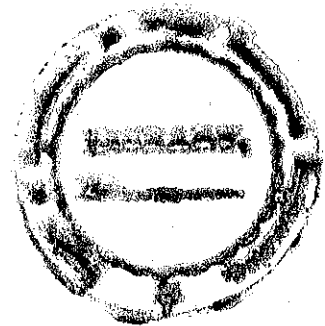


M.Sc THESIS

**MONITORING AND MODELLING OF GROUNDWATER
RECHARGE THROUGH RECHARGING WELLS**



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2019

ABSTRACT

Sustainability of the globe is threatened by the growing water issues. Water use has grown more than the population increase which led to develop water scarce regions in the globe. Pakistan whose population has gone over 200 million is facing water stress because of enhanced population, increasing industrialization and urbanization. Similar is the case with Pakistan's 2nd largest city, Lahore-capital of Punjab Province which is totally dependent on groundwater reserves for its domestic & industrial uses. High abstraction rates in Lahore has declined its water table and continuously declining with the increase of groundwater abstraction that also deteriorating the groundwater quality. The groundwater abstraction of 44.6 MGD in 1960 has increased to 804.4 MGD in 2018. Objectives of research were to monitor recharging wells by installing flowmeter and piezometers, simulate groundwater table of Lahore to determine the depletion rate and to determine the impact of recharging wells on depletion rate.

To fulfill the objectives of research work, flowmeter and piezometers were installed for monitoring of recharging well. Setting up of groundwater flow model was carried out using the software Visual MODFLOW to do the analysis of depletion. The model was calibrated and validated using observed data from 2015 to 2018 before the installation of recharging wells. The average depletion rate for groundwater was 0.86 m per year, -0.072 m per summer season and 1.02 m per winter season. Again, model was calibrated and validated using observed data of February and March, 2019 after installation of recharging wells. From model

results, it was found that the average depletion rate for groundwater was 0.7 m per winter season based on two months data.

The study shows that if the same urban development trends prolong, it will render groundwater system unsustainable as the groundwater recharging sources more or less remain at the same level while the abstraction rates continue to increase day by day. The gap between inflow and outflow is continuously increasing which is resulting in the depletion of groundwater storage. To overcome such rapid decline of water table, there should be rain water harvesting through recharging wells in Lahore city. The study underlines the importance of groundwater recharge through recharging wells to reduce the depletion rate of Lahore's aquifer.