



FIELD ENHANCEMENT 2

Studying Forest Layers

OBJECTIVES

Upon completion of this lesson, students will be able to:

- Identify the structural layers in a forest.
- Describe wildlife that can be found in each of the layers of a forest.

SUBJECT AREAS

Arts, Science

LESSON/ACTIVITY TIME

- Total Lesson Time: 75 minutes
- Time Breakdown:
 - Introduction.....10 minutes
 - Activity 130 minutes
 - Activity 210 minutes
 - Activity 310 minutes
 - Conclusion.....15 minutes

TEACHING SITE

A forested area that contains five layers (overstory, understory, shrub, forb, litter) is preferable.

CLASSROOM LESSON CONNECTIONS

This lesson ties closely with Classroom Lesson 2, *What Makes a Forest?*

NUTSHELL

In this lesson, students observe the structural layers of a forest and draw a color-coded picture. They also embark on two exploration activities to discover which animals can be found in each of the forest layers.

BACKGROUND

Forests vary in their composition (species present) and their structure (how species are arranged).

- Forest Layers**

 - Overstory
 - Understory
 - Trees
 - Shrubs
 - Forbs
 - Litter

Forests may have any combination of the following layers: **overstory**, **understory** which includes trees, **shrubs**, and **forbs**, and **litter**. A mixed forest, for example, may contain all of the layers. A pine plantation may only have

an overstory, forb layer, and litter layer. Each layer contains its own set of plant species and provides food and shelter to wildlife.

The overstory is above all the layers and is made up of mature trees. Tree species commonly found in the overstory include white and red pine, sugar and red maple, white ash, red and white oak, and trembling aspen. Animals that use the overstory of a forest include blue jays, owls, orioles, hawks, woodpeckers, eagles, squirrels, crows, turkeys, and porcupines.

The understory may contain a tree, shrub, and forb layer. Trees in this layer are usually immature. When a mature tree from the overstory dies, some of the immature trees may grow taller and become part of the overstory. The understory also contains smaller trees like choke or pin cherry, serviceberry, red cedar, ironwood, and musclemwood.

VOCABULARY

Forb Layer: Layer of the understory containing non-woody plants.

Litter Layer: Surface layer of the forest floor composed of leaves, twigs, needles, etc., with minimal decomposition.

Overstory: The uppermost trees in a forest.

Shrub Layer: Layer of the understory containing woody plants with multiple stems.

Understory: Forest vegetation present under the overstory, which can include trees, shrubs, and forbs.

These trees are shade-tolerant. This means that they are able to grow well even when the trees growing above them block most of the light. Animals in the tree layer of the understory are similar to those in the overstory.

The shrub layer occupies the space between the understory trees and the forb layer. Woody plants like raspberry, maple-leaved viburnum, dogwood, and witch hazel are found here. This layer provides food and habitat for a variety of wildlife like squirrels and deer. Birds common to the shrub layer in Wisconsin forests include grouse, robins, chickadees, warblers, sparrows, finches, cardinals, mourning doves, and grosbeaks.

The next layer of the understory is the forb layer. Small herbaceous (fleshy, not woody-stemmed) plants like bracken fern, wild columbine, pink lady slipper, and common blue violet grow here. Chipmunks, snakes, toads, mice, moles, grouse, turkeys, rabbits, insects, turtles, and spiders all use this layer.

MATERIALS LIST

FOR EACH STUDENT

- Copy of Student Page , *Forest Layers*
- Five different colored pencils
- Clipboard or other writing surface

FOR EVERY 3 TO 4 STUDENTS

- Bug boxes or magnifying lenses (optional)
- One white paper plate

FOR THE CLASS

- Copy of Student Page , *Forest Layers Example Page*

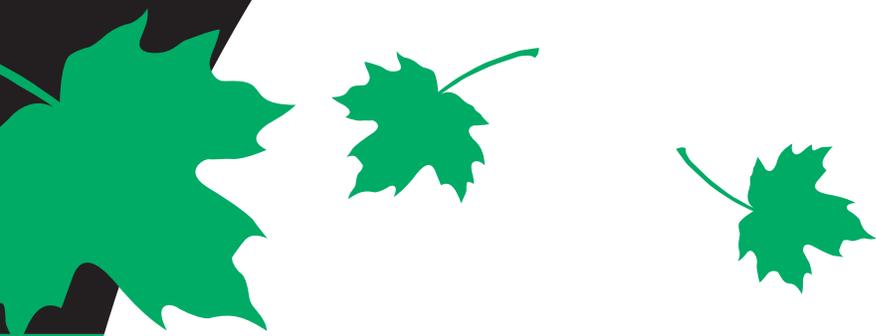
TEACHER PREPARATION

- Visit the teaching site in advance and choose boundaries for your students to work within.
- Choose an area on the site where your students can sit down and observe forest layers independently.
- Choose an area where small groups of students can sit on the ground and study leaf litter.
- Choose a trail on which to take a short walk to look for wildlife or evidence of wildlife.

