Assessing Suitable Techniques for Rainwater Harvesting Using Analytical Hierarchy Process (AHP) Methods and GIS Techniques

Ammar Adham 1,2 , Michel Riksen 1,* , Rasha Abed 1,3, Sameer Shadeed 4 and Coen Ritsema

Abstract

The objective of this study is to produce suitability maps for potential rainwater harvesting techniques (RWHT) in the West Bank (WB), Palestine. These techniques aim to reduce water scarcity, which is a major problem for the conservation of water resources in the area. Based on literature reviews and expert recommendations, seven RWHts were selected (runoff basin system, contour ridges, cisterns, eyebrow terrace, check dam, on-farm pond, and bench terraces). Analysis methods performed in the Arc GIS environment include spatial analysis and data reclassification. Other calculations include multi-criteria analysis for assigning suitability. Five criteria (rainfall, runoff, land use, slope, and soil texture) for RWHt were analyzed to produce a suitability map for each technique. The results show that runoff basin systems in the northeast and southwest of WB are the most suitable, with about 50% of the area of WB moderately suitable for this technique, while 70% of the area of WB is very suitable for the contour ridge technique. Furthermore, this analysis shows that almost 50% of the WB is very suitable for cisterns. Sixty percent of the area is very suitable for on-farm puddling, especially in the north and southwest of WB. The areas with high suitability for the different techniques comprehensively cover the WB, as shown in the RWHt suitability maps and the integrated map. Nevertheless, this approach can help decision makers in making an initial selection of RWH techniques suitable for their region.