



Accompanying Lesson: Stewardship and Sustainability

GRADES

6 - 8

I. OVERVIEW

A. Title

Caring for our Trees - Today and for the Future. In this class, students will identify ways that people use forests; and, how professionals sustainably manage forests resources.

B. Learner Objectives

1. Identify forest benefits and list human activities within each benefit.
2. Record and analyze flora and fauna observations on school grounds.
3. Categorize everyday objects that are made from trees and journal how humans are impacted by forest products.
4. Research the activities and management decisions of a forest in the community. Compare to a state, national or forest in another country.
5. Develop a school stewardship plan to care for resources on school grounds.

NEXT GENERATION SCIENCE STANDARDS

[MS-LS2-2 Ecosystems: Interactions, Energy, and Dynamics](#). Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

[MS-LS2-3 Ecosystems: Interactions, Energy, and Dynamics](#). Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

[MS-LS2-5 Ecosystems: Interactions, Energy, and Dynamics](#). Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

C. Materials (for each group)

- Activity 1: A Trees Dream Video, pencils, paper
- Activity 2: Schoolyard Investigations- paper, pencil, measurement tools (yardstick, measuring tape), binoculars, magnifying glass, soil thermometer, tree ID guides.
- Activity 3: A Day without Forest Products- forest products that you may have around your home or classroom such as: glue, cellophane tape, toothpaste, pencil, newspaper, chewing gum, dishwashing detergent, artificial vanilla flavoring, hair spray, crayons, lotion, paint, cinnamon, cough syrup, wooden handled hammer, aspirin, photographic film, citrus-flavored soft drink, baby food, instant hot chocolate, maple syrup, cork, RIT dye, muffin mix, nail polish, product information cards
- Activity 4: What Wood You Do? - Copy of forest management basics. Computer with internet access
- Activity 5: Stewardship Plan- Worksheets, clipboards, pencils

D. Time Considerations

Timing of activities can be altered to fit your classrooms needs.

- Activity 1: A Trees Dream- one 20-minute class session.

- Activity 2: Schoolyard Investigations- one 50-minute class session. Additional time needed if extending activity to observe over longer periods.
- Activity 3: A Day without Forest Products- one 50-minute class session.
- Activity 4: What Wood You Do?: one 50-minute class session
- Activity 5: School Stewardship Plan- two 50-minute class sessions. Additional time needed for ongoing project work throughout the year.

E. Getting Ready

- Activity 1: A Tees Dream- prepare audio and visual technology to show A Trees Dream to students.
- Activity 2: Schoolyard Investigations: choose ecosystem location on school grounds that can be safely accessed. Be aware of poison ivy, ant mounds, bees or wasps, or other potential dangers. Avoid trees next to fences, as students will not be able to measure tree crowns accurately. Pre-determine what science experiments to conduct based on state standards for science and math. Gather tools and instruments based on those experiments.
- Activity 3: A Day without Forest Products -Prepare pictures, props, materials. See appendix for ideas of forest products.
- Activity 4: What Wood You Do? - Have forest management introductory material available. Provide a list of local forested sites as well as state and nearby federal forests, (optional-students can research.) Access to computer lab if implementing activity during school hours.
- Activity 5: Stewardship Plan- Map out a walking tour of school grounds. Teachers can pre-select stewardship ideas to help focus students.

F Key Vocabulary

Nonrenewable Resource - substances such as oil, gas, coal, copper, and gold, which, once used, cannot be replaced in this geological age.

Renewable Resource - a naturally occurring raw material or form of energy, which has the capacity to replenish itself through ecological cycles and sound management, practices. The sun, wind, falling water, and trees are examples of renewable resources.

Silviculture - is the art and science of producing and tending a forest; the application of forest ecology and economics in the treatment of a forest; and the theory and practice of controlling forest establishment, composition and growth.

Sustainable - using natural and human resources in a way that does not compromise the needs of future generations.

Stewardship - the concept of responsible caretaking; based on the premise that humans do not own resources but are managers of resources and are responsible to future generations for their condition.

