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# FORESTS AND OUR ENVIRONMENT

An aerial photograph of a lush, green forest. A winding river flows through the center of the forest, surrounded by dense trees. The forest extends to the horizon under a clear sky.

Purdue University Cooperative Extension Service

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Throughout our history, trees have played a central role in our survival. Our ancestors used hickory for their wagons, white oak for their bridges and ships, and yellow-poplar for their cabins. They often looked to the forest for food to carry them through long winters. Our ancestors also feared the forest as a source of danger. They destroyed forests to remove that fear. We still utilize our forests to fulfill many needs today, but with a more rational attitude toward sustaining and appreciating what we have.

Forests today cover one-third of the earth's total land area, a third of the continental United States, and about a fifth of Indiana.

The more well-known values provided by the forest, such as timber products, wildlife, protection of soil and water, and outdoor recreation, have long been studied and well-documented. People also benefit from forests in other ways that are not so well understood but are just as important to quality of life. Forests provide a clean and comfortable environment. They help remove pollutants from the air and regulate the amount of carbon dioxide (a major contributor to global warming) in the atmosphere. They help moderate excessive noises and temperature extremes. They are especially important in providing a healthy escape from the demands of everyday life.

Forests play a vital role in our lives. Not only do they supply materials for our food and shelter, but they also contribute to our psychological well-being. Forest settings evoke a sense of calm and serenity, so much so that the heart rate and blood pressure decrease in individuals experiencing forest beauty.

People have depended on forests for thousands of years; and with careful management, forests will continue to play an important role in our existence in the future.

## What Is a Forest?

### A System

A forest is not just a stand of trees but an entire community of living things—both plants and animals—and nonliving substances. Ecology is the study of the relationships among plants and animals and environment. When studying a forest community, ecologists think of it

in terms of an ecological system, or ecosystem. An ecosystem is like a house of cards where each card is a plant or animal species. The house depends upon each card to maintain stability. If you remove one card, the stability of the entire house is jeopardized. Adjustment must be made with each remaining card if the house is to remain standing. In the same way, an ecosystem's many species are interdependent, keeping the system stable.

Thinking of the forest as an ecosystem, in which each element is linked to one another, helps to understand the important role of forests and how forests contribute to the quality and stability of our environment.

Indiana forests are complex ecosystems. Most of the trees are hardwoods, which are broad-leafed trees that shed their leaves in winter. The area under the tops of the trees, or the understory, is filled with seedlings, shrubs, and plants. The soil is alive with billions of bacteria, fungi, soil mites, earthworms, insects, and other organisms. Many higher forms of animal life, amphibians, reptiles, birds, and mammals are present in abundance.

The hardwood forest is very efficient in conserving and recycling forest nutrients. When leaves, twigs, branches, and trees die and fall to the ground, they are soon decomposed by fungi and microorganisms, forming humus. Nutrients from the humus are then returned to the soil. Thus, the forest recycles materials through its own waste disposal system, which benefits, rather than hurts, the entire ecosystem. In addition, humus covering the soil helps reduce water runoff and the loss of plant nutrients. This humus forms a natural mulch which conserves soil moisture and provides a constant suitable habitat for many invertebrates and microorganisms that are necessary to keep the forest healthy.

This same concept is important to us in our everyday lives. We can learn an important lesson from the forest ecosystem by handling our wastes in ways that benefit, not harm, our environment. Through activities such as recycling and composting, we conserve and re-use the "nutrients" (resources) used in our lives.

## Effects of Forests on Our Environment

Forests benefit humans in many ways, both directly and indirectly. Some of the more visible benefits are described here.

*Reduce air temperature:* The leaves and branches of trees reduce the amount of sunlight that reaches the ground and act as a shield to deflect heat radiation from the ground. This process helps reduce the extremes of heat during the day and cold at night. Trees surrounding a home during the summer greatly reduce the need for air conditioning to keep the occupants cool.

*Transpiration:* The movement of moisture from the soil through the trees to the leaves, where evaporated, is known as transpiration. During a hot summer day, a large tree evaporates up to 100 gallons of water. This evaporation helps cool the air.

