Rain Water Harvesting

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Some photos from NCSU Water Quality presentation

What is rain water harvesting?

- Simply put it is diverting rain water that otherwise would run off or soak in the ground into a storage device – cistern for later use in the landscape or other non-potable water needs.

System Overview

... many types of systems…from big to small

Whether you have a large tank or a small barrel the simplest way to connect is directly into the gutter downspout by diverting the downspout into the tank (here a straining device is being used to keep out debris).

Water harvesting system installation

- Installation Considerations
  - Size

    Drainage area, demand
  - Cistern Style

    Wood Wrap, Metal, Plastic
  - Location

    Gutters, water use, aesthetics, home owners assoc. rules, etc
  - Site Preparation

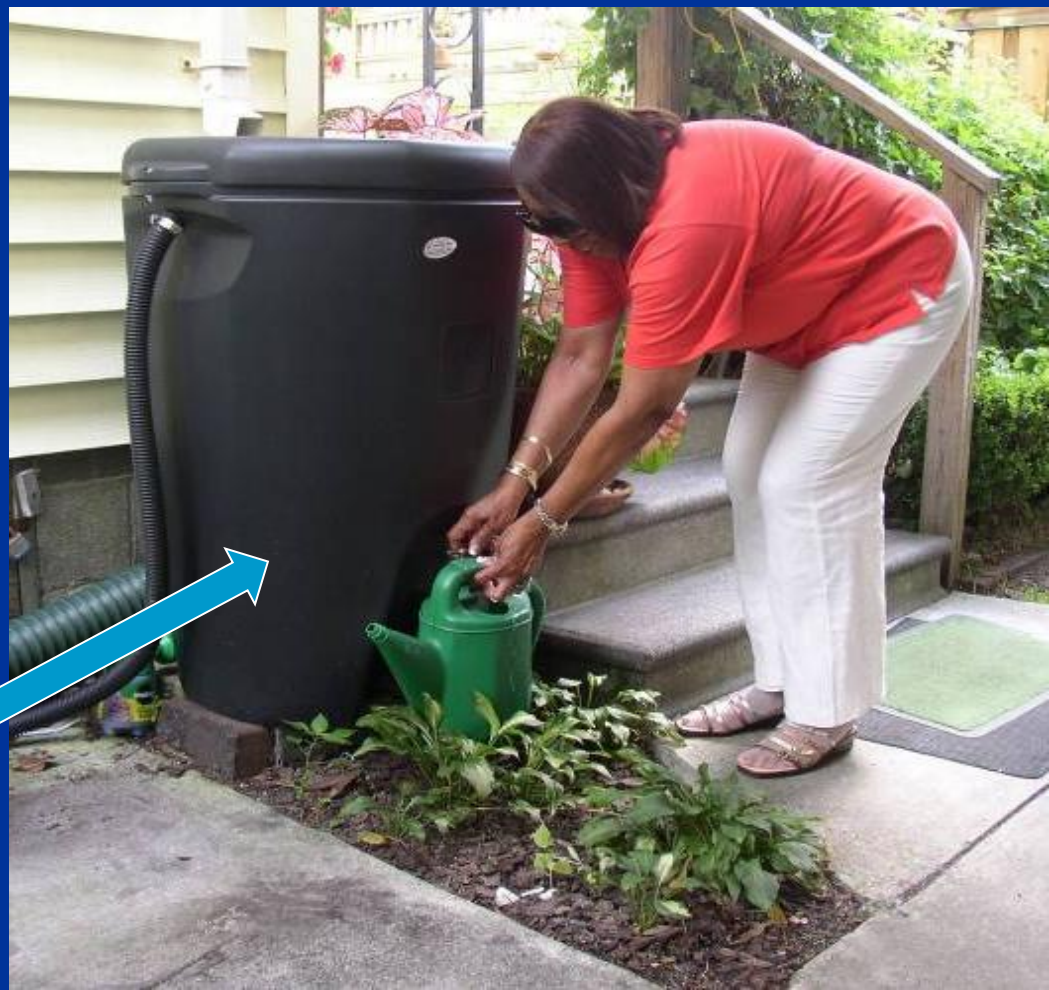
    Will digging be required
  - Cistern Placement

