

Grade: 6-8

How do trees function as part of a forest system?

Lesson #A2: Tree Life Cycle

Time: 2-3 class periods

Overview:

Students learn about an Alaskan tree species and diagram its life cycle.

Essential Questions:

How does a tree's structure help it to make food, grow, reproduce, and survive?

How do physical conditions affect a tree's ability to survive?

Contents:

- Standards addressed
- Vocabulary
- Assessment
- Teacher Information and Procedure
 - Prior knowledge for students
 - Materials
 - What to do in advance
 - Teaching the lesson
 - Gear -up
 - Explore
 - Generalize
 - Assess
 - Related Resources in the AMEREF Kit
 - Extensions, Adaptations, and more resources
- Background
- Tree life cycle student page

Source: AMEREF Forestry Curriculum fti3 Tree Life Cycle
Copied with permission, American Forest Foundation,
Copyright: 1993/1994/1995/1996/1997/1998,
*Project Learning Tree Environmental Education PreK-8
Activity Guide.*

The complete Activity Guide and High School Modules can be obtained by attending a PLT workshop. For more information visit the Project Learning Tree website at (www.plt.org).

Tree Life Cycle

Grades 6-8

2-3 class periods

Overview:

Students learn about an Alaskan tree species and diagram its life cycle.

Essential Questions:

How does a tree's structure help it to make food, grow, reproduce, and survive?

How do physical conditions affect a tree's ability to survive?

Assessment

Can students:

- diagram the life cycle of a tree?
- compare a tree life cycle to a human life cycle?
- explain the role each stage of a tree's life plays in the forest (or other) ecosystems?

Vocabulary

- angiosperms
- gymnosperms
- saplings

Alaska Standards

Addressed:

Science GLEs

The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by: [6] SC2.2 identifying basic behaviors (e.g., migration, communication, hibernation) used by organisms to meet the requirements of life. that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by: [6] SC3.1 recognizing that organisms can cause physical and chemical changes (e.g., digestion, growth, respiration, photosynthesis) to matter and recognizing or [7] explaining the importance of energy transfer in these changes.

Teacher information and Procedure

Prior knowledge for students: Students should have some knowledge of photosynthesis and the transfer of matter and energy that occurs as trees produce food, grow, decay, etc.

Materials needed:

Research materials

Art materials
Copies of Tree Life Cycle page

What to do in advance:

Select a few books on trees from the school library including field guides and stories. Start a "Tree-Source" center, so the students have easy access to material for researching trees.

What to do during the lesson:

• ***Gear up:***

Discuss the idea of life cycles by asking students to describe the life cycle, or history of a person. Make sure students include childhood, teenage years, young adulthood, and so forth in the discussion. Write these stages on the chalkboard. Ask students to identify the different jobs, roles, or things that a person might do in each stage of the life cycle.

• ***Explore:***

1. Ask students to describe the life cycle of a tree in similar terms to that of a person.
2. Have students choose and research a particular Alaskan species of tree to find out about its life characteristics, climate, and environment.
3. Distribute art material and ask students to create the life cycle of a tree, from birth through death and decomposition. Students should include at least four stages or events in their life cycles (e.g., a forest fire or insect invasion). Remind students that one event that affects the tree (e.g., insect damage) is likely to clear the way for another event (e.g., a hole for nesting birds). The life cycle could be represented by a circle on the page, with illustrations and a label for each stage or event, or could be shown in a line on a long, narrow piece of paper taped together at the ends.
4. On the diagram, students should label the transfers of matter and energy that are taking place as the tree makes food, grows, and passes from one stage to another.

3. Students should fill in the details for at least four stages or events on the "Tree Life cycle" student page. Some items may stay the same throughout the tree's life.

4. Give students the opportunity to share their life cycles in small groups or with the entire group. Create a "History of the Forest" exhibit by mounting all the life cycles around the classroom.

- **Generalize:**

Discuss how the life cycles of different trees compare. How does the length of a tree's life cycle compare to that of a human? Where does the "stuff" in wood come from as a tree grows? How can humans, animals, other plants, and the nonliving environment change a tree's life cycle.

- **Assess:**

Suggested criteria for evaluating students' drawings are:
Inclusion and accuracy of four steps or events in the tree's life cycle
Inclusion and accuracy of matter and energy transfers
Steps in life cycle shown in logical order
Effective communication.

