

# 4-H FORESTRY PROGRAM — UNIT B

# FORESTS



member's manual

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## The Principal Authors

**Joseph Buhaly**, State Extension Forester at Washington State University, is director of Forest Management and Sales Association, Inc., a forest cooperative. He is also director of the Washington Resources Council. Mr. Buhaly is a 1950 graduate of Washington State University, with post-graduate studies at the University of Puget Sound, Pacific Lutheran University and Oregon State University.

**John F. Kundt**, Extension Forestry specialist at the University of Maryland, holds the rank of Associate Professor in the Department of Horticulture. Dr. Kundt is a 1952 forestry graduate of West Virginia University, and holds a Doctor of Philosophy degree from North Carolina State University. He has worked extensively with the Cooperative Forest Management Program in Southeastern Virginia, and with the Union-Camp Corporation as a forest manager.

**Will A. McElfresh, 4-H Specialist with Virginia Polytechnic Institute and State University**, has worked for federal and state forestry organizations in the West, the Great Lakes states, and the Southeast. He did his undergraduate (1955) and graduate (1966) work in forestry at the University of Michigan. He has also done graduate work in adult education at North Carolina State University.

**George "Ted" Walker, Extension Forester** at the University of Georgia, holds a Masters degree in Forestry from that university (1956). He has served as both Junior and Senior Director of the Georgia Association of 4-H Agents, and was Group Chairman of the Society of American Foresters in 1978.

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# The 4-H Forestry Program

Educational Aids in the National 4-H Forestry Program consist of three parts. Unit A—Trees—explains what trees are, how they grow, why they are important and what characteristics identify them. Unit B—Forests—is about trees as part of the forest ecosystem, what values people hold for them, and how they are managed. Unit C—Forestry—is concerned with how people manage trees and other forest resources which provide wildlife shelter, recreational areas and wood for soil and water supplies. The most logical way to use this program is to start with Unit A and take the sections in order through Unit B. Then select those subunits of Unit C in which you have the most interest. More advanced members may start with Unit B—Forests—and refer to Unit A—Trees—as necessary.

Be sure to complete all sections of Unit B before you attempt to advance in the program. Do not try to crowd all the material in this manual into one year's time. Rather, work at a pace that will enable you to fully understand the basic concepts of forests as they are presented here. There are five natural divisions within the text—the Introduction plus the four major topic areas. These divisions will allow you to take a break at the end of the year and then resume with another topic area next year. If you do this, you will find that the study of forests will be more interesting, and you will be better prepared to advance into the various subject areas within Unit C.

## B-1 Introduction to Forest Values

### *Meeting 1*

#### *Finding Out About Forests*

Have you ever walked into a forest, stopped for a moment and looked around? If so, you probably sensed that forests are wonderful places. You didn't have to read about forests to realize this. Now, however, you may want to study forests in more detail to find out why they are so wonderful.

In Unit B you will observe things that happen in a forest. You will find out why forests are valuable and why people are glad we have them.

We sometimes think of the forest as simply a group of trees and other plants covering a given area of land. As you work in this unit, you will begin to think about the forest as something more than just trees growing together. You will see the

interaction of plants, animals, soil and other things in the forest. You will learn why this interaction is so important to people. So begin thinking about all that a forest contains.

The workings of the forest are complex and require careful study. But there are fun ways to find out how a forest works. Get a notebook, and keep a neat and accurate record of all that you do in your 4-H forestry project. Write down the dates when you begin, what you do and how your tasks turn out. Become a scientist and investigate how a forest works!

Make plans to visit a forest. Find a wooded area that you like and begin to spend some time in it. The area does not have to be large. It can be a park, state or national forest, a farmer's woodlot, a few trees near a stream or even a grove of trees in the city. Try to visit this area at least once during your study. If possible, go again in a different season of the year. You will see some amazing changes!

Use this manual to help you think about what to look for in the forest. Before you go, make a list of things that you would like to study. Then take a friend along and talk about what has happened and what is happening in your forest.

Begin asking questions about how your forest grows. Think as a real scientist would. Use the glossary in the back of this manual to help you with words or phrases that are not clear. Check references in handouts, books and encyclopedias, too. Since one forest can be very different from another, facts you gather about your forest may vary from the information on other forests that you find in references. In your scientific work you can examine and describe what exists at the time of your visit. These bits of information will become the information that you will work with. Each of the "Things You Can Do" covers some important part of the study of forests. Complete as many as you can. You may work as an individual or as a team member. Remember to write down what you have learned after you make your observation. You may want to repeat some activities at different times and places. Your results may show surprising differences. Any scientific measurements or observations made at different times and places may produce new results that differ from your original results.

### *Things You Can Do*

1. Find a forested area that you can study. The area does not have to be large. Just make sure to find one that you will be able to visit several times during the course of your participation in Unit B of the 4-H Forestry Program.

## Meeting 2

### Why Forests Are Valuable

In Unit A you learned that trees, whether small or large, have value. When they group together to form the basis of a forest, trees have special value. Forests provide us with watershed protection, oxygen, recreational opportunities, windbreaks, noise and vision buffers, and forest products. Some forests are valued simply for their beauty.

We are lucky to live in a land with such vast forest resources. Although most countries have forests, few compare to those of North America either in size or value. The forests in Eastern North America were used by the early settlers for homes, heat and transportation. Forests were used by the settlers to build our country's cities, railroads, farms and factories. Forests have played an important part in our nation's history.

Here are some reasons why forests are valuable to us today.

1. **Water:** Forests have spongy surfaces that soak up water and help to control soil erosion and water runoff. They help supply our water needs, especially in the critical summer months. Forests help to slow the melting of snow in winter and stream runoff in warmer months.

2. **Oxygen:** Growing forests produce oxygen, which we need to live. Also, they remove carbon dioxide from the air, which is harmful at too high a level. An acre of a vigorous young forest can produce three tons of oxygen each year. This is enough for the requirements of 18 people.

3. **Recreation:** Most people enjoy the beauty and sense of peace that a forest offers. As a result, the forest serves as a recreation area for hiking, camping, hunting, studying or resting.

4. **Forage:** Livestock may find grass and other nutritious vegetation in a few forest types. Although overgrazing can be bad, moderate grazing may remove plants that compete with trees in the forest understory.

5. **Windbreaks and Shelterbreaks:** These slow down the force of the wind on buildings and land. They are planted in three or more rows at right angles to the direction of the prevailing wind, they protect land from wind erosion and topsoil loss. The leaves of forest trees intercept dust particles in the air, and so reduce air pollution.

6. **Noise and Vision Buffer:** Forests and groves absorb noise made by automobiles and other sources, especially in the city. They also screen out unpleasant views from roadways and in residential areas.

7. **Forest Products:** Forests provide many products, including lumber, plywood, pulp and

paper. They also provide seed cones, floral greenery, fuelwood, resin and turpentine, berries and bark. Some of these products can be harvested each year while the trees are growing.

### Things You Can Do

1. Try to remember the last time you visited a forest or wooded area. Write down what you saw, heard, smelled and touched. Make a record of what you liked and disliked in the forest. Draw a picture or find a photograph of what you think were the most interesting plants and animals. As you proceed through this manual find out why your favorite plants grow where they do, and where your favorite animals live. Make a drawing or take a photograph of what you see.

2. Make your own list of reasons why the forests around you are valuable. Is there now more or less land in your area in forests than 10 years ago?

3. Start making a list of what your forest area contains, such as forms of wildlife and insects. Also list things like trails, fences and other objects that people have put into the forest. Begin making a division between what is natural to the forest and what has been done by people. Keep adding to this list each time you think of something else that should be included. By the time you finish this manual you should have a long list.

4. Consider starting work on an exhibit of city landscapes showing how trees and shrubs are planted to provide shade and beauty while reducing air and noise pollution.

## B-2 The Forest Ecosystem

### Meeting 3

#### What Forests Do

Forests, grasslands, oceans, rivers, lakes and deserts are the major ecosystems in the world. The word "eco" is from a Greek word meaning "house", or place to live. An ecosystem is an environment where different plants and animals interact with each other and with other parts of nature. In a forest, trees interact with other plants, the soil, wildlife, the air, water courses, micro-organisms and other animals. All of these things interacting together make up the forest ecosystem.

Trees play a major role in the forest ecosystem. They affect how well all other organisms in the forest live. Trees give food and shelter to many wildlife species. Trees bring minerals from the subsoil, and change them into useful fertilizer that

is left on the forest floor for other plants. Trees such as the alder and locust help to change the nitrogen in the air into a form that plants and animals can use. They give oxygen, food and shelter to many wildlife species.

On the other hand some trees can limit the growth of plant and animal populations. For example, a natural chemical from the roots of the eucalyptus and black walnut trees limits the growth of other tree species nearby. Some trees have leaves or fruit that are poisonous. Trees use these features to compete with other plants for survival.

Many relationships exist between tree species and other forms of life in the forest. Although we are continuing to learn more about these relationships through scientific research, many of them are still unknown to us. Since we still have a lot to learn about forests, we must be very careful whenever we change the forest ecosystem.

If a forest contains many types of plant and animal species, it is more complex. One small change does not change the whole forest. But in any forest where most of the trees are the same species, a small change can have a huge effect. A forest of mostly jack pines can be seriously damaged by insects called sawflies. These insects eat the needles of the jack pines. If a few extra warm days come in the spring when the insects hatch, their numbers greatly increase. Their effect

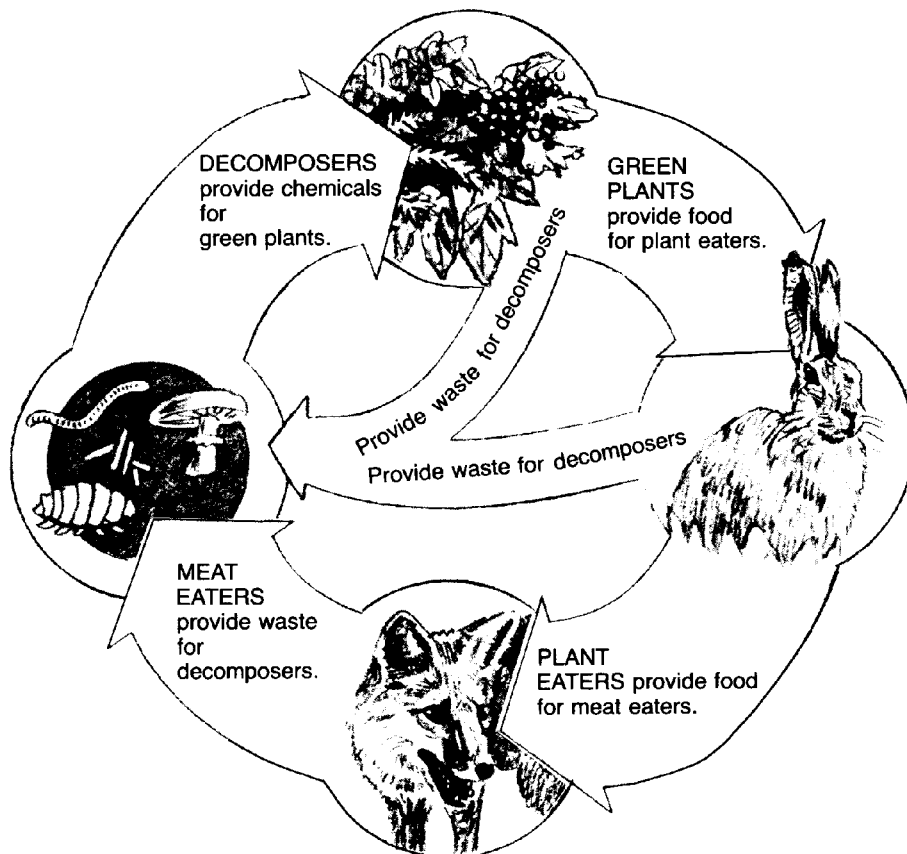
on the jack pine is then drastic, and a large part of the forest can be destroyed due to those few extra days of warm weather.

