

Groundwater Quality analysis in and Around Chidambaram Taluk, Tamil Nadu

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DOI: 10.29322/IJSRP.9.07.2019.p9123
<http://dx.doi.org/10.29322/IJSRP.9.07.2019.p9123>

Abstract- The estimation of water quality is very important for human being knowing its suitability for quality analysis in and around Chidambaram Taluk. Water samples were collected from 10 different areas of Chidambaram Taluk and analyzed various characteristics of water samples. The results showed that many of the water quality parameters from residential areas above the permissible limits of BIS and WHO.

Index Terms- Water pollution, BIS, Water quality, Groundwater.

I. INTRODUCTION

Groundwater is very important source of drinking water for both human being and animal in the world. It is also very essential source of water for the drinking, agricultural and the industrial sector. Being a significant part of the hydrological cycle, water resources depends on the rainfall and recharge methods. Groundwater quality is based on the physical, chemical and biological characteristics of groundwater. The suitability of groundwater for various uses majorly depends on quality of groundwater. Hence protecting the quality of groundwater is a major concern Packialakshmi et al., 2011. Water quality assessment is the major important tool for share the information on the qualities of water to the public. It acts as the indicator of the quality of water. The purpose of assessment water quality is to turn multifaceted water quality data into simple information that is essential for the public. Many other researchers have conducted a study on groundwater quality by estimating the water quality index to substantiate the variation of groundwater quality Kumar et al., 2013.

The availability of a water supply depends upon the both quality and quantity is vital to human existence. The supply for water has increased over the year by year and this has led to water scarcity in many other part of the world. The situation is aggravated by the problem of contamination or water pollution. India is facing towards a freshwater crisis mainly due to improper miss management of water resources and environmental degradation. This leads to deficiency of access to safe drinking water supply to millions of people. This drinking water crisis is already evident in many parts of India, varying in scale and intensity depending mainly on the time of the year Sundara Kumar et al., 2010.

If the groundwater is contaminated, its quality cannot be return to its original quality, till stopping the pollutants from the sources. So more attention required to regularly monitor the groundwater quality and to device ways and means to protect it

Khalid Hameed Lateef 2011. Water quality index(WQI) is the important tool to give the information on the water quality to the concerned citizens and policy makers. It is an important parameter for the analysis and management of groundwater. WQI is defined as a rating reflecting the composite influence of different quality of water parameters Ramakrishnaiah et al., 2009.

II. MATERIAL AND METHODS

All the water samples were collected from 2.5 litre clean and dry plastic canes without any air bubble. Then the water samples were analysed in the water analysis laboratory within four hours after sampling without mixing any preservatives. These Water samples were collected in the month of April 2015 to month of April 2016. The water samples temperature were noted in the sampling point itself. The samples were transfer to the laboratory to determine the major characteristics. The physical and chemical characteristics were analysed such as pH, turbidity, calcium, magnesium, iron, fluoride, TDS, Total Hardness, chloride, sodium, potassium, total coliform, using standard methods ISI, 1983; Sing et al., 2008; Dhembare et al., 1998. Based on the analysed data correlation co efficient was calculated by statistical method. Water samples were collected and analyzed as per procedures outlined in IS-2488/IS-3025/AWWA/ APHA. Sterilized containers were used for collection of water sample for bacteriological analysis, stored in ice-box and transported to the lab for the analysis. The temperature is measured using the thermometer and the pH is measured using the pH meter. The total dissolved solids are measured by Gravimetric method. Turbidity is measured using an instrument known as nephelometer Hussain and Hussain 2004; Shah et al., 2005;APHA 1989. Atomic Absorption Spectrophotometry provides accurate quantitative analyses for metals in waters. Total suspended solids are measured using Gooch Crucible and Total Hardness is measured using Titrimetric (EDTA) method Shyamala et al., 2008; Packialakshmi et al., 2010; Kumar, 1997; Purandara et al., 2003. Sodium, potassium by flame photometer and aluminium, manganese by atomic absorption spectrophotometer method Agbaire et al., 2009; Palanisamy et al., 2007.