Related Resources in the AMEREF Kit

AMEREF Interactive CD

Alaska Habitat Cards

Links to Geology, Mining, Energy, and Forestry Related Websites

Specimens

Spruce Tree Cross Section: AMEREF Courtesy of Sealaska

Books

Alaska's Forest Resources: Alaska Geographic

Extensions, adaptations, and more resources:

Have students write an imaginative story about the life cycle of the particular tree they created. The story can be written as a fable in which the trees, plants and animals can talk. In the story, students should include at least three stages or events of the tree's life, such as sprouting from a seed, or dying and decomposing into the soil. Ideally, the life events should show a cause-effect connection (e.g., a drought one year might lead to a fire that enables the cones of a particular tree to sprout).

Take students on a walk through a neighborhood, local park, or forest site that has plants and trees of various ages. Ask the students to look for trees at various stages in their lives. Have them try to identify at least one tree in each of the following categories:

- Young sapling (stem or trunk < 1/2 inch [1.3 cm])
- "Juvenile" (stem or truck _ inch to 2 inches [1/3 cm to 5 cm])
- "Young adult" (stem or trunk > 2 inches [5 cm], but still under canopy)
- "Adult" (trunk > 2 inches [5 cm], tree in upper canopy)
- Injured or unhealthy tree (showing signs of injury, disease or stress---Is the tree likely to survive?)
- Elderly tree (What factors are weakening the tree?)
- Dead tree (What factors combined to cause death?)

Copied with permission, American Forest Foundation, Copyright: 1993/1994/1995/1996/1997/1998, *Project Learning Tree Environmental Education PreK-8 Activity Guide*. The complete Activity Guide and High School Modules can be obtained by attending a PLT workshop. For more information visit the Project Learning Tree website at (www.plt.org).

Background

One of the best ways to learn about trees is to look at their life history. Trees, like all living things, have a life cycle that includes birth, growth, injury and disease, aging, and death. As trees go from birth to death, their physical form changes, as well as their role in the forest ecosystem.

You can learn about past changes in environmental conditions by looking at the growth rings in a cross section of a tree. Even more can be learned about the tree's life cycle by observing the tree from birth as it grows and develops throughout its life.

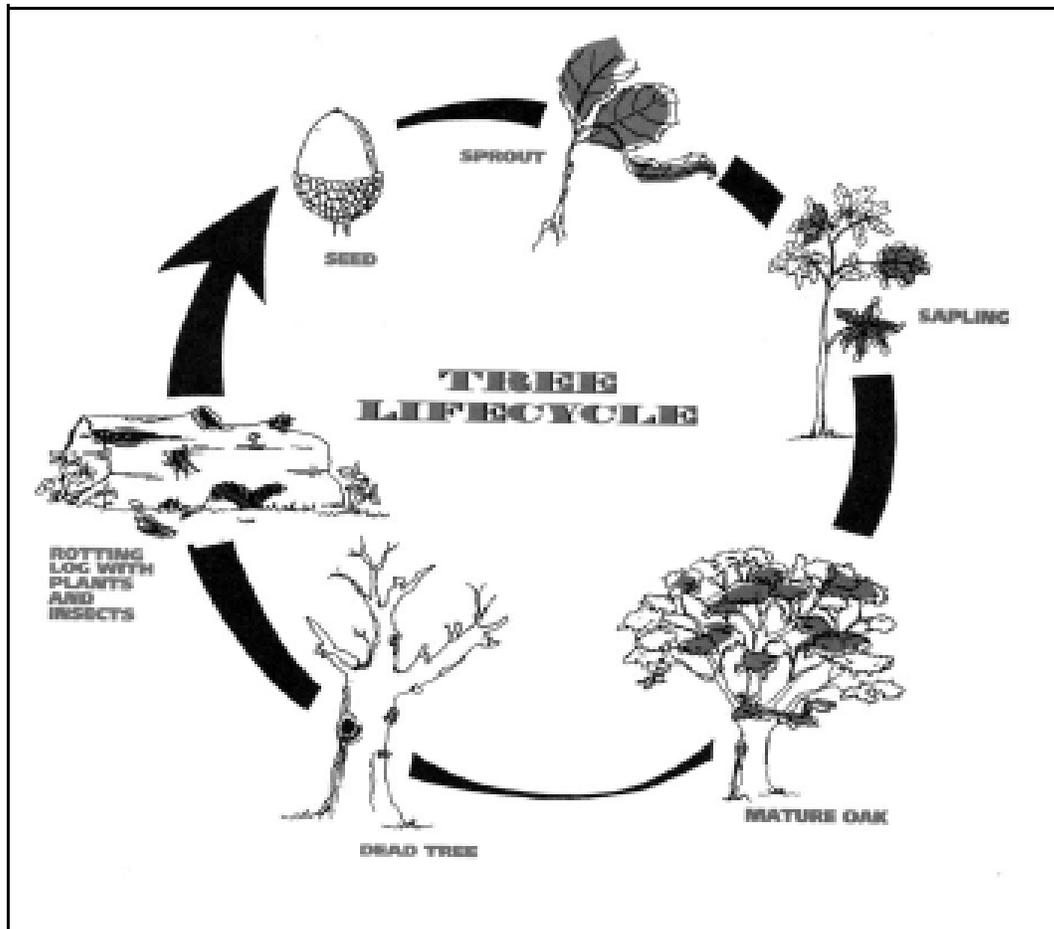
Most trees begin as seeds. Generally, trees are put into flowering and nonflowering categories. The angiosperms are flowering plants, including wildflowers, shrubs, and many trees. Angiosperms are pollinated by insects, bats, birds, and the wind. Plants that have flowers also protect their seeds inside a fruit. Maple, oak, and all other broad-leaved trees are angiosperms. Gymnosperms (from Latin "gymno-," meaning "naked") have seeds that are not enclosed in fruit or flowers. Rather, most gymnosperms produce their seeds in cones and are pollinated by the wind. The most common types of gymnosperms are the cone-bearers, or conifers, like redwoods, firs, pines, and other trees with needle-like leaves.

