PUMPING TEST ANALYSIS USING NUMERICAL METHOD

THESIS BY

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ABSTRACT

The available analytical techniques to study groundwater behaviour don't account for various factors which have a combined effect on the capability of an aquifer to store and transmit water. However, the numerical methods are flexible enough to simulate as many conditions as may be required. This study, carried out on some pumping test data in a part of the Bari & Chaj Doabs, aimed at investigating the applicability of numerical techniques to evaluate the storage coefficient (S) and transmissibility (T) of aquifers and to determine their sensitivity to these parameters.

The data of four long range pumping tests, conducted by WASID, was collected and analysed, both for pumping as well as recovery phases. The model developed by Rushton and Redshaw (1979) was modified to incorporate statistical parameters, standard error and correlation coefficient to fulfil the objectives of the study. Using the estimated values of storage coefficient (s) and transmissibility (T) the drawdowns/recovery levels were generated and compared with the observed ones for each observation well. The standard error for the best fit results is between 0.0127 to 0.0656 for pumping phase and between 0.0463 to 0.1052 for the recovery phase. The corresponding values of the correlation coefficient range between 0.9996 to 0.9717 and 0.9977 to 0.9046 respectively. The study concludes that the numerical model can be used efficiently for aquifer flow analysis for different hydrogeological conditions.

In case of unconfined aquifer the confined storage has marked effect during early part of the test. Rate of the delayed yield is such that its effect continue for quite some time during the recovery phase.

Standard error and correlation coefficient are statistical parameters which provide a measure of the acuracy of fitting the computed drawdown to the observed one and their statistical relationship in a descriptive way. Hence these parameters can be used to decide about the goodness of fit between observed and that of the computed drawdown.