

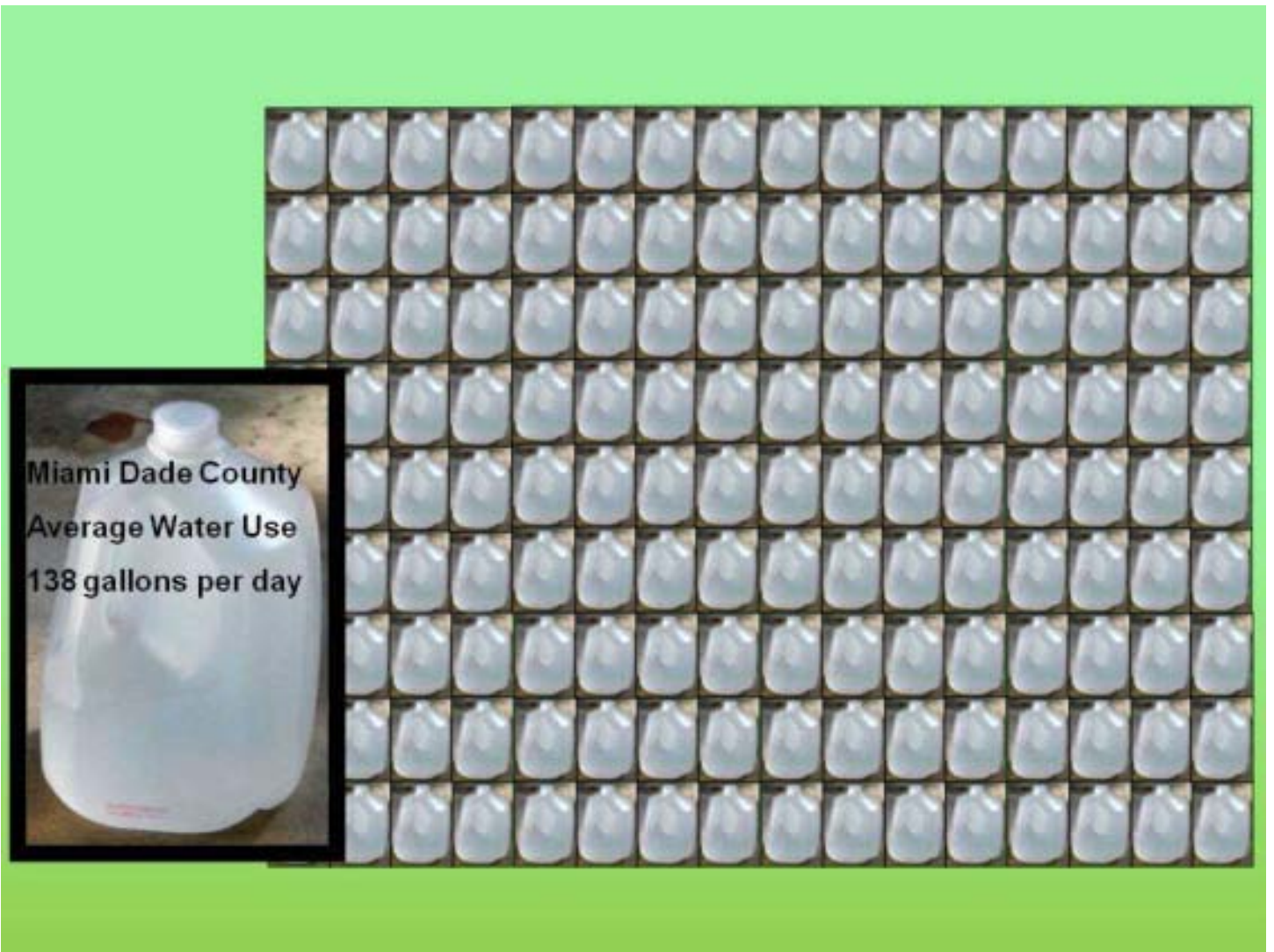


Water Conservation and Rain Barrels: A simple way to save water.

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Florida Yards & Neighborhoods Program
Miami-Dade County Cooperative Extension Division of Consumer Services Department
University of Florida/IFAS
In cooperation with
Miami-Dade Water & Sewer Department



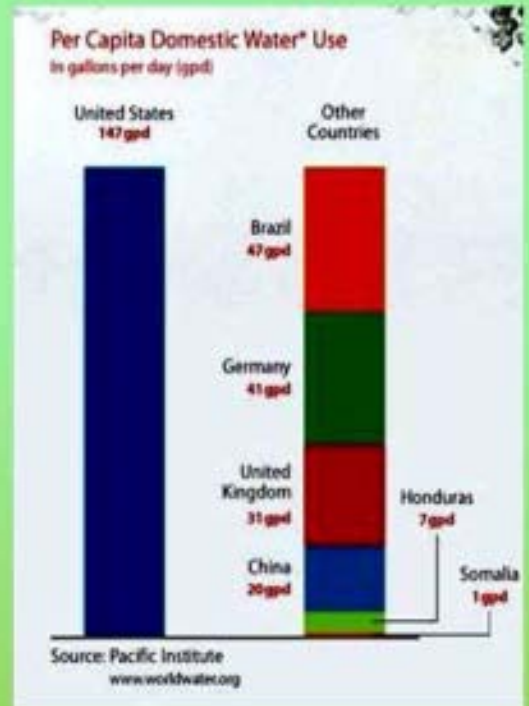
Miami Dade County residents use an average of 138 gallons per person per day. Water usage calculations are for residential water use. WASD is not able to calculate the water used from private un-metered wells. We can however, compare the water usage of beach residents who do not have access to the aquifer for irrigation and note that their water usage is significantly higher.

How does our water usage compare?

How do we use 138 gallons per day?