II. BACKGROUND

Forests provide many benefits to the environment, economy and community. They provide food and habitat for wildlife, produce clean air and water, and provide areas for recreation and aesthetic beauty. They also provide the raw materials needed to produce over five thousand wood products that we use every day, and support nearly one million jobs in the United States.

Forests must be managed to maximize these benefits. *Silviculture* is the art and practice of managing and regenerating a forest to best meet the objectives of the owner. Family forest owners apply silvicultural techniques to maintain and enhance their forestland. By altering, the *abiotic* (nonliving/never was) and *biotic* (living/once was living) factors, a forester can influence the tree species growing in a forest, and improve its overall health. Examples of Silviculture techniques that alter abiotic and biotic factors include harvesting (cutting and thinning), planting, and vegetation control (herbicide use and prescribed burning). The management techniques a forest owner applies to his or her land not only affect the present forest but also influence its future characteristics.

Since the late 1800s, humans have learned a great deal about forest ecosystems. In order to be good stewards of our forest resources, we must be responsible caretakers. Professionals understand that we need to actively manage our lands to keep them healthy and productive to in order for them to be sustainable.

III. DOING THE ACTIVITY

A. Engage - captures interest, makes connections, and provides an opportunity for students to express what they know

Ask students “*What do you like to do in a forest?*” Allow students to brainstorm ideas. Ideas will focus on recreational activities such as hunting, fishing, hiking, etc. Follow up with “*what are some ways that we can make sure that we have forests for a long time?*” Allow students to brainstorm and share ideas in various think-pair-share strategies. See link for Think-Pair-Share explained. <https://youtu.be/vxMOl2Vnw54>

Explain to students that in the United States, private landowners own over 60% of the forests. These landowners can be businesses big or small, or by people like your mom, dad, grandparents or teachers! In order to keep our forests healthy, it is important that these individuals make smart choices to manage the trees. Forest Management according to the FAO (Food and Agriculture of the United Nations) is “the process of planning and implementing practices for the stewardship and use of forests to meet specific environmental, economic, social and cultural objectives.” To better understand forest management, let us watch a short video. Show Forest Fast Break: Forest Management Video: <https://youtu.be/Bxt950wIUZ8>

After watching, ask the students to recap main point: “what are the three main benefits we get from managing our woods?” Answer - Economic, Environmental, and Social.

B. Explore - activities to explore the concept or skill

INTRODUCTION- ACTIVITY 1: A TREES DREAM

Forest come in all shapes and sizes. It is important we manage our forest for different benefits; like wood products, wildlife habitat, recreation or all three! Explain to the students that they will watch a video about a tree from a forest who had a dream. Ask the students to try to figure out what was the dream of the tree. Show the video, “A Tree’s Dream.” Ask the students to pay attention to different activities that were taking place in the forest, and how people were managing the woods.

a. Questions to ask post video:

- i. Who takes care of the management of the forest? (foresters or forest managers)
- ii. What is the job of a forester? (Foresters are professionals that balance the needs of the forest with the needs of people. They care, plant, and manage trees or forests. They are involved in various activities like planting, monitoring the growth of trees and timber harvest.)
- iii. For each tree that was harvested, how many trees are planted? (5 trees are planted for every one tree harvested)

iv. Define renewable and non-renewable resources. Have students provide examples.

The following activities focus on the major benefits forests can provide: environmental, economic, and social and the management decisions behind benefits. At the end of the lesson, students will create a stewardship plan to help actively manage their school grounds.

ACTIVITY 2: SCHOOLYARD INVESTIGATION

Forest ecology is the study of the components and functions of a forest ecosystem — community of organisms interacting with each other and with their physical environment. Forest ecosystems, which consist of bacteria, plants, birds, mammals, reptiles, amphibians, soil, water and air, differ from other ecosystems in that trees and other woody vegetation dominate them. Each of these components plays an important role in the function and health of the forest.

