

Chapter 5:

Forests for People

KEY FINDINGS

- Over the past century, the amount of forestland per person dropped 40% decreasing the ability of forests to provide the economic, social, and environmental benefits that residents depend on.
- Forests provide many benefits that enhance the physical and mental health of people.
- While urban forests represent only 5% of all forestland, they directly improve air quality, enhance community livability, and provide recreational opportunities for more than 80% of watershed residents.
- Tree cover affects community stability and desirability. Studies show that when neighborhood tree cover drops below 15%, more than half of all residents consider moving.



PEOPLE DEPEND ON FORESTS

Whether a person lives in a rural, suburban, or urban area, they are part of a “forest community.” Forests provide vital benefits for all people by affecting environmental quality, human health, and quality of life. Services that people receive from trees include clean air and water, reduced energy use in buildings, carbon storage, protection against ultraviolet radiation, and cooler air temperatures. Trees provide opportunities for viewing wildlife, as well as aesthetics.

Reductions in ecosystem health translate directly to declines in public health and quality of life. This is an important consideration for the expanding population of the Bay watershed, where 100 acres of forest are lost each day. The area of forest per person or “forest population density” has dropped steadily since the early 1900s. In Maryland, Pennsylvania, and Virginia, the forest population density fell 40% between 1907 and 2002. As a result, residents have a relatively smaller area of forest to use for drinking water, wood, air pollution control, and many other daily needs than what was available to people in the early 1900s. In Maryland, the amount of forest per person declined by 70% despite an increase in forest area because of a large gain in the population (>300%).^{1,2}

AIR QUALITY BENEFITS

There is a direct relationship between forest area and air quality in the Bay watershed. Forests and tree canopies improve local and regional air quality by altering atmospheric conditions by reducing air temperatures and other microclimatic effects, removing air pollutants, and conserving energy.⁴ Atmospheric pollutants like ozone, particulate matter, nitrogen dioxide, and sulfur dioxide can induce asthma and a variety of other respiratory problems. Fine particles of dust, smoke, and ash are thought to cause lung cancer.⁵ Improving air quality can substantially improve public health. For example, for each decrease of particulate matter of one microgram per cubic meter of air, death rates from cardiovascular disease, respiratory illness, and lung cancer decrease by 3%; extending the lives of 75,000 people in the United States each year.⁶

Temperature Reduction

Many unhealthy pollutants and ozone-forming chemicals develop in high concentrations

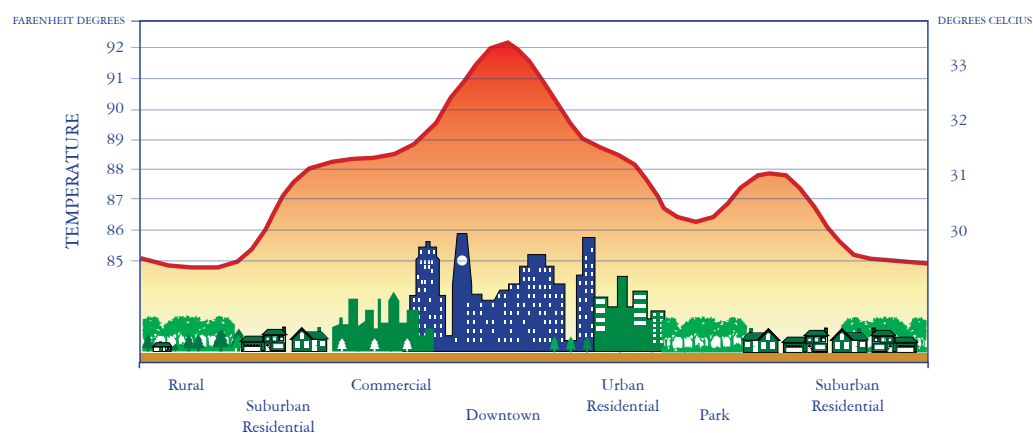
URBAN FORESTS: THE FORESTS WHERE WE LIVE