Outside around 50% of total water



How does our water usage compare? The comparison graph is from worldwater.org. and compares the countries noted to an estimated U.S. national average of 147 gallons per person per day.

Where and how we use water of course varies slightly from person to person and estimates range from 30 to 60% of our water is used for outdoor purposes (recreation, irrigation).

Where does our water come from?

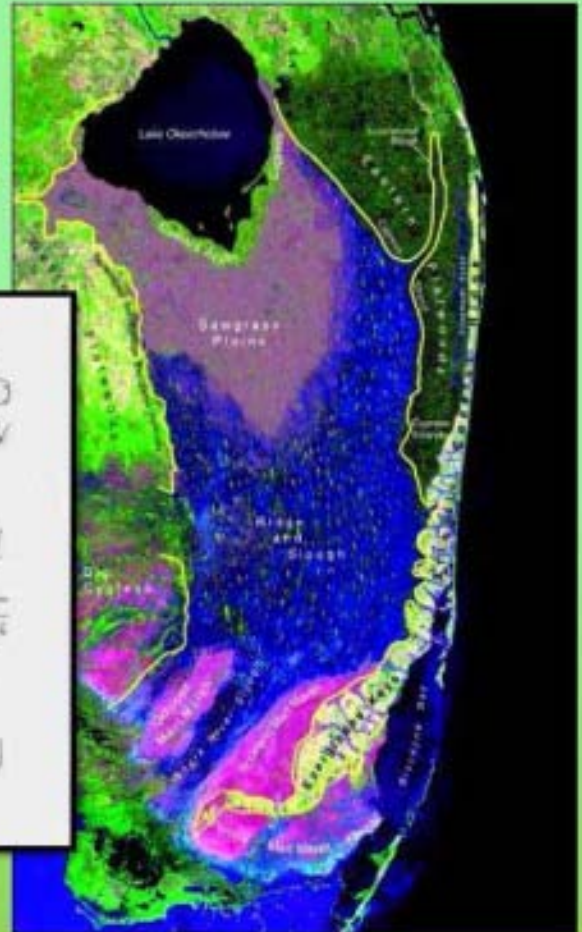
How does the aquifer recharge?

What about the quality of our water?

What about Lake "O"?



The Miami "Rain Machine"



How much do you know about our water resources in So. Florida, Miami-Dade County?

Our water comes from the Biscayne Aquifer and it is primarily recharged from rain fall. The Biscayne Aquifer is a sweet drinking water aquifer-rain fall percolates through our soils into coral rock creating underground pockets of alkaline water which has a naturally "sweet" taste.

Our drinking water wins awards for its purity. Connect to *WASD I Love Tap* and learn more about our water. <http://www.miamidade.gov/wasd/tapwater.asp>

What about the level of Lake "O".

Critical concern about the water level of Lake Okeechobee came into our awareness after SFWMD ordered the release of water from Lake O due to an approaching hurricane in the very active 2004 hurricane season. An approaching hurricane was predicted to bring large amounts of rain to the lake area. Water was released in preparation however the hurricane did not

bring rain as predicted. For the next 18 months we heard daily reports on the local news about the level of Lake Okeechobee. Lake O is part of our back up water supply.

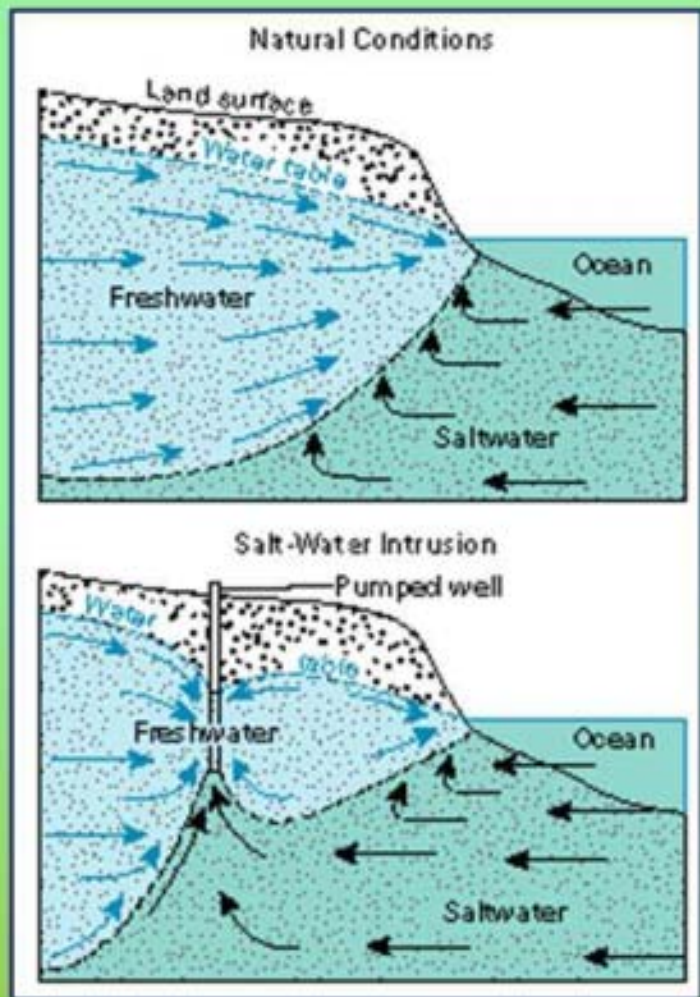
You can view the history of the 2004 hurricane season:

<http://www.nhc.noaa.gov/HAW2/english/history.shtml>

Which hurricane's approach precipitated the release of water from Lake "O", was it CHARLEY, FRANCES, IVAN or JEANE?

