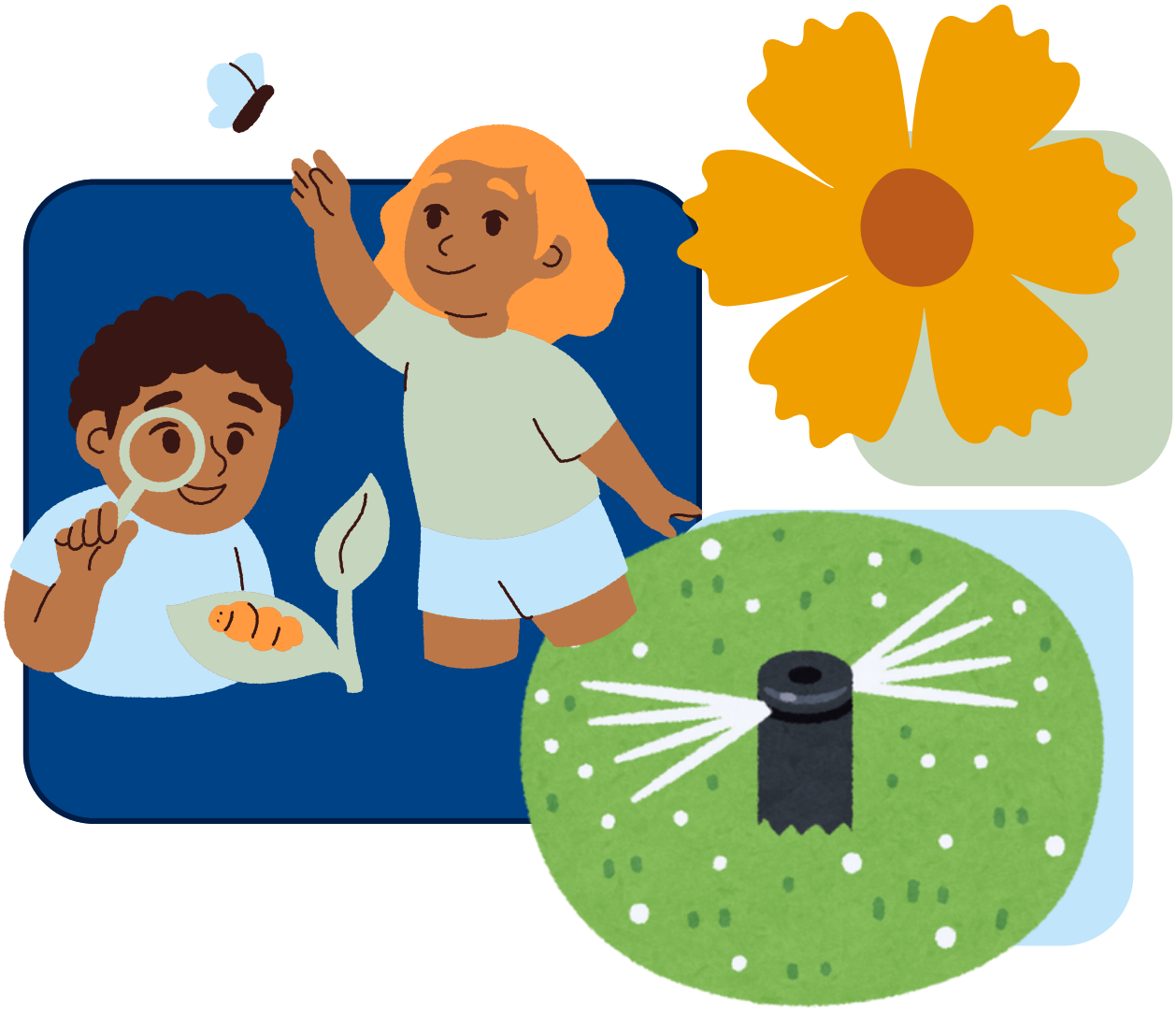
Florida-Friendly Landscaping™ Program

FFL Elementary Lesson Plans



Published on **September 9th, 2025**

Elementary FFL Overview

These lesson plans make Florida-specific environmental learning accessible and interesting for elementary school students with the use of hands-on activities that focus on sustainable landscaping and water conservation. By incorporating elements of the **9 Florida-Friendly Landscaping™ (FFL)** principles, this curriculum will excite students about being outdoors while teaching them how to identify native plants, test soil and mulch, and what it means to design and implement Florida-Friendly landscapes. With the use of interactive activities students will learn about topics ranging from Florida Friendly pest control to protecting Florida's waterfront. Using this curriculum allows for a connection between science concepts and real-world environmental practices. Students can then incorporate these lessons to their own lives, protecting Florida's natural resources at home.

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Elementary Curriculum Map

FFL Principle	Essential Questions	Florida Standards	Key Concepts/ Vocabulary	Resources/ Materials	Assessments
1- Right Plant, Right Place	How can choosing the right plant for the right place help create a healthy, low-maintenance, and environmentally friendly landscape? What observations and information do we need to collect about a site to make smart planting decisions?	SC.3.N.1.6 SC.4.L.17.4 SC.5.L.17.1 SC.5.N.1.1		Template or blank paper, clipboards, writing utensils, plant cards, chart paper	1. Site analysis and placement map 2. ***Reflective Writing:*** Students write a paragraph or short report to assess their ability to explain the key concepts in their own words.
2- Water Efficiently	How can we use what we know about Florida's climate to water our landscape in a way that saves water and protects the environment?	SC.4.E.6.6 SC.4.L.17.4 SC.5.E.7.6	Vocab: irrigation, drought-tolerant, mulch, rain sensor, runoff	Example pictures of sprinklers, photos, rain gauge/participation maps of local areas, plant cards and worksheet	1. Completion of station activities. 2. Design a landscape that includes water-efficient strategies and Florida friendly plants. 3. An exit ticket that can be a short reflection, comic strip, short story, a very detailed sketch that shows understanding of concepts learned.
3- Fertilize Appropriately	Why is it so important to take good care of the soil? What are the effects of adding things to the soil?	SC.1.E.6.1 ELA.1.V.1.1 SC.1.L.14.1 SC.1.L.17.1 ELA.1.V.1.3	Vocab: soil, nutrients	Soil, rock and organism samples, 4-H FFL Leader Guide, fertilizer, planting bags, gloves, beans, Edible Soil activity materials, pictures of soil and nutrients for soil	Students will plant beans on healthy and non-healthy soil and will monitor the effect of the fertilizers in the growing plants.

4- Mulch	What is mulch and how does it work? Why is mulch important in Florida Friendly Landscaping? How do different mulch types affect soil moisture? How can we make mulch from natural materials?	SC.5.N.1.1 SC.5.N.1.2 SC.5.L.17.1 SC.5.E.7.1		Landscape Observation Sheet, Slide Presentation, Lab Observation Sheet, Lab Report Sheet, heat lamps, moisture meter and ruler, watering can or bottle, pots or containers, potting mix, pine bark mulch, pine needle mulch, gravel	1. Completion and accuracy of student lab report 2. Participation in discussion about mulch benefits and FFL 3. Ability to explain experiment results and draw conclusions
5- Attract Wildlife	What is a habitat, and what do all organisms need to survive? How do the types of plants affect what organisms will be found in that habitat? What major groups of animals would we expect to find in the community garden built in this activity? What do the animals in this garden eat?	SC.3.L.17.3 SC.4.L.17.4 SC.5.L.17.1 SC.3.L.15.2 SC.4.L.17.2		FFL Handbook, IFAS introductory presentation, Florida Friendly organisms powerpoint, clipboard, pencils, paper of varying sizes, markers	A small poster board/ diorama/ or drawing project (depending on students' access to materials) depicting how they would design their own yard to foster local wildlife.
6- Manage Yard Pests (1)	Why do we use insecticides? What are some unintended consequences of using insecticides? Why should we use insecticidal soap first?	SC.3.N.1.1 SC.3.L.17.1 SC.3.L.17.2 SC.4.L.17.1 SC.4.N.1.1 SC.5.L.17.1		whiteboard/black board, presentation, insecticidal soap, tomato plants, spray bottle, magnifying glasses	1. Completion of activity 2. Answering question 3. Overall Participation
6- Manage Yard Pests (2)	What is a pest? What is the difference between a good bug and a “bad” bug? What can we do if plants are hurting our plants but we don’t want to hurt the environment? How can we help good bugs thrive in landscaping?	SC.3.L.17.2 SC.3.L.17.1 SC.4.L.17.4 SC.5.L.15.1		Pest or Pal Cards, presentation, Garden Detective Observation Worksheet, *Optional:* Magnifying glasses, Optional: Brief presentation showing some of the non-pesticide ways to control garden pests, Garden Guardians scenario cards	*1. Participation:* Participation in class activities and completion of the worksheet *2. Optional Exit Ticket* to assess learning at the end of the lesson

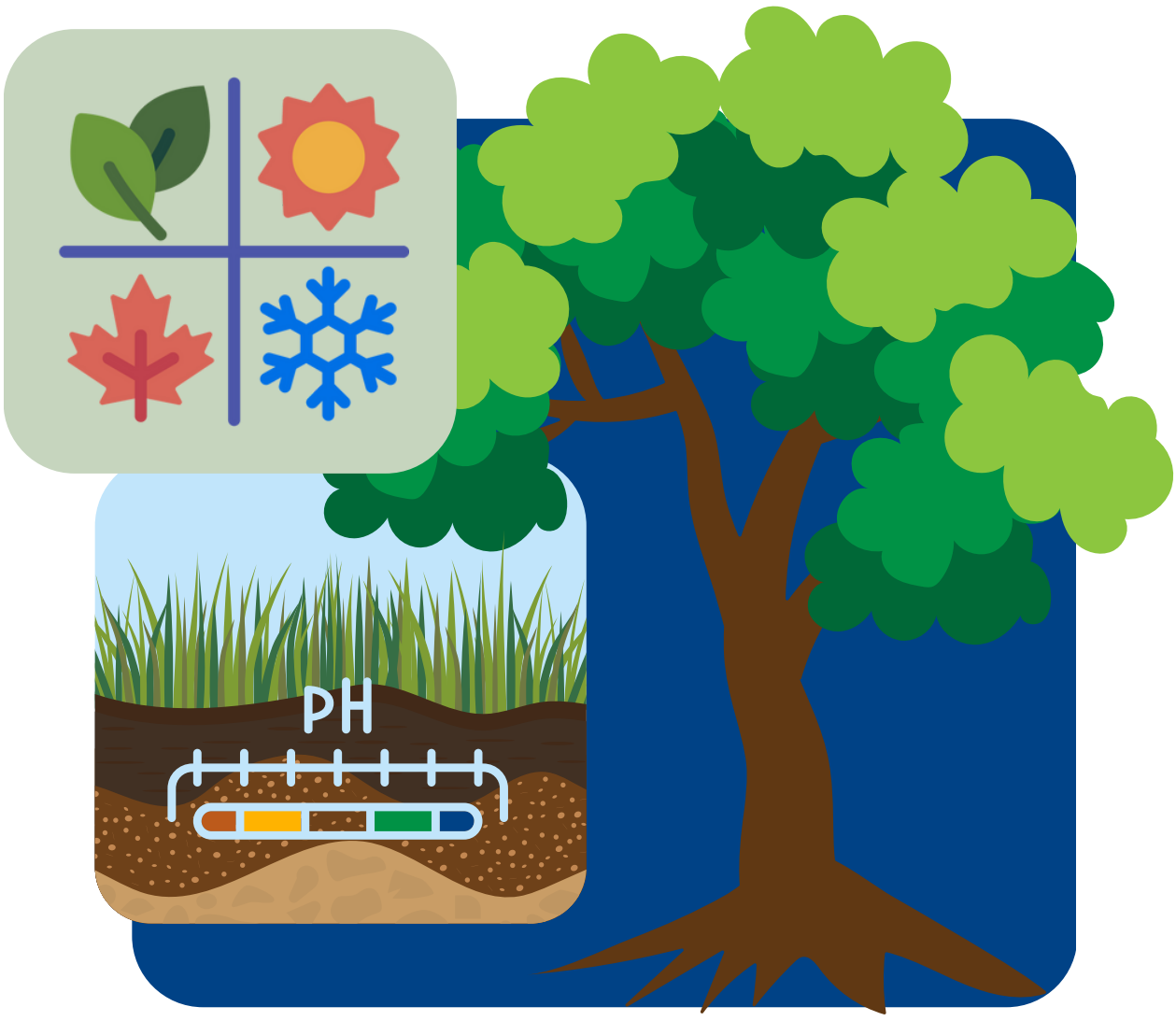
7- Recycle Yard Waste	How can recycling yard and household waste help protect Florida's environment and conserve natural resources?	SC.5.L.17.1	Vocab: Decompose, compost, organic, landfill, biodegradable, recycle	Pictures of your local landfill, compost piles and/or recycled garden clippings, premade unlabeled bags of "waste", disposable gloves, copies of books, poster paper, markers, index cards	Reflection and project-based assessment where students explain and illustrate a simple recycling or composting system, showing understanding of key concepts.
8- Reduce Stormwater Runoff	What happens to rain when it can't soak into the ground?	SC.1.E.6.1 ELA.1.V.1.1 SC.1.L.14.1 SC.1.L.17.1 ELA.1.V.1.3	Vocab: stormwater, pollution and soak	Powerpoint presentation, paint trays, worksheets, markers, crayons, tape, water spray bottle, artificial plant/leaves, "T" chart worksheet, pencils	After the "Stormwater Runoff: activity, students will draw about what they observed in the tray without plants vs. the tray with plants. Then, they will write (or draw - see the scripted lesson plan for details) their conclusions using guiding questions.
9- Protect Waterfront	How does stormwater runoff affect fish, plants, and water quality in waterfront areas? What are Florida-Friendly Landscaping™ principles and why were they created? How do rain gardens, buffer zones, and native plants reduce pollution and protect waterways? What changes could homeowners make to reduce pollution near a lake or river?	SC.3.L.17.1 SC.4.L.17.2 SC.3.E.6.6 SC.4.E.6.7 SC.3.E.6.7 SC.4.E.6.6 SC.3.N.1.5 SC.4.N.1.1		Presentation, plan checklist, graph paper/blank paper, coloring supplies	1. Complete and present a model of a Florida-friendly waterfront landscape 2. Participation in guided discussions and accurately 3. Ability to explain the environmental benefits of specific landscaping practices 4. Exit tickets 5. Groups articulate how their design reduces runoff and aligns with FFL principles during peer presentations

Florida-Friendly Landscaping™ Program

Principle 1:

Right Plant, Right Place

Elementary Level



Published on **August 5th, 2025**

About This Activity

Title: Right Plant, Right Place

Subject, Grade, Level:
Upper Elementary Science

Abstract:

This interactive, standards-aligned elementary lesson plan, "Right Plant, Right Place", introduces students to the core principles of Florida-Friendly Landscaping™ (FFL), focusing on selecting appropriate plants for specific environmental conditions. Over two sessions, students engage in a hands-on site analysis of a local outdoor space, identifying factors such as sunlight, soil conditions, and space constraints. They then apply their observations to match suitable native or drought-tolerant plants to the environment, using FFL resources. Through mapping, group discussion, and reflective writing, students learn how thoughtful plant placement supports water conservation, ecosystem health, and low- maintenance landscaping. The program integrates science and optional ELA standards, fostering both analytical and communication skills. The unit culminates in a practical assessment — students present a site map with plant placements and write about the importance of matching plants to place.

Learning Objectives:

At the conclusion of this activity, participants will be able to:

1. Conduct a site analysis of a local outdoor area (schoolyard or home).
2. Identify sunlight, shade, soil drainage, and obstacles on a site map.
3. Match plants to proper site conditions using Florida-Friendly Landscaping™ guidelines.
4. Describe why plant placement matters for water use, maintenance, and ecosystem health.
5. Recognize and propose alternatives to invasive plants.

Author: Morgan Nielsen
UF CPET
Edited by Melody White, UF CPET

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning standards:

SC.3.N.1.6	Infer based on observation.
SC.4.L.17.4	Recognize ways plants and animals, including humans, can impact the environment.
SC.5.L.17.1	Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments.
SC.5.N.1.1:	Define a problem, use appropriate reference materials, plan and carry out scientific investigations.

Timeframe:

This activity is designed to take approximately 90 minutes of class time, plus an extra 10 min if you choose to use the FFL Plants App.

List of Materials

Day 1: Site Analysis and Mapping-

- Mapping Materials:
  - template or blank paper
  - clipboards
  - writing utensils
- Optional Materials for day 1:
  - Site map template-younger students may benefit from the scaffolding of a rough diagram of the space being analyzed to fill in conditions

Day 2: Choosing the Right Plants

  - chart paper for class brainstorming session
  - slides/poster for native and non-native, sun/shaded and drought tolerance
  - example pictures
  - plant cards from the Florida Friendly Plant List- printed or digital
- Optional Materials for day 2:
  - devices to view FFL app/website

Important Note:

Consider a back-up activity in case of weather-related issues (it is Florida!) and reaching out to your local IFAS extension office to arrange a guest speaker to come speak to students for added local context.

Procedure and General Instructions (for instructor)

Introduction

Day 1: Site Analysis

1. Introduction (10 min)
- Discuss the concept of "Right Plant, Right Place" with simple, local examples-modified from the FFL app or FFL source materials with pictures of poor versus smart plant placement.

2. Site Analysis and Mapping (15 min)
- Take students to an on-campus outdoor space and discuss observations about sun/shade, soil types, space and obstacles related to use of an area. Have them map the space, noting: sunny/shady areas, walkways, buildings, any puddles or areas where water may pool, soil conditions and the use of the area.

Day 2: Choosing the Right Plants

3. Warm-Up (5 min):
- Quickly recap site observations and what factors should be considered to choose the "right" plant for a location

4. Matching Plants to a Site (25 min)
- Brainstorm what plants need to thrive. Introduce the idea of native and non-native plants, sun/shade plants and drought-tolerant plants. Show a few examples from your community and the Florida-Friendly Landscaping™ Materials.

5. Optional: FFL Plants App (10 min)
- If appropriate technology is available, use this opportunity to introduce the FFL Plants mobile app or website, showing students that they can filter by plant needs and aesthetic factors.

6. Activity- Plant Match Challenge (20 min)
- Give students plant cards with plant information (sun requirements, height and aesthetic qualities, water needs) and have them choose the BEST site for their plant on their mapped location. Let students present their maps and explain their choices.

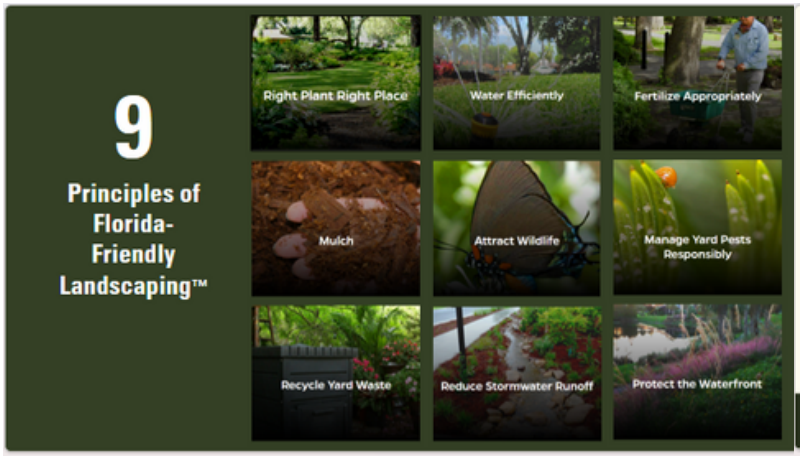
7. Wrap-Up and Assessment- Reflective Writing (10 min):
- Students write a short report (length and detail can depend on class needs) to answer the question "Why is it important to choose the right plant for the right place?"

