

Assessment of Well Water Quality in Koraikuppam Village, Tiruvallur District

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ABSTRACT: The Koraikuppam village people using well water for their drinking and other purpose. The present study was analysed the physical and chemical parameters of the well water sample and compare with Cauvery river water. Parameters that may be tested include Temperature, pH, Electrical Conductivity, Dissolved Oxygen, Salinity, Carbonate, Bicarbonate, Chloride, Calcium, Magnesium, Sodium and Potassium. The Salinity of the well water value was 24.39ppt, pH 8.29, Dissolved oxygen concentration was 4.83mg/L, EC 5.0dsm⁻¹, bicarbonate 616.1mg/L, Chloride 1396.5 mg/L, Calcium 184.0mg/L, Magnesium 147.6mg/L, Sodium 503.7mg/L and Potassium 257.4mg/L. The Koraikuppam village well water quality values were compared with Cauvery River water, the values were higher than the Cauvery River water and standards, so the well water is not suitable for drinking purpose.

Keyword: Koraikuppam, Well water quality, Tiruvallur, Cauvery river.

1. INTRODUCTION

India is facing a serious problem of natural resource scarcity, especially that of water in view of population growth and economic development. Most of fresh water bodies all over the world are getting polluted, thus decreasing the potability of water. All life is depend on water and exists in nature in many forms like ocean, river, lake, clouds, rain, snow and fog etc. Water is the most important in shaping the land and regulating the climate. It is one of the most important compounds that profoundly influence life. During last decade, this is observed that ground water get polluted drastically because of increased human activities. Consequently number of cases of water borne diseases has been seen which a cause of health hazards. An understanding of water chemistry is the bases of the knowledge of the multidimensional aspect of aquatic environmental chemistry which involves the source, composition, reactions and transportation of water.

The quality of water is of vital concern for the mankind since it is directly linked with human welfare. It is a matter of history that facial pollution of drinking water caused water-borne diseases (Ford, 1999). They added that access to safe water reduces water-borne and water-washed diseases. More importantly the provision of regulated in-house piped water would lead to massive overall health gains. A review of the existing literature revealed that the supply of portable piped-borne water helps to decrease the mortality and morbidity rate particularly among infants and children as well as making life easier for women (Howard and Bartram, 2005). It is therefore necessary to check the water quality at regular interval of time. The present study was focus on the Koraikuppam village people using well water for their drinking and other purpose. The well water physical and chemical parameters was analysed and compare with Cauvery river water.

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2. MATERIALS AND METHODS

Study Area: Koraikuppam is a seashore village in "North of Chennai" in Tiruvallur District, situated at a distance of 60 km from Chennai, Tamil Nadu state, South India. The ground water table is about 3.5 m near the coast. As the distance from the coast increases the water table falls to 2 to 1 m. Hence drinking water is available near the shore. However it is a problem for the villages away from the shore. Since the fresh water reserves are low, salt water enters into the subsoil. Hence, the only source of drinking water is rainwater stored in open ponds. Water samples were collected in well water in Koraikuppam and Trichy Corporation Cauvery water by clean polythene container of 2.5 litres capacity. Prior to the collection, the container was rinsed thoroughly with the sample. pH was determined immediately after collection. The samples for the estimation of the remaining parameters were preserved as per standard procedures of APHA (1998) and brought to the laboratory for further analysis.

3. RESULTS AND DISCUSSION

The present study the well water sample was collected from Koraikuppam village. The well water quality parameters were comparing with Trichy Corporation Cauvery water and standards. These samples were analysed for physical and chemical parameters such as Colour, Odour, pH, Temperature, Electrical Conductivity (EC), Carbonate, Bicarbonate, Dissolved Oxygen, Salinity, chloride, Calcium, Magnesium, Sodium, Potassium, Sodium Adsorption Ratio and Mg & Ca Ratio. The results are presented in Table 1. The results of the present study reveal that the sample of the station was colourless or clear and odourless. The distinct possibility of odour problem developing in the distribution system and thus, causing unpalatable drinking water cannot be ignored. Such incidents are normally found to be due to the delayed reaction of chemicals, being routinely used as a all domestic and industrial purpose, with organic compounds present in the finished water. If the water is consumed during this period i.e., before complete chlorination occurs, typical chlorophenolic odour will be apparent and consequently result in unacceptable water. Hydrogen ion concentration of the Koraikuppam well water sample was 8.29 it was slightly lower than to Cauvery river water (8.86). Sample of the water is thus found to be well within the range of natural waters in Hydrogen concentration and also within the standards set by

WHO and ICMR (6.5 to 9.2). The sample analysed for the Electrical Conductivity level in Koraikuppam well water (5.0 dsm^{-1}) was higher than to Cauvery river water (0.87 dsm^{-1}). The increased level of EC in the consumer point may be due to the migration of sea water impact etc., concentration of Dissolved Solids ions is an important parameter in drinking water and other water quality standards. They give a particular taste to the water at higher concentrations and also reduce its palatability (Trivedy and Goel, 1986).