## Food Chains

We hear a lot these days about people recycling glass, tin, aluminum and other materials. In the past we threw such things away. The forest does not throw anything away. In the forest all the organisms are interconnected, and everything is recycled.

We know from Unit A that plants in the forest get their food though photosynthesis. They use the sun's energy to make food from water, soil nutrients and carbon dioxide. Meanwhile animals and insects feed from the plants. These include herbivores like the deer and rabbit, and insects such as the gypsy moth, ladybug and sawfly. These animals and insects in turn provide food for other animals and insects. Carnivores such as the wolf and the mountain lion hunt the deer, and predator insects eat the leaf feeding insects. A predator may become prey for other predators. An insect-eating bird may be eaten by a hawk, or a fox by a bobcat. Some animals, such as foxes and bears, as well as people, eat both plants and animals, and so are called omnivores. This process of organism feeding upon another organism is called a grazing food chain.

*Food Chain*



Another food chain is called the food chain of decay. All dead organic matter returns to the soil to change into simpler matter. A dead tree on the forest floor rots, or decomposes. When an animal dies, its flesh and bones become part of the soil. Animal and plant material is broken down by tiny bacteria, fungi and small animals in the soil. These organisms, called decomposers, change the dead organic matter into substances that plants can use again as food. In the meantime, the carbon dioxide held in the tissues of the decomposers is released into the air. To complete the cycle, plants use the minerals, nutrients and carbohydrates for food.

In drier climates where the ground is not so moist, fire often takes the place of decomposition in returning dead material to the soil.

## The Water Cycle

Another cycle that takes place in the forest is the water (or hydrologic) cycle. When rain or snow falls in the forest, what happens to it? We already know that some of it is used by plant leaves in photosynthesis. More is lost as it goes back into the air through evaporation. Another part becomes runoff into streams or rivers above the ground. Some of the water soaks into the soil and heads toward the water table, the level of water underneath the ground. And some is taken from the soil by the plants.

How much water does a forest hold? In heavy rainfalls or deep snow, a forest has a lot of water. If one inch of rain would reach the forest floor at a time, the forest would have 27,000 gallons of water for each acre, or 250,000 liters per hectare. Trees build about 50 pounds (21½ kilograms) of water into 100 pounds (43 kilograms) of wood. At the same time about 1,000 times that amount is lost through their leaves into the atmosphere.

All of this moisture raises the humidity level in the forest. The water that has passed back to the atmosphere through evaporation can be used to bring more rain and snow, and again the cycle is completed and ready to repeat.

At what time of the year does the forest floor receive most of its water? In what season do trees in the forest grow the most, and why?

## Things You Can Do

1. Learn more about the *Food Chain of Decay*. Find a piece of rotting wood in your forest. Look at it carefully. What is happening to it? Turn it over so you can see underneath. Do you see any soil animals or other creatures at work? Feel the wood as it is being broken down into soil. How does it feel?

2. Tracking the "*Wild Raindrop*". Most people don't realize all the things that happen to a raindrop from the time it lands on a plant until it reaches a stream. Go out on a rainy day. Enjoy the different colors, sounds, smells and feelings. Try tracking a "wild raindrop". To be comfortable, wear a good raincoat, rainhat and boots. Take along paper and a pencil in a clear plastic bag to record where the raindrop goes.

Find the answer to the following questions:

a. What is the raindrop's trail downhill through the stands of different tree species?

b. Where does the raindrop go after it reaches the leaves on the forest floor?

c. Are any raindrops lost through evaporation along the trail?

3. There are other cycles operating in the forest besides food chains and the water cycle. As a forest scientist you will want to know about them as well. Ask your leader or other forest authority about the carbon, nitrogen and oxygen cycles. You may want to draw pictures of these cycles, complete with arrows showing the interconnecting parts.

4. Begin thinking of your own imaginary forest. Give it a name, and place in it your favorite animals and plants. You will be making more use of this forest in later meetings.

## Meeting 4

### *How Climate, the Land and Soil Affect Forest Growth.*

Imagine a forest thousands of years old, or a tree growing so high that you could not see its crown. Or imagine a cool pine grove in the desert. These are very unlikely, with a few important exceptions. Most forests are prevented from growing so old, to such heights or in such harsh places. Their growth is controlled by ways that we call limiting factors. The main limiting factors for forest growth are climate, soil and land forms, animals, insects and plant factors.

## Climate

Climate is the most important factor in determining where trees can grow. Climate controls how much warmth and moisture a forest receives. Most trees need at least 16 inches of rainfall (40 centimeters) a year to grow. Certain trees grow best in climates with heavy rainfall. Others grow in climates with many days of bright sunlight. Some trees grow in climates where few other plants can grow, because they have adapted to conditions in such places as along windy seacoasts or high in the mountains where the air is colder.

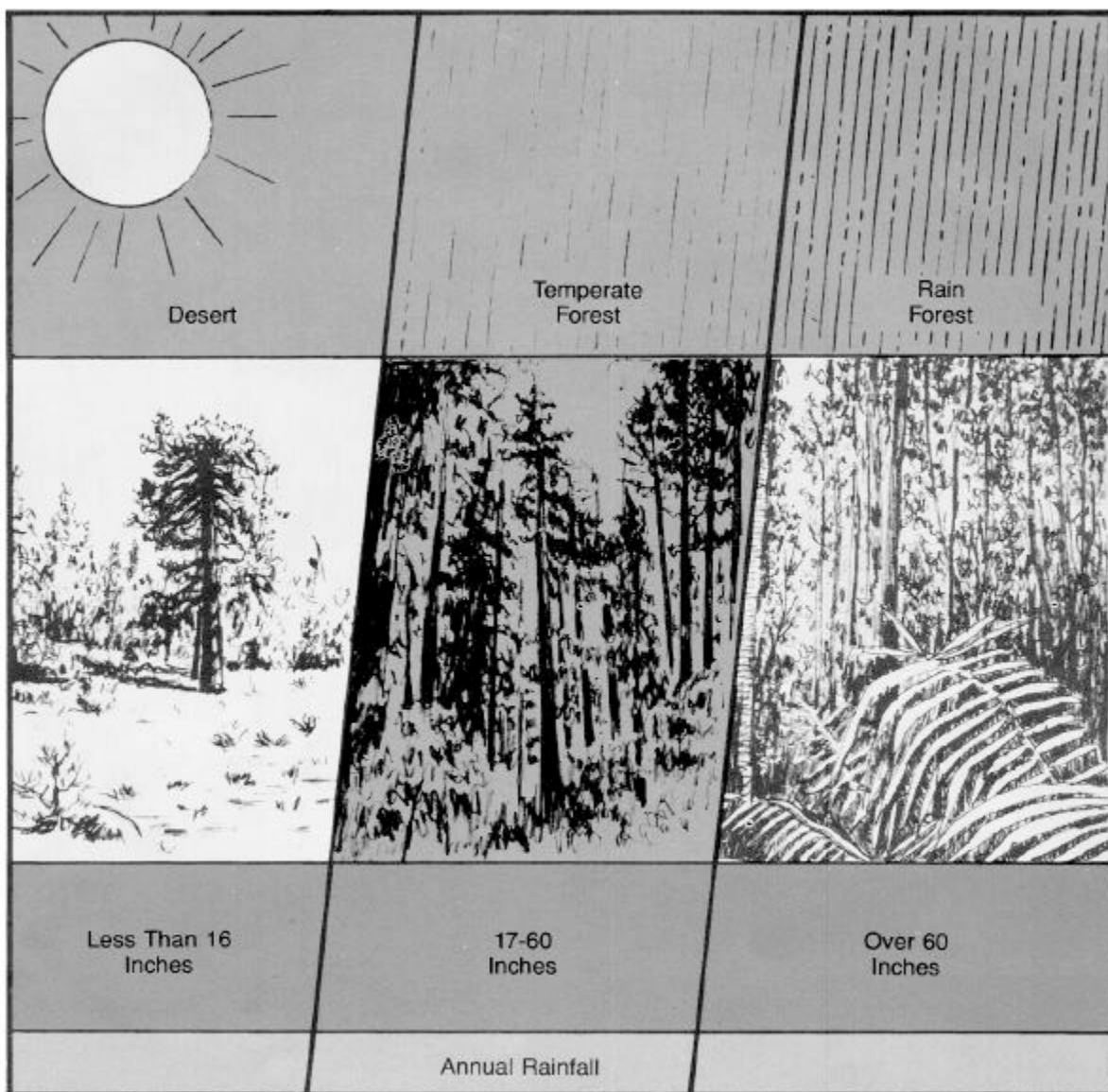
Within the forest are a variety of microclimates or "mini-climates." These can change the local conditions. In different places within the same forest you may find a difference in temperature, sunlight and moisture. For example, review what happened in Unit A when you took temperature readings in the sun and the shade, and at different heights above ground level.

The ancestors of all our trees were tropical plants. Most tropical plants are evergreens. They grow whenever there is enough moisture, and where they are not easily damaged by cold weather. Trees that live in the temperate zones had to adapt to the seasons. They had to begin new growth in the spring and to spread their seeds to reproduce. This process took many generations before the trees that we are familiar with today finally evolved.

Trees are accustomed to grow best in certain climatic zones. If a tree species is moved from one zone to another, it may not be able to grow in its new location. Trees that grow inland may not be able to grow on the seacoast. Trees that grow in a warm valley may not be able to grow at higher elevations where the air is cooler.

If the climate should change suddenly, many trees in the forest could suffer. Think what would happen if there were two or three years of drought in the Western forests, or if the Southern forests were struck by a tremendous ice storm in the spring. What might happen to forest growth in the Northern forests if many warm sunny days occurred in late summer and early fall? Would the broadleaf trees still "shut down" for the winter as they usually do? Remember our example of how a few extra warm days in the spring produced

*How Much Rain Do Forest Areas Receive?*



enough sawflies to eat up much of the foliage of the jack pine forests?

One example of extreme climatic conditions in the forest is fire. Although many forest fires are started due to people's carelessness, fire also occurs naturally. When the forest floor is very dry in times of drought, or when a lightning storm strikes, fire can start and spread very quickly in the forest. Uncontrolled fire can cause much destruction within hours. But controlled fires are actually helpful in some forests. Controlled fire can eliminate unwanted tree species, or allow another species to reproduce. Some trees, such as the lodgepole pine and the jack pine, need fire to reproduce. Their seed cones will open only under intense heat. Fire also does some of the work involved with the food chain of decay. Although wildfire is a horrible event to much of the forest, it is one of nature's ways to produce changes that may be needed in the forest ecosystem. Later in the manual we will see how controlled fire can be a useful management tool.