Teacher-Facing Materials

Included with this Lesson

- PowerPoint

Included Slides:



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Basics of Landscape Design

Proper Planning

- Florida environments vary widely
- Plant adaptations vary widely
- Choose plants that are suited to the environment of your landscape

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

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Basics of Landscape Design

- Form follows function
- Group plants with similar needs

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Basics of Landscape Design

- Color in the landscape
- Made in the shade

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Basics of Landscape Design

- Urban landscape biodiversity
- Lowdown on grass

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Basics of Landscape Design

FFL works for every aesthetic- formal, natural and everything in between

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Site Analysis

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Site Analysis

- Analyze the following site conditions in your yard
- Match the conditions with plants' requirements to thrive

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Site Analysis

- Soil type
  - Sand, clay or silt
- Drainage
  - Well- or poorly drained
  - Low-lying areas or ponds

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Site Analysis

Soil Health

- Soil is a living ecosystem
- Organic matter is crucial to soil health
- Add soil amendments
- Improve soil over time

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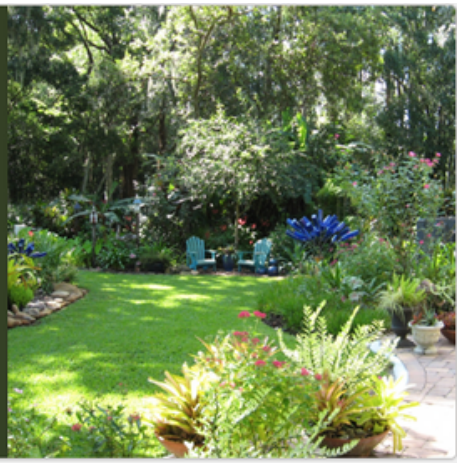
Site Analysis

Light

- Full, partial or shade

Views

- Outside and from inside house



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Site Analysis

- Hardscapes and structures
- Structural limitations and obstructions

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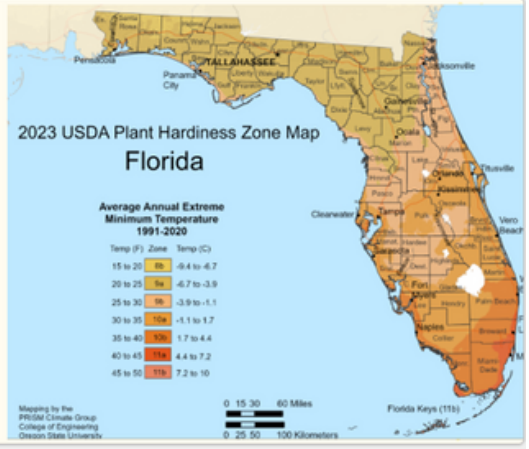
Site Analysis

Climatic Conditions

- Use FFL plant app to find the right plant for your zone



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Choosing Plants

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Choosing Plants

Diversity

- Trees
- Shrubs
- Native grasses
- Groundcovers
- Wildflowers

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Choosing Plants

Maintenance

- Choose low-maintenance plants

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Choosing Plants

Consider size

- How large will the plant become?
- Give them room
- Think ahead

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Choosing Plants

Groundcovers
- Shady areas
- Slopes
- Add interest

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Choosing Plants

Turf
- Turfgrass can be the right plant for the right place

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Choosing Plants

Shrubs
- Plant in large groups
- Group according to water and maintenance needs
- Space according to mature size

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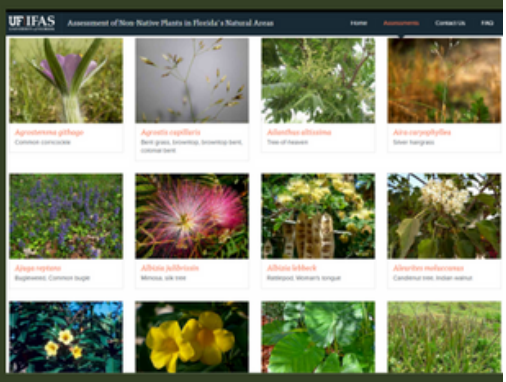
Choosing Plants

- Do not plant or keep invasive plants!!



9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

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Landscaping Pitfalls: Narrow Strips of Grass

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Make it Florida-Friendly!

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Landscaping Pitfalls: Multiple Small Plantings

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Make it Florida-Friendly!

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Before and After

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

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Before and After

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Before and After

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Before and After

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

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Before and After

Photo by S. P. Turnipseed

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

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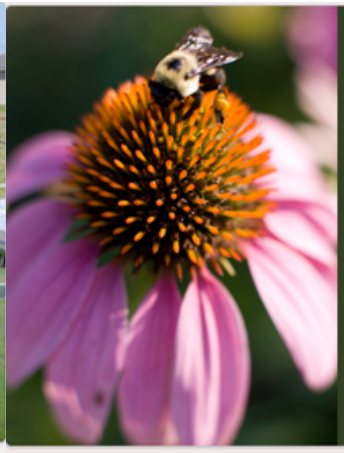

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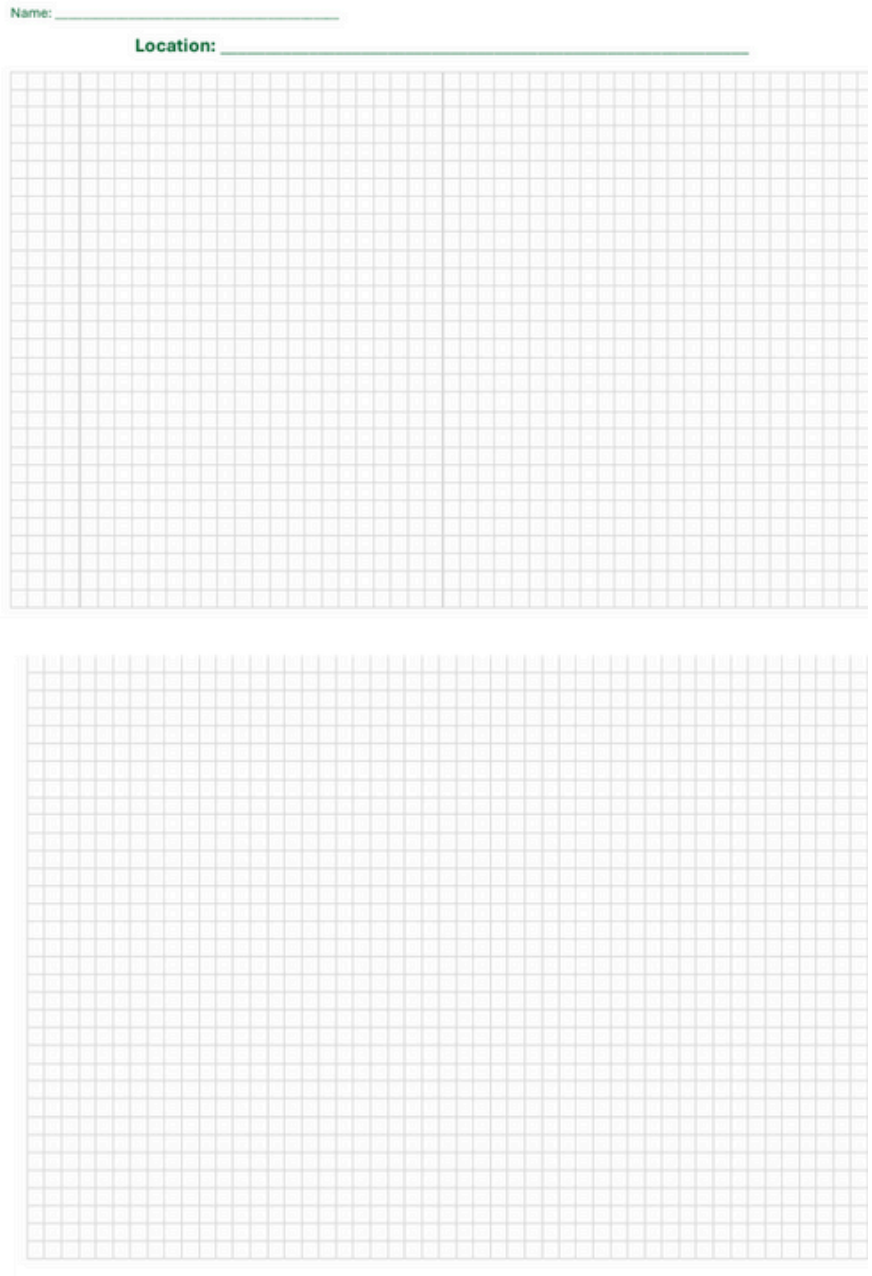
Student Activity Sheets and Assignments

Included with this Activity

1. FFL Landscaping Design Template
2. Landscaping Plants in Florida Plant Information Cards

FFL Landscaping Design Template



Landscaping Plants in Florida Plant Information Cards

Landscaping Plants in Florida Plant Information Cards

All information and images derived from the Florida-Friendly Landscaping™ Plant Guide

Florida Arrowroot *Zamia integrifolia*

Photos by Ryan Fessenden

Hardiness Zone: 8a to 11

Native/Non-Native Status: Native

Light Requirements: Can tolerate full/partial shade or full sun

Drought Tolerance: High

Soil:
Any Texture
Well Drained
pH 4.5-8

Appearance: Groundcover

Fun Fact! This poisonous plant is the only larval food plant for the Atala butterfly

Information and images from Florida-Friendly Landscaping™ Plant Guide

Wild Banyan Tree *Ficus citrifolia*

Photos by Ryan Fessenden

Hardiness Zone: 10a to 11

Native/Non-Native Status: Native

Light Requirements: Partial Shade to Full Sun

Drought Tolerance: High

Soil:
Any Texture
Medium Drainage
pH 4.5-8.0

Appearance: 25-50ft trees, edible fruit

Fun Fact! Shouldn't be planted near drain fields due to aggressive roots

Information and images from Florida-Friendly Landscaping™ Plant Guide

Podocarpus *Podocarpus macrophyllus*

Photos by Ryan Fessenden

Hardiness Zone: 7a to 11

Native/Non-Native Status: Not Native

Light Requirements: Partial Shade to Full Sun

Drought Tolerance: High

Soil:
Sandy
Well Drained
pH 4.5-7.2

Appearance: Large Shrub or Small Tree

Information and images from Florida-Friendly Landscaping™ Plant Guide

Chinese Hibiscus *Hibiscus rosa-sinensis*

Photos by Ryan Fessenden

Hardiness Zone: 5b to 9b

Native/Non-Native Status: Not Native

Light Requirements: Partial Shade to Full Sun

Drought Tolerance: Medium

Soil:
Sandy Loam
Medium to Well Drained
pH 4.5-6.5

Appearance: Large spreading shrubs with large, colorful flowers

Information and images from Florida-Friendly Landscaping™ Plant Guide

Firebush *Hamelia patens*

Photos by Ryan Fessenden

Hardiness Zone: 9a to 11

Native/Non-Native Status: Native

Light Requirements: Full Shade to Full Sun

Drought Tolerance: Medium

Soil:
Any texture
Medium to well drained
pH 4.5-8.0

Appearance: Irregularly shaped spreading shrub with red and orange flowers

Fun Fact! Attracts butterflies, hummingbirds and other birds

Information and images from Florida-Friendly Landscaping™ Plant Guide

Croton *Codiaeum variegatum*

Photos by Ryan Fessenden

Hardiness Zone: 9b to 11

Native/Non-Native Status: Not Native

Light Requirements: Partial Shade to Full Sun

Drought Tolerance: Low

Soil:
Any Texture
Well Drained
4.5-8.0

Appearance: Irregularly shaped large shrubs

Fun Fact! This species has over 100 variants in a range of colors and shapes.

Information and images from Florida-Friendly Landscaping™ Plant Guide

Ixora *Ixora coccinea*

Photos by Ryan Fessenden

Hardiness Zone: 9a to 11

Native/Non-Native Status: Not Native

Light Requirements: Full Sun

Drought Tolerance: Medium

Soil:
Any Texture
Medium to Well Drained
pH 4.5-5.5

Appearance: Small, round shrubs with year-round flowers

Information and images from Florida-Friendly Landscaping™ Plant Guide

Scrub Palmetto *Sabal etonia*

Photos by Ryan Fessenden

Hardiness Zone: 9a to 11

Native/Non-Native Status: Native

Light Requirements: Partial Shade to Full Sun

Drought Tolerance: High

Soil:
Sandy Loam
Well Drained
pH 4.5-8.0

Appearance: Small, shrub palm

Information and images from Florida-Friendly Landscaping™ Plant Guide

Simpson's Stopper *Myrcianthes fragrans*

Photos by Ryan Fessenden

Hardiness Zone: 9b to 11

Native/Non-Native Status: Native

Light Requirements: Full Shade to Full Sun

Drought Tolerance: High

Soil:
Any Texture
Well Drained to Wet
pH 6.0-7.2

Appearance: Large Shrub to Small Tree with fine leaves and tiny white flowers that bloom year-round

Information and images from Florida-Friendly Landscaping™ Plant Guide

Powderpuff *Mimosa strigillosa*

Photos by Ryan Fessenden

Hardiness Zone: 8a to 11

Native/Non-Native Status: Native

Light Requirements: Full Sun

Drought Tolerance: Medium

Soil:
Any Texture
Well Drained
pH 4.5-7.2

Appearance: low-growing groundcover with striking pink flowers, tolerates foot traffic and mowing

Fun Fact! Also called the "sensitive plant", the leaves visibly retract when touched

Information and images from Florida-Friendly Landscaping™ Plant Guide

Wild Coffee *Psychotria nervosa*

Photos by Ryan Fessenden

Hardiness Zone: 8b to 11

Native/Non-Native Status: Native

Light Requirements: Full or Partial Shade

Drought Tolerance: Medium

Soil:
Any Texture
Well Drained
pH 6.0-7.2

Appearance: Large, irregularly shaped shrub with tiny white flowers and small, red fruit that provides food for wildlife

Fun Fact! This is NOT the coffee that you drink, and the fruits contain no caffeine.

Information and images from Florida-Friendly Landscaping™ Plant Guide

Maidenhair Fern *Adiantum capillus-veneris*

Photos by Ryan Fessenden

Hardiness Zone: 7a to 11

Native/Non-Native Status: Native

Light Requirements: Partial to Full Shade

Drought Tolerance: Low

Soil:
Any Texture
Medium to Well Drained
pH 6.0-6.8

Appearance: Round spreading fern with fine-textured, delicate leaves

Information and images from Florida-Friendly Landscaping™ Plant Guide

Milkweed *Asclepias* spp.

Hardiness Zone: 8b to 10b

Native/Non-Native Status: Not Native

Light Requirements: Full Shade to Full Sun

Drought Tolerance: Medium

Soil:
Any Texture
Well Drained to Wet
pH 6.0-7.2

Appearance: Upright perennial with large flowers in a range of colors

Fun Fact! These plants are a big food source for caterpillars and butterflies, but all parts are poisonous to humans

Information and images from Florida-Friendly Landscaping™ Plant Guide

Bamboo *Bambusa* spp.

Photos by Ryan Fessenden

Hardiness Zone: 8a to 11

Native/Non-Native Status: Not Native

Light Requirements: Partial Shade to Full Sun

Drought Tolerance: Medium

Soil:
Any Texture
Medium Drained
pH 6.0-7.2

Appearance: Large, fast-growing clumping trees

Fun Fact! Grows very aggressively, should not be planted near lakefronts or streams

Information and images from Florida-Friendly Landscaping™ Plant Guide

Trumpet Creeper *Campsis radicans*

Photos by Ryan Fessenden

Hardiness Zone: 4a to 10b

Native/Non-Native Status: Native

Light Requirements: Full Shade to Full Sun

Drought Tolerance: Medium

Soil:
Any Texture
Medium Drained
pH 4.5-8.0

Appearance: Spreading vines that can reach up to 40 feet long

Information and images from Florida-Friendly Landscaping™ Plant Guide

Fakahatchee Grass *Tripsacum dactyloides*

Hardiness Zone: 8a to 11

Native/Non-Native Status: Native

Light Requirements: Partial Shade to Full Sun

Drought Tolerance: Medium

Soil:
Any Texture
Medium to Well Drained
pH 4.5-7.2

Appearance: Spreading ornamental grass

Fun Fact! Tolerates flooding and standing water

Information and images from Florida-Friendly Landscaping™ Plant Guide

Florida-Friendly Landscaping™ Program

Principle 2:

Water Efficiently

Elementary Level

Published on **August 11th, 2025**

About This Activity

Title: Water Efficiently: To Water or Not To Water

Subject, Grade, Level:
5th Grade Science

Abstract:

"To Water or Not to Water" is an engaging, standards-aligned lab investigation designed for 5th grade students to explore Florida-Friendly Landscaping™ Principle #2: Water Efficiently. Created by Amanda Wink from Fishhawk Creek Elementary School, this 60-minute lesson introduces students to the importance of conserving water through climate-aware landscaping practices. Through hands-on station activities, real-world scenarios, and a creative design project, students investigate how Florida's unique climate and seasonal rainfall patterns influence water use. They learn to identify drought-tolerant plants, analyze precipitation data, and evaluate inefficient vs. water-wise irrigation methods. Emphasizing environmental responsibility, students apply their learning by designing a simple, water-efficient landscape using Florida-Friendly plants and techniques like mulching and rain sensors. Aligned with Florida science standards (SC.4.E.6.6, SC.4.L.17.4, SC.5.E.7.6), this lesson builds foundational knowledge of sustainability and empowers students to make informed decisions about water use at home and in their communities.

Learning objectives:

At the conclusion of this activity, participants will be able to:

- Explain how water efficient landscaping practices support sustainability by conserving water in Florida's climate and relate this to local weather and seasonal rainfall.

Author: Amanda Wink
Fishhawk Creek Elementary School
Edited by Morgan Nielsen, UF CPET

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning standards:

SC.4.E.6.6	Identifies resources available in Florida, such as water, phosphate, oil, limestone, silicon, wind, and solar energy.
SC.4.L.17.4	Recognize ways plants and animals, including humans, can impact the environment, emphasizing interactions, dependencies, and both natural and human-induced environmental changes.
SC.5.E.7.6	Describe characteristics (temperature and precipitation) of different climate zones as they relate to latitude, elevation, and proximity to bodies of water.

Timeframe:

This activity is designed to take approximately 60 minutes.

List of Materials

- Pictures of examples of a lawn with sprinklers running during the rain, sprinkler heads facing the sidewalk or street, and broken sprinkler heads as well as efficient ways of watering lawns in addition to rain sensors, mulching, and location
- Photos
- Rain gauge/precipitation maps of local areas
- Plant cards and worksheet for students to take notes
- PowerPoint slides prepared ahead of time
- Chart paper to record student responses
- Paper, colored pencils or tablet apps
- Florida friendly plant guide sheets

Differentiation Suggestions:

ESE (Exceptional Student Education):

- Provide visual aids (e.g., diagrams of landscapes, labeled plant cards, icons for water-saving tools).
- Use sentence frames for discussions and written responses (e.g., “One way to save water is…”).
- Offer additional time to complete design projects or allow oral explanations
- Pair students with peer buddies during group tasks and rotate through stations with support.

