

Using the Artificial Lake to Evaluate the Efficiency of Groundwater Recharge in Taiwan

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Due to the temporal and spatial distribution of rainfall in Taiwan, there are apparent differences between rainy and dry season. This reason led to the management and deployment difficulties of water resources, so the usage of groundwater resources has become an important issue. During the dry season, farmland often relies on pumping groundwater and causes severe groundwater depletion. For this study purpose, the experiment of an artificial lake to discuss the benefits of groundwater recharge and to relieve this situation.

The artificial lake is the sedimentation lake (SL), and the infiltration lake (IL) is located in Gu-Keng Township, Yunlin County, Taiwan. Water from the agriculture channel first flows into SL, then precipitates and overflows to IL. The Hydraulic conductivity (K) of the artificial lake was obtained through the double-ring infiltration test and pumping test. The groundwater data from 4 observation wells around the artificial lake. Inflow and overflow were monitored in SL and IL. The estimated K is used in calculating the effective infiltration capacity (EIC) of the SL by Darcy's law. The real infiltration capacity (RIC) of the SL was calculated by the water balance equation and compared the differences between each other. The results showed that there is a linear relationship among the water depth of SL, the inflow, and the RIC. However, the RIC is higher than the EIC; one possible explanation may be that the silt has not entirely clogged the bottom base of the SL, thus when the lake water depth increases, the RIC also increases. Nevertheless, it can also be known that the artificial lake in this study is still effective for groundwater recharge.

Keywords: Artificial Lake, Groundwater Recharge, Water Balance Equation