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Thanjavur Hydrogeochemical Analysis of Groundwater

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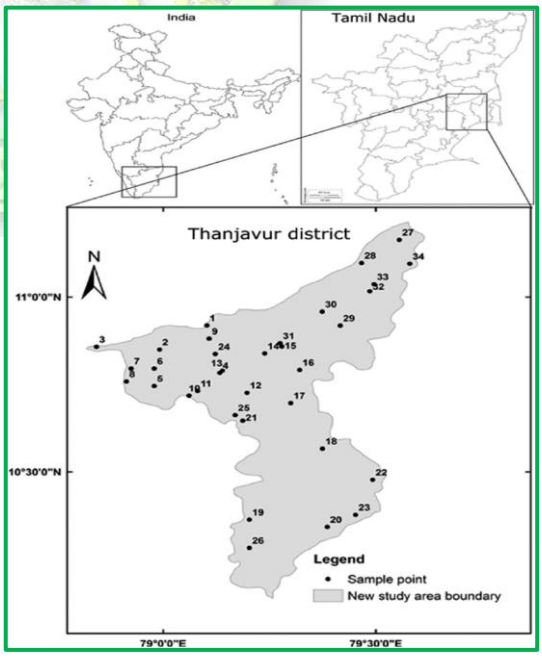
Abstract
The influence of land use patterns and geological settings on the hydrogeochemistry of the Thanjavur district in Southern India is assessed. To analyze the groundwater quality 34 samples were used. The water quality Index (WQI) values derived based on these values show that, over 80% of the samples were categorized as either as excellent or good quality for drinking. The main land-use pattern in the district is agricultural, built areas and industrial regions. The most common contaminant in agricultural lands is nitrate pollution from fertilizers. Overall, geology and land use have significant influence on groundwater quality of the region.

Keywords: Groundwater quality, geological influences, land use impacts,Thanjvur district

Introduction
Groundwater is one of the most important sources for potable water supply, irrigation and industrial uses in many arid and semi-arid regions around the world (Khan, Khan, Shakeel, & Jerome, 2011). Groundwater importance for water supply has increased in the past few decades.this article we'll fousing on thanjavur groundwater status . . Multiple methods such as hydrogeochemical evaluation, geostatistical modeling, and water quality index (WQI) were used to evaluate groundwater chemical variations in the different geological and land-use regions in the Thanjavur district.

Methods Used to Analyze Groundwater
For analysis 34 samples were taken for various wells in the period of pre& post monsoon in 2010.500ml capacity cleaned polythene bottles with proper labels to indicate source, date and time were used to collect samples which were then stored under laboratory conditions at 4°C until analysis. Complete chemical analysis was carried out with reference to the methods suggested from APHA (1992). EDTA titration was used in analyzing major ions such as chlorides (Cl), bicarbonates (HCO_3^-), magnesium (Mg) and calcium (Ca).for analysing the sodium and potassium content FLAME PHOTOMETER Was used.for sulphates- UV-visible spectrophotometer. The method used for fluride analysis was SPADNS method.



Water quality index (WQI):

WQI is calculated based on a series of interlinked equations as outlined below. WQI ¼ XSIi (1) SIi ¼ Rwiqi (2) Rwi ¼ Awi Pn 1 Awi (3) qi ¼ ðCi=SiÞ 100 (4) Awi = weights assigned; Rwi = the relative weight, Awi = the assigned weight of each parameter, n = the number of parameters; qi = quality rating for each parameter. Water Quality Index (WQI) of the Thanjavur district has been calculated using relative weights of water quality parameters based on their significance for drinking purposes. The highest weight of five is given to TDS, Sodium, Chloride, Sulphate, Fluoride, and Nitrate. Serious health impacts were reported by the excess use of fluoride and Nitrate. Consumption of fluoride in higher concentrations than the proposed 1.5 mg/L, can cause dental and skeletal fluorosis. In the same way nitrate can cause blue babies or methemoglobinemia disease in infants, gastric carcinomas, abnormal pain, central nervous system birth defects, and diabetes (Vasanthavigar et al., 2010). WQI for pre-monsoon and post-monsoon seasons were calculated separately since water quality is one of the main problems especially in developing countries like India. During premonsoon season the WQI ranged from 14.4 to 286.6 and during post-monsoon season the WQI ranged from 7.7 to 169.6. The WQI showed that 20% of pre-monsoon samples and 15% of post-monsoon samples were poor/very poor for drinking purposes. Results show that more than 50% of the samples in both pre-monsoon and post-monsoon seasons are potable. The percentage of very poor and unsuitable water samples for drinking purpose in Table 2 in the post-monsoon season is zero which clearly indicates that the water quality improved after the monsoon.

Conclusions and recommendations

The influence of geological formations and land use was studied based on the 34 groundwater samples and the results were analyzed using hydrochemical analysis, Water Quality Index (WQI), and spatial mapping techniques. Results from the Gibbs diagram show that the major processes controlling groundwater chemistry are rock–water interaction and evaporation depositions, which is confirmed by the water types mixed Ca-Mg-Cl type, Ca-HCO3 type and lastly Na-Cl types. Groundwater quality analysis using WQI suggests that more than 80% of the samples in both seasons is good for drinking. From this result, it can be proved that geological formations influencing the chemistry of groundwater. Thus, the clear influence of geology and land use on groundwater quality is confirmed.

Reference

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