ELL (English Language Learners):

- Pre-teach vocabulary using images and real-life examples (e.g., show a rain sensor or mulch).
- Provide bilingual plant guides or vocabulary cards when possible.
- Use gestures, visuals, and demonstrations to support comprehension during the Explain phase.
- Allow students to sketch their ideas during the Elaborate phase before writing or presenting in English.

Gifted Students:

- Encourage deeper analysis by asking students to compare water use in different climate zones (e.g., Florida vs. Arizona).
- Invite them to design a full backyard plan that includes water budgeting or integrates renewable energy features like rain barrels or solar lighting.
- Offer opportunities for independent research on water-saving technologies or policies.
- Ask them to present their landscape design to the class as a "consultant" to simulate real-world application

Procedure and General Instructions (for instructor)

Introduction

Engage (10 minutes)

- **Activity**: Begin with a short video or image slideshow showing examples of lawns with sprinklers running during a rainstorm vs. efficient landscapes with rain sensors and mulch. Ask: “What’s wrong with this picture?” “Why does it matter how we water our yards?”
- **Discussion Prompt**: Have students brainstorm ways people use water outside and why conserving water is important in Florida.

Explore (15 minutes)

- **Activity:** Students rotate through stations (or small group discussion)
  - Station 1: Match Florida native/drought-tolerant plants with their water needs
  - Station 2: Compare photos of overwatered vs. efficiently watered landscapes.
  - Station 3: Use rain gauge data or a precipitation map to observe Florida’s seasonal rainfall patterns.

Explain (10 minutes)

- **Mini-Lesson & Vocabulary:** Using a chart or slides, teach key concepts- why Florida’s climate leads to specific water challenges and how humans impact water challenges; what it means to “Water Efficiently”: water only when needed, early morning/late evening, use mulch, group plants by water needs.
- **Introduce terms:** irrigation, drought-tolerant, mulch, rain sensor, runoff.
- **Tie to Standard SC.5.E.7.6:** Discuss how climate (temperature, rainfall) affects watering needs in different regions of Florida.

Elaborate (15 minutes)

- **Activity:** Have an Extension Agent come out to share with students about watering efficiently as well as landscape design with Florida Friendly plants.
- **Project:** In pairs or small groups, students design a simple Florida-Friendly landscape for a model backyard using pictures, plant choices, and notes on watering practices. They must choose appropriate plants based on Florida’s climate and include at least two water-saving strategies.

Evaluate (10 minutes)

- **Exit Ticket:** “What is one way you can help your family use water efficiently outdoors?”
- **Student Presentations:** Share and explain their landscape design, emphasizing how it conserves water.

Teacher-Facing Materials

Included with this Lesson

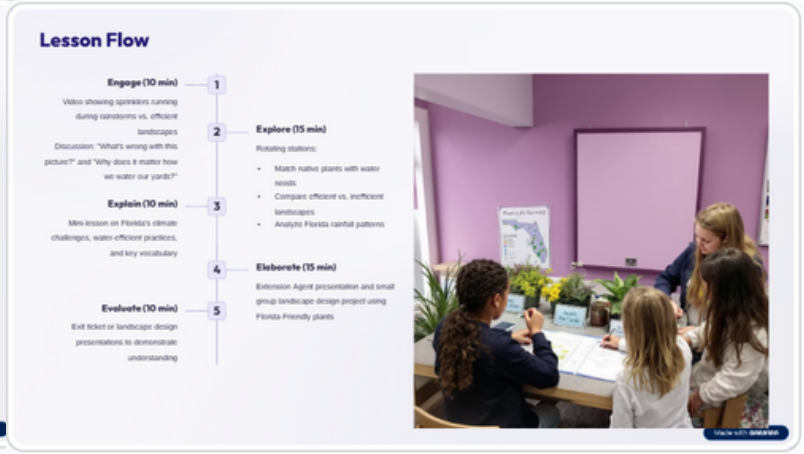
- PowerPoint

Included Slides:

1

2

3



4

Differentiation Strategies

ESE Students

Provide visual aids, sentence frames, extra time, and peer/adult support for group activities and design projects.

ELL Students

Pre-teach vocabulary with visuals, offer bilingual resources, use gestures, and allow sketching before written work.

Gifted Students

Encourage deeper analysis of climate zones, complex landscape design with budgeting, and independent research on water-saving tech.

5

Materials & Teacher Tips

Required Materials

- Florida-Friendly plant guides/cards
- Climate/rainfall maps and data
- Images of efficient/inefficient landscapes
- Rain gauges or precipitation data
- Design templates and art supplies

Teaching Tips

- Contact your local Extension Office early to schedule a guest speaker
- Collect real-world examples from your school grounds
- Consider a follow-up outdoor activity to apply concepts
- Connect to home practices with a family engagement component

6

Student Activity Sheets and Assignments

Included with this Activity

1.General design template
2.Stations student worksheet
3.Stations printout

General Design Template:

Florida-Friendly Landscaping™ Design Template

Name: _____

Location: _____

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

Stations Student Worksheet page 1

Guided Activities for Teaching and Outreach Resources

UF|CPET

FFL Principle 2- Water Efficiently: To Water or Not To Water

Student Worksheet- Stations

Amanda Wink, Fishhawk Creek Elementary

Name: _____

Date: _____

Station 1: Classifying Plants

Use the images of each plant to make an educated guess about the water needs for that plant. In the table, classify it as high or low-water needs and give a reason why.

Plant	High or Low Water?	Why did you guess the way you did?

Stations Student Worksheet page 2

Station 2: Overwatering VS Appropriate Watering

Make three observations about each set of pictures.

Overwatering Observations	Appropriately Watering Observations

Station 3: Rainfall Data

Use the data provided to answer the following questions.

1. Which city has the most rain in July?

2. What four-month period would you expect to be considered the "dry" season?

3. Which city has the driest dry season overall?

4. When would someone in Tallahassee need to consider increasing their irrigation?

5. Why might Miami get more rain than Orlando in June?

Stations Printout:

Florida Friendly Landscaping™
Principle 2: Water Efficiently

Station 1: Matching Plants to their Water Needs

Instructions: *Look at the photos of the plants at the station. Based on visual characteristics, try to categorize each as high, medium or low water needs. Record your answers on your worksheet.*

Florida Friendly Landscaping™

Principle 2: Water Efficiently

Station 1 Plants:

All photos courtesy of the FFL Plant Mobile App

Florida Friendly Landscaping™

Principle 2: Water Efficiently

Station 2: Over-Watering

Instructions: *Look at the following photos. What do you notice in the overwatered pictures compared to the appropriately watered ones? Record your observations on your worksheet.*

Florida Friendly Landscaping™

Principle 2: Water Efficiently

Station 2 Images:

Overwatered	*Appropriately Watered*
 	 

Florida Friendly Landscaping™
Principle 2: Water Efficiently

Station 3: Data Analysis

Instructions: *Look at the data on the following page. This data is simplified but represents real trends in rainfall in each of the four cities. Answer the questions on your worksheet.*
Florida Friendly Landscaping™

Principle 2: Water Efficiently

Florida City Monthly Rainfall Averages in Inches (2024)

Month	Tallahassee	Tampa	Orlando	Miami
January	4.7	2.2	2.3	1.5
February	5.1	3.1	2.4	1.6
March	6.0	3.2	2.9	1.9
April	3.8	1.5	2.4	2.3
May	4.5	3.2	2.9	3.7
June	6.6	5.4	5.7	6.3
July	8.1	7.1	5.6	4.7
August	6.9	7.3	5.6	5.1
September	5.4	5.9	5.1	5.6
October	2.9	2.4	2.8	4.1
November	3.5	1.8	1.8	2.1
December	4.6	2.2	1.9	1.3

Florida-Friendly Landscaping™ Program

Principle 3:
Fertilize Appropriately

Elementary Level

Published on **August 12th, 2025**

About This Activity

Title: Fertilizers– How good is our soil?

Subject, Grade, Level:
First grade, Science - Dual Language (Spanish)

Abstract:

This two-day dual-language (English-Spanish) lesson introduces first-grade students to Florida-Friendly Landscaping™ Principle #3: Fertilize Appropriately, through hands-on exploration and observation. Students investigate Florida soils by examining different samples, identifying living organisms and rocks found in soil, and learning about nutrients and the effects of fertilizers. On Day 1, students rotate through stations exploring soil types and create an "edible soil" model to visualize soil layers. On Day 2, they plant beans in both nutrient-rich and nutrient-poor soils with varying levels of fertilizer, then observe and compare growth over time. The lesson integrates science, observation skills, and vocabulary development while building awareness of soil health and sustainable gardening practices in Florida.

Learning objectives:

In this lesson, the activities will allow participants to:
Day 1: Explore different types of soil (originating from the ground), rocks, water, and some living organisms.
Day 2: Compare photos of nutrient rich and nutrient poor soils. Observe the effect that fertilizers can have on nutrient rich and nutrient poor soils.

Author: Glaribel Piñero-Amaro
Greenacres Elementary School
Edited by Morgan Nielsen, UF CPET

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning Standards:

SC.1.E.6.1	Recognize that water, rocks, soil, and living organisms are found on Earth's surface.
ELA.1.V.1.1	Use grade-level academic vocabulary appropriately in speaking and writing.
SC.1.L.14.1	Make observations of living things and their environment using the five senses.
SC.1.L.17.1	Through observation, recognize that all plants and animals, including humans, have the need for basics, like air, water, food, and space.
ELA.1.V.1.3	Identify and use picture clues, context clues, word relationships, reference materials, and/or background knowledge to determine the meaning of unknown words.

Timeframe:

This activity is designed to take approximately 2 days of class, 1 hour each day.

List of Materials

- Samples of soil from the schoolyard, the teacher's home yard, a basin near the school, and healthy soil
- Samples of some living organisms that can be found in Florida soil, such as flowers, grass, turf, and some plants
- Samples of native Florida rocks that positively contribute to the soil.
- 4-H FFL Leader Guide, "Fertilizer" (Simple version, adapted to 6 years old students.)
- FFL "Fertilizer" Principle (Spanish and English versions), page 31 and "Right Plant, Right Place (Spanish and English versions), page 9
- 1 clear plastic 9 oz cup per student, spoons (measuring spoons: 2 Tbsp, serving spoons: for step 5 of the activity, eating spoons), 3 (5.9 oz) Packages of Instant Chocolate Pudding, large package of chocolate Oreos, package of butterscotch chips, package of chocolate chips
- **Options**: gummy worms, organic layer green coconut (using green food coloring), edible leaves (lettuce, mint, stevia, spinach, etc.), candy pumpkins, and/or seeds
- Pictures of soil and nutrients for soil
- Beans
- Soil (good) - soil at a garden store
- Soil (bad) - get soil from a random part of school that looks like it has small to almost no organic soil horizon
- Biodegradable planting bags
- Fertilizer (same fertilizer for each treatment)
- Gloves

Important Note:

Activity Set-Up:
Day 1: Setting up the classroom in stations (4-6 stations) with samples of soil, rocks and living things.
All materials needed for the Edible Soil activity are individually prepared ahead and ready to be distributed when needed.
Day 2: Have materials ready and organized to plant the beans.
Presentation made ahead:
Day 1: Pictures of different types of soil and nutrients for soil, in the computer. A copy for the teacher with the Edible Soil activity, to follow the steps. Electronic presentation adapted for first graders.
Day 2: Pictures of soil with rich organic horizon and soils with very little organic horizon, on the computer.
Other materials:
Day 1: Flashcards with vocabulary words, **soil** and **nutrients.**
Day 2: Flashcard with the vocabulary words **nutrients.**

Procedure and General Instructions (for instructor)

Introduction

DAY 1- Based on the FFL "Fertilizer" principle

- Students will walk around the classroom, in small groups, to explore stations containing samples of different types of soil from around, samples of living things that can be found on the soil and samples of Florida native rocks. **(15 min.)**
- Presentation of the vocabulary (Tier 3) **soil, nutrients** and **fertilizer** leading to the discussion of Florida's soil layers and the importance of taking good care of it. **(10 min.)**
- **Edible Soil Activity:** With the help of the teacher, each student will create their own "edible soil" showing the layers of Florida's soil. **(25 min.)**
- **Learning review:** while students are eating their edible soils they will also share what they learned today about the soil, reviewing the concepts of soil and nutrients. **(10 min)**

DAY 2- Planting Beans Activity:

With the help of the teacher, students will plant beans in:

- Good soil - no fertilizer
- Good soil - high amount of fertilizer (twice the amount of recommended)
- Poor soil - no fertilizer
- Poor soil - appropriate fertilizer (follow recommended amount on packaging)

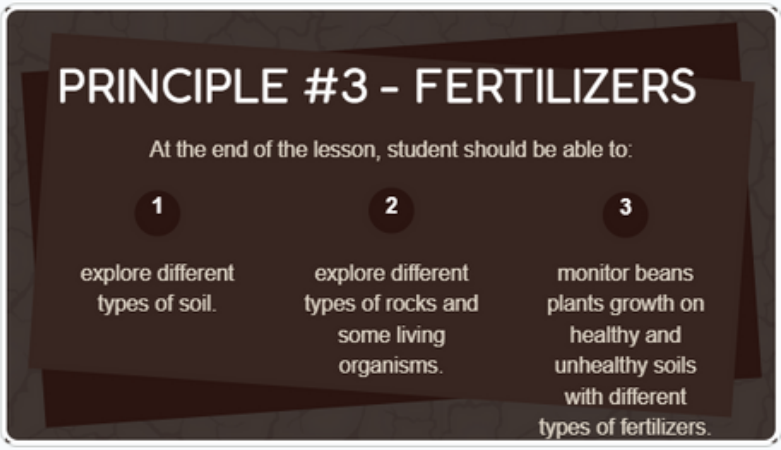
Teacher-Facing Materials

Included with this Lesson

- PowerPoint
- Teacher Lesson Plan in Spanish
- Station set up instructions

Included Slides:

1



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MATERIALS:
"Edible Soil" activity:
(See materials on the sheet.)
https://faitc.org/wp-content/uploads/2023/09/Edible-Soil-1.pdf
Pictures of soil and nutrients for soil.
Flashcards with the vocabulary words: soil, nutrients, fertilizers.

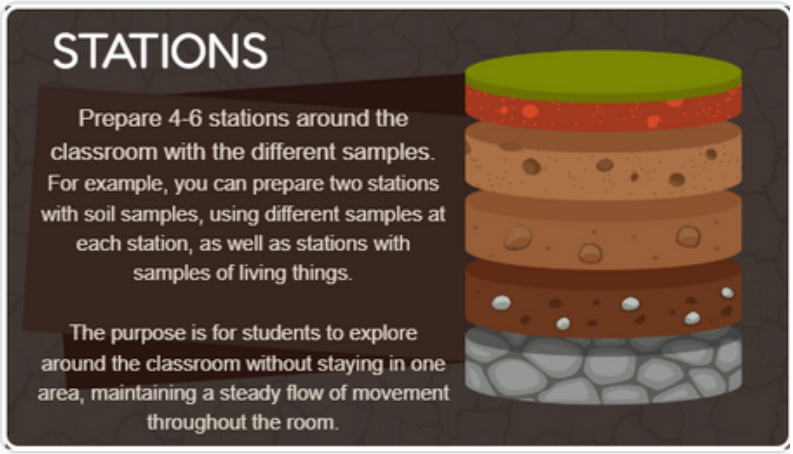
6


MATERIALS:
Samples of soil from the school yard, the teacher's home yard, a basin near the school, and healthy soil.
Samples of some living organisms that can be found in Florida soil, such as flowers, grass, turf, and some plants.
Samples of native Florida rocks that

5


MATERIALS:
Pictures of healthy soil
Pictures of unhealthy soil
Beans
Biodegradable planting bags
Healthy soil
Unhealthy soil
Natural fertilizers
Not appropriate fertilizers

7


STATIONS
Prepare 4-6 stations around the classroom with the different samples. For example, you can prepare two stations with soil samples, using different samples at each station, as well as stations with samples of living things.
The purpose is for students to explore around the classroom without staying in one area, maintaining a steady flow of movement throughout the room.

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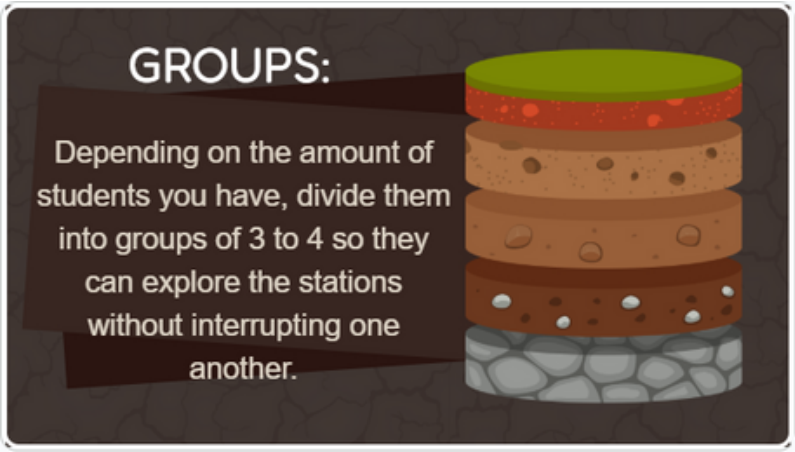
GROUPS:
Depending on the amount of students you have, divide them into groups of 3 to 4 so they can explore the stations without interrupting one another.

9


GUIDED DISCUSSION:
What things were you able to observe?
Did you find any living things?

10

VOCABULARY:

Presenting and using new words:

- **soil**
- **nutrients**
- **fertilizers**

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EDIBLE SOIL

Putting Learning into Practice

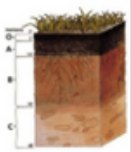
Students will create an "edible soil" with the Florida's soil layers.

12

Edible Soil

Purpose: Students will create an tasty treat that resembles the different layers of soil.

Horizon	Layer	Description	Edible Treat Material
O	Organic or Humus	Contains living and decomposing plants, animals, and microorganisms. This layer is thin and dark in color.	Cream Cucumber, Edible Leaves, Candy Pumpkins, and/or Seeds
A	Topsoil	Nutrient rich dark layer allows air & water to drain through providing a habitat for some animals, like earthworms, ants, moles, and rabbits. Many plants grow in this horizon.	Crushed Oreo Cookies (Option: add a gummy worm to this layer)
B	Subsoil	Lighter in color than topsoil and humus. This rich layer has minerals that have trickled from the horizons above it.	Chocolate Pudding
C	Bedrock	This can be made up of sedimentary, igneous, and metamorphic rock that is solid and tightly bound. Examples of bedrock may include limestone, granite, sandstone, and quartzite. Plant roots do not grow here.	Chocolate Chips and Butterscotch Chips



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DAY 2 - HEALTHY SOIL VS. UNHEALTHY SOIL

Place a set of photos of healthy and unhealthy soils in each table. Using their own understanding, students will decide and classify them into two groups: healthy and unhealthy soils.

