

# Managing Shorelines:

- Control Erosion and Protect Water Quality



Ben Powell  
Clemson Extension





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# Importance of Stable Shoreline

Erosion = loss of real estate

Erosion unsightly = reduced property value

Eroded shoreline gives appearance of low water

Eroded sediment fills pond – dredging!

Shoreline repairs are very costly

Stabile shorelines protect water quality



# What causes shoreline erosion?

Sheet Flow



Ripple/Wave Action



# Sheet Flow (a.k.a. runoff)

Runoff concentrated at swales between houses

Swales are inlets where runoff enters pond

Rapid, large flows scour gulleys



# A good stand of grass can ward-off sheet flow erosion

Consult Extension fact sheets for proper lawn care

[www.clemson.edu/hgic](http://www.clemson.edu/hgic) - Home and Garden Information Center

Consider allowing grass on bank slopes to grow taller to slow sheet flow



# What about native grasses?



# Biodegradable mats hold soil while grass establishes



# Structural options for managing sheet flow erosion

Reinforcement geotextile



Concrete flume



Reinforced rip-rap



Pipe slope drain



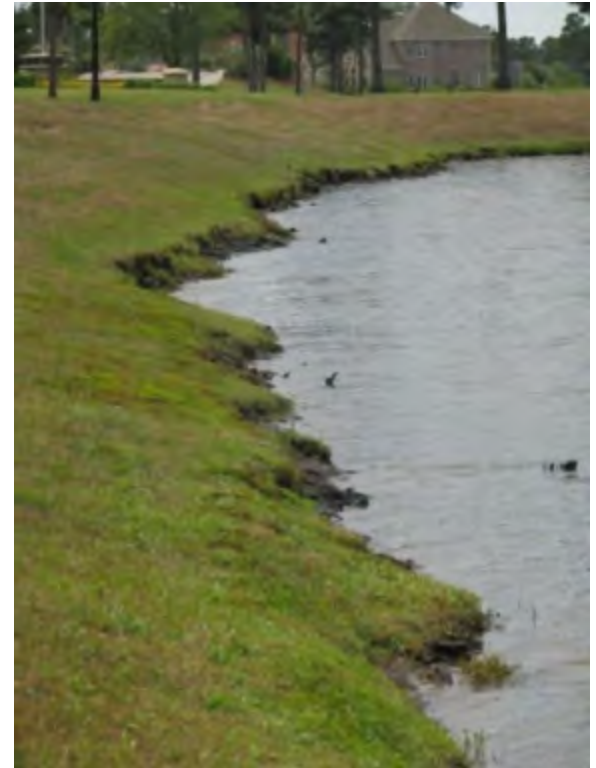
# Erosion due to wave action

Most significant cause of shoreline erosion

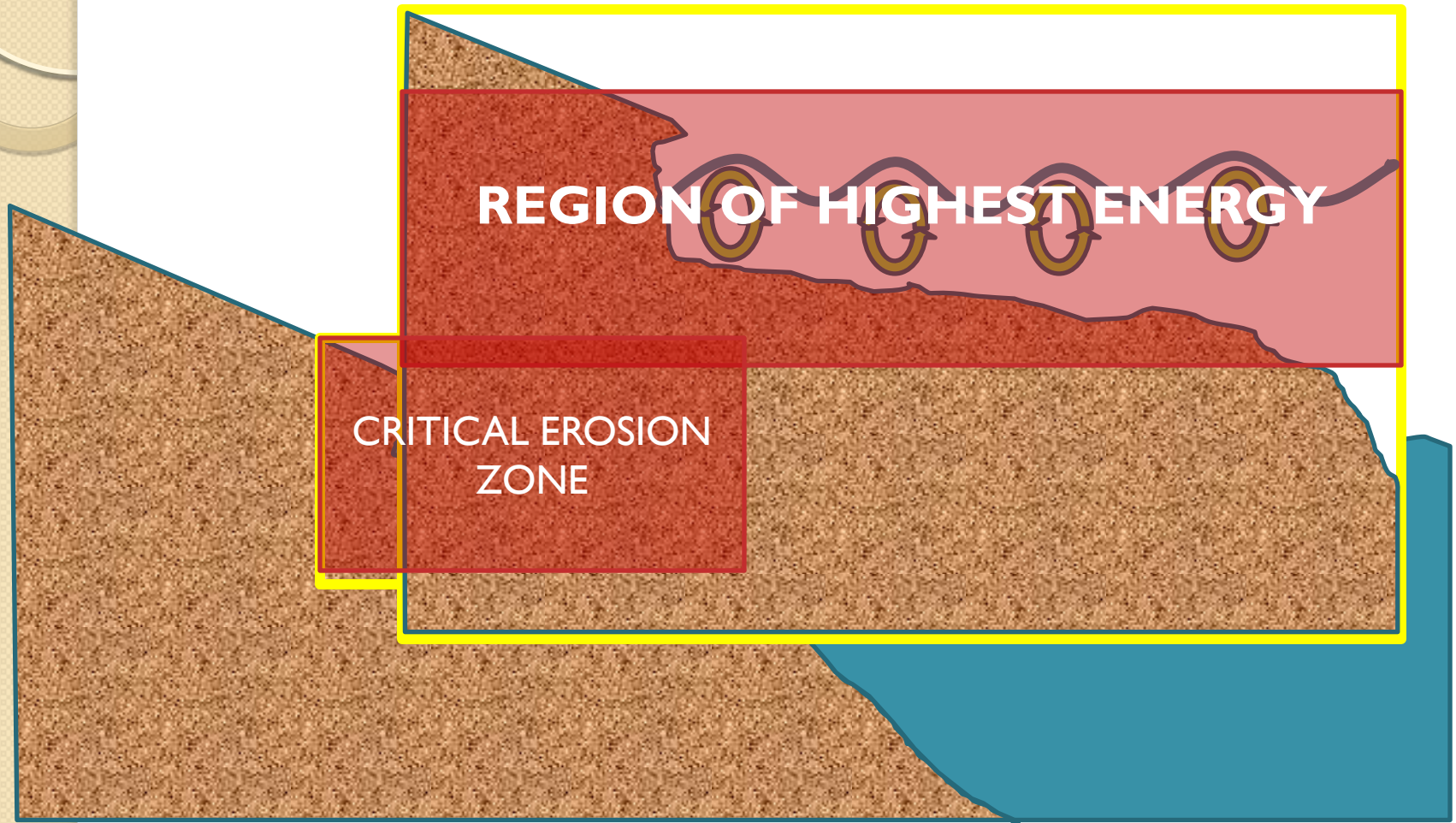
Slow process which often goes overlooked

