

Lesson Summary: In this lesson, students will learn about the plant life in and around a lake on campus (or any lake on the water atlas website). In addition to recognizing plants native to the lake habitat, the students will also learn how small changes in the ecosystem can result in drastic changes to the local plant life. Connections to these local changes and global climate change will then be drawn.

Grade Level: Middle School (6th – 8th grade)

Time Allotted: 3 class periods (approximately 50 minutes each period)

Performance Objectives

References are to the Next Generation Sunshine State Standards.

Science

- SC.6.N.2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered
- SC.7.N.1.5 Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
- SC.7.N.1.6 Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
- SC.7.N.3.2 Identify the benefits and limitations of the use of scientific models.
- SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites
- SC.8.N.1.6 Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
- SC.8.N.3.1 Select models useful in relating the results of their own investigations.

Language Arts

- LA.6.3.5.1 Prepare writing using technology in a format appropriate to audience and purpose (e.g., manuscript, multimedia)
- LA.6.3.5.3 Share the writing with the intended audience
- LA.6.4.2.2 Record information (e.g., observations, notes, lists, charts, legends) related to a topic, including visual aids to organize and record information and include a list of sources used

- LA.7.4.2.2 Record information (e.g., observations, notes, lists, charts, legends) related to a topic, including visual aids to organize and record information, as appropriate, and attribute sources of information
- LA.8.6.2.2 Assess, organize, synthesize, and evaluate the validity and reliability of information in text, using a variety of techniques by examining several sources of information, including both primary and secondary sources;

Prior Knowledge

Students will be expected to be familiar with the basic parts of plants (leaves, stems, roots, etc).

Topic Overview

In this lesson, students will learn about the plant life in and around a lake on campus (or any lake on the Water Atlas website). Florida has a wonderful diversity of plant life. It is good for students living in Florida to become familiar with the plants of various ecosystems in their state. It is important for students to understand the important role plants play in all ecosystems. Plants are the primary producers that support the food chain. It is also important for students to be able to identify poisonous plants versus nonpoisonous plants. This is a good exercise for student to learn how to properly take plant samples and how to properly categorize the plants and classify them. Once students have identified plants around their lake system they can compare them to plants found around other lakes on the Seminole Water Atlas website. The students will also learn how small changes in the ecosystem can result in drastic changes to the local plant life. Connections to these local changes and global climate change will then be drawn.

Students will learn about the plant life in and around a lake on campus (or any lake on the water atlas website) by:

- Sharing prior knowledge
- Making observations
- Reading field guides to identify plants
- Making predictions based on observations
- Collecting data
- Drawing conclusions based on evidence gathered

Key Vocabulary

Aquatic plants

Plants that grow in water or wet areas; plants that must complete part or all of their life cycle in, on or near the water.

Climate change

Any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer).

Emergent plants

Plants rooted to the bottom (in shallow water) and having most of the vegetative growth above the water.

Exotic species

A non-native plant or animal deliberately or accidentally introduced into a new habitat.

Floating plants

Plants that may or may not be anchored to the sediment, but have leaves that float on the surface of the water

Invasive species

An exotic species that causes problems (economic and/or ecological) in its new habitat.

Native species

An organism living in an area naturally, not introduced by human activity. In Florida, animals and plants that were here before Spanish contact are considered native.

Photosynthesis

A process that converts carbon dioxide into organic compounds, especially sugars, using the energy from sunlight.

Submersed plants

Plants growing with their root, stems, and leaves completely under the surface of the water. Sometimes the leaves and/or flowers may grow above the surface.

Terrestrial plants

Plants that live on dry land.

Materials

- Lake access on-site or at a nearby park
- Computer with internet access
- Field guides to Florida trees, wildflowers, and shrubs
- Clipboards
- Sketch paper
- Digital camera (optional)
- Digital scanner (optional)
- Plant press (optional)
- Plastic jars and/or bags (optional)

References

The following documents are available in the [Seminole County Water Atlas Digital Library](#):

Fore, Leska A., et al. 2007. [Assessing the Biological Condition of Florida Lakes: Development of the Lake Vegetation Index](#).

