Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Describe forest biomes.
2. Differentiate the types of forests in the United States.

Resources. The following resources may be useful in teaching this lesson:

- E-unit(s) corresponding to this lesson plan. CAERT, Inc. http://www.mycaert.com.
Equipment, Tools, Supplies, and Facilities

- Overhead or PowerPoint projector
- Visuals from accompanying masters
- Copies of sample test and/or other items designed for duplication
- Materials listed on duplicated items
- Computers with printers and Internet access
- Classroom resource and reference materials

Key Terms. The following terms are presented in this lesson (shown in bold italics):

- forest
- forest canopy
- forest region
- forestry
- native forest
- old-growth forest
- regrowth forest
- taiga (boreal forest)
- temperate forest
- tropical forest

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Display a picture of a forest, or take students to a forest. Ask them to identify 10 “things” they see. Direct a class discussion that leads into the lesson.

CONTENT SUMMARY AND TEACHING STRATEGIES

Objective 1: Describe forest biomes?

Anticipated Problem: How are forest biomes described?

1. Simply put, a forest is an area with a high density of trees. A forest ecosystem includes trees and other plants, soil, water, animals, insects, fungi, and bacteria. These elements of the ecosystem interact with one another. It is safe to say that a forest is a living, complexly interrelated community of trees and associated plants and
animals. This community is ever-changing. The study of forests and associated communities is known as forestry. Three of the earth’s commonly accepted terrestrial biomes are forest in nature. They are taiga (boreal forest), temperate forest, and tropical forest.

A. **Taiga (boreal forest)** is the terrestrial biome that consists primarily of coniferous trees, such as pine, spruce, and fir. Taiga is vast and covers about 11 percent of the earth’s terrestrial surface. Currently, taiga is being logged extensively.

1. Taiga grows in the broad belt between 50 and 60 degrees north latitudes across Eurasia and North America: About two-thirds of taiga is found in Siberia. The remainder is in Canada, Scandinavia, and Alaska.
2. Summer in taiga is short, moist, and moderately warm. The growing season lasts only 130 days. Winter is long, cold, and dry.
3. Most precipitation falls as snow. Annual precipitation is 16 to 40 inches (40 to 100 cm).
4. The soil is thin, low in nutrients, and acidic.
5. The **forest canopy**, the uppermost layer of a forest created by the crowns of the trees, shades the forest floor and limits understory growth.
6. Wildlife includes woodpeckers, hawks, moose, bear, weasel, lynx, fox, wolf, deer, hares, chipmunks, shrews, and bats.

B. **Temperate forest** is the terrestrial biome that consists of those forest areas with temperate or moderate temperatures and relatively high precipitation. Forests of this type are dominated by deciduous trees. Today, only relatively small pockets of original temperate forests can be found.

1. Temperate forests are in eastern North America, northeastern Asia, and western and central Europe. Much of the eastern United States is classified as temperate forest.
2. Most temperate forests receive 30 to 49 inches (76 to 124 cm) of precipitation distributed evenly throughout the year.
3. Some temperate forests are called temperate rainforests because they receive 80 to 152 inches (203 to 386 cm) of rainfall a year. Temperate rainforests can be found in the Pacific Northwest of the United States.
4. Temperate forests have well-defined seasons. The growing season lasts 140 to 200 days during 4 to 6 frost-free months.
5. Temperatures range from –22° to 86°F (–30° to 30°C).
6. Soil is fertile, enriched with decaying litter.
7. The forest canopy is moderately dense and allows light to penetrate. As a result, a well-developed and richly diversified understory of vegetation and stratification occurs.
8. Common tree species are oak, hickory, beech, hemlock, maple, basswood, cottonwood, elm, and willow.
9. Wildlife includes squirrels, rabbits, skunks, birds, deer, mountain lion, bobcat, timber wolf, fox, and black bear.
C. **Tropical forest** is the terrestrial biome that consists of those forest areas found in regions of the world where temperatures are high throughout the year and rain falls almost daily. More than half of tropical forests have been subject to deforestation.