Urban forests are especially important to the health and quality of life of Bay watershed residents as more than 80% of people live in urban areas. Urban forests are a combination of parkland, street trees, residential trees, and other vegetation found in towns and cities. While different in composition and structure from their rural counterparts, urban forests provide substantial benefits to communities, including recreational opportunities, temperature reduction, and air pollutant removal. The average urban area in the Bay watershed has 35% of its area covered by forests equaling approximately 1.2 million acres of urban forests in the Bay watershed.³



Photo: Eric Sprague

Urban Heat Island Profile



during summer days in the Chesapeake region as exhaust from increased automobile traffic is subjected to hot temperatures. Trees are able to counter-act the decline in air quality by cooling the surrounding environment with

shade and releasing water to the atmosphere through transpiration. As trees and other natural vegetation are replaced with pavement and buildings, “heat islands” are created that can produce air temperatures 2

to 10 degrees Fahrenheit warmer than nearby rural areas. These elevated temperatures affect communities by increasing peak energy demand, air conditioning costs, air pollution levels, and heat-related illness.⁷

Removal of Air Pollutants

The 1.2 million acres of urban forest in the Chesapeake region removes approximately 42,700 metric tons of pollutants annually. Sulfur dioxide and nitrogen oxide, two major components of acid rain, are among the pollutants removed by the Bay watershed's urban forests.

Pollution removal rates differ among cities based on a variety of factors, such as the amount and type of air pollution, length of the leaf season, and precipitation. Urban tree canopies in Baltimore, Maryland, and Washington, D.C., absorbed and intercepted more than 500 and nearly 400 metric tons of air pollution respectively in 2000. The urban tree canopy in Washington, D.C., covers less than a third of the city, yet removes an amount of particulate matter (10 microns) each year equal to more than 300,000 automobiles, or 60% of all cars in the city. Areas in cities that have a complete tree canopy, like Rock Creek Park in Washington, D.C., have shown short-term air quality improvements as high as 14% for sulfur dioxide, 13% for ozone, 9% for particulate matter, and 6% for nitrogen dioxide.³

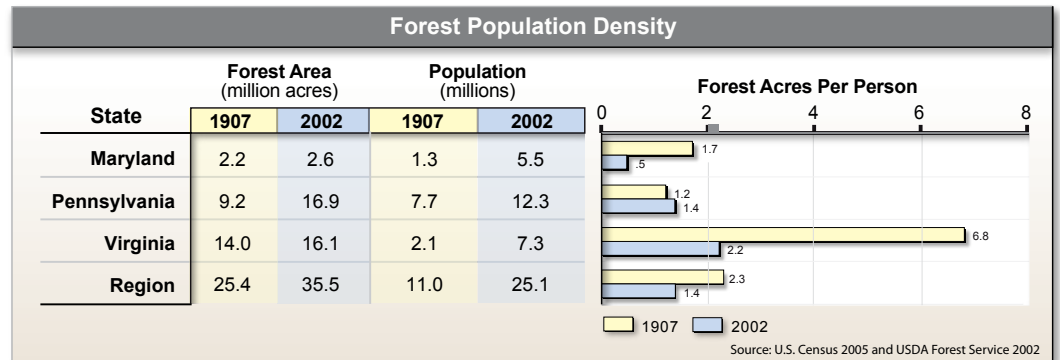
Energy Effects on Buildings

Trees save heating and cooling costs. Properly placed trees shade buildings in the summer and block winter winds. When buildings use less energy, pollutant emissions from power plants also are reduced. Shaded houses can have 20 to 25% lower annual energy costs than the same house without trees.⁸ In Washington, D.C., the urban tree canopy saves city residents approximately \$2.6 million dollars per year.⁹ Establishing 100 million mature trees around residences in the United States could save about \$2 billion annually in reduced energy costs.¹⁰

INTERPRETATION:

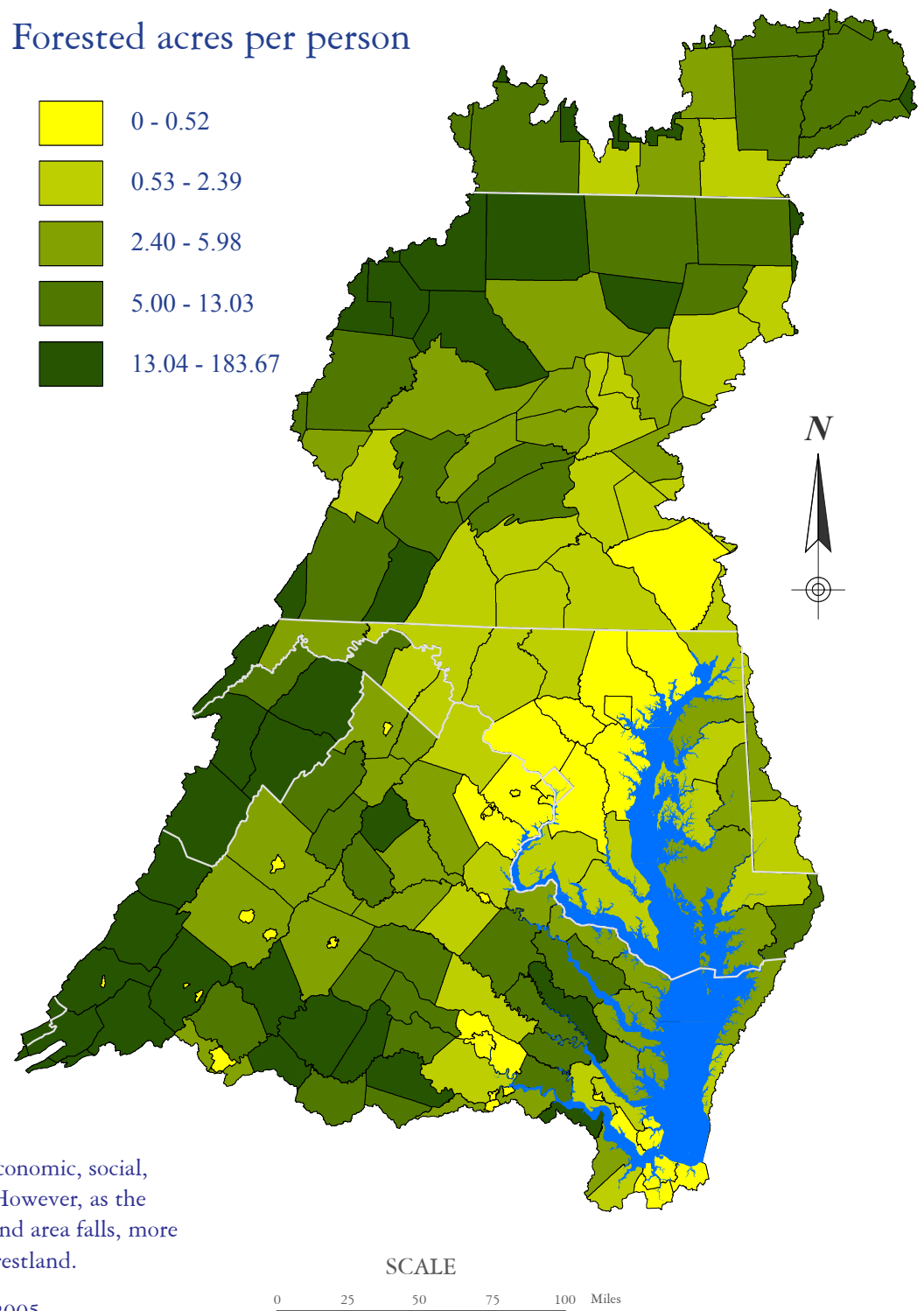
Chesapeake Forests provide numerous economic, social, and environmental benefits to people. However, as the population continues to rise and forestland area falls, more people depend on smaller portions of forestland.

