

A STUDY ON GROUNDWATER QUALITY OF  
THIRUKALUKUNDRAM AREA, KANCHEEPURAM  
DISTRICT, TAMILNADU

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**ABSTRACT**

Freshwater is most important for life. The demand for freshwater is so high, that a major share of obtained as groundwater. The portability of drinking water is mainly based on recommended permissible limit of certain parameters, when water exceeds these limits it is unfit for human consumption. For the present study in and around Thirukalukundram area have been selected. The requirement of groundwater is constantly increasing in the study area due to the population exploration in Kalpakkam and Mahabalipuram area. An attempt is made to identify the groundwater quality through the chemical parameters. The groundwater samples have been collected and analysed for various anions and cations. The results have been brought in digital format with the help of Geographical Information System (GIS).

**Keywords:** Groundwater, Saline water, seawater intrusion.

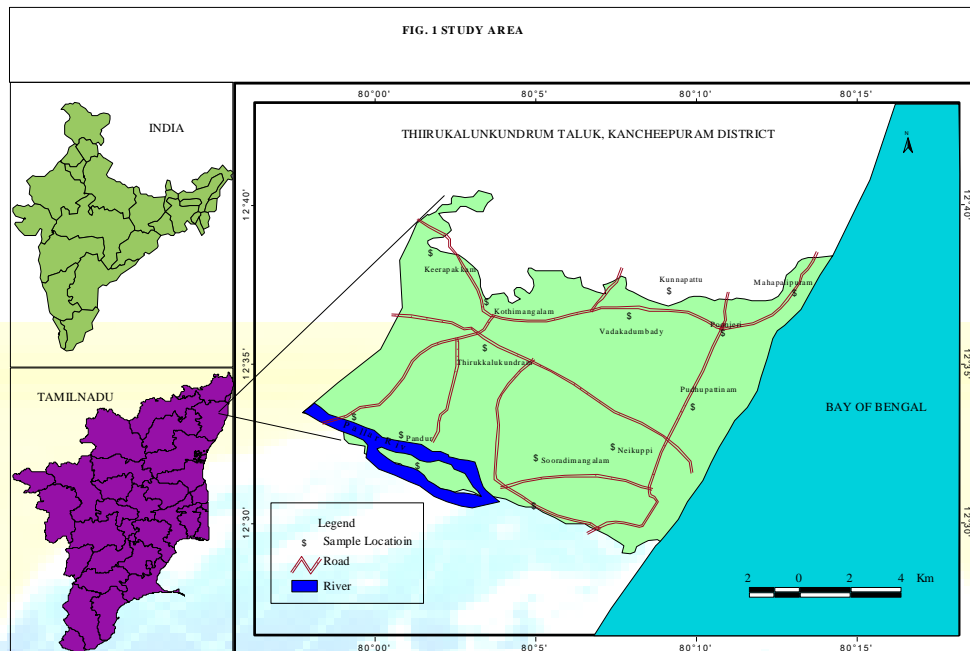
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## INTRODUCTION

Groundwater quality is more important than its quantity. The demands of groundwater get increased day by day due to the increase in population and industrial growth. The fresh water is in crises and most of the places the surface water get polluted and due to this the groundwater is pumped in excess amount in many places. Over exploitation of groundwater in coastal aquifer leads to seawater intrusion. The study area is one of the coastal districts of Tamilnadu. The demand for water is increasing day by day due to the increase in population and industrial growth in the study area. The quality of water is decreasing due to demand. Along the coastal area the groundwater quality is poor in certain places. The excess use of the groundwater has disturbed the hydrodynamic equilibrium between saltwater and freshwater. The Thirukalukundram taluk and nearby areas has been selected for the present study and the various chemical parameters of quality and the intrusion of seawater is assessed.

## STUDY AREA

The Thirukalukundram taluk has been selected for the present study. Thirukalukundram taluk is one of the coastal areas of Tamilnadu. The study area includes Thirukalukundram, Kalpakkam, Mahabalipuram of Kancheepuram district. The study area falls between  $79^{\circ}57'45''$  E to  $80^{\circ}14'15''$  E longitude and  $12^{\circ}29'05''$  N to  $12^{\circ}40'30''$  N latitude (fig. 1). The normal annual rainfall over the district varies from 1105 mm to 1214mm.



