



## Designing domestic rainwater harvesting systems under different climate regimes in Italy

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### ABSTRACT

Domestic rainwater harvesting practices are nowadays recognised as one of the tools of sustainable drainage systems within the urban environment thus contributing to limit the demand of potable water and, at the same time, to mitigate the generation of storm water runoff at the source. The final objective of this paper is to define regression curves for sizing of a Domestic Rain Water Harvesting (DRWH) system in the main Italian climate zones. For such a purpose, the Köppen climatic classification is used and furthermore a suitable number of precipitation sites are selected for each zone. A well-known behavioral model is implemented to assess inflow, outflow and change in storage volume of a rainwater harvesting system according to a daily mass balance equation under historical precipitation observations. The performance of the DRWH system under various climate and operational condition is examined as a function of two non-dimensional parameters, namely the demand fraction ( $d$ ) and the modified storage fraction ( $s_m$ ). The use of  $s_m$  as an alternative to the more traditional  $S/Q$  ratio permitted to analyse the system performance by taking into account the impact of precipitation variability. Performance results for the selected rainfall sites are finally used as input base to assess the regression curves corresponding to the different investigated climate zones.

### KEYWORDS

Modified storage fraction, rainwater harvesting, tank sizing, water-saving efficiency.