SAFETY PRECAUTIONS

Visit the teaching site ahead of time to locate any hazards such as hanging branches, protruding tree roots, holes, poison ivy, etc. Encourage students to walk, not run, at all times.

The litter layer contains fallen leaves, branches, needles, and other organic matter. Items in this layer are easily recognizable. They are starting to break apart but have not begun to decompose. Critters commonly found in this layer are centipedes, millipedes, ants, beetles, worms, snails, slugs, maggots, spiders, and pill bugs.



Although the plant species in each forest layer are more clearly defined, wildlife frequently use more than one or all the layers of a forest. For example, we commonly find squirrels leaping along the forest floor, as well as from branch to branch up in the treetops. In fact, squirrels make their nests in the branches of trees. Wild turkeys eat nuts and insects from the leaf litter; they also eat food found in the forb and shrub layer. In addition, they roost on branches in the understory or overstory.

PROCEDURE INTRODUCTION

1. Take students to the forested area you have chosen for exploration.
2. Have students sit in a circle on the ground in the forest. Explain that the forest is comprised of different layers. Ask them to pick up a handful of debris from the ground. Ask what they see in this debris. (*Leaves, twigs, needles, nuts, moss, and other decaying plant material.*) Explain that this layer, called leaf litter, is where things in the forest are recycled. Decomposers like fungi, worms, beetles, and ants break down dead plant material and return the nutrients to the soil so that living plants can use them.
3. Next, ask someone to point to a non-woody plant that is growing close to the ground. Explain that small herbaceous (fleshy, not woody-stemmed) plants like these make up the forb layer of the forest. This layer provides shelter to animals like snakes, toads, rabbits, insects, turtles, and spiders.
4. Ask your students to look around and spot a woody-stemmed bush or a sapling. Explain that these types of plants make up the shrub layer of the forest. Squirrels, deer, and many types of birds benefit from the cover and food these plants offer.
5. The next layer is composed of the understory trees. Ask your students to look around for trees whose crowns fit underneath the crowns of larger trees. Explain that these trees can tolerate a lot of shade. They are either young trees or species that do not get as big as the other trees around them. Tell your students that these trees make up part of the understory. The shrub layer and forb layer are also part of the understory with the trees.
6. Finally, ask your students to look directly overhead at the tallest trees in the forest. Explain that this layer is called the overstory. These trees dominate the forest. Very little light passes through their branches to the forest floor. Tell your students that when one of the trees in the overstory dies, a tree in the understory may have an opportunity to become a dominant tree.

NOTE: If your forested area does not contain all five layers, explain all the layers but modify the activity to accommodate your site.

ACTIVITY 1

1. Hand each student a copy of Student Page  1, *Forest Layers*, a clipboard, and a set of colored pencils. Explain that they will have time to sit alone and observe the different layers in the forest. Tell them they need to make a drawing of what they observe. The drawing should contain the plants found in each of the layers. Ask them to choose a different color to draw each of the layers. For example, the forb layer may be purple, the shrub layer orange, and so on. Tell them that after their drawings are complete, they should fill in the name of each layer on the blank provided. It is important that the drawings show detail and are complete. You can show Student Page  2, *Forest Layers Example Page*, as an example.



2. After you have given the directions, explain the boundaries you have chosen for this lesson. Then ask your students to spread out within the boundaries and find their own place to sit and work. Give your students time to draw, then bring them back together to sit in a circle.
3. During Activities 2 and 3, your students will add more information to their worksheets. Before continuing, quickly check to be sure that everyone drew five layers. Ask your group to put their drawings on the ground in front of them. As you walk around and check their work, ask the group to point to the overstory layer as well as the understory trees, shrub, forb, and leaf litter layers. If anyone is missing a layer, give him/her a chance to fill it in before moving on to the next activity.

