

# RAINWATER HARVESTING

F O R H O M E O W N E R S

**ALL ABOUT** the environmental, financial, and horticultural benefits of small scale residential rainwater harvesting.

**INSTRUCTIONS & TIPS** for designing and building your own rain barrel and creating a watershed-friendly home landscape.



When it rains,  
it pours...

When rainwater is not being captured for reuse, in an urban environment with roads, rooftops and other impervious surfaces, it runs off. Excess irrigation and snowmelt also lead to runoff. With limited opportunity to soak into the ground, rainwater spreads out, traveling downhill and



Even excess irrigation leads to runoff.



Stormwater entering a storm drain, leading to waterway untreated.

picking up pollutants that are left behind on the landscape. These pollutants include soil, litter (like cigarette butts) fertilizers, pet waste, yard debris, oils and many other contaminants.

These pollutants then get washed away, untreated, to local streams and rivers, polluting the beaches and rivers where we swim, fish and get our drinking water. This type of pollution is called "stormwater pollution," and it is the greatest threat to our nation's surface waters according to the U.S. Environmental Protection Agency.

With increased impervious areas (roads, rooftops and sidewalks, for example) and less water soaking into the groundwater table, there can also be an increase in localized flooding problems.

## An Age-Old Practice

*Rainwater harvesting, in ancient times, was often critical to communities' establishment and prosperity.*

*In recorded history, one can find references to rainwater harvesting as far back as 560 BC, if not further.*

*Desert nations engineered rainwater harvesting systems large enough to navigate with a boat! The Roman Empire designed and built houses that came standard with a rainwater capture feature.*



## Common Sense Solutions

There are many ways to manage stormwater as a community experiences growth. The difficulty lies in managing stormwater pollution after a community has been established. At that time, the problem of stormwater becomes a problem that everyone needs to address, oftentimes on a lot-by-lot basis.

Rainwater harvesting is a tool that can be used to manage stormwater in new and established communities. This concept relies on cisterns or other containers to capture rainwater for reuse. Benefits include the following:

- **Less water flowing over the landscape, which leads to decreased potential for flooding and protection of water quality;**
- **Rainwater harvesting saves water for use between rain events and during times of drought;**
- **Reuse saves money on utility bills;**
- **Some plants prefer rainwater compared to treated city water. Treated water typically contains chlorine byproducts, which some plants would rather do without. Rainwater, unlike city water, does not have these same chemicals and is superior for irrigation.**

---

**For a 1000 square foot roof with 4 gutters or corners where rainwater is collected equally, a 0.4" storm will fill a 60-gallon barrel. A 1" storm falling on this same rooftop will generate a total of 623 gallons of runoff.**



*Rain barrel at recreation building, Florence.*



*Cistern at DNR facility, Charleston.*

# Rainfall in South Carolina

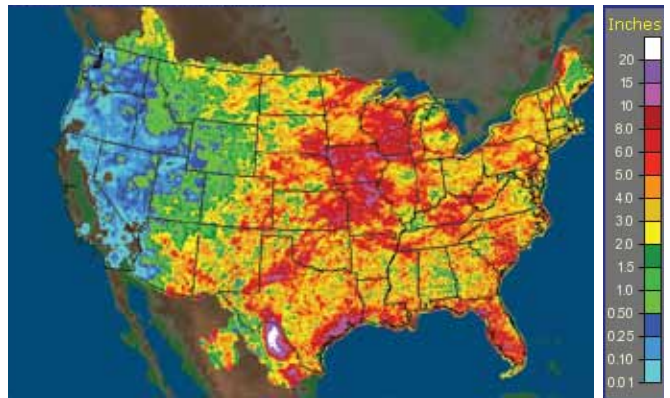
Most of South Carolina experiences a humid subtropical climate, though the Upstate less so. Relative to other states, precipitation is abundant the entire year with the coast typically having a wetter summer than inland areas. Inland, March is the wettest month. The images (right) demonstrate South Carolina's rainfall amounts in a given month compared across the state and to the rest of the nation.

Though South Carolina typically experiences a wet climate, there are still times of drought. Oftentimes, a month's rainfall can happen in one summer storm. In these scenarios, and in times of encouraged water restrictions, having a rainwater harvesting system has additional benefits.

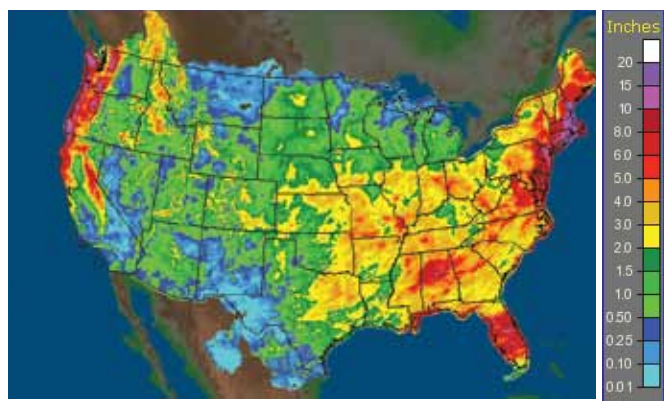
Some months, you will find that you have a greater supply of rain than what is needed, and your barrel will overflow. To calculate how large of a rainstorm will exceed your barrel capacity, follow these steps:

1. Estimate the square footage of your roof that drains to the barrel (or larger harvesting system).
2. Multiply the volume of your barrel (or other container) in gallons by 0.13 to convert gallons to cubic feet.
3. Divide this result by the square footage of your roof surface leading to the barrel. The result will give you the size storm in feet.
4. Multiply this storm amount in feet by 12 to yield storm amount in inches.
5. This storm amount in inches is the size storm that will fill your rain barrel.