1. Tropical forest exists near the equator, within the area bounded by latitudes 23.5 degrees N and 23.5 degrees S.
2. The annual rainfall ranges from 80 to 180 inches (203 to 457 cm).
3. The tropical forest does not have a winter. It does have two seasons, rainy and dry.
4. Since tropical forest is near the equator, the day length is 12 hours and varies little.
5. The average temperature is 68° to 77°F (20° to 25°C) and varies little during the year.
6. The soil is low in nutrients because of heavy leaching and is acidic. Decomposition of organic matter is rapid.
7. The forest canopy is multilayered and continuous, allowing little light to reach the forest floor.
8. The diversity of living organisms is very high. There may be as many as 100 different tree species in 1 square kilometer. Trees are tall, with buttressed trunks and shallow roots. They are mostly evergreen, with large dark green leaves.
9. Wildlife includes many birds, bats, small mammals, and insects.

**Teaching Strategy:** Have the students locate the range of taiga, temperate forest, and tropical forest on a globe or world map. Assign the reading of the corresponding E-unit. Use VM–A, VM–B, and VM–C during a class discussion.

**Objective 2:** Differentiate the types of forests in the United States.

**Anticipated Problem:** What are the types of forests in the United States?

II. At one time, nearly half of the United States, three-quarters of Canada, western Asia, almost all of Europe, and many other areas in the world were forested. Today, an estimated one-half of the world’s forests are gone. Only about 22 percent of the earth’s old-growth (original) forests remain. Most of the remaining old-growth forests are located in the Canadian, Alaskan, and Russian boreal; the tropical forests of the northwestern Amazon Basin; and the Guyana Shield in northeastern South America.

A. A **forest region** is an area with a predominance of related tree species present. A region is also based on the climate that promotes the forest growth. The United States can be divided into nine major forest regions. They are the northern coniferous forest region, northern hardwood forest region, central broadleaf forest region, southern forest region, bottomland hardwood forest region, Rocky
Mountain forest region, Pacific Coast forest region, tropical forest region, and Hawaiian forest region.

1. The northern coniferous forest region is the largest forest region. It spreads along the Canada–United States border.
   a. The northern coniferous forest region is characterized by swamps, marshes, rivers, and lakes, along with a cold climate.
   b. The northern portion of this region produces small-size trees that consist primarily of black spruce, white spruce, Sitka spruce, balsam fir, larch, paper birch, aspen, white pine, jack pine, poplar, and willow. Conifers dominate.

2. The northern hardwood forest region extends from southeastern Canada through New England to the northern Appalachian Mountains and westward beyond the Great Lakes. This forest region is a blend of species found in the northern coniferous forest and central broadleaf forest regions. Tree species of this region include spruce, birch, beech, basswood, maple, and northern red oak.

3. The central broadleaf forest region is located east of the Mississippi River and south of the northern hardwood forest region. Much of the forest land in the region has been cleared, and the land used for production agriculture.
   a. The central broadleaf forest region supports more varieties and species of trees than any other forest region in the United States.
   b. It is composed mostly of hardwood species, including oak, hickory, ash, elm, maple, cherry, sweetgum, beech, yellow poplar, walnut, cottonwood, sycamore, and dogwood.
   c. Coniferous species include Virginia pine, pitch pine, shortleaf pine, eastern redcedar, and some hemlock.

4. The southern forest region is located in the southeastern part of the United States and ranges south from Delaware to Florida and west to Texas and Oklahoma. It is one of the most important timber-producing areas in North America.
   a. Major coniferous tree species include Virginia, longleaf, loblolly, shortleaf, and slash pines.
   b. Some important hardwood species are oak, yellow poplar, maple, blackgum, sweetgum, beech, ash, elm, oak, and hickory.

5. The bottomland hardwood forest region extends mostly along the Mississippi River. Key forest species are oak, sweetgum, blackgum, and baldcypress.

6. The Rocky Mountain forest region extends from Canada to Mexico and accounts for about 27 percent of U.S. lumber.
   a. Important commercial tree species are western white pine, ponderosa pine, and lodgepole pine.
   b. Other trees common to the region are spruce, fir, larch, western redcedar, hemlock, and aspen.

