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Evaluation of Rainwater Harvesting Methods and Structures Using Analytical Hierarchy Process for a Large Scale Industrial Area

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ABSTRACT

In India, with ever increasing population and stress on natural resources, especially water, rejuvenation of rainwater harvesting (RWH) technique which was forgotten over the days is becoming very essential. Large number of RWH methods that are available in the literature are demand specific and site specific, since RWH system depends on the topography, land use, land cover, rainfall and demand pattern. Thus for each and every case, a detailed evaluation of RWH structures is required for implementation, including the analy-sis of hydrology, topography and other aspects like site availability and economics, however a common methodology could be evolved. The present study was aimed at evaluation of various RWH techniques in order to identify the most appropriate technique suitable for a large scale industrial area to meet its daily wa-ter demand. An attempt is made to determine the volume of water to be stored using mass balance method, Ripple diagram method, analytical method, and sequent peak algorithm method. Based on various satisfying criteria, analytical hierarchy process (AHP) is employed to determine the most appropriate type of RWH method and required number of RWH structures in the study area. If economy alone is considered along with hydrological and site specific parameters, recharging the aquifer has resulted as a better choice. However other criteria namely risk, satisfaction in obtaining required volume of water for immediate utilization etc. has resulted in opting for concrete storage structures method. From the results it is found that AHP, if used with all possible criteria can result in a better tool for evaluation of RWH methods and structures. This RWH structures not only meets the demand but saves transportation cost of water and reduces the dependability of the industry on irrigation reservoir. Besides monetary benefits it is hoped that the micro environment inside the industry will improve due to the cooling effect of the stored water.

KEYWORDS

Rain Water Harvesting, Analytical Hierarchy Process, Large Scale Industrial Area, Aquifer

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