

GRADE FIVE FOREST ECOSYSTEM

OBJECTIVES:

- Observe and measure weather
- MCAS review of producers, consumers, decomposers, and photosynthesis
- Find evidence that an ecosystem is a system of plants, animals, and fungi that interact with each other and with the non-living environment
- Observe and record evidence of producers, consumers and decomposers
- Draw a Forest Ecosystem
- Construct a forest food chain
- Realize the interdependency in a forest ecosystem

PREPERATION:

- Schedule walk in early May before MCAS science exams
- Walk duration is 60 minutes
- Notify nurse of the scheduled walks
- Make copies of walk guide for each Big Backyard volunteer (print double-sided)
- Make copies of worksheet for each student (print double-sided)
- Gather materials for each Big Backyard volunteer and put in BBY tote bags

MATERIALS:

Provided by teacher:

- Clipboard and pencil for each student

Provided by Walk leader:

- Student work sheet (one per student- print double sided)
- Each group should have a plastic baggie with a thermometer, compass, Beaufort wind chart and strip of plastic surveyor's tape
- Each group should have hand lenses, bug boxes and a trowel

ACTIVITIES:

- Observe and record outside temperature, cloud cover and wind direction
- Observe and sketch examples of consumers, producers, decomposers and non-living things in the forest ecosystem.
- Use journaling to record the forest ecosystem
- Discuss how parts of the system are connected

Pre-Walk Introduction: TO BE LED BY THE TEACHER

(Or by arrangement, by a Big Backyard volunteer)

1. Introduction to Ecosystems

Say: A system is a collection of objects that interact with each other in some way. For example, in grade 4 you studied about the Solar System. The Solar System is a system consisting of the Sun, planets, moons and comets, etc. In a system, the parts interact with each other. *How does the Sun interact with the other objects in the Solar System?* **(The Sun interacts with the planets by providing heat and light to them. It also holds them in orbit with its gravitational force.)**

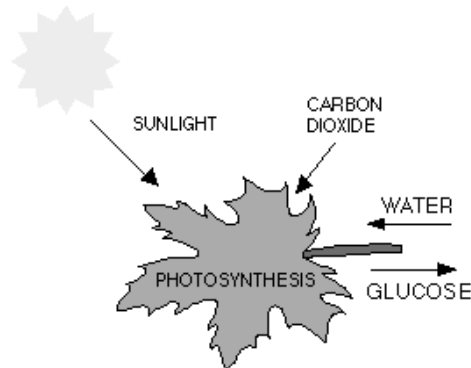
Today we are going to talk about an ecosystem. *How do you think an ecosystem is different from the Solar System?* (Focus is on living things) An ecosystem is not a place; it is a collection of plants, animals and non-living materials that interact with each other. *How do you think plants, animals, and non-living materials interact in an ecosystem?* (In Grade 3 you studied about food chains in which organisms were linked according to how they get food. There may be many food chains in an ecosystem. Other interactions include breathing and the recycling of waste.)

Ecosystems can be found in different places. An ecosystem can be found in a place as small as a hole in a tree or a small pond or in a place as big as a mountain. Today we are going to look at a forest ecosystem near Harrington.

2. What is a Producer?

First we need to review a little vocabulary that describes how parts of a forest interact with each other. Then we will know how to label what we see on our ecosystem walk.

PRODUCER—Producers make their own food. Plants are producers. They use the energy of the sun to make their own food from water, and carbon dioxide, a gas in air. The food is a type of sugar called glucose. Plants use this food to get the energy they need to live and grow. *There is a scientific name for this process that means “putting together with light.” What is the name of this process?* **PHOTOSYNTHESIS.**



There are two parts to this word-“**photo-**” which is related to light, and “**synthesis,**” which involves putting things together. *So --- putting together light, air, water and minerals to make food.*

3. What is a Consumer?

Consumers cannot produce their own food, they must eat **producers** (*plants*) or **other consumers** to get the energy they need to live and grow.

4. What is a Decomposer?

Decomposers are fungi, tiny organisms called bacteria and animals that feed on dead or dying plant or animal material. By doing this they turn dead plants and animals into nutrients that are returned to the soil (**Examples include:** earthworms, insects, and mushrooms. *Note that some scientists do not consider animals as decomposers.*)

Today you will identify some consumers, producers and decomposers in the forest ecosystem.

5. Non-living things needed in an Ecosystem

*What are some non-living things that are needed by living things in an ecosystem here at Harrington? **Minerals in soil; Water; Air and Light.***

We will measure one of these factors by finding out how much daylight there is today.

Provide sunrise and sunset information from the newspaper almanac or

<http://www.boston.com/weather/>

Ask students to guess the number of daylight hours today. Then have several students calculate the number of hours from the sunrise and sunset times. Have students record the day length on their response sheet.