    Above or below ground, etc

For irrigation this may be the future for everyone

Big

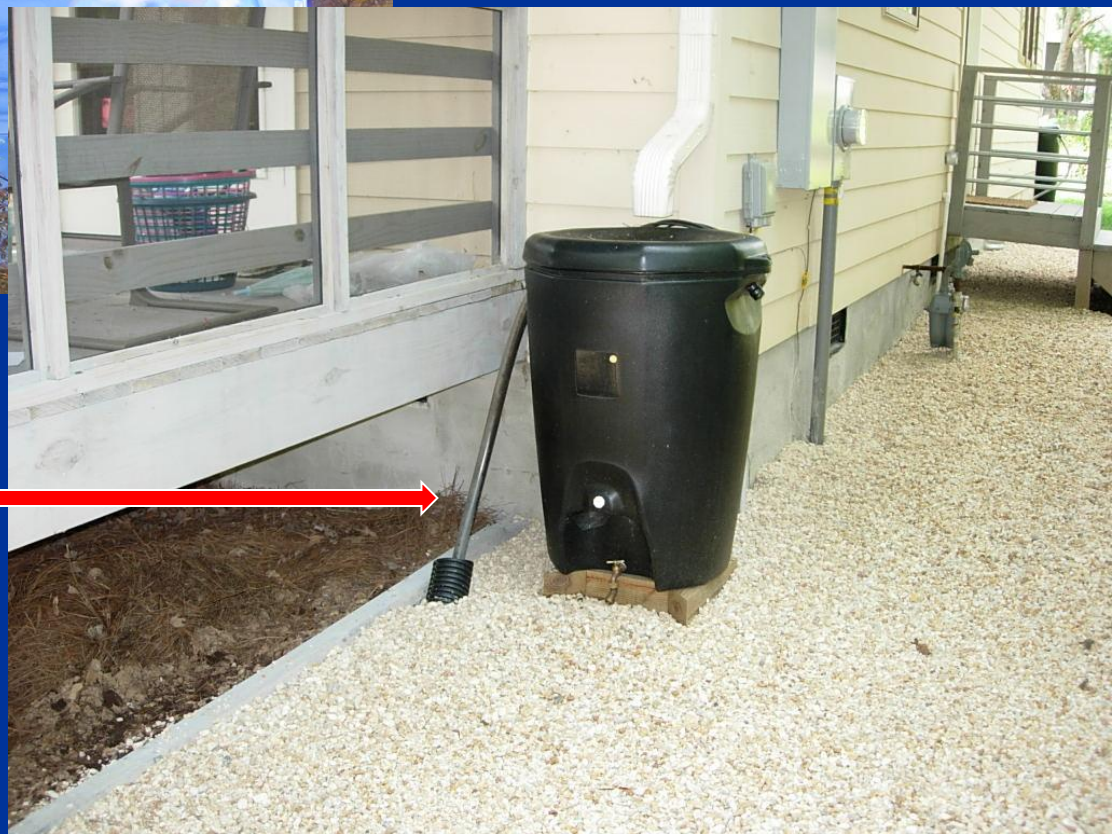
Very expensive but possible to irrigate a commercial site



Small

Inexpensive but limited storage capacity

Commercial applications work exactly the same but require more engineering to size correctly