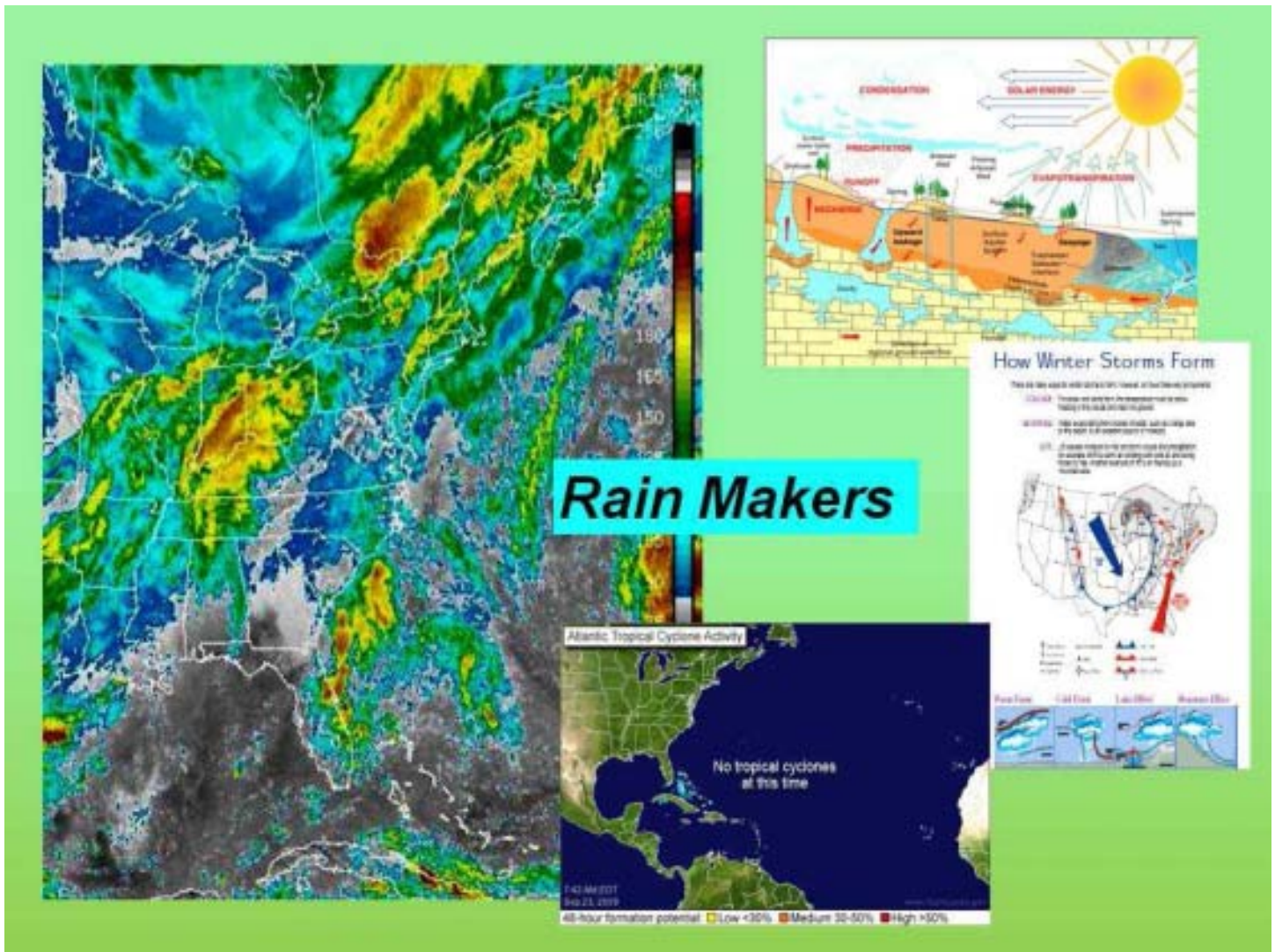
This incident served to bring the importance of water conservation to the attention of all of us.

Early May



The later part of the 2009 dry season taught us to look beyond the level of Lake O.

The USGS map from May 2009 shows well fields at record lows particularly in the south east area of Miami Dade County. The illustration to the right shows how salt water intrusion can occur once a well field water level falls below sea level. Once salt water intrusion occurs water from the well must now be further processed by reverse osmosis to remove salt before it can be used for drinking or irrigation.