Each animal has its own unique requirements for food, water, shelter and space so there is no perfect habitat for all wildlife species. Some animals prefer the dense undergrowth of young forests while others live on the edge of older forests and feed in the open fields. Still others need to be in areas where there is plenty of water or tall trees to build their nests. Foresters have a unique opportunity to help meet the needs of animals and people. With knowledge about the basic concepts of wildlife habitat and its relation to different wildlife species, foresters can implement management techniques to protect and enhance specific wildlife objectives. These techniques include, replanting, prescribed burns, thinning, creating cover, and mapping endangered or threatened species on properties.

In this activity, students will observe one location on school grounds and then record and analyze observations. Students will increase their environmental awareness and appreciation for nature as well as identify relationships between trees, other organisms, and the surrounding community.

PROCEDURE

1. Locate a natural area (can be courtyard, garden, field, wooded area on site) on school grounds that can be safely accessed by students. In a science journal, describe the ecosystem that you are studying. Then collect, record, analyze, and interpret observations within that ecosystem.

2. Ask the students the following questions or to collect the following data:

- a. Description of tree/plants in location if present. Use Senses- sight, touch, sound, smell
- b. Identify the trees/plants tree guides.
- c. What animals live in this ecosystem vs. what animals visit this ecosystem? Remember to look in the tree crown and on/in the soil. Use binoculars and magnifying glass for additional science tools.
- d. What signs of wildlife are present?
- e. What is the circumference of trees? Students can use tape measurers or string and yarn. What are some other ways we can measure/estimate?
- f. What is the estimated height of trees? Measure height using a yardstick: <https://www.youtube.com/watch?v=cDy5QjfMfZ8>
- g. What is the width of the trees crown? <https://youtu.be/332DklgHBnw>

- h. Are the trees in this ecosystem alive? Are they in decline? What signs tell us that a tree is in poor health?
 - i. Using a soil thermometer: What is the temperature of the soil under the tree? What is the temperature of the soil outside the crown of the tree? What does the temperature difference tell us?
 - j. What is the soil composition? What kind of plants thrive in that soil?
 - k. Is this ecosystem in full sun? Part sun? Shade? How can sunlight determine what plants will or will not grow?
 - l. What evidence of human activity is on or near our tree?
 - m. Is this tree getting enough resources? (Sunlight, water, nutrients) if not how can you tell? (Overcrowding, yellowing or wilted leaves, etc.)
3. If you had to guess the age of one tree in your ecosystem, what would you guess? For many schools, trees were planted when the school was built. Since the opening of the school, what has your tree observed or experienced? Have students research the history and timeline of your tree. Make note of major changes and events. Ideas could include drought, hurricanes, fires, or even school closures like the recent coronavirus pandemic. How would the tree and the surrounding environment respond?
4. Have students create an art project of their ecosystem. Have students depict what the ecosystem looked like in early succession/when it was first established, mid-succession/today, and what the ecosystem will look like in 10 years/late succession.
5. Extension: Have students observe three separate locations on school grounds. Compare and contrast each location.

ACTIVITY 3: A DAY WITHOUT FOREST PRODUCTS

What do lumber, cardboard boxes, paper, sports equipment, medicines, and even cosmetics all have in common? They are all made out of wood! These products are sent not only to your home, but also to homes across the world. Did you know that the average American uses more than 700 pounds of paper products each year? We manage our forests for not only paper but for 5000 wood products that we use every day.

Trees are a renewable resource, meaning we can replant trees to replace those that have died or have been harvested. Even though trees are renewable, we must be conservation minded. Landowners make management decisions that are not only in the best interest for our forests but also impact our economy and the goods we depend on. Do you know what different products come from trees?

In this activity, students will connect that the products they depend on every day are actually made from trees. Students will compare and contrast renewable and non-renewable resources, and research how products made from trees are manufactured.

PROCEDURE

1. Hold up one product at a time and have your students vote as to whether or not they think it comes from a tree. Be sure they understand that you are not talking about the packaging of the product but the product itself or some component of the product. Put the ones that they think come from a tree in one pile and the ones that they do not think come from a tree in another.
2. Review objects. See Goods from the Woods handout in appendix for a breakdown of wood components of common items.