The salinity level in Koraikuppam well water was 24.39ppt and it was slightly higher than to Cauvery river water (22.6ppt). Coastal salinity levels can change due to tides and the amount of freshwater entering the system. Heavy rainfall, release of groundwater in the spring, and melting snow can make a water body less salty because there is more freshwater mixing in. Drought can make a water body more salty because it limits the amount of freshwater entering from streams, rivers, and rain (Prabu *et al.*, 2008).

Bicarbonate is the abundant citation in land waters imparting hardness. The value of Bicarbonate was 616mg/l in Koraikuppam well water and the value was higher than that of Cauvery river water (244.06 mg/l). The Koraikuppam well water chlorides concentration was 1396.5mg/l, it was very high when compare with Cauvery river water (123.89mg/l). Chlorides are important in detecting the contamination of ground water by wastewater. In ground high evapotranspiration tends to increase the chloride and salinity at the root zone of take up water due to osmotic pressure difference between the water outside the plants and within the plant cell (Peter, 1974). In the present studies Sodium concentrations are found to be 503.7mg/l in Koraikuppam water and it was high when compare with Cauvery river water (80.96mg/l). Fluctuations in these values among the sampling station with the concentration of sodium linked to the status in and around environment. The entry of more salt and marine chemical industries might be the main cause for sodium content (Pasternak and Starzecka 1979). Potassium that is present in the aquatic system may either be assimilated by algae and aquatic macrophytes or transferred to underlying sediments where it undergoes denitrification. Concentration of potassium 257.4mg/l in the Koraikuppam well water and the value was higher than that of Cauvery river water (10mg/l). Calcium is one of the most abundant elements in natural water imparting hardness in them.

The concentration of calcium was 184.0 mg/l and it was higher than to Cauvery river water(46 mg/l).

Magnesium is the second abundant citation in land waters imparting hardness. The values of magnesium 147.6 mg/l in Koraikuppam well water and it was higher than that of Cauvery river water (25.51mg/l).Calcium and magnesium caused by far the greatest portion of the hardness occurring in natural waters. Hardness of water is objectionable from the viewpoint of water use for domestic purpose. So the hardness of the water increases day by day. Hard water is unsuitable for domestic purpose and reports indicate that it has a role in heart diseases (Peter, 1974).From this investigation and the foregoing discussions, it can be concluded that available water

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from Koraikuppamwell water was not suitable for the purpose of drinking and most of the parameters are elevated to Cauvery river water and Indian and International standards.

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Table 1: Physical and Chemical parameters of Koraikuppam well water and Cauvery

River water

S.No	Parameter	Well water	Cauvery water
1	Temperature ($^{\circ}\text{C}$)	32.0	31.0
2	Appearance	Clear	Clear
3	pH	8.29	8.86
4	Electrical Conductivity(dsm^{-1})	5.0	0.87
5	Colour	NIL	NIL
6	Odour	NIL	NIL
7	Salinity (ppt)	24.3	22.6
8	Dissolved Oxygen (mg/l)	4.38	3.81
9	Carbonate (mg/l)	42.71	1.48
10	Bicarbonate (mg/l)	616.0	4.20
11	Chloride (mg/l)	1396.5	123.89
12	Calcium (mg/l)	184.0	46.0
13	Magnesium (mg/l)	147.6	25.51
14	Sodium (mg/l)	503.7	80.96
15	Potassium (mg/l)	257.4	10.92
16	Sodium Adsorption Ratio	0.91	0.61
17	Mg &Ca Ratio	2.38	2.18

Table 2: Koraikuppam well water quality was compare with different water standards.