The table (right) shows information on rainfall amount in 2010 in four cities of South Carolina and how frequently amounts were exceeded, which could help identify the season your barrel will be most likely to overflow. This information may also help you determine if you need more than one barrel or a larger containment device for captured rainwater.



July 2010 Rainfall



March 2010 Rainfall

## ANALYSIS OF 2010 STORM VOLUME FREQUENCIES

Station	Number of storms >0.1"	Number of storms >0.5"	Number of storms >1"	Greatest number of >.05" storms and month(s)
NORTH CHARLESTON	68	36	22	7 June
FLORENCE	64	30	12	5 June
COLUMBIA METRO AIRPORT	54	24	9	4 July
GREENVILLE / SPARTANBURG	58	30	12	5 January, May

Data acquired from the National Weather Service Forecast Office at [www.weather.gov/climate](http://www.weather.gov/climate).

# PLANNING AHEAD

## Not Just a Pipe Dream

Gutter or no gutter, you can still harvest rainwater from your rooftop. Gutters are an easy transport mechanism that can be modified to direct rainwater directly into your barrel. Use a hacksaw to cut your gutter downspout so that the reattached elbow sits as the top of your barrel inlet. Transfer the lower downspout elbow or purchase a flexible, plastic elbow for approximately \$2.

Without a gutter, you can collect rainwater in the corners of your eaves where rain naturally gets concentrated or utilize a rain chain to direct water into your barrel. Rain chains can be both useful and artistic elements. Designs can be in loops, flowers, flower pots and so much more. Rain chains are attractive ways to direct rainwater, but come at a cost. Chain available at your local hardware store can be just as effective, less costly, but a different aesthetic. New research on the west coast is looking at the effect of trace amounts of copper on fish; therefore, due to ongoing research, this manual does not recommend copper as a means to transport rainwater.

## Identifying and Preparing Your Site

Before making or purchasing your barrel, you should identify where your barrel will be placed and how you will use your captured rainwater. Once that location and purpose are identified, you'll need to prepare your site. Clear the area of debris and create a stable surface for the barrel. The ground should be level, and if a platform is being built, that should also be a stable surface that can support a significant weight. **A full 55-gallon rain barrel will weigh over 450 pounds!** This is not something to be taken lightly, and one must ensure that the full barrel will not tip over and cause damage or injury.

Platforms can be stacked cinder blocks, stacked square paving stones, or a wooden platform. If you plan on using a bucket or watering can to retrieve water from your barrel, you will need to either raise your barrel on blocks (remember how heavy a full barrel gets!) or drill in your spigot at a height high enough for the access you need.

Raising your barrel will also give you more pressure coming out of the spigot. However, the pressure generated from a small rain barrel will not be adequate to operate an in-ground sprinkler system or low-volume



Sherry Posey, Sumter County



device such as mist sprayers or drip hose. Rather, a soaker hose or drip irrigation system work better at these low pressures. For the soaker hose, water will leach out very slowly *unless you remove the pressure-reducing washer to allow more water to flow through* (this is the round insert at the beginning of the hose). Drip irrigation systems should use adjustable nozzles to regulate the rate of flow.

## Barrels of Fun

Rain barrels are available for purchase at many stores and online (\$50-\$320), as well as sold inexpensively through environmental conservation organizations (\$35-\$45). These costs refer to the typical 55-60 gallon barrel. There are much larger systems, both for above and below ground use, available for those interested in harvesting larger volumes of water, perhaps for irrigation.

The purpose of this manual is to introduce the benefits and considerations of rainwater harvesting and assist the public in building their own rain barrels at a typically lower cost. With the right tools already in the garage, the instructions provided here will result in a rain barrel built for less than \$20.

To save costs and travel, it is important to consider what barrels are available to you locally. Many feed supply stores will sell previously used *food grade* barrels; here you have an opportunity to collect rainwater and reuse something that otherwise would have ended up in a landfill!



Previously used food grade barrels make great rain barrels.



## 10 WAYS TO USE YOUR HARVESTED RAINWATER:

1. Water the garden (read on for further information);
2. Water perennial beds;
3. Water your rain garden during dry periods;
4. Wash the dog;
5. Wash your car or boat;
6. Fill the bird bath;
7. Irrigate the lawn;
8. Keep compost moist;
9. Use a soaker hose to put under nearby landscape beds;
10. Also, with enough elevation or a pump, utilize a drip irrigation system to water plants individually. Drip irrigation directs water directly to the plant where it's needed.

