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## INVESTIGATION OF GROUNDWATER RECHARGES MECHANISM IN ALASEHIR PLAIN: FROM PHYSICAL CHARACTERIZATION TO MODELING

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**Abstract:** Characteristics of aquifer that allows the flow of groundwater, recharge and discharge mechanism effect the available groundwater potential. In order to determine the available potential of groundwater, the budget components are the most important parameters. In general, different analogical methods are applied in different countries, instead of using measurable data. Determination of the groundwater recharge is the most difficult parameter to be measured among the hydrological budget parameters. In general, the analogical methods are insufficient to determine the groundwater recharge rate. Precipitation, evaporation-transportation and runoff can be measured from the surface meteorological station. However, estimation of groundwater recharge cannot be measured directly. At the moment of climate change, visualization of the spatial distribution of the groundwater recharge estimation and mapping are needed. Therefore, improvements of easy groundwater recharge techniques are very important tools for groundwater basins to develop the water management planning.

A multi-disciplined research project has been conducted in Alasehir Basin which is the main part of Gediz River Basin. The main objectives of this project is not only to characterize the aquifers but also to determine the groundwater recharge components in Alasehir Basin. This project contains several groundwater recharge methods including soil moisture, water table fluctuation, environmental isotopic, chemical techniques, and surface runoff modeling. In this project, firstly, 3 meteorological stations were constructed at various locations to determine all water budget parameters within the Alasehir Basin. A comprehensive hydrogeological study has been conducted for identifying the elevations and aquifer materials. About a 1500 m long borehole was drilled and core samples were taken from the boreholes to characterize the aquifer parameters such as porosity, hydraulic conductivity and soil classification. During the borehole operation, hydraulic conductivity tests were applied to determine the hydraulic conductivity of the aquifer. After the core drilling, these boreholes were transformed to monitoring wells. About 20 groundwater level data logger were installed in these monitoring wells. Later, groundwater samples will be taken from the monitoring wells and they will be analyzed for numerous chemical and isotopes analysis to determine the groundwater recharge rate. In addition, about a 1000 m long of pumping test wells were drilled to different levels at



10 different locations. Pumping wells will be used to determine the specific yield and other hydraulic parameters that are necessary to determine the groundwater recharge by using the water table fluctuation method. In addition, 5 soil moisture systems were installed at different depth (5 m, 10 m and 15 m) to monitor moisture content changes in the unsaturated zone. Hence, real soil water content changes will be obtained and evaluated by other methods. The surface runoff modeling will be used to determine the spatial distribution of the groundwater recharge and visualization using a Geographical Information System (GIS) technique. In the final phase of the project, the most practical and economical groundwater recharge methods will be evaluated based on the results of the previous methods.

**Keywords:** Aquifer characterization, recharge methods, modeling, Alasehir, Turkey

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