Rain Makers

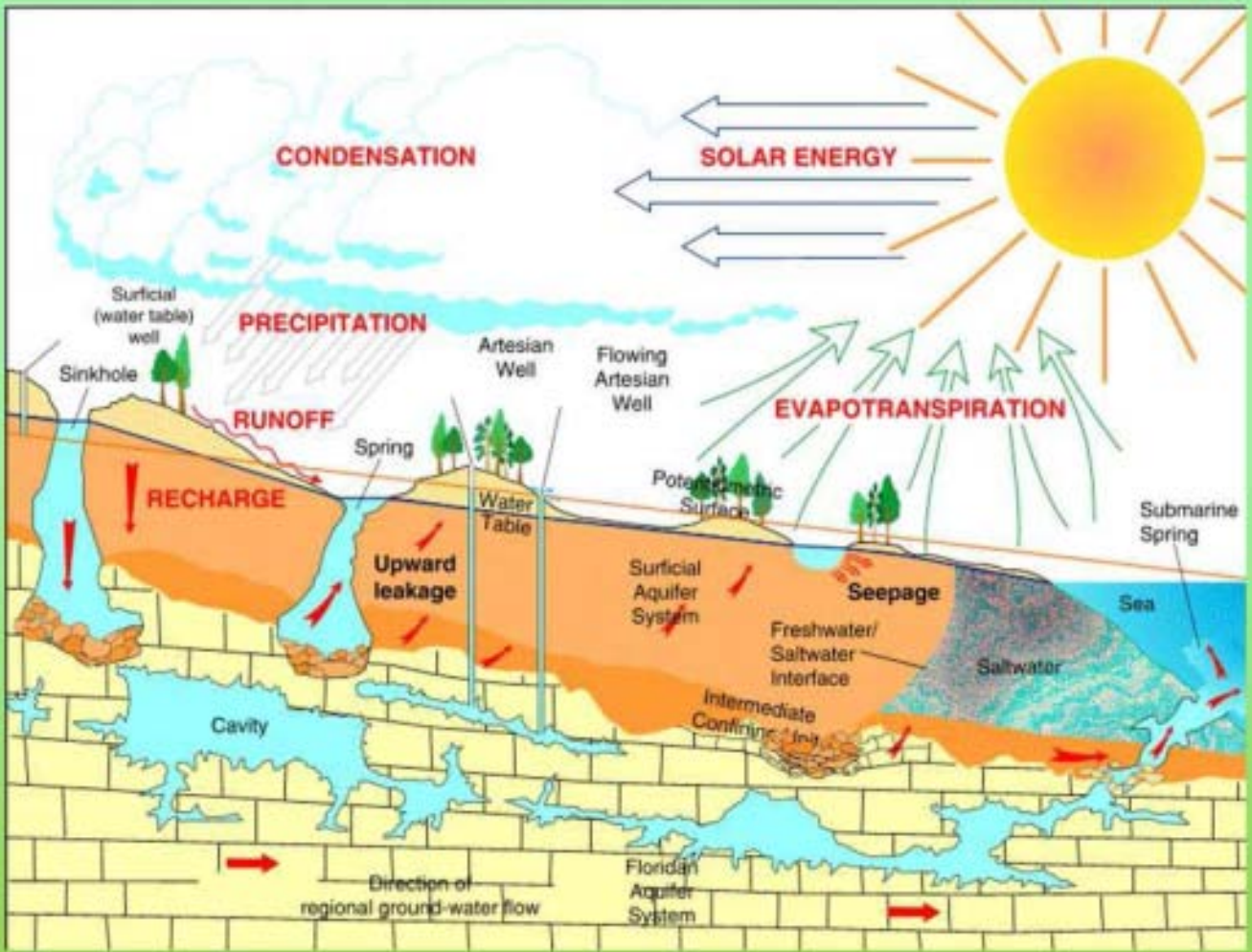
Our water comes from the Biscayne Aquifer which is a “sweet”, alkaline drinking water aquifer. To learn more about our hydrological system including the flow of the Everglades watershed follow this link to USGS publication

HA 730-A Biscayne Aquifer http://pubs.usgs.gov/ha/ha730/ch_g/G-text4.html .

One of the primary ways the aquifer is recharged (refilled) is from rain fall. We receive approximately 70% of our yearly 60 inches to 65 inches of rain in South Florida during the “rainy season” months (3rd week of May thru October). November through the beginning of May is referred to as our “dry season”.

Rain in the winter/spring months often arrives before a cold front. Days are also shorter and sunlight is diffused due to the southern angle. Shorter days (less sunlight) equals a slow down in plant growth. Additionally plants are less stressed in the cooler temperatures and need less water and nutrients.

The longer days and higher temperatures of May together with cooler ocean breezes usually begin our rainy season. Tropical storms and hurricane activity also bring additional rain fall during this season.



A larger view of the “rain machine”.

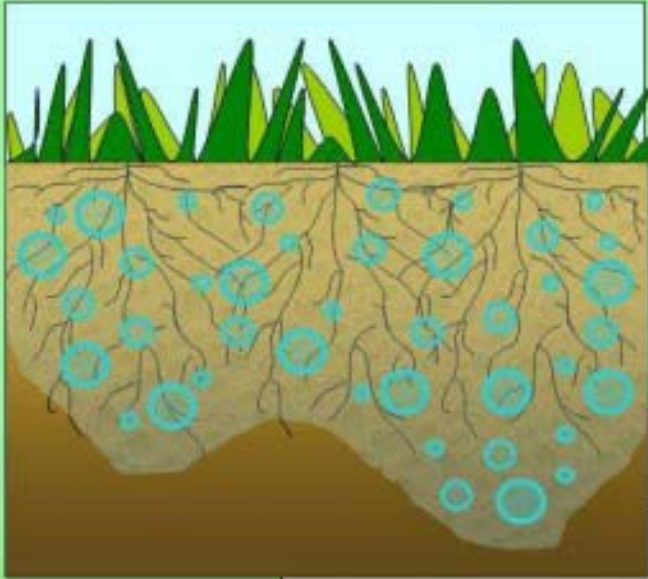
<http://www.ssd.noaa.gov/goes/east/tatl/flash-rb.html>



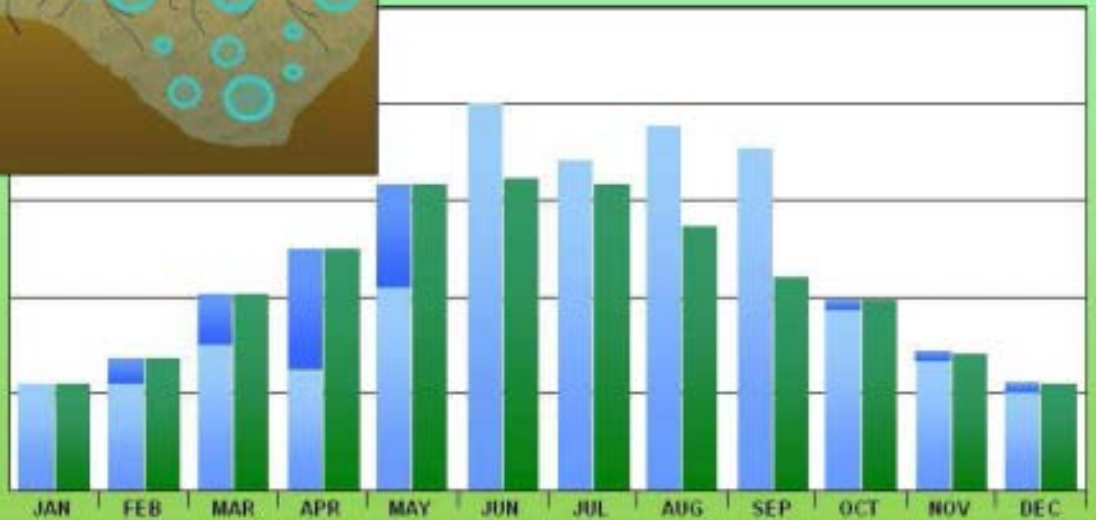
October 29, 2010 Cold Front, Shary & Tomas

The graph above (from <http://www.ssd.noaa.gov/goes/east/tatl/flash-rb.html>) shows the end of an active hurricane season meeting an early cold front.

