25.5	6.8	3013	1557	567	ND	167	322	205	15	178	58	50	206	2.6	0.7	4.3	65	3.6
3A	24.8	7.6	2952	1493	650	ND	143	338	247	20	195	73	58	247	2.7	1.1	5.5	61	4.6
3B	24.6	7.4	3180	1723	597	ND	200	385	223	20	188	67	55	220	2.6	0.8	5.0	52	5.0
3C	25.2	7.2	2660	1368	555	ND	102	317	220	16	183	65	46	229	2.2	0.8	4.9	46	4.4
3D	25.2	7.1	2608	1359	530	ND	165	327	192	17	177	59	51	217	2.5	0.6	4.1	39	4.7
4A	24.2	7.3	5797	2065	1007	ND	195	373	202	23	257	101	46	268	2.4	1.2	5.6	53	3.9
4B	23.7	7.3	2892	1697	497	ND	263	337	193	20	209	84	51	239	2.7	1.0	5.1	48	4.2
4C	24.2	7.0	2770	1783	668	ND	170	226	182	20	183	75	44	211	2.2	0.7	4.8	45	5.2
4D	24.3	6.8	2113	1437	432	ND	163	297	166	14	161	68	48	217	2.5	0.8	4.7	43	4.4
5A	24.5	7.5	7333	3970	1203	ND	210	410	230	20	191	93	49	227	3.3	0.9	5.4	51	3.5
5B	24.8	7.2	4852	3430	827	ND	289	327	223	19	230	80	56	225	2.7	1.1	5.8	44	4.6
5C	24.6	7.0	2093	1460	493	ND	157	288	202	17	142	51	48	202	3.1	0.7	5.2	43	4.4
5D	25.0	6.8	1707	1287	492	ND	238	218	208	17	164	51	48	209	2.1	0.7	5.2	41	4.2
6A	24.1	7.2	4060	2453	747	ND	257	310	223	21	209	76	54	240	2.5	0.9	5.5	47	4.9
6B	24.4	7.2	2467	1693	598	ND	322	315	218	20	157	68	55	212	2.2	0.7	4.8	63	3.6
6C	24.4	6.9	1553	1123	463	ND	178	253	202	17	158	68	51	211	2.3	0.6	4.5	43	3.8

6D	24.5	6.9	2228	1547	553	ND	188	265	185	14	137	62	45	196	1.9	0.7	4.7	50	4.8
7A	23.9	7.5	4388	1463	483	ND	228	371	233	23	208	106	44	211	2.3	0.3	5.8	59	5.2
7B	24.4	7.3	2740	1784	673	ND	280	380	220	18	196	75	56	191	2.5	0.9	5.3	59	5.1
7C	24.5	7.1	1862	1188	360	ND	193	313	217	19	137	56	42	196	2.2	0.8	5.3	56	5.2
7D	24.7	7.0	2329	1510	550	ND	230	300	203	16	163	52	53	177	2.4	0.7	5.1	56	4.1
8A	24.4	7.5	3083	1927	623	ND	233	355	222	21	178	71	54	221	3.6	0.9	5.3	52	5.1
8B	23.6	7.3	3475	2220	673	ND	158	372	232	18	181	71	50	218	3.7	0.9	4.9	55	4.9
8C	24.4	7.0	2837	1825	567	ND	188	325	190	18	164	65	44	207	2.8	0.8	4.9	48	4.3
8D	25.3	6.9	2157	1557	503	ND	124	282	193	15	143	61	49	203	3.5	0.6	4.7	50	4.7
9A	24.7	7.6	2150	1200	545	ND	203	315	253	20	180	65	45	231	4.2	1.0	5.4	55	4.9
9B	24.3	7.4	2033	1070	482	ND	160	324	223	16	190	56	50	222	3.1	0.9	5.1	51	4.1
9C	24.2	7.1	1964	1047	465	ND	135	288	229	15	143	55	45	207	3.6	1.0	4.9	50	4.5
9D	24.3	7.1	1879	973	432	ND	140	287	204	14	137	48	48	209	2.4	0.9	4.8	47	4.7
10A	23.2	7.6	3787	1353	575	ND	243	353	240	21	194	65	53	225	3	1.0	5.5	65	4.9
10B	23.7	7.4	2867	1327	520	ND	168	332	240	20	168	66	51	244	2.5	0.9	5.2	61	5.1
10C	24.1	7.2	2020	1070	462	ND	150	277	208	15	161	55	51	200	2.9	0.8	5.1	58	4.5
10D	23.1	7.1	1885	1053	468	ND	148	298	206	12	137	46	49	221	2.4	0.6	5.0	54	4.2

All the values are expressed in ppm except pH and EC

EC in micromhocm^{-1} Temperature in ^{o}C ND – Not Detectable

Conclusion

A study of the groundwater quality analysis of Karur Town shows that it is not fit for drinking purposes with respect to the highly pollution of groundwater. The groundwater sources, once get polluted, the effects of the pollutants may persist for longer duration. Ground water forms the major source of drinking water supply in the municipal area of Karur Town. Hence, people consuming it are prone to health hazards. Therefore, an effective water quality management plan is needed for the Karur district. Also, an attempt is made to improve the groundwater quality in Karur Town.

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