Estimation of aquifer parameters of limestone aquifers- A case study in Thirunelvely and Kondavil of the Jaffna district

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Abstract

The productiveness of an aquifer is determined by its aquifer parameters such as specific yield and permeability. Due to the complicated features of the large diameter wells and inadequate resources to conduct pumping tests in observation bore holes, estimating aquifer parameters for better use and management of groundwater resources is extremely difficult. The conventional pumping test; distance drawdown method was not possible in the Chunnagam limestone aquifers to determine the above said parameters because there was no drawdown in observation bore holes even at 3 m distance. Hence, alternatively the single well test was performed in specific places; Thirunelvely and Kondavil. The water level measurements were made by a dip water meter with respect to time during the pumping and recovery phase. A semi-log plot of field drawdown data versus time is made to evaluate the transmissivity of the aquifer. The relationship between residual drawdown and time was used to find the specific yield. The radial flow numerical model previously used to estimate aquifer parameters using large diameter wells in the dry zone of Sri Lanka was used to compare the results obtained by the single well test in the study area. The hydraulic conductivity and specific yield estimated by the single well test agrees with the values obtained by the radial flow numerical model when the model results were matched with the field results. Therefore the single well test in the large diameter wells is reliable and cost effective to estimate aquifers parameters in limestone aquifers when observation bore hole data is not available. The transmissivity value of the Thirunelvely areas was higher (274.88 m^2/day) when compared with Kondavil (126.5 m^2/day) and the specific yield was 0.221 and 0.201 respectively in the Thirunelvely and Kondavil areas.

Keywords

Aquifer parameters, Transmissivity, Specific yield, Limestone

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