A Local Government Guide to the Chesapeake Bay

Module 4: Capitalizing on the Benefits of Trees

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***Please refer to individual slide notes for data references and sources.**

A Guide for Local Governments

As a local leader, your decisions set the course for your community. Your actions determine the health and vitality of your jurisdiction, as well as that of your local waterways and the Chesapeake Bay. You can achieve win-win outcomes by prioritizing local economic development, infrastructure resiliency, public health, and education while also protecting your environment.

This module is one in a series created by the Chesapeake Bay Program to support decision making by local officials. We encourage you to examine the full suite of modules:

1. How Your Watershed Works
2. Foundations of Clean Water
3. Healthy Water for the Economy
4. **Capitalizing on the Benefits of Trees**
5. Preserving Local Character and Landscapes
6. Protecting Your Infrastructure Through Stormwater Resiliency
7. Building the Workforce of Today *and* Tomorrow

To help local government representatives better understand how the information in the modules aligns with their priorities, look for these icons:

Economic Development

Public Health & Safety

Infrastructure Maintenance & Finance

Education

Laying Foundations

Trees benefit your local community. Trees are natural, low-cost solutions to many municipal problems when compared to manmade systems. In this module, you'll learn about the benefits of trees and how they can be used to maximize those benefits.

What You'll Learn

Benefits to Your Community

Community trees improve the local economy, public health and safety, community infrastructure, and education.

Economic Development

A home near natural forests earns an average **$10k** property premium (more than near golf courses or specialty parks).

A neighborhood with good tree cover leads to **6-9%** increases in home value because the homes are perceived as more scenic and private.

Annually, the trees in the watershed provide at least

$24 billion

in the form of carbon removal, flood control, wildlife habitat, and recreation.

Well-placed trees can save **21-24%** in cooling costs and up to **25%** in heating costs.

Customers spend **more time** & **11% more money** in well-treed areas.

Case study: Pembroke Woods

Developers in Frederick County, MD saved over **$360k** by leaving trees and wetlands undisturbed in a residential subdivision. The savings were primarily stormwater benefits and reduced clearing costs.

Capitalizing on the Benefits of Trees | Benefits to Your Community

Recreation on Forested Land

Forests support robust local outdoor recreation economies.

Nationally, outdoor recreation contributes:

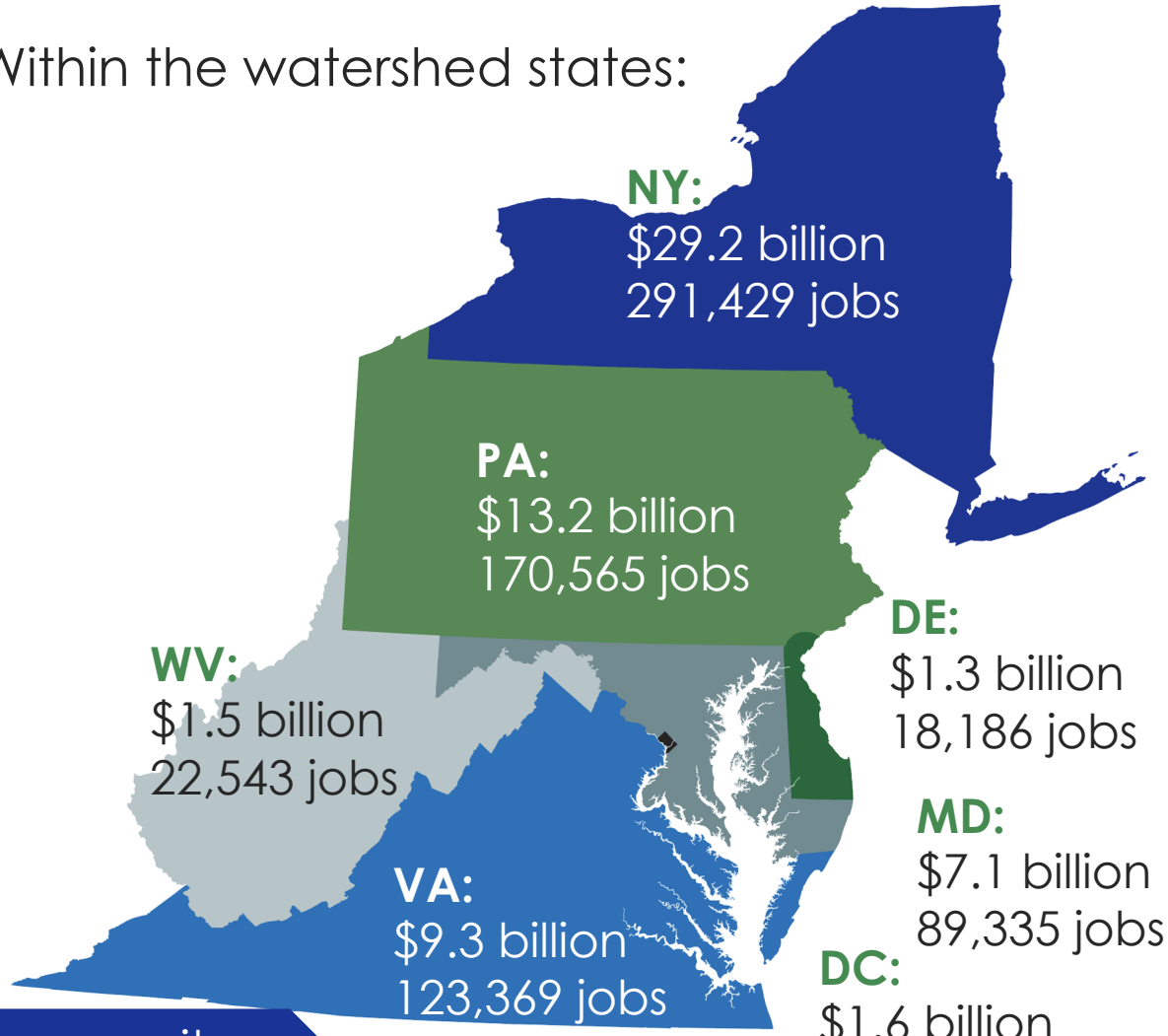
$887 BILLION
in consumer spending

7.6 MILLION
American jobs

$65.3 BILLION
in federal tax revenue

$59.2 BILLION
in state & local taxes

Within the watershed states:



Clean Air and Water

Trees remove over **650,000 tons** of air pollution in the US each year. They are a frontline defense to reduce air pollution-related deaths and respiratory disease.