SOURCE: USDA Forest Service / FIA 2005



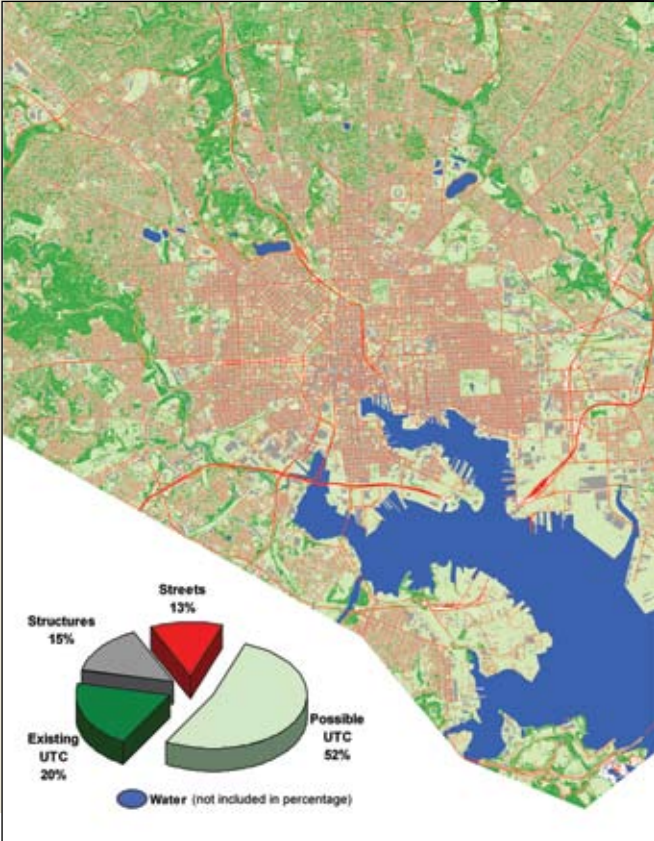
FOREST POPULATION DENSITY

Forested acres per person



URBAN TREE CANOPY GOAL IN BALTIMORE MARYLAND

On March 30, 2006, Baltimore, Maryland, became the first city in the Chesapeake Bay watershed to adopt an urban tree canopy goal. Under this initiative, Baltimore will seek to double its existing tree cover from just under the current 20% to 40% by 2030. Baltimore is the first of many communities that are expected to set tree canopy goals under the Chesapeake Executive Council’s Expanded Riparian Forest Buffer Directive. This directive asks that five communities each in Maryland, Virginia, Pennsylvania, and Washington, D.C., serve as models for the rest of the Bay watershed by adopting goals to increase tree cover.

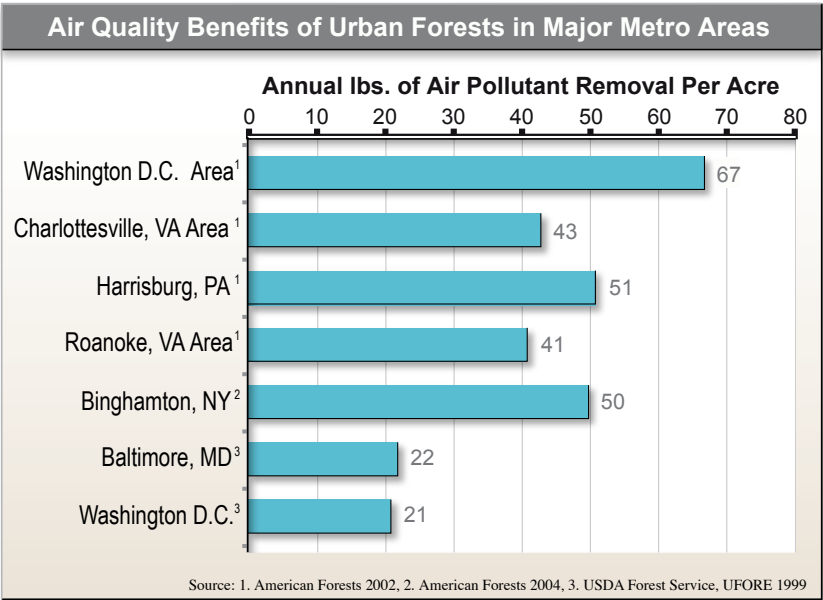


Air Quality Benefits of Urban Forests, Washington, D.C.		
Emissions Filtered	Urban Forest Removes Pollution Equivalent to the Emissions of	
	Automobiles	Single Family Homes
Particulate Matter (10 microns)	315,200	30,400
Sulfur Dioxide	82,400	1,400
Carbon	9,700	49,000
Nitrogen Dioxide	3,500	2,300
Carbon Monoxide	78	300

