Cornell University Cooperative Extension of Onondaga County

How to Build A Rain Barrel

A step-by-step guide for building and installing a homemade rain barrel



Cornell Cooperative Extension Onondaga County

Funding provided by the City of Syracuse Department of Water and the Onondaga County Environmental Health Council. With proper installation, maintenance and use, your rain barrel should function properly. Cornell Cooperative Extension assumes no liability for the installation, maintenance, or use of your rain barrel. We are not responsible for any rain barrel malfunction, property damage or injury associated with your rain barrel or contents.

The Benefits of Rain Barrels



Rain barrels are a simple way to capture and recycle the rain washing off your roof. Building a rain barrel is an easy way to save money, and personalize the look and utility of the barrel to match your own taste. This guide is intended to give you a basic overview of the tools, supplies, and steps needed to construct a basic rain barrel, as well as some tips on installation and maintenance. For more information about rain barrels, rain water harvesting, or other green-living projects, contact Cornell Cooperative Extension of Onondaga County. See the back cover for additional resources and contact information.

Help Reduce Pollution and Flooding in Local Streams & Lakes

When water flows over the land during a rainstorm or snowmelt, it can pick up eroded soil, bacteria, chemicals, and even trash. When these materials are washed downhill or into ditches and storm drains, they end up in nearby streams and lakes. Heavy rains can also cause other problems, such as property erosion, flash flooding, and overwhelmed drainage systems. Rain barrels capture and store rainwater, preventing it from carrying pollutants into local waterways.





You can recycle the water you catch!

- ♦ Fill watering cans
- Water gardens or lawns
- Connect a soaker hose to automatically empty the barrel
- ♦ Wash cars/pets
- Empty the barrel when full
- Use two barrels: Keep one full for watering needs, and one empty ready to catch the next rain!
- Catch rainwater so that it does not drain into already overwhelmed sewer systems and contribute to sewage overflows in nearby creeks.

Conserve Water for a Sunny Day

Rain Barrel Basics



The Rain Water Inlet

This is where the rain water enters the barrel. The inlet can be constructed in one of two ways. One style of barrel, known as an **"open-top" barrel (A)** allows rainwater to enter the barrel through a multiple holes in the lid of the barrel. The second style of barrel, known as a **"closed-top" barrel (B)**, receives rainwater through a single hole or port that is fitted with tubing connected to a special diverter on the gutter.



The Overflow Mechanism

Every rain barrel needs a means of handling excess water once the barrel is full, otherwise the water could just spill over the top of the barrel and flood the area around it (possibly soaking into the basement or weakening the building's foundation). The type of overflow mechanism you choose will depend upon your choice of inlet. Open-top barrels need an overflow portal near the top of the barrel that is fitted with a hose that carries excess water away from the foundation of your house. Closed-top barrels require the purchase of a specialized downspout diverter that automatically handles excess water by diverting it back into the existing gutter.



The Outlet

An outlet allows you to empty and utilize the water collected in your rain barrel. This is accomplished with a spigot at the bottom of the barrel. The spigot can be used to fill watering cans or can be connected to a garden or soaker hose.



The Linking Port

The final component of a rain barrel is a linking port that allows two rain barrels to be connected together. The port can be placed near the top of the barrel so that, once the barrel is full, the overflow water will be directed through a short section of hose to a second barrel. Alternatively, a linking port and connective hose could be placed near the bottom of the barrel so that the connected barrels fill at the same rate. This guide gives instructions for installing a linking port at the top of the barrel.

Decide on a Rain Barrel Style

Rain Barrel Building Decision Tree

The style of rain barrel you should build depends on what kind of downspout you have, if you have one. This determines what kind of lid you should build for your rain barrel, how water will enter your barrel and how overflow water will be handled.



Design Your Barrel

Once you have decided whether to build an open- or closed-top rain barrel, follow the instructions in the steps outlined below for the barrel of choice.