Check out the NOAA website and see how these systems can interact by viewing a loop sequence.



Florida receives 50 to 60 inches of rain per year. Approximately 70% fall during the summer rainy season. Not all is useful for plants, only what stays in the root zone.



Normally during the beginning to middle of the dry season temperatures are cooler and days are shorter (less sunlight!). Lawn and landscape plants are not growing as actively and do not need as much water. A good deal of water is often unnecessarily used for irrigation.

Seasonal fluctuations in tourism can affect water withdrawal as well.

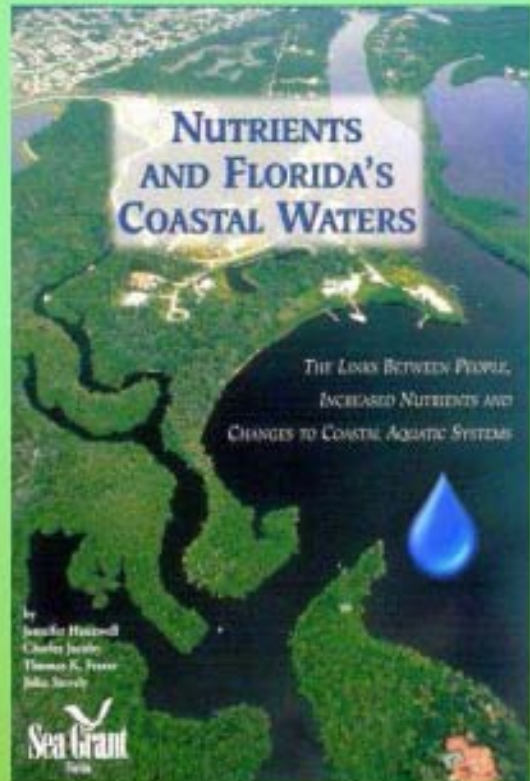
April and the first 3 weeks of May can be very stressful as days become longer and temperatures rise. This is also the time when the aquifer would be a lower level.



Hard Facts About Hard Surfaces

Rain which falls onto hard surfaces such as parking lots, concrete driveways and roadways often drains into the nearest canal or storm drain and does not recharge the aquifer. This rain water also carries oil, petroleum and other contaminants with it and is referred to as storm water runoff. Storm water runoff also carries excess fertilizers and pesticides used in our landscapes and presents a danger to our bay and estuaries.

Connect the drops



The upper left photos show irrigation water runoff resulting from a sprinkler head knocked to one side.

Follow this link for the publication titled:

Nutrients and Florida's Coastal Waters:

The Links Between People, Increased Nutrients and Changes to Coastal Aquatic Systems

<http://edis.ifas.ufl.edu/sg061>

Where rain meets earth



Where rain meets earth, the aquifer is recharged. The above photos are all examples of vibrant Florida- Friendly Landscapes that exist primarily on rainfall.

Rain Barrels

One way to save water and help prevent stormwater runoff is to use a rain water catch system. A rain barrel is a very simple RWCS.



Installing a rain barrel can help prevent storm water runoff and capture rain water for your gardening and outdoor water needs.

Rain barrels are available in many sizes and shapes. We use recycled food grade containers that have been reconditioned per EPA standards. Additionally the barrels have not been used for oil storage of any type, food grade included.

The captured rain water is non-potable, meaning not for consumption or use inside your home. It is best used to water your Florida- Friendly Landscape. Potted plants especially orchids will benefit from the Ph neutral rain water and rain barrels also are an excellent water source for raised bed vegetable gardens.

Rain Barrels How2Build

Supplies:

Reconditioned Food Grade Drum or Barrel
¾" Male Threaded Spigot (Hose Bibb)
Flexible Downspout Attachment for Rain Gutter
Concrete Blocks for support base
Pipe Thread Sealant
PVC Pipe Increaser Connection
Patio Screen if completely removing top

Tools:

Drill
15/16" spade bit
Band Saw (to cut down spout)
Reciprocating Saw (to remove top is needed)
Jig Saw (if cutting hole in top)



The tools needed are noted above for do-it-yourself folks but we will drill the hole for the faucet and remove the barrel top if needed at the workshop.

How to Build

1. Drill hole using a 15/16" spade bit about 6" from bottom of the barrel
2. Screw the spigot about 1/4 of the way into the hole.
 - This will be very snug. Must go in straight rather than at an angle.
3. Apply pipe thread sealant to the exposed threads and continue screwing the spigot into the barrel until it is flush



You are going to install the faucet. This is a tight fit and perhaps the most difficult part of creating and installing your rain barrel. Take care never to carry the barrel by holding onto the faucet as it may cause the connection to loosen and result in a leak. We use a dab of pipe thread sealant on the threaded part of the faucet.

How to Install

1. Locate the area where you plan to place the barrel and level the ground.
 - Your location should be close to a downspout or where water channels off the roof.
2. Once the ground is level place concrete blocks as shown in photo.



