

## Life cycle cost implications of urban rainwater harvesting in hot-arid areas

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Water scarcity is a serious problem of global concern and in subtropical dry arid areas like the Sonora Desert this is already a reality directly affecting the social and economic activities. Moreover, Sonora state population is expected to increase 22% by 2030 and the consequent water demand could jeopardize its availability.

As a solution to reduce water demand, Hermosillo city has reduced the number of hours that tap water is available to the population to 3-5 hours a day, and this has been happening recurrently since 1998. Nonetheless, water consumption is expected to increase 57% by 2030 compared to 2006. The disparity between water demand and water availability generates a severe problem affecting the possibilities for economic and social growth.

In this study, we explore the possibility of applying Rainwater harvesting systems to the city of Hermosillo which has an average yearly precipitation of 250 mm. To examine and compare the cost implications of having a rainwater harvesting system in dry arid urban areas, a life cycle cost analysis is performed and evaluated by three financial tools: Net Present Value, Internal Rate of Return and Payback time.

Two possible end uses of rainwater are examined: laundry and car washing; along with this, a third option where all rainwater is collected was studied. Also, 6 different system configurations are evaluated by varying the position of the tank: underground or at ground level; and considering 3 housing typologies.

Results indicate that installing the rainwater tank at ground level instead of underground derives in lower costs of installation and better financial outcomes in the lifespan. In the best case scenario, which corresponds to a 210 m<sup>2</sup> household with a tank installed at ground level, collected rainwater can meet more than twice the demand for laundry water. This is a significant contribution

since laundry water accounts for 20% of the water consumption for an average Hermosillo household.