# BARREL TYPES

In this manual, instructions are available for two different, readily available barrel types.



## *the* Pickle Barrel

*Screw top, black barrel*



## *the* Soda Barrel

*Sealed top, blue or white barrel*

### ADVANTAGES:

- The screw top lid makes the top screen more secure than other options and can make the barrel more accessible for maintenance (depending on design).
- The black color will reduce algae growth in the barrel and also camouflages well.
- If you do not own a jigsaw, this barrel design will save you money on tools.

### DISADVANTAGES:

- May be less available than sealed barrel.
- May be more expensive than sealed barrel.

### ADVANTAGES:

- Typically, less expensive and more readily available (in some parts of the state) than the screw top barrel.
- There is more flexibility in how you want to open the top of the barrel, and depending on your design and need, you can have the plastic surface mostly intact, which is stable and safe.

### DISADVANTAGES:

- Depending on how you cut the top, maintenance could be difficult.
- If you choose to completely remove the top, the screen and bungee cord design shown later could be a hazard if wildlife, cats, or children have access to the top of the barrel.
- Blue color, especially, may be difficult to camouflage.
- White barrel, especially, may be more prone to algae growth if placed in direct sunlight.



## Additional Considerations

**Water Quality and Water Use:** Water quality tests on the runoff from both an asphalt-shingled roof and metal roof showed quality suitable for irrigating vegetables. If you are concerned about the quality coming out of the barrel, you can always have this water tested. A “special” irrigation water test through



your local extension office costs \$25 and will help identify if your water coming out of the barrel is suitable for various crops and overall, for your intended use.

*Remember, this water is not for drinking, cooking or other potable use without further treatment!*

**Mosquitoes:** Keep in mind that some species of mosquitoes breed in water-filled containers and require approximately seven days to go from a harmless egg to a major annoyance! To minimize mosquitoes, your barrels should be completely

screened or sealed, and you should use all of your harvested water each week in order to empty the barrel.

**Outflow Size:** In the designs, you’ll notice that there are two sizes of hole boring drill bits. Why not use just the one? The larger hole boring drill bit is for the rain barrel overflow.

For our frequent South Carolina downpours, a larger overflow is recommended to handle excess volume. Also, make sure that you are drilling this outflow hole in the direction where you want outflow to go so that you don’t have to use as much hose. Be sure to also direct overflow away from your home, and preferably into a landscaped bed or a rain garden! Water should also never be directed towards a septic adsorption field, if you have one.



**NOTE:** *You can also use mosquito dunks, which look like clay donuts and are embedded with a strain of bacteria that will feed on mosquito larvae.*





**Screening Out Debris:** Why screen the top of your barrel? Mosquitoes are not the only reason, but a good one. Additionally, leaves, twigs and other items can get into your barrel and clog the spigot. A secure screen means less maintenance!

*NOTE: If you are on a heavily wooded lot, have trees hanging over your house, or feel that too much debris is piling up on the top of your barrel too frequently, other screening options are available to minimize plant debris throughout your rainwater harvesting system. These include leaf screens and leaf guards that affix to the gutter, funnel-type downspout filters that have built-in screens, and strainer baskets which fit over the exterior of the downspout. Keep in mind though that these screens do not eliminate mosquitoes from breeding in your barrel unless the downspout goes into the barrel directly and is sealed.*

**Safety:** How secure you want the screen is also an important consideration. Is there a cat that might want to take a sunny snooze on top of your barrel? If you are using the pickle barrel, you might leave the insert below the screw top in place and drill larger holes through the insert to allow water to filter in, but provide a stronger surface. The screen would still be used between the insert and the screw top (right).

For the sealed barrel designs, you may opt to keep the top and instead insert and cement a grate or pool filter (or similar fixture) that can directly receive runoff from the downspout. Do children have access to the top of the barrel? If so, further considerations are needed. This is described further in the second sealed barrel design.

**Roof Products:** If you use a moss control product on your roof, be sure that it is garden safe before harvesting this runoff.

**More information can be found at:**  
[www.clemson.edu/public/regulatory/ag\\_svc\\_lab/irrigation\\_water/](http://www.clemson.edu/public/regulatory/ag_svc_lab/irrigation_water/)



*Make sure the screen on top of the barrel is secure.*



# VARIATIONS IN DESIGN

There are many ways to capture rainwater. In this manual are the directions for three easy rain barrel designs made from barrels that are readily available in South Carolina.

For all three designs, you may be starting with a pretty stinky specimen. When selecting a barrel, **only use a barrel that has contained food grade materials (non-meat preferred)**. Other types of barrels are sometimes used for chemicals such as commercial soaps, which may not be safe for your plants or the environment.