ACTIVITY 2

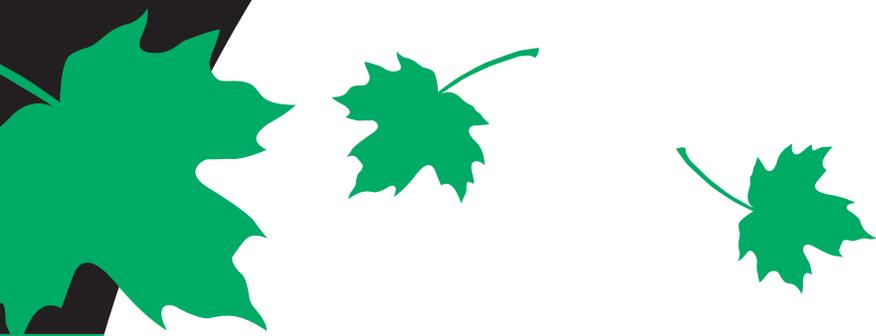
1. Tell your students that now they get a chance to look for animals and other critters in each of the forest layers. Tell them they will explore leaf litter first. Divide your students into groups of three or four. Hand each group a paper plate and several magnifying lenses or bug boxes (optional). Explain that each group will sit on the ground in a circle. Demonstrate how someone from each group will scoop a handful of leaf litter from the center of the circle and place it on the paper plate. Explain that the litter is made of all the stuff on the forest floor. It ends where the mineral soil begins. A scoop of litter should only be the stuff on top of the ground. Show your students how to carefully sort through the leaf litter and look for creatures. Your students may find: centipedes, millipedes, ants, beetles, worms, snails, slugs, maggots, spiders, and pill bugs. If magnifiers are available, encourage your students to use

them to get a closer look. Show your students where to make note of any animals they find on their worksheet. (There are examples of wildlife for all the layers listed along the edge of the student page.)

2. After you have explained the activity, ask the groups to spread out and begin working. As they work, walk around and check on their progress. If anyone has trouble with finding critters in the leaf litter, have them put their sample back, move to another location, and try again.
3. When all the groups have had time to work, remind them to put the leaf litter and critters back on the ground. Call your students back together and ask each group to share which critters they found in their leaf litter.

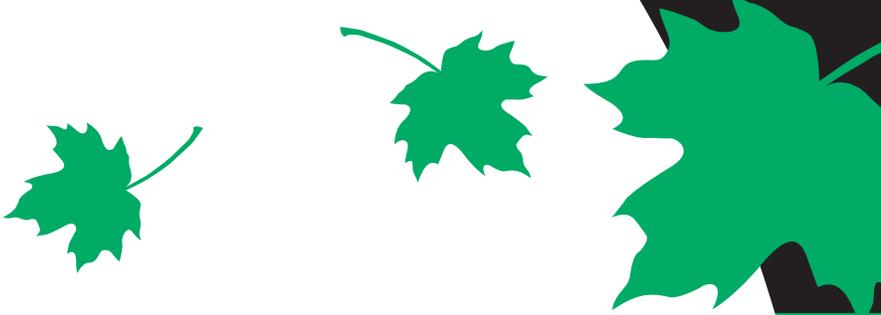
ACTIVITY 3

1. Explain to your students that their next job is very important and challenging. They must conduct a search for animals in the other forest layers. Explain that everyone will be looking for wildlife, or evidence of wildlife, in the forest. In order to increase the group's chances of a successful search, everyone must remain absolutely silent. Explain that each person who finds something should raise his/her hand and point to the wildlife or evidence of wildlife. Students who see someone's hand raised should raise their own to help "spread the word" that there is something to observe. Everyone should stop to observe the wildlife or the evidence of wildlife. Before moving on, everyone should write the observation on his/her worksheet in the space that corresponds with the layer it was found in.

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2. Explain that the search will begin by practicing quiet observation while sitting in one place. Ask your students to sit down in a circle facing out. Explain that they need to sit silently as they observe their surroundings. Tell the group that when you can see that everyone is quietly searching, you will lead them on a hike. After several minutes of silence, when you think your students are ready, stand up, motion to the group and begin walking slowly down the path you have chosen. Walking slowly will help keep the group together and give everyone time to look around.
 3. Continue walking until something is spotted. Each time you find something to observe, spend a couple minutes watching. Once everyone has had a chance to make notes on their worksheet, continue on your way. Make sure that the students get a chance to observe several different wildlife species or evidence of wildlife.
 4. When your search is over, congratulate the group for their good work. Gather them together and give them a chance to share their discoveries and experiences during the search.

