



RAINWATER HARVESTING BASICS

Harvesting rainwater by collecting and storing roof runoff is simple and inexpensive. It's a great way to take advantage of free water from the sky for basic outdoor water needs, such as pet and livestock drinking water, limited landscape irrigation, and fire suppression. And, if you live in an area where outdoor water use is restricted, harvesting rainwater may be your only option.

Is rainwater harvesting right for me?

Harvesting rainwater is great for properties with limited access to water, including those with low-production wells, subject to the Dungeness Water Rule, or serviced by municipal water that may be expensive or have seasonal restrictions. And, managing your roof runoff by collecting and storing it can help reduce stormwater runoff problems.

How much water can I collect?

Much more water will come off your roof than you will be able to capture and store. Two-thirds of our rain comes between October and April, when you don't need it for irrigation, so you'll likely be storing a small percentage of the total annual runoff. Use this formula to calculate how much roof runoff you can expect:

$$\text{Gallons} = \text{Roof Area (ft}^2\text{)} \times \text{Rainfall (in.)} \times 0.623$$

For example, 1 inch of rainfall onto a 2,000 square foot roof results in 1,246 gallons of water (1,246 gallons = 2,000 ft² x 1 inch x 0.623). With annual rainfall of 20 inches, that roof will generate 24,920 gallons of runoff in a year! And remember, roughly two-thirds of that (~16,600 gallons) will come during the non-irrigation season. If you only need water for livestock drinking, consider plumbing directly from the downspouts to the stock tanks, but be sure to account for overflows.

How much water do I need to collect?

The amount of water you need depends on what your intended use it, but rainwater harvesting is generally only practical for limited irrigation and pet and livestock drinking water, and possibly backup water for emergency fire suppression. In most cases, you'll want to use cistern water sparingly. Try to limit irrigation to the following:

- ◆ Establishing new plantings (generally first 1-3 years)
- ◆ *Maintenance* of high-value ornamentals
- ◆ Blueberries, raspberries, strawberries and other small fruits
- ◆ Summer vegetables

Raspberries are one of the most water-demanding crops, requiring 20 inches of irrigation over a growing season for optimal production in Sequim. This equals about 12.5 gallons per square foot. Many other perennial plants, including fruit trees, do not require any irrigation once established. Water requirements for vegetables vary but are less than raspberries. Mulching will substantially reduce irrigation requirements, as well as improve soil health.

Irrigating a lawn from a cistern is not very practical. In most cases, lawn grass goes dormant in summer and springs back to life when the fall rains come; however, hot and dry periods that extend beyond a month can overly stress turf grass. Check out <http://clallamcd.org/conservation-around-the-house/> for more low water-use landscaping tips.

Livestock drinking water needs vary, but here are averages for common livestock:*

- ◆ Horse, Beef Cow – 12 gal/day
- ◆ Pig – 8 gal/day
- ◆ Goat, Sheep – 4 gal/day
- ◆ Dairy Cow – 27 gal/day

**On hot days, animals may need twice as much water.*



Livestock water from roof runoff in Sequim

Cisterns come in many sizes, from 50-gallon rain barrels to 5,000-gallon plastic and concrete tanks, and they can be connected in a chain, increasing total water storage capacity. The actual volume of runoff you decide to collect and store depends largely on how much you are willing to spend. Obviously, a single rain barrel isn't going to be worth it.

Cistern costs vary with size. A 5,000-gallon cistern will cost \$2,000-\$3,000, and 2,000-gallon cisterns are available for under \$1,000. Installation, including the cistern foundation, plumbing from the roof to the cistern and from the cistern to the point of use, and maybe a pump, will cost at least as much as the cistern itself.

Rainwater Harvesting System Design and Installation

1. Identify an appropriate location for the cistern.

The location needs to be level and where water can easily flow by gravity from the gutters. Ideally, you will be able to discharge water from the cistern to the point of use by gravity, too. The location will need to have a safe overflow and drain area nearby.