Eventually undermines bank integrity

Grade of slope is greatest factor in erosion



# How waves erode

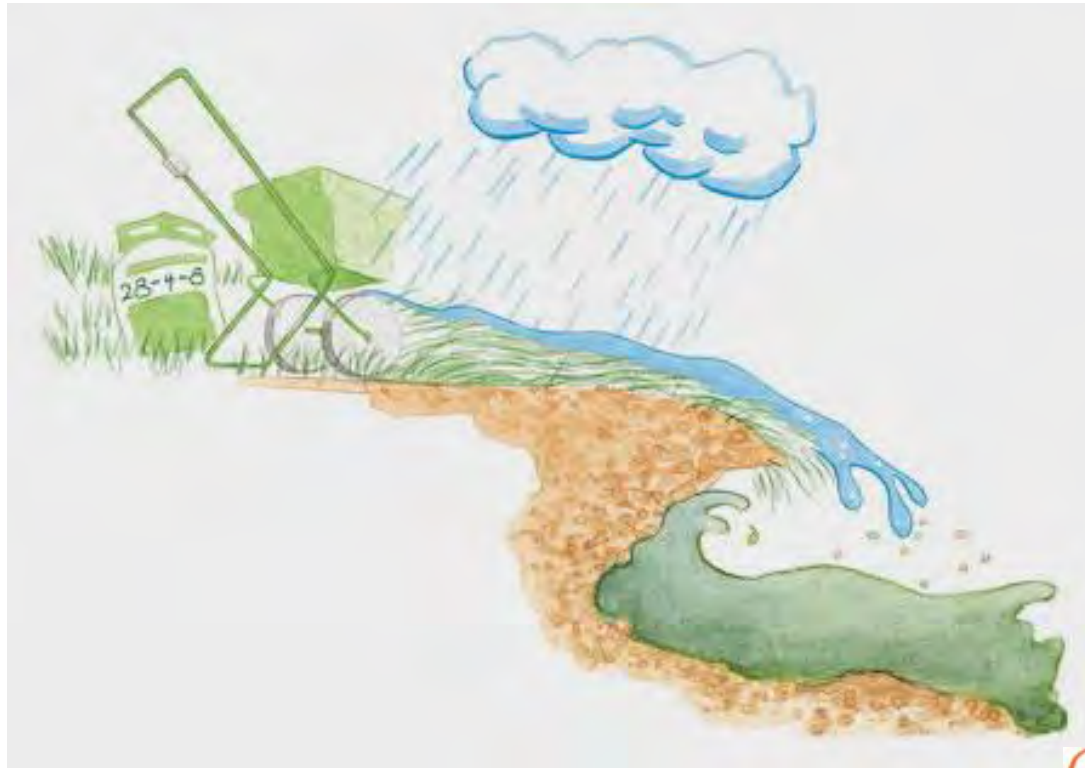






# Protecting the Critical Erosion Zone

Standard practice: Turf grass

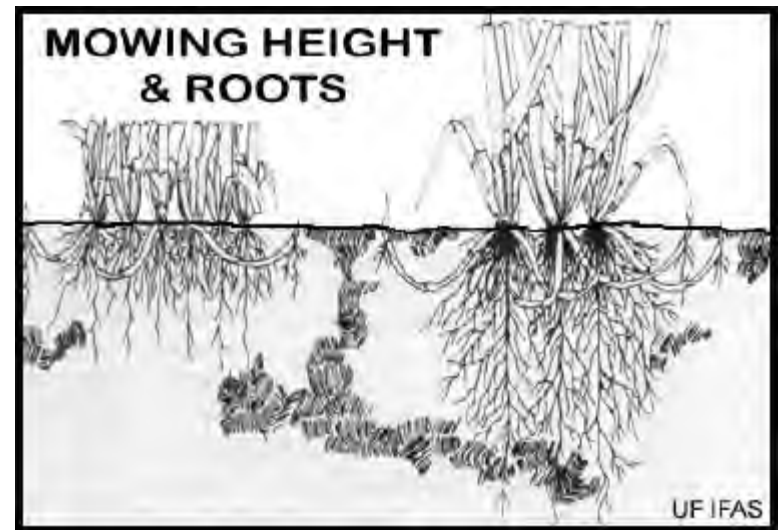


# Why turf fails in the Critical Erosion Zone

Turf grasses are not aquatic plants

Short grass has short roots →

Turf grass stunts in saturated soils



High erosion energy area is actually below the water surface, below where turf grass can survive