3. Next, assign your students a variety of forest products. Students will research if their product is a renewable or non-renewable resource. Then have students write a brief narrative how that product is made.

1. Questions to consider:

- i. What are the manufacturing steps to create this product?
- ii. Is this product made from a specific tree species?
- iii. When manufacturing this product, does it require other non-renewable resources?
- iv. Is a company making this product in my state?
- v. What steps is that company taking to be sustainable?

4. Extension: Explore the carbon cycle. What role does the forest products industry play in the cycle?

1. Forest Fast Break Carbon Capture: <https://youtu.be/cCwq8UhF1Qw>

2. Forest Fast Break Green Building <https://youtu.be/8-5i2LaEEDM>

C. Explain - students develop explanations for the concept or skill they have experienced

ACTIVITY 4: WHAT WOOD YOU DO?

People go to the forest for a variety of reasons. Activities like hiking, biking, camping, fishing, and hunting need to be managed to meet the needs of the public and to ensure that the resources will not be negatively impacted. For example, managers may establish hiking trails, clear up an area for picnicking, clear understory brush for wildlife habitats, or plant trees. Other activities like managing for clean water, protected habitat and other environmental benefits dictate how landowners can utilize the land. Managers need to consider how to best manage the forest in order to balance the needs of the public and conserve its resources.

A forest management plan is a roadmap for how a landowner will carry out goals and objectives for their land. A plan is important because it helps owners identify what they want from their forest and create a course of action. Goals could focus all on one type of benefit-- environmental, social, economic, or a combination of all three. See below for links of videos to Forest Planning and best management practices.

Recommended Videos:

- Example of a Forest Management Plan: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_013802.pdf
- Thinning Forest to Save the Birds: <https://youtu.be/9gGNGn6q834>
- Forest Stand Improvement: <https://youtu.be/QZhOPQHdJM8>
- Best Management Practices: <https://youtu.be/zQZEap6jxFQ>
- Forest Planning: <https://youtu.be/5WyH6R1ripY>

In this activity, students will research natural resources and/or forest management plans to learn how public forests are managed.

PROCEDURE

1. Introduce the concept of forest management. Distribute the basic forest management information found in the appendix. Landowners create forest management plans to help guide the management activities put into action based on their goals. Plans differ based on who is using the forests, and why.
2. Assign students a local, state, or federal forest and ask them to research the forest management plans. Ask the following questions:
 - a. Does this site have a forest management plan or a natural resource plan?
 - b. What user groups use this space? (Bikers, hikers, dog walkers, children, bird watchers, scientist, loggers, students, etc.)
 - c. What major activities can you do at this site? (Picnic, hiking, kayaking, camping, forest used for research, is site closed to the public, is site a nature preserve)
 - d. Do landowners harvest wood on site? If so, does the profit help finance the forest?
 - e. What management practices take place to help carry out activities? (Thinning, clearcutting, wildlife habitat, trail building)
3. Have students write a summary of the forest. Have students provide one additional recommendation based on the information they have learned.
4. Present forest to the class.

D. Elaborate & Evaluate - activities to apply learning to new situations and discuss/compare ideas with others & students review/reflect on their own learning and provide evidence for changes to their learning

ACTIVITY 5: STEWARDSHIP MANAGEMENT PLAN

Adapted from Every Kid in a Park “Environmental Stewardship”

Ask students to define the word steward. Explain that stewards are people who manage or take care of resources. When we think about forest stewardship, professionals manage the resources and responsibly care for them for present and future use.

What are some ways that you are good stewards of your community/home/school/classroom? Allow students to brainstorm and share ideas in various think-pair share strategies. Examples include caring for a pet, completing chores at home, taking out the trash, keep classrooms clean, and help with litter pickup.

