

Abstract

Al-Qilt catchment is classified as arid to a semi-arid area that suffering from water shortage and area without Sustainable management for water resources. Groundwater is the main source for freshwater in the area, but the area suffer that, the ability of wells and springs to cover the water demand is low. Therefore, it is important to find feasible solutions to increase aquifer storage. One of the identified feasible solutions might be the use of artificial recharge system by using winter flood and treated wastewater in the dry season as a source for artificial recharge.

The methodology of the work begins with collecting and analyzing the data that needed for estimate the water balance and to define the best areas for artificial recharge. Groundwater balance were estimated, and the best suitable areas for artificial recharge were identified.

To calculate water balance, Soil Moisture Demand (SMD) by using GIS model in semi-arid areas is used. Many parameters were used as inputs such as rainfall, temperature, monthly relative humidity and solar radiation. The result shows that The yearly recharge by this method is estimated about 99 mm/year in the upper parts of the catchment and estimated about 12 mm/year in the lower parts of the catchment.

In addition to (SMD), other methods are used to estimate the groundwater recharge, for example, chloride mass concentration, Guttman and Zukerman equations for the West Bank and Goldschmidt equation.

The annual recharge according to chloride mass concentration found to be 118 mm/year, the annual recharge that estimated by (SMD) about 84 % of chloride mass concentration. The annual recharge by Guttman and Zukerman equations for the West Bank estimated about 126 mm/year, annual (SMD) recharge represent 79 % of annual recharge by Guttman and Zukerman. While the annual recharge by used Goldschmidt 1959 is estimated to be 118 mm/ year.

GIS-based suitability was used to determine the best locations for artificial recharge project based on the slope of the area, runoff, infiltration capacity, land use, distribution of groundwater wells and the depth of groundwater table.

The results show that 159 km^2 of Al-Qilt catchment is moderately suitable to perform the artificial recharge project by using injection wells, represent 91 % of the total area. While the area of high suitable for artificial recharge by using injection wells estimated about 14 km^2 . The area that estimated to be suitable for artificial recharge by using treated wastewater estimated about 115 km^2 , which represent 66% of the total area, while 59 km^2 is considered not suitable for artificial recharge by using treated wastewater as source for external water that infiltrate to groundwater.