

There are 101 ways to build a rain barrel. You get the water in, you get the water out, and always plan for overflow. This booklet is intended to help you make design decisions, whether you are building your own, or buying a ready-made rain barrel.

If your mind says “just tell me what to do!”, have a look at the material below, and pick from one of the designs that will later be offered in our gallery of designs.

If your mind says “I can do this better!” have a look at the material offered and tell us with you come up with.

While it is easy to become concerned with the details of rain barrel design, do not forget the bigger picture. A rain barrel is best used as an integrated part of a larger approach to keeping all of your water onsite. Always allow for infiltration. Recognize that there is a direct relationship between water and energy. It takes energy to treat and move water. It takes water to produce energy.

We won't cover all that here...but stay tuned.

Recommended reading: Rainwater Harvesting for the Drylands and Beyond, Volume 1, by Brad Lancaster.

Thanks for reading, and check by often, as there will be additions along the way. We would love your feedback and welcome questions or comments.

If you'd like to share your design, we would gladly add it to the upcoming gallery of designs.

Warmly,

Alabama Rain Catchers

A few FAQs:

What is a rain barrel?

Most rain barrels are 55–75 gallon containers, used to capture rain water. Often they are made of plastic, but can be made of any material that will hold water. You can easily make your own rain barrel or, buy one ready-made. Build that rain barrel, and keep learning as you go.

What is the difference between a rain barrel and a cistern?

Size. There are no size specifics, but generally rain barrels are less than 200 gals, and cisterns are very large, up to 10, 000 gallons. Sometimes, a cistern is defined as a concrete tank for holding water, and tanks made of other materials are called water tanks. The installation of a cistern/water tank might need the help of a professional, while rain barrels are easy for anyone to install. A rain barrel is a great place to get started.

How much water can I catch?

It depends on the size of your catchment area.

For a rough estimate:

From 1 sq ft of roof, in a 1' rainfall, you'll get .62 gallons of water.

From a 1000 sq ft roof, in a 1" rainfall, you'll get 620 gallons water.

Average rainfall in AI is 52" per year.

Yes, that means that a 2000 sq ft roof could yield 64,480 gallons in an average year.

How can I use my rain barrel water?

- Give a drink to your garden & potted plants...plants love rainwater
- Wash your car, fill the birdbath, water livestock
- Replenish water features
- Wash tools and moisten compost piles
- Use the rain barrel to catch and move water away from the house and towards a needy area.

Water from you rain barrel is NOT for drinking.

It is possible to install a rain water harvesting system that can provide for ALL of your potable and non-potable needs, but a rain barrel is not that system.

With no treatment, captured rainwater can flush you toilets and do laundry.

With treatment, you can shower, wash dishes and drink rainwater.

Building a Rain Barrel

Containers

You can easily find new barrels, if you are willing to pay the hefty price tag. A new 55 gal barrel might cost \$100.00.

Fortunately it is easy enough to find used barrels. Be sure that the salvaged barrels:

- Have not held toxic materials
- Are made of food grade plastic
- Depending on your design, you may need both bung caps

Where to get them

- Soft drink bottlers, food service providers, recycling businesses, feed stores, junk stores, car washes
- Look in the yellow pages

Bigger is better. Most barrels will hold 55 gals, but you might find some that are larger. Used 300 gallon plastic cubes are also available; they measure about 3ftx 3ft. These cubes will need a little more effort to install, and might need a pump to distribute water.

Catchment

Catchment area is the area from which you'll harvest water. This can be an area of land, a parking lot, a roof... anywhere that rain falls. For our purposes catchment area will refer to your roof. Your roof generously provides a large volume of easily accessible water. If you have gutters, the collection is even easier.

To figure your catchment area, measure the footprint of your house. Don't worry about pitch or multiple roof lines, just measure the footprint.

For every 1 sq ft of roof, in a 1" rainfall, you'll get .62 gallons of water.

That .62 is a theoretical number. In reality, you will collect slightly less. Things like wind, gutter design, roof material and evaporation can affect the amount of rainwater that you actually catch. Also, if your rain barrel is not directly connected to the downspout, you'll lose some due to splashing.