# More reasons why turf is not a good shoreline option...

## Water quality

Turf requires more fertilizer and pesticides than most other landscape plants.

Grass clippings are a source of excess nutrients in ponds.

Turf also is not easy to establish on newly excavated soils.



# If turf doesn't work, what does?

Hardscapes

Shorescapes

Living Shorelines

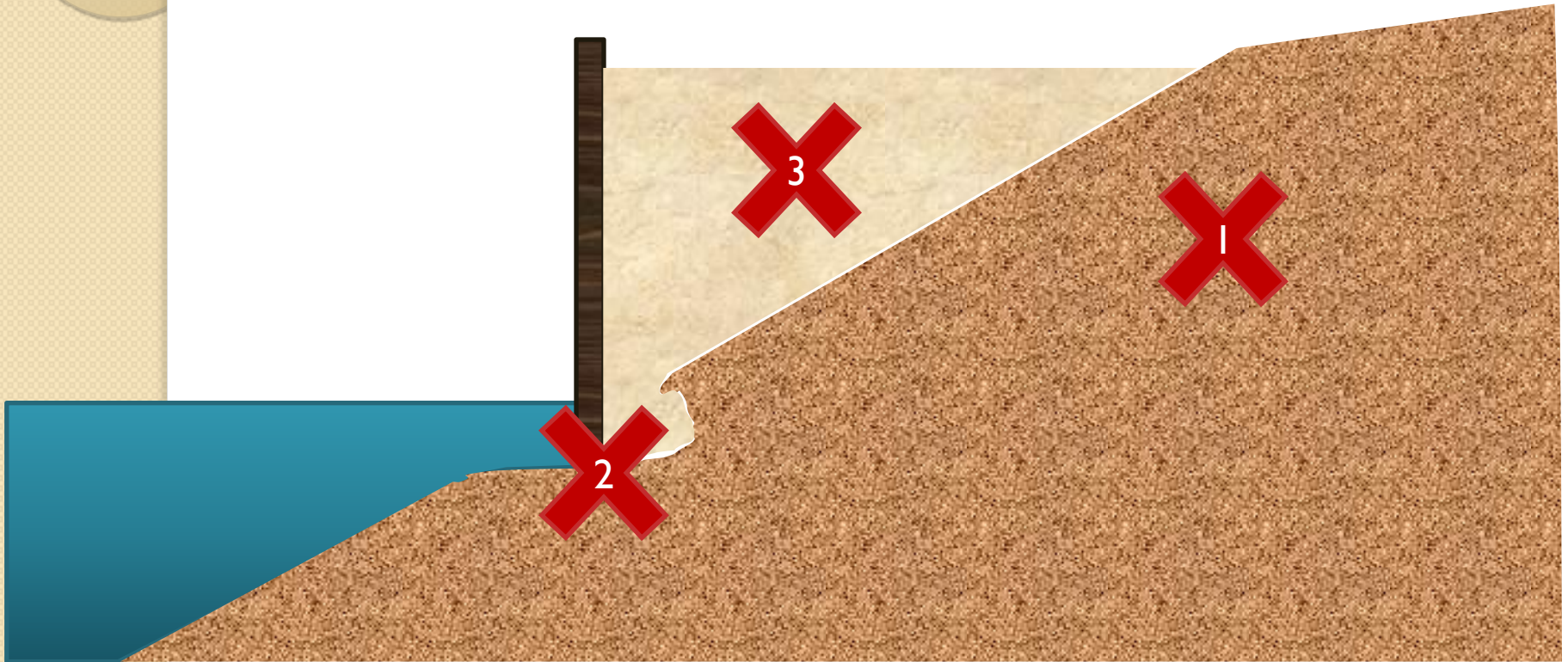