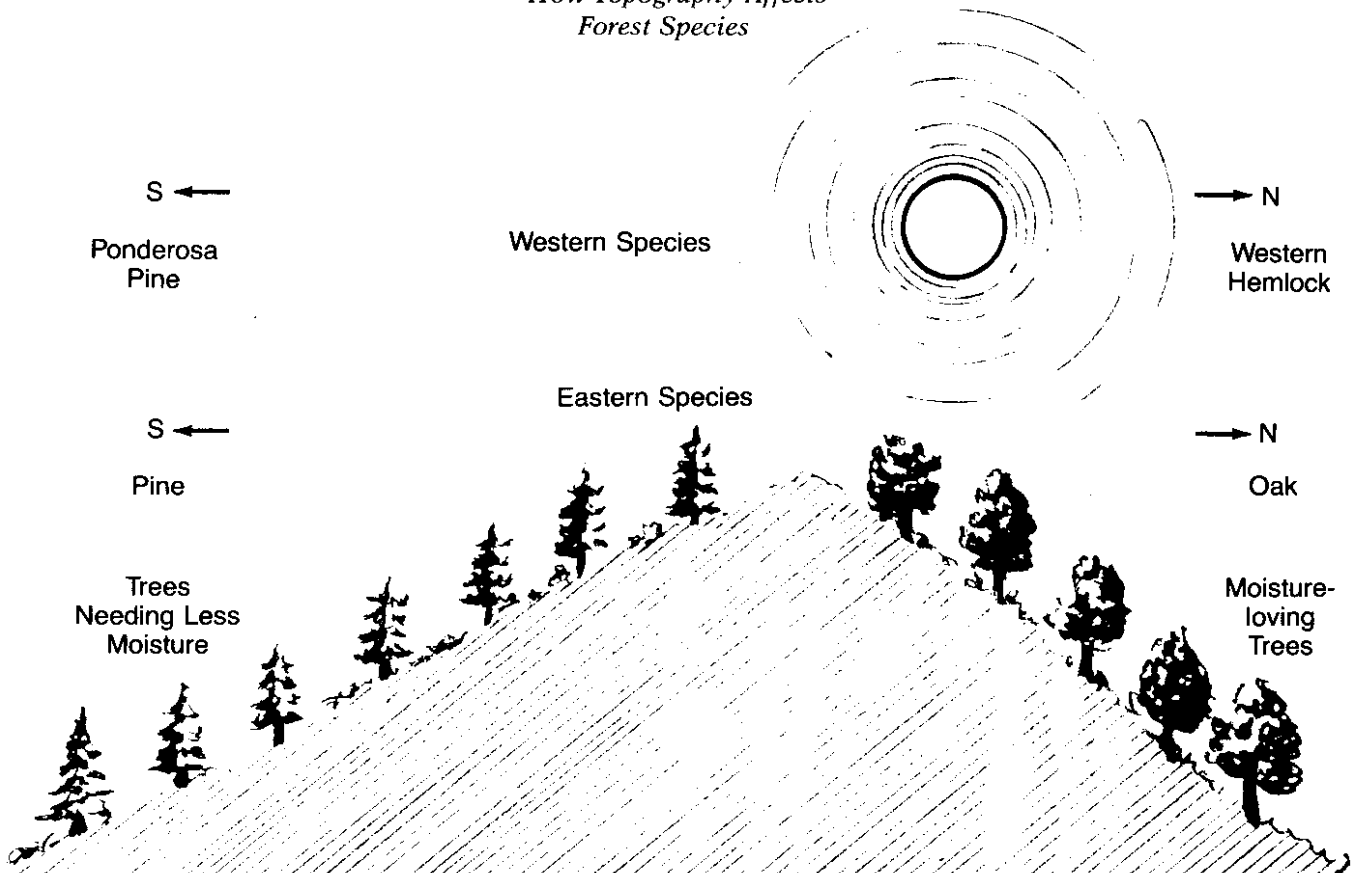
## Land and Soil

The "lay of the land" and its soil structure also affect forest growth. Some lands are naturally better for growing a forest than for other uses.

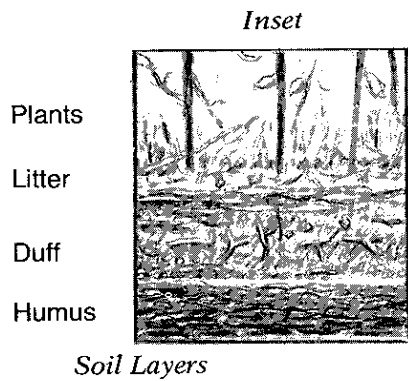
Their climates and soils are right for what forest plants and animals need. For instance, the North Woods of Minnesota and Wisconsin are much more suitable for coniferous forests than for agriculture or for cities. The shape of the land's surface, or its topography, helps to determine where and how well trees grow. Forests in mountainous areas high above sea level are different from those that grow in flat areas with low elevation. The land forms are different and the soil types are different.

The soil is the medium for plant growth, and holds many of the nutrients that trees need. It becomes like a natural sponge made up of four layers. The top layer is *litter*, made of undecayed leaves or twigs. The layer of decaying leaves under the litter is called *duff*. The next layer is *humus*, made of further decayed duff and mineral soil. In this layer the remains of the leaves can no longer be identified. The color is dark. Below this is the *parent soil*, which holds or anchors the roots. Parent soil contains most of the minerals that plants use. In this layer are holes made by old roots, animals and insects. The holes allow water to sink deeper into the soil. Forest litter, humus and roots allow the forest soil to hold more water and to resist being broken apart by erosion. Well developed forest soil is usually crumbly and porous.

*How Topography Affects Forest Species*

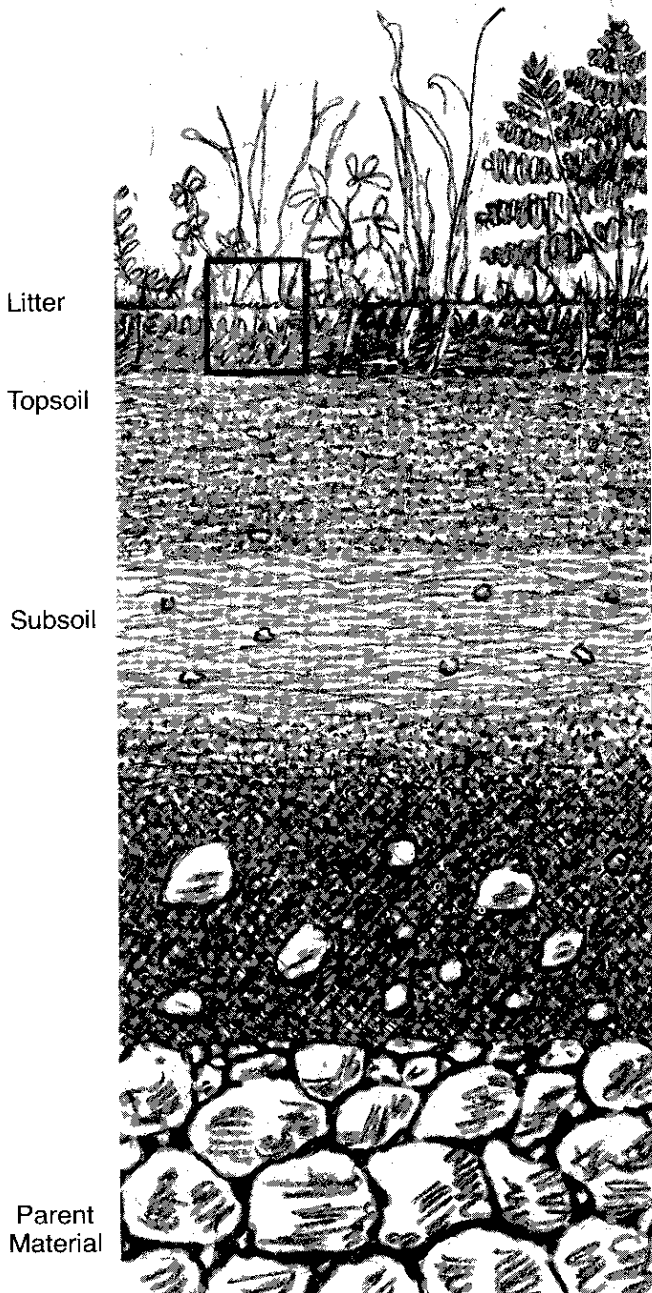






If soil is rich in nutrients, it has a lot of decomposers—the earthworms, bacteria, fungi and micro-organisms that help break down decaying organic matter. Some soils hold the right amount of water and enough of the nutrients that plants need in the topsoil. Other soils hold either too much or not enough moisture and therefore limit plant growth.

Over a period of time trees have adapted themselves to particular types of soil. Many trees grow on very specific soils. The longleaf pine of the South needs little water and grows best in sandy soil. But most species need fairly deep and well-drained soil. The baldcypress trees likes the heavy mucky soils of swamps. The red maple of the Eastern forests can grow in dry clay soils or in swampy peat bogs. This tree has a better chance of adapting to future changes in soil content than trees that need a specific soil type. To see the relationship between soil moisture and forest cover types, turn ahead to **Table 1 on page ??**.



### *Things You Can Do*

1. Find examples of micro-climates in your forest. Look around for changes in moisture and temperature. If you did not measure forest temperature in Unit A, take a thermometer with you to record the temperature at different places on the forest floor. Take readings in a sunny spot between the trees, in a meadow or other open area, then under a thick canopy of high trees. Also measure the temperature at different heights off the ground. If your results are different, explain why.

2. Draw a picture of what your forest area would look like if an ice age came and there was never any summer. Think about what tree species would become extinct and which ones would adapt. How could the ice age affect other life forms in the forest?

3. Visit a spot that was once damaged by fire. List what plants grew in the spot before the fire and what grows there now. Make a display of the different effects of fire, both good and bad. If a fire tower is located nearby, visit with the lookout to learn how fires are spotted.

4. Find a tree identification book for your state or region. Identify trees and other plants that grow in your forest area. Which trees grow on flat land and which grow on hills? Which ones grow on mineral soils without litter, duff or humus?

5. What happens to the soil in your back yard or park after it rains? In your notebook describe a place where plants are growing and a spot that is bare. Compare the two places. In which spot is the soil being washed away? Find a place in your forest where the same thing is happening.

## Meeting 5

### How Animals, Insects and Plant Factors Affect Forest Growth

Other main factors affecting forest growth are. . .

#### Animals and Insects

In a forest, wildlife and plant communities depend upon each other for survival. The animals and insects benefit from living in the forest in many ways. The forest provides them with food and shelter and a place to raise their young.

Some animals live only in certain trees. In Northern Michigan a bird called the Kirtland warbler nests only in jack pine. Lately the number of jack pines in the forest has decreased because of fewer fires. (Remember how the jack pine needs fire to reproduce?) With fewer places to nest, this bird is now on the endangered species list. It may become extinct.

Animals and insects affect how plants grow. They help trees in some ways and hurt them in others. Some plants rely on wildlife to carry their seeds or pollen so that they can reproduce in other areas of the forest. Plants obviously cannot walk around to do this for themselves. Birds such as the woodpecker, the pine marten and the owl help trees by eating insects or animals that may harm the trees.

Some wildlife species may limit forest growth. Bear and elk can damage trees by rubbing themselves against the bark. Deer eat seedlings and also feed on the leaves and twigs of older trees. Porcupines feed on the inner bark of both conifers and broadleaf trees. Smaller animals like rabbits, mice and chipmunks eat seeds and very young trees. Farm animals, such as cattle and sheep, eat away the low vegetation. They also trample the ground with their hooves, and make the soil of the forest floor so hard that water cannot soak in easily. Birds such as the yellow-bellied sapsucker damage trees by pecking into the sapwood. This leaves the trees more open to diseases and weakens the future timber taken from them.