14

GUIDED DISCUSSION:

What made you think that picture shows a healthy soil?

What made you think that picture shows an unhealthy soil?

15

DAY 2 - SEED PLANTING

Half of the class will plant beans in healthy soil while the other half will plant them in unhealthy soil. They will use natural fertilizers to the seeds planted on the unhealthy soil and they will use non appropriate fertilizers to the ones that were planted on the healthy soil.

They will track the progress of the seeds/plants for two weeks.

16

DAY 2 - SEED PLANTING

They will consider the following:

water needs (whether water was needed daily, every other day, every two days, etc.), whether the seeds sprouted, the color of the sprouts, leaves, and fruits, differences between the plants that were planted in healthy soil using non appropriate fertilizers between those that were planted in unhealthy soil but having natural fertilizers.

17

THANK YOU!

18

Teacher Lesson Plan in Spanish page 1:

Lección #1: (Dos días de lección.)

Día #1:

Big Idea:

¿Por qué es importante tener un buen cuidado del **suelo**?

¿Cuáles son algunos efectos de añadir sustancias al **suelo**?

Objetivo de aprendizaje:

El estudiante explorará diferentes tipos de tierra (provenientes de suelos), rocas, agua y algunos seres vivos.

Estándar:

SC.1.E.6.1 Recognize that water, rocks, soil, and living organisms are found on Earth's surface.
ELA.1.V.1.1 Use grade-level academic vocabulary appropriately in speaking and writing.
ELA.1.V.1.3 Identify and use picture clues, context clues, word relationships, reference materials, and/or background knowledge to determine the meaning of unknown words.

Materiales:

- Muestras de tierra del patio de la escuela, del patio de la casa del maestro, de una cuenca cerca de la escuela y de un suelo saludable.
- Muestras de algunos seres vivos que podemos encontrar en el suelo de Florida, como flores, pasto, césped y algunas plantas.
- Muestras de rocas nativas de Florida que aportan positivamente a la tierra.
- Actividad "Edible Soil" https://faitc.org/wp-content/uploads/2023/09/Edible-Soil-1.pdf (Ver materiales en la hoja.)
- Fotos de suelos y de nutrientes para el suelo.
- Tarjetas con las palabras del vocabulario: **suelo** y **nutrientes**, para la Pared de Palabras.

Preparación previa:

Estaciones:

Preparar de 4 a 6 estaciones, alrededor del salón, con muestras de diferentes clases de suelo, de seres vivos que se puedan encontrar en el suelo y de rocas nativas de Florida que sean beneficiosas para el suelo. Cada estación debe mostrar de forma separada los objetos, por ejemplo: dos estaciones de rocas,

Teacher Lesson Plan in Spanish page 2:

dos estaciones con las muestras de suelo y dos estaciones con seres vivos. Esto ayudará a los estudiantes a distribuirse a través de todo el salón, sin causar interrupciones innecesarias.

Grupos:
Dependiendo de la cantidad total de estudiantes, divida a los estudiantes en grupos de 3 a 4 estudiantes, para que puedan explorar las estaciones sin interrumpirse unos a otros.

Exploración:
Alrededor del salón, hay muestras de distintos objetos que podemos encontrar en la superficie de nuestro planeta. Las muestras están divididas en estaciones. Me gustaría que caminen alrededor del salón siguiendo las siguientes instrucciones:

1. Pueden tocar las muestras de los materiales, pero al pasar a la siguiente estación, deben dejar todo en su lugar.
2. Deben tratar las muestras con mucho cuidado para que no se rompan o se dañen y otros las puedan ver y tocar también.

(Instrucciones para el maestro: Prepare varias estaciones alrededor del salón, con las diferentes muestras. Por ejemplo, puede preparar dos estaciones con las muestras de suelo, diferentes muestras por estación, al igual que con las muestras de los seres vivos. El propósito es que los estudiantes según vayan explorando alrededor del salón, no se detengan en una sola área y pueda mantenerse el flujo de los estudiantes alrededor del salón.)

Desarrollo:
¿Qué cosas pudieron observar? (Esperar por las respuestas de los estudiantes.)
¿Encontraron seres vivos? (Dependiendo de cómo respondan los estudiantes, continúe la discusión.)

Hoy estaremos aprendiendo como las sustancias que tiramos a la tierra pueden afectar positiva o negativamente. Es decir, pueden hacer bien o hacerle mal al

Teacher Lesson Plan in Spanish page 3:

suelo. Aprenderemos el significado de las siguientes palabras: **suelo, fertilizantes** y **nutrientes.**

Vocabulario:
En las estaciones que visitaron, pudieron observar diferentes muestras de **suelo.** (Mostrar en pantalla una foto de un suelo.) El **suelo** es la tierra que pisas y el lugar donde crecen las plantas. Las muestras de **suelo** que vieron y tocaron son el patio de la escuela, del patio de mi casa, de una cuenca y de un suelo saludable. ¿Pudieron ver alguna diferencia entre ellos? (Permitir que los estudiantes compartan sus respuestas.)

El **suelo**, al igual que nuestros cuerpos, necesitan **nutrientes**. (Mostrar en pantalla una foto de nutrientes para el suelo.) Los **nutrientes** son las sustancias que las plantas necesitan para crecer fuertes y saludables, como si fueran la comida para las plantas. Estos **nutrientes** se encuentran en el suelo y las plantas las absorben a través de sus raíces. Imagina que el suelo es como una gran despensa de alimentos para las plantas. Además de los alimentos principales (macronutrientes como nitrógeno - N, fósforo-P y potasio-K), las plantas también necesitan pequeñas cantidades de "vitaminas" especiales llamadas micronutrientes.

Si el **suelo** es saludable, los seres vivos como las plantas que vimos en las estaciones, podrán ser plantas saludables también. ¿Sabían que las rocas que usamos o encontramos en el **suelo** también pueden afectar positiva o negativamente? Todo lo que ponemos o tiramos al **suelo** tiene un efecto, una consecuencia.

Aplicación (Actividad):
Crearemos un **suelo** saludable; pero para poder tener un **suelo** saludable, primero tenemos que aprender cómo está dividido el **suelo** de Florida. El **suelo** del estado de Florida tiene diferentes capas y por eso es tan importante cuidar lo que derramamos en el **suelo** porque si contaminamos una capa del **suelo**, las otras capas se contaminarán. Las plantas y cualquier ser vivo se contaminarán. Finalmente, el agua que hay debajo de todas esas capas del **suelo**, también se contaminará.

Teacher Lesson Plan in Spanish page 4:

Usando la hoja de trabajo, y siguiendo las instrucciones de la maestra, formaremos las capas de **suelo** que podemos encontrar en Florida. (Actividad "Edible Soil".)

(Una vez terminada la actividad, pueden comer las muestras de "suelo".

Conclusión:
Repasemos lo que aprendimos hoy:

1. Aprendimos dos palabras nuevas: **suelo** y **nutrientes**. (Mostrando la foto del suelo, pregunte:) ¿Quién puede ayudarme a repetir el significado de **suelo**? (Dejar que los estudiantes digan la definición. ¡Muy bien! El **suelo** es la tierra que pisas y el lugar donde crecen las plantas. (Mostrando la foto de los nutrientes, pregunte:) ¿Y, quién puede ayudarme con el significado de la palabra **nutrientes**? Esa es un poco más difícil. (Esperar respuestas.) ¡Muy bien! Los **nutrientes** son las sustancias que las plantas necesitan para crecer fuertes y saludables, como si fueran la comida para las plantas.
2. Aprendimos que hay diferentes clases de **suelo**; que no todos los suelos son iguales.
3. Otra cosa que aprendimos fue que las sustancias que tiramos en el **suelo** pueden afectar positivamente (ayudar a mejorar) o pueden afectar negativamente (dañar).
4. Y finalmente, conocimos un poco sobre las diferentes capas de **suelo** que tiene Florida, el estado en el que vivimos.

Mañana veremos el efecto de lo que puede ocurrir en el **suelo** si este se contamina.

Teacher Lesson Plan in Spanish page 5:

Día #2:

Objetivo de aprendizaje:

El estudiante comparará fotos de suelos saludables vs. suelos que no están saludables.

El estudiante observará el efecto que pueden causar los fertilizantes en el suelo, luego de sembrar semillas de frijoles.

Estándares:

SC.1.E.6.1 Recognize that water, rocks, soil, and living organisms are found on Earth's surface.
SC.1.E.6.2 Describe the need for water. (Moderate)

Materiales:

frijoles
fertilizantes naturales (té de cascaras de plátano, cáscaras de huevo trituradas)
tierra
fertilizantes no saludables para las plantas (cualquier bolsa de fertilizante no adecuado)
área para siembra cerca del salón

Repaso:

Ayer estuvimos aprendiendo que hay diferentes clases de **suelos**, dependiendo del área y de qué materiales se compone el **suelo** de Florida. También creamos nuestro propio **suelo** para conocer mejor cómo es el **suelo** de Florida.

Otra cosa que aprendimos fue que el **suelo** necesita **nutrientes** para poder ser un suelo saludable. Los **nutrientes** son la comida que el **suelo** necesita.

Hoy, estaremos aprendiendo un poco más sobre los **nutrientes** que necesita el **suelo** para ser un **suelo** saludable.

Vocabulario:

La palabra que estaremos aprendiendo y utilizando hoy, muchas veces, es **fertilizantes.** Los **fertilizantes** son como vitaminas para las plantas. Ayudan a que las plantas crezcan fuertes y sanas, como si les dieran un empujón extra

Teacher Lesson Plan in Spanish page 6:

para alimentarse. Son sustancias que se añaden al **suelo** o se aplican directamente a las plantas para proporcionarles **nutrientes** esenciales que necesitan para crecer, como nitrógeno (N), fósforo (P) y potasio (K), que son como la comida de las plantas.

Lección:

(Repartir por mesa, un grupo de fotos de suelos saludables y suelos no saludables.) En cada mesa hay un grupo de fotos de diferentes clases de **suelos**. Observarán cada foto y luego las separarán en dos grupos: en un grupo pongan las fotos de los suelos que ustedes creen que son saludables y en el otro grupo, pongan las fotos de las que ustedes creen que no son saludables.

Ahora, quiero que me cuenten cómo clasificaron los **suelos** que tenían en las mesas. (Escuchar las respuestas y motivar una discusión entre ellos.)

Preguntas guías:

1. ¿Qué les hizo pensar que esa foto pertenece a un suelo saludable?
2. ¿Qué les hizo pensar que esa foto pertenece a un suelo que no es saludable?

(Previamente, a los estudiantes se les informó que plantarán frijoles como parte de la unidad de los seres vivos.) Hoy, sembraremos nuestras semillas de frijoles. La mitad de la clase las sembrará en suelo saludable. La otra mitad de la clase las sembrará en suelo que no es saludable. Las semillas sembradas en el suelo saludable recibirán fertilizantes no apropiados. Las semillas sembradas en el suelo no saludable recibirán fertilizantes naturales. Mediremos el progreso de nuestras semillas por las próximas dos semanas. Tomaremos en cuenta lo siguiente para medir el progreso de nuestras plantas: necesidad de agua (si hubo que echar agua diariamente, un día si, un día no, cada dos días, etc.); si hubo brote; el color de los brotes, de las hojas y del fruto y las diferencias de las plantas entre el suelo saludable y el suelo no saludable después de haber recibido fertilizantes naturales y no apropiados.

Proyecto Final:

Siembra de semillas y observación.

Station set up instructions:

Guided Activities for Teaching and Outreach Resources

UF|CPET

FFL Principle 3: Fertilizers – How good is our soil?
Elementary- Stations Set Up and Guidance

Number of Stations: 4-6

- 2 Stations – Soil Samples
- 2 Stations – Living Organisms
- 2 Stations – Florida Native Rocks

Each station should have **clearly labeled materials** and **printed instruction/question cards** for easy student guidance- feel free to modify to suit your classroom/local availability of materials.

Group Rotation:

- Divide the class into **4–6 small groups** (3–5 students each).
- Each group starts at a different station and rotates every **3–4 minutes**.

Materials Needed per Station (Labels and basic instructions included in separate stations document)

Soil Stations

- Clear trays or containers with different soil types (e.g., sandy, loamy, clay)
- Magnifying glasses
- Scoops or spoons
- Paper towels
- Labels for each type of soil
- Optional: plastic plants to show growth in different soil types

Living Organism Stations

- Plastic models or preserved samples of worms, insects, fungi, roots, or use high-quality images
- Tray of fake soil or sensory bin
- Magnifying glasses
- Diagrams or visual aids showing soil food web
- Labels (e.g., "Worm," "Fungus," "Root Hair")

Florida Rock Stations

- Florida rocks: limestone, coquina, phosphate rock, etc.
- Magnifying glasses
- Labels with simple names and where they are found

Student Activity Sheets and Assignments

Included with this Activity

1. Station Covers
2. Student Station Worksheet

Station Covers:

Florida Friendly Landscaping™
Principle 3: Fertilize Appropriately

Rock Detectives

Instructions: *Look at the rocks. What do they feel like? What colors or shapes can you find?*

Florida Friendly Landscaping™

Soil Critters

Instructions: *Look closely at these living things. What do you see?*

Principle 3: Fertilize Appropriately

Soil Explorers

Instructions: *Look at the soil with the magnifying glass. Scoop it gently and feel it with your hands!*

Florida Friendly Landscaping™
Principle 3: Fertilize Appropriately

Student Station Worksheet:

Guided Activities for Teaching and Outreach Resources

UF CPET

FFL Principle 3: Fertilizers – How good is our soil?
Stations Worksheet

Name: _____

Rock Detectives

What color is the rock?

Is it smooth, bumpy, or rough?

Why do you think rocks are important to soil?

Can some rocks help plants grow?

Soil Explorers

Is this soil soft or hard?

Is it dry or wet?

Can you see little pieces of rock or plant?

Which soil do you think is best for plants? Why?

Soil Critters

What animals or bugs can you find?

What do you think they do in the soil?

How do these creatures help plants?

Activity designed by Glaribel Piñero-Amaro, Greenacres Elementary School
Worksheet developed by Morgan Nielsen, Center for Precollegiate Education and Training, University of Florida

Florida-Friendly Landscaping™ Program

Principle 4:

Mulch

Elementary Level

Published on **July 31st, 2025**

About This Activity

Title: The Power of Mulch: What's the Best Choice?

Subject, Grade, Level:
Upper Elementary Science

Abstract:

In this interactive lesson, students explore how different types of mulch affect soil moisture retention, emphasizing water conservation within Florida's unique climate. Through an initial outdoor observation of mulch and soil conditions, they will develop hypotheses and then conduct a controlled experiment comparing pine bark, pine needles, gravel, and no mulch under simulated sunlight using heat lamps. They collect and analyze moisture data over time, record findings in lab reports, and participate in discussions linking their results to real-world gardening practices and the principles of Florida-Friendly Landscaping™. This activity integrates scientific investigation skills with environmental awareness, promoting sustainable landscaping choices and fostering a deeper understanding of mulch's role in conserving water and supporting plant health.

Learning objectives:

At the conclusion of this activity, participants will be able to:

1. Understand the Florida-Friendly Landscaping™ (FFL) principle of using mulch.
2. Identify types of mulch: pine needles, pine bark, rock/gravel, and leaf litter
3. Learn how mulch helps retain soil moisture and benefits plant health.
4. Use the scientific method to investigate mulch effectiveness through an experiment.
5. Explore how natural mulch options support sustainable landscaping.

Author: Don Norton
Millennium Middle School
Edited by Morgan Nielsen, UF CPET

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning standards:

SC.5.N.1.1	Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types. **Application:** Students define the problem (water retention in soils), plan and conduct an experiment using different mulch types, collect data, and interpret results.
SC.5.N.1.2	Explain the difference between an experiment and other types of scientific investigations. **Application:** Students identify their mulch moisture test as an experiment involving variables and measurable data.
SC.5.L.17.1	Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments. **Application:** Understanding how mulch can help plants adapt to hot, dry Florida conditions by reducing evaporation and retaining moisture.
SC.5.E.7.1:	Create a model to explain the parts of the water cycle. **Application:** Students relate evaporation and transpiration to soil moisture and mulch's effect on these processes.

Timeframe:

This activity is designed to take approximately 120 minutes of class time, plus time to collect data over three days.

List of Materials

- Student Worksheets: Observation Sheet & Lab Sheet
- Investigation Materials:
  - 4 (6.0” W x 5” H x 6” D) pots or containers
  - Potting mix soil (4 cups per pot)
  - Pine bark mulch (3 inches for 1 pot)
  - Pine needle mulch (3 inches for 1 pot)
  - Gravel/decorative rocks (1”–1.5” size, 3 inches for 1 pot)
  - Watering can or bottle (16 oz per pot)
  - Moisture meter and ruler
  - Student lab report handout
  - Access to 4 heat lamps

Important Note:

The supplementary documents include a campus observation sheet, a student lab sheet and a lab set up guide that can be modified to fit the individual needs of your class and students.

Procedure and General Instructions (for instructor)

Introduction

1. School Walk Mulch Observation (20 min)

   Before beginning the experiment, students will visit an outdoor area on school grounds to observe ground conditions (dry, moist, compacted, sandy, etc.), presence and type of mulch (pine bark, needles, wood chips, gravel, etc.), soil condition and nearby plant health, signs of erosion or water runoff and other environmental details. Students will record their observations on the provided **observation sheet.**

2. Classroom Instructor Introduction (15 min)

   Why Mulch in Florida? What is unique about Florida's climate and soil challenges- high temperatures, humidity, sandy soils, and frequent rainfall?

3. Lab Activity (30 minutes, plus time for data collection over 3 days)

   (see supplemental set up instructions)- Students will set up and investigate the moisture content of three types of mulch over a span of three days.

4. Lab Report Writing (25 min)

   Students will utilize the provided lab report template (can be modified or substituted for other templates depending on class needs) to collect data and draw conclusions about the soil retaining properties of different types of mulch materials.

5. Class Discussion (30 min)

   Suggested Discussion Prompts:

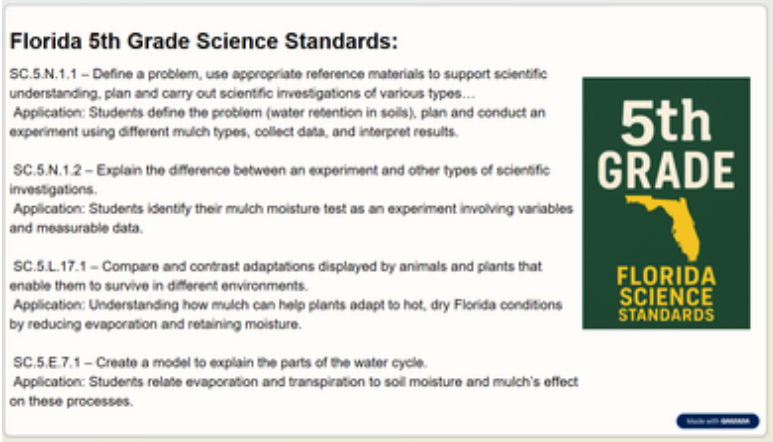
   - What did you observe during the experiment?
     - Which pot dried out the fastest?
     - Which pot stayed moist the longest?
     - Were your hypotheses correct? Why or why not?
   - Why do you think some mulches worked better than others?
     - What characteristics helped them retain moisture?
   - How does this experiment relate to real-world gardening or landscaping?
     - Why is mulch important for plants, especially in Florida's climate?
   - What would happen if people didn't use mulch in their gardens or yards?
   - Why is water conservation important? How does mulch help save water?
   - Which mulch would YOU recommend and why?