# Hardscaping Options

Bulkheads/Retaining Walls

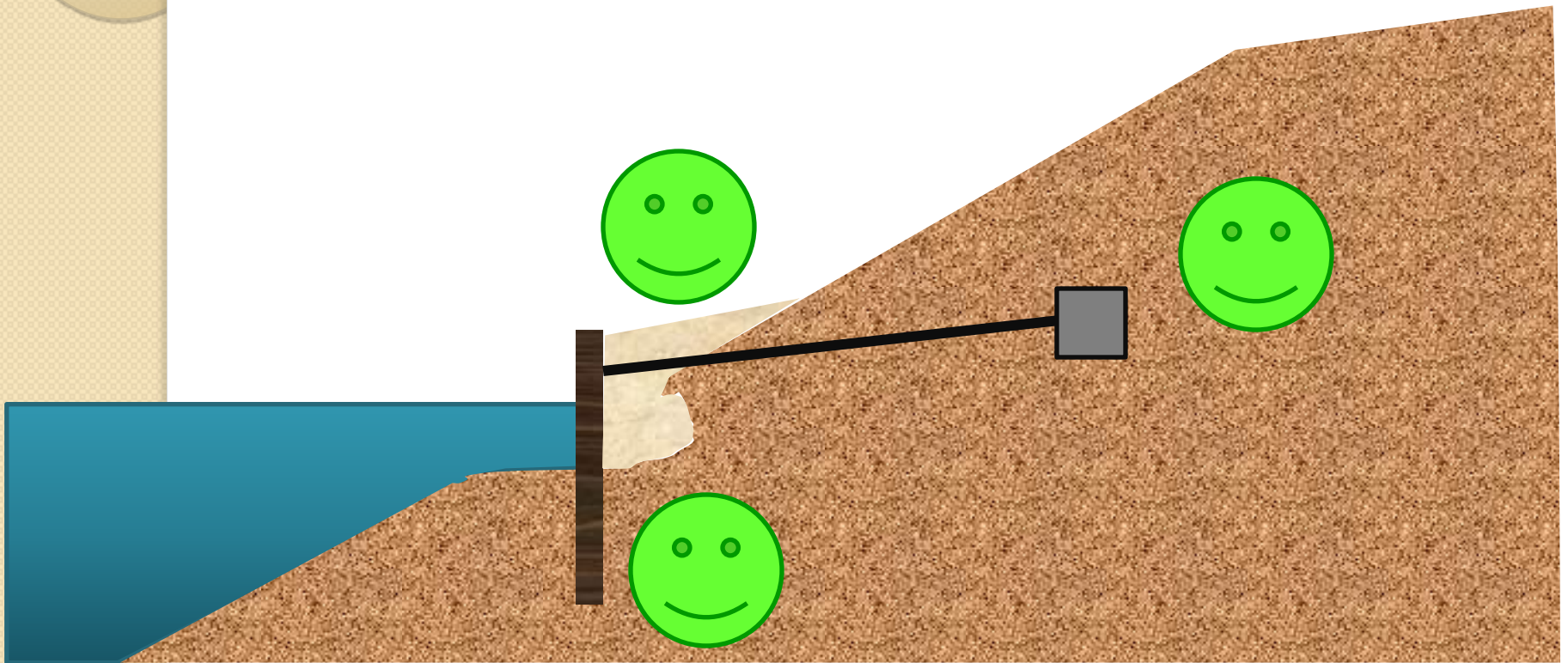
Rip-Rap

Concrete Mats

1. No deadman
2. Not properly toed-in
3. Reduced Storage Capacity



1. Deadman for extra support
2. Toed-in well below critical erosion zone
3. Protected Storage Capacity





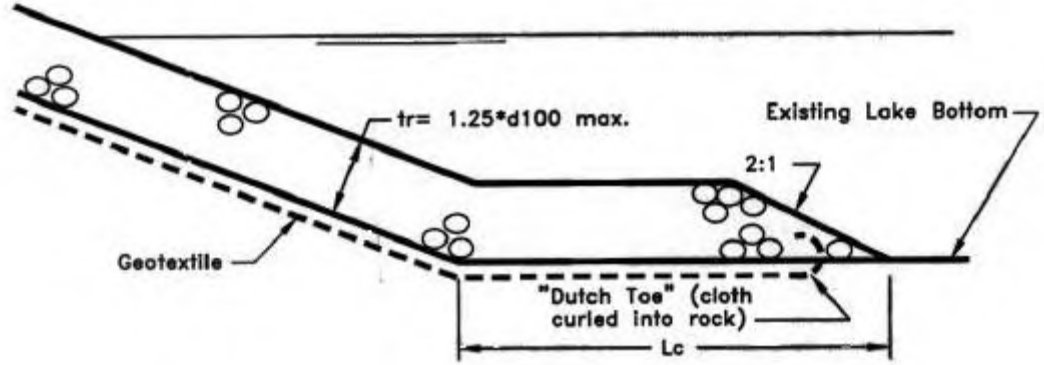
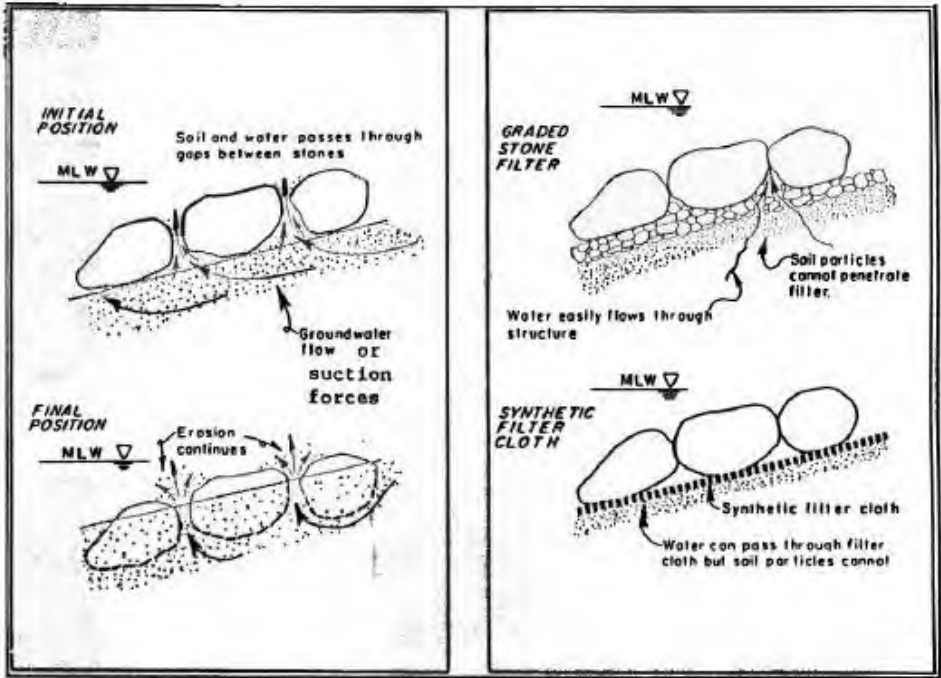