PROCEDURE

1. Take students on a walking tour around the school grounds. Ask the class to record and identify areas that need stewardship.
 - i. Examples of Solutions:
 1. Implement a recycling campaign.
2. When you return to the classroom, divide the class into small teams. Identify 10-15 “problems” or changes they would make to their school grounds in order to create a better environment. Examples of possible problem sports could be erosion, litter, or lack of recycling awareness. Have students brainstorm solutions to identified problems.

2. Plant a butterfly/habitat garden.
 3. Create a poster campaign with ideas to “green” your home.
 4. Build a birdhouse habitat.
 5. Develop an outdoor classroom.
 6. Conduct a trash audit and learn how to use more renewable resources vs. nonrenewable.
3. Have each group present ideas Class will vote to select one stewardship idea to adopt and complete throughout the school year. Some projects may need administration approval.
4. For Extension: Have each group present ideas. Complete Project Learning Tree: Green Your Home’s Outdoor Space https://www.plt.org/wp-content/uploads/pdf/PLT-GreenSchools-School-Site-Investigation_Student-Page_Green-Your-Home-Improving-Outdoor-Spaces.pdf

IV. Enrich: exercises that extend or enrich the learning experience

A. Option 1 – Have students explore forestry careers to better understand the roles people have in managing our natural resources.

- a. Forestry Works- <https://www.forestryworks.com/>
- b. NC Forestry Association- Focus of Forestry Careers Profiles
- c. Careers in Forestry: Find your Path by Oregon Forest Resources Institute- <https://www.youtube.com/playlist?list=PL-KepgRbFKJzyLnzlBOoflv-GLXUjghc>
- d. [Exploring Forest Careers by Project Learning Tree](https://www.plt.org/curriculum/green-jobs-forest-careers/) <https://www.plt.org/curriculum/green-jobs-forest-careers/>
- e. Texas A&M Forest Service: Forestry Career Pathway: https://www.youtube.com/watch?v=gbeClzhJmCA&list=PLLeudtKjcZlzxLSrh_gfIs5l16cPPKhk4a

B. Option 2 – Invite a professional into the classroom or look into field trip opportunities into state educational forest sites to see firsthand management techniques.

C. Option 3 – Have students create their own management plan for a stand of trees. What benefits will they focus on? Who will use their forest? What management techniques would they implement?

V. Additional Resources: (Links to other resources teachers and/or students could use to extend the learning. Examples: Project Learning Tree, USFS Kids, World Forestry Center, etc.)

1. Project Learning Tree – www.plt.org

Project Learning Tree is an award-winning environmental education program designed for teachers and other educators

2. Forest Fast Breaks- <https://www.youtube.com/playlist?list=PLS8kydnMHQ9ltXX5y1aPtSV2DfZkWQHQI>

APPENDIX/ADDITIONAL RESOURCES

A Day without Forest Products: Goods from the Woods Examples.

CELLOPHANE TAPE

Cellophanes are made from a chemical that is a by-product of wood pulping during the papermaking process. They are used in making such products as tape and wrap.

CHEWING GUM

Chewing gum base is made from the rosin or storax of trees such as spruce. Chewing gum may also be artificially flavored with peppermint and spearmint, which also come from tree chemicals.

PHOTOGRAPHIC FILM

Many photographic films contain cellulose acetate, a chemical derivative of cellulose, the main ingredient of wood. Cellulose acetate is also used to make molded plastics for eyeglass frames, combs, toothbrushes and car steering wheels.

PAINT

Many paints, varnishes and other surface coatings contain rosin, a by-product of the pine pulping process, which acts as a drying agent. Rosin is also used in printing inks, soaps, detergents and adhesives.

SOFT DRINKS

Many citrus-flavored soft drinks contain chemicals from trees called esters. The esters, which are derived from wood rosin, act as a weighting agent and assure a uniform distribution of the citrus flavors.

VANILLA FLAVORING

Artificial vanilla flavoring is made from lignin, the natural glue that holds wood together. Other products made from lignin compounds are ceramics, cleaning compounds and laundry anti-cling agents.

BABY FOOD

Torula yeast is a high-protein product made from wood sugars recovered during papermaking and used in many baby foods and baked goods.

