Seawater Intrusion in Coastal Areas from
Poovar to Shangumugham, Thiruvananthapuram District, Kerala, India

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Abstract

The coastal aquifers in Kerala are experiencing seawater intrusion due to overexploitation in order to meet the demand of the growing population. Only a few studies have been done in the present study area. So, a study was conducted on coastal aquifers from Poovar to Shangumugham, Thiruvananthapuram district, Kerala state in order to find out the status of seawater intrusion in the area. Groundwater samples were collected and the quality and impact of saltwater intrusion were studies by determining the geochemical characters of 78 groundwater samples collected during pre-monsoon and post-monsoon each. Physical parameters and chemical parameter major cations and anions were determined. The data were analyzed and the multivariate analysis was carried out using SPSS 24. The correlation and R-mode factor analysis confirms the presence of seawater intrusion and using Q-mode factor analysis the areas affected by seawater intrusion were demarcated. Thus, the groundwater of the study area has to be managed sustainably considering the geochemical nature and their seasonal variations, as region proposed for study is a coastal fragile environment.

Keywords : Salt Water Intrusion, Coastal Aquifers, Poovar-Shangumugham, Groundwater, Kerela

Introduction

According to Centre for Coastal Zone Management and Coastal Shelterbelt data an appreciable amount of population lives on the coastal zones of India, which fluctuates depending on the season as most coastal areas are tourism hotspots and they depend primarily on groundwater for their needs since in these area's water is available with considerable ease. The overexploitation of groundwater in the coastal aquifers in order to meets the requirement of the growing population led to the introduction of saltwater to the fresh groundwater which is not a good scenario. The increasing trend towards the coastal tourism and improper management of the resource add the misery. Many studies indicated that the coastal groundwater system of Kerala experiences setbacks in terms of quality and quantity (Dipanjali, 2000; CGWB, 2002; Kunhambu, 2003; Laluraj *et al*., 2005; CGWBKR 2007; Manjusree *et al*., 2009; Prasanth *et al*., 2012; Boominathan *et al*., 2012; Sarath *et al*., 2012; Priju *et al*., 2012; Priju *et al*., 2014; Anil-Kumar *et al*., 2015; Midhun *et al*., 2017; Sreekesh *et al*., 2018; Pramada *et al*., 2018). So, it is so important to assess the vulnerability of the aquifer to seawater ingress and only a few studies have

been done in the present study area. So, the main purpose of the study is to understand the present hydrogeological situation along the coastal stretches extending from Poovar to Shangumugham in Trivandrum district of Kerala state and grade the area based on vulnerability of aquifers towards intrusion of seawater for which multivariate statistical analyses act as a reliable method (Akbal *et al.,* 2011).

Study Area

The study area is located in the coastal regions of Thiruvananthapuram district, Kerala state. The study area extends from coastal aquifers of Poovar to Shangumugham. The district is one of the rapidly developing areas in Kerala and also hosts its capital. The study area extends to 100sq.km and is located in the western coast of India which experiences a humid tropical climate. The annual variation of mean air temperature is from 21°C to 34°C with average annual rainfall is about 2035mm. The area lies in the low land or coastal plain and dominated by Sandstone and Silt together with Sand and silt with patches of Laterite, Charnockite and Khondalite group of rocks. The laterites are secondary