Water Harvesting and Reuse BMP 17

Description

Water harvesting is the collection and storage of rainwater from roofs, paved surfaces and the landscape. Tanks, cisterns, or sealed wells store roof water. Water harvesting for landscape use is simply grading the site to drain toward planted beds or ponds.

General Information

Rain and snow fall as naturally distilled water that could be used to provide many beneficial uses when collected on site, such as irrigation, recreational lakes, groundwater recharge, industrial cooling and process water, and other nonpotable domestic uses. The collection and storage of rainwater from roofs, paved surfaces and the landscape is called water harvesting.

One technique is to fit tanks, cisterns, or sealed wells to take house roof water. The effect of using roof-generated runoff for domestic water supply is to eliminate roof impervious surfaces from contributing stormwater runoff. This elimination of runoff reduces the total volume of stormwater runoff from a site. Rainwater-holding cisterns are affordable when measured against the water supply and stormwater-drain investments they make unnecessary.

A rainwater harvesting system consists of three basic elements: a collection area, a conveyance system, and storage facilities. The collection area in most cases is the roof of a house or a building. The effective roof area and the material used in constructing the roof influence the efficiency of collection and the water quality (OAS, 1995). A conveyance system usually consists of gutters or pipes that deliver rainwater falling on the rooftop to a storage unit. Both drainpipes and roof surfaces should be constructed of chemically inert materials such as wood, plastic, aluminum, or fiberglass, in order to avoid adverse effects on water quality (Ibid).

The water ultimately is stored in a rain barrel, storage tank, or cistern, which should also be constructed of an inert material. Reinforced concrete, fiberglass, or stainless steel are suitable materials for storage tanks or cisterns. Storage tanks may be constructed as part of the building, built as a separate unit located some distance away from the building, or used as an underground storage tank. Premanufactured residential use cisterns come in sizes ranging from 100 to 1,400 gallons.

Rain barrels can be incorporated into the site's landscape. Rain barrels are equipped with a drain spigot that has garden hose threading, suitable for connection to an irrigation system. An overflow outlet should be provided to bypass runoff from large storm events. The size of the rain barrel is a function of the rooftop surface areas that drains to the barrel, as well as the amount of rainfall to be stored.

Choosing the best materials for rainwater-harvest depends on the ultimate use of the water. The Texas Water Development Board (1997) and the

Organization of American States (1995) have developed guidelines for water harvesting and reuse systems. In roof systems, stainless steel, tile, terra cotta, and slate are frequently used. Paved non-vehicular surfaces are generally suitable for water harvesting; vehicular paving with light traffic is also often clean enough.

Perhaps the simplest form of water harvesting for landscape use is simply grading the site to drain toward planted beds or ponds. In hillside areas, terracing at a small scale can be used to capture runoff for irrigation. Shallow ditches roughly following contours (often called "key lines") can be used to gather erosive sheet flows into series of small hillside ponds (Thompson and Sorvig, 2000). Low stonewalls or check-dams can also be used to hold back and infiltrate water at strategic points in a watershed.

At the University of Arizona's Casa del Aqua in Tucson, and at the Environmental Showcase home maintained in Phoenix by Arizona Public Service, harvested water supplements greywater to meet irrigation needs. Water harvesting is also extensively used at the Lady Bird Johnson Wildflower Center in Texas. A horticultural nursery in Thomson, Georgia has paved most of the watershed with plastic sheets and greenhouses. A pond captures the abundant runoff; from the pond, pumps recycle the water for the nursery's irrigation. This on-site "water harvesting" makes the use of water resources efficient and the future of this water consuming sustainable (Ferguson, 2000).

Additional Resources

Bay Area Stormwater Management Agencies Association (BASMAA), 1999. *Start at the Source: Design Guidance Manual for Stormwater Quality Protection.*

Coffman, L., 2000. *Low-Impact Development Design Strategies, An Integrated Design Approach.* Available on EPA website.

Organization of American States, 1995. *Rainwater Harvesting from Rooftop Catchments.* Available on website.

Pima County Flood Control District, no date. *How to Harvest Rainwater*. Available on website.

Texas Water Development Board, 1997. *Texas Guide to Rainwater Harvesting.* Available on website.

Figure 17-1. Rainwater harvesting and reuse