*Reduce wind velocity:* The crowns of trees are effective in slowing wind movement. Because of transpiration loss from the wind, trees have been planted in dense rows on farmland to reduce soil erosion and increase crop yields. Wooded areas near your home greatly reduce wind velocity that could have made your home drafty in the winter, which increases energy costs to heat your home.

*Suppress loud sounds:* Forests absorb sounds and make them less intense. A forest or tree barrier may suppress sound sufficiently to make a noisy location a pleasant place to live. For example, a wooded barrier 300 to 400 feet deep along a busy highway can suppress traffic noise to a reasonable level for people living near that highway.

*Produce oxygen:* As trees undergo photosynthesis (using sunlight as energy to combine carbon dioxide from the air with water to manufacture food), oxygen is produced. A young, vigorous forest is especially effective in releasing oxygen into the atmosphere. Managing forests and trees to keep them healthy and vigorous increases their capacity to perform this important ecological role.

*Improve air quality:* In the process of photosynthesis and respiration, forest trees take in and expel large volumes of air. Leaves of the trees thus intercept and filter out dust particles from the air. Aside from their scenic value, trees in and around cities have been found to be of major importance in controlling air and noise pollution.

## Products and Services from Our Forests

In addition to vital contributions to the environment, our forests provide many economically important products and services, including wildlife habitats, recreation opportunities, protection of our soil and water, and many forest products.

**Recreation:** The scenic beauty of forests provide the setting for many forms of outdoor recreation. Hiking, photography, bird watching, camping, hunting, and fishing are a few activities people consider important. Being in touch with "The Great Outdoors" gives people a sense of serenity and well-being.

**Wood:** The trees in a forest are a renewable natural resource. With proper management and harvesting practices, the same forest will continue to provide a sustainable crop of valuable timber. When forests are managed properly, they are protected from grazing by domestic livestock, from wildfire, and from insects and disease. Timber that is harvested with good forestry practices will assure additional harvests in the future.

**Protection of soil and water:** When rain falls on a forest, part of it is intercepted by the tree crowns, branches, and foliage. Part of the rain drips from leaves or runs down the tree trunks into the soil. The forest floor, with its fallen leaves, twigs, and branches, cushions the impact of falling rain, thus preventing rapid water runoff and soil erosion. Loose litter on the forest floor enables water to filter slowly into the soil and reach the ground water level. Forests serve as water regulators and purifiers.

**Wildlife:** Our central hardwood forests support over 260 different amphibian, reptile, bird, and mammal species that depend on forests for their food and shelter. Forests having mature timber, scattered openings, and borders of shrubs and brush provide excellent habitat for a wide variety of wildlife species. Properly planned timber harvesting creates openings which encourage the growth of small trees and shrubs that provide food and cover. This assures a balance and distribution of all habitat types.

**Ecosystem management:** The productivity of an over-mature forest (one in which growth is slowed by age and decay) can be increased and maintained at a high level by harvesting mature trees and allowing younger, more desirable species to grow. The hardwood forest,

composed of trees of various ages, can be managed as a continuous and renewable resource, while still providing wildlife, recreation, air, and water conservation for all.

We need to preserve some mature forest land so that we can observe, understand, and appreciate the natural processes that are at work. It is possible that some species require areas of unbroken forest to flourish. These forests can serve as guides for forest management decisions.

### The Timber Industry

The process of manufacturing trees and logs into lumber and other wood products actually uses far less power and causes less pollution than the manufacturing processes needed to produce substitutes, imitations, and other competitive products. Wood-using industries are utilizing one of our few renewable natural resources to produce many necessary products, and at the same time are maintaining these resources for future generations.

Indiana is known worldwide for its production of fine hardwood timber and face veneers (thin sheets of wood sliced from high-quality logs), and employs around 50,000 people to produce these timber products. The timber is used for such products as fine furniture, musical instruments, ball bats, barrels, and a wide variety of everyday items. Veneers are used to surface furniture and provide beautiful paneling and hardwood floors.

The general belief that forests are areas needing to be tamed and conquered is outdated. But we cannot afford to totally leave the forests alone. **We must take responsibility as stewards of the land, depending on it for many of our resource needs, yet sustaining the forest for future generations to enjoy.**

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#### Credits:

Brian K. Miller, Georgia L. O'Malley, and John R. Seifert, Department of Forestry and Natural Resources, Purdue University

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