WATER IN THE LANDSCAPE: DON'T GET BOGGED DOWN!

KIM COUNTS MORGANELLO

WATER RESOURCES AGENT

CLEMSON COOPERATIVE EXTENSION

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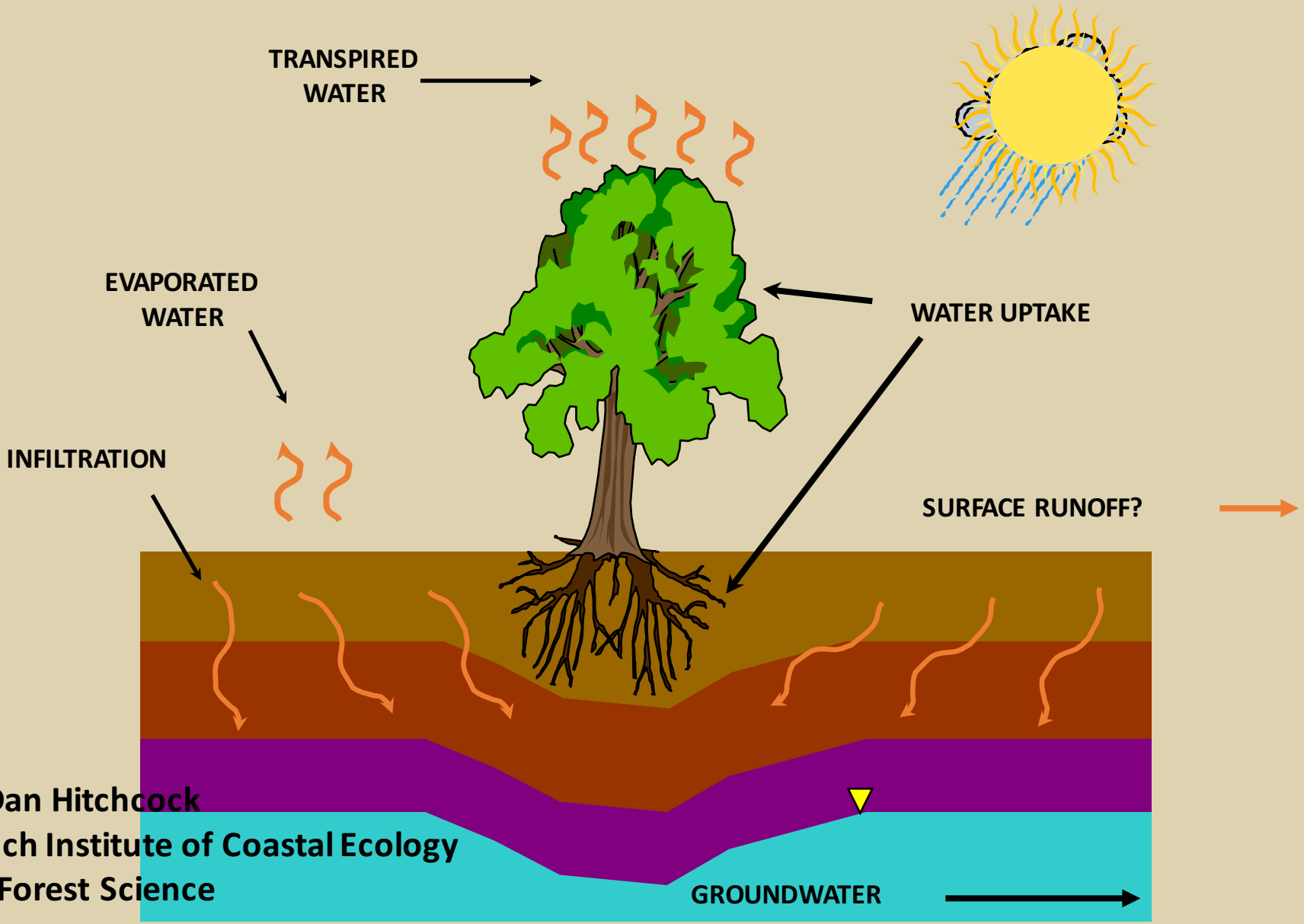
690ELC
JOHN DEERE

EROSION

Polluted runoff is the #1 threat to clean water in the US.

