"The idea that wilderness areas will take care of themselves if we just keep people out... that's an old model of wilderness management."

—Dr. Lee Frelich, University of Minnesota

CHAPTER SIX FORESTS TOMORROW

Can You Love the Earth and Cut Trees Too?

Minnesota's trees have great value as a part of the natural environment of our state. They also have great value as a key part of our industrial base. How can we appreciate trees as part of an ecosystem and harvest them, too?

The answer lies in balance, judgment, and wisdom. With more than 6.5 billion humans on this planet, there is no way we can avoid impacting the natural resources around us. (Every time we breathe we use part of the resource we call the atmosphere!) The key, from an environmental standpoint, is not to avoid using resources, but to use them mindfully in a way that minimizes the impact on the global ecosystem.

Why is it important to use renewable resources?

Renewable resources are just that—renewable! Nonrenewable resources such as gasoline disappear when used up. When renewable resources such as wood and plant material are disposed of and burned, the carbon dioxide (CO_2) they release equals the amount of CO_2 they absorbed during their relatively short lifetime. When nonrenewable resources such as oil and coal are burned, they release all at once CO_2 that was absorbed millions of years ago. Finally, renewable resources like trees provide many environmental, health, and economic benefits while alive, such as providing cleaner air, shade and cooling, food, habitat, aesthetics, protection from wind, and more.

When we look at things in this "big-picture" frame, harvesting Minnesota's timber begins to look like an earth-wise thing to do. Dr. James Bowyer, the University of Minnesota professor emeritus quoted at the beginning of Chapter 5, suggests that when we look at the environmental impact of harvesting Minnesota's trees, we need to also look at the environmental impact of NOT doing so.

Say we were to stop harvesting Minnesota's trees tomorrow. It's unlikely that we would at the same time stop using paper, sitting in chairs at tables, living in houses, and doing all of the other things that depend on the use of resources. Rather, we would turn to other resources. Each of these, whether wood from another region (such as Asia or South America) or substitutes such as plastics that are made from nonrenewable resources, has its own environmental costs, from initial production to transportation over long distances to eventual disposal.

The use of Minnesota's well-managed and maintained forest resource eases the pressure to harvest other ecologically more valuable forests such as tropical rain forests or the old-growth forests of the Pacific Northwest. It also keeps tree harvesting in an area where forests are scientifically managed as a renewable resource rather than cut and abandoned.

Also, as we have learned, not harvesting can lead to unhealthy, overcrowded, fire- and insect-prone forests. Today's forest managers have learned not only lessons from the days of over-ambitious loggers, but also from ecological records and American Indians showing that frequent, small fires and harvests can actually improve forest health.

Future Trends Will Affect Forests

Since trees' lifetimes are measured in decades rather than years, what we do—or don't do—now will make waves for a century or more. A number of trends today stand to influence Minnesota's trees in the 21st and 22nd centuries.

Changing Forest Products Industry

Like many other industries, global markets and competition drive the forest products industry. In fact, companies headquartered outside of the United State currently own many of Minnesota's major forest products mills. Competition for new investments also occurs globally, both among and within global corporations. Decisions to invest in a location such as Minnesota are based on many factors, such as available natural resources, raw materials, labor costs, and distance to markets. Providing a sustainable and reliable source of competitively priced wood will be key in attracting new forest products investments in Minnesota. Doing so means we must balance values and uses of public forest lands, and encourage private landowners to manage their lands to address these goals, too. Without new investments, Minnesota's forest products industries will struggle, and landowners may find that harvesting timber is no longer a cost-effective way to manage their forests.

Changing Forest Ownership

Timber and mining companies are selling thousands of acres of northern forest to timber investment corporations that use the land to make money. Sometimes, this means land may be sold in smaller parcels to several landowners rather than managing the forest to supply trees or wildlife habitat. At the same time, private, nonindustrial landowners are aging and their children are less interested in maintaining family homesteads. In both cases, Minnesota forests risk being sold, converted into smaller parcels, and developed. This compromises their ability to provide valuable unfragmented wildlife habitat, a sustainable source of timber, and recreational opportunities. In the future, fewer acres of forest land may be available to provide the same values and goods we receive from today's forests.

Forest Certification

Certification is an increasingly popular way to support sustainable forest management. Certification provides independent verification that land is being managed sustainably—in a way that meets today's needs without harming its ability to meet future needs. Lands become certified through periodic inspections by a qualified inspector who does not own the forest land. The Minnesota Department of Natural Resources earned certification for 4.9 million acres of state forest lands in 2006. Numerous counties and forest industry companies also have been certified or are pursuing certification of the forest lands they manage. Because some companies,

Internationally recognized logos from the Forest Stewardship Council and the Sustainable Forestry Initiative.

