

Rainbarrels... give it a try

Rain is a naturally soft water and devoid of minerals, chlorine, fluoride, and other chemicals. It is usually collected from the roofs of houses and picks up very little contamination when it falls. You can harvest a surprisingly large amount of rainwater from your gutters with one or more rain barrels. Instead of letting the water flow down your driveway and into a storm drain, you can collect it.

Because harvested rainwater does pick up some contamination, you need a good filtering system before it can be used as potable (drinking) water. Many cities require the filtration system to be certified and the water to be tested on a regular basis. However, you do not need a filtration system for landscape uses. You can use it directly from your rain barrel on your garden.

The most obvious reason for harvesting rainwater is to save money. Even if you live in a rural area and have your own well, the well water may be hard enough to justify harvesting rainwater. Have you ever washed clothes with really hard water? There are other reasons as well. I know rainwater makes my hair so very soft.

Water is a critical issue in many areas, particularly in the western half of the United States. If you harvest rainwater with rain barrels and show others how well it works, they will build their own systems. Droughts will become less of an issue and municipal water supplies won't be so overstressed.

Another reason for harvesting rainwater with rain barrels is to help your trees and plants. A lot of old theories about trees and plants have been disproved in the last couple of decades. Research has shown professional arborists and gardeners the value of an organic soil environment for trees and other kinds of plants.

Trees and plants rely on fungus, bacteria, and nematodes to help them absorb the minerals and nutrients they need. As an example, trees and plants depend on a fungal root system called mycorrhizae. Mycorrhizae attaches itself to tree and plant root hairs and extends the root hair system. Mycorrhizae uses some of the plant's energy, but provides the plant with minerals it can't otherwise absorb. In healthy soil, the mycorrhizae of one tree connects with mycorrhizae of other similar trees. Our garden doesn't consist of this plant and that plant, but a vast growing environment. Trees and plants have an efficient immune system that allows them to fend off diseases and other invaders as long as they have a healthy soil environment and aren't stressed by other factors.

Chemical fertilizers, fungicides, pesticides, and drought disrupt the balance and harmony of the soil. Trees and plants are weakened and disease takes over. The chemicals and hard water from many of our municipal water systems also add to the imbalance of the soil. Watering with soft rainwater will indeed make your garden smile.

#### Where to Start Collecting Water with Rain Barrels

There are a few things you can do to find out whether or not rainwater harvesting is right for you. The first step is to find out how much rain you can collect from your roof into rain barrels. When you find this out, you will be so amazed that you will want to follow the other steps.

#### How Much Water Can You Collect in Rain Barrels During a Rainfall?

Believe it or not, for every inch of rain that falls on a catchment area of 1,000 square feet, you can expect to collect approximately 600 gallons of rainwater. Ten inches of rain falling on a 1,000 square foot catchment area will generate about 6,000 gallons of

rainwater. That's right, six thousand gallons!

Your roof catchment area is equal to the total square feet of your house, plus the extension of your eaves. You don't need to consider the angle of your roof, like you would if you were buying roofing material, because rain falls evenly on every part of the roof.

To calculate the square feet of your house, measure the area of the outside walls. Be sure to include the overhang of your eaves.

If you have an oblong house with outside dimensions of 36 feet by 46 feet and the overhang of your eaves is 2 feet, you need to add 2 feet to each end of the wall. Two plus two equals four, so 36 plus 4 equals 40 and 46 plus 4 equals 50. You will multiply 40 times 50 (length times width). Your roof catchment area is 2,000 square feet.

$$(2 + 36 + 2) \times (2 + 46 + 2) = 2,000 \text{ sq ft}$$

Since one inch of rainfall provides approximately 600 gallons of water for a 1,000 square foot catchment area, and your sample house has a 2,000 square foot catchment area (twice the area), you will multiply 600 gallons times 2.

$$600 \text{ gal} \times 2 = 1,200 \text{ gal for a 2,000 sq ft roof.}$$

If you have an average rainfall of 20 inches per year, you have the potential to collect 24,000 gallons of water in one year.

$$1,200 \text{ gal} \times 20 \text{ inches of rain} = 24,000 \text{ gal}$$

Does that get your attention? Actually rainwater harvesting systems aren't 100% efficient. Most sources estimate an efficiency between 70% and 90%. Out buildings like barns or sheds can also be used to increase your harvest. Sometimes you can even use a patio or other paved area.

How Much Water do You Use (Municipal Supply)

Now you need to have some idea of how much water you use each year. You can check your utility bills if you rely on municipal water. If you have your own well, this step will be more difficult and we will talk about it later.

