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Potential water harvesting sites for groundwater recharging using remote sensing and GIS for modern irrigation scheme

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Abstract

Groundwater uses for modern irrigation purposes is a new trend in different countries in the world nowadays. The use of groundwater for these purposes normally is linked with different problems especially when it is over-extracted. Third-world countries are suffering lack of clean water compared to developed ones. In addition to that many conflicts around the world happen because of water resources. Moreover, due to climate change the problem will extend in the future, therefore more efforts are needed from international organisations. The high climatic variation prone to unreliable rainy seasons leads to droughts and desertification. Besides climatic, the poor policies help in the deterioration of water resources. Shortage of drinking water for human activity, livestock, and irrigation is a mean problem in different regions of Sudan. So the collection of rainfall water is one important water resource management in Sudan. This was achieved by designing and constructing small dams, Hafirs, and groundwater wells to solve the problems. During the last decade space-borne and airborne remote sensing technologies with geographic information systems (GIS) are widely used in water resources management. Nowadays satellite remote sensing has the possibility to provide wide coverage of variables such as precipitation, land cover, digital elevation, soil moisture, and vegetation change that are important inputs to modern hydrological models. The combination of surface and subsurface data in the decision support matrix to achieve the best site selection is used. In weighted overlay analysis rank values are assigned for each class of all thematic data layers according to their influence on groundwater recharge and factor-weighted values are assigned. Finally, the accuracy of sites being determined in GIS Software by field check verification shows that GIS is power full, cheap, and simple tool for quick decision take.

Keywords: Artificial recharge, GIS, remote sensing, salt-water/fresh-water relations, Sudan, water supply

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