But when these animals leave their waste behind, or when they die, they actually help to fertilize the soil. Better soil makes for better trees. This is another example of the balance in the ecosystem that we studied earlier.

Harmful insects may eat away forests. The gypsy moth larvae feed on the leaves or needles of trees in our eastern forests. Blown by the wind, these insects can actually eat away many tree leaves for miles around. Sometimes the only trees to survive are those least tasty to the insects.

All plant eaters have enemies called *natural predators*. The plant eaters rarely destroy an entire forest, because the natural predators limit their numbers when they are present. Some of these predators are animals. Some are insects like the wasp and the praying mantis, who may eat the adults or the larvae of the plant-eating insect population. In well managed forests a variety of natural predators exist to keep the ecosystem working well. (Some harmful insects recently brought into our country, including the gypsy moth, still do not have natural enemies here and so must be fought in other ways. Scientists have developed chemical pesticides and, more recently, have discovered bacteria, fungi and viruses to help fight these harmful insects.)

Remember how the food chain works when you think about how wildlife affects forest growth. How could an increase in the-number of foxes help forest growth? What changes might occur in the forest if the hunting season on animals lasted longer than it does now? These changes may be helpful in some forests and harmful in others.

#### Plant Factors

How is it that the giant redwood tree in California can grow as high as 360 feet or more? How can the bristlecone pine grow to be over 5,000 years old? The trees around them remain much smaller or die much younger, even though they have the same climate, land form, soil and wildlife species. Why can't they grow as tall or live as long as the redwoods and the bristlecone pine?

Forest growth also depends upon the needs of the individual species. Different trees need different amounts of water, sunlight, warmth and nutrients to grow. Some trees have more growth power or hormones to help them to grow long plant shoots. Some plants are more likely than others to suffer from the attack of certain kinds of insects or certain kinds of disease. Some trees have better methods of spreading their seeds than others. For example, compare the way the jack pine spreads its seeds with the way of the dogwood.

Foresters call these traits *silvicultural characteristics*. The word "silviculture" comes from Latin. "Silva" means forest and "culture" comes from a word meaning to cultivate, or to prepare the ground for growing plants. Each species has its own silvicultural characteristics which makes it different from all other tree species. Foresters use the known silvicultural characteristics of various tree species in their management practices.

Plants in the forest must compete with each other for survival. Trees that need full sunlight to grow are called *intolerant* species, because they

cannot survive in the shade. the Douglas-fir is one example of an intolerant species. Trees such as the red alder, which can grow more quickly than the Douglas-fir in early years, have an advantage over the Douglas-fir in the fight for light and space.

## Things You Can Do

1. When you visit your forest, think more about the different influences upon it. Look for the following . . .

a. a place where animals or insects have eaten plant growth

b. a place where insects have laid their eggs

c. some plant or animal matter in the process of decaying

2. Find at least one example each of organisms that live in the forest soil, on the forest floor, in the undergrowth and in the trees. Record this information in your notebook.

3. Describe what evidence of animal activities you find in and around trees. Look especially for animal tracks, and learn how to make a plaster casting. In your notebook, list the animal, the kind of tree affected and what the animal did. You may want to use a camera to record some of your findings.

4. Construct an exhibit or display on forest insects. Show how natural predator insects are beneficial to the forest ecosystem and to humans, and show how harmful insects destroy forest growth.

5. Make an exhibit of common forest tree diseases (such as Dutch Elm disease) including their effects on forests and methods of treatment.

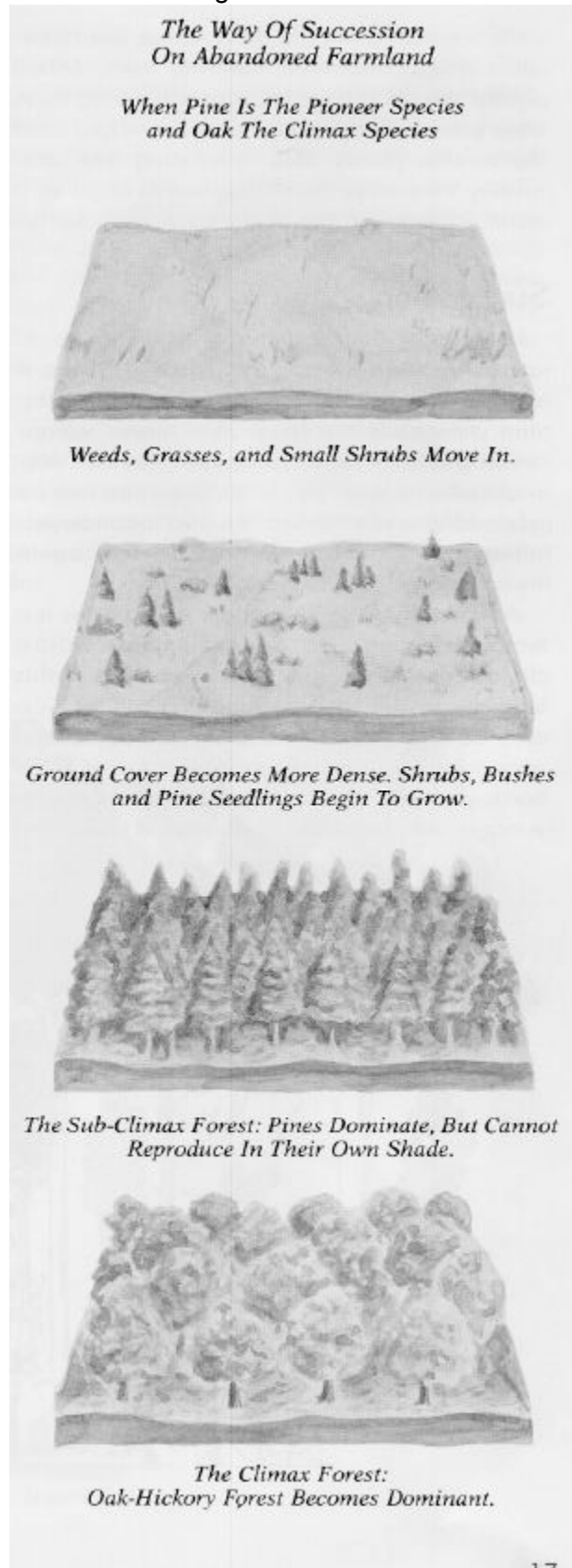
## B-3 Forest Development and Forest Regions

### Meeting 6

#### How Forests Age

Just as an individual tree has a history, so does a forest. At some point in time your forest started on bare ground. The bare ground may have been a natural opening, or one made by humans, without any plant cover. But then lichens and similar plants started growing on bare rock or soil. Slowly moss began to grow, too. Ferns and then short grasses and shrubs probably followed, growing on the soil. Gradually a mixed plant life grew. Large shrubs became intermixed with the first trees, called pioneer *species*. If there was

enough water, these trees grew quickly, and shut out sunlight from the smaller plants. This developing tree community may have lasted thousands of years if natural forces like fire or storms did not change it.



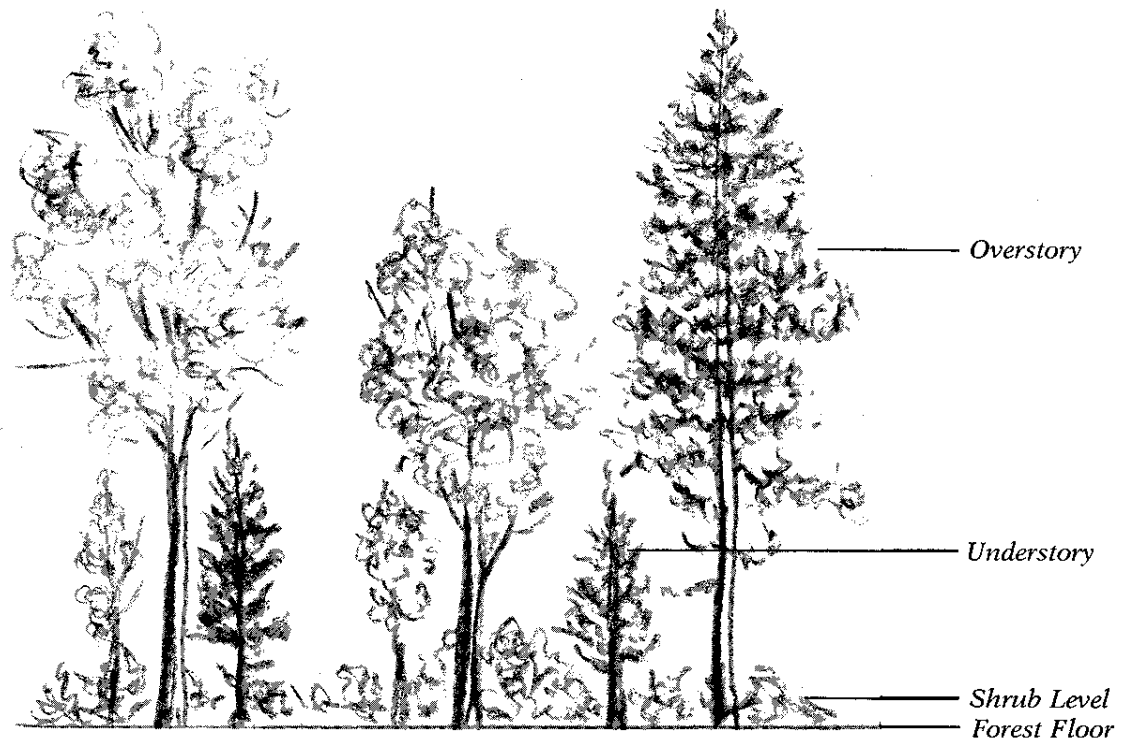
## Succession

If the forest reaches the stage where the vegetation stays the same over a long period of time, it is then called a climax forest. The process of long term changes in the forest as it moves toward climax growth is called *succession*. For instance, an area that was once a climax forest may now be in farmland or another use. If it is left abandoned, nature may reclaim this land and move again toward climax growth.

A forest made up of pioneer tree species is a temporary stage in nature's movement toward a climax forest. Let's look at an example of this kind of growth. Loblolly pine is a conifer—a cone-bearing tree. After it is harvested, the land may not grow another conifer but rather some hardwood tree. The hardwood tree has an advantage over the conifer because it is tolerant of shade. This hardwood may have been lying in the understory until the pine died or was harvested. The hardwood can still grow with less light, and can "shut down" its growth process during the winter season. A hardwood tree, like the beech, might adapt itself better to conditions than the pine tree. The Loblolly pine in this case is called a *sub-climax* species and eventually would be replaced by the climax species, the beech, if it is not quickly replanted by foresters.

Climax forest ecosystems are very resistant to widespread change. Insect attacks, diseases and other disturbances generally do not hurt these forests as much as they do sub-climax forests. Climax forests are also less affected by the loss of a single plant or animal species, because there are enough other species to take their place. But climax forests contain timber that is sometimes less valuable in a commercial sense. It takes longer for the trees in a climax forest to grow a mature stand. Some of the trees may be very old and decayed. Sub-climax forests may grow more usable timber, but are more likely to be heavily damaged by the forces of nature because the trees are usually even-aged (meaning all the same age).

Ground fires may keep a forest in a sub-climax stage for a long time. A few years back, fires swept through the Blue Mountains of Oregon. Each time after they were finally controlled, the white fir, a climax species that is tolerant to shade, slowly began to take over many areas of ponderosa pine forest, which is a sub-climax species. The ponderosa pine needs full sunlight to grow well. It was "shaded out" by the white fir. But as new fires flared up across the land every 10 years or so, the white fir trees were burned. The ponderosa pines kept growing because they were not destroyed by fire, and won out over the white fir. So, because of fire the forest remained in a sub-climax stage.