# Bulkheads





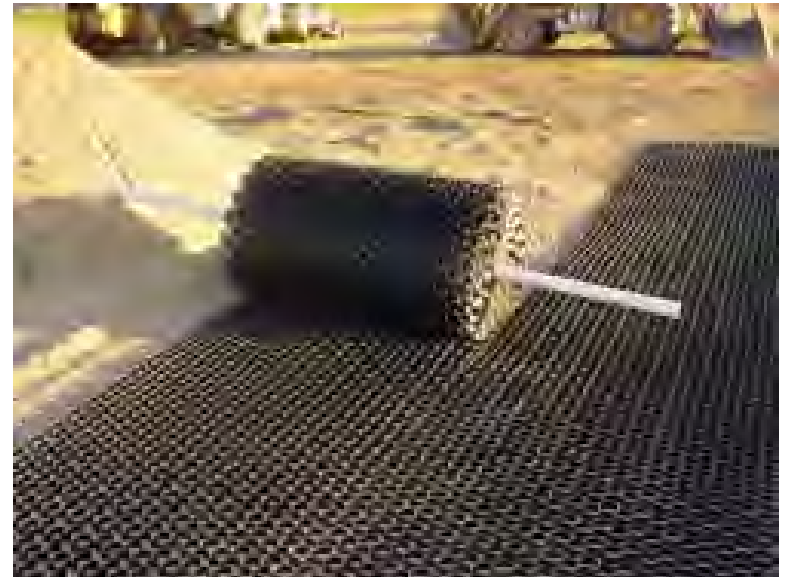
# Proper Rip-rap Design



TYPE C

# Reinforcement Mats

## Concrete & Plastic



# Hardscapes

Strong on erosion control

Weak on water quality protection

Do not have natural appearance

Expensive to install

# Vegetated Shorelines

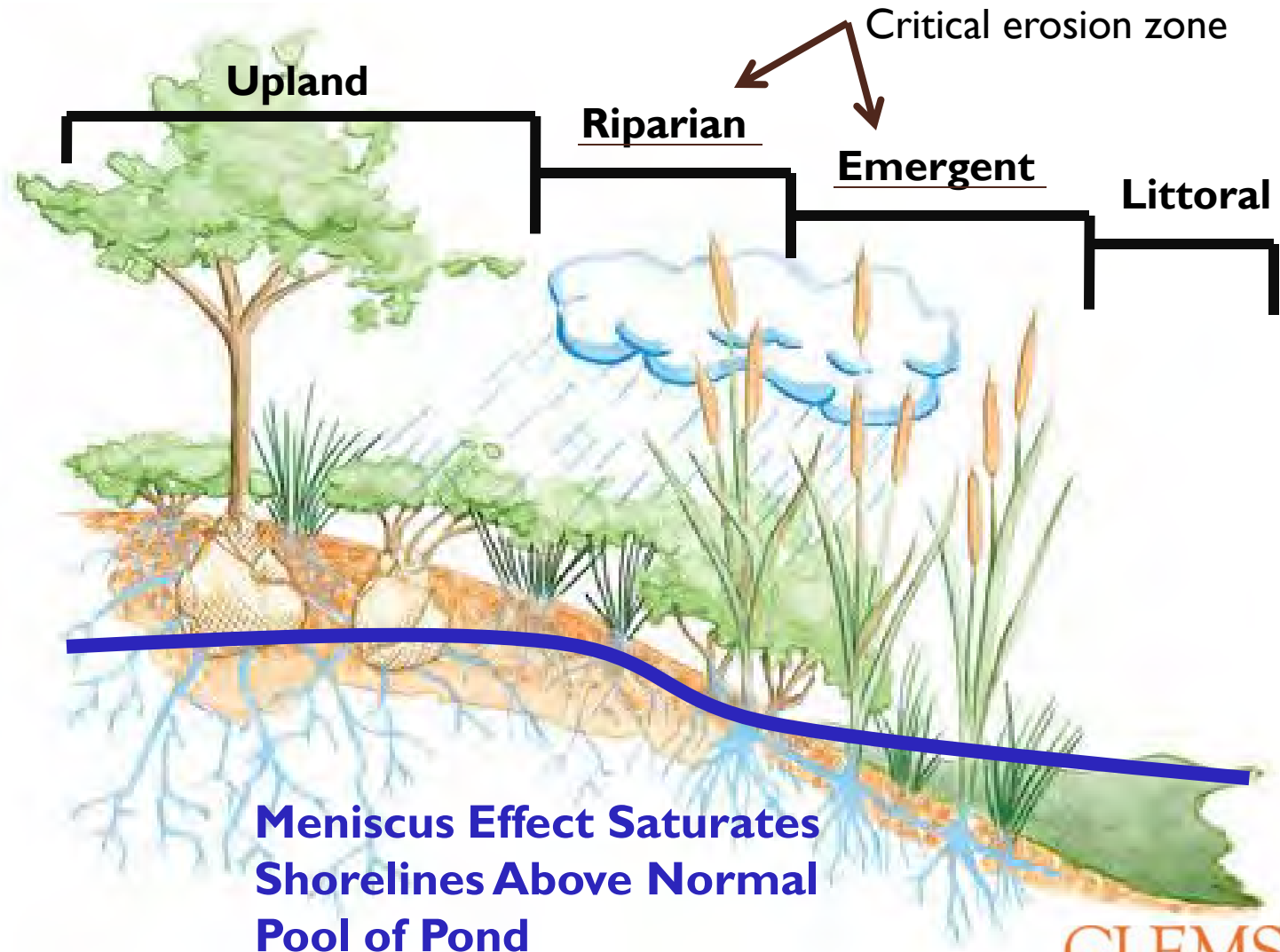