Your rain barrel needs to be elevated to create gravity feed so the water will flow faster. We prefer 8 concrete blocks used as above. Remember a 60 gallon barrel will weight close to 500 lbs when full, so select solid materials for your rain barrel base. Be sure to level the ground before placing the blocks and setting up the barrel.

How to Install

3. Use a PVC pipe connector to fit the flexible downspout into the existing bung hole. Bung holes are varying sizes so it is best to take the cap with you to insure proper fit.

Use a hack saw to cut the existing downspout to correct height.



2 concrete blocks will measure 16" high plus the barrel height (on average between 36" to 38") for approx. total of 54" high. Remove the downspout, set the barrel up and take measurement before cutting the downspout.



If you are connecting your barrel to existing rain gutters you will need to purchase a flexible downspout and a PVC pipe increaser. Measure your downspout and take the bung hole cover with you when you go to purchase these items to ensure proper size and fit.

The larger end of the flexible downspout needs to slip over your existing downspout (once it is cut) and the smaller end should fit inside the PVC pipe increaser. The smaller side of the PVC pipe increaser should fit into the "bung" hole of your barrel and a small piece of patio screening ensures that mosquitoes cannot enter the barrel.

It is best to set up the concrete base and barrel and then measure where you need to cut your existing downspout so that it easily connects to the flexible downspout.

Your aluminum downspout can be easily cut using a hack saw and it is best to remove the entire downspout and lay on a level surface to cut. Remember, measure twice, cut once!

Total cost of concrete blocks, flexible downspout, PVC pipe increaser and small hack saw is under \$25.00



Flexible Downspout

Normally located with construction materials along with rain gutters, downspouts etc. Check the size of you downspouts before you leave home.

Check the size of your downspout and confirm if it is standard residential size 2 ½" x 3.

PVC Pipe Reducer/Increaser

You will find this in the plumbing section with PVC fittings. The larger side should be 4" dia. and the smaller side should fit into the barrel opening. Take the bung hole cap with you to insure fit. This is usually 2".



A closer look at the extra components for connecting your rain barrel to existing rain gutters and a downspout.

How to Install

4. No rain gutters, the top of the drum can be removed and patio screening placed over the opening and secured with a bungee cord or rope to prevent mosquitoes



Trim excess screen



If you do not have rain gutters than we can remove the top of the barrel before you leave the workshop and you will need to purchase patio screening and rope or a bungee cord to cover the opening as shown above. This screened covering is to keep large particles from falling into the barrel and prevent mosquitoes from laying their eggs and making more mosquitoes!!!

Install the barrel on concrete blocks as previously explained.

Installation Options



Camouflaged barrel connected to rain gutters and downspout

Open top barrel with modified umbrella to increase surface catch area.



Auxiliary Rain Water Storage



Auxiliary Rain Water Storage

Some options to consider and ways to save water once your barrel is full.

The white barrel is wrapped with vinyl lattice that nearly matches the color of the house to help it blend in. The lattice could also support a small vine to further conceal the barrel. You can paint your rain barrel the same color as your home if needed to meet Home Owner Association restrictions.

The red barrel has an inverted umbrella lashed to the top to increase the catch area for rain. Empty 1 gallon milk containers are used to store excess water.

The blue barrel has an old iron grill covering the screened opening to ensure small animals (like my cats who like to sleep on top of the barrel) do not fall into the water. This barrel is placed under the roof overhang to capture water and 5 gallon water containers are reused to store excess water.

Connecting Barrels

To connect barrels
•Use at least 1”
pipe

Overflow



You may also choose to connect multiple barrels now or add barrels in future. This installation includes an overflow pipe and connects the barrels using PVC components.

Connecting Barrels



These are two barrels we have installed at the Extension Office. We used a clear pipe which sits inside the bung hole opening of the 2nd barrel. The barrels are staggered in height to encourage flow from the first barrel into the second barrel. Patio screening has also been used to keep mosquitoes from laying eggs in the rain water.

You can connect the barrels with using additional PVC fittings, however you need to install a screw through the bung hole collar and into the tubing as it enters the bung hole to prevent the tubing from falling into the barrel.

Connecting Barrels



One of the best reasons for using smaller rain barrels for your Rain Water Catch System is that you can continue to add these as needed and/or finances permit.

Connecting Barrels



Barrels on the previous slide are installed on a small farm and are connection from the bottom of each barrel to a small pump.

This system of 8 barrels is connected from the bottom and utilizes a small pump to irrigate a 2 acre farm in Maryland. You can see how this system evolved and was finally constructed at

http://www.emmitsburg.net/gardens/articles/adams/audrey/water_barrel.htm

A Spouse's Guide to Building the Perfect Rain Barrel System

[Mike Hillman](#)

[Master Gardener Spouse](#)



Rain barrels work best with soaker hoses and watering cans. The lack of water pressure makes it difficult to use a hose to water from your rain barrel.

Remember if you do occasionally use your municipal water with a hose be sure to water with a spray nozzle which you can shut off when walking from one area to another and when washing and rinsing your car etc.

Get Creative!



Have fun and get creative!



You could make designing and painting your rain barrel a fun family, school or summer camp project. Or you can leave your rain barrel plain and simple, it says:

“I practice water conservation”.



Saving Water is EASY!

Installing and using rain barrels are just one of the many simple, easy ways to save water.

Miami Dade Water & Sewer Department has incentive programs for residents and businesses.

Visit their website for a complete list of programs, including the Water Use Efficiency Program and how to create a Florida Friendly Landscape.

<http://www.miamidade.gov/conservation/homeowner.asp>

Did you know?

1 drop per second leak= equals 3154 gallons of water down the drain over a year's time? And fixing a leaking faucet is so easy the EPA *Watersense* program provides instructions for 3rd, 4th & 5th grade students on how to fix a leak and has a yearly "Fix a Leak Week" event! The EPA estimates **a trillion gallons of water is lost to leaks each year in the US.**

Other Ways to Save

1. Right plant, right place

All right men, our mission is to make the world more beautiful. Unfortunately, some of you will be sent out into conditions that you are not equipped for and you will not survive. Do your best to hang in there until replacements can arrive.