[Invasive Species Definition and Guidance White Paper](#). 2006. National Invasive Species Council.

[Learn More: Plants Species](#). Seminole County Water Atlas.

Other references:

Brown, Karen, Mark V. Moyer, and Daniel E. Canfield. 1996. *Florida Freshwater Plants: A Handbook of Common Aquatic Plants in Florida Lakes*. Tallahassee: Florida Department of Environmental Protection and University of Florida.

[Florida Invasive Species Plant Education Initiative and Curriculum](#). 2009. University of Florida Institute of Food and Agricultural Science. [Center for Aquatic and Invasive Plants](#).

[FWC Aquatic Plant Removal Permit Application](#). Florida Fish and Wildlife and Conservation Commission.

[List of Invasive Plant Species](#). 2011 (updated biannually). Florida Exotic Pest Plant Council.

Langeland, K.A. , H.M. Cherry, C.M. McCormick, and K.A. Craddock Burks. 2008. *Identification & Biology of Non-Native Plants in Florida's Natural Areas* (Second Edition). Gainesville: University of Florida Institute of Food and Agricultural Sciences. (First Edition available online at <http://plants.ifas.ufl.edu/node/613>)

Taylor, Walter K. 1998. *Florida Wildflowers in Their Natural Communities*. Gainesville: University Press of Florida.

[Understanding Invasive Aquatic Weeds](#). 2010. Aquatic Plant Management Society. (15-page interactive online activity booklet for classroom use.)

United States Department of Agriculture Natural Resources Conservation Service. [Plants Database](#).

University of South Florida Institute of Systematic Botany. [Atlas of Florida Vascular Plants](#).

Procedure – Day 1

Engage/Elicit

1. Ask students what they know about the lakes near their school. Have they fished, floated, swum or walked by them?
2. Ask students if they know what types of plants can be found near the lakes. Can they name any? Which plants live in the water? Which ones live at the edge of the lake? Which ones live nearby? Go over the vocabulary words: floating plants, emergent plants, submersed plants, terrestrial plants.

Explore

1. Discuss the concepts of *native*, *exotic*, and *invasive* species. The resource [Center for Aquatic and Invasive Plants](#) website contains descriptions to help you understand, and photographs of aquatic plants.
2. Guide your students to the [Atlas of Florida Vascular Plants](#) website and select Seminole County from the map of Florida. Look over the terrestrial plants listed. Follow some of the links and view the descriptions and photos.
3. Introduce the topic of plant diversity to your students. Talk about the different types of plants you might find around a lake ecosystem. Talk about the life cycles of plants, the importance of photosynthesis. Talk about the benefits and disadvantages of different species of plants.

Explain

1. Introduce your students to their field work assignment (Day 2). Have them make a list of plants they are likely to find at a nearby lake; draw/print pictures to help identify the plants. They should note where the plants are likely to be found, either in the lake or on land around it. Plants may be aquatic or terrestrial. Aquatic plants may be floating, submersed or emergent.
 - a) Have the students circle (or otherwise mark) the plants on the list that are native species.
 - b) Have the students check (or otherwise mark) the plants on the list that likely to be blooming during this time of year.
2. Inform the students that they will be responsible for finding at least 5 of the plants on their list during the next activity.

Extend

If you want the students to collect samples at the lake, discuss what parts of the plants need to be collected (leaves, flowers, etc.) and show them some dried and pressed examples. Alternatively, you may wish to bring with you plastic bags or jars to collect aquatic plant samples. (Plant collection requires a permit, unless on school grounds. See References for information.)

Exchange/Evaluate

1. Have the students share their lists and pictures. Encourage different students to share different plants so that there will be more species represented.
2. Verify that students are identifying the correct native plant species; habitat, range and season of bloom can be used as aids to identification.