To clean the barrel and remove some of the odors from its former purpose, rinse the barrel out with a hose; if you need to get rid of any odors, add 2 teaspoons of castile soap and 2 teaspoons of lemon juice or vinegar for every gallon of water used to clean your barrel. Please don't use any commercial cleaning products or bleach which could affect the environment. Instead, castile soap can be found at many grocery stores, and it is simply a multi-purpose soap made of fats from vegetable origins versus animal origins; it will easily rinse out and not harm the environment like other cleaners could.

How you plumb your rain barrel can be very specific to your needs and interests. What is presented here are designs that this program has found useful and effective for residential and very small scale rainwater harvesting and reuse. No matter how you choose to construct your barrel, there are four components that should always be present:

1. **The food grade barrel that you will use to collect the rainwater.**
2. **An inlet that is designed to allow rainwater into the barrel, but keep out twigs, leaves, mosquitoes and potentially, other creatures.**
3. **An outlet that you can turn on and off to drain your water.**
4. **An emergency overflow that directs water away from your home and to an infiltration area when the barrel is at capacity.**

## *tools of the trade*

*For the most part, the tools you'll need are the same for all three barrels. Exceptions will be noted with each design.*

1. *2 hole boring drill bits: 1½" and 1".  
You can use a paddle drill bit, but for those new to power tools, we find the boring drill bit much easier to work with.*
2. *Adjustable channel lock pliers;*
3. *Shoe rasp;*
4. *Box cutter;*
5. *Scissors;*
6. *Flat head screwdriver;*
7. *Caulking gun and silicone;*
8. *Teflon tape;*
9. *Safety glasses.*

**INVESTMENT?** Investigation by the Ashley Cooper Stormwater Education Consortium estimated that 50 full empties of your rain barrel will equate to utility savings close to the cost of making your own rain barrel, estimated at \$25.



three

RAIN BARREL DESIGNS

## DESIGN ONE

# The Pickle Barrel

For the components of this barrel design, you'll need the following:

- Food grade, screw-top barrel;
- Fiberglass screen (enough to secure around the top of your barrel, plus some extra);
- ¾" hose bib quarter turn brass spigot;
- 1" flat washer;
- 2" x ¾" female bushing, spigot x thread;
- 1 ½" threaded hose adapter for 1¼" hose (you can find this as a set called a "universal drain kit" with the hose clamp included as well);
- 2" x 1" PVC sch40 bushing;
- 1 ½" hose clamp.

### Completing Your Rain Barrel

1. Using the electric drill and the 1" hole-boring



drill bit, make the hole for the spigot. Remember the height consideration.

2. Switch drill bits and drill the larger outflow with the 1 ½" bit in the direction where you want the overflow to be directed.



3. Use the rasp to enlarge the lower hole just large enough to fit the spigot in tightly.
4. When the hole is ready, place the washer on the spigot and add silicone to the side of the washer

that will be against the side of the barrel. Line the threads of the spigot with Teflon tape. Apply the tape in a clockwise fashion, holding the spigot towards you. Then, push in the spigot.



5. On the inside of the barrel, secure the spigot with the 2" x ¾" female threaded plastic bushing. Tighten with the channel lock pliers. It will take one person to hold the spigot on the outside of the barrel, while another works from the inside.
6. Similarly, use the rasp for the overflow, ensuring a tight fit.
7. When the hole is ready, use silicone against the flat edge of this bushing to secure the back of the hose adaptor. Tighten with the channel lock pliers.
8. For the overflow, cut a small square of screen to put over the hose adaptor, then add the hose with the hose clamp already on it. This screen serves as an extra step in preventing mosquitoes.
9. For the top of the barrel, cut the size screen to fit under the screw top lid, which will screw over the screen and be fairly secure.
10. Give some time (24 hours or so) for the silicone to dry completely, and you are ready to deploy your new rain barrel!

## DESIGN TWO

# Screened-Top Soda Barrel

Changes to the standard tools and components:

- Reciprocating saw (or jig saw);
- Sanding paper;



### Materials

- Food grade, sealed plastic barrel;
- Fiberglass screen (enough to secure around the top of your barrel, plus some extra);
- ¾" hose bib quarter turn brass spigot;
- 1" flat washer;
- 2" x ¾" female bushing, spigot x thread;
- 1 ½" 45° PVC street elbow;
- 1 ½" x 1 ¼" PVC male adapter and nut;
- Metal snap down barrel rim fastener (this is recommended, but if unavailable, a 4' bungee cord can be used).



### Completing Your Rain Barrel

1. Drill 1½" hole in top of barrel using the electric drill and hole-boring drill bit.



2. Use reciprocating saw to cut top off of barrel (from the top and not from the side of the barrel,

about 1-2" in from the rim). Use the 1½" hole as an insertion point for the saw blade.



Trim away excess plastic shards using box cutter and sand the cut surfaces.

3. Drill ¾" hole in side of barrel about 2" above bottom. This will be for the spigot. You may need to use the rasp to enlarge the hole slightly to securely fit the spigot.

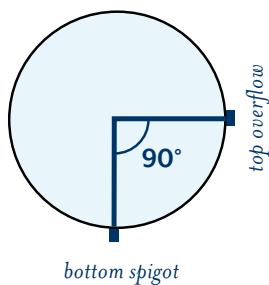


Frequently try to screw in bushing. Remember that the tighter the fit the less likely there will be leaks.