If you are designing a larger system, you'll need to take all of these factors into the accounting. For a rain barrel, these factors don't matter so much, since your rain barrel is very small in proportion to the volume of water it will receive from your roof. A 10 ft x 10 ft shed, during a 1" rainfall, will provide enough water to fill a 55 gallon rain barrel.

Consider how much rainfall that your area receives in one year. Alabama averages about 56 inches per year, depending on the region. Rainfall varies month by month, as do your water needs. Have a look at rainfall data for your region to get a better idea of how much water your catchment area will provide.

If your rain barrel is under a gutter downspout, it is recommended that you have no more than 500– 700 sq ft of catchment area that feeds the barrel.

"How do I know how much area feeds my downspout?"

Have a look at your roof and gutters. Downspouts are usually equally spaced. If your roof footprint is 2000 sq ft, and you have 6 gutters, the area feeding the downspout might be 333 sq. ft.

If your barrel is under a roof valley, look at how many sq ft feed this valley.

If your barrel is under an eave/ drip line, you will collect water more slowly, but you'll still get plenty of water. Again, it depends on the size of the catchment area.

Getting the water in

There are two general options for getting water into your barrel:

- An Open Top fed by:
 - A gutter directed towards the top of the barrel
 - A barrel under the eaves/ dripline
- A Direct Downspout Connection

The Open Top

Not Directly Connected to Downspout

Advantages

- Overflow sizing less critical
- Gutter backup not possible
- Easier to install

Disadvantages

- Splashing water
- Less efficient

One simple way to do this is to remove the top of you barrel, leaving the rim intact, and covering the opening with fiberglass screen, secured with a bungee cord. This is dangerous. It has been observed that cats think of the screened top as a hammock. Great until the bungee or screen fails. A person in New Mexico recently drowned while trying to retrieve a cat from a rain barrel. Don't even think about curious kids.

Keep the opening large enough for rain, but small and secure enough for safety.

A Few Options for the Open Top:

One opening:

Cut a hole in the top, the hole can be any size or shape. Cover with screen and hardware cloth. Affix with screws with washers. This is easy, but means a little more trouble (you'll have to back out the screws that attach the screen) to access the inside for periodic rinsing.

- Do leave the barrel rim intact, as it gives more structural integrity to the barrel.
- Be sure that the cover is secure, to prevent accidental drowning of small animals and curious children

The Polka Dot

Cut a series of large holes in the top, using a hole saw or large spade bit. It will still need to be covered with screen, to exclude mosquitoes. This design is very safe, but means difficulty in accessing the inside. It is also harder to rinse out the plastic shavings that are produced when you drill into plastic.

Notes: The screws used should be for outside use, otherwise they will rust. Washers will keep the hardware cloth more secure, and help to keep the screen from tearing. There are screws made for metal roofing that come with neoprene washers.

Inserts

Cut a hole in the top sized to accommodate a flower pot, hanging basket, aquatic plant basket, large plastic plant saucer, colander or whatever your creativity provides.

The insert should:

- Allow for water to pass thru quickly
- Exclude mosquitoes and debris (you can line with screen and/or gravel)
- Have a lip/flange that will allow it to hang easily. A larger lip will mean less precision when cutting the hole.
- Be sure that the level of your overflow is below the bottom level of your insert. If it isn't, the insert becomes a funky tea bag when the barrel is full

We like an insert that is commercially available. It is shallow, so that the level of the overflow can be high, therefore, you don't lose capacity. It has a wide flange, so the hole can be less precise. It is easy to remove for cleaning, and is large enough (1 1/4") to provide pretty good access to the inside of the barrel.

The 12" Rainwater Collection Screen is available for about \$15.00 from RainHarvest Systems. Shipping costs vary. Rainharvest.com

Direct downspout connection

If you have gutters, you can connect a downspout directly into the barrel.