" Your utility bills are usually calculated in CCF. One CCF equals

Rain\_Barrels\_2004.txt

one hundred cubic feet of water, which equals 748 gallons. (The first 'C' represents the Roman numeral C, which equals 100; the second 'C' stands for cubic; the 'F' stands for feet.)

If you have used a total of 110 CCF for the year, you can multiply 110 x 748 to determine the number of gallons.

$110 \text{ CCF} \times 748 = 82,280 \text{ gal}$

Since you can only harvest 24,000 gallons from your roof and your actual use is 82,280 gallons, it looks like collecting rainwater won't be much help. However, this information is misleading. The largest amount of rain falls in the winter in most areas, so you probably don't water your landscape during the winter.

Check your water bills again and look at how much water you use in the rainy season. Also check the average rainfall for your area. Many cities and counties have the statistics on line. You know which months you water your landscape and which months you don't water it. There is another way to more accurately estimate how much water is used in the house, as opposed to the landscape. You can turn on each water faucet in the house and measure how much water comes out in a given period of time and then estimate how many minutes each faucet is used each day.

As an example, you can turn on the water in your shower and catch it with a one-gallon container. If it fills up in thirty seconds, you know that a shower will use two gallons per minute. You then estimate the amount of time spent in the shower by members of your household. You can check your toilets by turning off the supply valve and flushing the toilet. Use your one-gallon container to fill it back up. That will tell you how many gallons it uses for each flush. You can then multiply those gallons times the number of flushes per day.

Household usage won't change much during the year, but landscape

usage will vary considerably. Total the water usage during the dry months and the water usage during the wet months. You will probably see that a lot of your water usage, up to fifty percent or more, is used for watering your garden during the dry months.

Using the 24,000 gallons of harvested rainwater during the dry season will reduce municipal water system stress. Since many municipalities charge extra for high water usage during the summer, you may also save quite a bit of money.

#### How Much Water do You Use (Private Water Well)

It is much more difficult to figure out your water usage if you have a well. Well systems usually rely on a submersible pump in a deep shaft. The water is pumped out of the well and into a pressurized tank. A tank pressure switch starts the pump when the pressure in the tank drops below the set point, say 40 ppsi (pounds per square inch). The pump shuts off again when the tank pressure reaches the cut off pressure, say 60 ppsi.

A water meter is the best indicator of water usage, but a lot of wells don't have a water meter. You can install one on the water the supply line. However, if you have the documentation on the well pump, it is possible to make an estimate without installing a water meter.

You can make a rough estimate of your water usage by noting how long your pump runs each day and then looking at your documentation to see how many gallons per minute (gpm) it pumps. As an example, your documentation may indicate that you have a half horsepower, single phase, 220 volt, pump that uses 9 amps at 40 gpm.

If your pump runs for fifteen minutes a day at 40 gpm, you can calculate the gallons per day by multiplying 40 gallons per minute x 15 minutes, which equals 600 gallons a day.

40 gpm x 15 minutes = 600 gallons per day

You can calculate the gallons you use each month by multiplying the 600 gallons per day by 30 days.

600 gallons per day x 30 days = 18,000 gallons a month.

Now you can find out how much the 18,000 gallons per month costs by calculating the KWH (kilowatt hours) your pump uses each month.

First calculate the watts by multiplying the volts times amps. In this example, you multiply 220 volts times 9 amps, which equals 1,980 watts.

220 volts x 9 amps = 1,980 watts

To find the watts used per day (watt hours), multiply the 1,980 watts times .25 (fifteen minutes equals .25 hours).

1,980 watts x .25 hours = 495 watt hours per day

The next step is to multiply the 495 daily watt hours by 30 days to get the monthly total and then to divide the monthly total by 1,000 to convert the figure to kwh (kilowatt hours).

495 watt hours x 30 days = 14.85 kwh

1,000

Now you can look at your electric utility bill and see how much the 14.85 monthly kwh costs.

You can also estimate your water usage by turning on each water faucet and measuring how much water comes out in a given period of time as described in the last section. You will also have to measure the landscape usage in the same way.

As you can see, estimating water usage is not very accurate. Whether or not you decide to harvest rainwater, you should install a water meter. You should also install an hour meter that is wired into your float switch. That will tell you how much water you use and how long the pump takes to pump it. If the pump begins to take more time to pump the same amount of water, you know something is wrong and you can get it fixed before the pump burns up. If you aren't familiar with plumbing and wiring, you should have a professional install the water meter and hour meter.

