



What's In A Forest?

Program Purpose:

The purpose of this program is to create a concept map and definition of a forest, to identify the different layers of a forest, to describe the eight forest types in Wisconsin, and to list the functions of a forest.

Length of Program: 2 hours

Age: 5th-8th grade

Maximum Number of Participants: 20

Objectives:

After completion of all activities, students will be able to:

- Define the terms forest, leaf litter, forb layer, shrub layer, understory, canopy, and species.
- Create a concept map of forests showing their composition (abiotic and biotic components), functions, and types.
- Identify and describe the importance of the 5 layers of a forest.
- Identify and describe the 8 forest types present in Wisconsin, and explain what factors would determine where a particular forest type is found.
- Identify at least five functions that a forest provides, both for the ecosystem and for human use.

Preparation:

Before the class arrives:

- Obtain the "What's In a Forest?" kit and 5 sheets of butcher paper from the work room.

Basic Outline:

- I. Introduction (30 minutes)
- II. Concept mapping (10 minutes)
- III. Definition of a forest (10 minutes)
- IV. Forest layers (10 minutes)
- V. Forest types (20 minutes)
- VI. Functions of a forest (25 minutes)
- VII. Conclusion (15 minutes)

Materials:

5 sheets of large butcher paper
Dry erase markers, crayons and pencils
1 "Forest Layers" Worksheet per student
"Under Cover" Copycat Page
5 copies of "Landforms of Wisconsin" map
Pictures of 8 forest types
Overhead projector
5 transparencies

Sponge
Air filter
Umbrella
Renewable battery
Shelter card
Tent stake
Ear plugs
Air freshener
Windbreaker jacket
Coffee filter
Mirror
Large tarp

Introduction:

Introduce yourself and the class. Explain that this class will focus on the composition, types and functions of forests. We will describe forests using pictures, words, and a concept map, and use those tools to help us define what a forest is. We will identify the layers within a forest, the eight major forest types found in Wisconsin, and brainstorm the factors that would influence where a particular type of forest is located. Finally, we will play a game to learn the major functions that forests provide for the ecosystem and for people.

For the first activity, students will get into five groups of four students each. Give each group a large piece of butcher paper, a handful of crayons, and a pencil. Ask the students to imagine a forest. What comes to mind or what do they picture when they think of a forest? Ask the students to close their eyes for 30 seconds and just picture a forest. After 30 seconds, the students should open their eyes and discuss with their team members what came to mind for about 2 minutes. Then, give the students instructions that as a group, they are to draw, write, picture, or otherwise symbolize a forest using everyone's ideas with the crayons and butcher paper. Tell the students they have 10-15 minutes to do this. When the students are finished, tell the students that now their task is to come up with a definition of a forest. At the bottom of their page, they should try to define what a forest is. Give the students 5 minutes to do this. When all groups are finished, it is time for the students to share what they've created. Each group should designate a spokesperson, come to the front and present what their idea of a forest is to the class, and how they defined "forest."

Concept Mapping:

Now that students have explored their ideas of forests, tell them that as a class you will create a concept map of forests. Tell the students a concept map is a tool used to

break down a complicated thought or idea into its component parts. In a concept map, you try to move from the general to the specific. For example, say you wanted to create a concept map for a cupcake. Write “cupcake” on the board. What goes into making a cupcake? (Flour, sugar, baking powder, etc.). Draw lines down from cupcake and write each word in a bubble. But if you placed all the ingredients on the table, how do they turn into a cupcake? (A person must measure, combine, and mix the ingredients together, then pour into a pan and bake). So you need tools to make a cupcake and a process to turn the raw ingredients into a finished product. Draw lines to the side of cupcake and write heat connected to oven, mixer or spoon connected to batter, etc. Finally, what do you use a cupcake for? To eat! But why eat a cupcake instead of a graham cracker? Usually you eat cupcakes at a celebration, like a birthday party or Halloween. Draw lines above cupcake, write party or festival, and list examples. Now look at the completed cupcake concept map. The map shows the ingredients of a cupcake, the process by which those ingredients become a cupcake, and what cupcakes are used for and where they’re found. In short, we’ve described a cupcake’s essence and also how it’s meaningful to us.

Tell the students they are now going to do the same thing for forests. We’re going to be synthesizing the ideas they’ve already come up with and adding some new ones. (See Appendix A for an example Forest concept map.) Remind the students that on a concept map we are trying to move from the general to the specific, and show connections between the components listed on the map. Add components to the concept map as students list them. They should be listing what’s in a forest (trees, shrubs, flowers, animals) what goes into making a forest (soil, oxygen, carbon dioxide, sunlight), the process by which that happens (photosynthesis and respiration), and what forests are used for (recreation, lumber, etc). If the students have not added these concepts, add them yourself.

