

Plants — whether they are trees, bushes or a forest — play important roles in community health. Loss or degradation of vegetation, especially in large quantities, can lead to major impacts on water resources, economies, fisheries and wildlife. Loss of even one mature tree can impact the way a piece of property is used and enjoyed.

Environmental Services from Trees



Alone or in groups, trees provide benefits to our communities. (Adapted from: *Cooling Our Communities – A Guidebook on Tree Planting and Light-Colored Surfacing*, U.S. Environmental Protection Agency, January 1992.)

Natural Architecture

Soil type, water and sunlight help determine the types of plants that can grow in an area. Plants in turn provide the “natural architecture” of a region, supplying shelter and food needed by animals and making every place unique. In North Carolina’s coastal region, plants help create special habitats including marshes, wetlands, maritime forests, dunes, pine savannas, and beds of underwater plants (known as submerged aquatic vegetation) such as shoalgrass. These

resources provide homes for species that range from blue heron and black bear to flounder and shrimp.

Humans accrue benefits from all of these natural resources. But as communities develop, some loss of vegetation usually results — along with the value, and goods and services those plants provide. The amount and type of plants lost will determine the scale of the impact. For example, evergreen trees generally intercept more water than a comparably sized deciduous tree. And some tree species are better than others at filtering pollution from the environment.

Quantifying Value

Most people have an inherent understanding that vegetation provides both individual and community benefits. In recent years, researchers and others have become better at clarifying and quantifying the value of nature — especially when it comes to trees. These include:

Air Quality

Plants produce the oxygen in the air people breathe. A single mature tree can absorb as much as 48 pounds of carbon dioxide per year and release enough oxygen into the atmosphere to support two human beings.

Trees in parking lots help reduce hydrocarbon emissions from cars by keeping temperatures of fuel delivery systems cooler than what occurs in non-shaded lots. Both evaporative emissions and exhaust emissions during the first few minutes of engine operation are reduced.

Water Resources and Stormwater

Two-thirds of the water supply in the United States comes from precipitation filtered through forests. Healthy, intact forest vegetation and soils help control water flows in streams, including peak flows after storms, low flows during dry weather, sediment levels, and water chemistry and quality.

Up to 55 percent of the variation in water treatment costs can be explained by the percent of forest cover in the water source area.

Because forests act as water storage units, they can save costs for stormwater management. One hundred large mature trees intercept 1.2 million gallons of rainfall per year, and for every 5 percent tree cover added to a community, stormwater runoff is estimated to be reduced by approximately 2 percent. Forests near Atlanta, Georgia, were estimated to save the city \$420 per acre per year in stormwater management costs enrichment.

The national averages of revenues collected by local governments for each dollar spent on community services for the land uses below are:

- Residential: \$0.87
- Commercial/Industrial: \$3.45
- Farmland/Forestland/Open Space: \$2.70

From a presentation by Jeffery Dorfman, University of Georgia, Alliance for Quality Growth, August 17, 2004.

Land and Aquatic Resources

Loss of forest cover has been shown to lead to loss of soil by wind and water. Loss of topsoil lowers the productivity of agriculture and forest ecosystems, and impacts aquatic ecosystems through sedimentation and nutrient enrichment.

Biodiversity

Native plant communities provide the food and shelter needed to maintain biodiversity. The native flowering dogwood (*Cornus florida*) supports 117 species of moths and butterflies alone. These insects are food sources for other animals, such as birds. Non-native ornamental plants support 29 times fewer animals than do native ornamentals.

Energy Savings

Shade from two large trees on the west side of a house and one on the east side can save up to 27 percent of a typical residence's annual air conditioning costs. Well-located trees can also result in similar savings for government buildings and businesses.

Good for Business

Urban trees improve economic stability for the retail sector by attracting businesses and consumers. Customers spend more time and shop more often in well-landscaped business districts and are willing to pay up to 12 percent more for goods and services.

One study suggest that landscape amenities have the highest correlation with office building occupancy rates — higher even than direct access to arterial routes.