RESIDENTIAL-SCALE TREATMENT TRAIN

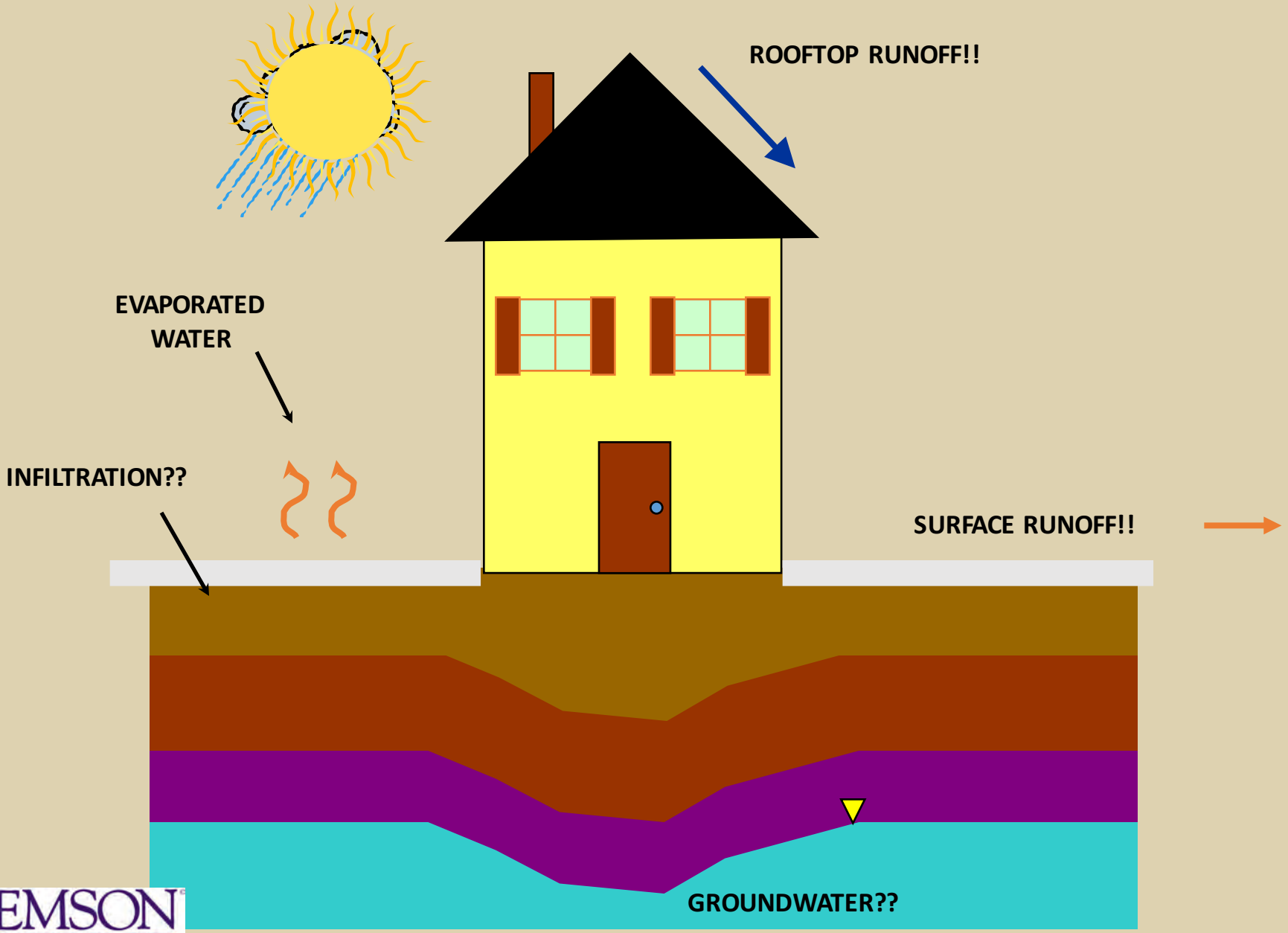
Forest Water Budget – Typical Scenario



Dr. Dan Hitchcock
Baruch Institute of Coastal Ecology and Forest Science

Slide by Dr. Dan Hitchcock

Urban Water Budget – Pavement and Rooftop Scenario



Rainwater Harvesting – Barrels and Gardens