## Forest Levels

Just as the soil has several layers on the forest floor, forest trees can be grouped into several levels. The trees that grow largest in a stand are called dominant. They receive full sunlight from above and partial light from the side. Their crowns are larger than those of other trees. The co-dominant trees, or medium-sized trees that receive sunlight from the top but not very much from the side, grow in between the dominant trees. These trees form the canopy, or the "roof" of the forest. Intermediate and suppressed trees make up the understory. These trees are shorter and overtopped because the dominant trees block most of the light. Below the understory is the shrub level, including grasses and ferns. Nearest the forest floor are the mosses, lichens and other small plants.

Some forests feature all of these levels, but many forests do not. Your forest area may have only tall trees, and no shrub level. In other forests you may find it difficult to tell the difference between levels. Have your leader help you with this.

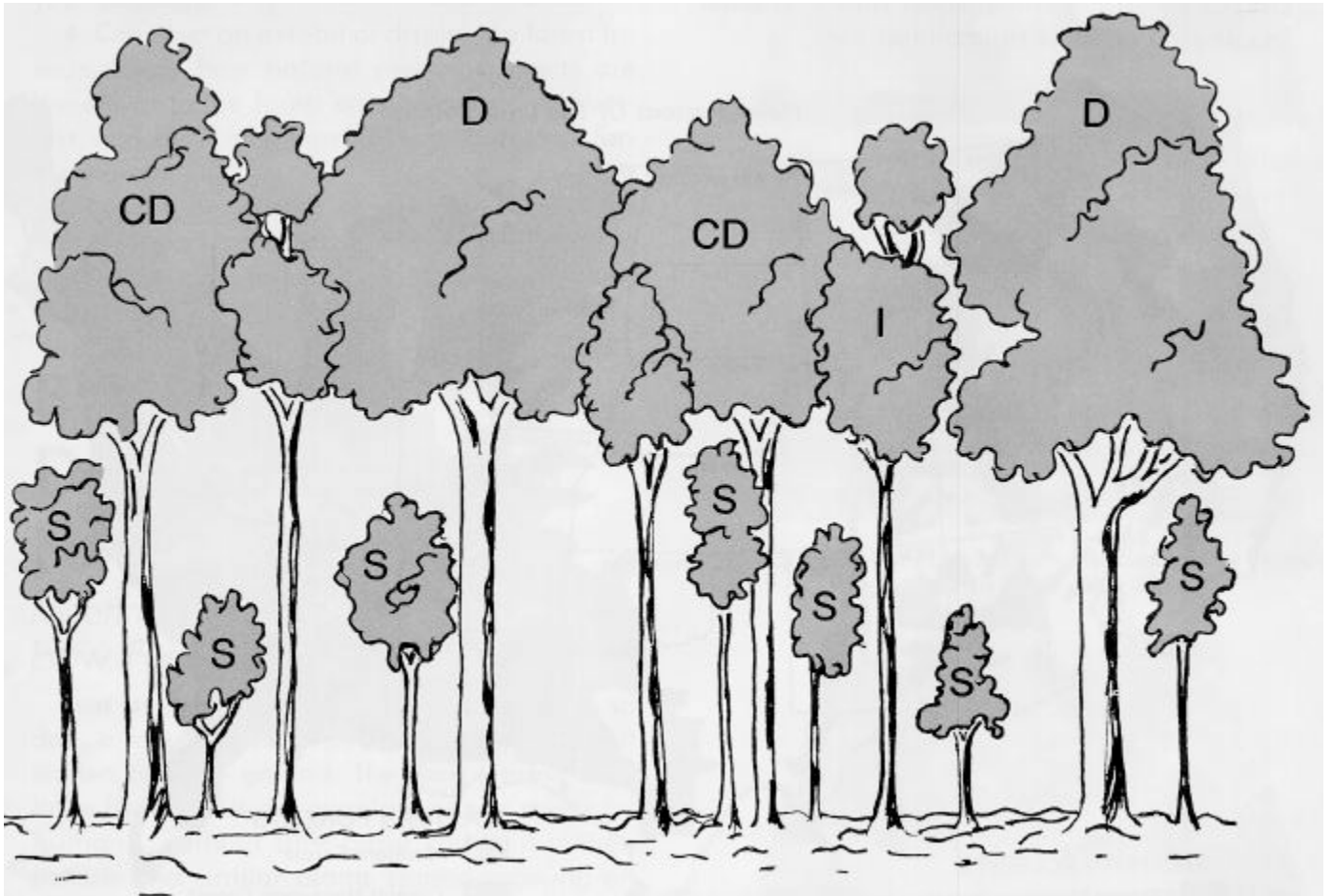
## Things You Can Do

1. Agricultural crops are one example of subclimax growth. If we do not re-plant each year, another plant community begins to grow. Find a field near your home that was once used to grow crops but which now grows wild. Describe in your notebook what plants are growing there now. Compare them to what was growing there before.

2. Find what you think to be the oldest tree in your forest. Estimate its age, and write down how you figured the tree to be this old.

3. Visit a section of the forest that has been harvested. Estimate the year of the cutting by figuring the age of the trees that have grown up in place of the trees that were cut.

4. Make a list of "sudden" changes that you have seen in your forest that were made by natural forces or by people. These could be changes caused by fire, storms, insect attack, disease, logging practices or agricultural use.



*Tree Crown Classes:  
D, Dominant; CD, Co-Dominant  
I, Intermediate; and S, Suppressed*

## Meeting 7 Forest Regions and Cover Types

### Forest Regions in Eastern Forests

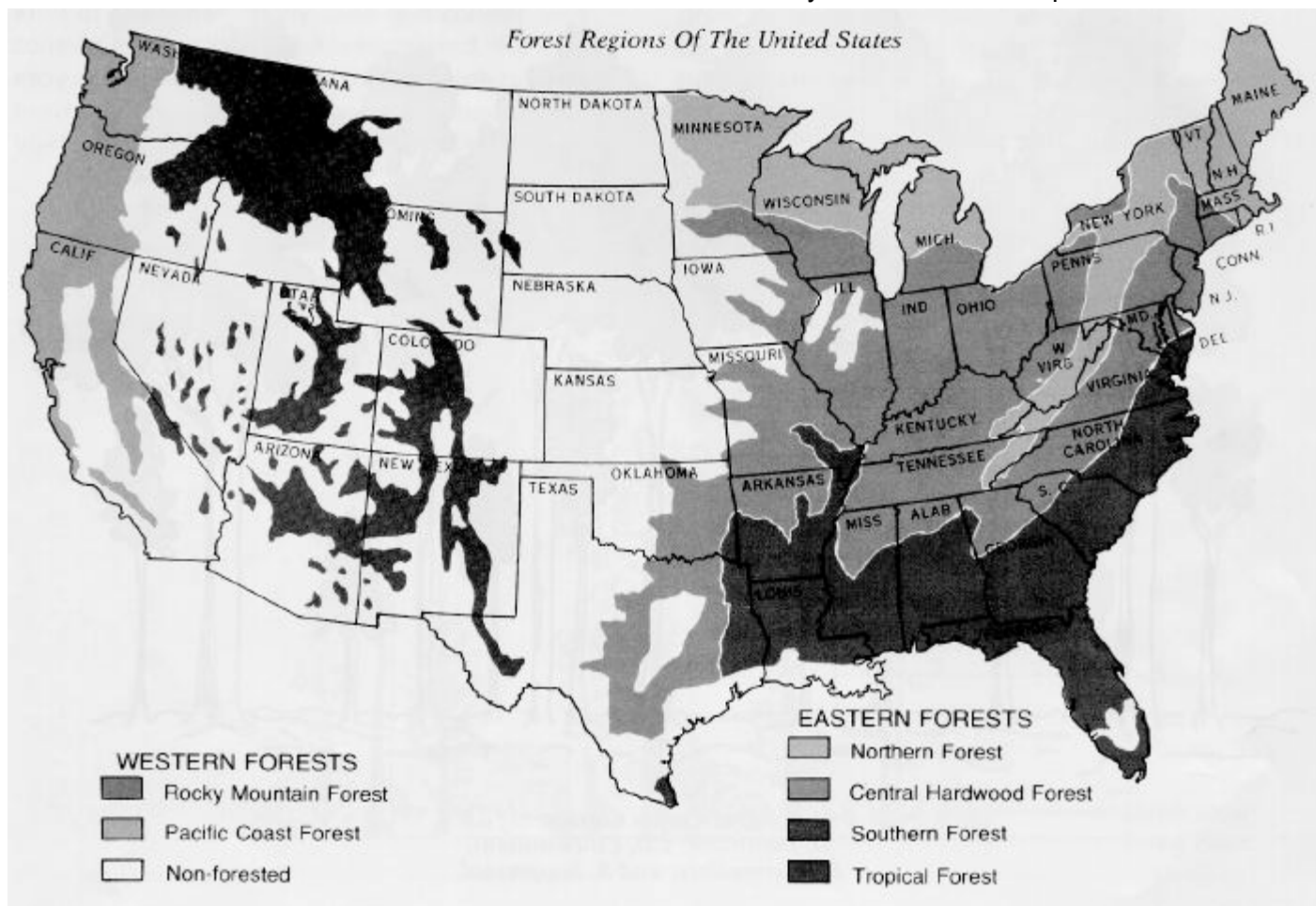
In the eastern part of the United States there are three major forest regions. These are the northern, central hardwood, and southern forest. This classification has been determined according to the kinds of trees and the number of each kind found on the land. Florida and Texas have small areas of tropical forest. Large unbroken forest areas still exist in some parts of the eastern half of our nation. These are in northern New England, northeastern New York, parts of the Great Lakes states, central Pennsylvania, and the Appalachian region of the South Atlantic and Gulf states. Other forest lands are mainly in small tracts on farms and other small properties. These small forests make up two-thirds of the total forest land in the United States.

The eastern regions contain only about one-third of the nation's standing sawtimber, meaning those trees large enough to saw into boards. Yet, over half of the annual harvest comes from these forested areas. About one-fourth of all sawtimber

in the eastern forests is southern yellow pine. The yellow pine forests have enough moisture, good soils and favorable temperatures to provide for a rapid growth rate.

There are more than 150 different commercially important tree species in the eastern forest. Foresters plan pine regeneration on pine sites and hardwood regeneration on hardwood sites. New stands of pine are started by planting nursery-grown seedlings or by direct seeding with aircraft or ground equipment. Some hardwood tree seedlings are also planted to make sure that there will be enough of that kind of timber for the next harvest, and to control the natural dominance of other species.

There are about 5,000 wood products made from eastern forests. The best markets for forest products are the urban areas of the eastern part of our country. Cities such as Boston, New York City, Baltimore, Norfolk, Washington D.C. and Atlanta use many wood products. A few of the many wood products from the eastern forest are lumber, plywood, furniture, turpentine, paper, utility poles, piling, rayon, baseball bats, firewood, charcoal, railroad ties, pine oil, musical instruments, caskets, cellophane, solid alcohol, paints and varnishes. You may want to add other products to this list.



The Northern Region of the eastern forests covers most of New England and New York. It extends southward over the Appalachian Mountain highlands to northern Georgia and westward into the Great Lakes state, including most of Michigan, Wisconsin and Minnesota.