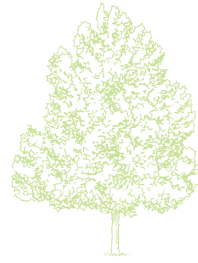
Source: Nowak et al. In Review



Photo: David Winston



CULTURAL BENEFITS



RECREATION

Forest recreation, such as wildlife watching, hunting, hiking, and camping, is very popular in the Chesapeake Bay watershed. Visits to national forests and wildlife refuges have risen dramatically.¹¹ In 2001, greater than 2.5 million and 12.5 million people hunted or viewed wildlife in the Bay region, respectively.¹² Nearly five million people annually visit the two national forests in the Bay watershed, the George Washington-Jefferson and Monongahela forests. The majority of these visitors come to view wildlife and scenery.¹³ Greater than 1 million people also visit the heavily forested Shenandoah National Park.¹⁴

Urban forests are valued for recreation and provide opportunities for daily exercise. Washington, D.C., and Baltimore, Maryland, are among the top five “large” cities in park availability, with 13 and 9 acres of parkland per 1000 persons, respectively.¹⁵ This is an important public benefit, when only 25% of Americans are getting the exercise they need. Lack of exercise is a leading contributor in the current obesity epidemic and is a factor in more than 200,000 deaths a year.¹⁶

Private forests are also highly regarded for their cultural benefits. Many private forest landowners enjoy viewing wildlife, hunting, and ATV travel as means of recreation. Most own forests, though, to enjoy the solitude and peacefulness of the woods. These objectives

are important, as families and individuals own 64% of Chesapeake forests.¹⁷

QUALITY OF LIFE

Trees provide myriad benefits that affect quality of life for individuals and communities. These benefits range from providing pleasant surroundings and a more meaningful connection between people and the natural environment to improving health. Residents in the Chesapeake region have become increasingly aware of these benefits, as shown by the \$2 billion made available for conservation on election days between 1996 and 2005.¹⁹ In addition, approximately one-third of Chesapeake forests are protectedⁱ from conversion to other land uses. Pennsylvania has the largest area and percentage of protected forestland. Maryland and Delaware have approximately 30% of all forestland protected from development.²⁰

A study in Baltimore, Maryland, revealed that as the percent of tree canopy cover increases, residents are more satisfied with their community. The study also showed that when neighborhood forest cover is below 15%, more than half of the residents consider moving away. Therefore, increasing forest cover in urban neighborhoods makes existing communities more desirable and can be an important tool for encouraging revitalization and helping to reduce sprawl.²¹



Photo: Middleton Evans / Chesapeake Bay Gateways Network

THE AMERICAN ELM

The American elm was once a prominent and much loved urban tree in the Chesapeake Bay watershed. American elms are large trees that often reach 100 feet in height and four feet in diameter. These stately trees were planted heavily in urban areas because of their superior shade.

In 1930, the European elm bark beetle and its associated fungus, known as Dutch elm disease, arrived in the United States on a shipment of logs from Asia. First discovered in Ohio, the disease spread quickly and reached the Bay watershed. By 1960, the American elm was no longer prominent in Chesapeake communities. During the past 75 years, approximately 100 million American elms have perished.¹⁸

Researchers have been working to develop disease resistant elm varieties and hybrids. Over the past few years, numerous types of disease-resistant American elm trees have become available to the public and been planted around the Bay watershed.