Choose a Rain Barrel Style



Tools and Materials



	Materials	Qty. for Open - Topped Barrel	Qty. for Closed- Topped Barrel	
Α.	One 50-90 gallon food-grade container with a removable lid	1	1	
В.	3/4 inch male threaded boiler drain	1	1	
C.	Roll of Teflon tape	1	1	
D.	Plumbing Goop TM	1	1	
E.	Package of gasket rubber	1	1	
F.	1-inch x 3/4-inch reducing washers	6	4	
G.	3/4 inch steel conduit locknuts	3	2	
H.	3/4 brass male pipe to female garden	2	2	
I.	3/4 inch PVC plug	1	1	
J.	3/4 female hose coupling/mender	x	1	
K. Downspout Diverter (see page 13 for options)		x	1	
L. I	Mesh Screen	1	x	
	OTHER			

2 - 4 cinder blocks

• 1 garden or soaker hose



Drilling Tips for Water-Tight Fittings

A Smooth Shave Counts!

Every hole drilled into the barrel will be the exact size of the parts that need to be screwed into the holes, so use the utility knife to shave away about 1/16 inch of plastic. **Try to shave away the plastic in one fluid motion.** You want to avoid making any gashes in the plastic. Alternate shaving the plastic with trying to screw in the hardware. You'll be able to see and feel when the threads of the hardware are catching. Shave away where the threads are not catching until it can be screwed in straight, but don't shave too much!



Shave away just enough plastic so that the threads catch. It should still be difficult to turn the hardware completely in by hand. (Later, you will use pliers to help you tighten the fitting all the way). If you have a plumber's tap, it can be used to thread the finished hole.





Using Teflon Tape

Teflon Tape is used to fill in the spaces between the threads of the hardware to create a water-tight seal. When instructed, start wrapping at the end of each piece by holding the tape down with your thumb and wrapping the tape clockwise around the threads (while holding the threads towards you). Wrapping the tape clockwise will prevent it from coming undone when the adapter is screwed into the hole. Once all the threads are covered, gently rip off the end of the tape and press the tape down into the threads.



Step A: Selecting a Barrel

• Purchase a Food-Grade Container

Recycled food-grade containers make great rain barrels because no harmful chemicals can leach into the water held inside. The container should hold at least 50 gallons and have a fully removable lid. (You may find containers that have a sealed lid with bungholes, but these lids can not be removed.) Food grade containers can be purchased locally from:

The Syracuse Barrel Company	317 Burnet Ave	Syracuse 13206	479-7249
Bronstein Container Company	1313 Rams Gulch Road	Jamesville 13078	469-6191
Mulcorr Container, Co.	2 Willey Street	Auburn 13021	252-2765



Look for a container that has a removable or screw-top lid. This is very important so that you can clean out the inside of the barrel! The barrel will be black or bright blue, but can be painted to better match your house. Directions for painting are on page 18.

The resources listed in this guide are for informational purposes only. The products, services, and companies listed does not imply an endorsement by Cornell Cooperative Extension.



You can catch even more rain when you connect multiple barrels together! See page 18 for directions.

Step B: Building a Lid for an Open–Top Rain Barrel







Place the lid on top of the barrel. It is not necessary to screw it fully on. This will make it easier to drill the holes in the lid. Drill 20-30 holes into the lid using the 15/16-inch spade bit. Trace the shape of the barrel lid onto the mesh screen (L) with a pencil. Use scissors to cut out the mesh screen. Glue it down to the top of the lid with the Plumbing GoopTM (D) and let stand overnight to dry.

Step C: Building a Lid for a Closed–Top Rain Barrel

Place the lid on top of the barrel. It is not necessary to screw it fully on. This will make it easier to drill the holes in the lid. Using the 15/16-inch spade bit, drill a hole 2-3 inches in from the edge of the lid. Shave away some plastic in the hole until the adapter can be screwed in straight. **Remember, a smooth shave counts!** Adjust the size of the hole by shaving a tiny bit of plastic from the hole with the utility knife. Screw the 3/4 inch male hose adapter (H) so that the threads will be sticking up through the top of the lid. Spread Plumbing GoopTM (D) around the hose adapter where it meets the plastic. **Note: The lip around the rim of the lid may trap standing water when rain falls directly onto the barrel. If you observe this, you may want to drill several small (size) drain holes in the lid. The holes should not be large enough to allow insects to enter the barrel, or so large that they will prevent pressure from building up inside the barrel to the point that the diverter will not function properly.





