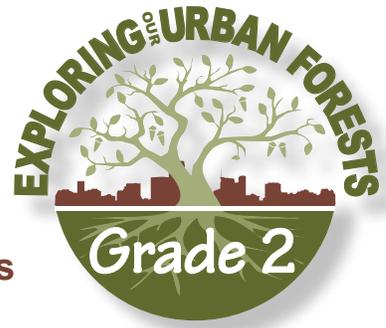


Grade: 2

Noticing Differences



Trees are important for animal habitats, and animals help trees and plants disperse their seeds.

Teacher Background Reading

Trees have a distinct life cycle, just like people, though the length of the life cycle varies as much as life cycles vary in the animal kingdom. Some trees grow for thousands of years, while others live only a few dozen. But even as a tree dies, its dead organic matter is recycled back to become soil and support the life of another growing tree as nutrients. The life cycle of a tree starts with a seed, then a sprout, then a sapling, then a mature tree producing seeds, then a dead snag, and finally a rotting log turning back into soil.

A tree is an important part of the habitats of many animals. Trees provide food, shelter and a safe place to raise young. A tree could be the entire habitat for some smaller animals such as insects or squirrels. Within any habitat there are smaller microhabitats that can vary in temperature, moisture and light.

Seeds are a plant's embryo, or offspring. A seed is a small embryonic plant enclosed in a covering called the seed coat. Within the seed, there usually is a store of nutrients for the seedling that will grow from the embryo. The seed coat in the mature seed can be a paper-thin layer (e.g. peanut) or something more substantial (e.g. hard in acorns, and thick and hard in coconut). The seed coat helps protect the embryo from mechanical injury and from drying out.

It is important for the seeds to be spread (dispersed) away from each other and from the parent plant. This helps to avoid overcrowding and the competition for light, water and mineral salts that would result. Dispersal also enables species to take advantage of new opportunities and to survive if conditions for the parent plant become unsuitable. Plants have a variety of ways in which they disperse their seeds, or the fruits containing the seeds. Four dispersal mechanisms are: animal, wind, water, and mechanical (seed pods dry and split, throwing seeds away from the mother plant). ■



Vocabulary

Ecosystem: a system of living things (plants and animals) and nonliving things (like air, water and soil)

Evidence: observation that shows something is true

Habitat: the area in which an animal lives, providing everything the animal needs to survive

Microhabitat: an area that is small and different from surrounding areas

Predator: an animal that hunts or captures other animals for food

Prey: an animal that is hunted or captured by other animals as food

Scat: animal droppings (poop)

Seed: structure that grows into a new plant

Find a spot in nature you can use for the lessons - either in the schoolyard or in a park nearby with trees or bushes. Check for any hazards. Describe the boundaries of the outdoor area that you will be using for the lessons and explain acceptable and unacceptable behaviors outdoors. Much of the class discussion, etc. can also be done outside.

Note: Worksheets are available for all lessons, though please save paper when possible by having students use journals, notebooks or scratch paper.

Advance Preparation For Lesson 2 and 3

(See lesson for more specifics and materials needed)

1. Gather acorns from local oak trees. Collect acorns that have recently fallen or can be removed from the tree easily by gently twisting acorn cup or cap. Remove all acorn caps and test for viability (ability to sprout). Place the acorns in water, discard any acorns that float and keep those that sink. ***If you need to keep acorns for 1 to 3 months, dry them fully and put them in a sealed plastic bag in the refrigerator (without soil).***
2. If acorns are not available, buy lima beans or beans from a nursery or grocery store.
3. ***A few days before Lesson 2 begins,*** collect some seeds from fruit, grasses, trees, or other types of plants that you find in everyday life. Look for seeds that disperse in a variety of ways (for example: dandelions blow in the air, tomatoes fall in place, foxtail grasses attach to animals or people). Note: This lesson is easier done in the Fall when seeds are plentiful. Seeds are much harder to find in the Spring, so use more fruit seeds if you're doing the lessons at this time and stop by your local grocery store for the fruit seeds.

Grade 2/Lesson 1:

Schoolyard Safari

Students will be able to identify ways that animals and plants depend on a habitat for survival.

Learning Outcomes

Students will understand that plants and animals depend on each other in a variety of ways. Students will gather evidence of this interdependency.

MATERIALS

- Clipboards - 1 per student
- Copies of “Growing Trees & Habitats” reading – 1 per student
- Copies of “Growing Trees & Habitats” worksheet – 1 per pair
- Colored pencils and markers
- Magnifying glasses – 1 per student
- Toilet paper roll for “scopes” – 1 per pair
- Tools for digging
- White paper to draw picture of schoolyard with animals they observed

Getting Ready

Review the Teacher Background reading.

Make the necessary copies.