7. The Pacific Coast forest region is located in northern California, Oregon, and Washington. It is the most productive forest region in the United States. Some
important species are Douglas fir, western hemlock, western redcedar, Pacific yew, ponderosa pine, Sitka spruce, sugar pine, lodgepole pine, noble fir, and white fir. The region is also home to the redwood and giant sequoia. Important hardwoods are oak, cottonwood, maple, and alder.

8. The tropical forest region consists of portions of southern Florida and southeastern Texas. It is the smallest forest region in the United States. Tree species include palms, mahogany, mangrove, and bay.

9. The Hawaiian forest region is subdivided into wet and dry regions.
   a. Tree species in the wet forest regions are ohia, boa, tree fern, kukui, tropical ash, mamani, and eucalyptus.
   b. The dry forest regions are home to koa, haole, algarroba, monkey pod, and wiliwili trees.

B. Some other terms are used when classifying forests.
   1. An uncut forest is commonly known as an **old-growth forest**. Uncut forest is also referred to as virgin forest, primeval forest, and primary forest. Most old-growth forest that remains in the United States is in the Pacific Coast forest region. Designated national parks and national forests protect much of the remaining old-growth forest.
   2. A **native forest** is a forest in which the species are voluntarily growing and are naturally present in the area. Native forests often have a variety of species and provide wildlife habitat.
   3. The majority of the forests east of the Rocky Mountains have been cut one or more times. After a forest has been logged, it may regenerate. A forest area that has experienced new growth is known as **regrowth forest**. Lumber companies harvest trees and replant trees with the intention of harvesting the regrowth forest approximately a quarter century later.

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**Teaching Strategy:** Ask the students to determine the type of forest and the characteristics of the forest in your area. Refer them to the Internet or other resources to conduct their research. Assign the reading of the corresponding E-unit. Use VM–D. Assign LS–A.

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**Review/Summary.** This lesson provides the basic information needed to start a unit on natural resources. To review the objectives, have students take notes and go over the terms and anticipated problems provided.

**Application.** Refer to activities in the suggested resources for additional application of this lesson.

**Evaluation.** Use the following sample test to evaluate the students’ comprehension of the material covered in this lesson.
Answers to Sample Test:

Part One: Matching

1. i
2. d
3. b
4. c
5. h
6. f
7. g
8. a
9. e

Part Two: Completion

1. native forest
2. forestry
3. regrowth forest
4. forest
5. old-growth forest
6. forest region
7. forest canopy

Part Three: Short Answer

The answers should reflect the teaching content associated with Objective 1.
Part One: Matching

Instructions: Match the following forest regions with their descriptions.

- a. northern coniferous forest region
- b. southern forest region
- c. bottomland hardwood forest region
- d. Rocky Mountain forest region
- e. central broadleaf forest region
- f. tropical forest region
- g. Hawaiian forest region
- h. Pacific Coast forest region
- i. northern hardwood forest region

1. Extends from southeastern Canada through New England to the northern Appalachian Mountains and westward beyond the Great Lakes; tree species include spruce, birch, beech, basswood, maple, and northern red oak.
2. Extends from Canada to Mexico and accounts for about 27 percent of U.S. lumber; important commercial tree species are western white pine, ponderosa pine, and lodgepole pine.
3. Ranges south from Delaware to Florida and west to Texas and Oklahoma; one of the most important timber producing areas in North America; important coniferous tree species include Virginia, longleaf, loblolly, shortleaf and slash pines
4. Extends mostly along the Mississippi River; key species are oak, sweetgum, blackgum, and baldcypress.
5. Located in northern California, Oregon, and Washington; the most productive forest region in the United States.
6. Consists of portions of southern Florida and southeastern Texas; the smallest forest region in the United States.
7. Subdivided into wet and dry regions.
8. The largest forest region; spreads along the Canada–United States border; characterized by swamps, marshes, rivers, and lakes, along with a cold climate.