View from underside of lid



View from topside of lid

Step D: Building the Linking Port (for both open-top and closed-top barrels)



Drill a hole here. Make sure that the spot where you drill is not on a curved part of the barrel.



View from outside of barrel

Try to screw the ³/₄ inch brass garden hose adapter (H) into the hole with the threads going inside the barrel. You will notice that the adapter is exactly the same size as the hole, but it won't easily screw in. Shave away some plastic in the hole until the adapter can be screwed in straight. **Remember, a smooth shave counts!** Adjust the size of the hole by shaving a tiny bit of plastic from the hole with the utility knife.



Once you know the adapter can be screwed into the hole, remove the adapter so that you can wrap the threads of the adapter with Teflon tape (C). Refer to page 6 for details. **Remember to wrap clockwise!**

Set the adapter aside. You will now make rubber washers.



Take one reducing washer (F) and one sheet of gasket rubber (E). Using a pencil, trace the shape of the reducing washer onto the rubber. **Remember to trace and cut out the inside circle!** Cut out the rubber washers with the scissors or with the utility knife. If you are building a closed-topped barrel, cut out four rubber washers. If you are building an open-topped barrel, cut out six rubber washers. Push one reducing washer (F) onto the threads of the adapter (H), followed by the rubber washer. Screw in the adapter, using pliers if necessary to tighten.

On the inside of the barrel, push on the second rubber washer and reducing washer (F). Screw on the locknut (G) with your fingers. Fully tighten the locknut by grabbing the grooves of the locknut with the jaws of the pliers.





View from inside of the barrel

Once the linking port hardware is installed, screw in the PVC plug (L) until you are ready to connect a second rain barrel.



View from outside of barrel

Step E: Building the Overflow (for an open-top barrel)

Drill a hole here.– Make sure that the spot where you drill is not on a curved part of the barrel.

Follow the directions given in Step D for the linking port. (You do not need to make any more rubber washers.) The overflow will have exactly the same hardware and technique, with the exception of being on the opposite side of the barrel. Your open-top barrel, will have the overflow on one side of the barrel and the linking port on the other side. Do not plug the overflow as you did in Step D. Instead leave it open for the later attachment of the overflow hose.



Step F: Building the Outlet/Spigot (for both open-top and closed-top barrels)



The spigot will be installed on the front of the barrel. There is usually a rim around the barrel a few inches up from the bottom. Below the rim the barrel will be slightly curved, but above the rim the barrel's side will be flat.

Drill a hole using the spade bit just above the rim (but not on the rim) so that the hole is a few inches up the side from the bottom. To drill the hole, sit on the barrel or stand with the barrel between your legs.



Use the utility knife to shave away about 1/16 inch of plastic. It is especially important to get a tight fit when installing the spigot, so try to avoid making any gashes in the plastic. Alternate shaving the plastic with screwing in the boiler drain (B). You'll be able to see and feel when the threads of the boiler drain are catching. Shave away where the threads are not

catching until it can be screwed in straight, but don't shave too much! Shave away just enough plastic so that the threads catch, but so that it is still difficult to turn the boiler drain by hand. (Later, you will use pliers to help you tighten the drain all the way). When it is clear that the boiler drain can be screwed straight into the hole, remove the boiler drain to wrap the threads with Teflon Tape (C).







Next, push the reducing washer (F) onto the boiler drain (B). Push a rubber washer (constructed in step D) onto the threads of the boiler drain. The rubber washer will be flush with the side of the barrel when the boiler drain is screwed in. Apply a bead of Plumbing $Goop^{TM}$ around the hole on the barrel. Use the pliers to tightly screw on the boiler drain until it is tightened and oriented so that a hose can be attached. One rubber washer, one reducing washer (F) and one locknut (G) will now be screwed on to the threads of the boiler drain on the inside of the barrel. Looking at the locknut (G), you will notice it is slightly curved. When it is screwed onto the threads inside the barrel, make sure that it is curved toward the barrel.

