

A GIS-Based Multicriteria Decision for Groundwater Potential Zone in the West Desert of Iraq

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Abstract

In arid and semi-arid parts worldwide, the investigation of the groundwater potential recharging zone is a main target to recompense the massive shortage in rainfall and surface water supplies. Recently, the combination of Remote Sensing (RS) and Geographical Information System (GIS) techniques became possible to overcome the water scarcity and supply all the water requirements for the population, agricultural and commercial purposes in the western Iraqi desert. Various thematic layers such as geology, slope, soil infiltration, land use and land cover, rainfall, drainage density, and lineament density were derived from RS data like Landsat 8 satellite images and the SRTM Digital Elevation Model (DEM) and published Iraqi geological maps. The thematic map of the parameters was generated and transferred into the raster form by employing the raster conversion tool in ArcGIS 10.8 software, and each layer was subjected to different assigned weights through adopting Analytical Hierarchical Process (AHP). The prospective map of the groundwater recharging zone in the study region is categorized into five regions. The output map shows that 3.21% of the area locates in the perfect potentiality zone, followed by 10.75% in the good potentiality zone, 38.6% moderate potential zone, 42.9% in the poor groundwater zone, whereas only 4.44% of the study area falls under the very high prospective zone. To attain the sustainable management of the groundwater in the Iraqi western desert, this study provides a primary methodology and significant database for the local management of water resources by adopting the groundwater perspective map.