Rainwater Reuse

Rainwater harvesting in the state of Texas

In recent years, rainwater harvesting has emerged as a water conservation tool and an alternative water supply source in Texas. Escalating costs of centralized water systems and well drilling, an increasing recognition of the beneficial qualities of rainwater and dwindling water supplies have contributed to this trend. Interest in rainwater harvesting has also been spurred by the prospect of rising municipal water demand resulting from the state's enormous population growth.

By Sanjeev Kalaswad & Jorge Arroyo

Over the next 60 years, the population of Texas is expected to grow from almost 21 million in 2000 to more than 46 million in 2060, and demand for municipal water is projected to increase from about 4 million acre-ft per year to about 8.3 million acre-ft per year over the same time period. Compounding the problem, existing freshwater supplies are, for a variety of reasons, expected to decrease by about 3.3 million acre-ft. As a result, Texas is turning to alternative water technologies to conserve its existing supplies.

What is Rainwater Harvesting?

Quite simply, rainwater harvesting is the capture and storage of rainwater for use. A rainwater harvesting system can be as simple as channeling the rain that runs off of a roof into a barrel or cistern or as sophisticated as a system made up of pumps, filters and water treatment equipment.

Regardless of its complexity, a rainwater harvesting system consists of six parts: a catchment surface such as a roof; a channeling system such as gutters and downspouts; a screen or diverter; storage tanks such as barrels or cisterns; a delivery system such as pumps; and if the end use warrants it, a treatment system such as sediment filters and ultraviolet lamps.

Simple systems can supply water for lawns and other nonpotable uses while more sophisticated systems, if properly designed, constructed and operated, can provide potable water.

Costs for a rainwater harvesting system in Texas can range from a few thousand dollars to several hundred thousand dollars depending on size and complexity. For example, a 6,500-gal above-ground storage system with a pump and filters designed for domestic use in the Hill Country region of Texas costs about $5,000, while a more sophisticated 175,000-gal system with a green roof and concrete underground cisterns in east Texas costs about $225,000.

The volume of water that can be collected by a rainwater harvesting system depends primarily on two factors: the catchment area and the amount of rainfall. In theory, for every square foot of catchment area, about 0.62 gal of water can be collected for one inch of rainfall. In practice, however, this volume is usually lower because of loss of water in the system; an 80% recovery rate, which translates to about 0.5 gal per square foot of catchment area, is average. Thus, for example, if a house with a roof area of 2,000 sq ft receives 1 in. of rainfall, the volume of water that the homeowner can expect to realistically collect is about 1,000 gal.

Because of the wide range of rainfall across Texas, the volume of rainwater that can be collected varies. In the western part of the state (for example, El Paso, where average annual rainfall is 9 in.), a homeowner with a roof area of 2,000 sq ft can expect to collect about 9,000 gal of rainwater per year. However, a homeowner in the eastern part of the state (for example, Houston, where average annual rainfall is 48 in.) with the same roof area can expect to collect about 48,000 gal per year.

On a statewide basis, assuming an average annual rainfall of 28 in., about 96,000 acre-ft—or 31 billion gal—of rainwater can be collected annually even if only 10% of the roof area in the entire state was used. The estimated roof area in the state is approximately 22.5 billion sq ft.

Conservation Potentials

Rainwater harvesting has considerable potential as a tool to conserve existing water supplies and an additional source of water in Texas. Mindful of this, the Texas Legislature and the state's primary water agency, Texas Water Development Board, have been actively promoting rainwater harvesting.

In 1993, Proposition 2 provided property tax relief to commercial and industrial facilities using rainwater harvesting and pollution control measures. In 2001, Senate Bill 2 gave local taxing entities the authority to exempt all or part of the assessed value of the property on which water conservation modifications such as rainwater harvesting are made. That legislation also provided sales-tax exemptions for rainwater harvesting equipment. In 2003, House Bill 645 prevented homeowners' associations from implementing new covenants banning outdoor water conservation measures such as rainwater harvesting.

More recently, the 2007 Texas Legislature incorporated several recommendations made by the Rainwater Harvesting Evaluation Committee into House Bill 4. The recommendations included:

- Direct new state facilities with roof areas of 10,000 sq ft or more to incorporate rainwater harvesting systems into its design and construction;
- Encourage Texas institutions of higher education and technical colleges to develop curricula and provide instruction on rainwater harvesting;
- Exempt homes using rainwater harvesting as their sole source of water supply from water quality regulations required of public water systems; and
- Require facilities using both public water supplies and rainwater to have safeguards for cross connection and to use the rainwater only for nonpotable indoor purposes. The Texas Commission on Environmental Quality is currently finalizing rules on cross-connection safeguards for rainwater harvesting systems connected to public water systems. The new rules will be adopted in September 2008.

In October 2007, the Texas Water Development Board initiated the Texas Rain Catcher Award. A first of its kind in the state, this quarterly, statewide competition recognizes the contribution of individuals and entities pursuing rainwater harvesting in Texas.

Much progress has been made to facilitate and promote rainwater harvesting in the state of Texas, but more can be done. Plumbing codes and certification programs for installers need to be developed, financial incentives and assistance can be improved and guidelines need to be established to encourage municipal rainwater harvesting. *wqp*

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