We will also observe the weather in the forest ecosystem today. *What can we observe or measure about the weather? (Air temperature; precipitation; types and amount of clouds; direction and strength of wind). **How might weather affect the type of living things we might find in the forest ecosystem?***

Forest Ecosystem: to be Led by Big Backyard Volunteer

(60 minutes)

Divide the students up into groups, one per walk leader. Assign each leader a different site to begin walk. Go to assigned site and hand out worksheets to students.

Introduction:

Say: Today we will be studying a forest ecosystem. We will look at a forest ecosystem and its collection of plants, animals and non-living materials. We will learn what role each of these components play and you will draw a forest ecosystem on your worksheet.

Activity #1: Observe and Measure the Weather**[10 minutes]**

Have students record their observations of the weather on Worksheet #1.

Assign a student to measure the wind direction: Have them hold the plastic strip by one end to show which direction wind is coming from. Using the Beaufort Scale, students can determine wind speed using the same plastic strip. Ask another student to measure air temperature with the thermometer. Have them hold the thermometer about 3 feet from the ground. If possible, shield the bulb of the thermometer from the direct rays of the Sun. Wait a minute or so until the temperature stops changing. Have the students observe the cloud cover and record their observations. **Ask:** *How might weather affect the type of living things we might find in the forest ecosystem today?*

Activity #2: Draw and Label a Forest Ecosystem**[5 minutes]**

Lead the group into the woods and pick a spot with a variety of plants and animals (or evidence of animals e.g. Bird nest, bird calls, eaten acorns, eaten leaves).

Say: *Please take the next 3-5 minutes to draw everything you see in this site. Include plants, animals and non-living things. Remember, observe all around you, your ecosystem goes down into the ground and up into the sky!*

Say: *You may only have evidence for a particular animal without having observed it. If this is the case, draw the animal you think is associated with the evidence. (E.g. Spider web, bird nest, eaten leaf, bird call)*

Activity #3: Identify Parts of the Food Chain**[20 minutes]****Can you identify an example of a Producer in your Ecosystem?**

Have students label these plants within their drawing and list them on Worksheet #2.

Ask: *What are Producers?* Producers are organisms that produce their own food in order to live and grow. **Plants are producers.**

(Note to adult: Other organisms such as algae can photosynthesize, but these are not in the plant category. At Grade 5, the general statement that plants are producers is fine.)

Ask: *Plants make their food by a process called photosynthesis. What do you remember about photosynthesis from the fall walk? What “ingredients” are needed for this process? What is the product?* Photosynthesis is a process by which a plant uses the sun’s energy, water, and air (CO₂) in order to make its own food. This happens in green leaves.

Say: Let's look all around and try to identify and list some of the different producers (plants) we see. A description is okay if they don't know the names. Trees, shrubs, ground plants, vines

What consumers have you included in your drawing?

Ask: Can animals stand in the sun and make their own food? NO! Animals are not producers but consumers. Animals eat other living things to get the energy they need to grow and survive.

Animals can not make their own food.

Ask: Are humans animals? YES!

The difference between consumers and producers is that **Producers MAKE THEIR OWN FOOD FROM SUNLIGHT** and **Consumers MUST FIND THEIR FOOD**.

Say: Some consumers eat plants for energy/food

Ask: What are some examples of these animals? Chipmunks, deer, rabbits, squirrels, bees, and some birds

Say: Let's look for animals that eat plants in the forest ecosystem, or signs of these animals (be sure they know that insects are animals!) If you only see signs of the animal, describe the signs. Tell them to look for clues such as chewed acorns, leaves and berries, also animal scat. Scat containing plant matter are likely from rabbit or deer.

Say: Some consumers eat other animals for energy

Ask: What are some examples of animals that eat other animal? Foxes, fishers, coyotes, owls, spiders and snakes

Say: Let's look for signs of these animals in the forest ecosystem

Tell them to look for clues such as animal scat containing fur, fox holes, feathers, or bones from a dead animal that has been eaten. (Note: It will be much easier to find signs of consumers that eat plants since there are so many more animals that eat plants than consumers that eat animals)

Say: In your drawing and on worksheet #2, record the animals or the signs of animals within the forest ecosystem

Identify the decomposers

Ask: What is a decomposer? Decomposers are living things that break down the dead bodies of animals and dead plant parts into soil. This part of the soil (called humus) contains nutrients the producers use to make new cells from their food, which was made by photosynthesis.

Turn over a rotting log and encourage children to explore underneath. Do not destroy the log; it is home to many plants and animals. You may find sow bugs, millipedes, earthworms, ants, ant eggs, ant larvae, spiders, spider eggs, slugs, beetles, centipedes, fungus, and white fungus filaments. You may want to put an interesting critter in a bug box for closer viewing.

