

Identification and Characterization of Groundwater Recharge Sites in Kuwait

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Abstract : Groundwater is an important component of Kuwait's water resources. Although limited in quantity and often poor in quality, the significance of this natural source of water cannot be overemphasized. Recharge of groundwater in Kuwait occurs during periodical storm events, especially in open desert areas. Runoff water dissolves accumulated surficial meteoric salts and subsequently leaches them into the groundwater following a period of evaporative enrichment at or near the soil surface. Geochemical processes governing groundwater recharge vary in time and space. Stable isotope (^{18}O and ^2H) and geochemical signatures are commonly used to gain some insight into recharge processes and groundwater salinization mechanisms, particularly in arid and semiarid regions. This article addresses the mechanism used in identifying and characterizing the main water shed areas in Kuwait using stable isotopes in an attempt to determine favorable groundwater recharge sites in the country. Stable isotopes of both rainwater and groundwater were targeted in different hydrogeological settings. Additionally, data and information obtained from subsurface logs in the study area were collected and analyzed to develop a better understanding of the lateral and vertical extent of the groundwater aquifers. Geographic Information System (GIS) and RockWorks 3D modelling software were used to map out the hydrogeomorphology of the study area and the subsurface lithology of the investigated aquifers. The collected data and information, including major ion chemistry, isotopes, subsurface characteristics, and hydrogeomorphology, were integrated in a GIS platform to identify and map out suitable natural recharge areas as part of an integrated water resources management scheme that addresses the challenges of the sustainability of the groundwater reserves in the country.

Keywords : scarcity, integrated, recharge, isotope

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