

## **RAINWATER HARVESTING SYSTEM WITH DISTRIBUTED STORAGE CAPACITY FOR MULTI-LEVEL BUILDINGS**

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### **ABSTRACT**

Rainwater harvesting is an important concept in sustainable development and has seen much research in optimizing of system components. Consisting mainly of a collector surface, storage tank and the piping network the system requires a tank to store collected rainwater to be used on non-rainy periods. The tank is typically kept at or above the floor level to which collected rainwater to be supplied, requiring additional space and structural strengthening, contributing the biggest cost component to the system. Behavioral studies have been carried out based on the yield after spillage model to optimize the volume of the tank for the desired water saving efficiency for a given annual demand, rainfall and collector area, with pumping of collected rainwater is often required for systems installed in buildings with differential floor levels. If the storage capacity can be distributed by installing optimized tanks at each level to cater to the demand, the pumping requirement of collected rainwater to upper levels and the capacity requirement of the main storage tank at ground level can be brought down. In the model, the roof run-off would be diverted to the uppermost tank with the overflow cascading down through a series of smaller capacity tanks into a main storage tank. Tanks at each level are to feed the service points under gravity and a pump is to feed collected rainwater at the main storage tank back to the uppermost tank to complete the cycle. This study concentrates on developing a system algorithm based on a behavioral model to determine the roof collection contribution to each level and the amount of collected rainwater that can be pumped up from the main storage tank, which could be used to evaluate system performance.

**Keywords:** Sustainable, Rainwater, Roof run-off