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Urban Rooftop Area Assessment for Estimation of Rooftop Rainwater-Harvesting Potential

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ABSTRACT

Rooftop water conservation is a promising technique for sustainable water resource management especially in urban areas. The tedious available roof top area estimation can be made easy with advances in geospatial technologies. The present study taken up to develop the roofing layer to estimate potential rooftop area from high resolution satellite imagery (1 m) i.e., Google earth Pro in GIS environment. The roof surfaces are considered as the micro catchments and GIS is employed to calculate the area of various types of roofs and their potential for planning of water harvest. The results are validated for errors in digitization by ground-truthing against 112 household systems through manual measurement. It is also attempted to identify the type of the roof to know the quality of the harvested water. The annual rainfall was analyzed to quantify the potential of the rainwater harvesting. The results of this study will demonstrate the Application capability of Google Earth Pro and GIS in estimating rainwater harvesting potential to tackle the prevailing water shortage. The estimated total roofing area is 818565.53 sq. m. The results of the study revealed the huge potential of 71.154 cubic meter with 1 mm of uniform distribution of rainwater over the roof tops.

Highlights

- Remote sensing and GIS in estimation of Rooftop area
- Manual validation with simple random sampling
- Roof top runoff potential estimation

Keywords: Rooftop, Rainwater, Harvesting Potential, GIS, geospatial environment

The availability of fresh water was the major challenge faced by the majority of the people for different non-potable and regular purposes like flushing, cleaning, gardening, laundry washing and cultivation etc. The lack of water from the water resources is called water scarcity is prevailing many the places of the world. Rainwater harvesting (RWH) is one of the best practices to overcome the scarcity of water (Hari *et al*. 2018). Rooftop rainwater harvesting among other options, plays a central role in addressing water security and reducing impacts on the environment. The small contribution from the rainwater harvesting technique was playing a major role in reducing the water scarcity. Generally, harvesting rainwater is two types one is Surface runoff harvesting and the other is Rooftop rainwater harvesting (RTRWH). In rooftop rainwater harvesting, rainwater runoff is collected from various roof surfaces which typically offer dirt free water that can be used for drinking. To reduce groundwater contamination and to supplement groundwater supplies during lean seasons, to reduce runoff and to avoid flooding from roads rainwater harvesting is necessary.

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