

Characterization of irrigation water quality of Chunnakam aquifer in Jaffna peninsula

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Abstract

Chunnakam aquifer is the main limestone aquifer of Jaffna peninsula. This study focused on characterization of Chunnakam aquifer for its suitability for irrigation. Groundwater samples were collected from wells to represent different uses such as domestic, domestic with home garden, public wells and farm wells during January to April 2011. Important chemical parameters, namely electrical conductivity (EC), chloride, calcium, magnesium, carbonate, bicarbonate, sulfate, sodium and potassium were determined in water samples from 44 wells. Sodium percentage, Sodium adsorption ratio (SAR) and Residual sodium carbonate (RSC) levels were calculated using standard equations to map the spatial variation of irrigation water quality of the aquifer using GIS. Groundwater was classified based on Chadha diagram and US salinity diagram. Two major hydro chemical facies Ca-Mg-Cl-SO_4 and Na-Cl-SO_4 were identified using Chadha diagram. Accordingly, it indicates permanent hardness and salinity problems. Based on EC, 16% of the monitored wells showed good quality and 16% showed unsuitable water for irrigation. Based on sodium percentage, 7% has excellent and 23% has doubtful irrigation water quality. However, according to SAR and RSC values, most of the wells have water good for irrigation. US salinity hazard diagram showed, 16% as medium salinity and low alkali hazard. These groundwater sources can be used to irrigate all types of soils with little danger of increasing exchangeable sodium in soil. However, 2% of the wells are not suitable for irrigation due to very high salinity and sodium hazard.

Keywords

Jaffna peninsula, Chunnakam aquifer, Groundwater quality, Irrigation, Salinity

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