Teacher-Facing Materials

Included with this Lesson

- PowerPoint
- Lab Set Up Instructions (Teacher Page)

Included Slides:



Benefits of Mulch

Moisture Retention
Reduces evaporation and conserves water in soil

Weed Suppression
Blocks sunlight and inhibits unwanted weed growth

Temperature Regulation
Insulates soil against extreme heat and cold

Soil Health
Organic mulches add nutrients and improve soil structure

Erosion Control
Reduces surface runoff and stabilizes soil

Aesthetic Appeal
Provides a neat, finished look to landscapes

5

Program Structure

1. School Walk (20 min) — Outdoor observation of ground conditions, mulch types, soil condition, and plant health
2. Introduction (15 min) — Classroom presentation on mulch benefits and Florida's unique challenges
3. Lab Activity (30 min) — Hands-on experiment comparing moisture retention of different mulch types
4. Lab Report (25 min) — Students document findings and draw conclusions from their experiment
5. Discussion (30 min) — Facilitator-led summary and reflection on results and applications

6

Lab Experiment Setup

Materials (Per Group):

- 4 pots (6.0" W x 5" H x 6" D)
- Potting mix soil (4 cups per pot)
- Pine bark, pine needles, gravel (3 inches each)
- Watering can (16 oz water per pot)
- Moisture meter and ruler
- Heat lamps

Students will measure moisture levels at 15-minute intervals to determine which mulch type retains water most effectively.

7

Lab Procedure

Setup
Label pots: No Mulch, Pine Bark, Pine Needles, Gravel. Add 4 cups of potting mix to each.

Add Mulch
Leave one pot uncovered. Add 3 inches of appropriate mulch to each of the other pots.

Water
Add exactly 16 oz of water to each pot using a watering can or bottle.

Heat Exposure
Place pots under heat lamps at equal distances to simulate sunlight.

Measure
Record soil moisture levels at 15, 30, 45, and 60 minutes using moisture meters.

8

Discussion & Reflection

1. **Experiment Results**
Which pot dried out fastest? Which stayed moist longest? Were your hypotheses correct?

2. **Mulch Characteristics**
Why did some mulches work better than others? What properties helped them retain moisture?

3. **Real-World Applications**
How does this experiment relate to gardening in Florida? Which mulch would YOU recommend and why?

4. **Environmental Impact**
Why is water conservation important? How does mulch help save water and protect plants?

Mulch is more than decoration – it's a powerful tool for conserving water, protecting soil, and helping plants thrive in Florida's challenging climate.

9

Lab Set Up Instructions (Teacher Page)

UF|CPET

FFL Principle 4- The Power of "Mulch"
Elementary School
Detailed Lab Instructions- Mulch and Moisture Retention

Objective:

To investigate how different types of mulch affect soil moisture retention under heat lamps, and to determine which material best conserves water.

Materials (Per Group):

- 4 (6.0" W x 5" H x 6" D) pots or containers
- Potting mix soil (4 cups per pot)
- Pine bark mulch (3 inches for 1 pot)
- Pine needle mulch (3 inches for 1 pot)
- Gravel/decorative rocks (1"–1.5" size, 3 inches for 1 pot)
- Watering can or bottle (16 oz per pot)
- Moisture meter and ruler
- Student lab report handout
- Access to 4 heat lamps

Lab Setup & Procedures:

1. Label each pot: No Mulch, Pine Bark, Pine Needles, Gravel.
2. Add 4 cups of the same potting mix soil into each pot.
3. Leave the 'No Mulch' pot uncovered.
4. Cover the 'Pine Bark' pot with 3 inches of pine bark mulch.
5. Cover the 'Pine Needle' pot with 3 inches of pine needles.
6. Cover the 'Gravel' pot with 3 inches of decorative rock or gravel.
7. Water each pot with 16 oz of water using the watering can or bottle.
8. Place each pot under a separate heat lamp to simulate sunlight. Ensure they are equidistant and receive equal light exposure.
9. At 15-minute intervals (15, 30, 45, 60 minutes), use the moisture meter and/or ruler to record the soil moisture level in each pot.
10. Record all data in the Student Lab Report handout.
11. After all measurements are taken, write a short narrative in your lab report summarizing your findings:
    - Which mulch retained the most moisture?
    - Which dried out the fastest?
    - Why do you think that happened?
12. Participate in a class discussion about what was learned and how mulch affects water conservation.

Reminders:

- Be sure to measure carefully and accurately.
- Only test one variable (mulch type); keep everything else the same.
- Work as a team and divide responsibilities (timer, measurer, recorder, setup).

Student Activity Sheets and Assignments

Included with this Activity

1. Campus Observation Worksheet
2. Student Lab Report Worksheet

Observation Walk Worksheet

UF|CPET

FFL Principle 4- The Power of "Mulch"
Mulch Moisture Investigation Lab Report

Outdoor Observation Sheet – Florida Friendly Landscaping

Name: _____ Date: _____

Location Observed: _____

1. Describe the ground surface (circle all that apply):
   Dry / Moist / Muddy / Hard / Soft / Sandy / Covered in mulch

2. Is mulch present? If yes, describe the type:

3. What does the soil look and feel like?

4. Are plants nearby? If so, what condition are they in?

5. Any signs of erosion or water runoff?

6. Sunlight conditions in the area (circle one):
   Full Sun / Partial Shade / Full Shade

7. What other things do you notice about the environment?

Student Lab Report Worksheet

UF|CPET

FFL Principle 4- The Power of "Mulch"
Mulch Moisture Investigation Lab Report

Name: _____ Date: _____

Question: *Which mulch type best helps soil retain moisture?*

Hypothesis: _____

_____

Materials:

- 4 Pots with equal soil
- Pine Bark
- Pine Needles
- Rock/Gravel
- Water
- Ruler or Moisture Meter

Procedure:

1. Add the same amount of soil to each pot.
2. Add mulch: one pot each with pine bark, pine needles, rocks, and no mulch.
3. Water each pot with the same amount.
4. Place pots in the sun.
5. Measure and record soil moisture over 3 days.

Data Table:

Mulch Type	*Day 1 Moisture*	*Day 2 Moisture*	*Day 3 Moisture*
None			
Pine Needles			
Pine Bark			
Rock/Gravel			

Conclusion: What did you learn? Which mulch worked best and why?

_____

_____

_____

_____

_____

Don Norton, Millennium Middle School
Edited by Morgan Nielsen, Center for Precollegiate Education and Training, University of Florida

Florida-Friendly Landscaping™ Program

Principle 5: Attract Wildlife

Elementary Level

Published on **August 11th, 2025**

About This Activity

Title: Attracting Wildlife: Landscape Architects

Subject, Grade, Level:
Upper Elementary Level Science

Abstract:

"Attracting Wildlife: Landscape Architects" is a hands-on, two-hour lesson for elementary students focused on Florida-Friendly Landscaping™ Principle #5. Students learn how Florida Friendly plants can provide food, water, shelter, and space for local wildlife. Through interactive games, schoolyard observation, and a group design activity, students explore the relationships between plants and animals and create their own wildlife-friendly landscape plans. This activity promotes environmental awareness and encourages students to support biodiversity through thoughtful landscaping choices at home and school.

Learning objectives:

At the conclusion of this activity, participants will be able to:

- Learn how to design a yard/garden/area in a way that attracts and provides a habitat for Florida Friendly fauna.

Author: Alex Horvath and Morgan Nielsen
UF Center for Precollegiate Education and Training

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning standards:

SC.3.L.17.3	Describe that animals, including humans, need food, water, shelter, and space to live and grow.
SC.4.L.17.4	Recognize ways plants and animals, including humans, can impact the environment.
SC.5.L.17.1	Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments.
SC.3.L.15.2	Classify animals into major groups according to physical characteristics and behaviors.
SC.4.L.17.2	Explain that animals, including humans, cannot make their own food and must rely on plants or other animals for energy.

Timeframe:

This activity is designed to take approximately 2 hours of class time.

List of Materials

- FFL Handbook. Available for free online through UF IFAS
- A presentation on the suggested introductory material provided by IFAS, altered to be more specific to your local community.
- Premade presentation of Florida Friendly organisms to choose from. Could also make this a game where students form groups to determine which species are local. Each time a group gets it right, they get a point.
- Clipboard for students
- pencils
- paper
- A large piece of paper and markers to draw and write their landscapes
- Very large piece of paper so that each student can add something to the landscape.

Activity Set-Up:

- Create a presentation to teach learning objectives of FFL “attracting wildlife” principle.
- Create presentations of different species of animals and plants so students can play the game outlined above. Have clipboards with paper attached ahead of time and ensure paper and markers for the last two activities are set aside.
- Check the weather report to avoid bad weather conditions such as high UV index and storms.

Procedure and General Instructions (for instructor)

Introduction

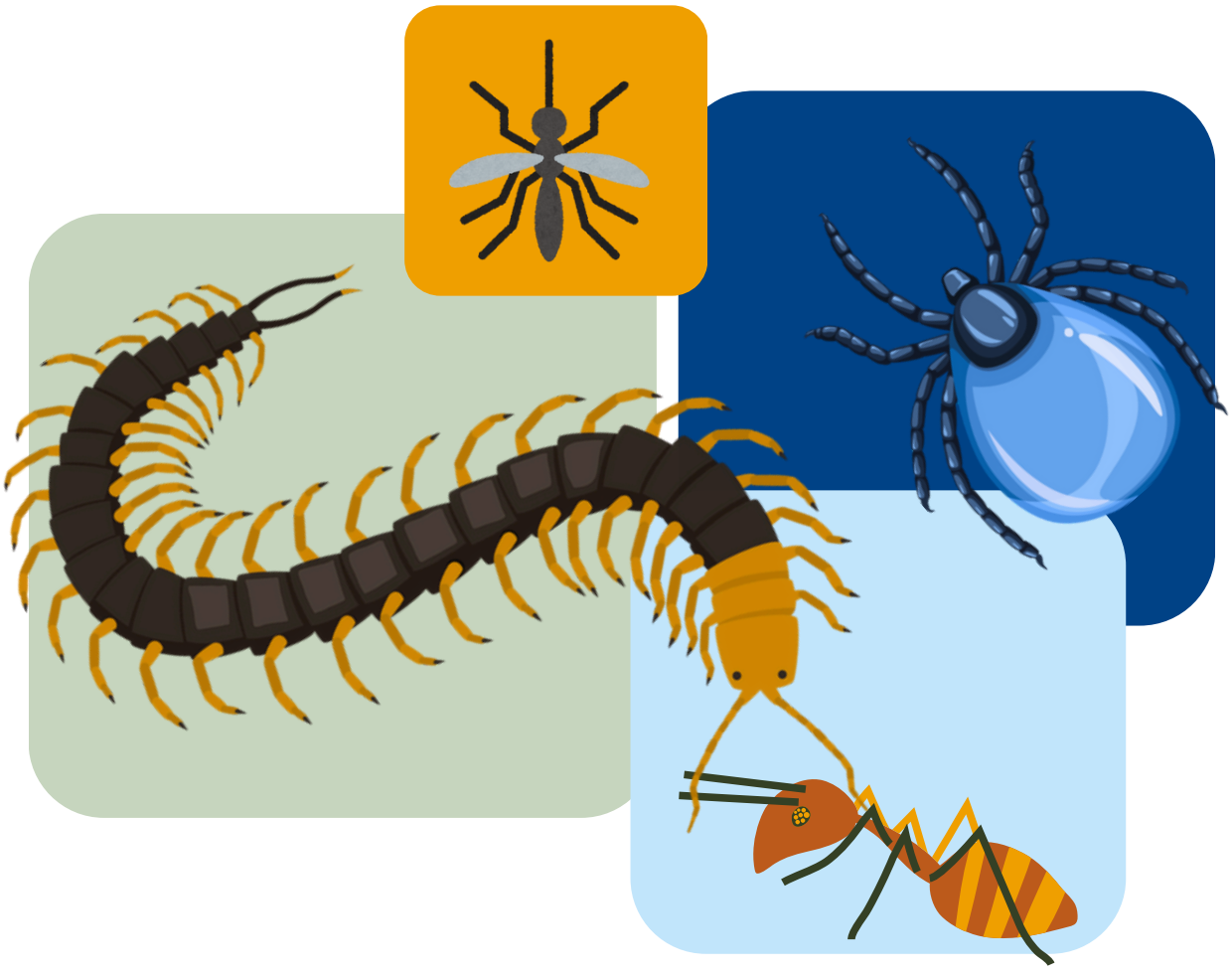
1. **Introductory Lesson based on FFL Principle 5** (20min)
   - Talk about the importance of plants as a habitat and how the distribution of plants can impact what animals will be found in that habitat.
2. **Students identify common landscaping plants** (10min)
   - Have students work together to identify what Florida Friendly species are found in their community from a pre-made list. This list will include Non-Florida friendly species.
3. **Matching Plants to Animals** (15min)
   - Have students select plants that may attract local species. Remind students of “right plant right place” as it relates to their community.
4. **Investigate Your Landscape** (20min)
   - Walk around the school and have students write down how they think the school landscape attracts or may even deter native wildlife.
5. **Improve Your Landscape** (20min)
   - Students will work together in small groups to determine what their school should add to be a better landscape for local Florida wildlife.
6. **Design a Landscape** (20min)
   - As a class, determine what aspects of the school landscape may already be habitat for local species and design ways to attract other organisms to the school's landscape. Draw this out on very large piece of paper.

Florida-Friendly Landscaping™ Program

Principle 6:

Manage Yard Pests Responsibly (1)

Elementary Level



Published on **August 14th, 2025**

About This Activity

Title: Managing Yard Pests- Gently Saying “Goodbye Bug”

Subject, Grade, Level:
5th Grade Science

Abstract:

This engaging 75 min elementary school lesson introduces students to Florida-Friendly Landscaping™ Principle #6: Manage Yard Pests through hands-on science and environmental awareness. Students explore the purpose of insecticides, learn about the roles of beneficial and harmful insects, and examine the environmental impact of various pest control methods. Students apply either safe, insecticidal soap or water to plants, form hypotheses about their effectiveness, and collect observational data over time. The activity integrates core science standards through inquiry-based learning and real-world application, encouraging students to think critically about how human actions — like pesticide use — can affect ecosystems. By the end of the lesson, students will understand how to manage pests responsibly and advocate for safer, more sustainable pest control practices at home and in their communities.

Learning objectives:

At the conclusion of this activity, participants will know:

- The purpose of insecticides
- How to deter pests
- Why to be careful when choosing, using, and applying insecticides

Authors: Alex Horvath and Morgan Nielsen
CPET, University of Florida

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning standards:

SC.3.N.1.1	Ask questions and make predictions based on observations. (Helps students form hypotheses about insecticides.)
SC.3.L.17.1	Describe how animals and plants depend on each other and their environment. (Supports learning about good bugs and bad bugs in the garden.)
SC.3.L.17.2	Explain how living things need food, water, and shelter to live and grow. (Relates to why plants and insects need careful care.)
SC.4.L.17.1	Describe how plants and animals in Florida's environment depend on each other. (Connects to understanding how insecticides can affect nature.)
SC.4.N.1.1	Use observations to answer questions and make decisions. (Supports data collection during the experiment.)
SC.5.L.17.1	Explain how living things and their environment affect each other. (Teaches about how insecticides impact ecosystems.)

Timeframe:

This activity is designed to take about 75 minutes of class time.

List of Materials

- Slides/ other presentation medium
- Whiteboard/blackboard
- Tomato test plants for experiment
    - One plant - to be sprayed with insecticidal soap
    - One plant - to be sprayed with water
    - One control plant
- Garden Safe Insecticidal Soap Ready-to-Spray
- Spray bottle (to fill with water)
- Magnifying glasses (optional, for closer inspection)

Important Note:

- **Have the plants sitting outside to attract pests so it will be ready for the activity.**
- **Only the teacher will spray the insecticidal soap.**

Procedure and General Instructions (for instructor)

Introduction

1. **Intro lecture on FFL principle 6: Managing Yard Pests (15 min)**
    - Emphasize the idea that some bugs are beneficial to our plants while others are not.
    - Have slides/other mediums to teach students about FFL principle 6.

2. **Discuss proper application (10 min)**
    - Importance of identifying pests to target pesticides and selecting the least toxic, most targeted options.
    - The teacher will spray the plants once a week, on Fridays, giving enough time for the sprays to dry on the plants before the students observe them on Mondays. The first spray will happen after the first student observations.

3. **Intro to the experiment (15 min)**
    - Class will discuss insecticidal soap as a pesticide, and see if spraying pest ridden tomato plants with the pesticide has any effect. Students will compare the effects of the soap with just spraying water and doing nothing.

4. **Forming a Hypothesis (10 min)**
    - Will the soap, water, or applying nothing be effective when getting rid of pests (insects, fungus, etc)? Why?

5. **Discuss data collection (5 min)**
    - Tomato plants are susceptible to pests such as aphids, whiteflies, and mealybugs. Remind students of the signs of pests discussed in the lecture. Reapply horticultural soap once a week (on Fridays), so students can collect data once or twice a week (on Mondays and Fridays before spraying), even across a few months. Have students make observations and collect data throughout the time frame. (Tip: Label the plants you spray in some way so you can easily gather data)

Procedure and General Instructions (for instructor) cont.

6. **Observe Plants and Collect Data (15 min)**
    - Have students look at, but not touch, the tomato plants to find pests. If magnifying glasses are available, use them. Students will be given a worksheet where they will write down observations of damage for each plant and presence of insects.

7. **Spray Plants on Fridays (5 min)**
    - Make sure to label the plants for one to be sprayed with water, one with soap, and one labelled control. Have students take turns spraying the water on the plant labelled water. The teacher will thoroughly spray any pests with the insecticidal soap on the appropriate plant when the students are gone. Make sure students are not touching the plants after spraying. Leave the plants to dry for the weekend.

8. **Observe Plants and Collect Data Again:**
    - Have students look at, but not touch, the tomato plants to find pests. Students will record their observations on the same data collection sheet from Step 6. Have students observe the plants on Mondays and/or before spraying on Fridays.

9. **Repeat steps 7 and 8 until the end of the experiment (a few weeks to months)**

10. **Discuss: Students should fill out the questions on the worksheet after their observations. Then the instructor will discuss the students hypothesis, their observations, and if their observations supported their hypothesis (why or why not?).**

Student Activity Sheets and Assignments

Included with this Activity

1. Gently saying goodbye to some bugs PowerPoint
2. Did we send the “Bad Bugs” somewhere else? worksheet

Included Slides:

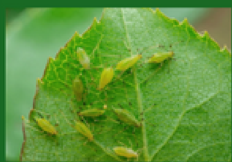
1

2

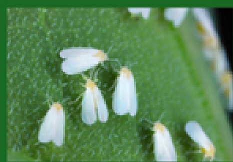
3

4

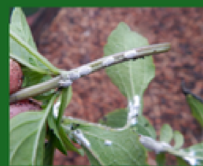
What bugs do we want to deter?