Procedure – Day 2

Engage/Elicit

1. On the way to the lake, ask students to recall concepts discussed during Day 1.
2. At the lake, select a plant to use as an example; ask the students if they know what the plant is called and if it is native or exotic. If you are collecting samples, ask the students what you need to do to the plant to collect it as a specimen.

Explore

1. Give the students 10 – 15 minutes to walk around the lake and identify plants on their lists they created day 1. Small groups (4 or fewer students) are recommended.
2. Take or draw pictures of plants, especially any that are difficult to identify.
3. Identify at least 5 plants from the list; when identifying plants, have students observe what other plants are located nearby.
4. Are native and exotic plants frequently found growing near each other?
5. Is the weather unseasonably warm/wet/dry/cold/etc? If so, do any particular plants seem to be thriving more than the others? Is that plant native or exotic?

Explain

As students try to identify plants, help them look for them in field guides that you bring to the site. Ask them to tell you what characteristics are important to notice when trying to identify an unknown plant.

Extend

For homework, ask the students to find out as much of the following information as they can about their identified plants (The resource **Atlas of Florida Vascular Plants** and **Center for Aquatic and Invasive Plants -- UF/IFAS** websites contain descriptions and photographs):

- a) What are the common name(s) of each plant(s)?
- b) What is the scientific name of each plant?
- c) What type of plant is it (aquatic, terrestrial, etc)?
- d) Is the plant native to Florida? Does it occur in all parts of the state?
- e) Is the plant invasive?
- f) Is the plant toxic?
- g) Do humans use this plant? If so, what parts, and for what?
- h) What wildlife might use this plant?

Exchange/Evaluate

1. Have students work in small groups to share information/identification responsibilities.
2. Use the students' lists, pictures, and number of plants they identify to assess time on task.
3. Use informal assessment/probing questions to assess understanding of concepts at the lake.
4. Use the homework assignment to assess understanding of concepts.

Procedure – Day 3

Engage/Elicit

1. Ask the students if they have ever noticed that different plants at the lake are evident at different times of the year. What effect does climate have on the life cycle of plants? Do different plants grow best at different temperatures, with different amounts of rainfall and sunlight?

2. Ask them if they have heard of climate change and what the term means. Have they heard of any specific examples? Have they ever lived in another area with a different climate? If so, what types of plants were found there?

Explore

1. Have students access the Seminole County Water Atlas Digital Library, and find and print out the Plant Species List for any one of the following lakes: Bear Gully Lake, Fairy Lake, Lake Howell, Lake Jesup, Red Bug Lake, Sylvan Lake, Lake of the Woods.
2. Look up some of the plants on the list to see if they also are on the Florida **List of Invasive Plant Species** (see references). Write down the names of several that are.
3. Find the profiles for each invasive plant in the **USDA Plant Database**. For each, make a note about where in Florida each plant is found (north, central, south, coast, inland, etc.)

Explain

1. Look at the Florida List of Invasive Plant Species. Quite a few of the plants listed are shown to be problems only in South Florida. Why do you think this is?
2. Scientists are worried that if the climate becomes warmer, exotic plants that are not now a problem might become invasive. Why do you think this might happen?
3. Why do you think scientists are worried that climate change might hurt plant species that are threatened or endangered more than other species of plants that are more common and/or widespread?

Extend

Use what students have learned to begin a further discussion and exploration of the topic of climate change by asking students to research plants in lakes in very different climates (US Midwest, Pacific Northwest, Sub-Saharan Africa, Sub-Arctic Tundra of Canada/Russia, etc) and compare to their identified lake.

Exchange/Evaluate

1. Conclusions drawn on poster or report can be used to determine what students have learned regarding plant life around lakes and climate.
2. The students can submit their reports as stories on the [Seminole County Watershed Excursion](#). See the Seminole County Curriculum Lesson for information on how to do so.