



Using Remote sensing and geographic information system for delineating suitable sites for artificial groundwater recharge: A multi-criteria decision-making approach.

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The semi-arid region of Deraa Oued Noun in Morocco faces significant challenges related to water scarcity, which greatly affects the availability of groundwater resources. With recurring droughts and periods of water shortage, it is imperative to address these challenges and implement effective measures for sustainable groundwater resource management. Artificial groundwater recharge has proven to be a viable solution for alleviating water scarcity issues. By capturing and storing excess water during periods of heavy precipitation or surface water availability, artificial recharge can replenish depleted aquifers and provide a reliable water source during drought periods. However, the success of recharge projects depends on identifying suitable sites that meet specific criteria and maximize the efficiency of the recharge process.

The identification of suitable sites for artificial groundwater recharge in Deraa Oued Noun, through the integration of remote sensing, GIS (Geographic Information System), and MCDM (Multi-Criteria Decision Making) techniques, offers a promising solution to address water scarcity challenges in the context of climate change. The proposed research project aims to provide valuable and spatially explicit information for strategic groundwater resource management.

This study was conducted in the Deraa Oued Noun district, where water shortages have been observed over the years. The research utilized geology, soil, land use, stream data, and Sentinel-2 and DEM images to develop thematic layers, including lithogeology, soil, slope, lineament density, land use, stream density, and water surface. Additionally, data on the vadose zone thickness were incorporated to enhance the analysis.

By integrating GIS and image processing techniques, these thematic layers were utilized to prepare groundwater recharge maps of the area through a weighted overlay method on a GIS platform. The results revealed that artificial recharge potential was high in the northern and western parts of the study area.

By following a systematic and rigorous methodology, including data collection, remote sensing analysis, MCDM evaluation, and site validation, this project aims to contribute to the successful implementation of artificial recharge projects in the region. By maximizing the efficiency of the

recharge method, these projects will help ensure sustainable water supply, mitigate the impacts of drought, and promote long-term water security in Derâa Oued Noun and similar semi-arid regions.