The Central Region covers a large part of the central portion of the eastern half of the United States. It extends almost to the Atlantic Coast. It starts in Southern Minnesota and extends eastward to Connecticut. Excluding the southern Appalachian Mountain Highlands, the Central Region extends south through the Cumberland Plateau to the northern parts of the southern states.

The Southern Region provides the most important source of softwood (pine) sawtimber in the eastern United States. This region extends along the Atlantic and Gulf Coastal Plain from eastern Maryland to eastern Texas. It includes parts of Missouri, Arkansas and Oklahoma.

The Tropical Region covers a very small area. This region includes the Florida Keys, the southern tip of Florida and a 200 mile coastal strip in Texas from the Mexican border to Corpus Christi.

## Western Forests

The main forest regions of the western forests are the Rocky Mountain, Sierra Nevada, Cascade and Pacific Coast. Here, there are large bodies of timber extending over the main mountain ranges of the west. Large areas of the dry foothills are covered with low forests of juniper and pine.

Heavy stands of Douglas-fir, spruce and hemlock grow in the Pacific Coast Forest region. In the southern part of the region, the timbered lands are surrounded with narrow margins of low hardwood trees or chaparral. About two-thirds of the nation's sawtimber is in the West. One-fourth of this total is Douglas-fir.

**TABLE 1**

Soil Moisture	Region	Major Uses
Dry Average Wet	<b>Northeastern Forest Region</b> Jack pine Northern pin oak Aspen Gray birch – red maple Black spruce Black ash – American elm – red maple	pulp, sawtimber, wildlife lumber, pulp, aesthetics, recreation boxes, pulp, aesthetics furniture, lumber, aesthetics pulp lumber, pulp, aesthetics
Dry Average Wet	<b>Central Forest Region</b> Post oak – black oak Pitch pine White oak yellow-poplar – hemlock Atlantic white-cedar	railroad ties, pulp, lumber lumber, pulp Furniture, barrels, lumber, wildlife Furniture, lumber, pulp fences, lumber, small boats
Dry Average Wet	<b>Southern Forest Region</b> Sand pine Longleaf pine – scrub oak Swamp chestnut oak – cherrybark oak Sweetgum – yellow-poplar Pond pine Baldcypress – water tupelo	pulp poles, piling, lumber, pulp pulp, lumber, veneer, furniture furniture, lumber, pulp lumber, pulp lumber, pulp
Dry Wet	<b>Tropical Forest Region</b> Mahogany Mangrove	wildlife, aesthetics prevent soil erosion, aesthetics, wildlife
Dry Average Wet	<b>Rocky Mountain Forest Region</b> Ponderosa pine Rocky Mountain juniper Western white pine Western larch Grand fir Engelmann spruce – subalpine fir	lumber, paneling wildlife, aesthetics, posts lumber, paneling, veneer lumber, plywood, poles lumber, pulp lumber, aesthetics, watershed
Dry Average Wet	<b>Pacific Coast Forest Region</b> Arizona cypress Aspen and cottonwoods Sitka spruce Western red cedar Douglas-fir and western hemlock Red alder	posts, stakes, corral poles boxes, crates, pulp furniture, doors, sash, pulp shingles, lumber, posts, poles lumber, plywood, pulp furniture

The western forests have been supplying nearly half of the timber cut each year for lumber, pulp, piling, veneer, plywood, laminated timber, particleboard and chemicals. However, an increasing share of the total volume of timber being cut is now shifting to the eastern forests, especially as the use of wood as an energy source is increasing.

The timber growth rates vary greatly. Moisture, elevation, slope and soil types affect how trees grow. The drier and higher elevations produce the poorest growth conditions, especially on shallow or rocky soils. The best growing places are on deep well drained soils at middle elevations. Most of the commercially important trees in the West are conifers.

Markets for western forest products include such western cities as Seattle, San Francisco, Los Angeles, Phoenix, Denver, as well as many central and eastern urban centers.

The Rocky Mountain Region of the western forests is spread over a vast expanse of mountains and high plateaus. The Rocky Mountain forest region is in the centralwestern part of the country reaching from Canada to Mexico, a length of about 1,300 miles. It stretches from the Great Plains to the great basin of Nevada and eastern parts of Oregon and Washington, a width of about 800 miles.

There are many kinds of soils and climates across the United States. These give us over 1,000 different native species of trees. For various reasons many more species have been imported from other countries. There are 106 forest types in the eastern forest regions and 50 in the western regions. A few examples of forest types and their uses to people are given in Table 1 on page 15.

### *Things You Can Do*

1. Using the map of U.S. forest regions, locate and trace the borders of the six regions of the eastern and western forests. Make a list of states that have little or no forest land. Make a list of states with only one type of forest land and a list of states with two or more forest types. You should have three lists, each labeled clearly.

2. Make an exhibit of the more common timber types of your state or region. Use photos, sketches or wood products that correspond with each timber type. Name the species, and if possible, make a map that shows their distribution. (Refer to Unit A for instructions on getting specimens and preparing exhibits of a tree's foliage, fruit and bark.)

3. Select one forest type you have identified in your forest. Write a description of the plant cover

as you saw it on the ground or the understory of the forest. Include a drawing if you wish.

4. Learn the difference between a national forest and national park. Write down two or three characteristics of each. Find out from a history book the efforts of President Theodore Roosevelt to establish these systems and report to the group.

5. Read about the giant redwood or the sequoia trees and make a report to club members. Illustrate the report so that the age and size of these trees are shown in comparison with other trees or objects.

## **B-4 Forest Management**

### *Meeting 8*

#### *Gathering the Facts*

In Unit B-2 we discussed various influences on forest growth. These were climate, topography, soil factors, animals and insects and silvicultural characteristics. Many times people themselves are a very important influence on how forests grow. The amount of land changed somehow by people increases each year. We should consider these changes to be important in the future management of our forests.

(Before going on you may wish to go back to the introduction to review forest values.) The forest manager has to make plans and choices in deciding which values to seek in a particular forest. This unit's meetings will help you learn how we get the most value from our forests.

At one time forests covered much more of our country than they do today. For hundreds of years nature was the only manager of our North American forests. North American Indians used some management practices such as agriculture and prescribed burning. They set fires for warfare, to open up travel routes, to allow more small plants to grow for game animals to eat and to run these animals out of hiding for a richer hunting area. But overall they changed very little of the vast amount of forest land on our continent.

When the European settlers arrived, they changed the forest quickly. They harvested timber for fuel, ship building and homes. They sent wood back to Europe, too. Some of these people had different beliefs about forests than we do today. To the early settlers, trees were in the way of progress. They had to be removed as quickly as possible for homesteading and farming. Many times the settlers simply set fire to the trees and let



them burn. At that time there was plenty of forest land, and not enough open land, so they did not feel wrong in doing this. In time more forests were cut down, and homesteads became settlements.

Our country came to realize that as cities grew, our forests were decreasing both in size and quality. About a century ago the federal government passed a law to set aside special vested areas to be owned by the people. These areas became the basis of the National Forest system.

We still do not fully understand how nature manages the forest ecosystem. Therefore many times people can spoil resources without realizing what they are doing. But through careful scientific research we have learned how to change the forest for the better. For example, a well managed forest will actually provide more water and wildlife than most climax forests. But to be successful managers of our different uses of the forest, people must work in harmony with nature.

## Management And Land Use

Management is planned, orderly ways to reaching goals. Forest management isn't just for large forest-industry holdings or publicly owned forests. It is needed on even the smallest of farm woodlots. When the area is small, the manager may not have as many goals. The opportunities for management may be few, but the need remains.

Owners of private woodland are becoming more mindful of community values. Nevertheless, many forest owners still have the idea that land is theirs to do with as they please without consideration for others. For example, one landowner may control the watershed for a whole community. This owner may decide to graze goats or sheep on the land. If the owner is not careful, over-grazing can kill the plant cover. Then rainfall runs off rapidly, carrying along soil and causing floods. Meanwhile during dry periods, very little water will soak into the ground to feed springs and streams. Silting damages streams and reservoirs. Actions such as these have an impact on not just the owner, but the entire community.

The future use of the land involves not just one person but many people. Good forest managers consider community needs and proper use. The wisest plan for a landowner is a single use. This may mean harvesting, setting aside the land for

aesthetic purposes or using it for recreation. On private land a single practice may allow some other use in the future. For example, the owner who used his land to harvest some fine oak timber may find increased hunting for rabbits, quail and other game animals. A new plant cover replaces the harvested oak, and different food is available for different wildlife.

A more difficult plan is multiple use of land. This attempts to take into account many needs and values over the same period of time. The same general forest area may produce water, wildlife, wood and other forest products and recreation. For instance, let's say the manager of a city watershed is interested in maintaining the water supply. The manager may harvest some of the trees so that more rainfall will reach the surface of the watershed. As a result of more openings in the trees, some wildlife habitats are sacrificed but other kinds are gained.

In multiple-use forestry all the uses have to be well-managed over the entire forest for the maximum benefit of the people. Some uses, if improperly managed, may conflict. Such as poor logging practices and recreation or horsback trails and motorized bike trails. Foresters and land planners must be careful to prevent conflicts between different users of the forest. One special use of specific areas of our national forests is wilderness. By its very definition, a wilderness does not permit any non-recreational uses.

To gather facts needed to make decisions about forest trees, managers often use the cruise method. This is a plan for gathering information on timber volume and growth, as well as other important facts about the forest. A complete cruise is a listing of all the facts known about a given forest. Some cruises are made from measurements of sample plots or strips through the forest. Some are made from aerial photographs.

The forest manager must think of costs and benefits. The manager must think economics. He or she must ask such questions as how much the stand is worth now, as compared with the future, or what will be the future dollar value of the increased tree growth as a result of thinning the trees. A land manager's job grows more difficult when other values must be considered, such as natural beauty, recreation and keeping the forest ecosystem intact.

### Kinds of Information Obtained in a Forest Cruise

<b>Land</b>	<b>Trees</b>	<b>Community</b>	<b>Economics</b>
soil quality topography location	kinds quality quantity	recreation watershed protection natural beauty	markets price cost

*Timber* is a term applied to trees that have a certain size and quality. This wood is used for making lumber, plywood and beams for building and construction. What is left over in the making of the lumber is then made into chips for paper and fiberboard. The commercial values of a standing tree may differ greatly. Its value in dollars depends on the species, quality and location of the tree. (A local forester can explain to you how the commercial value of a tree is decided.)

For example, consider the following case. A stand of 24-inch diameter trees 100 feet tall may contain thousands of board feet. If the stand is sold to a timber buyer while it is standing in the forest, its lumber could be made to build valuable wood products. This same stand may be worth much more if it forms a shady grove on a street or in a city park. We look on this stand then as valuable not for timber but for shade and beauty. It is much more difficult to put a dollar value on a stand of trees that is appreciated more for its beauty than for its timber.

### *Things You Can Do*

1 . Construct a map showing the extent of North American forests in the years 1600 and 1900 as compared with today. Use your encyclopedia for help.

2. How would you show the person who over grazes that the forest ecosystem may be upset? Think of the different natural cycles taking place in the forest, and how plants and soil rely on each other. Draw an example of this interdependence and label the different parts.

3. Name the three best trees in your area for street or park planting. Give several reasons why each is considered best. Visit your city planing commission to find out what trees they suggest for planting on city streets and in parks.

4. How can we determine the value of forest recreation benefits? Is it fair to charge campers, picnickers, horse riders, hikers, vehicle drivers, fishermen, hunters, wilderness seekers and others for their recreational use of forests?