Do The Rain Barrel Crawl or the Rain Barrel Dive!



Your arms will probably be too short to reach all the way inside the barrel, so you'll have to "crawl" or "dive" inside the barrel. It helps to have two people for this step. Turn the barrel on its side so that the spigot is close to the ground.

Partner 1: With the second rubber washer, second reducing washer (F), and the conduit locknut (G) in hand, crawl inside the barrel. If it is really dark inside, bring a flashlight with you.



Partner 2: Standing on the outside of the barrel, hold the spigot in place to keep it from spinning. Use the pliers or a pair of gloves to get a really good grip on the spigot.Partner 1: First push the rubber washer onto the threads of the boiler drain, followed by the second reducing washer (F). Next, screw on the locknut (G). Make sure the locknut is curved toward the barrel when it is screwed on. Tighten the locknut with the pliers.



View from inside of barrel

If you don't want to crawl inside the barrel...

"Dive" into the barrel while standing. Have a partner help you tilt the barrel at an angle until you can bend over and reach far enough inside the barrel to reach the threads of the boiler drain near the bottom of the barrel. Follow the same steps for each partner above.



Before **Partner 1** gets out of the barrel, **Partner 2** should check that the boiler drain is tightened from the outside of the barrel. Try to turn the faucet on; the boiler drain is fully tightened when only the colored handle spins and not the entire boiler drain. If the entire boiler drain spins, keep tightening the locknut on the inside. Spread Plumbing GoopTM on the inside of the barrel around the rubber washer.

Step G: Selecting a Diverter (for a closed-top barrel)

Closed-topped rain barrels require the purchase and installation of a downspout diverter. A downspout diverter is a special attachment for your gutter downspout that is used to create a seamless flow of water from the downspout into the rain barrel. Using a downspout diverter saves you from having to remove the bottom half of the gutter downspout because it keeps the downspout intact. When the rain barrel is not in use during the winter, the downspout is able to function normally.



The GardenWater SaverTM www.gardenwatersaver.com



The RainReserve[™] www.rainreserve.com



Gardner's Supply Diverter www.gardeners.com

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Diverters range in price from \$25-\$45. Shop online by searching for the term "downspout diverter" or check with gardening and rain barrel retailers. If you don't want to use a downspout diverter, refer to the instruction for an open-topped rain barrel.

Installing Your Barrel

- Roll Out the Barrel in Spring Wait until after the last frost (usually in mid-May for Central New York) to install your rain barrel.
- Find the Right Rooftop and Downspout Choose a downspout that is close to the area where you want to use the water.
- **Remember Gravity** Your rain barrel will work best if it is slightly uphill of the area where you want to use the water. It is recommended that your barrel be elevated off the ground with cinder blocks to ensure good water pressure from the barrel.
- Know Your Ground Make sure the ground beneath the selected downspout is solid and level. When filled, the rain barrel will weigh about 400 pounds and you don't want it to tip



over. Gravel, wooden boards or concrete slabs can be used to create a firm base beneath the rain barrel.

Step H: Installing an open-top barrel





Remove any plastic shavings or debris from your barrel, to avoid future clogging of the outlets and hoses. Level the ground beneath the downspout, using gravel, wooden boards or concrete. Elevate the rain barrel on cinder blocks, using 2-4 concrete blocks as necessary, to raise the barrel.

If the downspout ends above the lid of the rain barrel, installation is complete! If the downspout empties below the lid of the rain barrel when the barrel is raised on the cinder blocks, use a hacksaw or tin snips to cut the downspout so that it empties above the rain barrels lid.

If there is not much clearance or room for the barrel right beneath the downspout, use a flexible, plastic elbow to send the water over the lid of the rain barrel. The elbow slips over the end of the downspout and can be secured with screws. If you do not have a gutter or would prefer a different look, a rain chain may hung from the roof or the upper gutter to direct the flow of water into the barrel. Connect a garden hose to the overflow port on the side of the barrel to handle excess water. Direct this hose out so that it empties in the area where you want to divert the overflow water.