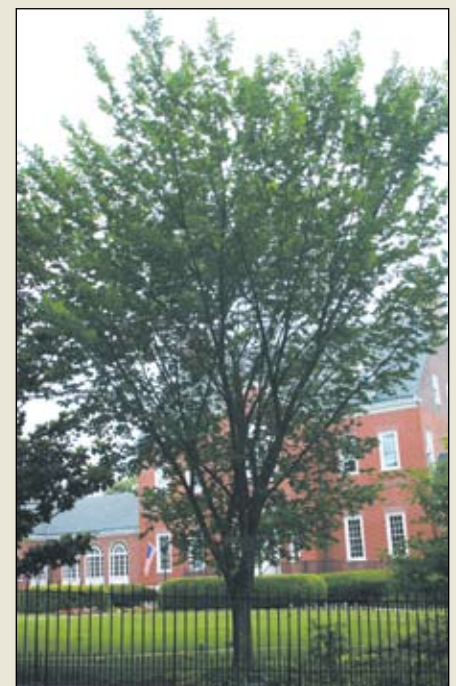
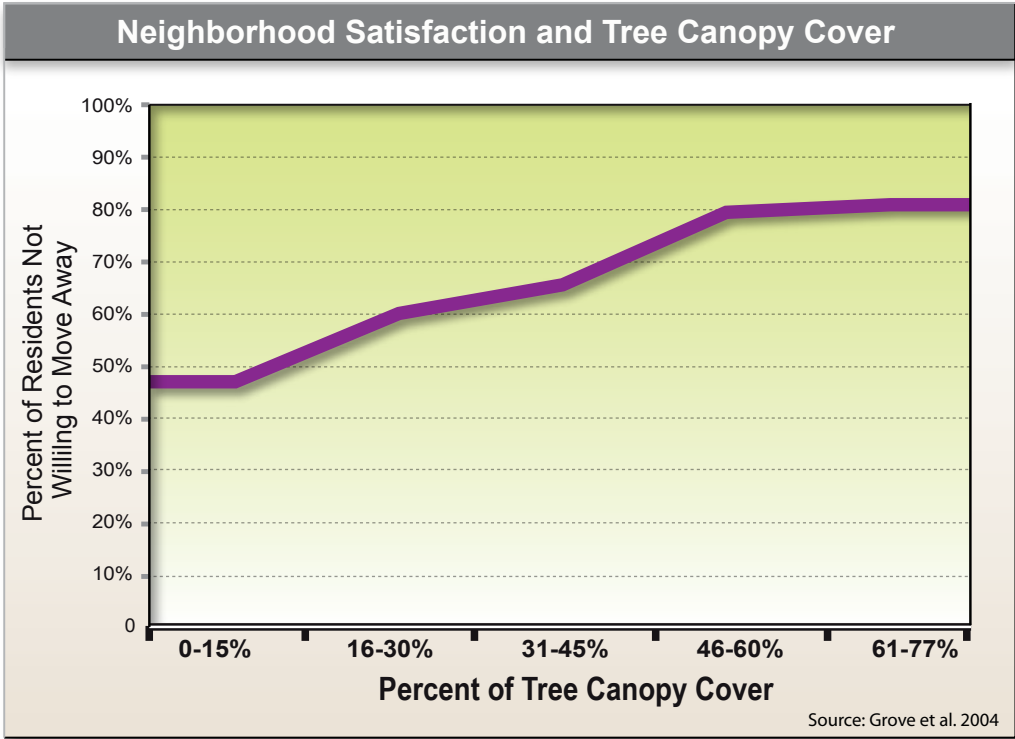
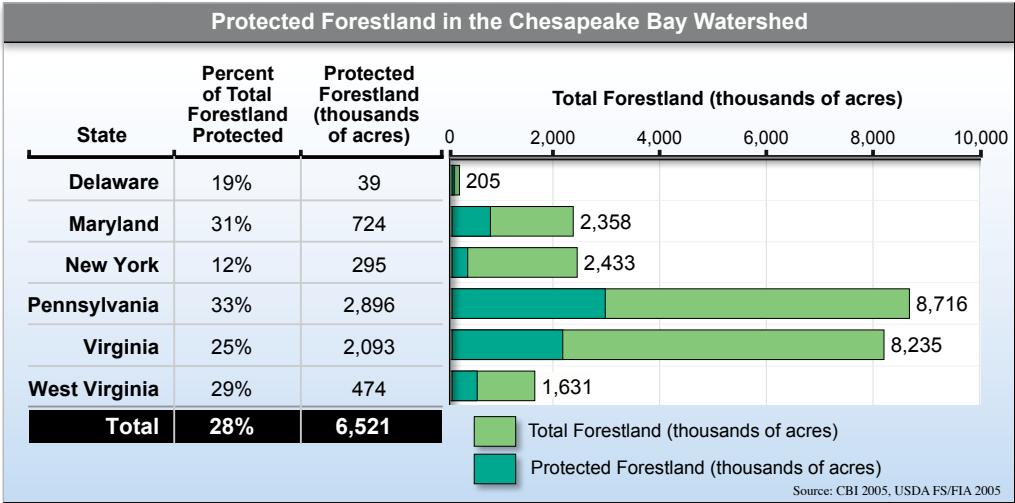