4. When the hole is ready, place the washer on the spigot and add silicone to the side of the washer that will be against the side of the barrel. Line the threads of the spigot with Teflon tape. Apply the tape in a clockwise fashion, holding the spigot towards you. Then, push in the spigot.
5. Apply silicone to the flat side of the 2" x ¾" bushing which will secure the back end of the spigot. On the inside of the barrel, secure the spigot with the 2" x ¾" female threaded plastic bushing and tighten with the channel lock pliers. It will take one person to hold the spigot on the outside of the barrel, while another works from the inside.



Overhead View of Rain Barrel



6. Drill 1½" hole in side of barrel 2½" below top and at 90° from bottom hole. This hole will be too small for the 1½" x 1¼" PVC male adapter. Use the shoe rasp to enlarge the hole (no more that 1/16").

Frequently try to screw in the adapter. Leaking here will be less of a problem than with the lower assembly, but have the adapter fit as tightly as possible.

7. Screw 1½" x 1¼" PVC male adapter into upper hole of the barrel to create the overflow.



8. Apply a generous amount of silicone to threading of 1½" x 1¼" male adapter on inside of barrel.

9. Screw nut onto male adapter and hand tighten.



10. Measure and cut screening to allow for 3 to 4" of overhang all the way around top of barrel. Do not skimp on the overhang!



11. Lay cut screen over barrel and notice the extra room that any one of the corners has.



12. Cut a circle from the extra room big enough to cover the opening of the 45° PVC street elbow with a bit of overhang (about 2" in diameter).

13. Insert screen circle into PVC male adapter overflow from the outside.



14. Insert 45° PVC street elbow into outer side of overflow to hold screen circle in place.

15. Lay screen on top of barrel.

16. Put rim fastener over top of screen and onto rim of barrel, loosely attaching nut and bolt.



17. Position rim fastener so that it will easily tighten without having to readjust its position.

18. Tighten screen under rim fastener by pulling the screen all around the barrel.

19. Tighten rim fastener loosely and retighten screen.

20. Tighten rim fastener the rest of the way leaving plenty of screen overhang for easier attachment after removal.



21. Give some time (24 hours or so) for the silicone to dry completely, and you are ready to deploy your new rain barrel!

## DESIGN THREE

# Cut-Top Soda Barrel

### Why use this barrel?

If you are concerned about children having access to the barrel or wildlife getting through the screen, this design has the smallest top opening of the three designs presented. Rather than using just the screen, the top can be modified to cement in a pool filter or NDS 8" round grate (approximately \$5), which will result in a more long-lasting and sturdy inlet. This barrel design, though, will make maintenance difficult, so be sure that your screen is effective in keeping out twigs and leaves.

Changes to the standard tools and components:

- **Reciprocating saw (or jig saw);**
- **Do not need the 3/4" hole boring drill bit;**

### Materials:

- **Food grade, sealed plastic barrel;**
- **Fiberglass screen;**
- **3/4" hose bib quarter turn brass spigot;**
- **1 1/2" x 3/4" threaded bushing**
- **1 1/4" poly MIP adapter;**
- **1 1/4" conduit locknut, 2 per package (optional);**
- **1 1/4" hose;**
- **1 1/4" hose clamp.**



### Completing Your Rain Barrel

1. Drill a hole in the top of barrel using the electric drill and bit. Use reciprocating saw or jigsaw to cut opening in the top of barrel as shown below. Use the hole as an insertion point for the saw blade. Trim away excess plastic shards.



2. Drill a hole (with a 1 3/4" hole saw or 1 3/4" paddle bit) at the top of the barrel for an overflow and one at the bottom of the barrel for the spigot. If barrel will not be elevated locate hole for spigot high enough to attach hose without crimping.



3. To insert spigot, thread the 1 1/2" x 3/4" bushing with your hand then use a wrench to completely tighten. The threaded bushing will fit tightly in the hole therefore this will take some effort to insert.



Run a generous bead of the 100% silicone sealant on the outside around the bushing. Use your finger to smooth the bead, filling in any cracks or voids. *Hint: Wet finger with soapy water prior to smoothing bead for easy clean up. Let silicone dry according to manufacturers specifications.*

Wrap threaded end of the spigot with Teflon tape and screw into the threaded opening of the 1½" x ¾" threaded bushing. Turn until spigot is tight and vertical.



- At the overflow hole; thread one of the 1 ¼" conduit locknuts on the threaded end of the 1 ¼" poly MIP adapter. Then insert the 1 ¼" poly MIP adapter through the overflow hole and tighten with the second 1 ¼" conduit locknut on the inside of the barrel. Apply a bead of the 100% silicone sealant on the inside and outside of the barrel around the adapter (apply generously). Use your finger to smooth the bead, filling in any cracks or voids. Allow silicone to dry according to manufacturers specifications.