GLUE

Many glues and adhesives are made from hard resins, a natural substance that comes from trees.

STP™ OIL TREATMENT

STP™ Oil Treatment and other synthetic lubricants are made from finished fatty acids derived from wood.

DISHWASHING DETERGENT

Detergents as well as many soaps and shampoos, are made from crude fatty acids derived from wood. The lemon scent of some detergents and furniture polishes is produced during pine turpentine processing.

LOTION

Many products, including lotions, contain Vitamins A and E, which come from turpentine extracts. Many skin lotions also contain stearic acids, which are derivatives of fatty acids produced during the papermaking process.

MEDICINE

Medicine in tablet form is held together with lignin, the natural glue that also holds wood together. The essential elements

of aspirin come from the bark of willow trees. Other medicines used in treating diseases such as high blood pressure and Parkinson's disease contain various wood derivatives.

CINNAMON

Many spices used in cooking, such as nutmeg, bay leaves and cinnamon, come from trees. Cinnamon is made from the bark of the laurel tree, which grows in India and Sri Lanka. Cinnamon sticks are thin pieces of bark from young trees that have curled up as they were dried.

INSTANT HOT CHOCOLATE

Instant hot chocolate contains cellulose, the main building block of wood. This form of cellulose acts as a thickening and binding agent.

HAIR SPRAY

Hair spray and many other adhesives are made from tree resins, which are sticky, liquid substances found in trees. Resins usually harden when exposed to air.

MAPLE SYRUP

To make syrup, sap is collected from the sugar maple tree by pushing a hollow tube through the dead bark to the sap-conducting layer. The sap is then boiled until only the sticky syrup remains.

CORK

Cork is the bark of the cork oak. Every eight to ten years, the outer bark of the trunk is stripped away, leaving only the bark cambium. This layer then grows into new bark.

CRAYONS

Carnauba wax, which comes from the leaves of the carnauba tree, is the waxy component of crayons, lipstick and other cosmetics. It also is used in car wax and as a finish coating on furniture, fruits, vegetables and a wide variety of other products including medicine tablets.

COUGH SYRUP

Many cough syrups and mouthwashes contain pine resin, a natural component of tree sap, which has antiseptic properties.

RIT DYE

The osage orange is a shrubby North American tree whose wood produces a yellow fabric dye. The North American black oak is also a source of yellow dye.

MUFFIN MIX

Many baked goods contain some type of tree gum that acts as a thickening agent and has similar composition to carbohydrates. Gums also are used in cosmetics and as stabilizers in ice cream.

TOOTHPASTE

Toothpaste contains cellulose gum, a natural product derived from wood that acts as a binder and provides a creamy texture. Many toothpastes also contain terpenes, chemicals derived from wood and used to sweeten the spearmint or peppermint flavor of toothpastes and mouthwashes.

FABRIC SOFTENER

Fabric softener sheets are a paper product formed from cellulose, the main building block of wood. They also may contain beta pinene, a turpentine by-product used in many perfumes and fragrances.

NAIL POLISH

Nail polish and other paints contain nitrocellulose, a mixture of cellulose from wood pulp and several chemicals. The presence of nitrocellulose makes a liquid moisture-proof when it dries. Some nail polishes also contain resin, a natural substance secreted by plants.

Forest Management Basics

Forests are an important part of our state's environment and economy. When they are well managed, forests provide clean air and water, homes for wildlife, beautiful scenery, places for recreation and more than 5,000 products we all use every day. When they are not well managed, forests are often unhealthy and unproductive because of overcrowding, disease, insects, and competition for light, water and nutrients. To maintain or improve the health and productivity of a forest and to achieve the landowner's objectives for the property, foresters use a number of management techniques, including harvesting, prescribed burning and reforestation.

HARVESTING TREES

In forest management, trees are harvested for a variety of reasons including improving the health of the forest; controlling the types of trees that grow on the site; attracting certain wildlife species; providing a source of income for the landowner; producing paper, lumber and numerous other forest products; and improving access to the area for hikers, hunters and other recreational users.