Advantages

- No splashing around the barrel, or on your house
Too much water around the barrel can cause the barrel platform to erode or water seepage into your foundation.
- More Efficient, no water is lost

Disadvantages

- Water can back up into your gutters
This can result in property damage
- More attention to sizing the overflow
You must have an adequately sized overflow valve

If you have a tight connection between the downspout and the barrel, and your overflow valve isn't large enough, excess water can back up into your gutter system. That excess will find the weakest point to escape.

There are ways around this, but it must be considered. It is not a problem in areas with low rainfall intensity, but folks in Alabama know that rain can come hard and fast. Do plan for overflow.

- More parts and labor for installation

Using a direct downspout connection is the best way to connect a larger system, and just fine to connect a rain barrel, but be aware of the consequences if you don't plan for overflow.

Making Direct Connections between the Downspout and Rain Barrel:

The downspout is likely too close to the house to feed it straight down into the barrel. Depending on your situation, the downspout may be cut or a section of downspout can be removed. The downspout can be cut with a hacksaw or reciprocating saw. It can also be temporarily removed and cut with a chop-saw.

A visit to the local hardware store or gutter supply house will yield many options. Before you shop, measure the length of connection needed. It is helpful to take photos to the store.

Note that all downspouts are not the same size. Most are 3 x 5", but have a look at yours before you visit the store.

The fittings described below can be attached directly to the barrel, or used to direct a downspout into an open top barrel.

Gutter Elbows

This will be a rigid connection, so you'll need to be more careful with measurements.

Flexible Downspout Adapters

You'll find at least two variations of flex adapters. Both will extend to greater length. The label will tell you how long it will reach.

One type of flex adapter will be found with the gutter parts. Those that are locally available can be inserted directly into the downspout. For some, you might need an adapter in order to join the flex adapter with the downspout. This type of flex adapter can be fed directly into the barrel, or you might find a round adapter that would give a neater junction.

The other type of flex adapter is designed to connect with a 4" corrugated pipe. This is the kind of pipe used for French drains, and these flex adapters are often found with the 4" corrugated pipe. This type of flex adapter needs an adapter ring to join it with the gutter downspout. This type of adapter can be fitted with a 4" atrium grate, which will catch some of the debris before it enters your barrel. The atrium grate can be covered with a panty-hose knee hi, to provide extra filtration.

All barrel connections should be tight enough to exclude mosquitoes. Screen can be added to provide mosquito exclusion and provide extra filtration. Fiberglass screen is easier to cut and handle than metal screen. It is not recommended to seal the connections with caulk, as you will want to remove the connection for periodic rinsing of the inside. You might try Magic Tape, if you need to seal an opening.

Getting the water out

- There are lots of ways to tap your barrel, the biggest concern is whether the fitting will leak or not.
- Think about how often you will access your barrel, and how you will use it. If you will drag a hose from the spigot frequently, you'll need a more secure fitting.
- Some folks just connect the barrel to a soaker hose, or run a hose to a tree and leave the spigot open. In this case, you can get by with a less secure fitting.

Types of Fittings

- Spigots

Hose bibbs.

This is the most familiar type of spigot. It sticks out a little more than other options, so it is easier to attach a hose, or fill a watering can. The length also means more stress on the attachment point.

Boiler Drains

Short and stubby, so it is less convenient to attach a hose or fill a watering can, but it causes less stress on the attachment point.

Kink-Free Hose Bibbs

Basically the same as a hose bibb, but shorter.

Attaching the Spigot

Consider how much access you will have to the inside. If you have a 4" opening in the top, it will be difficult to reach the inside of the barrel.

While you can simply drill a hole and insert the spigot, it will eventually leak. It depends on how often and how you use the spigot. If you don't mind a little leakage, don't worry.

All of the above spigots are male. For $\frac{3}{4}$ " spigots, you need to drill a $\frac{15}{16}$ " or 1" hole. The $\frac{15}{16}$ " is tighter, but difficult to screw in and keep flush.

It is recommended that you insert the spigot thru a 1' inside diameter washer before you screw the spigot into the outside of the barrel.