When you buy wood, or items made from wood, do you know where it came from? Often, retailers and consumers choose to buy wood from the cheapest source. However, the "cheapest" wood in terms of price may actually be the most expensive wood in terms of environmental costs. The price on the shelf depends on the cost of the tree in the state or country it came from, cost of transportation, and cost of manufacturing. If the wood came from Minnesota or other area that uses sustainable forest practices, you can be sure it was harvested from a well-managed forest. If the wood came from South America, Asia, or other regions, management standards may differ. In Minnesota, most state-administered lands are ***certified.*** Certified wood from lands managed by the DNR means that the DNR's forest management exceeds internationally recognized certification standards like the Forest Certification Council (FSC) and the Sustainable Forestry Initiative (SFI). Certification ensures the wood has been harvested with considerations toward forest health, wildlife, water quality, and future reseeding or replanting. Some retailers like IKEA or Time-Warner have required that certain percentages of its products be produced using certified wood. (In Time-Warner's case, 80 percent.) Retailers label certified wood so consumers know when their lumber, plywood, paper, or furniture has come from a well-managed source. And as more consumers demand environmentally friendly products, more retailers will offer them.

like The Home Depot, require that a certain proportion of the wood or paper pulp they buy is certified, Minnesota's forest market competitiveness improves when forest lands are certified.

Climate Change

Scientists expect Minnesota's climate to change in the years to come because of atmospheric changes caused largely by combustion of fossil fuels. This change will have implications for Minnesota's forests. Although there is much uncertainty regarding actual impacts, changing climate is expected to alter forest composition, tree growth, pest distribution, and populations of plants, mammals, birds, and pests inhabiting the forest. Certain tree species (e.g., oaks, maples) are expected to increase while others (e.g., spruce, fir, white pine) are expected to decrease. According to the U.S. Department of Agriculture, one acre of forest absorbs (or sequesters) 6 tons of carbon dioxide and produces 4 tons of oxygen each year. This is enough to meet the annual needs of 18 people. Because carbon dioxide is a significant contributor to global climate change, future forest landowners may be able to participate in carbon credit offset programs. These programs allow forest landowners to trade credits and collect income from the amount of carbon dioxide the trees on their land absorb. Carbon offset programs for forests can also give landowners financial incentives to engage in sustainable forest management, support local natural resources economies, and preserve family lands.

Biomass Energy

Due to the rising costs of fossil fuels, interest is growing to produce and use more energy from renewable sources, including plants and wood. Emerging technology is likely to expand biomass energy options to include broader applications of woody biomass, including tree plantations, residue from timber harvests, and brush.

Urbanization

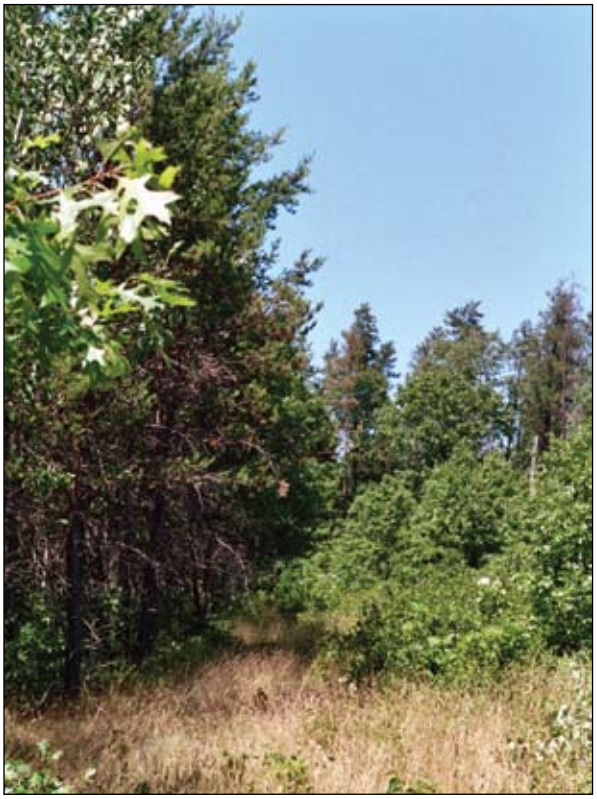
As human populations expand, pressure builds to cut more timber and build more houses, hospitals, shopping areas, and roads. All of these activities, if unchecked and uncoordinated, can fragment forests and habitats into smaller pieces and hinder movement of plants and animals from one area to another. Also, as more roads thread deeper into forests, the added threat of damage from illegal recreational use increases.