2. Install the cistern on a stable foundation.

The foundation can be compacted crushed rock, sand subsoil, or concrete. A stable base is critical, as a full cistern is very heavy. The cistern supplier might provide specifications.

3. Install screens to keep debris out.

Gutter guards keep leaves out of the system. A self-cleaning screen between the gutter and the first-flush system is also helpful.

4. Install pipeline to first-flush diversion and cistern.

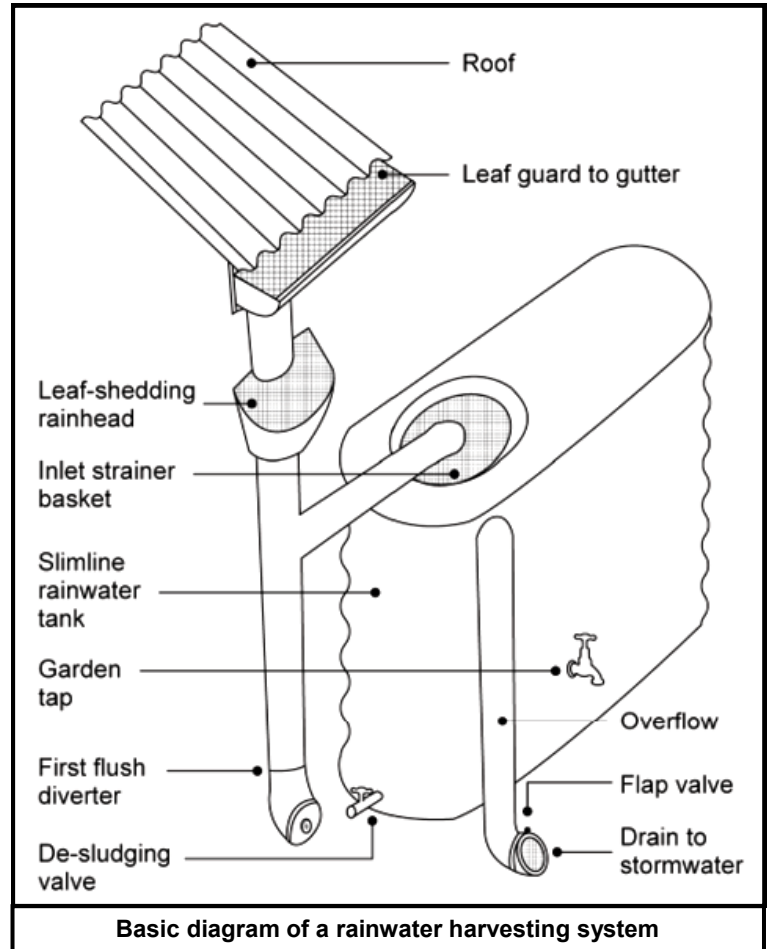
A first-flush diversion captures the finer material and bacteria coming off your roof during initial rains. Systems are available commercially or easily installed yourself. They consist of vertical "reservoir" pipes that fill up before water continues into the cistern. The size of the first-flush system depends on the roof area, but one or two 3" or 4" pvc pipes extending from the roofline to just above the ground should work. Install drain plugs at the bottom to drain out the dirty water and sediment.

5. Install overflow pipe.

An overflow pipe allows water to safely flow out of the cistern when full. Make sure the overflow pipeline discharges to a safe, stable area. Screen the outlet or include a "P" trap in the line to help keep mosquitos and rodents out.

6. Install plumbing from cistern to point of use.

This will depend on your particular situation. It may be as simple as a garden hose or it could be a pipeline to another basin from which the water is pumped or even hooked up to an automatic timer.



Rainwater Harvesting System Operation and Maintenance

If you use your cistern water year-round, such as for livestock water, simply keep an eye on it to make sure the overflow is operating properly. Check it often during freezing weather. If you only use the stored water for irrigation, you'll probably want to disconnect the system from October until about March. Depending on how your system configuration, you might be able to simply reconnect the downspouts to the original roof runoff collection system (most likely outletting to a dry well). Otherwise, you will need to reconnect to the original system from the cistern outlet.