Slide sump pump hose over overflow adaptor secure with hose clamp if applicable. Another step at this point is to wrap a piece of screening around the adapter and then attach the hose and clamp. This will aid in preventing mosquitoes from entering from into the barrel through the overflow.

- Cut fiberglass screen into a section at least 1" greater than the hole at the top of the barrel. Place the screen over the opening and run a bead of silicone around the 1" overlap. Smooth the silicone bead with your finger keeping the screen taut on top of the barrel and allow time to dry. Repeat step with a second bead at the cut edge of screen, this will prevent raveling.



**Enjoy Your Rain Barrel and  
Start Conserving Water!**







## Maintenance

Simple maintenance can prevent problems in the future. Below is a list of steps to take to keep your rain barrel in good working order.

- Try not to let water sit in the barrel for more than a week.
- Clean gutters at least twice a year, more often if you have trees.
- Completely empty and rinse your barrel at least once a year. After pollen season is a good time!
- Check for leaks at all fixtures.
- Check and clear downspout elbows.
- Caulk any gutter, downspout, fixtures that may be leaking.
- If your barrel is a light color, consider painting it a darker color to help reduce algae growth.
- If your barrel is in the sun, consider relocating it to a shadier spot to help reduce algae growth and/or plant around it to yield shade.
- Check all screens regularly to be sure that mosquitoes cannot gain access.
- Clear debris on screens after heavy storms.
- Monitor where overflow is going. Is it causing erosion? If so, use plants or stone to prevent further erosion. Continue to direct overflow to permeable surfaces where the water will slowly infiltrate and be used rather than run off.
- If there is no winter demand for water, you can store your barrel and route the rainfall away from your home and hopefully to a lawn or landscape bed area where the rainwater can infiltrate.

# MOVING WATER AND STORING MORE VOLUME

## Pumps

There are many ways to get creative with your rain barrel and water use. A submersible pump can be handy if the area you wish to water is level or higher than the rain barrel.



*Submersible pump.*

This can also be handy if you don't want to carry buckets of water for irrigating. Submersible pumps, such as the 1/10 HP pump and 1/3 HP sump pump have been used to push water about 8 feet in elevation and across about 120 feet. The 1/10 HP produces a very small trickle of water. The 1/3 HP pump produces a strong

enough stream of water by hose (with a nozzle on it) for about a 12 foot distance. These will increase the cost of your rain barrel. Recent prices are \$50-\$68 for the 1/10 HP pump and \$97-\$105 for the 1/3 HP sump pump. A sump pump will turn itself off when the water level gets to a certain level in the barrel. A submersible pump, which is not a sump pump, can run dry and potentially burn itself out so it must be monitored. If you purchase one, be sure that it has any attachments necessary to attach a garden hose to it.

**NOTE:** *The electrical cord and the hose will come out of the top of the barrel, so you must work around that with whatever top you are using.*

## Multiple Barrels

Once you know how to build one barrel, you may find that you want more! If you want to capture more water, you can “daisychain” barrels together so that when one fills up, the second one takes the excess volume. The picture at right shows daisy-chained rain barrels alongside each other connected with Y-connectors and pieces of flexible hose (female connector at both ends).

With water seeking its own level, as the downspout barrel fills, the other barrels will fill too, although more slowly.

Alternatively, you can also go vertical. Stacked barrels can be plumbed and connected in many ways. Barrels lying on

their side can be connected using hard PVC plastic piping.


Barrels can be connected at the top



*Daisy chained rain barrels with Y-connectors.*

overflow or at the bottom. If the connections are made at the top of the barrel, you will need to have an outlet on each barrel because once the water level drops, there will be no other way to rid the water in the barrel. If the connections are made at the bottom, then an outlet is only necessary at the last barrel.

**Once you know how to build one barrel, you may find that you want more!**

The background is a vibrant, abstract composition. It features a dark purple and black gradient at the top, which transitions into a lighter blue and teal gradient at the bottom. A prominent white circle is positioned on the left side, and a large, pink, teardrop-shaped form is on the right. The entire scene is peppered with small, colorful specks and dots, creating a textured, starry effect.

PAINTING YOUR BARREL  
& ALTERNATIVE COVERS

*You can also paint your barrel or grow plants around the barrel, even using a trellis to conceal it.*

To paint your barrel, we recommend cleaning and priming your barrel. First, clean the exterior surface with a 1:1 mixture of vinegar and water.



You'll want to use a paint that adheres well to the rain barrel's plastic surface. One example is Krylon's Fusion for Plastic® spray paint. There are several new colors to match the color of your home, garage or shrubbery. One can of this brand's spray paint is \$4-\$5 in most retail stores.

### COVERAGE

One can of Fusion for Plastic® covers up to 25 feet. You can cover a rain barrel with one can but, to do a complete job, buy two cans — the barrel will look better. Darker colors require more paint. It's also good to have leftover paint to touch up your barrel if gets scraped later.

