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Modelling of Linked Rainwater Harvesting Systems Effects

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Abstract: The objective of this study is to examine the change in required size and reliability in water supply when the rainwater harvesting systems (RWHSs) are connected compared to a single RWHS. This study evaluated analytical approaches comparing with the modified SS STORM. The SS STORM, a modified spreadsheet version of the storage, treatment, overflow and runoff model (STORM), was used in this study for investigating the physical performance of RWHS. In this study, the linked effects of rainwater storage units to the RWHS size and reliability were analyzed depending on different water use, RWHS size and reliability in two different rainfall stations, which have different precipitation characteristics. This study investigated the size and reliability of RWHS in Chicago and Los Angeles (LA) because climatological conditions between two cities are different. Also, this study investigated the socio-economic evaluation of RWHS in Chicago and LA. As a result, analytical approaches showed better fit with precipitation characteristics of Chicago than that of LA. It indicates that the precipitation characteristics in Chicago are well represented with the basic assumption of analytical approaches based on a specific distribution. The water availability in increasing reliability from connecting RWHS was greater in Chicago than LA. On the contrary, the water availability in reducing RWHS size from the connection was greater in LA than Chicago. It indicates that connecting RWHS may increase reliability of water supply in rainy region such as Chicago while it reduces required RWHS size in semi-arid region such as LA. This result suggests that the linked RWHSs improves the design of RWHS to be more reliable and cost effective.

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Keywords: analytical approach, Chicago, Los Angeles, rainwater harvesting systems, SS STORM