Easy does it, I just need a little to get growing.

I always feel like I need vitamins or more nutrients, this soil just does not agree with me.



Do you honestly think I can bloom like this all year?

Man, I just recovered from last month's surgery and now under the knife again.....



The Florida Yards & Neighborhoods program was created to help residents reduce pollution, conserve water and enhance their environment by improving home and landscape management.

Perhaps the single most important principle is Right Plant Right Place.

Know what really grows here in the unique environment of South Florida. Contact us at the Extension Office for help and any questions you may have. You can find publications on our websites and blogspot or we can mail them to you.

<http://miami-dade.ifas.ufl.edu/>

<http://www.greenyardsmiami.blogspot.com/>

<http://edis.ifas.ufl.edu/>

Other Ways to Save

Consider reducing lawn area and adding drought tolerant low maintenance landscape plants.

Check with our office for Landscape re-Design workshop schedule.

<http://miami-dade.ifas.ufl.edu/old/programs/fyn/publications/drought-tolerant-plants/dtpt-intro.htm>



Adopting a Florida-Friendly Landscape:

Steps for Converting a Typical Development Landscape to a Florida-Friendly Landscape

<http://edis.ifas.ufl.edu/pdf/EP/EP39600.pdf>

Lawn (grass) uses the most water in the landscape. Adding bedded areas can greatly reduce your water usage. Learn how to transform your yard into a Florida-Friendly Landscape using native and drought tolerant, low maintenance landscape that also bring life and color into your garden. Check our website calendar for future workshops and plant giveaways and our newest workshop on creating and designing your own Florida-Friendly Landscape.

<http://greenyardsmiami.blogspot.com/p/landscaping-tips>

Other Ways to Save

2. Repair Irrigation Leaks and Clogs



If you are using an irrigation system make sure it is efficient by finding leaks and clogs etc. The Water Use Efficiency Program will find the leaks and clogs and give you a written report complete with recommendations. Also do-it-yourselfers can refer to

“Basic Repairs and Maintenance for Home Landscape Irrigation Systems” at:

<http://edis.ifas.ufl.edu/pdf/ae/AE45100.pdf>

And visit our blogspot for a complete list of publications

<http://greenyardsmiami.blogspot.com/p/irrigation-workshop.html>

Other Ways to Save

3. Only Irrigate Landscaped Areas



Another common and easy to fix problem, watering sidewalks and roadway. This is usually a minor adjustment. Many landscape companies now use heavier riding lawn mowers that can misdirect the aim of irrigation heads even if they are retracted in the ground. You should check your system monthly and make adjustments and minor repairs if needed.

Other Ways to Save

4. Only Irrigate When and Where Necessary

- Most established ornamentals need little water



Know how to “read” your grass and put it on an exercise program! Excessive irrigation in cool months can lead to lawn disease problems. Established low maintenance landscape plants that are planted in the right place will need little water. Irrigation for bedded plants should be separately zoned. However remember **ALL** plants need water until they are established. Finally, remember to check the weather forecast for rain.

The Electronic Data Information System (EDIS) website of the University of Florida/Institute of Food & Agricultural Science has an entire page of publications covering best management practices for healthy, Florida-Friendly lawn care. http://edis.ifas.ufl.edu/topic_lawn_watering

What about the “exercise program” for you grass? Watering as recommended only when grass begins to show signs of stress will encourage grass roots to grow deeper and stronger and better able to withstand brief periods of drought.

Other Ways to Save

4. Only Irrigate When and Where Necessary

- Use a control device – WUEP program
 - All automatic irrigation systems must have a control device installed on them (F.S. 373.62)



Not sure you can learn to “read” the grass? Use a control device such as a soil moisture sensor or rain sensor and you will never be caught irrigating in the rain. For more information on how these devices work and how you can be reimbursed for installing a control device join the **Water Use Efficiency Program**. Contact us for more information.

| | | |
|----------------|-----------------------|--|
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Other Ways to Save

5. Replace fixtures

- MD Water and Sewer rebate program
 - Up to \$50.00 for each HET toilet installed
 - Has to be on the EPA Water Sense labeled
 - 1.28 gallons per flush or less
 - Toilets before 1992 – 3.5 to 6 gpf
 - Mail original purchase receipt and application to:
Miami Dade Water and Sewer Department



Replacing older fixtures is made easier by Miami Dade Water & Sewer's homeowner incentive programs.

<http://www.miamidade.gov/conservation/homeowner.asp>

How many times a day do you flush the toilet?

Other Ways to Save

5. Replace fixtures

- Showerheads
 - Showers can use up to 30% of total household water
- Miami Dade Water and Sewer Dept.
 - Free replacements
- Non-conserving showerheads ~ 5 to 8 gpm
- County provided shower heads ~ 1.5 gpm
 - Save 7.5 gallons during a 5 minute shower
 - Save 30 gallons during a 20 minute shower



Shower head exchanges and rebate incentives for new faucets are also part of Miami Dade Water & Sewer Department's Water Conservation Program and can be found on the website noted on the previous slide.

Additionally we have a limited supply of shower coaches which we use them to demonstrate to children of all ages the difference between a 5 minute shower with a 1.5 gallon per minute (gpm) shower and using an older shower head and showering for long periods.



A typical example (and good math review too) would be:

5 minutes x 1.5 gpm = 7.5 gallons for a daily shower.

30 minutes x 5 gpm = 150 gallons for a daily shower.

You can also use an inexpensive kitchen timer to check how long you shower for.



Beyond the Barrel

Rain Watering Harvesting System

<http://www.water.org.uk/home/about>

WaterUK is the industry association that represents UK statutory water supply and wastewater companies at national and European level.