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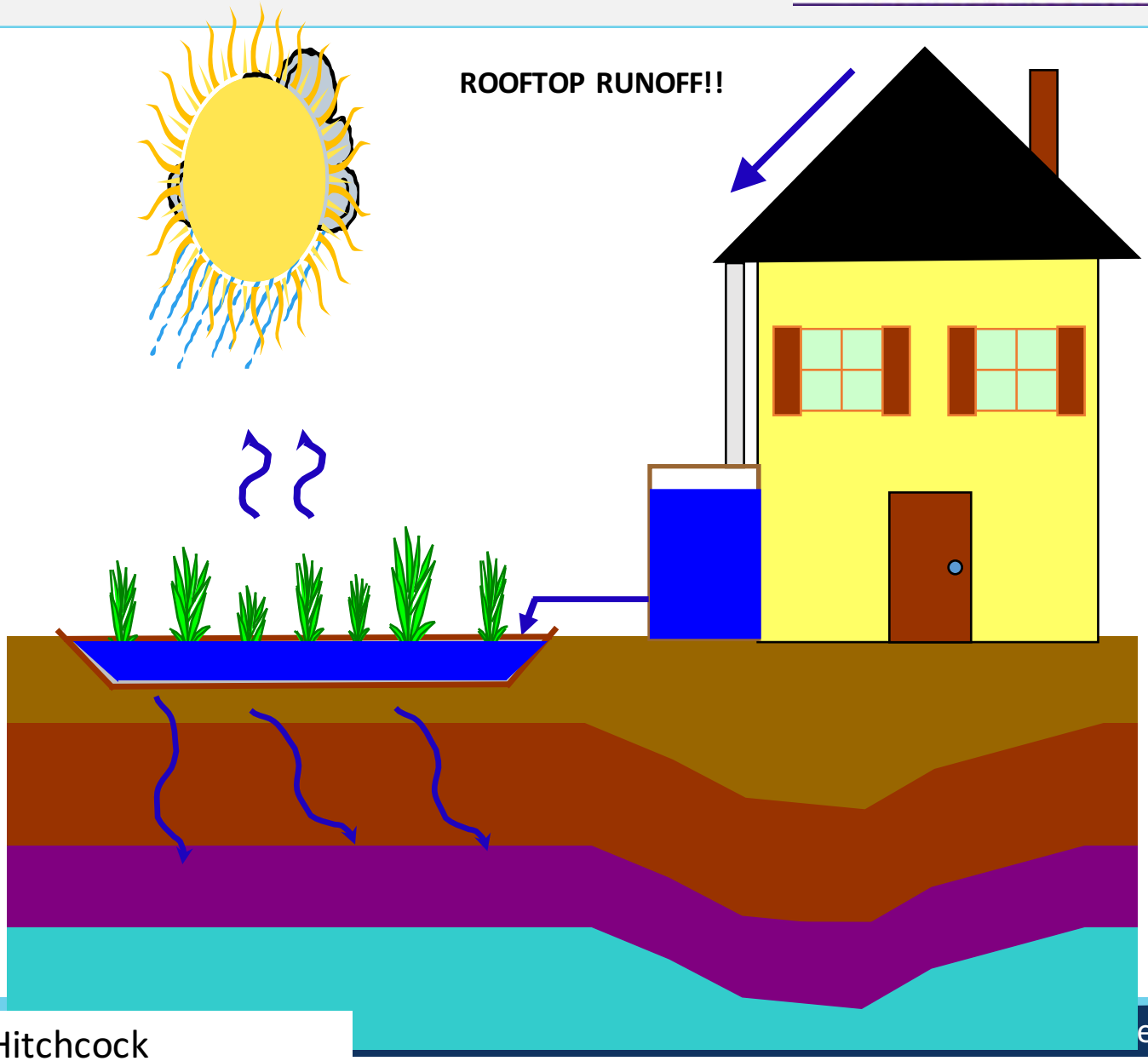

Slide by Dr. Dan Hitchcock

GREEN INFRASTRUCTURE IN THE HOME LANDSCAPE

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- Healthy Soils/Mulch
- Rain Gardens
- Native Plants/Vegetative Buffers
- Rainwater Harvesting
- Reduce Impervious Surfaces