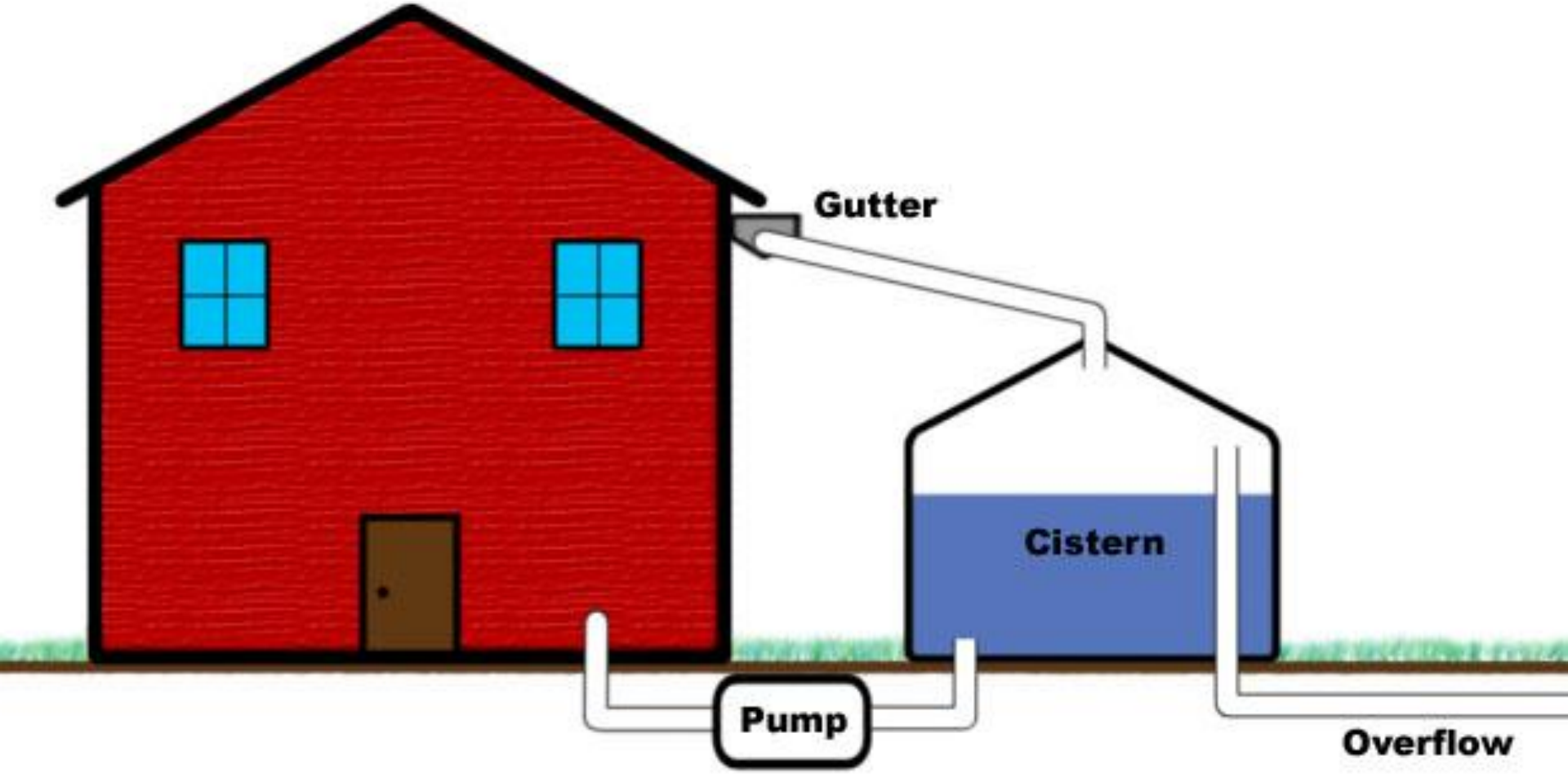


Notice the overflow diversion to an underground perforated pipe. It could also be diverted to a Rain Garden

This commercial system fits the site very well

Overflow is being diverted to a rain garden on the other side of the boardwalk away from the building

Larger System - Basic Design



In this system water is being used in the landscape and in the toilets

Capture Volume

You may compute the surface area to get an approximation of how much water to expect with a given rain fall.

A one inch rain will provide about .62 gallons of water per one square feet.

Therefore, a small area 10 x 10 or 100 sq/ft would provide 62 gallons in a one inch rain event. An average house would have 1500 – 2500 sq/ft and could capture 930 to 1550 in a one inch rain event.

An Average Rain Barrel of 50 gallons only needs about 50 to 100 sq.ft. of roof area

Making Gutter Connections

The closer the tank is to the gutter the easier and less expensive the hook up will be.