## *Meeting 9*

### *Forest Management Practices*

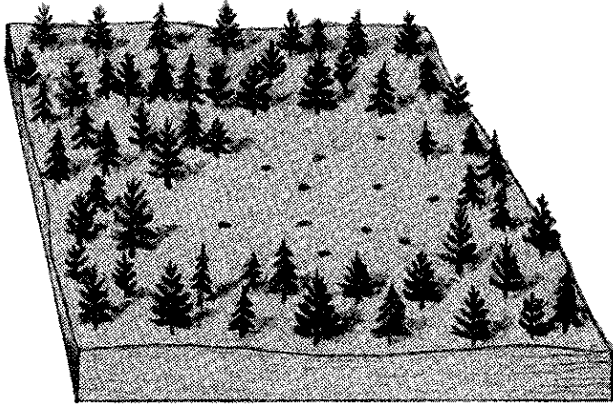
Once a forest manager gathers the facts and sets his priorities, the manager must decide which practices will best meet the community's goals. To produce a steady supply of wood products, wildlife, water and recreational sites, foresters must use various practices to manage forest resources, such as:

- a. Insect and disease control
- b. Fire control and prescribed burning
- c. Harvesting practices
- d. Thinning and pruning
- e. Reforestation

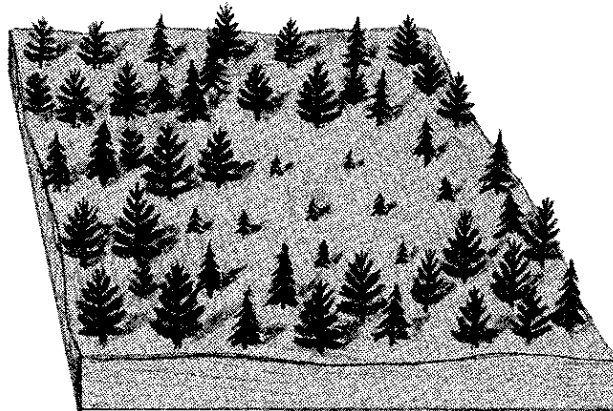
We already know the effects that insects, disease and fire can have on forests, and a little about how they can be prevented or controlled. Below you will read about ways forest managers harvest and regenerate the forest. Foresters can use certain harvesting practices that not only provide timber, but which meet other goals as well. For instance, planned tree cuttings and other management practices can improve food supply and cover for wildlife. Often wildlife can be encouraged without giving up other goals.

In some cases sacrifices must be made. Management is needed to help the endangered red-cockaded woodpecker. This bird needs old living pines with decaying heartwood. This is where it builds its nests. To provide trees for nesting, the forester must keep some older trees which will not be sold. This is a sacrifice. Besides loss of money, this practice can result in tree snags which may be struck by lightning or blown over. In this case, the forest manager must decide which value is more important, and then choose one or the other.

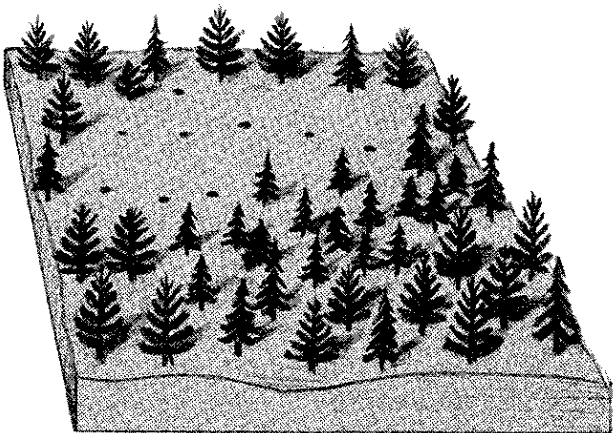
## Clearcutting



*The Forest is Divided Into Blocks That Are Cleared at Different Times. After Some Period of Years, The Forest Will Contain a Mixture of Age Classes in Even-aged Stands or Blocks.*



*Remaining Trees Must Protect The Soil and Wildlife Habitats. The Clear-cut Area is Either Planted With Nursery Stock, Seeded or Left To Be Re-seeded Naturally.*



*Once the Clear-cut Area Begins to Grow Back, Another Section is Harvested For Timber.*

## Clearcutting

Clearcutting is a harvest system that removes all the trees in a stand at the same time. The size of the stand may vary greatly. A few clearcuts are as little five acres. Large clearcuts of 40 to 200 acres are called patchcuts. In order to make sure that the area continues to produce desirable trees, foresters usually re-plant or reseed soon after cutting.

People disagree over the use of clearcutting in some forest areas, especially where a large acreage is involved. Clearcutting allows higher wood production of intolerant species. It also allows those trees that need much sunlight (such as the Douglas fir) to grow more quickly without competition from other tree species. These kinds of trees are important to some forms of wildlife. But large patch cuts without proper care bring increased danger of soil erosion. The great change in tree species during harvest and re-planting can greatly change the habitat for various forms of wildlife. The ecosystem is much simpler, and the forest is more likely to be harmed by disease or insects.

## Selective Cutting

In this type of harvesting, individual trees or groups of trees are harvested from time to time on a regular basis over a longer period of time. Timber harvesters make a number of light cuttings as the trees mature. In selective cutting the forest keeps trees of different ages. This is called an all-aged forest. An all-aged forest supports more varieties of wildlife and can better resist natural attacks of disease and insects.

Most softwood varieties of trees, such as pine, fir and redwood, do not regenerate as well under this system. They are naturally replaced by climax species that are more tolerant to shade. Another problem is that wind and ice storms can damage the open stands that are left behind after cutting. In general, timber production is less under this system than under clearcutting.

Both clearcutting and selective cutting are good forms of harvesting in certain areas. The forest manager must decide when to use which system of harvesting.

## Seedtree and Shelterwood Regeneration

Seedtree regeneration is one of the oldest ways to start new crops on a harvested area. It can only be used with those tree species that regenerate by releasing lightweight seeds to the wind. When loggers harvest they leave behind enough of the best trees in each acre so that the forest can reseed itself. This is an inexpensive way to produce a new stand of trees, with little disruption of the ecosystem. But seedtree regeneration is not always efficient. The forest manager has no control over how the seed is spread or how many trees of what species will grow as a result. There could be up to a seven-year wait for enough seedfall to begin a new crop.

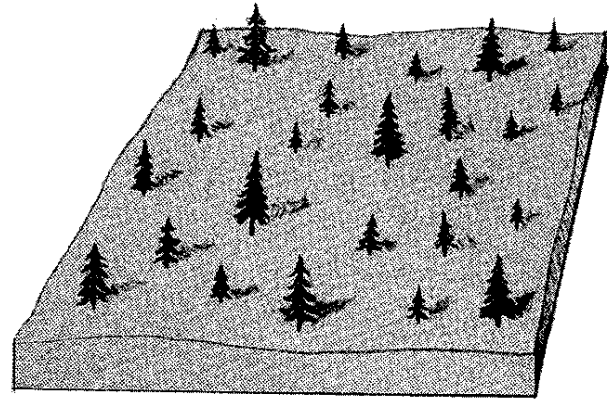
Shelterwood regeneration is like seedtree regeneration, but allows more trees to stand to reseed the area and to protect the new seedlings. It still takes a long time to reforest an area with this method, because two or more cuttings are needed.

### Planting and Seeding

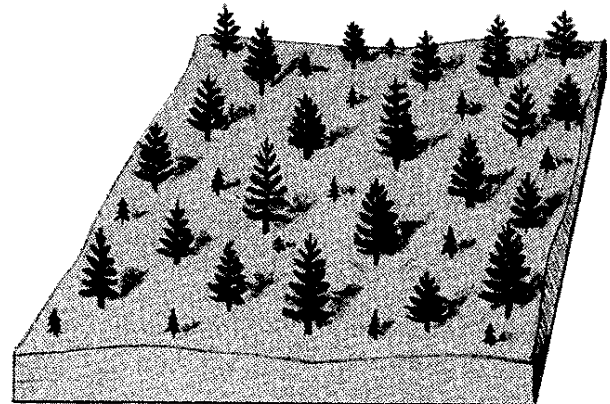
Tree seedlings may be *planted* by machine or by hand. The advantage of this method is that the most desirable species will be present and will have proper spacing to allow the best growth conditions. Forests areas can also be *seeded*, either by hand, machine or aircraft.

Seeding is used often in areas that are too rough to machine-plant. This is a good method when large areas need to be reforested quickly, such as after large forest fires. Genetically improved seeds that are resistant to harmful insects and diseases may be used to give better growth. Seeding costs more than direct planting, but the results are often worth the extra expense. But with this method the number of trees growing in the same area cannot be controlled as easily.

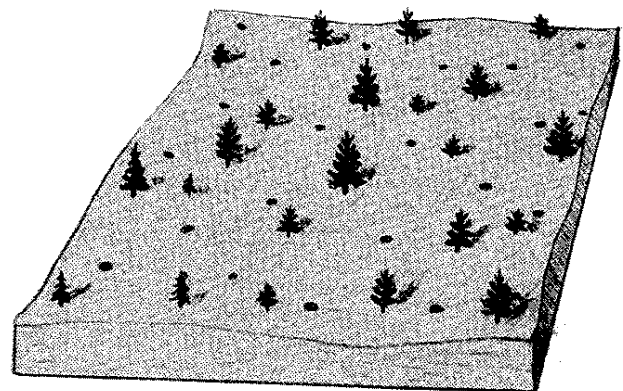
*Seed-Tree Method*



*A Large Area is Cleared,  
Leaving Seed Trees Spaced Evenly for Seed-drop.*



*Seed Trees Provide Seed for New Growth.*

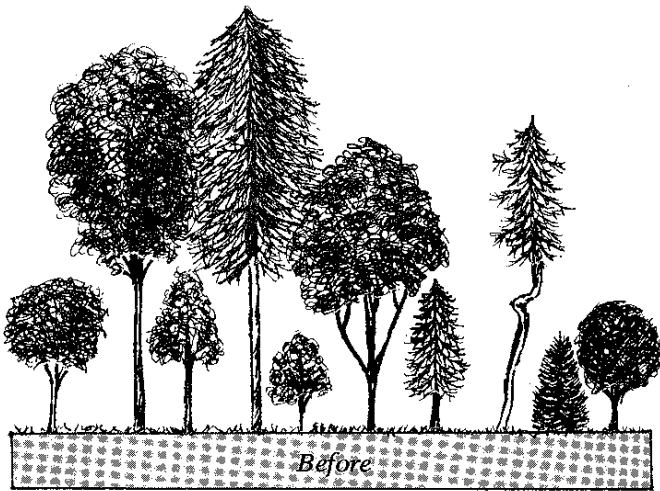


*Seed Trees and Deformed Trees  
Thinned Out in One or Two Cuttings.*

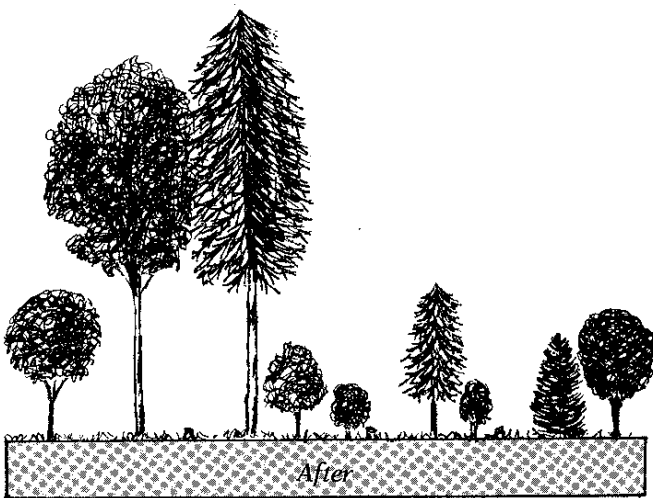
## Thinning

Forest managers can increase growth in young timber stands by thinning. They remove the poor quality and slow-growing trees and allow the most desirable trees more space for their crowns and roots to grow. This improves the quality of the stand and reduces crowding. The remaining trees become stronger, produce more usable wood fiber and are less likely to be damaged by insects or diseases.