Aphids: damage plants and can transmit plant viruses



Whiteflies: sucks the sap from plants, which causes damage, and they cause mold growth on plants



Mealybugs: sucks the sap from the leaves and stems of plants, which causes the leaves to yellow and can lead to plant death

Aphids: https://www.shutterstock.com/search/aphids-on-plant?dd_referrer=https%3A%2F%2Fwww.google.com%2F

Whiteflies: https://www.istockphoto.com/photos/whiteflies

Mealybugs: https://www.google.com/url?sa=i&url=https%3A%2F%2Faskwetandforget.com%2Fhow-to-get-rid-of-mealybugs-on-houseplants%2F&psig=AOvVaw0JfzMLjeOE5E3TWgisvXNW&ust=1759419084402000&source=images&cd=vfe&opi=89978449&ved=0CBYQjRxqGAoTCIC95_uog5ADFQAAAAAdAAAAABCzAQ

5

How can we gently say goodbye to some bugs?

- Not all pests are looking for the same thing!
  - Aphids will want to find weak or fast growing, high nutrient plants to feed on
  - While whiteflies may look for over fertilized plants
- The types of plants you have in your yard will attract or potentially deter pests.
- Another option to deter pests is to use insecticides; chemicals that target insects.

6

https://www.wildhope.tv/article/conservation-comeback-the-bald-eagle/

Dangers of Pesticides

- We must be careful not to impact local ecosystems through our use of pesticides to deter pests.

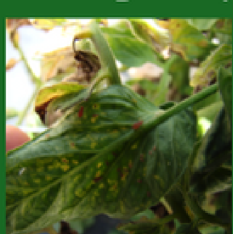
7

How do we use insecticides effectively?

- Commercial insecticides are very useful but often have greater unintended effects.
  - If commercial insecticides are necessary, direct application can help limit effect insecticide has on local ecosystems.
- Insecticidal soaps are effective in killing soft-bodied pests, which include whiteflies, aphids, and mealybugs. The pest must be sprayed directly. Hard-bodied insects, such as ladybugs, are generally safe from the effects of the soap.

8

What signs of pests are we looking for?



Aphids can cause yellow spots on the leaves of plants from when they feed.

Whiteflies release honeydew which leads to sooty mold growth on plant leaves (IFAS). Aphids also secrete honeydew which causes mold growth.

Aphids source: https://plantpath.ifas.ufl.edu/u-scout/tomato/aphid-damage.html

Whiteflies source: https://www.istockphoto.com/search/2/image-film?phrase=sooty%20mold%20on%20plants

9

What signs of pests are we looking for?

Mealybugs cause yellowing on plants from where they suck the sap.

Mealybug source: https://thehouseplantguru.com/2019/10/30/mealybug-insects-and-how-to-control-them-on-your-houseplants/

10

Did we send the “Bad Bugs” somewhere else? worksheet page 1:

Did we send the “Bad Bugs” somewhere else?

1) **Hypothesis:** Will the insecticidal soap, water, or applying nothing be effective when getting rid of pests (insects, fungus, etc)?

Fill out this table

Tomato Plant #	Treatment	Signs of Mealybugs	Signs of Aphids	Signs of Whiteflies	Do you see any Insects (Look don't touch) If any, how many are there?	Describe the plant damage you observe
Plant #1	Insecticidal Soap					
Plant #2	Water					
Plant #3	Nothing (control)					

Did we send the “Bad Bugs” somewhere else? worksheet page 2:

2) Which plant had the least signs of pests? The one sprayed with insecticidal soap, water, or nothing?

3) Which plant had the most signs of pests? The one sprayed with insecticidal soap, water, or nothing?

4) Did your observations match your hypothesis? Why or why not?

Did we send the “Bad Bugs” somewhere else? worksheet page 3:

Signs of “Pests” Reference

Aphids

This is a picture of Aphids on a plant

This is sooty mold. Some species of Aphids increase the chance of plants contracting this mold.

Aphids can cause yellow spots on the leaves of plants when they feed.

Did we send the “Bad Bugs” somewhere else? worksheet page 4:

Whiteflies:

This is a picture of Whiteflies on a plant.

Whiteflies: https://extension.usu.edu/planthealth/ipm/notes_ag/hemp-whiteflies

This is sooty mold. Some species of Whiteflies increase the chance of plants contracting this mold.

Did we send the “Bad Bugs” somewhere else? worksheet page 5:

Mealybugs:

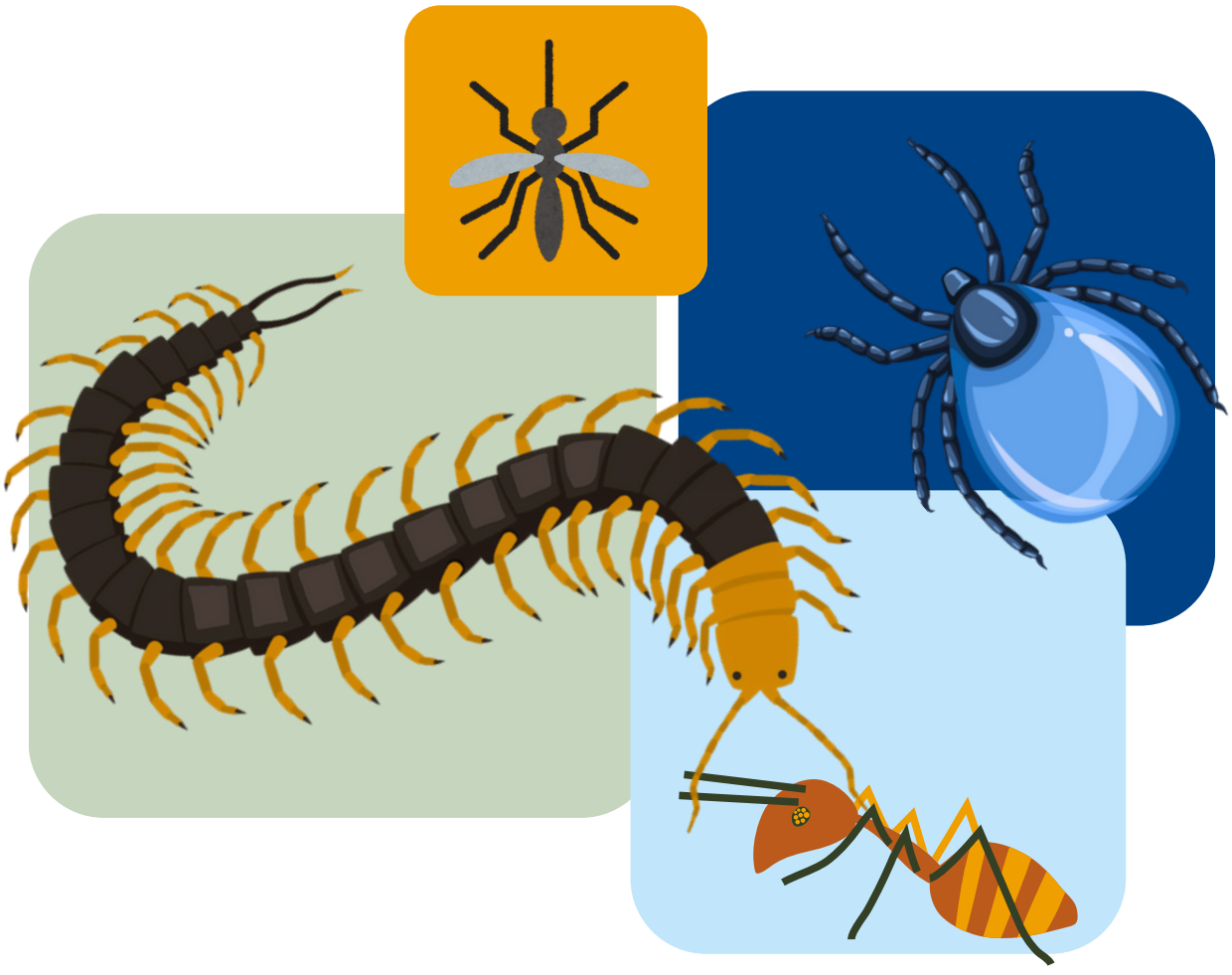
This is a picture of Mealybugs on a plant.

Mealybugs can cause yellow spots on the leaves of plants when they feed.

Florida-Friendly Landscaping™ Program

Bug Buddies and Garden Guardians (2)

Elementary Level



Published on **September 26th, 2025**

About This Activity

Title: Managing Yard Pests- Bug Buddies and Garden Guardians

Subject, Grade, Level:
Upper Elementary Science

Abstract:

Bug Buddies and Garden Guardians is a 100-minute, in-class lesson designed for upper elementary students to explore Florida-Friendly Landscaping™ (FFL) Principle 6: Managing Yard Pests. Through interactive activities, observation, and roleplay, students learn to distinguish between pests and beneficial insects, identify non-chemical pest management strategies, and understand how healthy landscapes can naturally reduce pest problems while protecting the environment.

Learning objectives:

At the conclusion of this activity, participants will be able to:

- **Identify** the difference between pests and beneficial insects
- **Explain** at least two natural, non-chemical ways to manage yard pests
- **Observe** plants for signs of pest damage
- **Predict** how healthy landscaping environments can reduce pest problems without the use of pesticides

Authors: Morgan Nielsen
CPET, University of Florida

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning standards:

SC.3.L.17.2	Recognize that plants use energy from the sun, air, and water to make their own food.
SC.3.L.17.1	Describe how animals and plants respond to changing seasons.
SC.4.L.17.4	Recognize ways plants and animals, including humans, can impact the environment.
SC.5.L.15.1	Describe how, when the environment changes, differences between organisms allow some to survive and reproduce while others die or move to new locations.

Timeframe:

This activity is designed to take about 100 minutes of class time.

List of Materials

- Pest or Pal Cards (one set per group of 3-4 students, or whatever may suit your class)
- Presentation with pictures of common bugs around the area and whether they are pests or beneficial
- Garden Detective Observation Worksheet
- *Optional:* Magnifying glasses to excite the students!
- Optional: Brief presentation showing some of the non-pesticide ways to control garden pests
- Garden Guardians scenario cards

Optional Extension Activities:

- **Home Observation Journal:** Have students observe the plants around their homes, parks or other areas they visit for signs of pests and beneficial insects.
- **Bug B&B:** Have students build simple “bug hotels” using recycled or household materials to attract pollinators or predators like ladybugs.
- **Logistics:** Invite a guest from UF/IFAS Extension (optional) to give a real-world perspective on FFL applications.

Procedure and General Instructions (for instructor)

Introduction

1. **Introduction: Pest or Pal? (5-10 min)**
    - After a brief introduction to the principle, have students look at the “Pest or Pal” cards and try to determine whether they help or harm gardens. Use this to launch a discussion about what makes a bug a “pest”.
2. **Mini Lesson: Meet the Bugs (20 min)**
    - Presentation (visual aids or slides) of common Florida pests (e.g., aphids, whiteflies) and beneficial insects (e.g., ladybugs, lacewings, bees). Try to use your own photos or photos of insects that are readily observed around the school site.
3. **Activity: Observation Walk or Stations Lab (30 min)**
    - Students can either walk (supervised) outside around the school to look for pest damage on plants or teachers can set up stations or a presentation with images of pest damage compared to healthy growth.
4. **Class Discussion: Safe Ways to Help (20 min)**
    - Brief discussion on why pesticides (even natural ones) can be harmful, and that there are ways to reduce pest damage without resorting to those. Class brainstorm ideas (hand-picking bugs, attracting pest predators, removing diseased plants, planting appropriate plants) and show a brief presentation.
5. **Game: Garden Guardians (20 min)**
    - In small groups, students will act out a short scenario based on the scenario card given to them- they will work in groups to discuss and roleplay responsible pest management solutions.
6. **Exit Ticket (5 min)**
    - Have students write down one thing they learned and one way to help the garden without the use of chemicals. Review key takeaways as a class.

Teacher-Facing Materials

Included with this Lesson

- Pest or Pal? Bug Cards Instructions
- Scenario Cards Potential Answers

Pest or Pal? Bug Cards:

Pest or Pal? Bug Cards

Introduction & Teacher Info

This activity is designed to help students explore how insects and other small creatures interact with plants, people, and each other. Students will examine a set of insect profiles and decide whether each one is more often considered a "pest" or a "pal" in the context of landscaping and home gardens. The goal is not only to practice observation and classification skills, but also to build awareness that the role of any species depends on context and that it can be difficult to classify organisms as "good" or "bad" depending on the context. By asking students to consider whether an insect is a "pest" or "pal," we encourage them to think critically about how humans classify living things. This activity highlights the usefulness of models for learning, but also the importance of recognizing their limits.

A cornerstone of this Florida-Pally Landscaping™ Principle is the idea that pest management should be mindful and specific, not automatic. Many of these "pests" can be beneficial in certain situations and harmful in others or vice versa. For example, insects that feed on pests may also serve as food for birds or other wildlife. Even insects that damage plants play a role in the food web and may only become pests when their numbers grow too large.

Suggested Introduction for Students:

Insects and other small creatures can do many different things in a garden. Some eat plants, some eat other insects, and some become food for birds or frogs. Today, you'll look at a group of bugs and decide if each one is more like a "pal" or a "pest" in the garden, but remember that no bug is always good or always bad.

"Answer" Key and Additional Information:

Insect	"Pal" or "Pest"	Common Plants Impacted	Predators/ ecological role	Economic/ Human impacts
Mealybugs	Pest	Citrus, hibiscus, ornamental plants	Food source for lacewing, ladybugs, parasitic wasps	Weaker plants, reduced fruit yield
Whiteflies	Pest	Tomatoes, peppers, squash, ornamental plants	Food source for beetles, ladybugs, parasitic wasps	Transmits viruses between plants that can lead to significant crop loss
Aphids	Pest	Citrus, watermelon, ornamental plants	Food source for lacewing, ladybugs, parasitic wasps	Feeding damage and virus transmission can reduce crop yields
Chinch Bugs	Pest	Turfgrasses	Food source for beetles and spiders	Infestations can lead to significant damage, impacting laws and golf courses
Sod Webworms	Pest	Turfgrasses	Food source for birds, beetles and predatory wasps	Infestations can lead to significant damage, impacting laws and golf courses
Mole Crickets	Pest	Turfgrasses	Food source for birds, mammals and reptiles	Tunneling and feeding damage can damage lawns and make weed infestations worse

Insect	"Pal" or "Pest"	Diet	Other Considerations
Assassin Bugs	Pal	Generalist Predators ("pest" bugs, mosquitos, flies, etc.)	Can have painful bites if handled
Yellow Garden Spiders	Pal	Trap flying insects in wings	Native to Florida, generally non-aggressive
Pirate Bugs	Pal	Feed on very small insects (mites, insect eggs)	Native to Florida, generally harmless to humans
Green Lacewings	Pal	Known as "aphid lions"- can eat massive amounts of aphids	Native to Florida, adults feed on nectar and pollen and are harmless to humans
Parasitic Wasps	Pal	Lay eggs on or in other insects	Can be introduced specifically for pest management, generally harmless to humans
Ladybugs	Pal	Soft-bodied insects like aphids	Can be introduced specifically for pest management, generally harmless to humans

Scenario Cards Potential Answers

Potential Answers and Suggestions:

Scenario 1: Mealybugs

What's happening: Mealybugs suck sap from stems and leaves. The white, cottony material is a waxy coating that protects them.

Natural solutions:

- Gently wash the bugs off with a spray of water.
- Use a cloth or cotton swab dipped in rubbing alcohol to remove them.
- Encourage predators like ladybugs and lacewings.

Scenario 2: Whiteflies

What's happening: Whiteflies are small flying insects that feed on sap. The sticky substance is honeydew, which can lead to sooty mold.

Natural solutions:

- Spray the undersides of leaves with water to dislodge them.
- Use sticky traps to monitor and catch them.
- Encourage predators like parasitic wasps and lacewings.

Scenario 3: Aphids

What's happening: Aphids gather on stems and leaves, sucking sap and leaving sticky honeydew.

Natural solutions:

- Spray with a strong stream of water to knock them off.
- Attract or introduce predators like ladybugs and lacewing larvae
- Trim heavily infested parts of the plant.

Scenario 4: Chinch Bugs

What's happening: Chinch bugs are damaging the grass by sucking the sap and injecting toxins, causing dry, brown patches.

Natural solutions:

- Avoid over-fertilizing, which attracts chinch bugs.
- Encourage healthy turf through proper mowing and watering.

Scenario 5: Sod Webworms

What's happening: Sod webworm larvae (caterpillars) are chewing grass blades at night, leaving brown spots.

Natural solutions:

- Mow the lawn and remove excess thatch where they hide.
- Encourage birds and natural predators.

Scenario 6: Mole Crickets

What's happening: Mole crickets are tunneling under the soil, damaging roots and loosening grass.

Natural solutions:

- Maintain a healthy lawn to resist damage.

Student Activity Sheets and Assignments

Included with this Activity

1. Bug Buddies Observation Worksheet
2. Pest or Pal? Bug Cards
3. Scenario Cards

Bug Buddies Observation Worksheet:

UF CPET

FFL Principle 6- Manage Yard Pests
Bug Buddies: Observation Worksheet

Name: _____

Date: _____

Instructions:

Use this worksheet to observe plants in the area or images provided- try to observe three different kinds of bugs and record your observations.

Observation Location: _____

What bug do you see? Describe the bug and what it is doing.	*Does it appear to be helping or hurting the plants around it?*	*Sketch what you see:*

Pest or Pal? Bug Cards:

Cards: Print and cut out (ideally in color), folding along dotted line). Can be laminated for easier reuse

All photos and information from UF IFAS and the Florida-Pally Landscaping™ Program unless otherwise noted.

Mealybug

https://blogs.ifas.ufl.edu/seminoleco/2019/06/14/mealybugs/
https://blogs.ifas.ufl.edu/stlucieco/2022/03/31/citrus-mealybug-and-control-methods/

Mealybugs are tiny, soft bugs that suck the juice from plants like tomatoes, citrus trees, hibiscus, and flowers. This can make leaves turn yellow, wilt, or fall off. They also leave behind a sticky goo called honeydew, which can grow black mold on the leaves. Mealybugs are also an important food source for other animals like ladybugs.

Whitefly

https://sfyl.ifas.ufl.edu/agriculture/whiteflies/
https://edis.ifas.ufl.edu/publication/IN695

Whiteflies are tiny flying insects that hide on the bottom of leaves and suck juices from plants like tomatoes, peppers and hibiscus. Their feeding can make plants weak, with yellow or curling leaves. Like mealybugs, they make a sticky goo called honeydew that can lead to black mold on the leaves. Whiteflies are also food for helpful garden insects.

Aphid

Melon aphids, photo credit: FJ Santana
https://blogs.ifas.ufl.edu/manateeco/2023/03/30/spring-is-here-and-so-are-the-bugs/

Aphids are tiny bugs that suck juice from garden plants like roses, lettuce, tomatoes, and milkweed. They can cause leaves to curl or turn yellow, and produce honeydew. Aphids multiply quickly, but they're also a favorite food for ladybugs, lacewings, and even some birds. Some ants "farm" aphids to collect their honeydew!

