A Methodology to Assess and Evaluate Rainwater Harvesting Techniques in (Semi-) Arid Regions

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Abstract

Arid and semi-arid regions around the world face water scarcity problems due to lack of precipitation and unpredictable rainfall patterns. For thousands of years, rainwater harvesting (RWH) techniques have been applied to cope with water scarcity. Researchers have used many different methodologies for determining suitable sites and techniques for RWH. However, limited attention has been given to the evaluation of RWH structure performance. The aim of this research was to design a scientifically-based, generally applicable methodology to better evaluate the performance of existing RWH techniques in (semi-) arid regions. The methodology integrates engineering, biophysical and socio-economic criteria using the Analytical Hierarchy Process (AHP) supported by the Geographic Information System (GIS). Jessour/Tabias are the most traditional RWH techniques in the Oum Zessar watershed in south-eastern Tunisia, which were used to test this evaluation tool. Fifty-eight RWH locations (14 jessr and 44 tabia) in three main sub-catchments of the watershed were assessed and evaluated. Based on the criteria selected, more than 95% of the assessed sites received low or moderate suitability scores, with only two sites receiving high suitability scores. This integrated methodology, which is highly flexible, saves time and costs, is easy to adapt to different regions and can support designers and decision makers aiming to improve the performance of existing and new RWH sites