Making Gutter Connections

Inlet Basket Filter – just like your gutter it needs occasional cleaning

Over-Flow

First-Flush Diverter has a flush cap on the end at base


Plumbing 101:
Dry-fit the pieces
BEFORE you glue!
DANGER
NOT ENTER
AUTHORIZED
ERSONNEL ONLY


This tank has a built in, removable screen
300
365 GALLON
Kit

300 gallon cistern from previous slide

Captures a 1.0” rain off this side of the roof

- Tank - $280 - $400
- Downspout Filter - $ 80
- 1st Flush Diverter - $80
- Fittings + Pipe – $40
- Concrete Pad + Blocks - $40
- TOTAL - $520 - $640
- Small submersible pump not included.

Multiple Barrel Systems

Option to large tanks.

How many can you connect

- It depends on your roof capacity
- Remember: a small area 10 x 10 or 100 sq/ft would provide 62 gallons in a one inch rain event.
- Therefore one side of a 40 x 50 roof would be 1000 sq/ft and would provide 620 gallons in a one inch rain event (all 10 barrels would fill)

Rain Barrel Considerations

- Off the ground for ease of use and better gravity flow
- Faucet position a few inches high to allow trash to settle

Other Points to Consider

- What size should the overflow be?
- How do I get the water where I need it if my garden is uphill?
- Is it visible or hidden (how does it look)?
- What was in the barrel?
- Will algae growth be an issue?
- Beware of danger!
- Requires some maintenance!
- Can I use this water on edible crops safely?

Undersized overflows

If the downspout is diverted full flow to the top of the barrel the overflow should be as large as the inflow.

If you use a small flow diverter this is not a problem but you may not fill your barrel in small rain events and calculations for harvest potential will be off

This Old House diverter install

Getting water where you want it when gravity won't do the job.

- Small Submersible Pumps can do a nice job but the top must be easily removed to take the pump in and out.

The View

They can be showy and whimsical to very decorative depending on:

- Taste
- Landscape style
- Visibility

Algae Growth Concerns

Algae growth is dependent on photosynthesis.

Clear or translucent (white) barrels will have algae growth if water is not used frequently.

You could paint it with a plastic coat type paint product (Krylon Fusion or Valspar Plastic Paint)

Also, you can get submersible bacterial packets sold in pond supply stores.

Clean Barrel Thoroughly (avoid containers that have had caustic chemicals, herbicides, etc)

Open containers present a drowning hazard

In addition it presents an excellent mosquito breeding area

Everything needs a little care

Clean both the top and the inside to remove trash.

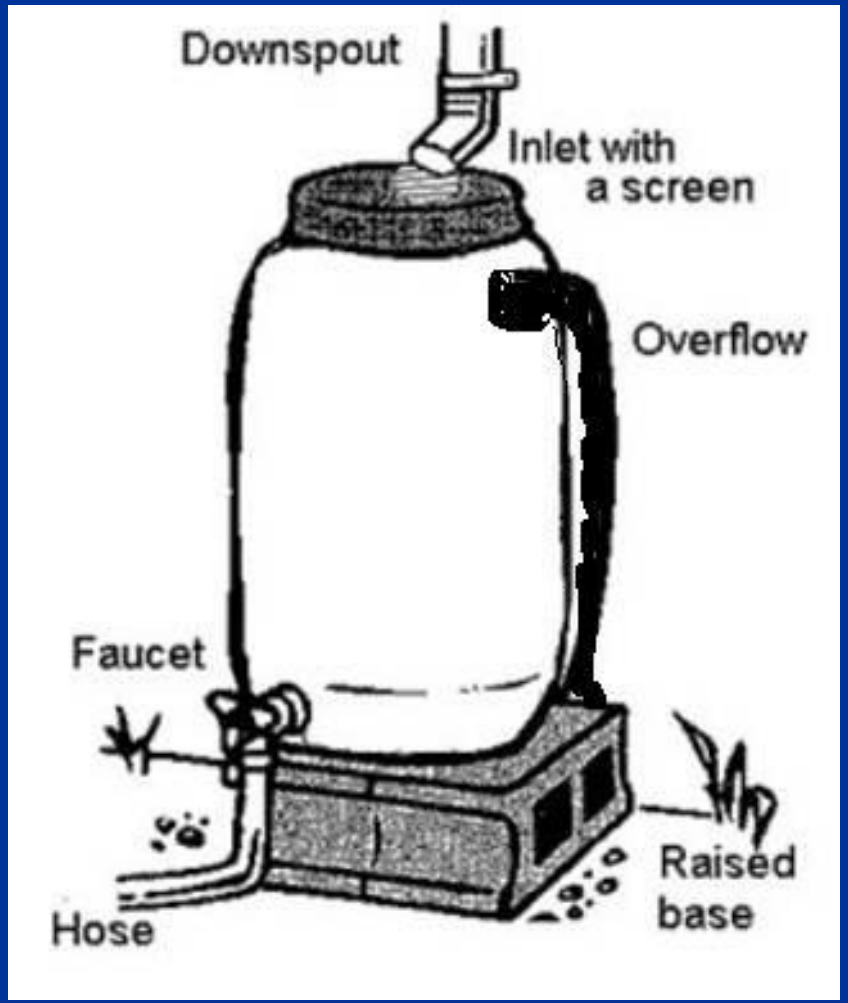
Just like your gutters they will stop up.

