A Computer-assisted Method for Optimum Design of Rainwater Harvesting Systems

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ABSTRACT:

Rainwater harvesting systems may function as a major alternative or supplementary source of water where the resource is limited, unusable or inaccessible. A computer-assisted mathematical model is presented for design and analysis of rainwater harvesting systems. The computer program determines the required minimum size of the storage tank for a given collection area, water demand and predicted rainfall amounts considering a computational time step of one day. Since the storage tank is the most expensive component of a system, minimization of the size of the tank would significantly reduce the cost. Results indicate that a storage tank smaller than that determined by traditional design methods would be sufficient to satisfy the specified demand. The computer program also produces a set of system performance curves for design and analysis of the system at various levels of reliability and security. These curves also estimate the feasible ranges of system components at a given level of system performance.

Keywords: Rainwater harvesting, Roof collection, Alternative water source.