If a seed lands in an area with favorable soil, climate, and nutrient conditions, it will germinate (some remain dormant for long periods before sprouting). Usually, many more seeds will be produced than can possibly survive. Most seeds will be destroyed by fungi or other decomposers, or eaten by birds or mammals, leaving only a few sprouts to survive and become mature members of the forest community.

As part of the understory, young saplings must compete with other trees and plants for sunlight, nutrients, water, and space. In dense forests, many young trees must wait for years for older trees to fall and leave openings in the canopy for them to grow into.

The length of time it takes a tree to reach maturity depends on the species of tree. Trees have many different roles in the forest community depending on their age and size. Their leaves, bark, seeds, flowers, fruit, and roots provide food for many kinds of animals. Trees also provide roosts, shade and shelter to many living things. For example, holes in older trees and around their roots provide shelters for nests and dens.

Like all living things, trees are subject to disease and injury. Physical damage may not kill the tree, but may provide holes and openings in which animals and insects can live and feed. Eventually, trees weakened by injury and disease will die, fall down, and be decomposed. When they die, trees return their nutrients and other elements back into the soil to recycle through the forest ecosystem.



Copied with permission, American Forest Foundation, Copyright: 1993/1994/1995/1996/1997/1998, Project Learning Tree Environmental Education PreK-8 Activity Guide. The complete Activity Guide and High School Modules can be obtained by attending a PLT workshop. For more information visit the Project Learning Tree website at (www.plt.org).

**TREE LIFECYCLE
WORK SHEET**

Fill in the information for various stages or events your tree's life-cycle.
Describe at least three stages or events.

TYPE OF TREE (COMMON NAME) _____

SCIENTIFIC NAME _____

CHARACTERISTICS OF TREE _____

LIFECYCLE STAGE OR EVENT _____

TREE AGE _____

ROLE IN FOREST ECOSYSTEM _____

LIST OF THINGS TREE DEPENDS ON TO SURVIVE _____

LIST OF THINGS THAT DEPEND ON THE TREE TO SURVIVE _____

PROCESSES THAT MIGHT MOVE TREE INTO THE NEXT STAGE _____

LIFECYCLE STAGE OR EVENT _____

TREE AGE _____

ROLE IN FOREST ECOSYSTEM _____

LIST OF THINGS TREE DEPENDS ON TO SURVIVE _____

LIST OF THINGS THAT DEPEND ON THE TREE TO SURVIVE _____

PROCESSES THAT MIGHT MOVE TREE INTO THE NEXT STAGE _____

LIFECYCLE STAGE OR EVENT _____

TREE AGE _____

ROLE IN FOREST ECOSYSTEM _____

LIST OF THINGS TREE DEPENDS ON TO SURVIVE _____

LIST OF THINGS THAT DEPEND ON THE TREE TO SURVIVE _____

PROCESSES THAT MIGHT MOVE TREE INTO THE NEXT STAGE _____

LIFECYCLE STAGE OR EVENT _____

TREE AGE _____

ROLE IN FOREST ECOSYSTEM _____

LIST OF THINGS TREE DEPENDS ON TO SURVIVE _____

LIST OF THINGS THAT DEPEND ON THE TREE TO SURVIVE _____

PROCESSES THAT MIGHT MOVE TREE INTO THE NEXT STAGE _____

Copied with permission, American Forest Foundation, Copyright: 1993/1994/1995/1996/1997/1998, Project Learning Tree Environmental Education PreK-8 Activity Guide. The complete Activity Guide and High School Modules can be obtained by attending a PLT workshop. For more information visit the Project Learning Tree website at (www.plt.org).