Definition of a Forest:

Look at the completed concept map and ask the students to try to define “forest” based on it. After a few tries, give this definition:

A forest is a land ecosystem characterized by interactions between soil, water, air, plant, and animal components, made up mostly of woody plants.

Notice the definition says “mostly woody plants.” What other components are present in a forest besides woody plants? (Mushrooms, wildflowers, grasses, etc.) What is an example of a woody plant? (Trees or shrubs). Many times woody and non-woody plants are present in different places in the forest. The next activity will focus on the concept of layers in a forest.

Forest Layers:

Tell the students that like a house, forests have a vertical structure to them. For example, if they pictured a typical two-story house, what would the bottom layer be? (The basement). What’s in the basement? (pipes, furnace, storage, etc.). What’s the next layer up? (The first floor). What’s on the first floor? (kitchen, living room, bathroom, etc.) How about the next layer? (The second floor, with bedrooms, additional bathroom, etc.) The final layer? (The attic or roof).

A forest also has these different layers. Go through each layer from the ground up, describing what’s in it and the function of that layer.

Bottom (first) layer – called the *leaf litter*. Made up of dead leaves, bacteria, microorganisms, insects. These break down the dead leaves or branches and turn them into soil.

Second layer – called the *forb layer*. Made up of small non-woody plants, like flowers and ferns. This layer provides food and habitat for animals. It can also help identify the type of forest you are in. For example, if you see ferns in a forest, you know the soil must be moist and cool, because ferns only grow where it is moist and cool. Certain trees tend to grow alongside ferns because they also like it moist and cool. By looking at the plants present in the forb layer, it can help you identify what kind of forest you’re in.

Third layer – called the *shrub layer*. Made up of shrubs, like raspberries, blackberries, sumac, and small tree saplings. These provide more food and shelter for animals, especially birds.

Fourth layer – called the *understory*. Made up of small, shade tolerant trees. These trees must grow in the shadow of taller trees around them, which means they don’t get a lot of sunlight. However, when taller, older trees die and fall down, trees in the understory take advantage of the sunlight and grow very quickly, shading out younger trees below them.

Top (fifth) layer – called the *canopy*. Made up of tall, mature trees. They receive the most sunlight, but also receive the brunt of wind and precipitation during storms. This layer is important for providing habitat (esp. shelter) for some animals, such as birds, squirrels, and raccoons. These mature trees are also the most valuable for harvest, as they contain the most lumber.

Specific layers of a forest are an extremely important element in many animals’ habitats. Some animals may spend their entire lives only ever seeing one or two layers of a forest. Tell the students we will be playing a quick version of “Pictionary.” The students should get back into their teams of four. Ask for one volunteer to be the first artist. Show the volunteer the “Under Cover”

Copycat page. Open one of the doors and point to an animal for the volunteer to draw. Any team can guess what is being drawn. The team who correctly identifies the animal gets one point. That team also gets the first crack at the bonus question (for one point), which is, “Which layer is the animal found in?” If the team does not identify the correct layer, other teams can guess. Play a few rounds, then do the assessment. For assessment, give each student a copy of the “Forest Layers” worksheet and a pencil. They should correctly fill in the blanks on the worksheet for each layer. Afterwards, go over the correct answers with the class, answering questions to alleviate any confusion. You can also assess this activity by taking the students to the forest outside the nature center, and asking the students to each touch or point to the layer of the forest that you name.

Forest Types:

Next the students are going to be learning about the different types of forests found in Wisconsin. Ask the students if they remember what can help identify what type of forest they’re in? (The kind of plants present.) How do we determine what kinds of plants are present? By identifying plant species. What are species?

- *A species is made up of many individuals that have the same characteristics.*

In a forest, there may be trees, shrubs, flowers, ferns, etc. You can tell a tree from a shrub because of certain characteristics present on both. But there are many species of each. For example, there can be white pine trees, maple trees, hemlock trees, birch trees, etc. When trying to identify the type of forest you are in, it’s important to look at the species of all trees, shrubs, flowers, ferns, etc. present. What species are dominant determine what type of forest you’re in.

For example, there are eight different types of forests in the state of Wisconsin. Show the overhead or draw a representation of each on the dry erase board and see if the students can name them. If they cannot name them, see if the students can pick out any of the main species present, as that may help them to figure out the name of the forest type.

Prairie: Ecosystem composed of grasses, sedges, and other forbs. May or may not contain shrubs. Has almost no trees.

