RSHS18-110
Remote Sensing and Hydrology Symposium (ICRS-IAHS)

Site Suitability Analysis for Water Conservation in Water Scarce Region of India

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Water is the most crucial for maintaining an environment and ecosystem conducive to sustaining all forms of life. A large part of India is at present water stress and it has been predicted under future climatic scenarios that most of the part of the country will be under water scarce condition. The principle of watershed management is the proper management of all the precipitation by the way of collection, storage and efficient utilization of runoff water and to recharge the ground water. The present study aim's to identify suitable zones for water harvesting structures in Balotra sub basin of Barmer district, Rajasthan by using overlay analysis in Geographic Information System (GIS). The analysis will help the decision makers in determining suitable zones for water harvesting structures based on the physical characteristics of the watershed. Different layers which were taken into account are; Soil texture, slope, rainfall data (2013-2015), land use/cover, drainage network. The natural resources conservation service curve number model was used to estimate the runoff depth of the study area.
In this project, augmentation of water resource is proposed by construction of runoff harvesting structures like check dam and percolation pond. The site suitability for different water harvesting structures is determined by considering spatially varying parameters like runoff potential, slope, fracture pattern and micro-watershed area. GIS is utilised as a tool to store, analyse and integrate spatial and attribute information pertaining to runoff, slope, drainage and fracture. The runoff derived by SCS-CN method is a function of runoff potential which can be expressed in terms of runoff coefficient (ratio between the runoff and rainfall) which can be classified into three classes, viz., high (>40%), moderate (20–40%) and low (<20%). Integrated Mission for Sustainable Development (IMSD) specifications for water harvesting/recharging structures, parameters such as effective storage, rock mass permeability are herein considered to augment effective storage. Using the overlay and decision tree concepts in GIS, potential water harvesting sites are identified. Produced suitability map will help in the selection of harvesting structures such as percolation tanks and check dams. The derived sites are further subjected to field investigation for suitability and implementation.