

Identification of Suitable Rainwater Harvesting Sites Using Geospatial Techniques with AHP in Chacha Watershed, Jemma Sub-Basin Upper Blue Nile, Ethiopia

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Abstract : Rainfed agriculture in Ethiopia has failed to produce enough food, to achieve the increasing demand for food. Pinpointing the appropriate site for rainwater harvesting (RWH) have a substantial contribution to increasing the available water and enhancing agricultural productivity. The current study related to the identification of the potential RWH sites was conducted at the Chacha watershed central highlands of Ethiopia which is endowed with rugged topography. The Geographic Information System with Analytical Hierarchy Process was used to generate the different maps for identifying appropriate sites for RWH. In this study, 11 factors that determine the RWH locations including slope, soil texture, runoff depth, land cover type, annual average rainfall, drainage density, lineament intensity, hydrologic soil group, antecedent moisture content, and distance to the roads were considered. The overall analyzed result shows that 10.50%, 71.10%, 17.90%, and 0.50% of the areas were found under highly, moderately, marginally suitable, and unsuitable areas for RWH, respectively. The RWH site selection was found highly dependent on a slope, soil texture, and runoff depth; moderately dependent on drainage density, annual average rainfall, and land use land cover; but less dependent on the other factors. The highly suitable areas for rainwater harvesting expansion are lands having a flat topography with a soil textural class of high-water holding capacity that can produce high runoff depth. The application of this study could be a baseline for planners and decision-makers and support any strategy adoption for appropriate RWH site selection.

Keywords : runoff depth, antecedent moisture condition, AHP, weighted overlay, water resource

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