# Advantages of Shoreline Plants

- Strong on erosion control
- Inexpensive to install and maintain
- Adapt to changes in riparian area
- Physical & chemical filters
- Manage wildlife
- Beauty and Marketing



# Structure of a Shoreline



**Meniscus Effect Saturates  
Shorelines Above Normal  
Pool of Pond**

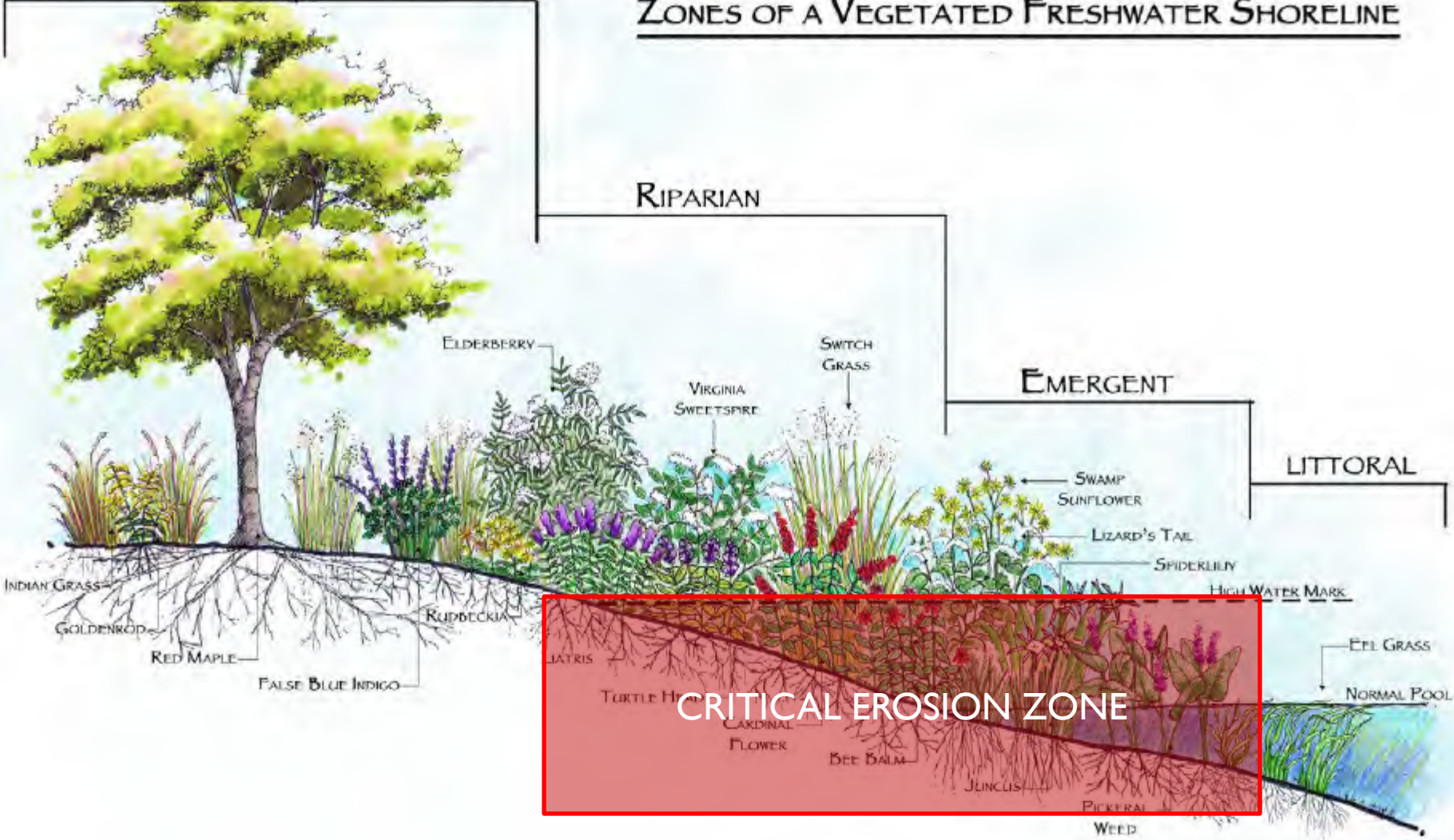
# ZONES OF A VEGETATED FRESHWATER SHORELINE

