SNP
Sound Native Plants
ECOLOGICAL RESTORATION SPECIALISTS

RAINWATER HARVESTING

(360) 352-4122 • www.soundnativeplants.com • PO Box 7505, Olympia WA 98507 • Fax (360) 867-0007

Residential Stormwater Reuse: Rainwater Harvesting

Rainwater harvesting refers to the practice of collecting and storing rainwater for household or irrigation uses, including stormwater from rooftops. Historically, rainwater harvesting was a major source of water for household use. Prior to municipal water supplies, cisterns—storage tanks for collected rainwater—were widely used.

Rainwater may be harvested, stored and reused through a variety of methods ranging from simple, gravity-fed barrels to more advanced systems using cisterns, pumps, and flow controls. Rainwater harvesting systems do not have to be expensive or complicated, and it is easy to start with a modest rain barrel system and expand later as household requirements grow, budgets allow, and/or the cost of municipal water increases. Try to start simple with expansion in mind.

First, check with your state and local government for laws on water collection and water rights. In Washington State, no water right is required for rainwater harvesting; however, other states may differ. Each local jurisdiction has its own requirements, especially if you intend to use your harvested rainwater for any interior household use, such as flushing toilets or laundry. Harvested rainwater may also be used for drinking, but requires special treatment with a filtration system. Many cities require filtration systems for drinking water to be permitted and certified, and require periodic water testing. Filtration is not typically required for landscape uses. Water can be used directly from rain barrels into the garden. In fact, rainwater can help improve the health of gardens, lawns, and trees. Rainwater is naturally soft and low in minerals, chlorine, fluoride, and other chemicals, so plants respond very well to it. After all, it's what native plants thrive on.

Rain barrels connected together in series

Rainwater harvesting systems have 4 subsystems:
Capture, Conveyance, Holding, and Distribution.
(Household systems will also include **Filtration & Purification**.)

Capture: Occurs on impervious roof surfaces

1. Non-roof surfaces like asphalt driveways, sidewalks etc. Are not appropriate for rainwater collection. Some older roofs, such as tar and gravel or asbestos shingled roofs create too much contamination for rainwater harvesting. Treated cedar shakes are also not recommended for water harvesting.
2. Explore this handy calculator to determine how much rainwater can be collected from your site: www.save-the-rain.com/world-bank/. This tool uses Google maps to estimate rooftop area and water volume collection potential for any roof in the world.
3. The basic equation to estimate roof water capture potential is: Maximum Annual Gallons of Rain Capture = Annual Rainfall x Square Footage of Roof x .623 Gallons. The last factor in the equation (.623) is the number of gallons in an area of one square foot by one inch deep of rainwater. Most metal, tile and shingled roofs have 95% efficiency.

Example: 1000 sq. ft. metal roof surface in a region with18" annual rainfall

- 18in. x 1000 ft. sq. x .623 gallons = 11,214 gallons
- 11,214 gallons x .95 efficiency = 10, 653 gallons of yearly capture under ideal conditions. That's a lot of water!

Once you have this figure, you can estimate your monthly capture and size your optimum holding tanks to accommodate 2–3 months of water. From the same example:

- 10,653 gallons / 12 mos. = 888 gallons average per month
- 888 x 2 mos. = 1,776 gallon holding tank size goal

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Conveyance system: Moves the water from the roof to the holding tank

Conveyance pump and controls

1. Simple household gutters and downspouts or rain chains.
2. Downspouts may feed directly into holding tanks, or into pipes that carry the water to the tanks.
3. Pipes need to be sloped adequately (about 1" downward slope for every 4–6 linear ft.).
4. Debris should be excluded from the conveyance system, to keep the tanks clean and sediment free. Downspout diverters, readily available in the marketplace, separate the debris and direct water back into regular stormwater systems when the holding tanks fill up. Gutter and downspout filters may be installed at various points in the system. A screen on the tank inlet may be enough for basic rain barrel systems.

Holding tank: Stores rainwater for later use

Large capacity aboveground cistern

1. Above-ground rain barrels may be used singly or connected in a series of barrels near each downspout. Rain barrels can be purchased ready-made or constructed from recycled barrels. The barrels should be opaque to minimize algal growth.
2. Used wine barrels make an attractive landscape feature and food-grade steel or plastic drums and square "tote" tanks are common, economical, recycled options.
3. Cisterns are constructed of durable material, such as masonry, concrete, plastic, polyethylene, or metal. They are larger and usually more permanent than rain barrels, typically 100–10,000 gallons. They may be placed aboveground or underground.
4. Holding tanks should be sized to meet the needs of the landscape, and placed accordingly. Remember that water is heavy, 8.3 pounds per gallon, so plan for weight support at the foundation of your system. Start small and plan to expand!

Distribution: Sends the water from the holding tank to the end points

1. Distribution systems may be gravity-fed or pumped. Gravity-fed systems must be elevated above the irrigated area.
2. Gravity feed works well for low-flow, drip irrigation system. To calculate water pressure, measure the vertical distance from the bottom of the tank to the irrigated area (head). The system gains .433 psi for every foot of head. Some drip systems can operate at a pressure as low as 4 psi, though 8–15 psi is better for most gravity systems. Drip systems need a filter to prevent clogging.
3. If elevation is impossible, small electric submersible pumps are economical, readily available and effective in moving water to your site.

Rainwater catchment and reuse can be as simple or complex as factors allow. Plan ahead and get started small and simple, then work into larger goals. It is easy to add on to existing systems. Even a simple rain barrel has a measurable impact in preserving safe purified drinking water for its intended purpose; drinking!

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WA: SOUNDNP017BL OR: LCB#8781