Find an area with several trees or shrubs that students can examine. If you find an area with decomposing material, let the maintenance or grounds keeper know not to clean the area until you are done with the lessons. You can also make your area by covering an area with mulch, dead leaves or a log.

Explain to students that they need to be very careful not to disturb the animals in their homes. If you pick up a beetle, it is important to put it back where you found it. Try not to break any branches. Collect items very carefully and respectfully.

ENGAGE:

Write the vocabulary words from the teacher background on the board and go over the definitions of each word with the class. Revisit them as they come up in the lessons.

Tell students, the word safari means “trip” in Swahili, the language of east Africa. A safari traditionally has been a trip to observe animals in their natural habitat in Africa. A safari can take place anywhere that animals live in a habitat—even a backyard, or a schoolyard.

Discuss what kinds of habitats they might find in their schoolyard. What kinds of animals should they be looking for?

Write the word habitat on the board and put the students into pairs. Pass out the Schoolyard Safari worksheet and a clipboard - one for each pair. Ask students what an animal’s habitat must include (food, water, shelter, space, and conditions necessary for reproduction and raising young). They will be writing elements of habitats on their worksheet as they find them.

EXPLORE:

Take the students outside into the schoolyard. Talk about looking for evidence of life. How would you know an animal is living in the schoolyard, without seeing the animal?

Tell students to look for signs, using all their senses to find them. Look for signs of the animal’s habitat—everything it needs to survive. Students should write and draw what they find on their worksheets to fill in all the columns. Some examples include holes in leaves, insect eggs and worm castings.

Have students dig down into the dirt—what do they find there? Have them look on the surface of the ground, under rocks, leaves or logs, into the tree or shrubs, and into the sky—what animals do they see? Have students look carefully at each area using magnifying glasses.

EXPLAIN:

Bring students back together to share what they found.

Write the following questions on the board and have each group share what they found focusing on these questions.

What animals did you actually observe?

What animals did you find evidence of?

What parts of the animals' habitats did you find (food, water, shelter)?

What evidence did you find, of animals depending on the trees in the schoolyard?

What signs did you see, of animals in the habitat? (chewed leaves, nests, holes in leaves, scat)

Were there actual animals climbing on branches, living in tree, flying nearby?

What was the largest animal you found?

What was the smallest animal you found?

What surprised you the most?

ELABORATE:

Discuss the following topics as a class and record students' ideas on the board or have students record them in a journal.

Based on the interactions and animals signs that they found in their habitat, ask students how the animals that live there are dependent on the habitat of the tree and shrub area (for food, shelter, space, water).

Animals that are eaten are called prey, and animals that eat other animals are called predators.

Explain ways plants are dependent on the animals (animal scat helps plants grow because it gives them nutrients, birds and bees touch plants and transfer pollen between plants, seeds go through animals' digestive tracts and come out in scat and then trees grow from them).

EVALUATE:

Ask students to draw a picture of their habitat with animals they observed, labeling each item. Draw the habitat on a piece of white paper, make it as accurate as possible and allow them to share their drawings with the class.

EXTENSION:

Teacher, parent or naturalist can collect natural objects that show signs of animals, for example: leaves with bite marks or insect holes or webs, twigs with holes or scratches, bark with insect holes or tunnels, fruit with worms or holes, egg cases, scat, acorns with worm holes, and galls (tumor-like growths on leaves that house insect larvae).

Show students the collection of signs of plant and animal life. Discuss each sign. Examples: an acorn with a small hole in it - an animal has bored into the acorn to lay eggs or to eat it; a piece of bark with squiggly lines on the underside—evidence of a bark beetle eating the soft inner layer of bark; a feather; a nest; an animal dropping.

REFERENCES:

American Forest Foundation (2012). Trees as Habitats. In *Project learning tree: Pre K-8 environmental education activity guide* (6th ed., pp. 97-101). Washington, DC: Author.

Grade 2/Lesson 2:

Have Seeds Will Travel

Students will understand the variety of ways that plants have adapted to spread their seeds.

Learning Outcomes

Students will identify and model a variety of ways that seeds are dispersed.

MATERIALS

- Extra seeds from grocery store (in veggies and fruits) or nursery (about a snack bag full)
Examples: acorns, sycamore seeds, willow seeds, weed burrs, dandelion fluff, grasses, watermelon or pumpkin seeds, cherries, olives with pits, dates with pits, strawberries with seeds, citrus or apples (or just their seeds), tomatos, walnut in the shell, avocado seed, a coconut, lemonade berries or toyon from a canyon, park or yard
- Copies of the “Seed Dispersal” Worksheets - 1 per group of 4
- Copies of “ Growing Trees & Habitats” (1 for document camera, or a class set)
- Small cups or bags for collecting seeds
- Materials for each group to create a model of how animals assist in seed dispersal or paper for the groups to draw this out
- Glue - 1 per student
- Paper
- Pencil

Getting Ready

Review the Teacher Background reading

Collect seeds from fruit, grasses, trees, or other types of plants that you find in everyday life to have available for this lesson. Another way to collect seeds is to have students wear old socks and when they go out to collect seeds, some will stick to their socks. If you do this, check for hazards and set rules for where they can go in the school yard. Note: Time of year is important for collecting seeds. Seeds will be easier to collect in the fall, and will vary depending on location.