Installing Your Barrel (cont.)

Step I: Installing a closed-top barrel

Remove any plastic shavings or debris from your barrel, to avoid future clogging of the outlets and hoses. Level the ground beneath the downspout using gravel, wooden boards or concrete. Elevate the rain barrel on cinder blocks, using 2-4 blocks as necessary, to raise the barrel.



With the barrel in place, mark the barrel's height on the downspout with a pencil. Put the barrel aside. Remove the downspout by unscrewing the clincher straps that attach the down-spout to the house so that it's easier to work with. Lay the downspout on the ground. Cut the gutter to accommodate your style of diverter, according to the instructions included with your diverter. Reattach the downspout to the house (two sets of hands helps here!). Align the barrel against the house next to the downspout. Connect the hose (included in the diverter kit) to the spout on the diverter. Attach a hose mender (J) to the end of the diverter hose so that it can be screwed on to the inlet on the lid of the barrel.



Using Your Rain Barrel

After it rains, let it drain!

Having an empty rain barrel will allow you to catch even more rain in the next rain storm. If your rain barrel is already filled to capacity when it rains, all of the new rain will overflow out of the barrel. Although having a full rain barrel at the start of a new rain storm is not a problem, you'll be able to capture a greater proportion of the rainwater that falls on the rooftop and make good use of it around your lawn and garden if you have emptied your rain barrel ahead of time.

Only keep your rain barrel filled when a period of dry weather is expected.

Let the water soak in.

Attach a soaker hose to the outlet spigot at the bottom of your barrel. Soaker hoses have tiny holes that slowly release water. This is a great way to gradually empty your rain barrel while watering your garden when you know you will be away from home for a few days. Soaker hoses can be purchased at local hardware or garden supply stores.

Do not drink rain barrel water.

The water you catch in your rain barrel should not be consumed by humans or pets and should only be used to water lawns and gardens. Although your rain barrel is made of food-grade plastic, bacteria and other chemicals may still enter from the rooftop into the water. While rain barrels are used in other countries as a source of drinking water, they are equipped with filtration devices to make the water safe for human consumption.

Use caution when using rain water in vegetable gardens.

Studies have shown that harmful chemicals may leach from the following rooftop materials:

• Treated cedar shakes

• New wood shingles

Copper

- Asphalt shingles
- Rooftops treated with chemicals to prevent algae/lichen/moss growth
- Rooftops treated with chromate copper arsenate
- Gutters containing lead solder or lead-based paint.

Check your rooftop materials before watering your vegetable garden with water collected in a rain barrel.





Rain Barrel Maintenance

☑ Lid: Make sure the lid is always tightly secured so that no mosquitoes, rodents or debris gets inside. Make sure there are no holes in the mesh screen. Patch any holes with mesh screen.

If you find mosquitoes or other insects inside your rain barrel:



Pour a few tablespoons of vegetable oil into the barrel. This will create an impenetrable film on the water's surface to keep the bugs away.

✓ Look inside the barrel: Algae growth and pollen deposits inside the barrel are normal. If the algae or pollen are bothersome to you, clean out the barrel.

Cleaning: Unless a lot of debris is collecting inside your rain barrel or there is bothersome algae growth, a rain barrel really only needs to cleaned when it is brought inside for the winter or before it is reinstalled in the spring. To clean your rain barrel, use vinegar or soap and water and spray it out with a hose.

✓ Overflow: If you are home during a storm, go outside to check that water is being diverted away from the house and that the barrel is not overflowing out its lid. If you notice your rain barrel is always overflowing, it may be a sign that the rooftop being drained from the downspout is yielding too much water for the barrel to handle. If the overflowing barrel becomes a problem, reinstall the barrel onto a smaller section of rooftop or add a second or third rain barrel. ✓ Leaks: Check all hose and spigot connections for leaks. Use Plumbing Goop[™] to seal any leaks from the hardware on the barrel.