Can rain water be used on edible plants?

- Yes, but only in the same way that other non-potable water is used – in the ground only.
- Avoid using overhead irrigation – don't wet the foliage or fruit (Drip Irrigation is great)
- This prevents contamination of edible above the ground plant parts that are hard to clean, especially leafy greens.
- The vegetable may not be safe unless thoroughly washed using potable (drinking) water.

Simple design like we will demonstrate

- Screened inlet for mosquito and trash exclusion
- Overflow hole approximately the same size as the inlet gutter
- Faucet a few inches off the bottom to exclude trash and allow for gravity flow
- On a secure level base for safety and better water flow and access



Access hole and hole to place aquatic basket

Cut entry hole slightly smaller than the aquatic basket so it won't fall through.

Our faucet hole is drilled with a 15/16” drill bit

Once the whole is drilled you may use a pipe thread making tool (tap - fairly expensive for one time use) to make ¾” threads to fit.

I 1” drill bit can be hand threaded with a slight chance of a drip leak developing. Use a washer to reduce the chance of a leak.

Make someone young and flexible do this part.

We used a PVC - T with threads on one side to tighten the faucet to the barrel with a rubber washer placed over the threads of the faucet and the T tightened to snug

Inside view of T

Line the basket with screen to exclude mosquitoes

These aquatic plant baskets work great to filter debris and allow for easy access into the barrel

Overflow

Make the overflow at least 3” in diameter.

We used 3” S&D thin walled drain pipe with a coupling inside and a downturned elbow outside

Finished barrel

Flexible downspout extender

3” overflow pipe diverted to drain

¾” hose bib faucet

Elevated for easy access and better flow

Innovative design by Bob Mead for solid barrels

Barrel is turned upside down.

Hose connector is in the lid (now on the bottom) in pre-made threaded holes and is directed out via a threaded elbow.

Cutoff valve and hose end adapter is used instead of a hose bib faucet.

Trash is screened in gutter with ½" hardware cloth rectangular box stuck into the outlet (as shown above).

Overflow is out the top via 3" or 4" PVC Thin Walled Pipe and then directed wherever desired

Other Bob Mead Creations

Local Sources of Rain Barrels and Cisterns:

Bob Mead – Makes Rain Barrels

205-324-1345

205-901-8405

Email: Fallenrock@aol.com

Nature's Tap – Designs Cisterns Systems
Local source for larger systems

205-870-2215

Email: Scott@Naturestap.com

Coca Cola Company

Empty barrels only

205-841-2653

Jefferson County Master Gardeners

Source to order recycled tanks

205-568-0005 (Tony Glover)

Email: gloveta@aces.edu

300 Gallon Recycled Tanks

Rain barrels need not look like they came from outer space

You can dress them up any way you like

Questions?