Chinch Bug

https://blogs.ifas.ufl.edu/orangeco/2023/05/30/pot-chinch-bugs/
https://blogs.ifas.ufl.edu/pinellasco/2010/09/17/chinch-bugs/

Chinch bugs are tiny insects that mostly feed on common lawn grasses. They suck the juice from grass blades, causing dry, yellow, and/or dead patches in the lawn. They are most active during hot, sunny weather. But like other insects, they are part of the food chain and help feed birds and spiders.

Sod Webworm

https://gardeningsolutions.ifas.ufl.edu/care/pests-and-diseases/pests/tropical-sod-webworm/

Sod webworms are the caterpillars of moths that feed on grass, especially in sunny areas. They chew the grass blades at night, leaving brown patches behind, so they can be hard to see during the day. You might see little moths flying low when you walk through the yard. The caterpillars are food for birds and helpful insects.

Mole Cricket

https://sfyl.ifas.ufl.edu/lawn-and-garden/mole-crickets/
https://nwdistrict.ifas.ufl.edu/hort/tag/mole-crickets/

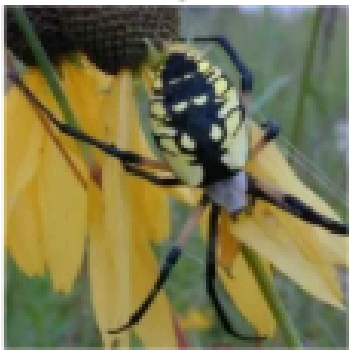
Mole crickets live underground and dig tunnels through lawns and gardens, especially in sandy soils. Their digging and feeding can damage roots of grass and vegetable plants. They are also an important food source for birds, frogs, and some wasps.

Assassin Bug

https://blogs.ifas.ufl.edu/escambiaco/2023/10/04/weekly-what-is-it-assassin-bug/

Assassin bugs are predators that catch and feed on insects like caterpillars, aphids, beetles, flies, and stinkbugs. They poke their prey, turn the insides into liquid, and then suck it up like a straw. They don't usually bother people, but if handled or disturbed they can deliver a painful bite. Even though they kill many pests, they are part of a bigger food web and may even eat other beneficial insects.

Yellow Garden Spider



Credit: Dennis Profant, www.bugguide.net
https://edis.ifas.ufl.edu/publication/IN1273

The yellow garden spider builds large webs and captures many insects such as flies, wasps, grasshoppers, and beetles. They are not aggressive and generally flee rather than bite; their venom is harmless to most people. Because they eat insects that might harm plants, they help gardens but they also sometimes catch insects that people like (such as butterflies or bees).

Pirate Bug

Photograph by James Castner, University of Florida https://nwdistrict.ifas.ufl.edu/hort/tag/minute-pirate-bug/

Photographer: Lyle Buss, University of Florida
https://entnemdept.ufl.edu/projex/gallery/dl/Beneficial_Arthropods_Predators/text/pirate_bugs.htm

These insects are very small but strong hunters, using sharp mouthparts to pierce other creatures and suck out their juices. They are found on plants where they feed on mites and sometimes even insect eggs. Bigger animals, like spiders and birds, sometimes eat them as well.

Green Lacewing

Photograph by Lyle J. Buss, University of Florida
https://nwdistrict.ifas.ufl.edu/hort/tag/minute-pirate-bug/

This insect has delicate, see-through wings and can often be found near flowers and leaves. The adults mostly drink nectar and pollen, while their young are active hunters that crawl over plants looking for food. Lacewings themselves can be eaten by larger insects, birds, or amphibians.

Parasitic Wasp

Credit: Charles Stuhl, USDA-ARS-CMAVE Gainesville, Florida

Credit: Andrei Sourakov, Florida Museum of Natural History

Parasitic wasps are tiny insects that lay their eggs inside or on other pest insects, and when the wasp larvae hatch they feed on and eventually kill their host. These wasps are so tiny that they often go unnoticed. Other creatures, like birds and spiders, may eat the wasps themselves.

Ladybug

Photograph by Luis F. Aristizábal, University of Florida.

Both the larvae and adults eat soft bodied pests like aphids, scales, mites, insect eggs, mealybugs, and whiteflies. They feed on nectar, pollen, or honeydew when prey is scarce, and their bright colors warn predators they're not a tasty snack, but they can be food sources for frogs, lizards and birds.

Sources:

- McIntyre, T., Gutner, R., Cohen, H., Silvasy, T., & Momol, E. (2023). *A Florida-Friendly Landscaping™ Approach to Pest Management in Your Edible Landscape* (ENH1365 / EP629). University of Florida IFAS Extension. Retrieved from https://edis.ifas.ufl.edu/publication/EP629 Ask IFAS - Powered by EDIS
- *Landscape Integrated Pest Management* (ENY–298 / IN109). University of Florida IFAS Extension. (n.d.). Retrieved from UF/IFAS EDIS (or related URL)
- *Invertebrates as Biological Control Agents* (IN120). University of Florida IFAS Extension. (n.d.). Retrieved from UF/IFAS EDIS
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- *Balancing Pest Management and Insect Conservation* (IN1444). University of Florida IFAS Extension. (n.d.). Retrieved from UF/IFAS EDIS
- *Pruning, Harvesting, and Maintenance of Florida-Friendly Edible Landscapes* (EP622). University of Florida IFAS Extension. (n.d.). Retrieved from UF/IFAS EDIS
- *Edible Landscaping Using the Nine Florida-Friendly Landscaping™ Principles* (EP594). University of Florida IFAS Extension. (n.d.). Retrieved from UF/IFAS EDIS
- *Landscaping Methods to Prevent Pests from Entering Your Home* (IN1397). University of Florida IFAS Extension. (n.d.). Retrieved from UF/IFAS EDIS
- *Steps to a Florida-Friendly Landscape* (EP413 / ENH1153). University of Florida IFAS Extension. (n.d.). Retrieved from UF/IFAS EDIS
- *Integrated Pest Management Goes Hand in Hand with Safety* (PI297). University of Florida IFAS Extension. (n.d.). Retrieved from UF/IFAS EDIS

Scenario Cards:

Garden Guardians Scenario Cards

Instructions: Print and cut out cards and provide one card to each group of students. Have them make a plan to manage this pest. As an optional add-on, you can have them come up with and preform a skit of their management plan!

Scenario #1

Clue: You notice a plant in your school garden has white, cottony stuff on the leaves and stems. The plant looks weak and its leaves are starting to turn yellow.

Questions: What pest do you think this is? How can we help this plant without using chemicals?

Scenario #2

Clue: While checking the underside of some leaves, you see tiny white bugs fly up when you touch them. The leaves look pale and a bit sticky.

Questions: What pest do you think this is? How can we help this plant without using chemicals?

Scenario #3

Clue: You find a group of small green bugs clustered on a stem. The plant's leaves are curling, and there's a shiny, sticky liquid on them.

Questions: What pest do you think this is? How can we help this plant without using chemicals?

Scenario #4

Clue: A patch of the school's grass is turning brown, even though it's getting plenty of water. You look closely and see tiny black and white bugs moving around in the soil.

Questions: What pest do you think this is? How can we help this plant without using chemicals?

Scenario #5

Clue: In the morning, you notice small brown patches in the lawn. Later, you spot a little caterpillar near the soil and some grass blades look chewed.

Questions: What pest do you think this is? How can we help this plant without using chemicals?

Scenario #6

Clue: The soil in a garden bed looks dug up, and the grass is dying in weird patterns. When you dig a little, you find a strange bug with big front legs made for digging.

Questions: What pest do you think this is? How can we help this plant without using chemicals?

Florida-Friendly Landscaping™ Program

Principle 7:

Recycle Yard Waste

Elementary Level

Published on **August 14th, 2025**

About This Activity

Title: Recycle Yard Waste: Trash to Treasure

Subject, Grade, Level:
5th grade Science

Abstract:

This 60-minute lesson engages 5th-grade students in exploring Florida-Friendly Landscaping™ Principle 7: Recycle Yard Waste. Aligned with standard SC.5.L.17.1, the lesson focuses on how composting and recycling reduce landfill use, enrich soil, and support ecosystems. Students compare images of landfills and compost piles, sort simulated waste, and learn key concepts through a mini-lesson and vocabulary review. They apply their learning by designing a recycling or composting plan for home or school. Assessment includes an exit ticket and project rubric. Differentiation strategies support diverse learners through visuals, sentence frames, hands-on activities, and extension options. The lesson encourages students to take practical action toward environmental sustainability.

Learning objectives:

At the conclusion of this activity, participants will be able to:

- Understand the importance of recycling yard and household waste.
- Identify ways to reduce waste through composting and other sustainable practices at home and in their community.

Author: Amanda Wink
Fishhawk Creek Elementary
Edited by Morgan Nielsen, UF CPET

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning standards:

SC.5.L.17.1	Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycle variations, animal behaviors and physical characteristics.

Timeframe:

This activity is designed to take approximately 60 minutes of class time.

List of Materials

- Pictures of landfills, preferably local landfills.
- Pictures of compost piles and/or recycled garden clippings
- Baggies of premade “waste” (unlabeled!)
    - 5 bags of yard waste- leaves, sticks, fruit peels, etc.
    - 5 bags of recyclable waste- cans, plastic, paper, etc.
- Disposable gloves for each student
- Copies of books, poster paper, markers, index cards for vocabulary
- Poster paper
- Index cards for exit tickets
- Rubric

Procedure and General Instructions (for instructor)

Introduction

1. **ENGAGE (10 minutes)**
    - **Activity**: Show a short video or image series depicting a landfill and then a compost pile or recycled garden. Ask students:
    - What do you notice?
    - Where does your yard and food waste go?
    - Have you ever seen composting or recycling in action?
    - **Purpose**: Spark curiosity and activate prior knowledge.
    - **Videos**: https://www.youtube.com/watch?v=AJVky2Fzl54
    - **Compost video**: https://www.youtube.com/watch?v=oFlsjRXbnSk

2. **EXPLORE (15–20 minutes)**
    - **Activity**: In small groups, students investigate two bags of "waste". Students sort items into what can be: recycled, composted or thrown away
    - **Discussion Questions**: Which items break down naturally? Which items take up space in landfills?
    - **Purpose**: Promote hands-on discovery of recyclable and compostable materials.

Procedure and General Instructions (for instructor) cont.

3. **EXPLAIN (20 minutes)**
   - **Mini-Lesson with visuals**: Share copies of “Growing Up Florida-Friendly: A Kid’s Guide to the 9 Principles” for each group. You could also jigsaw if needed for different groups with different needs.
   - Define yard waste and household waste and explain what happens when waste is not recycled (landfills, pollution, etc.)
   - Introduce composting as a natural way to recycle yard and food waste to enrich soil and share FFL Principle #7 materials.
   - Essential Vocabulary: Decompose, compost, organic, landfill, biodegradable, recycle

4. **ELABORATE (30 minutes)**

   Project Activity: Students design a "Recycle and Compost Plan" for their school or home.
   Options include:
   - Drawing a diagram of a compost bin and explaining its parts.
   - Creating a poster or brochure promoting composting and recycling.
   - Writing a short persuasive paragraph encouraging families to compost.

   Extension Idea: Create a simple classroom compost bin or garden using lunch scraps (e.g., fruit/vegetable peels only).

5. **EVALUATE (15 minutes)- Assessment Tools:**
   - Exit Ticket: “One thing I learned, one thing I’ll do, and one question I still have.”
   - Review student projects/posters for accurate understanding
   - Use a rubric that checks for correct sorting of waste and a clear understanding of the content
   - Practical application of their plan or model

Florida-Friendly Landscaping™ Program

Principle 8:

Reduce Stormwater Runoff

Elementary Level

Published on **August 14th, 2025**

About This Activity

Title: Reduce Stormwater Runoff

Subject, Grade, Level:
First grade Science - Dual Language (Spanish)

Abstract:

This bilingual first-grade lesson introduces students to Florida-Friendly Landscaping™ Principle #8: Reduce Stormwater Runoff, through a hands-on demonstration and guided reflection. Students observe how plants near lakes and rivers help prevent erosion and reduce pollution by absorbing stormwater and keeping water sources cleaner and safer. Aligned with early science and language arts standards, this one-hour classroom activity uses visual aids, key vocabulary instruction, and a comparative runoff experiment (with and without plants). Students engage in observation, discussion, and drawing-based reflection to reinforce their understanding of how plants protect natural water systems. The activity builds science literacy while encouraging environmentally responsible thinking from an early age.

Learning objectives:

At the conclusion of this activity, participants will have:

- Explored how plants near lakes and rivers keep soil in place and make the water cleaner and safer when the stormwater is being managed properly.

Author: Glaribel Piñero-Amaro
Greenacres Elementary School
Edited by Morgan Nielsen, UF CPET

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning standards:

SC.1.E.6.1	Recognize that water, rocks, soil, and living organisms are found on Earth's surface.
ELA.1.V.1.1	Use grade-level academic vocabulary appropriately in speaking and writing.
SC.1.L.14.1	Make observations of living things and their environment using the five senses.
SC.1.L.17.1	Through observation, recognize that all plants and animals, including humans, have the need for basics, like air, water, food, and space.
ELA.1.V.1.3	Identify and use picture clues, context clues, word relationships, reference materials, and/or background knowledge to determine the meaning of unknown words.

Timeframe:

This activity is designed to take approximately 1 hour of class time.

List of Materials

- slides presentation with pictures and information (Not included)
- 2 paint trays (with textures- bumps in the tray)
- 2 printable stormwater runoff worksheets
- markers or crayons
- tape
- water spray bottle
- pollutant examples: oil, chocolate syrup, frosting, shaving cream, salt, sand, etc.
- moss (outside or craft store)
- worksheet with a “T” chart and questions.
- pencils

Procedure and General Instructions (for instructor)

Introduction

1. **(15 minutes):** Brief presentation about the FFL “Stormwater Runoff” principle.

2. **(5 minutes):** Presentation of the vocabulary (Tier 3) stormwater, pollution and soak.

3. **(20 minutes)- Stormwater Runoff Activity:-** Show the effects of not having plants near lakes and rivers to absorb most of the pollution, and the effects of having plants near lakes and rivers. See details in both english and spanish expanded lesson plan documents.

4. **(20 minutes)- Reflection:-** Reflect on what the demo showed.
   - Note: For those students that cannot write a complete sentence, they can draw their answers and write some labels with words.

Teacher-Facing Materials

Included with this Lesson

- Expanded Lesson Plan in English and Spanish

English lesson plan page 1:

UF|CPET **FFL Principle 8- Reduce Stormwater Runoff**
Elementary School
Glaribel Piñero-Amaro, Greenacres Elementary School

Reduce Stormwater Runoff Lesson Plan (English)

Field of Science: Environmental Science
Grade Level: First Grade (can be adapted for Kindergarten and Second grade)
Concepts Explored: Stormwater runoff, pollution, soak

Big Idea:
What happens to rain when it can't soak into the ground?

Learning Target:
Students will explore how plants near lakes and rivers keep soil in place and make the water cleaner and safer when the stormwater is being taken care of properly.

Standards:
- **SC.1.E.6.1** Recognize that water, rocks, soil, and living organisms are found on Earth's surface. (Recall, level 1)
- **SC.1.E.6.2** Describe the need for water and how to be safe around water. (Basic application of skills and concepts, level 2)
- **ELA.1.V.1.1** Use grade-level academic vocabulary appropriately in speaking and writing.
- **ELA.1.V.1.3** Identify and use picture clues, context clues, word relationships, reference materials, and/or background knowledge to determine the meaning of unknown words.

Materials:
- 2 paint tray (with textures -bumps in the tray)
- 2 printable stormwater runoff worksheet
- Markers or crayons
- Tape
- Water spray bottle
- Pollutant examples: oil, chocolate syrup, frosting, shaving cream, salt, sand, etc.
- artificial plants/leaves

Introduction:
Stormwater is water from rain (or melting snow) that isn't absorbed into the ground. In cities and towns, hard surfaces like roads and sidewalks prevent water from soaking into the soil. Instead, it runs off these surfaces, collecting dirt, oil, garbage, and other pollutants. This is called **stormwater runoff**. **Stormwater** can carry pollutants into local rivers, lakes, and oceans, harming aquatic life and water quality.

English lesson plan page 2:

Lesson:

Stormwater runoff happens when rainwater (or melted snow) can't soak into the ground. Instead, it flows over surfaces like roads, driveways, and rooftops. This runoff can pick up harmful materials such as car oil, trash, and lawn chemicals.

Urban areas are more affected because of all the paved surfaces. **Stormwater** pollution can harm fish, plants, and other animals living in rivers and oceans. It also makes cleaning our drinking water more difficult and expensive.

Farms also contribute to **stormwater runoff**. Fertilizers and pesticides can wash into streams and lakes, causing algae blooms that reduce oxygen and harm aquatic ecosystems.

Some facts:

- Stormwater is one of the leading causes of water pollution in urban areas.
- Storm drains often lead directly to rivers, lakes, or oceans without treatment.
- Even leaves, grass clippings, and pet waste can cause pollution when washed away by rain.

What helps?

- Planting more trees and gardens, creating rain gardens (Green infrastructure, like rain gardens and permeable pavements, can help soak up rainwater.)
- Using rain barrels.
- Cleaning up trash.
- Reducing lawn chemicals.

Vocabulary:

stormwater runoff - water from rain (or melting snow) that isn't absorbed into the ground.

pollution - making the Earth dirty and unhealthy. It happens when harmful things like trash, chemicals, or even extra noise get into our air, water, or land, making them unsafe for living things.

soak - means to make something very, very wet, like putting a sponge in water or getting caught in the rain. It can also mean to absorb something, like a sponge soaking up water.

Activity:

(For the teacher:) By exploring this simple model, kids learn how human activity affects the environment and how they can make a difference.

English lesson plan page 3:

Set up the activity:

Print and color two sets of the stormwater runoff worksheet. Cut out the images. Tape the images into the first paint tray to represent roads, grass, storm drains, etc. Then, do the same in the second tray, but this time, glue the plastic plants at the top of the pictures.

STEP 1: Add substances like oil or syrup to represent pollutants. Place small amounts on the hard surfaces.

STEP 2: Add clean water to the lower part of the tray to simulate a river or stream.

STEP 3: Use the spray bottle to simulate rainfall. Watch what happens to the water and where the pollutants go.
Discuss with students their observations.

Guided questions:

- Where does the dirty water go?
- What do you notice about the pollution?

(Now, repeat the activity using the second tray, with the artificial plants.)

English lesson plan page 4:

Guided questions:

- Where does the dirty water go?
- What do you notice about the pollution?

Conclusion and concept learn application:

(Give the students a paper with a "T" chart.) Now, I want you to draw what you saw. On the left side of your "T" chart, you are going to draw what happened on the tray without plants. On the right side, you are going to draw what happened in the tray with the plants.

Then, I want you to write your conclusions. Use these questions to help you to write your conclusion:

- Which side holds cleaner water?
- Why do you think this happened?

As a class, discuss possible good practices and solutions to stop or minimize the effects of the stormwater pollution.

https://littlebinsforlittlehands.com/stormwater-runoff

Spanish lesson plan page 1:

UF CPET

FFL Principle 8- Reduce Stormwater Runoff
Elementary School

Glaribel Piñero-Amaro, Greenacres Elementary School

Lección: Reducción de las escorrentías de aguas pluviales

Área científica de estudio: Ciencia Ambiental
Grado: Primer Grado
Conceptos a ser explorados: escorrentías, contaminación, empapar

Big Idea:
¿Qué sucede con la lluvia cuando no puede filtrarse en el suelo?