Rain Garden Myths

RAIN GARDEN

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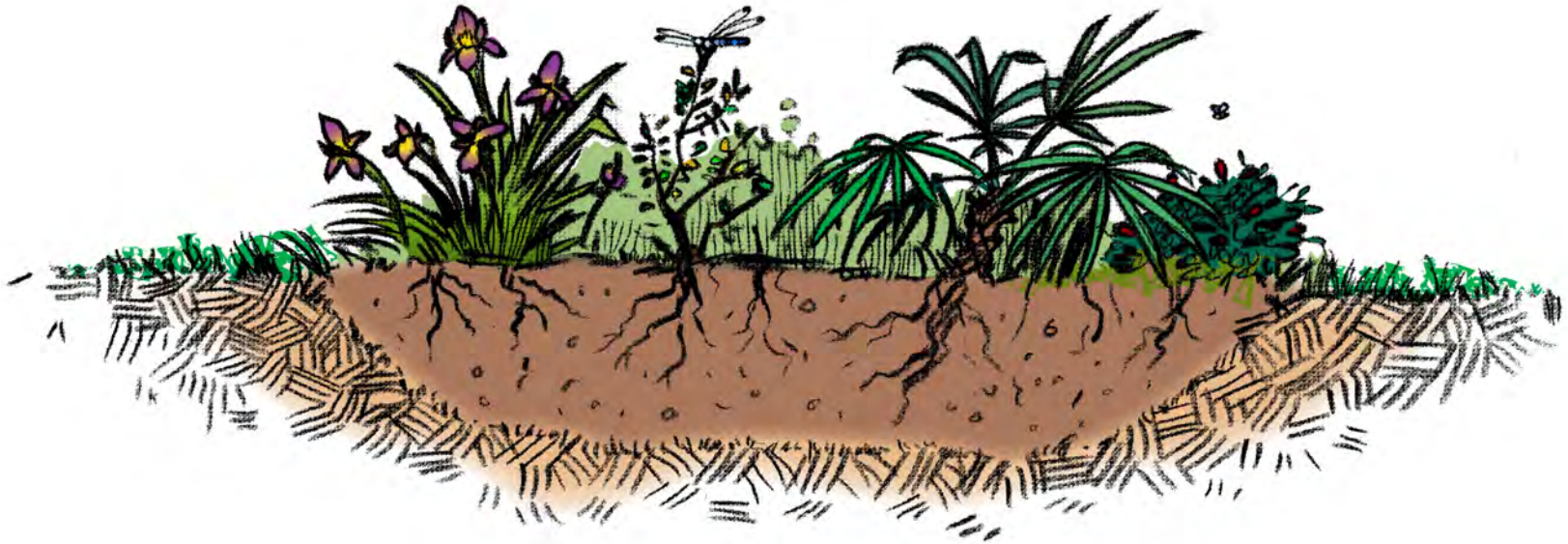
A **rain garden** is a planted depression that allows rainwater runoff from impervious urban areas, like roofs, driveways, walkways, parking lots and compacted lawn areas, the opportunity to be absorbed.



WHY RAIN GARDENS?

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- Allows for **Collection and infiltration** of stormwater runoff (reducing quantity)

- **Manage erosion & moisture control issues** around home

- **Beautify** the landscape

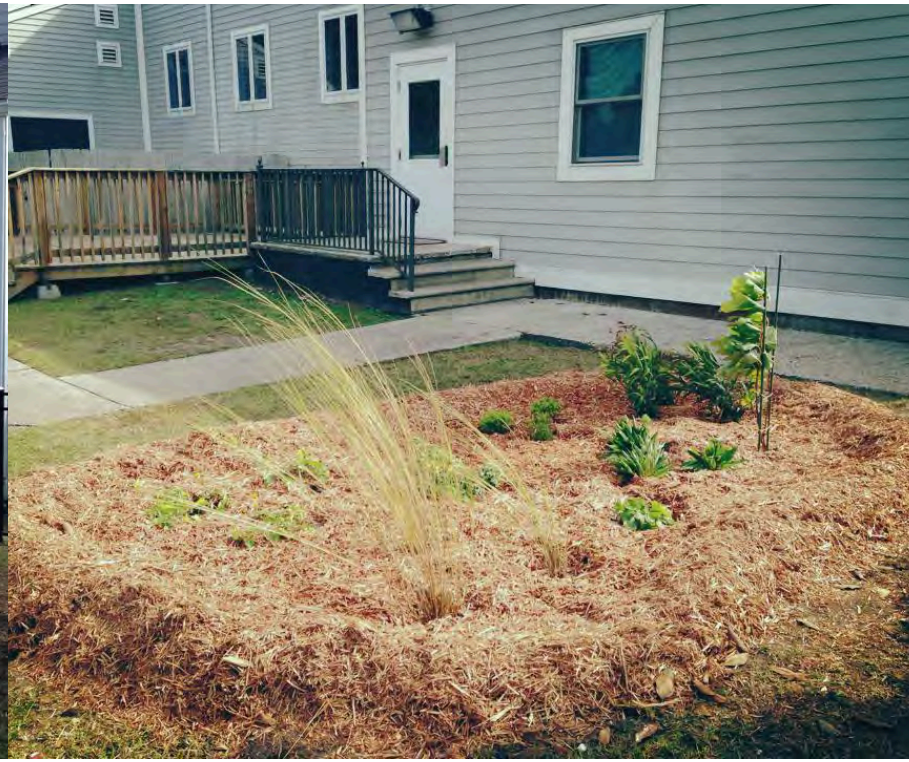
- Plants and microbes do the work of **pollutant removal** (protecting downstream water quality)