All-Terrain Vehicles

Motorized use of state forest lands has grown in recent years. This has led to some concerns about overuse and resource damage. The Minnesota Department of Natural Resources is working to accommodate all-terrain vehicle use on state lands without displacing nonmotorized forest users or harming habitat.

White-Tailed Deer

While white-tailed deer are native to Minnesota, in times before European settlement their numbers were far fewer than they are today. Deer populations tend to increase in milder winters and when humans create more deer-friendly habitat. Deer prefer forest edges, which are created by natural disturbances like fire and windthrow, but also from timber harvesting, roads, homes, and other development. The consequences of high deer populations are heavy browse damage on new growth of white pine, cedar, and other saplings, from which many forests are unable to recover without human help.



Minnesota DNR

In this photo, jack pine seedlings were planted in all areas at the same time. On the left, a deer exclosure (fence) protected the seedlings and they grew to maturity. The area in the foreground was not protected and the deer browsed it away.

Invasive Plants and Animals

Minnesota forests are facing invasions from a growing number of nonnative, invasive forest pests. Three factors are increasing the potential for exotic pests to threaten the health of native plant communities in our state:

- More people entering forest lands
- Increasing interstate and international commerce
- Changing climate

Earthworms

Steve Mortensen

All terrestrial earthworms are nonnative, invasive species from Europe and Asia. (There is a native aquatic species that woodcock eat.) Earthworms arrived with European settlement and are often spread when moving soil or depositing live fishing bait. Worms are natural decomposers and can aerate soils. Many people add worms to compost piles. However, when worms escape into forests, earthworms devour the ***duff*** on the forest floor and reduce nutrients in the soil. Many plants suffer, such as trilliums or the endangered goblin fern that relies on duff as a growing medium and source of nutrients. Studies conducted by the University of Minnesota and forest managers show that at least seven species of worms are invading our hardwood forests and causing a loss of tree seedlings, wildflowers, and ferns. In areas heavily infested by earthworms, soil erosion and leaching of nutrients may reduce the productivity of forests. Because many areas of the state are still free from earthworm disturbance, and because earthworms are nonnative, it is illegal to release them into the wild. Minnesota Statutes, section 84D.06 requires anglers to dispose unwanted bait in the trash, not in the soil or water.

Buckthorn

Jan Samanek, State Phytosanitary Administration, Bugwood.org

European buckthorn was introduced into the United States in the 1920s. Planted as a shrub, buckthorn can grow to the size of a small tree, thrives in all regions of Minnesota, and is an aggressive invader. Once it invades a forest, buckthorn quickly crowds out natural vegetation, greatly reduces or eliminates regeneration of native trees, and decreases the animal and plant diversity.

Emerald Ash Borer

David Cappaert, Michigan State University, Bugwood.org

The emerald ash borer is an insect native to Asia and has the potential to kill all ash trees in Minnesota. It was found in the eastern United States in 2002 and is expected to arrive in Minnesota soon. The adult beetles lay eggs on the bark, which hatch into larvae that bore into the tree. The larvae tunnel through the phloem layer and disrupt the movement of water and nutrients, eventually killing the tree.

Plans for Future Forests

In response to past actions and future needs and conditions, managers make plans to ensure forest health and benefits into the future.

Don't Move Firewood

To prevent damaging insects such as emerald ash borers, Japanese bark beetles, or gypsy moths from entering the state, always buy wood from an approved Minnesota firewood vendor, buy it where you burn it, and burn all of it where you buy it.

Assessing Trees and Forests

By congressional mandate, the U.S. Forest Service periodically inventories the nation's forest land, regardless of owner. The Minnesota DNR inventories state-owned lands in Minnesota. Field foresters do inventories using tools such as:

- Clinometers to measure tree height
- Diameter tapes to measure tree diameter
- Prisms to estimate the number of trees large enough to be considered valuable on an acre
- Global positioning system (GPS) units to record locations

The Minnesota DNR has helped the U.S. Forest Service conduct the past six inventories (1936, 1953, 1962, 1977, 1990, and 2003). When foresters, hydrologists, wildlife specialists, and others inventory a large area, it gets a designation determined by the number of similar plants, animals, soils, topography, and water features in the area. This designation is called an ***ecological classification.*** Computer experts compile the information into maps. Planners, scientists, and others use the maps to study forest components and make decisions about current and future forest and wildlife management.

Minnesota DNR

A forester estimates tree height using a clinometer.