## DATA ANALYSIS

Fourteen water samples have been collected from the existing wells covering the entire study area during July 2012. The samples were taken in a clean half litre bottle for determining the various salt present in it. The water samples have been analysed for major anions and cations based on the standard procedures (AHPA, 1998).

## METHODOLOGY

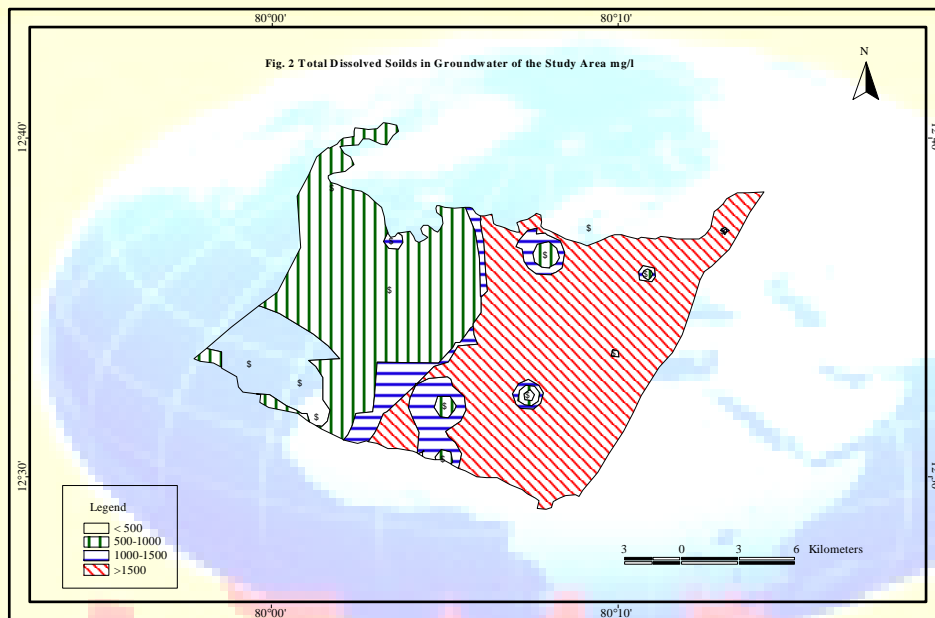
The study area map has been prepared from the toposheet in 1: 50,000 scale and is converted in digital format using GIS. The analysed results of the water samples have been classified based on WHO (1996) standards. Based on the classified outputs various thematic maps have been prepared in GIS platform.

## RESULT AND INTERPRETATION

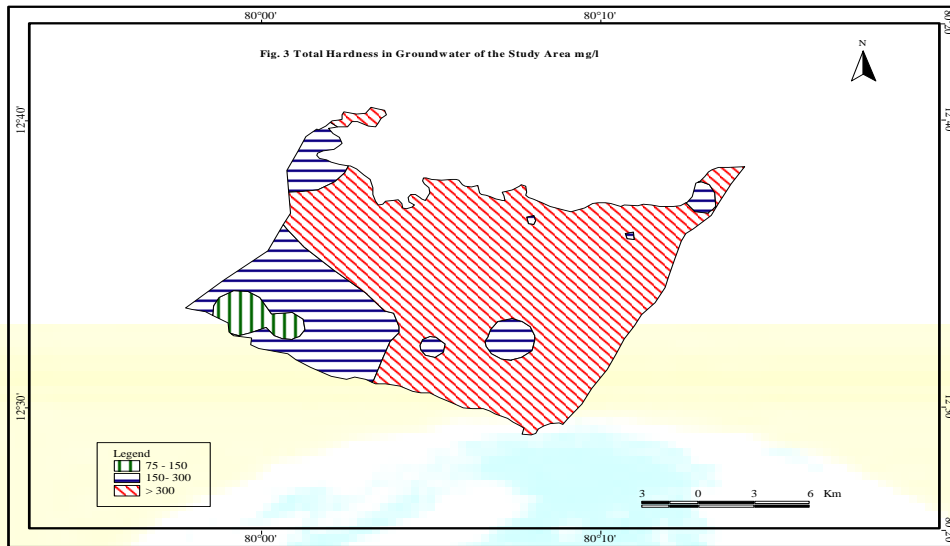
With the analytic results the groundwater has been classified and the following thematic maps have been prepared using GIS.