S.No	Parameter	Present Study	WHO Standards		ICMR Standards		CPHEEO Standards	
			Min	Max	Min	Max	Accepted	Rejected
1	pH	7.61	7.0- 8.5	6.5- 9.2	7.0- 8.5	6.5- 9.2	7.0- 8.5	6.5 – 9.2
2	E C	57	---	---	---	---	---	---
3	Colour	Clear	5	25	5	25	5	25
4	Odour	Clear	Nil	Nil	Nil	Nil	Nil	Nil
5	Chloride	1396.5	200	600	200	1000	200	1000
6	Calcium	184.0	75	200	75	200	75	200
7	Magnesium	147.6	50	150	50	150	30	150

EC-dsm⁻¹, All result are expressed in mg/l Except pH.

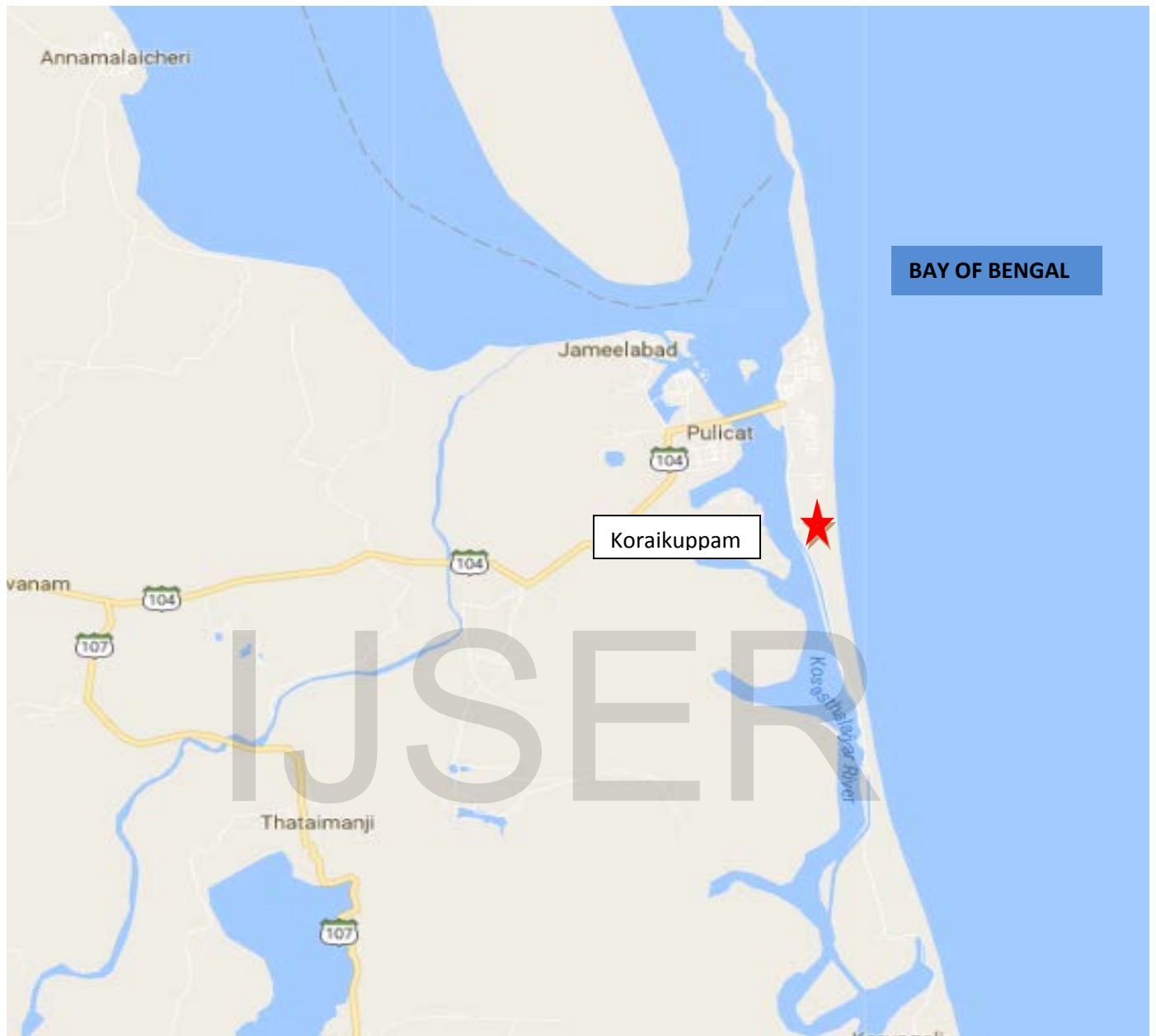


Fig. 1. Shows the sampling station well in Koraikuppam village, Tiruvallur District.