How Minnesota's Forest Land Is Measured

In Minnesota, land use and land cover are measured in a variety of ways. Land ownership records, U.S. Forest Service's Forest Inventory and Analysis (FIA) assessments, and the Minnesota DNR's Cooperative Stand Assessment data all yield different numbers. In addition, forest land and timberland are defined differently.

Here are some numbers commonly used to describe the extent of Minnesota's forested land:

- 54 million acres comprise Minnesota's land base, including water. *Source: Minnesota Land Use and Cover: 1990s Census of the Land*
- 51 million acres comprise Minnesota's land base, not including water. *Source: Minnesota Land Use and Cover: 1990s Census of the Land*
- 16.3 million acres in Minnesota are considered forest land. *Source: Minnesota Forest Inventory and Analysis (FIA) 2005 data*
- 15 million acres of Minnesota's forested land are considered timberland. *Source: Minnesota Forest Inventory and Analysis (FIA) 2005 data*
- 5.6 million acres of Minnesota's land base are administered by the DNR. *Source: DNR Division of Lands and Minerals—Land Records System 2003*
- 4.5 million acres of land administered by the DNR are considered forested. *Source: Cooperative Stand Assessment Data*

Forestry Careers

People with many kinds of talents and skills are needed to keep forests healthy and productive. The future will require even more people to work in forest-related careers. People with forestry-related careers include:

- Forest economists (assess best ways to use and market trees)
- Timber specialists (assess best ways to harvest and manage forests)
- Forest planners, Geographic Information Systems (GIS) specialists (plan and map out forests and the plants and animals that live in them)
- Ecologists (study forests and the interactions among living and nonliving components)
- Loggers (cut timber)
- Foresters (measure and inventory timber and forests)
- Paper/pulp mill workers (make paper from wood pulp)
- Policy advisors, consultants, or liaisons (affect forestry policies)
- Sawmill workers (make lumber)

- Craftspeople (make products from wood)
- Scientists (study trees and forests)
- Urban foresters (manage trees in urban settings)
- Arborists (take care of tree health)
- Nursery workers (grow and nurture seedlings)
- Recreation specialists (manage campers, off-road vehicle enthusiasts, hikers, and other recreational users in a forest setting)
- Hydrologists (study water in the forest), biologists (study wildlife in the forest), and botanists (study plants in the forest)
- Educators (teach about trees)

Encouraging young people to consider careers in forestry and other natural resources is critical to maintain healthy resources into the future. A good way to start is to give young people frequent opportunities to explore the natural world that will strengthen a love and respect for the land and the natural resources it provides.

Interview With a Forester: Rebecca Barnard

Forestry requires an interest in science, natural resources, the outdoors, and community. An average day may involve inventorying tree and plant species, measuring trees, meeting with a logger on a timber sale site, working with private landowners and suggesting management options, teaching school-age children and public citizens about forestry, attending public and/or legislative meetings, or fighting wildfires. I enjoy the challenge of applying scientific principles to our everyday life, while improving people's understanding of forestry and managing for healthy forests.

What Can You Do?

Plant Trees

Each new tree that graces our landscape is a new source of beauty, oxygen, shade, and habitat for creatures of all sizes and sorts. An investment in a tree is an investment in the future. Appendix 1 provides advice on how to plant seedlings and trees.

Keep Trees Healthy

Plant, water, and prune carefully. Remove invasive exotic plants. Be careful not to transport pests and diseases from one place to another (for example, in infested or diseased firewood).

Keep Forests Healthy

Consider NOT mowing or paving all property around your home, school, church, business, and city parks. Retaining forested areas costs less, saves energy, provides needed green space for communities and wildlife habitat, and may even reduce crime!

Protect the Forests You Own

If you own forest land, consider strategies for permanent land protection, such as conservation easements, land exchanges, and other options.

Rethink, Reduce, Reuse, Recycle

Choose to use renewable resources over nonrenewable resources, buy items with reduced or "green" packaging, and avoid buying unnecessary products.

Remember the Balance

Conservation does not mean "Never cut a tree!" It's true that we can harm this resource if we use it without concern for the future. But our forests will be healthiest if we balance human uses with the other values of the resource.

Be a Teacher

Everyone can teach neighbors, friends, and, most importantly, the next generation how to be good stewards of Minnesota's forests and sustain a healthy way of life.

To sum up

Chapter Six: Forests Tomorrow

- Forests are an important renewable resource.
- Future trends will affect forests: changes in the forest products industries, changing forest ownership, forest certification, climate change, biomass energy, urbanization, motorized recreation, deer, and invasive plants and animals.
- Foresters measure the number and health of trees to manage forests for the future.
- There are many forestry-related careers.