- **Attract desirable wildlife** (birds and butterflies)

- **Water-wise:** A smart way to irrigate

Before

After



Bioretention Cell Vs Rain Garden

RAIN GARDEN SITING

- > 10 ft. from building foundation
- > 25 ft. from septic system drainfield
- Avoid shallow water tables < 18 in. deep
- Away from utility lines

- Call #811! Ensure no buried cables or pipes in the excavation area
- In full to partial sun, if possible

SITE ASSESSMENT

Go outside when it rains and watch how water flows across your landscape!!!

Note the “source” and “destination.”

SITE ASSESSMENT

- The ability of rain water to *drain* is important for your rain garden location

- A simple *"perc" (percolation) test* can help you to decide:

1. Dig a hole about 6 inches deep and wide

2. Fill the hole to the top with water

3. Check the hole 24 hours later – if the water is gone, you have an ideal rain garden location, otherwise, consider a backyard wetland!! **Ideal is 1-6 inches an hour.**

RAIN GARDEN SIZING

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1. Determine the area of impervious runoff source (rooftops + sidewalks + driveway areas). Note: Your rain garden likely only capturing a portion of your roof area.

2. Rule of thumb: estimate the size of your rain garden based on perc test:

   Sandy soil (well-drained) = 20% of impervious area

   Loamy soil (poorly-drained) = 30-50% of impervious area

Refer to Rain Garden Worksheet on p.11 of "A Guide to Rain Gardens in South Carolina"

RAIN GARDEN SHAPE

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Excavate down 12 inches.
Find friends to help!

Build a berm around perimeter of shape

Berm varies, typically no more than 5 inches high and 12 inches wide

RAIN GARDEN SOIL AMENDMENT

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•Consider existing soil when amending rain garden. For example if a quick draining perc test, will not need to add as much sand.

- Typical rain garden soil mix:
  - Sand: 50-60%
  - Compost: 20-30%
  - Existing soil: 20-30%

- In a standard rain garden, will amend 2 bags sand to 1 bag compost. Mix well in the excavated area, like baking a cake!

RAIN GARDEN PLANT SELECTION

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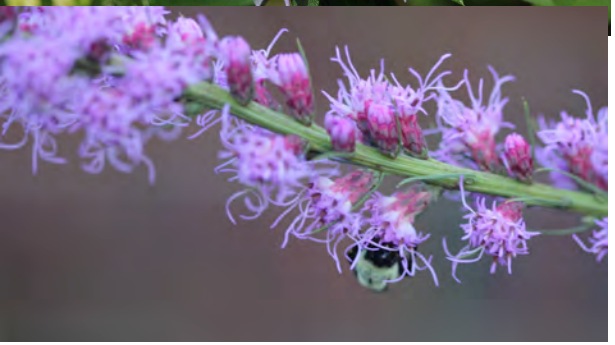


