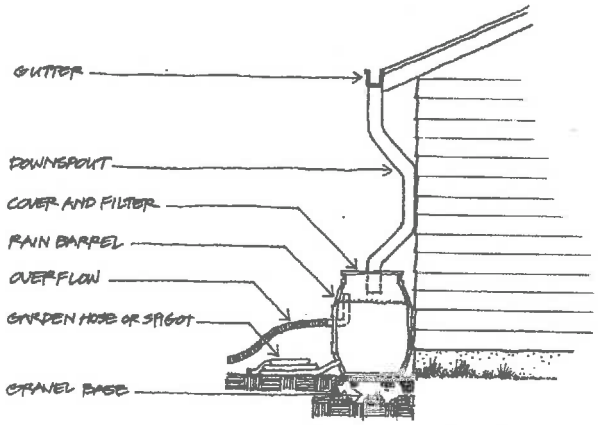
UF UNIVERSITY of FLORIDA
IFAS Extension

Cisterns/Rain Barrels



Rainbarrel rainfall harvesting system fitted with overflow pipe, spigot and hose for watering. To increase pressure, the rainbarrel can be elevated above the ground, but it must be secured. A rainbarrel full of water weighs over 400 lbs.

Definition:

Cisterns and rain barrels are storage tanks that capture runoff water from a catchment area such as a rooftop. Cisterns are essentially large-scale rain barrels.

Objectives:

Cisterns are typically used as commercial or industrial catchment devices for rainwater harvesting, storage, and reuse. Rain barrels are used for the same purposes by homeowners. Cisterns are more costly but can hold significantly more water.

Benefits

- Reduces use of potable water for irrigation
- On site reuse reduces quantity of stormwater runoff

Applications

- New construction
- Retrofits
- Commercial
- Residential communities

Overview:

Cisterns can be located above or below ground, depending on site conditions and the preferred use of the harvested rainwater. Runoff collected from roof tops is often relatively clean and can be used for irrigation or for flushing toilets. Rain barrels, often made from 55-gallon plastic drums, are becoming popular with homeowners as a supplemental irrigation source. The University of Florida's Florida Yards & Neighborhoods program offers rain barrel workshops in a growing number of counties (find your county's Extension office at http://solutionsforyourlife.ufl.edu/map/.

Water Protection Benefits:

Water conservation implications – When cistern-harvested rainwater is used for landscape irrigation, which can account for as much as 50% of household potable water use in Florida, the potential to offset potable water demands is significant. The quality of water harvested by cisterns is dependent on a variety of factors, including rainfall quality, catchment debris that may have accumulated on the roof since the last rain, and inclusion of a first flush diversion devise. The amount of water captured and therefore the amount of water available for use will depend on the size of the cistern and rainfall pattern. Cistern size can range from hundreds to thousands of gallons. A typical size for residential application in Florida is around 5,000 gallons.

Stormwater implications – Similar to the benefits of green roofs, rainwater harvesting with cisterns reduces stormwater runoff through interception, reducing stress on downstream management and treatment systems.

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Design Considerations:

Cisterns or rain barrels can be applied across various site conditions. Because they function independent of soil types and site slopes, the possibilities for residential and commercial application of cisterns throughout Florida are widespread. Their sizing is based on expected water demands, rainfall pattern, and cistern system cost. A general rule of thumb is that 1" of rain on 1000 sq. ft. of roof will yield approximately 600 gallons. Rain barrels are often elevated on stands to improve water pressure of the outflow. Cisterns and rain barrels are placed near the catchment site. Cisterns should not be placed near trees whose roots may damage the cistern walls. A spigot is usually attached to the rain barrel or cistern for use and drainage. Submersible or surface pumps can also be used with cisterns to increase pressure for use in most irrigation systems.

Design Keys

- Size of roof
- Water demand
- Rainfall pattern
- Cistern capacity
- Overflow device
- First flush bypass

Operations and Maintenance:

Rain barrels and cisterns require minimal maintenance. The tank should be cleaned out about once a year if debris is present. Gutters and downspouts should be inspected regularly and kept clear. If a first flush bypass system is used, remove debris from the bypass and make sure drain holes are kept open so that the system functions properly. No maintenance is required to prevent mosquito breeding in a rain barrel if all surfaces at the downspout entrance are sealed. However, the seals should be inspected periodically, and if mosquitoes become a problem, mosquito dunks [floating donut-shaped briquettes containing the biological insecticide *Bacillus thuringiensis* (Bt)] can be used.

Credits in Green Building Certification Programs:

- FGBC-Home Standard (W10-11 rainwater harvesting)
- Florida Yards & Neighborhoods (stormwater runoff: storage provided for harvested water in a rain barrel, cistern or above ground tank; underground distribution tanks installed to collect stormwater)
- LEED for Homes (SS 4.3 management of runoff from roof)
- LEED for Neighborhood Development Pilot (GCT Credit 9: Stormwater Management)
- NAHB Model Green Home Building Guidelines (1.3.5 Manage storm water using low-impact development when possible; 4.1 indoor/outdoor water use)

Relative Costs:

Materials and installation costs vary substantially across cistern applications, depending on the source (e.g., manufactured or pre-fabricated vs. constructed on site), storage capacity (size), location (above or below ground), and structural material. A single residential rain barrel with typical attachments and accessories costs around $50 for the parts for self assembly and $200 assembled, whereas cisterns costs can start at about $1,500 and a large commercial cistern can cost thousands or tens of thousands of dollars. These upfront costs can be partially offset by reduced demand for potable water, but they do not directly offset regularly incurred materials and installation costs of conventional stormwater system components.

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Two 1,550 gallon cisterns are used to harvest rainwater that has filtered through the Perry Construction Yard green roof at the University of Florida in Gainesville

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Credits

Authors:

Mark Clark
Soil and Water Science Department

Glenn Acomb
Landscape Architecture Departmen

Fact Sheet Illustrations:

Glenn Acomb
Landscape Architecture Department

Wei Ren
Landscape Architecture Department

Fact Sheet Illustration Assistance:

Brian Niemann
Florida Yards & Neighborhoods

Layout:

Barbara Haldeman
Program for Resource Efficient Communities

This fact sheet was produced with funding from The Elizabeth Ordway Dunn Foundation

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