III. RESULTS AND DISCUSSION

Determination of chemical and physical characteristics of water is very important for the suitability of water for drinking, household uses and industrial. Standards have been laid down by

various agencies such as a World health organization, U.S. Environmental protection agency, Bureau of Indian standard and ICMR for drinking water quality for many other uses. The results of the physico-chemical analysis of water samples are shown in tables 1 and 2. The mean temperature of water samples ranged from 24 to 37°C. The highest temperature was recorded in the month of June and the lowest temperature was recorded in the month of February. All the water samples were colourless, odourless, tasteless and clear.

Turbidity is the haziness or cloudiness of a fluid caused by individual particles (suspended solids) that are generally invisible to the naked eyes (Mazhar et al., 2013). The turbidity of all water samples ranged from 0.7 to 2.8 NTU (Tables.2). The higher values are observed at station 1 and lowest turbidity was observed at station 3. The analysed values are above the recommended limits (BIS: 10500-1991). Clear water is more appealing to drink; one treatment method is a filtration system. A total dissolved solid is a measure of total concentration of all constituents dissolved in water and has a bearing on its taste color and odour. The TDS values varied from 114 to 388 mg/L Tables.2. High levels of TDS is not suitable for bathing and washing (Senthilnathan and Parvathavarthini, 2011). It is generally inferior to palatability and may induce an unfavourable physiological reaction in the transient consumer (Dhembare et al., 1998); Sangeetha et al., (2000); Mariappan et al., (2000) observed greater values of TDS than that of ISI standard, the reason may be due to entry of pollutants.

Table 1: Name of areas were samples taken.

Station no.	Location	Source
1	Sethiyathope	Open Well
2	Manjakollai	Bore Well
3	Bhuvanagiri	Bore Well
4	Poonthotham	Bore Well
5	Vakkur	Bore Well
6	Chidhambaram	Bore Well
7	Orathur	Bore Well
8	Mirallur	Bore Well
9	Oodiyur	Bore Well
10	Vazhakollai	Open Well

Table 2: Groundwater quality parameters of the study area.

S I . N o	Part icul ars	Un it	1	2	3	4	5	6	7	8	9	10
			1	EC	µS / cm @ 25	7300	10500	8758	6380	9620	11900	8950
2	pH	m g/l it	7.5	7.3	7.3	7.5	8.1	7.4	7.3	7.3	7.3	8.4

3	Tur bidi ty	N T U	0.7	2.3	2.8	2.6	1.5	2.5	1.7	0.9	1.8	1.6
4	Ca	“	315	374	414	445	367	459	343	473	447	338
5	Mg	“	26	23	31	25	23	27	32	26	29	30
6	Na	“	13	15	15	14	17	16	17	16	17	12
7	K	“	25	93	57	62	54	66	59	14	18	95
8	HC O ₃	“	248	756	978	1101	850	159	140	170	145	960
9	CO ₃	“	0	0	0	0	0	0	0	0	0	0
10	SO ₄	“	128	127	77	106	147	170	90	86	134	127
11	Cl	“	28	115	118	385	155	252	122	69	96	128
12	NO ₃	“	53	54	46	49	52	72	69	56	54	68
13	F	“	04	07	06	05	04	06	08	05	09	06
14	TD S	“	114	208	189	276	178	388	288	331	289	188
15	TH as Ca CO ₃	“	180	135	122	166	127	170	164	159	169	150
16	TA as Ca CO ₃	“	198	127	115	179	132	200	144	110	143	139

IV. CONCLUSIONS

Groundwater is essential need for growth of all country. If water resources is to remain available as good quality water for upcoming generations, it is very essential to control from the possible contamination. This freshwater and pure water crisis is already evident in many other part of India, particularly in Tamil

nadu, varying in scale and intensity, depending mainly on the climate condition of the year. In Tamil Nadu, water supply scarcity plays an important role. However, water quality monitoring is an important tool to find contamination of groundwater and to provide an advanced warning of the approaching contaminated groundwater to important sources of water supply. This is of great importance, because the problem concerns securing a safe portable water supply for the present and future generation people.

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