UPLAND

RIPARIAN

EMERGENT

LITTORAL



CRITICAL EROSION ZONE

# H<sub>2</sub>O Ownership

an informational series from Clemson University's Carolina Clear

## Shoreline Plants in South Carolina Waterfronts

### Shorescapes

South Carolina is blessed to have an abundance of water resources in the form of rivers, lakes, ponds and estuaries, and many residents own properties that adjoin these beautiful watercourses. This presents the waterfront owner with a unique opportunity to discover a largely unexplored form of gardening - SHORESCAPING. A shorescape is a landscaped shoreline that uses attractive plants to protect and beautify the waterfront. A well designed shorescape uses native plants to provide a functional solution to problems such as shoreline erosion, poor water quality, invasive weeds, and wildlife management. Also, like a flower bed in the yard, a shorescape that uses a mixture of flowering plants can serve as a waterfront garden that improves the appearance of the shoreline and adds value to the property. Luckily, there are many very attractive plants that are easy to grow, native to South Carolina, and suitable for use in a most shorescapes.



*Shorescaped pond bank in community near Myrtle Beach, SC*

should be careful not to obstruct these conveyances

# “Living Shorelines”

Mixing hardscapes and vegetation to manage shorelines



# Wetland Carpets: the easy way to shorescape



# McLean Park Case Study









# Futrell Park, Myrtle Beach



# Floating Islands

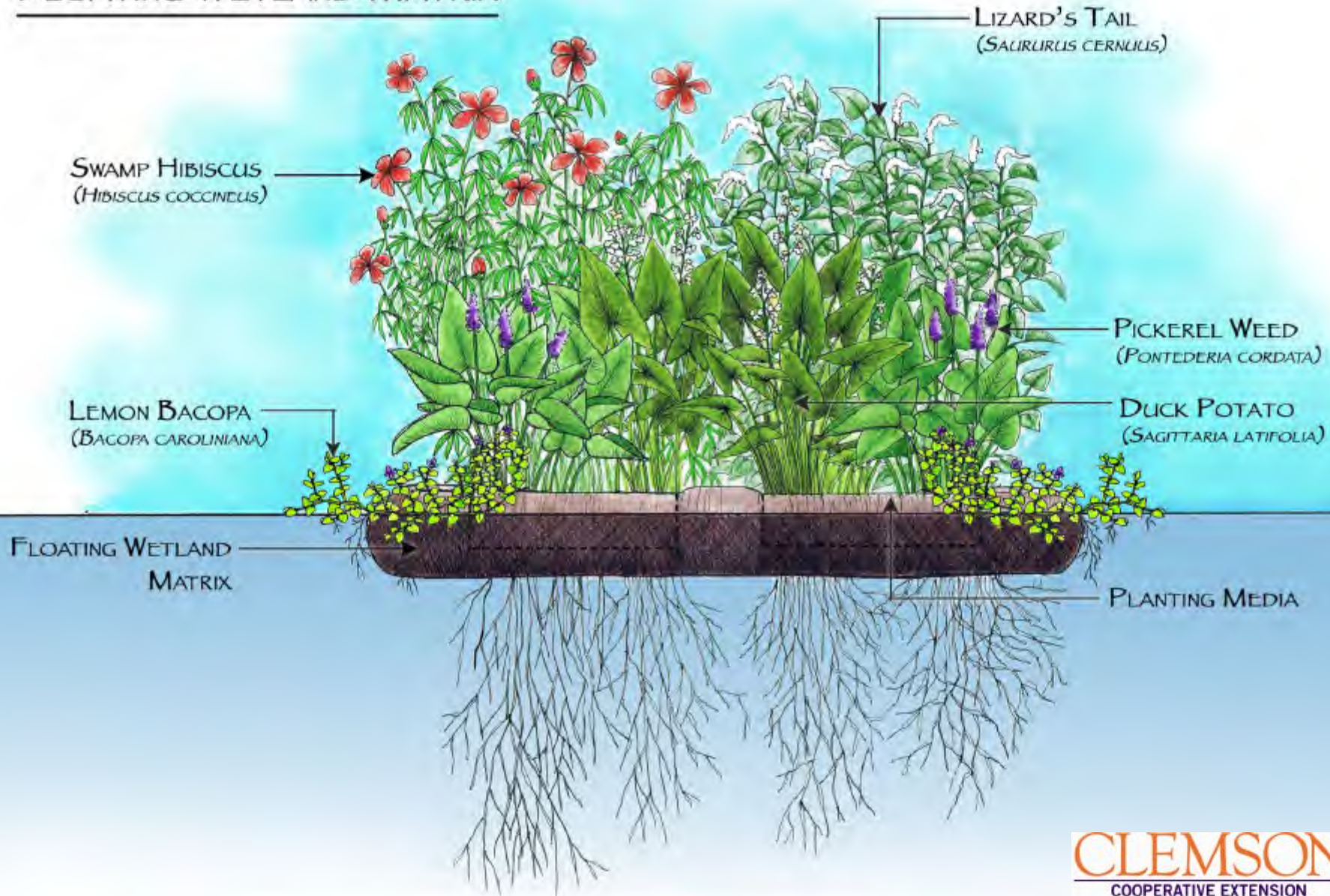
Improve water quality

Beautify waterfront

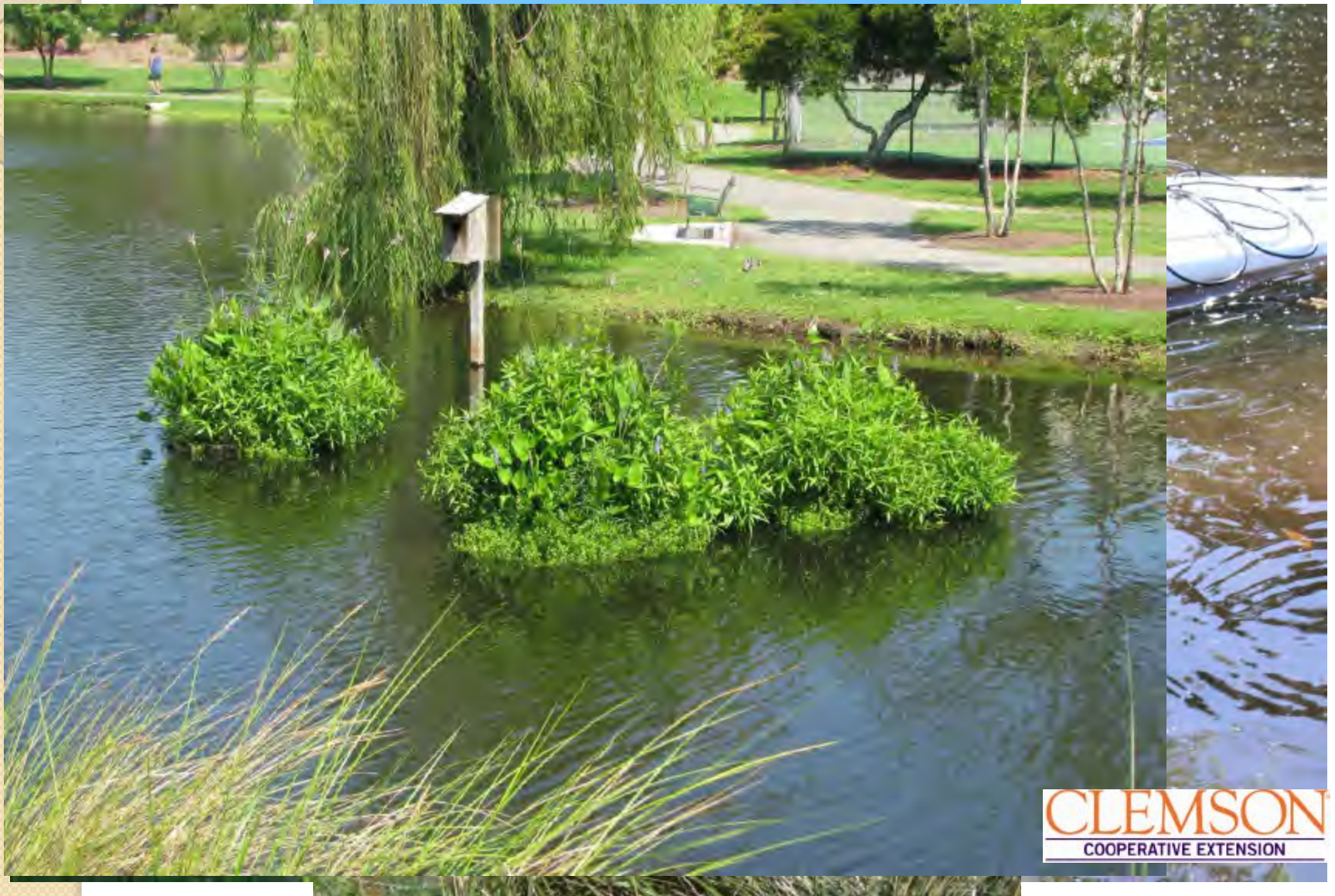
Alternative to fountains



# FLOATING WETLAND MATRIX



# McLean Park, NMB



# Recap

Manage sheet flow in swales and top of slope with good grass management

Consider higher mowing, less frequent mowing, native grasses

Highest erosion energy is at the water's edge and below the water surface

Critical Erosion Zone = Emergent and Riparian zones

Little ripples are enough to cause major erosion

Hardscapes work but they are costly and do little to protect water quality

Take care not to fill-in storage capacity when designing shoreline revetment

Vegetated shorelines provide many benefits beyond preventing erosion

Wetland Carpets and Floating Wetlands are great retrofits for ponds