

PREPARATION: Make and hang trees prior to the class period each day for three days preceding discussion

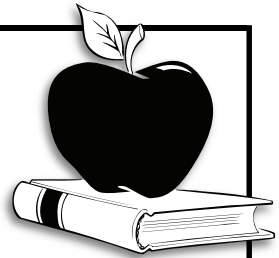
CLASS TIME: 20-30 minutes

VOCABULARY: forest, ecosystem, forest interior

MATERIALS: large paper cut-outs of different-sized trees and shrubs (students can make these)

COMMON CORE STANDARDS: English language arts
MS Writing 1, MS Writing 2, MS Writing 4, MS Writing 8,
MS Reading 7, MS Reading 10

TEACHER'S GUIDE



ACTIVITY

Defining A Forest

OVERVIEW

Through simulation and discussion students define a forest.

CONCEPTS

Forests are complex ecosystems.

OBJECTIVES

Students will be able to describe some of the complexities of a forest ecosystem.

KEY POINTS

- Forests are dynamic and complex.
- Forest ecosystems include all living and nonliving components.
- Forest ecosystems differ in significant ways from tree plantations.

TEACHER BACKGROUND

Forests are diverse communities of plants; they contain animals and inanimate parts of our environment such as water, air, light and soil. Within these diverse communities, plants and animals live and die in a cycle of competition and harmony. Forest communities provide many indispensable ecological services: they recycle wastes; help maintain the chemical composition of the atmosphere; provide a home for wildlife; and play a major role in determining the earth's climate. Forest ecosystems are dynamic and constantly changing. Trees continually change through their life cycle from germination of a seed, through the maturation of a seedling into a large tree and eventually death. Throughout this process, trees modify the surrounding environment by their physical presence and biological processes. Since they are living organisms, they have physiological or normal living functions, such as respiration, nutrient and moisture intake, water evaporation from plant tissues (transpiration), food production (photosynthesis) and reproduction. As the trees live and associate with other organisms and the abiotic (nonliving) environment, the competition for life constantly influences and perpetuates the change.

A majority of Illinois' wildlife, including many Neotropical migratory bird populations, depend heavily on the forest resource for food and shelter. While Neotropical migrants can be found in grasslands, wetlands and forest edges, many species spend most of their time in the forest interior. Each species belongs to a particular feeding guild, such as seed-eating, ground insect-feeding, foliage-gleaning (searching foliage for invertebrates and fruit) or sap-sucking. Birds use different parts of the forest structure, searching for food in different layers of the forest. The ovenbird walks along the forest floor as it methodically inspects the leaf litter for insects. The wood thrush forages on the ground, picking up insects and, occasionally, fruit. Above them, American redstarts hover while they glean foliage and try to catch the insects they flush. Vireos frequenting the same branches as the redstarts slowly search for larger insect prey. The magnolia warbler (*Dendroica magnolia*), with its tail fanned, rapidly hops between branches, picking insects from the bottom surfaces of leaves.

These birds also utilize different parts of the forest structure for nest sites. Ovenbirds construct their oven-shaped nests on the forest floor. Female wood thrushes build cup-shaped nests six to 50 feet high in tree branches. Both male and female magnolia warblers contribute to building their nest in tree or shrub branches just one to 10 feet from the ground.

Just as they do in temperate forests, wildlife in tropical rain forests use different layers of the forest. In forests there are four layers: emergent; canopy; understory; and forest floor. In the tropical rain forest, most of the plants and animals live just below the canopy in the protection of the understory. For example, Wallace's flying frog (*Rhacophorus nigropalmatus*) finds its food and water in bromeliad plants and large leaves of the understory. The crested wood partridge (*Rollulus rouloul*), on the other hand, a plump green bird resembling a pheasant, runs along the forest floor in search of large fruits, seeds, beetles and ants.

In addition to utilizing forests for their own needs, wildlife contribute many things to the forest ecosystem. Each animal plays a role in the function of the forest. Squirrels are familiar agents of seed dispersal, integral to the forest as they collect and disperse acorns and other nuts. Likewise, some birds act as seed-dispersing agents for certain vegetation, like berries, by eating the seeds with the fruit, then leaving the seeds in their droppings some distance away from the source plant. The majority of Neotropical migratory forest birds feed on insects. In temperate regions of North America, these birds may control certain defoliating insects, like the spruce budworm (*Choristoneura fumiferana*) in some stands of young trees. In the rain forest, complex interrelationships between the plants and animals show strong interdependencies among species. Some ant species, for example, raise their young and grow fungus gardens inside the branches of a tree. In return for this shelter, the ants protect the tree from other insects and browsing animals. Brilliantly colored male orchid bees obtain food from orchids while transporting pollen necessary for the orchid's reproduction.