Also recommended is a fitting on the inside of the barrel. This will give more stability to the spigot. A pvc tee is easy to attach and turn, but any $\frac{3}{4}$ " female threaded fitting will work. A conduit locknut works, but will rust.

- Teflon Tape. The spigot threads should be wrapped with Teflon plumbers tape. Screw in the spigot, then back the spigot out. This taps the hole. Then wrap with tape and re-insert. You could add a dab of silicone caulk, if desired. If you opt to add silicone caulk, be sure that it is paintable, as you will want to paint the completed rain barrel.
- To tap or not to tap? A tap is a tool that puts threads in a surface, in this case, the plastic barrel wall. The rule of thumb is that a tapped hole needs 3-4 threads to make the threads grab the fitting. I can't say if the barrel wall is that thick. Tapping the hole

does make it easier to insert the spigot, especially if you are using a 15/16" bit. Most folks don't have a tap, and they are expensive... \$60.00–\$95.00. If you have one, go for it.

- Epoxies. Epoxies are a good way to provide a leak-proof seal between the barrel wall and spigot. Be sure that that the epoxy is made for underwater use, safe for potable water and designed to be used with both plastic and metal. If you use epoxy, skip the Teflon tape.
- PVC cement. PVC cement acts by slightly dissolving the surface of a pvc fitting, so that two pvc pieces are fused, not glued. I have observed pvc cement to have no effect on plastic barrels (they aren't made of pvc). I can see no reason to use pvc cement to join high density plastic with metal. If someone has different information, please let me know.
- Gorilla glue. Yes, I too am a fan of Gorilla Glue, but it doesn't work for rain barrels. We tried it already.

Bulkhead Fittings

The most secure and leak proof way to attach a spigot.

The bulkhead is made of two pieces that screw together, and two gaskets. The center is threaded to accommodate a 3/4" spigot. The two pieces are designed to sandwich the barrel wall between them.

A bulkhead fitting is the best way, but can be expensive. Plumbing supply stores carry them for \$10.00–\$15.00. Our source for affordable bulkhead fittings is rainharvest.com, they have them for \$4.00.

Installing the bulkhead

- Take the bulkhead apart. Note that it left-hand threaded, so you'll need to turn it in the opposite direction than you would normally turn.

- From the inside of the barrel, insert the male side of the bulkhead and its gasket thru a 1 3/8" hole. This is the size hole for RainHarvest Systems bulkheads, the size can vary by brand.
- If you can't reach the inside of the barrel, run the fitting down a coat hanger or piece of wire. You'll be able to easily pull it thru the hole with your fingers.
- Thread the female side and its gasket from the outside. Wrap your spigot threads with Teflon tape and screw it in to the bulkhead. Done.

- Using the bung cap

If you examine the bung caps, you'll see that the caps have a threaded depression. The threads can be used to attach a 3/4" hose bibb, boiler drain, or silcock. Drill out the seal in the threaded depression. Use a 13/16" bit, using care to not damage the threads.

To do this, you'll need to turn the barrel upside down, with bung caps on the bottom, or lay the barrel on its side.

- Hose Adapters

- A hose adapter will allow you to attach a hose directly to the barrel, without a spigot. This is not cheaper than a spigot, even though it is a simpler fitting. I cannot explain this. If the end of the hose is above the level of water in the barrel, no water will come out of the hose. Or you can add a cut-off on the hose. These are available with the hose repair fittings. Don't plan to kink/ clamp your hose, unless you want the hose to spring a leak.

- Note that there are several types of hose adapters, the threads can be different. If you want to attach a hose, you'll need hose threads.

Watts # A-665 Hose thread x Pipe thread

Watts# A-680 Hose threads on both sides

- Improvised Bulkhead fittings

Use a female silcock on the outside with a male pvc adapter on the inside of the barrel. Add a 1" inside diameter washer on the inside

and outside. This works great, but is difficult to install unless you have a large opening to reach the inside of the barrel. Or very long arms.

- No Fitting: Dipping

There is no law that you must use a fitting. You can fashion an easily removable lid and dip water with a watering can, gourd, turtle shell or Grecian urn. If you need something to do.

