Geospatial analysis for the identification of rainwater harvesting sites using SCS-CN technique in the Swat Basin, Pakistan

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Rainwater Harvesting (RWH) is considered to be a coherent approach not only for the conservation of abundant rainwater collected in a watershed but also to combat scarcity of water by providing an alternative of water supply reducing the pressure on ground and surface water resources. In addition, this method also aids in the mitigation of flood risks resulting from long and heavy spells of rainfall. The proposed study adopts a basin-wide that uses geographic information system (GIS) to identify specific locations for rainwater collection sites. By measuring rainfall runoff depth, the prospective RWH sites are found using the Soil Conservation Services-Curve Number (SCS-CN) approach. In order to ensure that there is land available for the construction of RWH structures, the proposed methodology is applied as a case study on the Swat basin, Pakistan. The analysis involved a number of thematic levels, including runoff depth, land cover/use, slope, and drainage density. Additionally, the geological settings, soil composition, and drainage stream features were also included. Land use/cover map was created using the online data of European Space Agency. Drainage density and slope were calculated from a digital elevation model. The aforementioned thematic layers are integrated in a GIS environment with weights corresponding to their importance to create a RWH potential map of the area. The resulting suitability map was divided into four potential zones, having 23%, 25%, 28%, and 24% area for high, moderate, low, and not suitable categories, respectively. The analysis revealed that all identified locations were distributed randomly throughout the study area, primarily on the western and central regions of Swat basin. As a result, the suggested methodology aids in locating potential locations for rainwater harvesting, setting a standard for future research on related topics in other places as well. The derived appropriateness will help decision- makers quickly identify potential locations for RWH structures to store water and address possible water shortage in the area.