Ask: What is happening to this rotting log? Is it still firm and hard or soft and spongy? Why? Is it moist? Are there tunnels? Who made them? What do we call what is happening to this log?

Decomposition

Decomposing leaves

Look around at the leaves on the forest floor.

Ask: Do you rake the leaves at home in the fall. How big is the pile of leaves? Well no one has raked here for a hundred years why aren't the trees buried in the leaves? Where are the leaves that fell last year? And the year before that?

Explore the leaf litter digging through the layers to discover broken up leaves, tiny pieces of leaves and eventually soil.

Ask: How do you know when you reach soil? What is happening to the leaves on top of the soil? Have they decomposed? What have the leaves turned into? Does anyone have a compost pile at home? Why did the leaves decompose? Fungi and animals helped to break down the leaves.

Invite each student to dig up some soil. Look at soil with a hand lens. Note particles of rock or sand as well as tiny pieces of plant material such as roots and leaves (humus). Have them list what they see on their worksheet.

Ask: Where does soil come from? (Weathered rocks, decomposed plants and animals)

Fungi

Ask: Does anyone know what fungus looks like? An example of a fungus is a mushroom. Fungi live on dead or dying organic material.

Locate **shelf fungus** on a log/tree. Shelf fungi are found in the forest year round on dead or unhealthy trees; they are so named because they grow parallel to the ground like a shelf.

Ask: What role do you think fungus plays in this ecosystem? Fungus plays an important part in decomposition. Fungi help dead material to rot and change into soil.

Locate other types of fungus such as **toadstools** and **black fungus**.

Toadstools appear for a brief period according to seasons and weather. A toadstool is a spore producing part of a fungus that grows underground year round as white filament.

Black Fungus is a black growth on some cherry branches. This is a black fungus and will eventually kill the branch it is growing on.

Lichens

Ask: does anyone know what lichen is? Lichens are plant-like organisms but they are not plants. Lichens grow on trees, on rocks, on decomposing logs, and on poor soil.

Lichens are a combination of algae and fungus growing together and totally dependent on each other. (Adult note: Biologists have divided all living things into 5 categories. These categories now include: plants, algae, fungi, animals, and one celled organisms.)

The fungus provides moisture and an anchor for the algae while the algae provide food through photosynthesis (algae are among the few non-plant organisms that can make their own food). One without the other cannot survive.

Lichens on rocks produce a chemical that helps the rock decay and they also help rotting logs to decompose. Children may remember the name lichen because fungus and algae have "a likin" for each other. Lichens can be distinguished from moss by their gray-green color.

Encourage observation by the students, to show that the fungi and mini- creatures they have found are DECOMPOSERS. **Have students record these decomposers in their drawing and on worksheet #2.**

Activity #4: Identifying Non- Living Things**[10 minutes]**

Ask: What is the difference between living and non-living things? What are the characteristics of living things? Living things require energy to grow, take in oxygen, reproduce, excrete waste and die.

Ask: Is the web of a spider or tent caterpillar living or non-living? The larva and spider are alive but the web is non-living.

Ask: Think of non-living things that are needed by living things in order to survive. How many of these non-living things can you find in this ecosystem: Soil, Rocks, Water, Sun and Air?

Ask questions as needed to help children pay attention to the non-living things in the forest environment. Example: Where does an old tree trunk belong? Or an old brown leaves? Ask children to decide, but expect them to give reasons. Sometimes it helps to have a “once living” category, such as fallen leaves, etc.

Review the Ecosystem worksheet #2 to insure all students have entries under each category.

Activity #5: Looking at Food Chains**[15 minutes]**

Have students create their own food-chains on Worksheet #3. If time runs out, have the students complete their food-chains in the classroom.

Using student drawings and the data they collected, discuss the following:

Ask: What is the basis of all food chains? The Sun

Would animals survive if there were no plants-just animals, sun, air, water and rocks? Would there be any animals at all if there were no plants? NO! (No food)

Ask: Is it important to appreciate and take care of plants? And to take care of the air, water, and soil they need to live and grow? Yes!

Ask: Who can provide an example of a forest plant (producer)? Ask for an example of a forest consumer that would eat that plant. Challenge the group to think of a forest consumer that might eat the animal. Invite students to share another example of a forest ecosystem food chain.

Some examples of food chains (all start with the Sun):

Green leaves – larva/caterpillar – bird

Tree – lichen (D) – deer

Dead leaves – earthworm (D) – centipede – skunk

Rotting log – insects – mole – snake – hawk

Tree – nuts – squirrel – raccoon

Log – fungus (D) – slug – spider – bird

Ask: What happens to the plants and animals when they die? What do the decomposers produce? Nutrients and minerals in the soil.

Ask: Is this really a food circle rather than a food chain? Nature is a great recycler.