9. Located east of the Mississippi River and south of the northern hardwood forest; supports more varieties and species of trees than any other forest region in the United States.

Part Two: Completion

Instructions: Provide the word or words to complete the following statements.

1. A _________________________ is a forest in which the species are voluntarily growing and are naturally present in the area.

2. The study of forests and associated communities is known as _________________________.

3. A forest area that has experienced new growth is known as _________________________.

4. A _________________________ is an area with a high density of trees.

5. An uncut forest is commonly known as an _________________________.

6. A _________________________ is an area with a predominance of related tree species present.

7. The _________________________ is the uppermost layer of a forest created by the crowns of the trees.

Part Three: Short Answer

Instructions: Answer the following.

Name three forest biomes, and give five characteristics of each.
TAIGA (BOREAL FOREST)

♦ Consists primarily of coniferous trees
♦ Covers about 11 percent of the earth’s terrestrial surface
♦ Being logged extensively
♦ Grows across Eurasia and North America
♦ Summer: short, moist, and moderately warm
♦ Winter: long, cold, and dry
♦ Growing season 130 days
♦ Precipitation most snow
♦ Thin soil, low in nutrients and acidic
♦ Forest canopy limits understory growth
♦ Wildlife: woodpeckers, hawks, moose, bear, weasel, lynx, fox, wolf, deer, hares, chipmunks, shrews, and bats
TEMPERATE FOREST

- In areas with temperate or moderate temperatures and relatively high precipitation
- Dominated by deciduous trees
- Only small pockets of original temperate forests remain
- Found in eastern North America, northeastern Asia, and western and central Europe
- Receive 30 to 49 inches (76 to 124 cm) of precipitation annually
- Temperate rainforests receive 80 to 152 inches (203 to 386 cm) of rainfall a year
- Growing season lasts 140 to 200 days during 4 to 6 frost-free months
- Temperatures range from –22° to 86°F (–30° to 30°C)
- Fertile soil, enriched with decaying litter
- Forest canopy permits a well-developed and richly diversified understory of vegetation and stratification
- Common tree species: oak, hickory, beech, hemlock, maple, basswood, cottonwood, elm, and willow
- Wildlife: squirrels, rabbits, skunks, birds, deer, mountain lion, bobcat, timber wolf, fox, and black bear
TROPICAL FOREST

- Found where temperatures are high throughout the year and rain falls almost daily
- More than half of tropical forests lost to deforestation
- Exist near the equator
- Annual rainfall totals 80 to 180 inches (203 to 457 cm)
- Does not have a winter
- Two seasons, rainy and dry
- Day length 12 hours and varies little
- Average temperature 68° to 77°F (20° to 25°C) and varies little during the year
- Soil low in nutrients because of heavy leaching and acidic
- Rapid decomposition of organic matter
- Forest canopy multilayered and continuous, allowing little light to reach the forest floor
- Very high diversity of living organisms
- As many as 100 different tree species in 1 square kilometer
- Trees 25 to 35 meters tall, with buttressed trunks and shallow roots; mostly evergreen, with large dark green leaves
- Wildlife: many birds, bats, small mammals, and insects
NINE MAJOR FOREST REGIONS IN THE UNITED STATES

- Northern coniferous forest region
- Northern hardwood forest region
- Central broadleaf forest region
- Southern forest region
- Bottomland hardwood forest region
- Rocky Mountain forest region
- Pacific Coast forest region
- Tropical forest region
- Hawaiian forest region
Forest Regions of the United States

Purpose

The purpose of this activity is to recognize the extent of the different forest regions in the United States and to identify the major tree species in each region.

Objective

Create a map showing the nine forest regions in the United States, and identify dominant tree species in each.

Materials

- lab sheet
- sheet of paper
- drawing utensils
- writing utensil
- map
- corresponding E-unit
- various resources

Procedure

1. On the map provided, draw the boundaries of the nine forest regions of the United States.
2. Use a different color to shade each region.
3. Provide a key to the map with the name of each region.
4. On another sheet of paper, identify the dominant tree species for each region.