*\*Be sure to check with your HOA before you paint. Some may have covenants or restrictions about this.*

### OPTIONAL STEPS FOR BEST ADHESION

Sand the entire barrel with a 220 grit or finer sand paper before you clean it with an ammonia-based solvent cleaner. Be sure to use a sand paper that does not leave scratches. This extra step is well worth your time.

### NEED MORE COLORS?

You can use any kind of color primer and paint as long as the base coat is a paint that sticks to the plastic. Once the surface is covered in a paint such a Fusion for Plastic®, you can prime and paint with any type outdoor spray or brush paint.

### IDEAL CONDITIONS

Paint in a well-ventilated area; 50-85° F in low humidity.

**You can use any kind of color primer and paint as long as the base coat is a paint that sticks to plastic.**



*School children in Pickens, SC painted these colorful, fun rain barrels. Photo courtesy of Susan Bridges-Smith, Art Teacher, Pickens Elementary.*





*Painting these rain barrels was part of a school art project.  
Photo courtesy of Susan Bridges-Smith, Pickens Elementary.*

### HOW TO PAINT:

1. Cover spigot and overflow valve with masking tape.
2. Shake can vigorously for 2 minutes; hold it 8 to 10 inches from surface.
3. Spray in sweeping motion keeping even distance from surface. To keep from creating messy edges, sweep the spray starting away from the surface of the barrel (into the air), to the barrel surface, and then finish into air away from the barrel.
4. Begin by applying a thin coat and wait 30 seconds.
5. Apply multiple thin coats to avoid runs and drips.

### DRY TIME

15 minutes or less. Handle after 1 hour.

### RE-COAT

Before 24 hours or after 7 days.

### PRESERVATION RECOMMENDATION:

Use Armor All® car plastic preservative on your rain barrel a couple of times a year to brighten, condition and protect it for a long life.

## I DON'T WANT TO PAINT!

### *Any Alternatives?*

Hide your rain barrel the natural way. Get some plastic mesh or wiring and plant a hardy vine nearby. Allow the vine to climb up the mesh and cover the rain barrel — or build a simple box or fence out of trellis. There are some native plant alternatives as well:

- Carolina Jessamine (evergreen; part-shade), the State Flower;
- Evergreen Honeysuckle (evergreen; sun);
- Climbing Hydrangea (deciduous, shade);
- Akebia (evergreen; sun-shade);
- Clematis (deciduous, sun).

*Carolina Jessamine.  
Karen Russ, ©2007 HGIC, Clemson Extension.*





## Rain Gardens

And, while you're doing great things for the environment by minimizing runoff from your property and reducing treated water use, you can also direct flow from your rain barrel to a rain garden.

Rain gardens are vegetated depressions that intercept runoff from impervious surfaces and allow that runoff to infiltrate into the soil. In a rain garden, physical, chemical, and biological actions take place to remove pollutants from that runoff. For instance, sediment settles out, plants uptake nutrients, and microbes

remove bacteria and metals. For more information on how to build a rain garden, download the Rain Garden Manual for South Carolina at [www.clemson.edu/carolinaclear](http://www.clemson.edu/carolinaclear) or purchase the manual for \$4 at your local county Extension office.

# Other Ways to Conserve Water on the Home Landscape

- Drip irrigation allows water to be dispersed directly to the plant and minimizes water evaporating (water loss). More than a dozen fact sheets on irrigation exist at Clemson’s HGIC website, and one specifically focuses on drip irrigation (1811).
- Getting your soil tested will help you learn about what plants are suitable for a certain area of your yard. This will help you troubleshoot plant problems, as well. The best deal in town, a soil sample for \$6 at your county Extension office will save money wasted on plants that are not suitable, over-applying unnecessary fertilizers and watering plants to bring them back to life, when maybe they just were not supposed to be there to begin with!
- Putting the right plant in the right place may also prevent over-watering if a plant is not appropriate for an area’s conditions.
- Utilize the tallest recommended mowing height to reduce irrigation needs, which will also lead to strong, deep root systems. Recommended mowing heights for common grasses used in SC are below. In general, remove no more than 1/3 of the height of your grass blade.

TURFGRASS	CUTTING HEIGHT
Bahiagrass	3-4"
Common Bermudagrass	1-2"
Hybrid Bermudagrass	0.5-1.5"
Centipedegrass	1-2"
Zoysiagrass	1.5-2"

Source: HGIC Fact Sheet 1205, *Mowing Lawns* by Bob Polomski and Debbie Shaughnessy



Use compost to allow the soil to hold more moisture.

- Water plants only when they are showing signs of stress — like when you walk across your grass, and your footprint stays. Most lawns and plants need no more than 1 - 1.25" of rain per week. A rain gauge will help you decide when and how much to irrigate as well.
- Group plants of similar water needs together.
- Use soil amendments like compost to allow the soil to hold more moisture, extending the time between watering. Similarly mulch planted beds to lessen soil evaporation and extend time between watering.