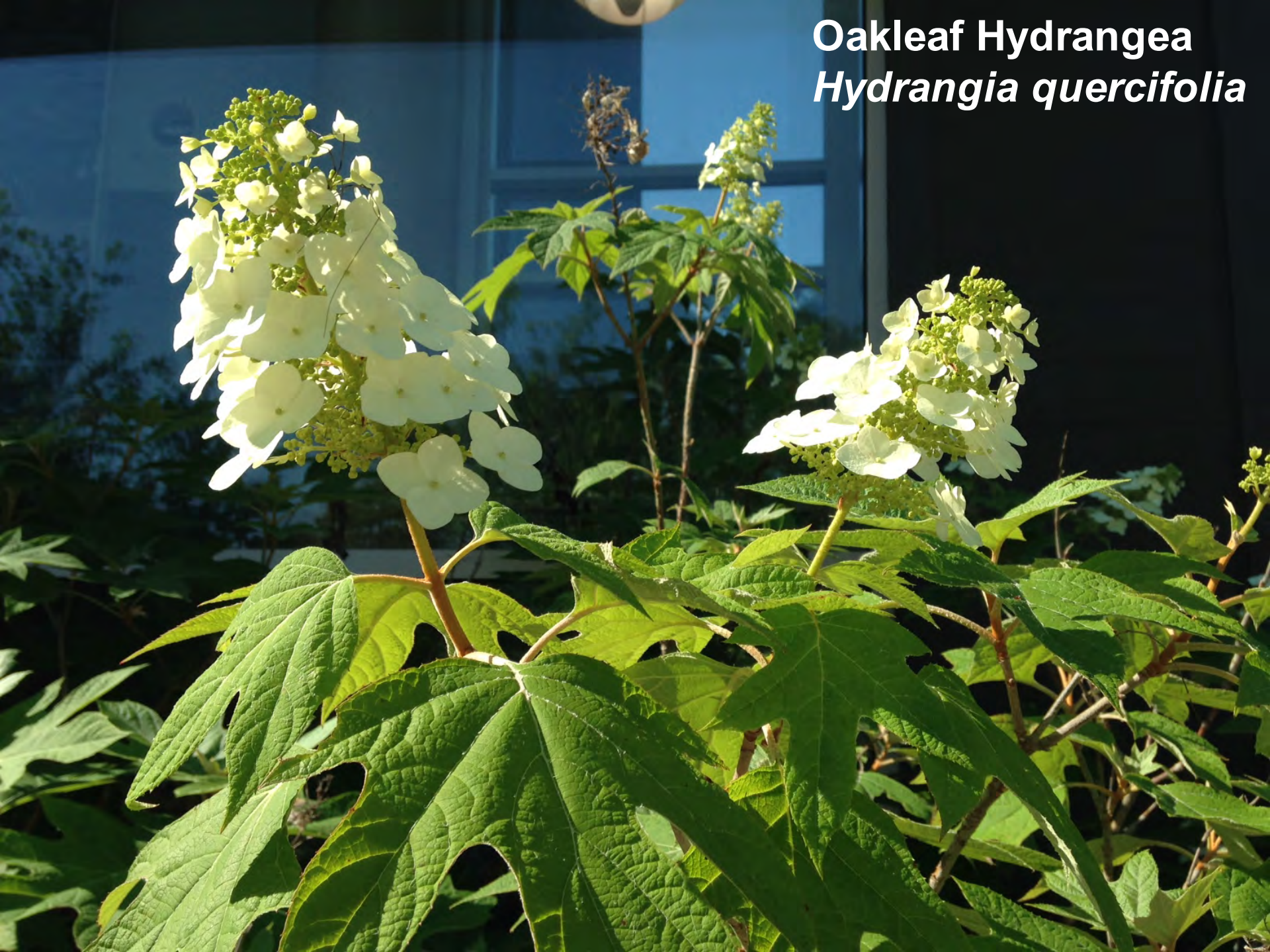
Perennials

Grasses

Shrubs

Dwarf Palmetto
Sabal minor

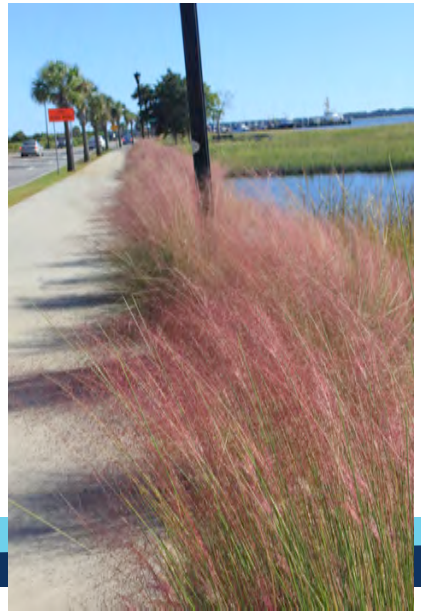
Hearty species with a range of drought and wet condition tolerance