*A Stand Of Trees Before and After Thinning*



*Overstory Trees Of Poor Quality  
and Suppressed Trees In Need of Thinning.*



*Undesirable Trees Thinned From Below;  
Dominant Trees Left Standing.*

## Things You Can Do

Select one or more forest management practices, such as clearcutting or thinning, and find out as much as you can about it. If possible, visit one or more areas that have received this treatment and make your own observations. Report your findings to your 4-H group. Be sure to include disadvantages as well as advantages. Tell under what conditions the practice should be used and under which conditions it should not.

2. Management objectives. Select a forest area or a park and interview the manager of the area to find out

a. what objectives and practices are followed and  
b. if people disagree on proper management practices.

You may wish to mail a questionnaire to the manager if you cannot arrange an interview in person. When you have gathered the information, prepare a report on the results.

3. Make a model section of the forest out of sticks or twigs. Label them with the names of different trees. Make a plan for multiple use of the forest, including recreation, watershed protection and timber harvesting.

4. Make an exhibit on the history of advances in logging technology, or on the various stages involved in making lumber in a modern sawmill.

## B-5 The Dollar Value of Forests

### *Meeting 10 Forests Employ People*

Not every member of the 4-H Forestry Program will be able to manage a whole forest in the future. However, there are millions of people in the United States who have forest-related work. Besides those that manage and protect our forest, there are many others who either harvest or sell forest crops or who manufacture wood products. Thousands of communities are directly dependent on our forests to provide jobs for their citizens. They rely upon forest industries and forest recreation to earn a living.

Find out if your community has any of the businesses or other locations listed below. Then add to the list other places that you may know about. Consider touring at least one of these businesses either as an individual or as a group.

Cabinet shop	Logging operation
City watershed	Lumber yard
Certified tree farm	Paper plant
Office of Public Forestry Agency	Pole treating plant
Christmas tree farm	Plywood plant
Fence posts plant	Pulpmill
Fiberboard plant	Sawmill
Forest nursery	Shingle or shake plant
Furniture factory	Veneer plant
Greenery plant	Wood building supply store
House under construction	Wood novelties factory
Laminated wood products plant	Wooden toys factory

## *Things You Can Do*

1. Identify five people in your community who make a living from the care, management and/ or harvest of trees. What are their titles and what kind of work does each do?

2. Visit one or more forest-based places of work with your parent or club leader. Write in your notebook what you learned about product values, salary, jobs and why trees are important to those people and to the community.

3. Using an almanac or encyclopedia, select five countries and make a list of each country's products. Indicate which of these products come from trees and forests. How many did you find? Next, prepare an exhibit that compares our country's wood products with those of another country. Display your exhibit in a public place.

4. If you are interested in carpentry, build a lumber framework house display to show how the home building industry depends upon trees. Obtain some scrap lumber from a nearby lumber yard to use as the wood.

## *Meeting 11*

### *Earning Money from the Forest*

If you live near a forest area, you can have fun and earn extra money by working with and selling forest products. Remember to ask the property owner or manager before you take any products out of the forest. Meanwhile, consider these ways of making money for yourself or for your group:

1. **Cones or Seeds** During good seed-producing years, forest cones or tree seeds are often in demand. Nurseries need seeds for production of tree seedlings.

2. **Floral Greenery** Commercial florists will often pay you to harvest floral greenery in certain parts of the forest. Greenery may be sold with Christmas trees.

3. **Christmas Trees** If you have good quality trees and a good display area you can sell them at Christmas time.

4. **Decorative Wreaths** Decorative wreaths made from evergreen trees are often used during the Christmas holidays. Small corsages fashioned from cones, wood and artificial red berries sometimes can be sold all year-round.

5. **Firewood** People with stoves and fireplaces will buy forest thinnings or logs from dying trees. The biggest demand is during cold weather, so stockpile the dry wood in pleasant weather for fall and winter.

6. **Kindling Bundles** Sawmill or trimmings provide bundles of kindling for people who have fire places in their homes.

7. **Birdhouses** You can use sawmill trimmings or slabs to make bird houses.

8. **Moss** Sometimes florists buy moss for floral displays. People sometimes pack things with moss, too.

9. **Shrubs And Ferns** Homeowners value different species for landscape plantings. Take plants only with the landowner's permission and only from abundant areas. Always leave an ample supply of plants for continued growth. Note that the U.S. Fish and Wildlife Services has placed 800 plants in the continental United States on the endangered species list. Individual states sometimes have their own list of endangered species. If in doubt whether or not a plant is on the list, check with a local botanist or forester for guidance.

10. **Seedlings Raised From Collected Seeds** Seedlings are always needed by persons reforesting the land and by homeowners wanting tree seedlings.

11. **Wild Berries** Huckleberries, blackberries and others can be sold during the season.

12. **Medicinal Products** The drug trade seeks to purchase a number of forest products, including certain barks, seeds, roots and herbs. Cascara bark is an example. In the Northwest, it is best harvested in May and June when the bark is "slipping". Herbs and many medicinal plants come from forests. Check with a local forester about other possible products in your area that may have a market value.

**13. Forest Novelties or Souvenirs** Wooden knick-knacks, cypress "knees", table centerpieces, decorative yule logs, pine owls, candle holders and other novelties may be made from materials that can be gathered in many forested areas. If they are finished with a good level of handicraft skill, such items will enjoy a high market demand at a fair price.

**14. Maple Syrup** Many people extract sap to make maple syrup, especially in the northeastern United States and Great Lakes states. The sugar maple species is the best producer of sap.

### *Things You Can Do*

1. Try to list all the things you have touched or used today that came from trees.

2. Listed below are products that are used in the United States. Which kinds of trees in your forest could be used for one or more of these purposes? The products are

- a. brown paper bags
- b. construction plywood
- c. fence posts
- d. industrial charcoal
- e. railroad ties
- f. siding on homes

Would you be in favor of growing trees in your forest for these purposes? Why or why not?

3. Consider planting a tree on the next "4-H Tree Farm Day" in cooperation with a local garden club or community organization, or with your local park board. Also, help "Clean up America" by picking up litter and improving a recreation area or park.

4. Organize a "Big Tree Contest" in your community. Do you have a big tree around where you live? Persons may nominate trees for the American Forestry Association's National Register of Big Trees by sending the tree's measurements along with the name of the owner, date the tree was measured and a photograph of the specimen to:

National Register of Big Trees  
American Forestry Association  
1319 18th Street N.W.  
Washington D.C. 20036

Trees may also be nominated for state lists of "Big Tree Champions".

5. Hold a "Forestry Fair" where you can hold various forestry competitions or a poster contest. Display your exhibits and crafts items, and sell some of your forest items!

## Conclusion

Congratulations upon completing Program B! By this time you should be well into the 4-H Forestry Program. You now know some important things about trees not only as individual species, but also as part of a forest ecosystem. You learned why forests are valuable, what forests do, and what things affect where and how well forests grow. You found out that forests grow old just like other living things, and that we have many different types of forest land in our country.

You can now speak with some authority on important things to consider in managing a forest, and how you can actually earn money for yourself or your club with forest products.

That's a lot of activity for one manual! But there's more to come. During the course of Unit B you may have become involved with an activity that particularly interests you. No matter what your interest is, chances are that one of the subunits of Unit C will be covering it. Here are the eight separate subject areas planned for Unit C.

- ! Tree Farming
- ! Water, Wildlife and Forage Management
- ! Careers in Forestry
- ! Timber Harvesting
- ! Forest Recreation
- ! Urban Forests and the Environment
- ! The Dollar Value of Forestry
- ! Great Plains Forestry

# Glossary

Forest scientists and managers must learn new terms. When you use new words in talking about the forest, you are actually learning a new language. Below are some terms listed for quick reference. Don't try to memorize these words or their meanings. Look at each word and its meaning. Look at the word again when you want to use it.

**CARNIVORES** - flesh-eating animals  
**CLIMATE** - all air and weather, such as temperature, moisture, wind and evaporation  
**CLIMAX FOREST** - the final stage of a tree and plan/community which has stabilized its population; this stays the same as long as the climate and soil remain unchanged by nature or people  
**CRUISE** - information about timber volume, growth and other factors used to make decisions about the forest  
**CYCLE** - a period of time in which regularly recurring events are completed  
**DOMINANT** - a tree species that grows better and taller than any other in the forest; dominant trees rise above the canopy level and grow in full sunlight  
**DECOMPOSERS** - very small bacteria, fungi and micro-organisms that live in the soil and help break down dead plants and animals  
**ELEVATION** - height above sea level; temperatures at higher elevations are generally colder than temperatures at lower elevations  
**EVAPORATION** - water vapor passing back into the atmosphere  
**FOOD CHAIN** - the energy cycle where one species feeds on another, fixing or releasing energy in the process  
**GRAZING FOOD CHAIN** - the process of one organism feeding upon another organism  
**HERBIVORES** - animals that feed only on plants  
**HORMONE** - a substance that is formed in a living cell and that influences the activity of other cells  
**INTOLERANT** - said of trees that need full sunlight to grow well and which cannot live in full shade  
**LARVA** - the feeding form of an immature insect which upon hatching from its egg finally emerges into adult form  
**LATITUDE** - a measure of distance north and south of the Equator

**LICHEN** - any of a number of plants made up of algae and fungus growing together on a solid surface, such as a rock  
**MICRO-ORGANISMS** - microscopic (very small) animals that often live in the soil as decomposers  
**MULTIPLE USE** - the practice of land management that serves two or more forest values  
**OMNIVORE** - an animal that feeds on both plants and animals  
**PIONEER SPECIES** - the first trees to grow on bare soil  
**POROUS** - said of a substance that allows water or other liquids to flow through it  
**PRESCRIBED BURNING** - the management practice of setting controlled fires in selected forests in order to reduce fire hazard, prepare seedbeds, control hardwood growth and fight disease  
**PREDATOR** - a species that feeds on another species  
**REGENERATION** - the beginning of a new tree's life cycle  
**RUNOFF** - the portion of water from rain, snow and fog that flows over land and eventually reaches streams  
**SAWTIMBER** - those trees large enough to saw into boards (usually pine over 10 inches in diameter and hardwoods over 12 inches in diameter)  
**SILVICULTURE** - the study of developing and caring for forests  
**SOIL** - a natural body developed from weathered minerals and decaying organic matter covering the earth in a thin layer; a natural medium on the surface of the earth in which plants may grow  
**SPECIES** - a grouping of similar plants or animals  
**STAND** - a group of trees in the same area  
**SUBCLIMAX SPECIES** - a species in a temporary stage in nature's movement toward climax  
**SUCCESSION** - the progressive growth from pioneer plants to a climax forest  
**TEMPERATE ZONE** - either of two climatic zones (the north or south temperate zone) between the tropics and the polar circles  
**TOPOGRAPHY** - the shape or form of the land surface, such as flat lands, hills and mountains  
**WATERSHED** - a funnel-like area bounded on the outside by water parting and draining to a particular body of water