CONCLUSION

1. Have the group sit in a circle to share their drawings. Lead a discussion about all the observations they made during the lesson. Begin by asking someone to show his/her picture and point to the leaf litter. Ask the group to tell you what makes up the leaf litter. *(This layer contains fallen leaves, branches, needles, and other decaying organic matter.)* Ask them to share what kinds of critters they found in that layer. *(Observations include but are not limited to: centipedes, millipedes, ants, beetles, worms, snails, slugs, maggots, spiders, pill bugs, and salamanders.)*
2. Next, ask someone to show you the forb layer on his/her drawing. Ask what kinds of plants they found in the forb layer. *(Smaller plants with fleshy stems. Your students may be able to list specific species like bracken fern, wild columbine, lady slipper, and violet.)* Ask what kinds of animals students observed in the forb layer. *(Observations include but are not limited to: chipmunks, snakes, toads, mice, moles, grouse, turkeys, rabbits, insects, turtles, and spiders.)*
3. Now tell your students to hold up their drawings and point to the shrub layer. Ask what kinds of plants grow in the shrub layer. *(Plants with woody stems. Your students may be able to list specific species like raspberry, maple-leaved viburnum, dogwood, and witch hazel.)* Ask what animals they found in the shrub layer. *(Observations include but are not limited to grouse, robins, chickadees, warblers, sparrows, finches, cardinals, mourning doves, grosbeaks, squirrels, and deer.)*
4. Tell your students to point to the understory trees on their drawings. Ask which trees grow in the understory. *(Immature trees of any species and smaller species of trees. Your students may be able to list specific species like cherry, serviceberry, red cedar, ironwood, and musclewood.)*
5. Finally, ask your students to point to the overstory. Ask which plants grow there. *(Taller, more mature or dominant trees live in the overstory. Your students may be able to list specific species like white and red pine, sugar and red maple, white ash, red and white oak, and trembling aspen.)* Ask your students what kinds of animals they observed in the understory and/or the overstory. *(Observations include but are not limited to: blue jays, owls, orioles, hawks, woodpeckers, eagles, squirrels, crows, turkeys, and porcupines.)*
6. Conclude your discussion by restating that the forest is made up of several different structural layers, and that each layer contains different plant and animal species.



SUMMATIVE ASSESSMENT

Assign students to write a story that shows what they learned about the layers of a forest. Tell students to imagine that they are the size of a mouse. They should write a story about an adventure in which they ride an elevator up and down in the forest and get off on three different layers. Their story should answer the following questions: What plants do you see in each of the layers? What animals do you encounter? What kinds of trouble do you find yourself in? How do you get around in each layer? They should write one paragraph about each of the three layers they chose. Their story should also include an introductory paragraph that tells how they shrink and how their adventure begins. They should also write a concluding paragraph that explains how they get home safely.

REFERENCES

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- Forest Trees of Wisconsin: How to Know Them. (1990). Wisconsin Department of Natural Resources Bureau of Forestry. PUBL-FR-053
- Little, E. L., & Knopf, A. A. (1980). National Audubon Society Field Guide to North American Trees Eastern Region. New York: Alfred A. Knopf, Inc.
- Niering, W. A., Olmstead, N. C. & Knopf, A. A. (1979). National Audubon Society Field Guide to North American Wildflowers Eastern Region. New York: Alfred A. Knopf, Inc.

RECOMMENDED RESOURCES

●●● BOOKS ●●●

One Day in the Woods by Jean Craighead George. (New York: Harper Collins Publishers, 1988.) In this illustrated book, a girl climbs a tree and observes the things around her. The story examines forest layers, habitat, birds, animals, insects, and forest characteristics.

Temperate Deciduous Forest by April Pulley Sayre. (New York: Twenty-First Century Books, 1994.) This book looks at temperate forest biomes and the plants and animals in them. It talks about communities, people and forests, and the abiotic factors that influence them.

●●● WEBSITE ●●●

Mighty Trees

www.mightytrees.com/science/foreststrat.html

This southeastern site has an interactive illustration of the layers of a forest with explanations.

Examples: birds, scat, deer, chewed tree bark, centipede, bird's nest, fly, squirrel, fur, feather, squirrel's nest, holes in leaves, raccoon, nut shell, bones, etc.

FOREST LAYERS

OVERSTORY
UNDERSTORY
TREES

LITTER
FORB
SHRUB

Draw the Layers • Label the Layers • List Wildlife in the Layers

FOREST LAYERS EXAMPLE PAGE

Examples: birds, scat, deer, chewed tree bark, centipede, bird's nest, fly, squirrel, fur, feather, squirrel's nest, holes in leaves, raccoon, nut shell, bones, etc.

FOREST LAYERS

OVERSTORY SHRUB
UNDERSTORY TREES FORB LITTER

Draw the Layers • Label the Layers • List Wildlife in the Layers