Just as there are many reasons for harvesting trees, there are many different harvesting methods. Each method has its benefits, drawbacks and conditions under which it is the most suitable way to harvest trees. No one harvesting method is ideal for all situations.

THINNING HARVEST

When trees are crowded together, they are in greater competition for sunlight, nutrients and water. As a result, they tend to be less healthy and to grow less vigorously. To improve the health and productivity of the forest, forest managers may remove a portion of the trees in the early stages (10-15 years) of a growing stand of trees so there is less competition for sunlight, water and nutrients. The forest is 'thinned' by taking out a certain percentage of the trees. The remaining trees will grow faster, stronger and larger. The thinning also improves the growth of the forest's understory such as wildflowers and native weeds by increasing the amount of sunlight that reaches the forest floor. This growth provides more food and cover for animals such as quail and rabbits.

This type of harvest is typically referred to as a "pre-commercial" harvest since the costs associated with the forest management (road maintenance, harvesting, etc.) often equal or outweigh the money earned on the harvested trees for the landowners. These type of harvests result in pulpwood size trees, which are smaller in diameter than trees that would be made into lumber.

CLEARCUT HARVEST

Clearcutting removes all the trees in a given area, much like a wildfire, hurricane or other natural disturbance would do. It is used most frequently in pine forests, which require full sunlight to grow, and in hardwood forests with yellow poplar, sweetgum, cherry, maple and other species that require full sunlight.

Clearcuts are an efficient way to convert unhealthy stands to healthy, productive forests because they allow forest managers to control the tree species that grow on the site through natural or artificial regeneration.

While a clearcut removes all canopy cover and is unattractive for a short period of time, it is an effective method for creating habitat for a variety of wildlife species. Animals that eat insects, such as turkeys and quails, and those that eat annual and perennial plants, such as bears and deer, thrive in recently clearcut areas. Many creatures also find shelter from

weather and predators in the low growing grasses, bushes and briar thickets that follow this type of harvest. In addition, clearcutting is an important forest management tool because it can be used to create edges – areas where two habitat types or two ages of the same habitat meet. Because edges provide easy access to more than one habitat, they usually have more diverse wildlife communities than large blocks of a single habitat.

A clearcut harvest will produce a mixture of pulpwood and sawtimber products for the forest products industry based on the size of the trees and whether the trees are softwood (pine) or hardwood (maple, oaks, etc.). Loggers sort the trees onto different trucks for their different locations. The smaller diameter trees, typically called pulpwood, will head to a paper mill or energy facility. The larger diameter trees, typically referred to as sawtimber, will be sent to a sawmill. Again, different tree species (whether softwood or hardwood) are sent to specific markets.

SHELTERWOOD HARVEST

In a shelterwood cut, mature trees are removed in two or three harvests over a period of 10 to 15 years. This method allows regeneration of medium to low shade-tolerant species because a “shelter” is left to protect them. Many hardwoods, such as oak, hickory and cherry, can produce and maintain seedlings or sprouts in light shade under a partially cut stand. However, the young trees will not grow and develop fully until the remaining overstory trees are removed.

One benefit to shelterwood harvests is that they provide cover and early successional food sources for wildlife. However, this method of harvest is not recommended for trees with shallow root systems because the remaining trees are more susceptible to wind damage after neighboring trees are removed. Another disadvantage to shelterwood cuts is that they require more roads to be built through the forest, and increase the risk of soil disturbance and damage to the remaining trees during harvesting.

SEED TREE HARVEST

In a seed tree harvest, five or more scattered trees per acre are left in the harvested area to provide seeds for a new forest stand. These trees are selected based on their growth rate, form, seeding ability, wind resistance and future marketability.

Wildlife benefit from seed tree harvests in much the same way as they do from a clearcut harvest, except that they also reap the benefits of the seed trees themselves. If left on site indefinitely, seed trees eventually may become snags or downed logs, which are important habitat components for woodpeckers and many other species. Seed trees are also excellent food sources and nesting sites for hawks and other birds.