Photo: Shannon Sprague

ⁱ National, state, or local designations (such as national forests) or legal restrictions (such as conservation easements) that preclude land conversion.

Other benefits of urban forests and trees include:

- **Noise reduction** - Wide belts (98 feet) of tall dense trees combined with soft ground surfaces can reduce apparent loudness by 50% or more.²² In narrow planting spaces (less than 10 feet wide), dense belts of vegetation can achieve reductions of three to five decibels by combining one row of shrubs with one row of trees behind it.²³
- **Work productivity** - Desk workers without views of nature claim 23% more sick time, while those with natural views demonstrate greater job satisfaction, less frustration, more enthusiasm, and better overall health.²⁴ Nearby nature, even when viewed from an office window, can provide substantial psychological benefits that affect job satisfaction and a person's well being.²⁵
- **Patient recovery** - Hospital patients with views of trees and other greenery recover more quickly, with fewer complications and less pain medication after surgery than patients without views of nature.²⁶
- **Reduced stress** - Experiences in urban parks have been shown to change moods and reduce stress.²⁷ Reduced driver aggression and stress recovery have also been associated with treed thoroughfares.^{28,29}
- **Improved business** - Consumer behavior responds favorably to streetscape greening. Consumers pay more money for parking in treed areas, spend more time shopping there, and pay up to 50% more for certain goods—suggesting a basis for partnerships between the business community and urban forest planners.^{30,31}
- **Emotional experiences** - Urban trees and forests provide significant emotional and spiritual experiences that are important in people's lives



- and can foster a strong attachment to particular places and trees.³²
- **Increased property values** - A survey of sales of single-family homes in Athens, Georgia, indicated that landscaping with trees was associated with an increase in sales prices of 3.5 to 4.5%.³³ In addition, builders have estimated that homes on wooded lots sell on average for 7% more than equivalent houses on open lots.³⁴
 - **Improved community and public safety** - Urban trees and forests contribute to stronger ties among neighbors, greater sense of safety and adjustment, more use of neighborhood common spaces, healthier patterns of children's play, and fewer property and violent crimes.³⁶

INDICATORS FOR SUSTAINABLE CHESAPEAKE FORESTS

The following indicators could be used to track the ability of forests to improve human health and quality of life:

- Number of communities that have adopted a tree canopy goal
- Acres of forestland per person
- Acres and percent of total forestland that is protected



CHAPTER IN PERSPECTIVE

Rural, suburban, and urban residents of the Chesapeake Bay watershed all benefit from forests. However, as forests are lost or degraded, the public health, quality of life, and environmental quality of the region declines. Negative effects of tree cover loss include rising asthma rates, community discontent, loss of jobs and income, increase in taxes, and decline in the fiscal health of Bay communities. For example, communities are forced to spend millions of dollars on technological replacements for services that forests provided naturally—such as air pollution control, flood mitigation, storm water management, and drinking water filtration. The economic value of forests is explored in the next chapter, The Economics of Chesapeake Forests.