ENGAGE:

Connect to prior knowledge and experiences: Ask students if they have ever heard of the word “safari” and explain that the word safari means trip in Swahili. Tell students that they will be going on a Seed Safari in their schoolyard, looking for seeds from a variety of plants. Begin by sharing some seeds you have brought in—from fruit, grasses, trees, or other types of plants. Ask students what seeds are (inside each seed is the potential/ability to make a new plant), which plants produce seeds (all flowering plants), and how they might recognize seeds (different shapes and sizes).

Talk about the ways seeds get around—by falling to the ground (acorn), by sticking in fur or cloth (foxtail or burr), by flying through the air (dandelion), by being eaten in fruit, (cherry), and by floating (coconut).

Give each child a small cup for collecting seeds. The students will explore outside, looking for seeds from a variety of plants, from grasses, to bushes, to flowers to trees. If you are having students use socks to collect seeds, remind them to carefully walk around to collect seeds on their socks. Give students clues about where to find seeds (in seed pods, pine cones, after flowers die, in fluff).

EXPLORE:

Bring students back into the classroom and combine all of the seeds collected with those the teacher has brought in. Divide students into groups of 4. Pass out the “Seed Dispersal” worksheet (one for each group).

This is a great video series on dispersal: http://www2.bgfl.org/bgfl2/custom/resources_ftp/client_ftp/ks2/science/plants_pt2/dispersal.htm

Write the methods of dispersal on the board:

1. Fall in place
2. Carried by wind (or water)
3. Fruit eaten by animals (seeds not digested and deposited as scat or droppings)
4. Attach to animals fur or clothing

As a class, sort a few seeds to model what the students will do in their groups - you want to sort them based on the way they are dispersed.

Give each group 15-20 seeds to sort.

EXPLAIN:

Read the "Growing Trees & Habitats" student reading as a class.

Have each group share out a few of the seeds they put in each category. Then have each group take the seeds from each category and glue them onto their worksheet.

On a separate sheet of paper or on a section of the seed dispersal worksheet have students write why each method of dispersal is effective for the seed to be able to grow into a plant and survive.

ELABORATE:

Give 5-6 seeds to each student group, and tell them to remove the fruit or seed cover. This is used for seed protection or dispersal. Ask students to describe differences between the seeds (in size, shape, texture, color) and similarities. Make a poster drawing of the seeds and show it to the class.

EVALUATE:

Class discussion: What are the most effective ways for plants to disperse their seeds and why would that be more effective? (any answer would work – e.g.: carried by wind since they can travel farther)

Why do you think different plants have different methods of dispersal? (Why would acorns drop straight down and plant where they lay? Squirrels could pick up the seeds and hide/plant them. Acorns will grow into little trees that will replace the older trees etc.)

After the class discussion, have students go back and add to or correct their descriptions on their worksheets.

Have students discuss as a group how animals assist in seed dispersal. Once they have come up with different methods, have them model through diagrams or using materials you provide in the classroom one way an animal would help to disperse seeds.

EXTENSION:

- 1. Go outside in an area of the school yard (that has soil if possible.) Pretend you are seeds. Hold up pictures or actual seeds and have children act out how the seeds would spread. Dandelion-blowing in the wind. Acorn, plopping on the ground. Burr or Foxtail-stuck to your clothing or shoe, wipe it off. Repeat with different types of seeds. Pine cone-look out! A pine cone is falling. Boom!, Make believe you are eating an apple. Oops! A seed fell. What may happen? etc.*
- 2. You can do this to quiet music too: Pretend you are a squirrel squatting on the ground. Reach way up high for an acorn. Reach, Reach, Reach! Now use your other hand to reach for another acorn. Reach, Reach! Eat that acorn. Yum! Now use both hands to reach for an acorn and bury that acorn! What could happen to that acorn if you don't find it and collect it?!*

REFERENCES:

American Forest Foundation (2012). Schoolyard Safari. In *Project learning tree: Pre K-8 environmental education activity guide* (6th ed., pp. 197-199). Washington, DC: Author.

Grade 2/Lesson 3:

How Do Your Seeds Grow?