Objetivo de aprendizaje:
El estudiante explorará cómo las plantas que crecen cerca de lagos y ríos ayudan a mantener el suelo en su lugar, y a que el agua sea más limpia y segura cuando las aguas pluviales se manejan adecuadamente.

Estándares:

- SC.1.E.6.1 Recognize that water, rocks, soil, and living organisms are found on Earth's surface. (Recall, level 1)
- SC.1.E.6.2 Describe the need for water and how to be safe around water. (Basic application of skills and concepts, level 2)

Materiales:

- 2 bandejas de pintura (de las que tienen textura al relieve)
- 2 copias de la hoja de dibujos
- marcadores o crayones
- cinta adhesiva
- botella con boquilla para rociar agua
- ejemplos de contaminantes: aceite de cocinar, jarabe de chocolate, merengue de bizcochos, crema de afeitar, sal, arena, etc.
- plantas/hojas artificiales

Spanish lesson plan page 2:

Introducción:
El agua pluvial es el agua de la lluvia (o de la nieve derretida) que no es absorbida por el suelo. En las ciudades y los pueblos, las superficies duras como las carreteras y las aceras impiden que el agua se filtre en la tierra. En lugar de eso, corre por estas superficies, recogiendo tierra, aceite, basura y otros contaminantes. A esto se le llama **escorrentía de agua pluvial**.

Las escorrentías de agua pluvial llevan contaminantes hacia los ríos, lagos y océanos dañando la vida acuática y la calidad del agua.

Lección:
La escorrentía de aguas pluviales ocurre cuando el suelo no puede absorber el agua de lluvia (o la nieve derretida). En su lugar, corre (se mueve) sobre superficies como carreteras, entradas de autos y techos. Esta escorrentía puede arrastrar materiales dañinos como aceite de automóviles, basura y productos químicos para el césped (grama en los patios).

Las zonas urbanas se ven más afectadas debido a todas las superficies pavimentadas. La contaminación por la escorrentía de aguas pluviales puede dañar a los peces, las plantas y otros animales que viven en los ríos y océanos. También hace que limpiar el agua potable sea más difícil y costoso.

Las granjas también contribuyen a la escorrentía de aguas pluviales. Los fertilizantes y pesticidas pueden llegar a arroyos y lagos, causando floraciones de algas que reducen el oxígeno y dañan los ecosistemas acuáticos.

Datos extra:

- El agua de lluvia es una de las principales causas de contaminación del agua en las zonas urbanas.
- Los desagües pluviales suelen desembocar directamente en ríos, lagos u océanos sin tratamiento previo.
- Incluso las hojas, los recortes de césped y los desechos de mascotas pueden causar contaminación cuando la lluvia los arrastra.

¿Qué cosas pueden ayudar?

Spanish lesson plan page 3:

- Plantar más árboles y jardines, y crear jardines para retener la lluvia (La infraestructura verde, como los jardines para retener la lluvia y los pavimentos permeables, puede ayudar a absorber el agua de lluvia).
- Usar barriles para recolectar agua de lluvia.
- Recoger la basura.
- Reducir el uso de productos químicos en el césped.

Vocabulario:

escorrentía de aguas pluviales – agua de lluvia (o nieve derretida) que no es absorbida por el suelo.

contaminación – hacer que el suelo esté sucio y sea poco saludable. Sucede cuando cosas dañinas como la basura, productos químicos o incluso el ruido excesivo entran en el aire, el agua o la tierra, haciéndolos inseguros para los seres vivos.

empapar – significa mojar algo en gran cantidad, como poner una esponja en agua o quedar atrapado bajo la lluvia. También puede significar absorber algo, como una esponja que absorbe agua.

Actividad:

(Para el maestro:) Al explorar este modelo sencillo, los niños aprenden cómo la actividad humana afecta al medio ambiente y cómo ellos pueden marcar la diferencia.

Preparación de la actividad:

https://littlebinsforlittlehands.com/stormwater-runoff

Imprimir, colorear y recortar las dos copias de la hoja de trabajo sobre la escorrentía de aguas pluviales. Pegar las imágenes en la primera bandeja de pintura para representar carreteras, césped, alcantarillas pluviales, etc. Luego, haga lo mismo en la segunda bandeja, pero esta vez, pegue las plantas de plástico en la parte superior de las imágenes.

Spanish lesson plan page 4:

PASO 1: Añada las sustancias como el aceite o el jarabe, en representación de los contaminantes. Ponga una pequeña cantidad en la parte alta de la superficie.

PASO 2: Añada agua en la parte de abajo de la bandeja, simulando un río o arroyo.

PASO 3: Use la botella para rociar agua simulando lluvia. Observar lo que pasa con el agua y a donde van los contaminantes.

Discuta con los estudiantes las observaciones.

Preguntas guías:

- ¿A dónde se fue el agua sucia?
- ¿Qué notaste sobre la contaminación del agua?

Spanish lesson plan page 5:

(Luego, repita la actividad usando la segunda bandeja, con las plantas artificiales.)

Preguntas guías:

- ¿A dónde se fue el agua sucia?
- ¿Qué notaste sobre la contaminación del agua?

Conclusión y aplicación de conceptos:

(Entregue a los estudiantes la hoja de trabajo con la tabla en forma de "T".)
Ahora quiero que dibujes lo que observaste. En el lado izquierdo de tu tabla en forma de "T", vas a dibujar lo que ocurrió en la bandeja ***sin*** plantas. En el lado derecho, vas a dibujar lo que ocurrió en la bandeja ***con*** plantas.

Luego, quiero que escribas tus **conclusiones**. Usa estas preguntas para ayudarte a escribir tu conclusión:

- ¿Qué lado tiene el agua más limpia?
- ¿Por qué crees que ocurrió esto?

Como clase, **discutan buenas prácticas y soluciones posibles** para detener o minimizar los efectos de la contaminación por aguas pluviales.

https://littlebinsforlittlehands.com/stormwater-runoff

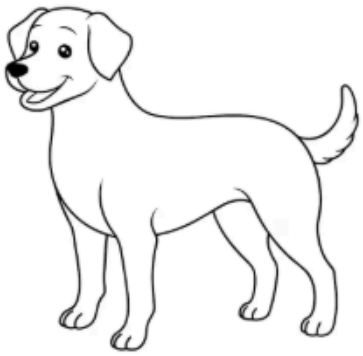
Student Activity Sheets and Assignments

Included with this Activity

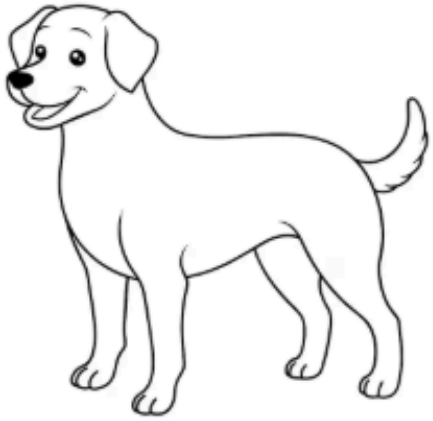
1. Stormwater Cut Outs Pictures
2. Stormwater Effects Worksheet

Stormwater Cut Outs Pictures:

STORMWATER CUT OUTS PICTURES



DIBUJOS PARA LA BANDEJA SIMULADORA DE ESCORRENTÍAS PLUVIALES



Stormwater Effects Worksheet page 1:

STORMWATER EFFECTS

Name:_____ **Date:**_____

Instructions: Make a picture of what you saw that happened in each tray, when the water was poured.

Without plants	With plants

Stormwater Effects Worksheet page 2:

Using these questions as your guide, explain what happened on each tray.

Which side holds cleaner water? Why do you think this happened?

Spanish- Stormwater Effects Worksheet page 1:

EFECTOS DE LA ESCORRENTÍA PLUVIAL

Nombre:_____ **Fecha:**_____

Instrucciones: Dibuja lo que viste que sucedió en cada bandeja, cuando la maestra derramó el agua.

sin las plantas	con las plantas

Spanish- Stormwater Effects Worksheet page 2:

Usando las siguientes preguntas como guía, explica que sucedió en cada bandeja.

¿Qué lado tuvo el agua más limpia?

¿Qué crees que sucedió?

Florida-Friendly Landscaping™ Program

Principle 9:

Protect the Waterfront

Elementary Level

Published on **August 19th, 2025**

About This Activity

Title: Protect the Waterfront
"We All Live In A Watershed"

Subject, Grade, Level:
Elementary Science

Abstract:

This 120-minute elementary lesson, aligned with Florida-Friendly Landscaping™ (FFL) Principle 9: Protect the Waterfront, introduces students to the impact of stormwater runoff on Florida's waterways and the role of sustainable landscaping in protecting water quality. Through interactive presentations, group discussions, and hands-on design activities, students learn how FFL principles — such as using native plants, buffer zones, and rain gardens — help reduce pollution and safeguard aquatic ecosystems. Aligned with grades 3–4 science standards, the lesson encourages students to apply their learning by designing a model of a Florida-Friendly waterfront landscape. Assessment includes group presentations, design plans, participation, and exit reflections, empowering students to promote and apply eco-friendly landscaping practices in their communities.

Learning objectives:

At the conclusion of this activity, participants will be able to:

- Explain how waterfront areas are affected by stormwater runoff and pollution
- Identify key principles of Florida-Friendly Landscaping™ that help protect water quality
- Describe specific landscaping practices that reduce pollution entering waterways
- Propose landscaping solutions to protect local waterfront environments
- Design and share a model of a sustainable landscape using real-world strategies

Author: Don Norton
Millennium Middle School
Edited by Morgan Nielsen, UF CPET

This curriculum was created during the 2025 University of Florida Center for Precollegiate Education and Training (CPET) Environmental Science Summer Program, funded in part by the U.S. Environmental Protection Agency and the Bingham Environmental Education Foundation and developed in collaboration with the UF/IFAS Florida-Friendly Landscaping™ Program.

Learning standards:

SC.3.L.17.1	Recognize ways plants and animals, including humans, can impact the environment.
SC.4.L.17.2	Describe how environmental changes can affect plants and animals.
SC.3.E.6.6	Recognize how pollution affects air, water, and land quality.
SC.4.E.6.7	Identify ways to reduce pollution and protect natural resources.
SC.3.E.6.7	Describe how human activities affect the environment.
SC.4.E.6.6	Explain ways to conserve and protect water resources.
SC.3.N.1.5	Collect and record information using tools and instruments.
SC.4.N.1.1	Use appropriate tools to measure, observe, and collect data accurately.

Timeframe:

This activity is designed to take approximately 120 minutes of class time.

List of Materials

- Presentation
- Plan Checklist
- Graph Paper/Blank Paper
- Coloring supplies
- (optional) plan template, rubric-scaffolding may be helpful for younger students

Procedure and General Instructions (for instructor)

Introduction

1. **Engage (10 minutes):**
    - Introduce the topic of water pollution protection with images of FFL presentation and ways to improve landscapes using FFL principles
    - Ask: "What happens to rainwater when it falls near homes or waterfronts?" Discuss stormwater runoff and its potential to carry pollutants to water bodies.
    - Show pictures comparing waterfront areas with traditional landscaping vs. Florida-Friendly Landscaping™

2. **Explore (15 minutes):**
    - Introduce Florida-Friendly Landscaping™ principles:
        - Use of native plants
        - Minimizing fertilizer and pesticide use
        - Creating low maintenance zones near waterways
        - Managing irrigation efficiently
    - Discuss how these practices reduce pollution and protect aquatic habitats.

3. **Explain (10 minutes):**
    - Guide students to explain how each landscaping practice helps filter or reduce pollutants in stormwater before it reaches the waterfront, connecting to Florida Science Standards about pollution effects and human impacts on water quality.

Procedure and General Instructions (for instructor) cont.

4. **Elaborate (20 minutes):**
    - In small groups, students design a simple landscaping plan for a waterfront property using Florida-Friendly principles by drawing the outline of the waterway and surrounding land.
    - Key Features to Include:
        - Waterway (river, lake, pond)
        - Shoreline or bank
        - Existing trees and plants
        - Pathways or walkways
        - Structures (docks, benches, fences)
    - Indicate where you will place:
        - Native plants (list specific species if known)
        - Low Maintenance zones (areas to filter runoff near water)
        - Rain gardens or bioswales (areas to collect stormwater)
        - Mulch or ground cover areas

5. **Share (30 minutes):**
    - Groups will present their plans to the class.

6. **Evaluate (5 minutes):**
    - Exit ticket: Students write one way Florida-Friendly Landscaping™ protects water quality and one practice they would recommend for their community

Teacher-Facing Materials

Included with this Lesson

- Power Point
- Extended objectives/guiding questions doc

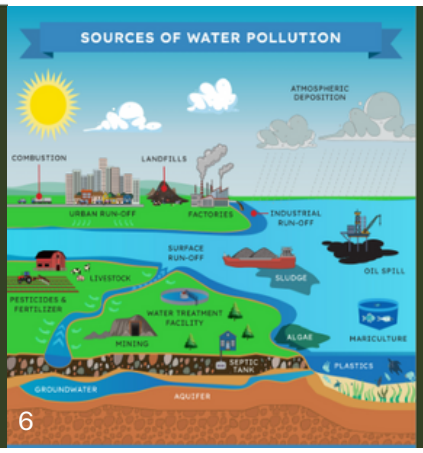
Included Slides:

5

Prevent Pollution in Waterways

- Waterfront living is special
- Special benefits and responsibilities
- Landscape practices can protect our waterways

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™



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What is water pollution?

Pollution is when contaminants (chemicals, materials, any other substance) have a harmful effect on the area they enter.

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

7

Low-Maintenance Zone

- Designate a 10-25 ft low-maintenance zone around water bodies
- No mowing, fertilizer or pesticides

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

8

Plant Shoreline Vegetation

- Plant in the riparian zone
- Choose Florida-friendly plants

9

Living Shorelines

- Vegetation planted in coastal areas
- Controls erosion
- Protect shoreline habitat

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

10

Seawalls and Rip Rap

- Seawalls
- Rip rap
- Gabions

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

11

Erosion Control

Soil erosion affects water quality

Vegetation prevents erosion

Also prevents thermal pollution

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

12

No Invasives Near the Water

- Remove invasive exotics
- Protect and plant native shoreline plants

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

13

Other Maintenance Considerations

- Pick up after pets
- Prevent plant debris from entering the water

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

14

Enhance Stormwater Ponds and Canals

Create wildlife habitat

Transform into neighborhood amenity

9 PRINCIPLES OF FLORIDA-FRIENDLY LANDSCAPING™

Water at the Neighborhood Level

How can FFL practices protect the waterfront in your community?

15

Your yard can make a difference!

16

17

Extended objectives/guiding questions doc

UF|CPET

FFL Principle 9- Protect the Waterfront
"We All Live In A Watershed"
Elementary School

Don Norton, Millennium Middle School

Extended Resources: Objectives, Guiding Questions & Florida Standards

Learning Objectives & Guiding Questions:

Explain how waterfront areas are affected by stormwater runoff and pollution

When it rains, water flows over roofs, driveways, lawns, and streets, collecting pollutants like fertilizers, pesticides, oil, and trash. This stormwater runoff can flow directly into lakes, rivers, and oceans without being filtered. As a result, it can damage aquatic ecosystems by introducing harmful substances that decrease water quality, lead to algae blooms, and harm wildlife. Waterfront areas are especially vulnerable because they receive much of this untreated runoff.

Guiding Questions:

- What types of pollutants might rainwater pick up as it flows across the ground?
- Why don't many stormwater systems filter water before it reaches lakes, rivers, or oceans?
- How does stormwater runoff affect fish, plants, and water quality in waterfront areas?
- Why are waterfront areas more vulnerable to pollution than other places?
- What are some examples of things we do at home that could contribute to water pollution?

Identify key principles of Florida-Friendly Landscaping™ that help protect water quality

Florida-Friendly Landscaping (FFL) is based on nine guiding principles designed to create sustainable, eco-conscious yards and green spaces to keep landscapes attractive while safeguarding Florida's water resources. The principles that most directly protect water quality include:

- **Using native and drought-tolerant plants** to reduce the need for water, fertilizer, and pesticides.
- **Creating buffer zones** near water bodies that act as filters for runoff.
- **Reducing fertilizer and pesticide use** to limit chemical pollution.
- **Managing stormwater runoff** through rain gardens, swales, and mulched areas.

Guiding Questions:

- What are Florida-Friendly Landscaping™ principles and why were they created?
- How can using native plants help protect the environment and reduce pollution?
- What is a buffer zone, and how does it work to protect nearby water bodies?
- Why should we reduce fertilizer and pesticide use in our yards?
- How do rain gardens, swales, or mulched areas help control runoff?

Describe specific landscaping practices that reduce pollution entering waterways

Certain landscaping choices significantly reduce runoff and pollution by intercepting, absorbing or filtering pollutants, including:

- **Planting buffer zones** along shorelines with deep-rooted, native plants that trap sediment and absorb nutrients.
- **Avoiding chemical overuse** by applying fertilizers and pesticides only when needed and according to guidelines.

Extended objectives/guiding questions doc

- **Installing rain gardens or bioswales** to slow down and absorb stormwater.
- **Using mulch and ground covers** to prevent soil erosion.
- **Redirecting downspouts** to vegetated areas instead of hard surfaces.

Guiding Questions:

- What types of plants should we use along shorelines to trap and filter runoff?
- What happens when too much fertilizer or pesticide is used?
- How do rain gardens or bioswales prevent pollution from reaching water bodies?
- Why is it important to use mulch or ground cover on exposed soil?
- How does redirecting rain gutters away from sidewalks help protect water quality?

Propose landscaping solutions to protect local waterfront environments

To protect waterfronts in your community, residents and planners can:

- **Convert turfgrass lawns into native plant beds** that require less watering and fertilization.
- **Install vegetated buffer strips** between lawns and the water's edge.
- **Use porous surfaces** like gravel paths or permeable pavers to reduce runoff.
- **Collect rainwater** in barrels for irrigation.
- **Educate neighbors** about reducing yard waste, fertilizer use, and pet waste near water bodies.

Guiding Questions:

- What changes could a homeowner make to reduce pollution near a lake or river?
- How can planting a buffer zone between a yard and a lake protect the water?
- What are porous surfaces and how do they help reduce stormwater runoff?
- How does collecting rainwater for irrigation benefit the environment?
- How could you encourage your family or neighbors to use water-friendly landscaping?

Design and share a model of a sustainable landscape using real-world strategies

Students or community members can apply their knowledge by designing a model waterfront landscape that includes:

- A visible **water body** (lake, stream, or pond)
- A **buffer zone** with native plants along the shoreline
- **Rain gardens** or swales to manage runoff
- **Mulched areas** to control erosion
- Clearly marked **irrigation systems** that conserve water
- Minimal use of turfgrass and avoidance of chemical inputs

Guiding Questions:

- What features would you include in a model of a clean and safe waterfront property?
- Where would you place native plants or mulch in your model design?
- How would your design help reduce pollution and protect the shoreline?
- What could you include in your design to help save water?
- How could you present your model to help teach others about Florida-Friendly Landscaping?