UF|CPET

FFL Principle 9- Protect the Waterfront
High School- Erosion Simulation

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Program Type: Lab	**Duration:** 1-2 hours (1-2 class periods)

Standards:

SC.912.E.6.6 Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.

SC.912.L.17.11 Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, and food.

SC.912.L.17.2 Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

SC.912.L.17.18 Describe how human population size and resource use affect environmental systems.

SC.912.N.1.6 Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.

Learning Objectives: Students will be able to analyze how different landscaping methods and slope angles influence soil erosion and runoff, and apply Florida-Friendly Landscaping principles to design strategies that protect waterfront ecosystems.

- Identify the causes and effects of soil erosion near waterfronts.
- Describe how slope angle affects the rate of erosion and runoff.
- Compare how different ground covers (bare soil, grass, mulch, rocks) impact erosion control.
- Analyze experimental data to evaluate the effectiveness of various landscaping materials in preventing erosion.
- Apply Florida-Friendly Landscaping principles to design a strategy that protects waterfronts from erosion.

Guiding Questions: How do different types of ground cover and slope affect erosion and water quality, and what landscaping choices can best protect Florida's waterfronts?

- What causes soil erosion, and why is it harmful to waterfront ecosystems?
  How does the steepness of land influence the amount of soil washed away during rainfall?
- Which types of ground cover best reduce erosion and why?
- Based on the erosion activity, which landscaping methods protect waterfronts most effectively?
  How can we use what we learned about erosion and landscaping to protect Florida's waterfront environments?

Intended Outcomes

As a result of the program, what I want my audience to LEARN…	**As a result of the program, I want my audience to ACT by…**	**Assessment: (*How will you know* your audience has reached your intended outcomes)**
Causes and impacts of soil erosion on waterfront ecosystems. How slope and different ground covers influence erosion and runoff. How Florida-Friendly Landscaping principles help reduce erosion and protect water quality.	Analyze and interpret erosion data from the simulation. Applying understanding to design or recommend landscaping strategies that protect waterfront areas. Make informed decisions about landscaping choices that minimize erosion in real-world settings.	Data sheets and lab reports analyzing erosion under different conditions Guiding questions and participation in class discussions Students will submit a landscaping plan or scenario writing assignment applying Florida-Friendly Landscaping principles to protect waterfronts.

Edited by Morgan Nielsen, Center for Precollegiate Education and Training, University of Florida

Schedule Layout:	Items Needed:
Set Up Your Mini-Landscapes: Fill each tray with soil or sand to create different "landscapes." Prepare variations with different ground covers: bare soil, grass sod, mulch, and rocks. Adjust the trays to different slopes using books or blocks.	Aluminum baking pans or plastic trays, sand or bare soil, grass sod or turf samples, mulch or coconut coir, rocks/gravel, books or blocks (to create slopes), protractor (to measure slope angle)
Simulate Rainfall, Waves, or Wind: Slowly pour a measured amount of water (using spray bottles or cups) over each landscape to simulate rainfall and runoff. Add a few drops of colored dye to the water to visualize runoff flow and sediment.	Spray bottles or cups of water, colored dye (food coloring)
Observe and Record: Watch how the water flows over each landscape and note any erosion (soil washed away) and water clarity in the runoff. Record the amount of soil lost (estimate), runoff speed, and turbidity for each setup on your data sheet. Measure amount of erosion.	Data collection sheets, rulers, paper towels (for cleanup)
Compare Results: Discuss with your group how slope and ground cover affected erosion and runoff. Identify which ground covers best prevent soil loss and why.	Just a partner for a discussion and data collection sheet
Draw Conclusions & Apply: Use your observations to explain how landscaping choices protect waterfronts from erosion.	Paper or way to collect conclusions

Details:

Activity Set-Up:
The activity will take place in the science classroom or an outdoor covered area where tables are available. Students will work in groups of three to four to encourage collaboration and discussion. Before class begins, trays will be prepared with soil or sand and different ground cover options, or students can help set these up at the start of the lesson. Blocks or books will be arranged to create various slope angles for each group's trays. Water bottles with dyed water will either be prepared in advance or students will be provided with food coloring to add themselves. The entire activity is expected to take about 50 to 60 minutes. Students will be reminded to handle water carefully to avoid spills, and paper towels will be available for cleanup.

Logistics:
The activity may take one or two class periods, depending on how much time is devoted to discussion and extension work. Tables will be arranged to facilitate group work and to allow easy access to sinks or water stations for cleanup. Materials will be stored in the science prep room before and after the activity to keep everything organized. Since this is an in-classroom activity, there is no vehicle or transportation information to coordinate. If available, a teaching assistant or aide will be scheduled to help monitor and support student groups during the hands-on portion of the lesson.

Extension/Introduction:
Have a IFAS Environmental Science representative come in to talk.