**Utilize the tallest recommended mowing height to reduce irrigation needs, which will also lead to strong, deep root systems.**

## Frequently Asked Questions...more answers!

### 1. Is rainwater safe for my pets/wildlife/and human contact?

This is a question certainly requiring emphasis. Raindrops are pure, acquiring slight acidity as they fall through the air. Once in contact with your roof and container, though, rainwater is changed by dust, dirt, plant material, fecal matter from birds and rodents, pollen and so on. Collected rainwater is NOT suitable for consumption without further treatment. Contact with harvested rainwater is safe, though, and captured water can be tested through an irrigation analysis with your local county Extension office (\$25) to ascertain if your captured rainwater is suitable for gardening and irrigation.

### 2. I have a commercial rain barrel, but the overflow is small (3/4")...should I retrofit?

Based on rainfall amounts in South Carolina, this program does advise that the owner retrofit the rain barrel (following steps identified in each design) to accommodate a larger overflow of at least 1¼".

### 3. Where should I look to find a barrel to build my own?

This program has found food grade barrels for reuse and retrofit through feed supply stores, soda companies, Craigslist™, and farmers who have them for sale. If you find other unique sources, please tell us so that we can help spread the word!





## Resources and Links for More Information

- To find more on environmentally friendly practices for your yard and to become certified as having a *Carolina Yard*, seek out more information on the Carolina Yard & Neighborhood program here:



[www.clemson.edu/cyn](http://www.clemson.edu/cyn)

- Learn more about Do's and Don'ts around the home that can help protect your local environment here:

[www.epa.gov/owow\\_keep/nps/dosdont.html](http://www.epa.gov/owow_keep/nps/dosdont.html)

- HGIC Fact Sheets that are resources for many home landscape questions are here:

[www.clemson.edu/hgic](http://www.clemson.edu/hgic)

- Learn more about what watershed you live in and what water quality concerns are in your backyard here:

[cfpub.epa.gov/surf/locate/index.cfm](http://cfpub.epa.gov/surf/locate/index.cfm)

- See rainwater harvesting examples from around the world here:

[www.unep.or.jp/ietc/publications/urban/urbanenv-2/9.asp](http://www.unep.or.jp/ietc/publications/urban/urbanenv-2/9.asp)



- For a comprehensive review of rainwater harvesting, Texas A&M Cooperative Extension has a new Rainwater Harvesting Manual available here: <http://rainwaterharvesting.tamu.edu>

For more information on water quality protection, concerns and groups in South Carolina working to protect water quality and minimize the effects of stormwater, internet search **CAROLINA CLEAR!**



Map your rainwater harvesting efforts using the Low Impact Development Atlas at Carolina Clear's website!

[www.clemson.edu/carolinaclear](http://www.clemson.edu/carolinaclear)

Carolina Clear is a program of Clemson University's Public Service Activities. Information is provided by Faculty and Cooperative Extension Agents. Clemson University Cooperative Extension Service offers its programs to people of all ages, regardless of race, color, sex, religion, national origin, disability, political beliefs, sexual orientation, marital or family status and is an equal opportunity employer.

## **AUTHORS**

**Katie Giacalone**, *Clemson University Carolina Clear*

**David Joyner**, *Clemson Cooperative Extension Service*

**Marguerite Bishop**, *Formerly Clemson Cooperative Extension Service*

**Benjamin Powell**, *Clemson Cooperative Extension Service*

**Bill Blackston**, *Clemson University Carolina Clear*

**Sheri Armstrong**, *Lexington County Public Works*

**Synithia Williams**, *Lexington County Public Works*

**Terasa Young**, *Clemson Cooperative Extension Service*

**Mimi Sansbury**, *Clemson Master Gardener*

*The authors would like to thank the following people  
for their important contributions:*

**Richard Porter**, *Volunteer*

**Sherry Posey**, *Clemson Master Gardener*

**Linda Mungia**, *Clemson Extension Service*

**Susan Bridges-Smith**, *Pickens Elementary*

*This program greatly appreciates the contributions and efforts of  
the agents working with Carolina Clear as well as our partners across the state  
who have lended ideas and have attempted different designs to make  
these designs the most functional and efficient for the citizens of South Carolina.*

### IN THIS MANUAL...

<i>Common Sense Solutions</i>	2
<i>Rainfall in South Carolina</i>	3
<i>Planning Ahead</i>	4
<i>Barrel Types</i>	6
<i>Variations in Design</i>	9
<i>Three Rain Barrel Designs</i>	11
<i>Moving Water and Storing More Volume</i>	17
<i>Painting Your Barrel</i>	19
<i>Rain Gardens</i>	21
<i>Other Ways to Conserve Water on the Home Landscape</i>	22
<i>Questions and Answers</i>	23
<i>Resources</i>	24

---

## ABOUT RAINWATER HARVESTING

This manual seeks to inform  
the reader of the benefits –  
**environmental, financial  
and horticultural** –  
of small scale residential rainwater harvesting and  
prepare and lead the reader through designs for  
**building your own rain barrel**  
and taking additional steps towards having a  
**watershed-friendly  
home landscape.**



*For more information please visit:*  
[www.clemson.edu/carolinaclear](http://www.clemson.edu/carolinaclear)