Oakleaf Hydrangea
Hydrangia quercifolia


Black-eyed Susan
Rudbeckia fulgida


Stokes Aster
Stokesia laevis

- Sweetgrass
  Muhlenbergia filipes

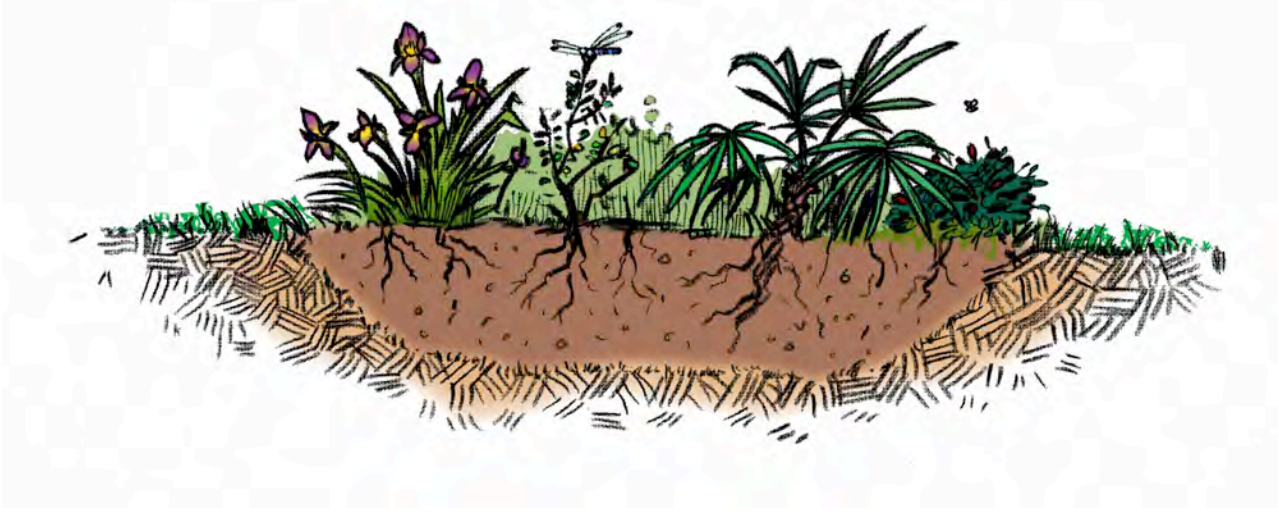


MULCH

- Non-floating mulch
- Cedar generally most recommended

** After soil is amended & mulch added, the depth of the rain garden should be at least 6 inches from top of the berm to the bottom of the rain garden*

clemson.edu/raingarden



MASTER RAIN GARDENER
A PROGRAM OF CLEMSON EXTENSION

WHAT IS RAINWATER HARVESTING? ANCIENT PRACTICE OF CAPTURING RAIN AND STORING IN A RESERVOIR FOR REDISTRIBUTION/REUSE

COLLECTION + STORAGE + USE

The Cistern, Randolph Hall, College of Charleston, SC

BEFORE AND AFTER

Rainwater Harvesting Comes in All Shapes & Sizes

"Rain Barrel" vs. "Cistern"

During a one inch rainfall, a 1000 square foot roof can yield over 600 gallons of water!

Multiple square footage of roof area by 0.623

CONVEYANCE

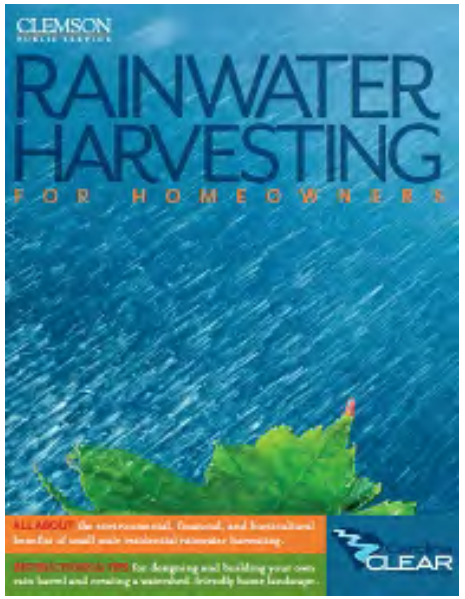
- Gutters
- Downspout
- Rain chain
- Corners/eaves where water collects
- Flexible downspout
- PVC