Dealing with overflow

- You will have overflow

If your rain barrel has a tight connection between the downspout and the barrel, and water comes into your barrel faster than it can get out through the overflow valve, water can back up into your gutter system. The water will find the weakest point to escape, which can result in property damage.

If your barrel is not directly connected to the downspout, any backup will come out of the opening in the top. If there is too much water that flows over the top, the area around your rain barrel can become eroded or water can seep into your foundation.

There are several factors to consider when sizing the overflow; catchment area, gutter size, rainfall intensity and how far your overflow valve is from the top of the barrel.

It is recommended that you have no more than 500–700 sq ft of catchment area feeding your barrel.

In general, an 1 ½" overflow valve is adequate. Yes, you can use a 4" overflow, if you want to.

There are ways to prevent gutter backup, in case of torrential rain:

If you expect an unusually large storm, drain the barrel and leave the spigot open.

Downspout vents. Make an opening in the downspout. It will give backup a place to go. To make it look tidy, you might use a pvc fitting, such as an adapter or ell.

Add a tee to the downspout. You might have to buy this from a gutter supplier. Our local big-box stores don't have them.

Extra hole in the barrel. Remove one of the bung caps and cover with screen.

Use two overflow valves. This gives you two ways to utilize the overflow.

Downspout diverters. Commercially available devices that divert water from the barrel back into the gutter system. Some are automatic; others require you to turn a lever.

Be sure to utilize your overflow. Do not send to stormdrain or impervious areas. Always allow for infiltration.

Sunscreen for Your New Friend

A home made rain barrel will need sunscreen.

- If light reaches the water inside your barrel, algae will grow. Algae are wonderful, but smell bad and can stain surfaces.
- Most plastics do not have UV inhibitors. UV will make your plastic barrel degrade.

There are several ways to provide sunscreen:

Paint

The most popular sunscreen is paint. Paint gives sunscreen and can help your rain barrel blend in with its surroundings.

- Paint must be formulated to adhere to plastics. Most of these paints are spray paint. Read the label.
- Primer. You might also use a primer that is formulated to prepare a plastic surface for ordinary exterior latex paint. This will allow you to use the same color as your house.

Shade

Depending on your situation, you might be able to place the rain barrel under a deck or other structure. With enough shade, you won't need to paint.

Covers

Yes, you can throw a tarp or shadecloth over your barrel, as long as water can still get in and out.

Locating Your Barrel

Finding the perfect spot

Where do you intend to use the water?

Do you have gutters? If so, where are the downspouts?

No gutters? Where does the most water come from the roof? A roof valley can provide a lot of water.

Gravity is your friend.

Be sure that the barrel is uphill from the area that you will use the water. Water will not flow uphill without a pump.

Most folks put the barrel on concrete blocks or some other very sturdy platform. This gives better flow and easier access to the spigot. The platform must be able to support 400+ lbs. and it must be level.

Ideally the ground around your barrel should be sloped away from the house. Some clever people create a dry stream bed that leads water away from the barrel.

A full barrel weighs over 400lbs., be sure that it cannot tip over. Also be sure that the base is very strong and stable. Most decks are not designed for such a load in a small space. If you place the rain barrel on your deck, the deck will likely need to be reinforced.

Where will you direct the overflow? In Alabama, you will have plenty of overflow, plan on utilizing that overflow as a secondary resource.

Mosquitoes. Any openings in your barrel should be covered with screen. The screen should exclude mosquitoes and large debris. If mosquitoes gain access, drain the water and find their access. Mosquito dunks may also be used. Mosquito dunks are a disease selected to kill only mosquitoes. Be sure that your dunks are made with *Bacillus thuringiensis*, not chemical insecticides. Do not use other insecticides. You might also add fish to the barrel.

Daisy Chains

It's easy to connect several barrels in series to increase capacity.

Connected at the top:

The overflow from one fills the next one. Each barrel needs a spigot. They can all be at the same level or not.

Connected at the Bottom:

They function as one unit. They fill at the same level as water enters. Only one needs a spigot. They must be at the same level.