Students will engage in hands-on inquiry to develop an understanding of a plant's basic requirements for growth: sunlight, air, water, nutrients and space to grow and function.

Learning Outcomes

Students will set up and monitor a classroom experiment in which one need of plants is assessed (light or water).

MATERIALS

Materials for each group of four students:

- Acorns
- Paper towels
- Water
- Bean seeds, several varieties from seed packets at nursery
- Zip-lock sandwich bags
- Ruler

Getting Ready

Review the Teacher Background Reading.

Have pencils and journals (or plain paper and clipboards) ready for students to write questions

Gather materials for the experiment and have materials divided for groups of 2-4 students.

Locate some dark and light places, such as a window with sunlight, drawer (dark), and shaded part of classroom.

Locate some places with different temperatures, all in the dark, such as a refrigerator, drawer (room temperature), and warm window (in the warm sun but covered so that light doesn't get in).

Have your copy of the Student Reading available to use on the document camera or have copies available for each student or to read in pairs.

This is not a classic germination study (with plants in soil and pots), but observations of the requirements for seeds to germinate.

ENGAGE:

Ask students about how they have seen seeds grow.

What do you think happens to a seed when it is planted in the soil? What do you think a seed needs to grow?

EXPLORE:

Students walk around schoolyard and identify places that seeds could grow. This could be bare ground, soil under plants. Show them weeds that have grown from seed that accidentally blew or travelled to the schoolyard from other weed patches. For each of these places, notice which places have sun and which have shade. Is the soil dry or moist?

EXPLAIN:

Each group chooses one variable (either water or light), and develops a question about how water or light affects seed germination. For water, encourage students to think about different ways to experiment with water. For example, keep some seeds dry, others on paper towels they keep moist, and others under water. For light, students can identify places with different exposures to light, including sun, shade, darkness and night lighting.

ELABORATE:

Give students enough seeds to do an experiment. For example, three different treatments (amounts of water or light) would require at least 30 seeds per group. This will provide 10-12 seeds for each treatment so students will have a good number to observe and count. Help students set up the experiments.

Observe the seeds three times each week, for two or three weeks. Record the date that seed radicle first emerges from the seed. The radicle is the first growth from the seed and grows downward in the soil to absorb water. It eventually develops into roots. After two weeks, measure the length of the radicle. Draw one seed from each of the treatments.

EVALUATE:

Have students from each group write their results on a class board. Each group describes what they tested and measured, and what they learned.

REFERENCES:

American Forest Foundation (2012). How Plants Grow. *In Project learning tree: Grades 4-8 environmental education activity guide (6th ed., pp. 179-181)*. Washington, DC: Author.

Grade 2/Lessons 1 and 2: Student Reading

Growing Trees & Habitat

A habitat is a place an animal lives where it has everything it needs to survive. A habitat must have the right food, water, and shelter. There also needs to be a safe place for animals to care for their babies. Trees are habitats for many animals.

A habitat for one animal may be very different from the habitat for another animal. A single tree could be a habitat for a small animal like a bark beetle or a squirrel. Mountain lions need a very large habitat like an entire mountain range.

Trees are plants. Most plants make flowers and seeds. Seeds grow into new plants. Some seeds grow inside a fruit, which animals or humans eat.



Seeds can fall to the ground and grow there. The shape of the seeds helps some seeds travel to a new place to grow. The wind can blow them to another place. Rain can wash them away, far away from where they fell. If seeds have burrs, they catch on the fur of animals and fall off in a different location. ■

Grade 2/Lesson 1: Student Worksheet

Schoolyard Safari

Write and draw the elements of each animal's habitat below as you find them on your schoolyard safari.

Animals/Insects	Evidence	Food	Water	Shelter

Grade 2/Lesson 2: Student Worksheet

Seed Dispersal

Carried by the wind

Fall in place

Fruit eaten by animals

Attached to animal fur & clothing

Standards Grade 2:

Next Generation Science Standards

- 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.
 - 2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
 - 2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
 - 2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.
- California Science Standards

Life Science

- 2. Plants and animals meet their needs in different ways. As a basis for understanding this concept:
 - a. Students know different plants and animal inhabit different kinds of environments and have external features that help them thrive in different kinds of places.
 - e. Students know light, gravity, touch, or environmental stress can affect the germination, growth, and development of plants.
 - f. Students know flowers and fruits are associated with reproduction in plants.
- 4. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

Common Core Standards

Literacy - Writing

W.1.5 With guidance and support from adults, focus on a topic, respond to questions and suggestions from peers, and add details to strengthen writing as needed.

Literacy – Speaking and Listening

- SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
- SL.1.5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

Literacy – Language

L.1.6 Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships (e.g., because).



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Additional resources for educators available at
www.sdchildrenandnature.org