1. Total Dissolved Solids (TDS), 2. Total Hardness (TH), 3. Corrosivity Ratio (CR), 4. Chloride vs. Bicarbonate and Carbonate Ratio  $[Cl/(HCO_3+CO_3)]$ , and 5. Ground Water Classification

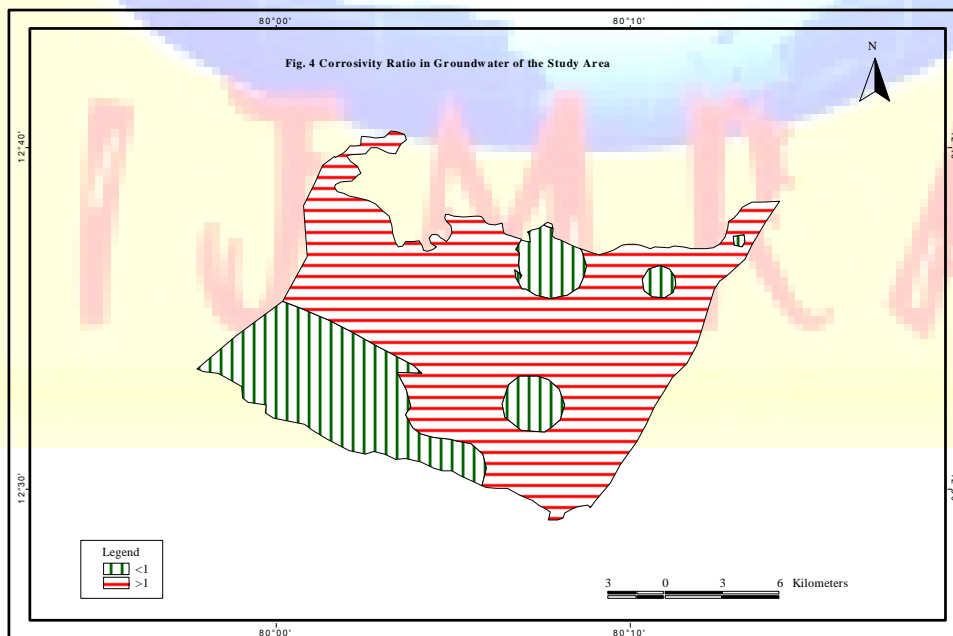
The groundwater having TDS value less than 1000 mg/l is consider to be freshwater or potable (WHO, 1996). In the study area most of the water falls in potable category. Few locations the groundwater has TDS value above the permissible limit and is considered to be poor category (fig. 2).



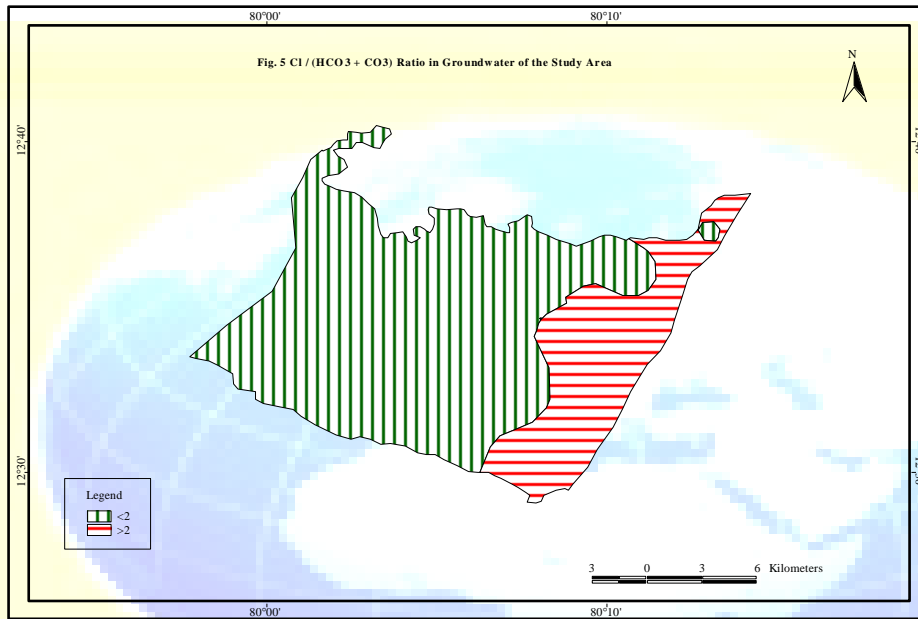
Groundwater with Total hardness 0 to 75 mg/l are consider as a soft water. Those with total hardness more than 300 mg/l are consider as very hard water. The hardness value varies from 75 – 150 mg/l are considered as moderately hard and those have 150 to 300 mg/l are considered as hard water. In the study area the total hardness ranges from 119.94 mg/l to 938.58 mg/l. Hence the study area falls under moderately hard to very hard category. Most of the area falls in hard and very hard category (fig.3).