Shopping centers that have ample vegetation, like this one in Wilmington, N.C., can increase patronage simply by providing a pleasant location to visit. (Photo: Pam Smith)

Deferred Street Maintenance

Repaving can be deferred for as many as 10 years on a well-shaded street and 25 years on a heavily shaded street. Shading reduces the amount of oil that is volatilized (changed to a gaseous or vapor form) from the asphalt. Volatilization leaves the stone aggregate unprotected and vehicles can cause the asphalt to loosen and break down. Large shade trees can also reduce costs of repaving by 58 percent over a 30-year period.

Property Values

Properties with trees are estimated to be valued 5 to 15 percent higher than comparable properties without trees. Higher property values translate to increased tax revenues for local governments.

Human Health and Community

Trees in public housing neighborhoods are linked to lower levels of fear, contribute to less violent and aggressive behavior, and encourage better neighbor relationships and coping skills.

The presence of trees can also reduce mental fatigue, help people relax and reduce aggression.

Hospital patients with views of trees have been found to need less medication and have faster recovery times following surgery.

Vegetation provides character and sense of place to public spaces where community members gather and recreate.

Climate Moderation

Large shade trees can reduce local temperatures by 5 to 10 degrees Fahrenheit.

Plants also utilize sunlight and carbon dioxide to produce sugars and oxygen. Carbon dioxide is a known heat-trapping gas that contributes to global climate change.

PLANTS LOWER TEMPERATURES

Vegetation helps moderate local temperatures through evapotranspiration (ET). As the name implies, ET occurs as two processes. Evaporation occurs on surfaces when liquid water changes to water vapor (vaporization). Transpiration is simply vaporization through small openings on a plant leaf (stomata). In both processes, solar radiation or heat is used to change the water molecules from a liquid to a vapor, contributing to lower temperatures.



Increases in residential and commercial development can be linked to loss of forest health, decreases in native fish and wildlife and their habitats, reduced opportunities for outdoor recreation, and decreases in the production of timber and other forest products.
(Photo: Gloria Putnam/North Carolina Sea Grant)

FORESTS AT A GLANCE

*North Carolina is one of six states where future housing development on rural lands is most likely to affect private forest cover.

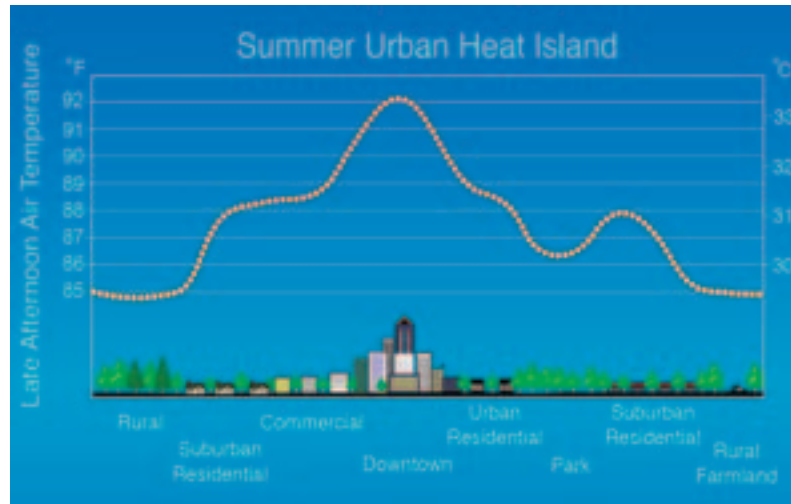
*There are 18.6 million acres of forest land in North Carolina, slightly more than 59 percent of the state's land area.

*Approximately 86.5 percent of forest land is privately owned and 97 percent is classified as available or capable of timber production.

*The total economic value of North Carolina's forests, as estimated by the U.S. Forest Service, is \$30 billion dollars.

PLANTS HELP BEAT THE HEAT

The lack of vegetation in a predominantly built environment can create a heat island effect where air and surface temperatures in urban areas are higher than nearby rural areas with more vegetation. This difference can be as much as 2 to 10 degrees Fahrenheit and is usually most significant in the afternoon. In the built environment, solar energy is absorbed by unshaded streets, walls and other surfaces and released slowly back into the atmosphere, warming the surrounding air. Vegetation provides shade, thereby reducing heat absorption and in combination with the soil, moderates temperature through evapotranspiration. (Graphic: Heat Island Group, Lawrence Berkeley National Laboratory)



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