CONVEYANCE

- Gravity fed
- Elevate using cinder blocks, pavers, wooden stand..
- Site close to end use
- Distribute water using: watering can, drip tubing, hose

NECESSARY FEATURES

- Outlets that can be turned on and off
- Emergency overflows that allow water to escape when barrel is full (direct away from house)
- Dark colored that prevents sunlight penetration and algae growth
- Recycled barrels, should be food grade never been used to transport chemicals
- Point of water entry secure to exclude small animals/children
- Screening to prevent mosquitoes



NON-POTABLE USES

- Landscape Needs
- Wildlife
- Washing Equipment
- Toilets (check codes)

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HOME & GARDEN INFORMATION CENTER

http://www.clemson.edu/extension/hgic

HGIC 1728 1-888-656-9988

Best Practices for Application of Harvested Rainwater on Edibles

The ancient practice of rainwater harvesting is widely used throughout the world and is gaining popularity in commercial and residential applications in the United States. Rainwater harvesting is the collection and storage of rainwater from impervious surfaces, typically a roof area, for use at a later time. Rainwater harvesting systems can also provide stormwater, erosion and flood control benefits.

Capturing and storing rainwater is a practical water conservation practice due to the sheer volume of water that flows off of roof surfaces during a rain event. For every one-inch of rain and every one-square foot of roof area, the potential exists to capture 0.623 of a gallon of water (Mechell 2010). To put this in perspective, for a one-inch rainfall, 1000 square feet of roof area can capture over 600 gallons of water. This harvested water can be used in non-potable ways including irrigation of landscaped beds, butterfly gardens, container plants, and vegetable and fruit gardens. With additional design considerations, water purification features and cost, a rainwater harvesting system can provide water for flushing toilets, taking showers and even for drinking. The recommendations in this factsheet focus on the more commonly found, non-potable rainwater harvesting systems.

In South Carolina, there is an increased interest in the use of harvested rainwater to irrigate fruits, vegetables, and other edibles. In 2014, as part of the Ashley Cooper Stormwater Education Consortium's rainwater harvesting program evaluation, participants in the Charleston, South Carolina Tri-county area, were asked to indicate the primary use of their rainwater harvesting system. Of the 67 respondents, 43% indicated that watering their vegetable garden and/or edibles was their primary use of harvested rainwater (Wooten et al, 2014 unpublished data).

To ensure human health and safety, additional design, maintenance and application strategies should be employed when utilizing non-potable rainwater harvesting systems to irrigate fruits, vegetables, and other edibles.

Pollutants, including heavy metals, bacteria, pathogens, herbicides, and pesticides, can accumulate on rooftops and can potentially be transported to the rain barrel or cistern following storm events. The sources of these materials are numerous and include atmospheric deposition, animal waste, roof materials, shingle treatment, and others.

Rainwater Harvesting System Design & Maintenance for Optimal Use on Edibles

All rainwater harvesting systems are comprised of the following:

a. A *catchment area* (roof) where rainfall is collected;
b. A *conveyance system* (gutters, downspout, rain chain, or sheet flow) which helps to transport water;
c. A *storage system* (rain barrel or cistern), which contains the water for later use.

Though rain barrels and cisterns differ in size and shape, both are rainwater-harvesting systems and the main components remain consistent.

HGIC 1728

USE THE WATER!

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TREATMENT TRAIN

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clemson.edu/raingarden

See links under the AMGA website's "Helpful Links" tab to stormwater and rain garden resources. Also, if you enter rain garden in the HGIC main seach window - the search results provide Factsheets on a variety of plants suitable for use in rain gardens.

SUPPORTING RESOURCES

Carolina CLEAR
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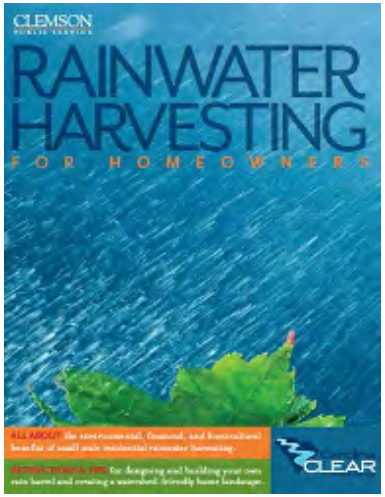
clemson.edu/carolinaclear



Carolina YARDS
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clemson.edu/cy

SC WaterWays
answering today's water resource challenges for future generations

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