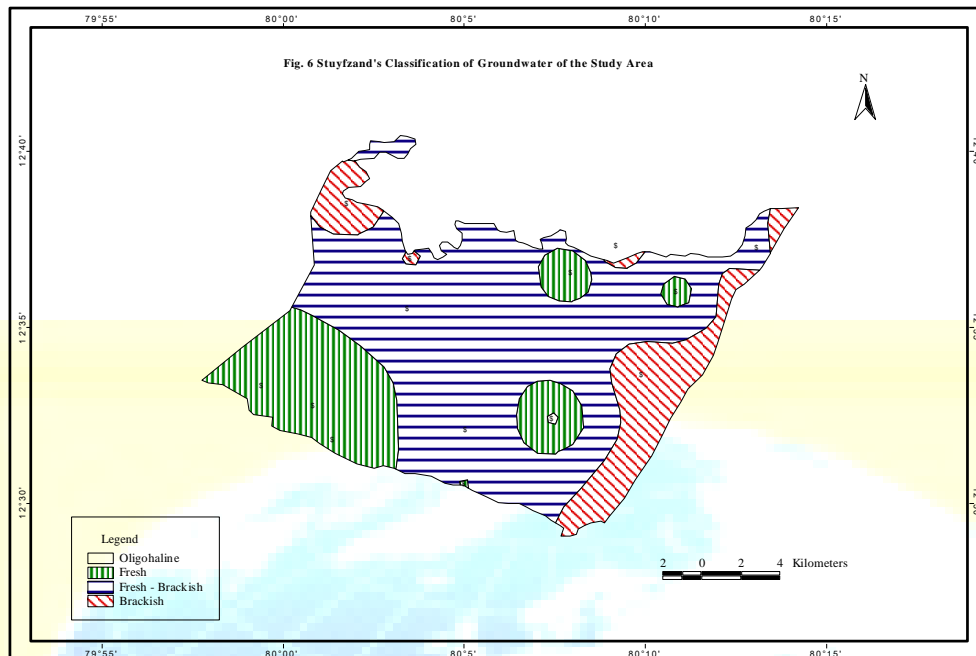
The groundwater is further classified based on the corrosive nature. If the corrosivity ratio of groundwater is less than one then the water is consider to be non corrosive and it can be transported through metal pipe also (Rengarajan et al., 1990). In the study area many location have the corrosivity ratio more than one and the water are in corrosive nature (fig. 4).



The saline water intrusion is to be found out by the Chloride vs. Bicarbonate and Carbonate Ratio  $[Cl/(HCO_3+CO_3)]$ . If the Chloride vs. Bicarbonate and Carbonate Ratio is more than two, then the water is saline in nature Desai et. al (1979). In the study area only two locations have the  $Cl/(HCO_3+CO_3)$  more than two. The two locations falls near the coastal area which indicate the saline water have been intruded along the coastal area (fig. 5).



The groundwater is classified as very oligohaline, oligohaline, fresh, fresh-brackish, brackish, brackish-salt, salt and hyperhaline based on the presence of chlorine (Stuyfzand, 1989). In the study area the groundwater falls under oligohaline, fresh, fresh-brackish and brackish category. Most of the water falls in fresh brackish and brackish type. Few locations falls in fresh and oligohaline type (fig. 6).



## Conclusion

The above study indicates that the groundwater have variable quality. Most of the areas the water quality are found to be poor. Based on the TDS, total hardness and stuyfzand classification the groundwater is unsuitable for drinking purpose. Most of the area the groundwater have fall under hard and very hard nature and can be used after proper treatment. The fresh groundwater occurs away from the coast. From the chloride vs. bicarbonate ratio, the seawater intrusion has been taken place along the coast. The surface water has to be utilized to its maximum level and to prevent the saline water intrusion along the coastal aquifer. Rainwater harvesting can be practiced in the entire study area. The rainwater harvesting and the construction of rain fed tanks may improve the groundwater quality.

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