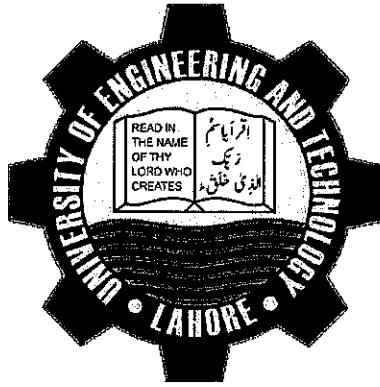


PERFORMANCE EVALUATION OF GROUNDWATER RECHARGING ARRANGEMENT IN URBAN AREAS

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by

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ABSTRACT

Groundwater is an important source of fresh water. In recent years, water availability in urban areas is rapidly declining due to the overexploitation of groundwater and maximum rainwater discharge in the drainage system. This water can be used to recharge the groundwater using suitable arrangements. For this purpose, present study is conducted in order to evaluate the performance of different groundwater recharging wells installed in urban areas of Lahore. The objective of present study was to investigate/ evaluate the performance of groundwater recharging well by observing groundwater levels to investigate the reasons behind the poor performance of recharging wells in order to suggest the suitable remedial measures to improve their performance.

This study was conducted on various groundwater recharging wells installed by Pakistan Council of Research in Water Resources (PCRWR) and Lahore Development Authority (LDA). Rainfall data was collected from Pakistan Meteorological Department (PMD) Lahore from Year 1991 to 2018 and analyzed. Runoff volume and peak flows were calculated using SCS Curve Number method and Rational formula. Groundwater table was observed and analyzed by using processing MODFLOW before, during and after monsoon season. In order to evaluate the performance of filters used in recharging wells, physical model study was performed. Moreover, recharge rates were measured, and water quality tests were conducted before and after the storm water was filtered through porous medium. Based on this comparison, recharge rate and water quality, final suitable design of groundwater recharging well was recommended.

The study concluded that, total maximum rechargeable volume during monsoon was 24206 m³ at Gaddafi stadium, 1403 m³ at irrigation colony, 3438 m³ at STEDEC office and 3587 m³ at PCRWR office Lahore. It is concluded from the recharging of water can only slow down the depletion rate of groundwater table, but do not increase water table. Performance of groundwater recharging wells can be enhanced if sand traps are provided before the filter chamber in recharging wells. Recharging well at Gaddafi stadium and one of designed well having filter made of boulder and fine material along with mesh have highest recharging rates among all, also the water quality results of these wells are approximately acceptable. Recharging well at STEDEC office Lahore is found to be efficient in case of water quality although its recharging rate is less.