✓ WINTER STORAGE: The first frost in Central New York is in early to mid-October, so disconnecting the barrel in late September can prevent any water from freezing inside. The barrel must be disconnected over the wintertime so that ice doesn't form inside where it could expand and crack the barrel. If possible, store the barrel indoors. If you must leave the barrel outside, remove the hoses, open the spigots and turn it upside down to allow any water to drain out.



Additions to Your Rain Barrel

A Second Rain Barrel (or more!)

Catch even more rain by connecting a second rain barrel (or more) in series. When the first barrel is filled, it will overflow into the second barrel. Having two rain barrels allows you to keep one filled with water to use in your lawn and garden and one barrel ready to catch the next rain!

- 1. Using the same directions, construct a second barrel that has its overflow aligned with the overflow on the first barrel.
- 2. Connect the barrels together with a short piece of hose. With the barrels in place, measure and cut the length of hose needed to join the two barrels at their linking ports. Use a hose-mender kit to re-attach a 3/4 inch male



Plastic (A) or brass (B) hose mender kits are available.



The cut end of the connective hose should be fitted with the male coupling.

Both ends of the connective hose can then be screwed into the linking ports.

coupling (you will need to purchase this additional hardware) to the end of the hose that was cut. When finished, both ends of the linking hose will be fitted with male couplings and can screw onto linking ports. Make sure the linking hose is relatively level and has no kinks or twists. See page 7 for picture of linked barrels.

A Paint Job

To paint your rain barrel a solid color, use a spray paint that will adhere to plastic. Try Krylon FusionTM or RustoleumTM specialty plastic paint—neither require the barrel to be sanded or primed. They come in many colors. Just spray on! To hand-paint your rain barrel, use a spray primer that will adhere to plastic. After spraying it on the barrel, let dry

for the period of time specified on the can. Use acrylic water based craft paint to paint or stencil a design on the rain barrel. Protect your rain barrel art by spraying a clear waterproof gloss that adheres to plastic.





Rain Barrel Resources

Want to capture even more rain water? A rain garden is designed to soak up water from your downspout! Learn more by contacting Cornell Cooperative Extension or by referring to the following rain garden resources:

- "An Introduction to Rain Gardens"
- "A Plant List for Rain Gardens"



FAQ

Should my rain barrel always be filled with water?

Keep your rain barrel filled when you know dry weather is on the way. Otherwise, it's best to have your barrel emptied so that it will be ready to capture rain in the next storm. However, keeping the barrel empty all of the time is harder than it sounds. A good idea is to connect two rain barrels together so that one can be full with water and the other is standing by ready to catch the next rain. Having a soaker hose attached to the spigot at the bottom of the barrel is a good way to slowly release water from the barrel.

How much rain will my rain barrel capture?

Your rain barrel will fill quickly during a rainstorm. One inch of rain falling on 1000 square feet of rooftop will yield 623 gallons of water! As a result, a typical 55-gallon rain barrel will fill up quickly, even when connected to a modest-sized rooftop. To harvest more water, consider linking several rain barrels together or adding a rain garden. Be sure to monitor your rain barrel in action and ensure that the overflow water is being directed as planned.

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I already have a lot of mosquitoes in my backyard. Will a rain barrel attract more? As long as the lid on the rain barrel remains

secured, mosquitoes and other pests should not be able to get inside. You can also try adding a few drops of vegetable oil to the water inside the barrel so that a thin film forms on the water's surface.

Who is using rain barrels? What other kinds of techniques are being used to recycle rainwater? Many residents use rain barrels for their plants and gardens. Because rain water is usually soft and free of dissolved minerals, the water is great for indoor plants, as well as your lawn and garden. An increasing number of homes are using rain barrels, as well as rain gardens, as an environmentallyfriendly way reduce stormwater pollution and protect local streams and lakes. To learn more about rain barrels or rain gardens in Onondaga County, visit **www.ongov.net/savetherain**



Finished Your Barrel? Send us a Picture!

We'd love to see a photograph of your finished rain barrel, as well as hear any comments you have about this guide and instructions!