- 1 Water main
- 2 Storage tank
- 3 Main control panel
- 4 Level display unit
- 5 In-line filter 120 microns
- 6 Internal rain filter
- 7 External rain filter
- 8 Pump
- 9 Header tank
- 10 Tundish valve
- 11 Mains top-up to tank
- 12 External tap



More advanced Rain Water Catch or Harvesting systems are being used around the world. The system above is from the UK/Great Britain. Take a visit to this website to read about water saving tips from across the ocean <http://www.water.org.uk/home/about>

The system shown in this slide captures all the rain water that falls onto the roofing system and directs the water into an underground cistern. Remember that rain water that is intended for use inside the home must be filtered and disinfected and a back flow system must be installed to prevent rain water from entering into municipal water supplies. Please have your architect or contractor contact the Miami Dade County Building Code Department which has now merged with the Building and Neighborhood Compliance Department.

<http://www.miamidade.gov/building/>

Beyond the Barrel

Rain Water Harvesting in Australia

<http://www.sydneywater.com.au/SavingWater/>



Australia also progressively promotes water conservation.

<http://www.sydneywater.com.au/SavingWater>

You may also have seen water bladders installed under a deck on an episode of “This Old House” on PBS (Public Broadcasting System).

Beyond the Barrel



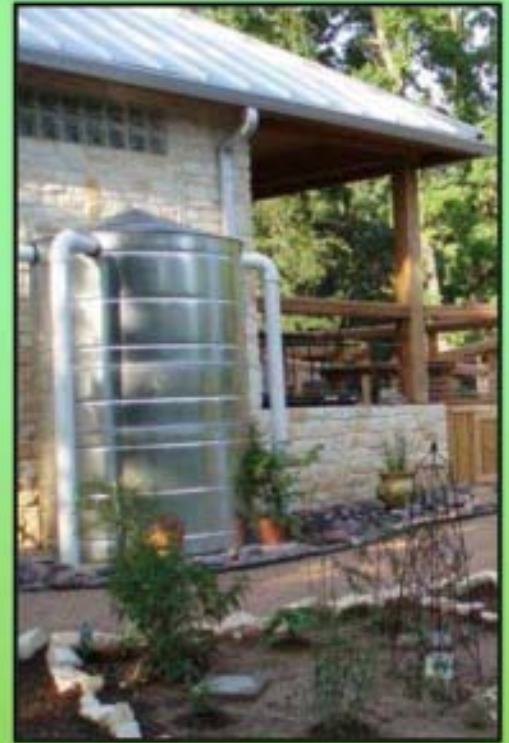
This slide shows a section of a “green” home in Kendall as well as a sump pump and a small solar panel with marine battery power storage. This simple solar panel system will power a small sump pump to deliver drip irrigation to our vegetable gardens here at the Extension Office.



A very innovative “Beyond the Barrel” concept is shown in place at the Curtis 50cent Jackson Community Garden in Queens, New York. The tall blue tulip shaped structures provide shade and capture rain water which is stored below in a 13,000 gallon cistern. This garden is part of the New York Restoration Program founded by Bette Midler and you can find more information at <http://www.nyrp.org/>

Beyond the Barrel

Rain Bladders



500 to 10,000 gallon containers

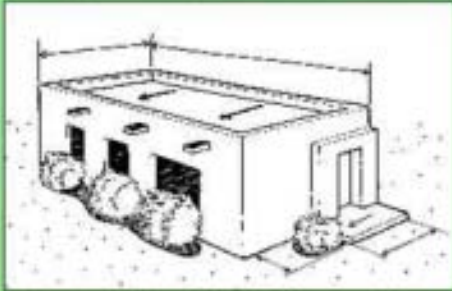
The variety of innovative rain water catch systems and the sheer size of many systems bring added awareness to water conservation efforts around the world.

<http://edis.ifas.ufl.edu/pdf/ae/AE02900.pdf>

Cisterns to Collect Non-Potable Water



Area of flat roof - Length X width



Area of sloped roof - Length X width



| Inches/Rainfall | Gallons/Square Foot |
|-----------------|---------------------|
| 0 | 0 |
| 1 | 6 |
| 2 | 1.3 |
| 3 | 1.9 |
| 4 | 2.5 |
| 5 | 3.1 |
| 6 | 3.7 |
| 7 | 4.4 |
| 8 | 5.0 |
| 9 | 5.6 |
| 10 | 6.2 |
| 11 | 6.8 |
| 12 | 7.5 |
| 13 | 8.1 |
| 14 | 8.7 |
| 15 | 9.3 |

How do you plan on saving water?

Miami Dade County Extension Service

<http://miami-dade.ifas.ufl.edu/>

Miami Dade County Water & Sewer Department

<http://www.miamidade.gov/wasd/>

Florida Yards & Neighborhoods program University of Florida website

<http://fyn.ifas.ufl.edu>

South Florida Water Management District

<http://www.sfwmd.gov>

Water Science for Schools

<http://ga.water.usgs.gov/edu/mwater.html>

EPA Water for Kids

<http://www.epa.gov/ow/kids/waterforkids.html>

California Urban Water Conservation Program- interactive website

<http://www.h2ouse.org>

The Story of Drinking Water/City of North Miami Beach

http://www.nmbworks.com/story_of_water/html/story.htm

UF Publication *Cisterns to Collect Non-Potable Water*

<http://edis.ifas.ufl.edu/pdffiles/AE/AE02900.pdf>

A few of the many helpful websites and publication links, you can find these links and more on our website: http://miami-dade.ifas.ufl.edu/environment/natural_resources.shtml

Sit back and enjoy your “green” garden



Practicing and implicating the water saving methods we have explored will ensure enough water for us now and for future generations.

Please call us or email us with any questions you may have and please share your ideas!

