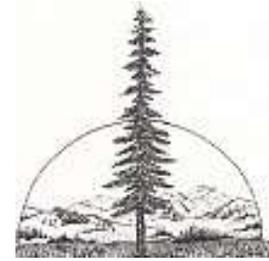


Lesson: Land's Wonders and Worries: Thrive To Survive

Environmental Literacy Question: How have humans affected the Chesapeake Bay and its watershed?



Topic/Essential Question: What characteristics of an organism help it survive in its habitat and how have human activities changed its habitat and ability to survive?

Unit: This lesson is one of two in the “Land’s Wonders and Worries” module based at Arlington Echo Outdoor Education Center. The lesson’s focus is on how the adaptations of native Maryland plants help them thrive in their natural habitats.

Content Standards:

- **Environmental Literacy**

5.A.1. Analyze the effects of human activities on earth’s natural processes.

1.A.5.f. Make recommendations supported by data to help address or resolve the issue.

8.F.1.b. Identify actions that can be taken as individuals and those that require the involvement of other people, organizations and government.

MSDE 5.0 Humans And Natural Resources - The student will use concepts from chemistry, physics, biology, and ecology to analyze and interpret both positive and negative impacts of human activities on earth’s natural systems and resources.

- **Science**

MSDE 3.0 Life Science - The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interactions that occur over time.

- **Social Studies**

3.D.1.b Describe ways and reasons people in Maryland and the U.S. modify the natural environment and the consequences of modifications.

Length of Lesson: 35 minutes

Student Outcomes:

I Can: observe native Maryland plants within their natural and manmade habitats. I can work together to identify plant characteristics and how they have adapted to thrive in those conditions. Finally, I can “Adopt” my own native Maryland plant, take it home, and observe it over time.

Knowledge of the Learner:

- Prerequisite knowledge, skills and processes: plants have adapted to succeed in their environment over time – those best suited to their habitat have the best chance of surviving and passing on their genes. Students will be able to listen to instruction and follow directions.
- Student needs, interests and previous learning: These will be identified in the pre-assessment.

- Conceptual difficulties: understanding that plants adapt like animals and that plants also have a habitat; building self-efficacy to help identify differences in plant characteristics.
- Differentiated: Students are in 4th grade, with a diversity of backgrounds and skill levels. In this lesson, students will use a variety of learning styles. The auditory learners needs will be met through the presentation, the kinesthetic learner will have the hands on aspect with the plants, the visual learner will have the opportunity to see plants in their environment, and the reading/ writing learners will have the use of the extra journal pages. There is an opportunity for social learning by working in partners while identifying the different adaptations. Students that need more guidance can use the information on the back of the plant ID cards.

Knowledge of Content:

I Can: investigate how plants have evolved and adapted to their environment to ensure their survival. We wonder what adaptations have helped plants thrive in their habitats. I can observe plant adaptations including finding new sources of food in a low nutrient environment or disseminating seeds aquatically if their habitat is frequently flooded.

- Content knowledge for instructor: Provided in text of lesson and supplemental materials.
- Vocabulary: Characteristics, Predator, Habitat, Organism, Ecosystem, Prey, Adaptation, Infiltrate, Aquatic, Survival, Carnivorous, Reproduction, Deciduous, Bio-retention.
- **Resources and Materials:**

Main Activity Materials:

- Devils Walking Stick Plant
- Plant IDs
- Adaptation Clues
- Two Cups with Water (optional)

Supplemental Material:

- Supplement A: Journal Page
- Supplement B: Native Roots Posters
- Supplement C: Adaptation Clues
- Supplement D: Habitat Descriptions

Closing Activity Materials:

- Pot Makers
- Newspaper Strips
- Soil
- Seeds

Pre-Assessment: During the opening activity for Land Wonders and Worries concepts of adaptations will be introduced and discussed.

Activity A: Who Am I?

Set up before Students Arrive:

1. Set out Devils Walking Stick Plant near the table.
2. Place bladderwort in bucket
3. Cut one or more cranberries in half and place in a container of water.

4. Place plant ID cards near plants
5. Layout adaptation clues on the sidewalk
6. Place two cups with water on sidewalk by raingarden (optional)

Motivation/Warm-up:

1. Have student come to the picnic table. Introduce yourself and welcome them to the lesson: "Thrive to Survive".
2. Direct the student's attention to the devil's walking stick plant. Introduce the idea that plants also adapt to their environment just like animals.
 - a. Ask if they can notice what kind of adaptations the devil's walking stick has?
 - i. *Large thorns to protect from predators.*
 - b. Can anyone guess what other kinds of adaptations plants can have?
 - i. *Bright colors to attract bees and other pollinators.*
 - ii. *Storing water like a cactus to make up for a lack of rain or groundwater.*
 - iii. *Becoming a carnivore like Venus Fly Trap when in low nutrient soils.*
 - c. Ask Students what they would do if they had to adapt to intense cold.
 - i. *"Wear a coat" – This is similar to how evergreen plants have adapted to thrive in cold environments by having thick, waxy leaves.*
3. Lead them into the next part of the lesson by saying that all plants have different adaptations but not all are as obvious as the devil's walking stick, and may not even always be visible (i.e. underground or even at the molecular level).
 - a. All plants and animals have different characteristics. Just like every snowflake or thumbprint is slightly different. Some organisms are better at defending themselves or finding food. Some blend into their surroundings or even change colors like chameleons. If an organism's traits make them more likely to survive in nature, it also means they have a greater chance of reproducing and passing those traits on to their offspring.