One disadvantage to seed tree harvests is that the remaining trees are at increased risk of damage from wind, lightning, insect attack and logging of nearby trees. This type harvest may also require the landowner to make future investments in thinning and competition control because of uncontrolled reseeding.

GROUP SELECTION HARVEST

Group selection is essentially a small-scale clearcut where groups of trees in a given area are harvested over many years so that the entire stand has been cut within 40 to 50 years. This method is used primarily on bottomland hardwood stands to harvest high-quality, top dollar logs. The size of the group cut determines the tree species that are likely to return after the harvest. Openings that are less than one-fourth acre favor shade-tolerant species, and larger openings favor sun-loving species.

Group selection provides ideal pockets of young vegetation for grouse, deer and songbirds. But because it requires intensive management and frequent access to all areas of the property, it can be an expensive forest regeneration method.

SINGLE-TREE SELECTION HARVEST

Single-tree selection removes individual trees that are ready for harvest, of low value or in competition with other trees.

With single-tree selection, the forest continuously produces timber and constantly has new seedlings emerging to take the place of harvested trees. Single-tree selection maintains a late succession forest that benefits many wildlife species such as squirrels and turkey.

Single-tree selection harvesting is best in small or confined areas for a variety of reasons. One is that this harvesting method requires more roads. In addition, surrounding trees can be damaged during harvests, and frequent use of logging equipment in a given area may compact the soil. Sun-loving trees, which are an important source of food for wildlife, do not regenerate well with single-tree selection, so forest managers must use mechanical or chemical controls to prevent shade-tolerant species from taking over the site.

PREScribed BURNING

Prescribed burning is a forest management practice that benefits certain forests by reducing the amount of leaves, branches and dead trees accumulated on the forest floor that could fuel a wildfire. In addition to helping control the spread of wildfire, removal of this “litter layer” also promotes the growth of new forage and succulent plants, which are important sources of food for many wildlife species including rabbits and deer. And the increase in available insects and seeds following a prescribed fire is good for turkeys and a variety of nongame species.

While improving wildlife habitat, prescribed fire also promotes the health of the forest by controlling the spread of disease and insect infestations, and reducing plant competition for nutrients, water and sunlight.

This management technique is commonly used in Longleaf, Shortleaf and Loblolly pine forests because these trees are naturally resistant to fire. In fact, the Longleaf Pine requires fire for its seeds to germinate.

REFORESTATION

Trees are a renewable resource. This means that they can be grown, harvested, replanted and harvested again and again in a never-ending cycle to provide clean air and water, habitat for wildlife, beautiful views and thousands of products both today and in the future. The process of growing trees on an area that previously has been harvested or cleared is called reforestation.

The two basic methods of reforestation are natural regeneration and artificial regeneration.

Natural regeneration relies on nature to return an area to forestland after trees are harvested. Through natural regeneration, new trees grow from seeds that are carried by the wind, transported or buried by animals, or that are simply dropped on site by mature trees. In addition to producing seedlings from seeds, hardwood trees regenerate naturally by sprouting new growth from the stumps of cut trees.

Artificial regeneration involves human intervention in sowing seeds or planting seedlings. This method of forest renewal has several advantages over natural regeneration. It provides better control over tree spacing, more control over the species present in the new forest, the opportunity to plant genetically improved seeds or seedlings, and a higher rate of tree survival. Although artificial regeneration is more expensive than natural regeneration, the result is usually a more productive stand in a shorter period of time.

FOREST SUCCESSION

Each stage of succession provides different benefits to a variety of wildlife species. In fact, many species need more than one forest type to meet their needs. Rodents and rabbits prefer early successional forest where there are plenty of grasses and shrubs for food and shelter. Deer also need food found in early succession, but require the denser cover of middle and late succession for shelter and escape from danger. Birds of prey nest in mature forests, but feed on rodents and snakes found in early succession. Other wildlife, such as squirrels, find both their food and shelter in mature trees.