

Rainwater harvesting and storage in Asir, Kingdom of Saudi Arabia, using spatial modeling and geographic information systems

Maysoon Alzghoul^{a,*}, Yusra Al-husban^b

^aFaculty of Human Sciences, Department of Geography, RS and GIS Applications in Hydrology, King Khalid University, Saudi Arabia, email: malzghoul@kku.edu.sa, Website: <https://www.kku.edu.sa/en>

^bFaculty of Arts, Department of Geography, The University of Jordan, Amman, Jordan, email: y.alhusban@ju.edu.jo

Received 31 January 2021; Accepted 18 June 2021

ABSTRACT

This article focuses on selecting and determining optimum sites for indigenous rainwater harvesting (RWH) in the Asir region in the Kingdom of Saudi Arabia. The three biophysical factors chosen are slope percentage, rainfall, and soil texture. In addition to seven socio-economic constraints, various other parameters included in the analysis are the distance to the drainage network, road networks, international borders, urban areas, vegetated area, established dams, and faults. The different geospatial layers were then reclassified and transferred to a suitability coding number to produce the suitability map of RWH using multi-criteria analysis in combination with a geographic information system, and data from remote sensing. Overlay analysis and buffering zone applied for each socio-economic parameter. The results determined the optimal spatial sites for RWH storage within the Asir region; these findings showed that there is a sufficient area with a high potential of RWH. Thus ca. 14,261.76 km², 18.5%, of the study area, has a high or very high suitability for the RWH systems, while 9,626.99 km², 12.5% of the total area, is unsuitable. The fieldworks were carried out on the selected optimum sites for further investigation to make sure that the selected sites are not in conflict with other land use/land cover in the area.

Keywords: Hyper-arid land; Site selection; Land use/land cover; Water resources; Asir region, Saudi Arabia

* Corresponding author.