Procedure: Visit 3 distinct habitats (bog, rain garden, and forest) stopping at each to read the habitat descriptions (**Supplement D**) and allowing time for students to play the adaptation matching game - *Who Am I?*

1. Introduce the activity by explaining to students that there are many different biomes on earth with drastically varying conditions. Have students verbally identify the different variables that define a habitat and ultimately influence plant adaptations.
 - a. Light
 - b. Water
 - c. Nutrients and Soil Type
 - d. Climate
 - e. Predators
2. **Who Am I?** : Walk with the students to each habitat and describe the appropriate habitat description. Then read the adaptation clues on the ground and give the students two minutes to find the correct plants and match in their *Thrive to Survive* journal page.
 - a. Deciduous Forest (across from picnic table) – here in Maryland, this is what a lot of our neighborhoods looked like before we built houses and roads. Deciduous

forests have moderate climates and plants that live here must adapt to the changes of all four seasons. Many plants species that live in deciduous forest shed their leaves in the winter to conserve energy and water.

- b. Man-made Bog (Bio-retention area) – bogs have very moist soil and can even become partially flooded. Plants that live here must be capable of surviving with waterlogged conditions, low nutrients in the soil, and low oxygen/acidic soils. Some plants that live here are carnivorous as an alternative method for getting food since the soils are so low in nutrients. Bogs are great at filtering pollutants out of the water and make a great habitat for insects such as dragonflies and amphibians like frogs.
 - c. Rain garden – although this is a manmade habitat, these plants could be found naturally in a meadow or forest edge. Explain that the rain garden is a great way humans can reduce pollution from runoff, encourage water to infiltrate into the ground and to create habitat for native Maryland species. Rain gardens catch storm water runoff from parking lots, roads, roofs, and other impervious surfaces. Not only are rain gardens beneficial to the environment, they are also easy to take care of and look great.
 - i. Show the root system posters and explain that native Maryland plants grow deeper roots than non-native turf grass in order to help water infiltrate.
 - ii. Ask for one volunteer to dump water on the sidewalk and another to dump water in the rain garden. Ask the others to observe which one soaks up the water better.
3. Conclude the introduction back at the picnic table by explaining that although these habitats are within a human environment (Arlington Echo) they represent vast areas of the natural world today. Explain that these conditions have existed and influenced animal *as well as* plant adaptations over millions of years, and those that are best suited to the conditions of their habitats are the ones who THRIVE.

Assessment:

The students engagement in the “Who Am I?” game and the completion of their journal page.

Activity B: Adopt a Plant!

Set up before Students Arrive:

Display plant potting materials (newspaper strips, pot makers, soil, and seeds) on table closest to boat house.

Motivation/Warm-up:

1. Gather back at the picnic table and get the students attention by asking them what they found interesting about the plant's adaptations or the characteristics of the different habitats.
2. Explain that now they will have the opportunity to adopt their own plant which they will be allowed to take home with them and plant there. Encourage the idea that they could start their own rain garden by finding where water drains in their

yard and starting a garden there to help the water to infiltrate.

Procedure:

1. Hand out the materials for making a newspaper pot (newspaper strips and pot makers).
2. Demonstrate how to make a pot out of newspaper and then how to plant it.
3. Help the students as they construct their pots.
4. Give each student enough media to fill their pot. Then have them make a hole in the media about twice the size of the seed.
5. Give each student a seed to put in the pot, and then cover the seed with the surrounding media.
6. Collect the completed pots and place them in a tray. By the end of the day, carry the trays to the main pavilion so they will be taken back to school for the students to take home.
7. Point out the "Adopt a Plant" page in the journals, where students can find instructions for caring for their plant, a place to document its growth, and a prompt to do research on their plant.

Assessment: Critique each student as you collect their pot. Provide positive feedback or help them repot their plant if they need it. Ask them how they plan to use their plant when they get it home.

Module Debrief: After the two lessons in Land's Wonders and Worries have been completed, students will participate in a game, led by an AE staff member, which exemplifies how native plants help regulate stormwater movement.

Notes for morning set up (overnight trips):

Remember to set up your materials prior to the morning activities. If you do not spend the night, please arrive at AE to set up your activity by 8:45 AM, activities begin at 9:05 AM.

Notes for inclement weather:

Arlington Echo encourages keeping students outdoors whenever possible—even in the rain—but in the case of severe weather (thunder, extreme cold, etc.), the rain location for this activity will be under the overhang at the lower Resource Lab.

Notes for Clean up

Please organize and return the lesson folder, with all the supplements to the tray. All adaptation cards and plant IDs should also be put away. All the pots should be taken to the main pavilion. Once all materials are gathered they can be brought back to the resource lab except the potting supplies which can be stored in the boat house. Remember to inform the Arlington Echo Staff if you need assistance or if any materials are damaged or missing.