These descriptions begin to reveal the complexity and diversity of forests. When trees are planted for harvest in pine plantations, much of this natural diversity is lost. The trees in a plantation are often of the same size, age and species. The structure is similar throughout the forest and does not provide the varied habitat layers evident in a natural, uneven-aged forest. Other plant and animal life is therefore less diverse.

People who manage forests must consider different kinds of birds and their needs, as well as the needs of other plants and animals in the forest. Through careful consideration we can manage the whole forest ecosystem, with all its complexities and interdependencies.

PROCEDURE

1. Cut out large paper silhouettes of different-sized trees and shrubs ahead of time. (You may ask students to do this task.) Hang a couple from the ceiling in the middle of the classroom prior to class. Say nothing about them to the class.
2. During the next three days add more trees until you have a symbolic replica of a small forest and student curiosity is piqued.
3. On the fourth day ask why the trees are hanging from the ceiling and what they represent. What constitutes a forest? Have students brainstorm definitions of a forest and write their ideas on the board.
4. Have one student stand up. Tell the class this student represents a tree. Ask: Is this one tree a forest? Have a few more students stand and represent more trees. Ask: Is it a forest now? Make the point

that a small woodlot will work as habitat for some wildlife, but some, like the ovenbird, need a bigger tract of forest that has an "interior." What do we need to do to make it a forest? Invite students to suggest and role play any parts of a forest, including other plants, animals and inanimate objects. If students are stuck, brainstorm all the things that are in a forest. Make the point that forest ecosystems include all living and nonliving components.

5. Ask whether all the trees are the same size. The same age? Have students representing trees try to make themselves the same height and stand in rows. Discuss how a plantation or an orchard is different from a natural forest. Provide students with background information on how different birds use different parts of the forest structure.

DISCUSSION

1. What purposes does a forest serve to the environment? To wildlife? To people? What do some birds obtain from the forest? What services do birds provide the forest?

EXTENSIONS

1. Make the point that forests are dynamic. Have one student stand up with arms outstretched, representing a species that thrives in an open area and needs lots of sunlight. It reproduces and more trees grow in the area. Have more students stand up. When there's no room for more students to stand with arms outstretched without touching, point out that after a while, the species that needs lots of light won't be able to reproduce. Trees that can grow in shade will take over and gradually another type of tree will become dominant. This represents the dynamic change of species composition in a forest.
2. Take the students out to a wooded area near school. Let them explore the area and examine the structure and diversity of life in it. What birds do they see or hear? Take them to an area recently cleared for a subdivision or similar land conversion. What birds do they see or hear?
3. Have student groups use water colors or pastels to develop a visual image of various forest settings.
4. Discuss how the poem, "It's Five-Thirty," by Nicaraguan poet Felipe Peña, defines the forest.

ASSESSMENT

1. Ask students to write a paragraph on what a forest is. They should define it as a complex ecosystem, including plants, animals and other organisms.
2. Students should be able to explain a contribution birds make to the forest.

IT'S FIVE-THIRTY

By Felipe Peña

It's five-thirty in the afternoon, the weather is calm
no sound of the spotter plane that patrols the border
only the mumble-mumble of some compañeros talking in their lean-to
and birdsongs from the mountain as the evening closes in -
the dove, the guás
the partridge that whistles like someone lost in the woods
the choschos
the howler monkeys chanting con con con
the woodpecker pecking a dead limb
and the monkeys having fun in the leafy trees
shrieking and throwing dry sticks.
This afternoon the crickets are all turned on
they sing ririri as though to announce the rain that starts to fall.
The mountain has clouded over, some of us are going to take up our posts,
others are going to sleep without their supper.

SON LAS CINCO Y MEDIA

Son las 5 y media de la tarde, el tiempo está sereno
no se oye el sonido de la avioneta que vigila la frontera
sólo el gurún gurún de los compañeros que hablan desde sus champas
y el canto de los pájaros en la montaña al atardecer
la gongolona el guás
la perdiz que silba como persona perdida en los bosques
el choschós
los congos que cantan con con con
el pájaro carpintero picotea en un palo seco
y los monos que hacen gracias en los árboles frondosos
chillan y botan ramas secas.
Esta tarde más que las otras se han animado más los grillos
que cantan ri ri ri como si anunciaran la lluvia que empieza a caer
la montaña se ha oscurecido, nosotros vamos a hacer la posta
los otros a dormir sin haber cenado.

guás = a long bird; makes a raucous cry

choschos = a small flycatcher with a bright yellow breast

Felipe was captured in 1977 during a raid against Somoza's guard because he stayed in position to cover the retreat of his friends. He was tortured and held in prison for almost a year and then later died in battle. Reprinted from *Nicaraguan Peasant Poetry from Solentiname* (1988) with permission of the translator, David Gullette, Simons College, Boston, Massachusetts.