Some rural homeowners who have a house and several out buildings are able to rely on harvested rainwater 100% of the time.

Some roofs, such as old tar and gravel or old asbestos shingle, create too much contamination for rainwater harvesting. Also, if you live in an area that contains heavy industrial contamination, rainwater may also be contaminated.

Any catchment area will pick up some contamination from leaves, bird droppings, dust, and other natural causes. This water is fine for watering your garden, but it will need a good filtering system before you can be sure it is safe to drink.

#### Types of Rain Barrel Systems

All rainwater harvesting systems lose some of the rainwater. It may spill out of the gutters and the wind may blow it away. Evaporation will undoubtedly capture some of it.

All systems should use covered barrels or cisterns that keep the water from accumulating leaves and other contaminants. They should also have some kind of filter to keep out silt and leaves. Filters can range from a funnel with mesh in the bottom that is covered by gravel to a rainwater washing apparatus that you can purchase. The first few minutes of rainwater should not be collected because it is the most contaminated.

Perhaps the simplest use of rainwater is to put a barrel under one of the gutter downspouts and use the water on sensitive indoor plants. The plants will appreciate the soft water. The barrel should be covered between uses.

A slightly more sophisticated system might use several barrels

connected together near the bottom with pvc pipe or hose. A small pump can be used in one of the barrels to pump the water to your garden. All barrels will drain simultaneously.

Bigger systems may use gravity to feed water from gutters to a larger cistern, which pumps water to the landscape.

There are many possible configurations and degrees of complexity. They will all make your garden smile. You can spend anywhere from a few dollars to thousands of dollars. Some online sites sell cisterns and other rainwater harvesting equipment.

#### THE PROJECT:

If you have a gutter and downspout system on your house or garage, you can build a rain barrel to gather water for your garden. To find a barrel, check with companies that buy bulk food ingredients. Some of their supplies come in large plastic containers. Scrub the inside thoroughly with soap and water to remove any residues. Because they're often hard to clean, barrels that contained motor oil or fuel products don't make good rain barrels. If you can't locate a barrel, substitute a large plastic garbage can.

Level the area for your barrel with a spade and set the concrete blocks in place. Place the barrel on the blocks. Hold the new elbow on top of the barrel against the downspout. The bottom of the new piece should reach just above the barrel – an inch or so. Mark the existing downspout where you'll cut it off. Set the barrel and the elbow aside and measure down 2 inches from the pencil mark on the downspout. That'll allow room for the old downspout to fit into the elbow securely. Use the hacksaw to cut off the old downspout. Fit the new elbow over the end of the downspout and fasten it in place with sheet metal screws or pop rivets.

Drill a 3/4-inch hole in the barrel wall high enough to allow you to place a bucket underneath. Squeeze caulk around the hole on both sides. Assemble the spigot and coupling, wrapping a piece of Teflon tape on each threaded section to form a tight seal. Slip on a washer and poke the threaded end of the coupling through the hole from the outside. On the inside of the barrel put a washer over the pipe and fasten everything together with the bushing.

A couple of inches down from the top of the barrel drill another 3/4-inch hole for the overflow valve. Squeeze some caulk around the hole, inside and out, and place a washer on the hose adapter and push it through the hole. On the inside slip on a washer and Teflon tape and tighten everything together with the lock nut. With a garden hose connected to this safety valve, you can direct some of the overflow after a heavy rain out into the garden.

If your barrel has a lid, cut a hole in it where the new downspout elbow will drain into it. Cover the hole with a small piece of screen. If there is no lid, lay a large piece of window screen over the top. You can leave the barrel uncovered, but you'll find that open water is irresistible to mosquitoes.

Set the barrel on the concrete blocks, make sure the downspout will direct the water properly and sit back and wait for rain.

Materials and Tools:

Materials:

- 1 clean 30-to 55-gallon barrel  
or garbage can
- 1 "S"-shaped elbow with pop  
rivets or sheet metal screws
- 2-3 concrete blocks
- 1 piece of window screen
- 1 spigot with 3/4-in. pipe threads  
and a 1-in. standard hose fitting

Rain\_Barrels\_2004.txt

1 ¼-in. x ¼-in. coupling  
1 ¼-in. x ½-in. bushing  
1 ¼-in. pipe thread with a 1-in.  
hose adapter  
1 ¼-in. lock nut  
4 metal washers  
1 roll Teflon tape  
1 tube silicon caulk

Tools:

Hacksaw, screwdriver or pop rivet gun, drill, pencil, ruler, spade,  
level, adjustable wrench.

Make sure to take pics and show us what you did!!

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