Wrap Up

An ecosystem is not a place; it is a collection of plants and animals interacting with each other and with the nonliving environment. An ecosystem is constantly changing.

Ask: Is everything dependent on everything else? What happens to the fox if there is a drought and we take away water? What happens to the rest of the system? (fewer foxes may result in more mice, etc.)

An ecosystem can be as small as a hole in a tree or a small pond or it can be as big as a mountain range or planet earth. Whatever happens to one thing in an ecosystem affects everything else. Return to the classroom.

Post-Walk Activities: To be led by teacher

1. Say: *Today we explored a forest ecosystem. What are some parts of this ecosystem (use journal notes from walk)?*

Their answers should include examples of producers, consumers, decomposers and non-living things. If it doesn't, prompt them to include these things. An ecosystem is not a place. An ecosystem includes all of the living organisms and non-living things (water, soil) that interact together in a given area.

2. How do you think the forest ecosystem is similar to a pond ecosystem? (all energy comes from the sun, some organisms produce food, others eat producers or other consumers); How do you think it is different? (type of animals and plants, sources of water, and air)

3. What do you think might happen to the Harrington Big Backyard if a family of coyotes moves in, and has many pups? How will that affect our forest ecosystem? Any explanation on how this affects the food chain is acceptable. Stress that ecosystems are interdependent - all the parts are dependent on each other.

Other "what ifs...":

What is happening to the ecosystems in__ (use current event such as: Oil spills into the Gulf of Mexico, Mount St. Helens erupts in Oregon? Use any well-publicized hurricanes, floods, volcanoes, fires)

Possible Scenario:

Fire burns woods

Many trees now dead, fall down

Decomposers start decaying dead wood, since fire generally can't kill off all these organisms

Seeds (brought by wind or animals, or that are buried) sprout in rich soil

Because more sunlight gets to the forest floor, new plants grow quickly

Animals come to eat new plants, or to eat fruit from new plants

Eventually trees grow again, providing homes and shelters for large animals

Lead them to the conclusion that fire (or flood, or any other weather assault) can disrupt an ecosystem and move it out of balance. However, usually the ecosystem adjusts and finds a new balance.

4. Visit: Journey North: <http://www.learner.org/jnorth/>

Follow an animal as the seasons change, or plant an International Tulip Garden.

Name: _____ Date: _____ Time: _____

Weather:

Temperature: _____ °F

Cloud cover (circle one): No clouds partly cloudy Mostly or completely cloudy**Wind Speed:** (Make an estimate based on the Beaufort Wind Scale) _____ **mph****Wind direction** (direction wind is coming FROM): _____In the space below, draw a picture of your forest ecosystem site:

Include plants, animals and non-living parts.

Label all parts and be specific when possible.

(e.g. label "oak tree", not just "plant", or "chipmunk hole", rather than hole).

**** Remember your ecosystem extends from down in the ground to up into the treetops.**

Forest Ecosystem - Worksheet #2

List all the things you see in your ecosystem under the appropriate topic.

ECOSYSTEM: System of interrelationships between **producers, consumers, decomposers,** and **non-living things.**

Producers:**Consumers:**

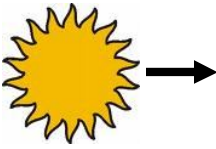
(Put a * next to consumers that eat other animals)

Decomposers:**Non-Living:**














FOREST FOOD CHAIN

Look at your list of producers and consumers. Find a producer and then choose a consumer that eats this producer. If possible, find an animal on your list that eats this first consumer.

Make a food chain using the plants and animals you have seen to show how energy flows in the forest. Start with the sun and connect the parts of the food chain with arrows. Add arrows to show what happens to dead plants and animals.



Beaufort Scale

Beaufort number	Wind Speed (mph)	Seaman's term		Effects on Land
0	Under 1	Calm		Calm; smoke rises vertically.
1	1-3	Light Air		Smoke drift indicates wind direction; vanes do not move.
2	4-7	Light Breeze		Wind felt on face; leaves rustle; vanes begin to move.
3	8-12	Gentle Breeze		Leaves, small twigs in constant motion; light flags extended.
4	13-18	Moderate Breeze		Dust, leaves and loose paper raised up; small branches move.
5	19-24	Fresh Breeze		Small trees begin to sway.
6	25-31	Strong Breeze		Large branches of trees in motion; whistling heard in wires.
7	32-38	Moderate Gale		Whole trees in motion; resistance felt in walking against the wind.
8	39-46	Fresh Gale		Twigs and small branches broken off trees.
9	47-54	Strong Gale		Slight structural damage occurs; slate blown from roofs.
10	55-63	Whole Gale		Seldom experienced on land; trees broken; structural damage occurs.
11	64-72	Storm		Very rarely experienced on land; usually with widespread damage.
12	73 or higher	Hurricane Force		Violence and destruction.