Deciduous: These forests are composed of broad-leaved trees that survive the winter by becoming dormant and losing their leaves in the winter, only to re-grow them the following spring.

Coniferous: These forests are composed of needle-leaved trees that keep their needles all year round (with the exception of tamarack).

Mixed Deciduous and Coniferous: These forests are composed of both broad-leaved and needle-leaved trees.

Boreal: These forests are composed of mostly cold-tolerant coniferous trees. The main distinction between boreal forests and coniferous is climate. Boreal forests occur in latitudes where deciduous trees cannot survive.

Oak Woodland: These are dense stands of deciduous forest, composed mostly of oak trees.

Oak Savanna: These forests are composed of oaks surrounded by prairie with almost no other tree species present. Oak savannas are in between prairies and oak woodlands.

Pine Barren: These forests are composed of jack pine trees usually of a similar age and height. They occur only on sandy soils and are heavily dependent on fire to maintain themselves.

Ask the students what would determine where these types of forests would be found throughout the state? Possible answers include climate, soil type, glaciations, elevation, historical use, etc. Show the overheads for each factor named and briefly explain each. (See Appendix B). Afterwards, divide the students into five groups of four, and give each a “Landforms of Wisconsin” map and one “Forest Types” card. Using their own personal experiences, the information on the cards, and the information they’ve just learned from the overheads, the groups must decide where they think their forest type is found in Wisconsin. When they’ve reached a decision, they should use the crayons to draw on the “Landforms of Wisconsin” map where they think their forest type is located. Give the groups about 10 minutes to do this. When finished, each group must designate a spokesperson to come to the front, show the map of where their forest type is located, and explain how the group came to that conclusion. Emphasize that the brainstorming is the most important part of the exercise. Even if the location the group decides upon does not turn out to be correct, the most important part of this exercise is sound reasoning. When all groups have presented, show the “Natural Divisions of Wisconsin” overhead. Were the students’ predictions on where their forest types should be located correct? Review the factors that should influence where each type is located.

Functions of a Forest:

The final activity is a memory game to help identify the functions a forest provides to people and to the ecosystem. Refer back to the concept map briefly. So far, we’ve covered what’s in a forest, forest layers and

their functions, forest types, and factors that would influence where a forest is located. The last activity has to do with why forests are meaningful to us. Divide the class into two teams. Explain that under the blanket there are 11 objects. Each team will have 30 seconds to look under the blanket. The goal is to remember not just what's there, but what that object symbolizes as a function of forests. For example, say that under the blanket there was a walnut. What would a walnut symbolize? (Forests provide food for both humans and animals). Teams get one point for remembering the object, and one point if they can explain how the object represents a function of the forest.

Have one team face the back wall and close their eyes. Have the other team come up and view the objects under the blanket for 30 seconds. Then switch. Afterwards, keep score. If the team can remember the object but can't think of a function, the other team gets a chance to steal that point. Below is the list of objects and functions.

Sponge – Forests soak up water and help control flooding.

Air filter – Leaves of forest plants trap aerosols (tiny airborne particles) like dust, ash, pollen, and smoke that can damage our lungs.

Umbrella - forests provide shade and cool the soil and plants beneath them.

Renewable battery – Forests “recharge” themselves through the process of death, decay, and rebirth.

Shelter card – Forests provide shelter and homes for countless birds, mammals, reptiles, amphibians, and insects.

Tent stake – Roots of forest plants hold the soil in place and prevent erosion.

Ear plugs – Forests muffle noise from traffic and create sound barriers.

Air freshener – Forests remove carbon dioxide from the atmosphere and release oxygen during photosynthesis.

Windbreaker jacket – Forests slow down powerful winds, protecting homes and habitat.

Coffee filter – Forests improve water quality by filtering out pollutants before they enter streams, lakes, and rivers.

Mirror – Forests are aesthetically pleasing; in other words, beautiful.

Conclusion:

Use the “Doorway of Knowledge” review with the students to reinforce the main concepts of the class. Ask the students to define forest and species, name the parts of a forest, the different layers of the forest and what each is useful for, the eight forest types in Wisconsin,

factors that would influence where a forest is found, and the functions of a forest. After a correct answer, the student gets to pass through the “Doorway of Knowledge” and is dismissed. No student may give the same answer.

References:

Central Wisconsin Environmental Station’s “The Science of Forests and Trees” and “The Natural Divisions of Wisconsin” Lesson Plans. University of WI- Steven’s Point.

“Under Cover” activity, Ranger Rick’s NatureScope “Trees are Terrific!” guide, Vol.2, No.1, pg. 40.

Wisconsin Forests Forever “It Does What?” Lesson Plan.