

Design of Roof Top Rainwater Harvesting Structure for Domestic Water Supply

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Abstract

Present study deals with the determination of the size of storage tank for storing harvested roof top rainwater. The study was carried out on a roof section having catchment area of 1500m² of an official building situated in Bhubaneswar, the capital city of Odisha State, India. The demand for harvested water has been expressed on the basis of various domestic usages of the official building. Stochastic daily rainfall data for a period of 24 years from 1990 to 2013 were used for the estimation of runoff potential of the roof. A computer programme in Visual Basic was developed for predicting the tank size based on daily inflow and outflow from the tank. The inflow to the tank includes runoff caused due to rainfall falling on the roof and outflow from the tank includes the demand of water for drinking, flushing and cleaning of toilets, washing of floors and laboratory usages. The study reveals that the tank sizes were not same for all the years. Hence, to predict the tank size at different probability of exceedances by the best fit probability distribution, software 'Flood' was used. Statistical tests like root mean squared error (RMSE) and mean absolute error (MAE) were also used to rank the distribution and find out the best fit distribution. The average tank size at 50% probability of exceedance by the best fit distribution *i.e.* Generalised Extreme Value distribution was found to be 830m³ for the roof top area of 1500m².

Keywords: Rooftop rainwater harvesting, Runoff potential, Storage tank, Water balance model, Bhubaneswar, Odisha