Trees beside local waterways can also reduce polluted runoff by **30-98%**, which includes:

Nutrients

Bacteria

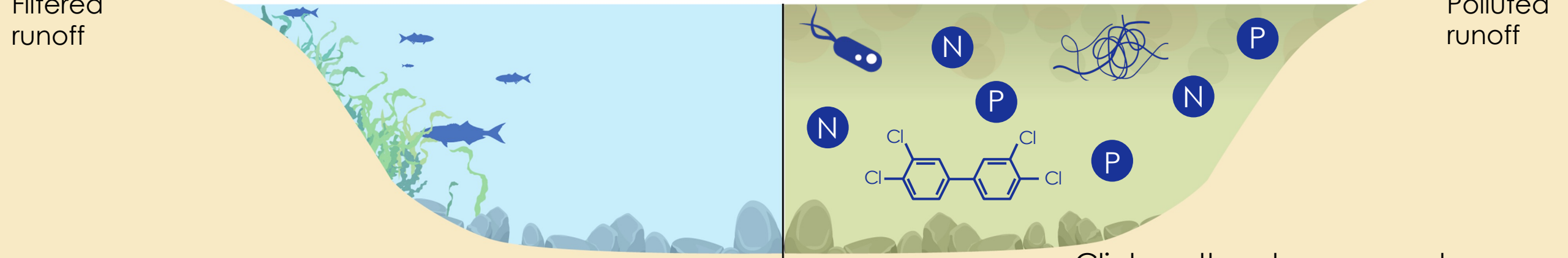
Sediment

Microplastics

Agricultural biproducts

Urban toxic contaminants

Filtered runoff



Polluted runoff

Click on the glossary words above to find their definitions and impacts on humans and wildlife.

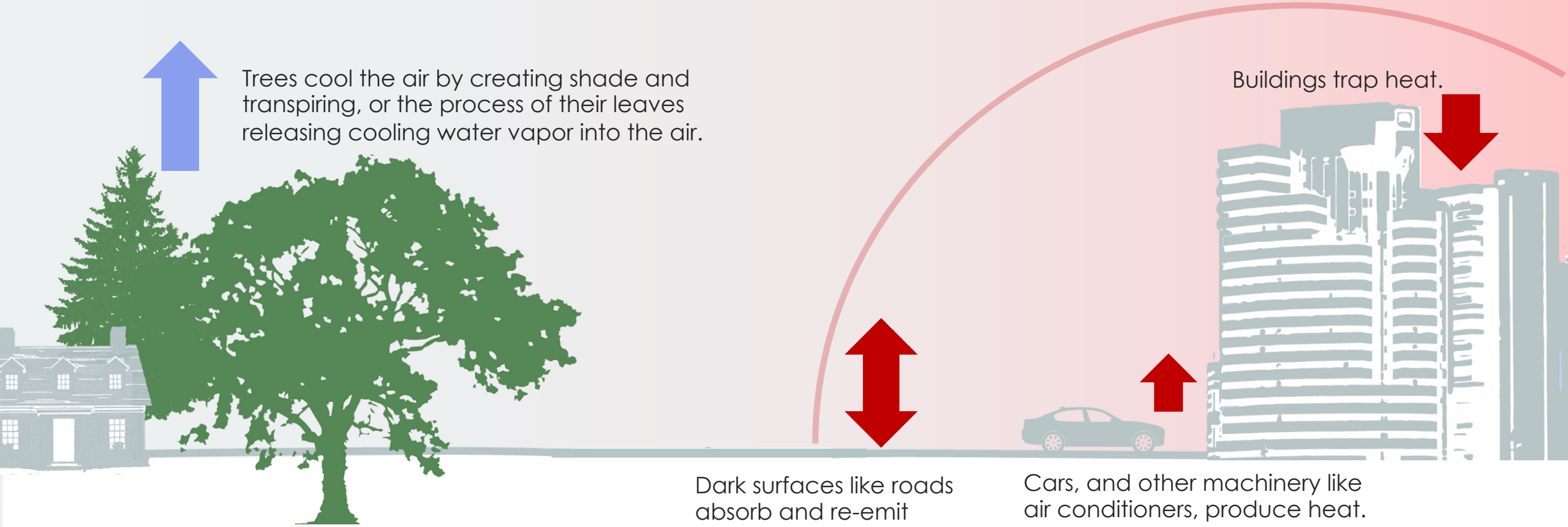
Benefits for Agriculture

Strategically planted or conserved trees on farms can reduce soil erosion and prevent pollutants, like fertilizers and pesticides, from reaching local waterways.

Trees can also act as a visual and noise barrier and provide safe corridors for wildlife movement.

Urban Heat Islands

Urban heat islands experience extreme high temperatures due to the forces illustrated below. They can increase the magnitude & duration of heat waves in cities, elevating instances of heat stroke, heat exhaustion, and death. The elderly and those with pre-existing conditions are especially at risk.

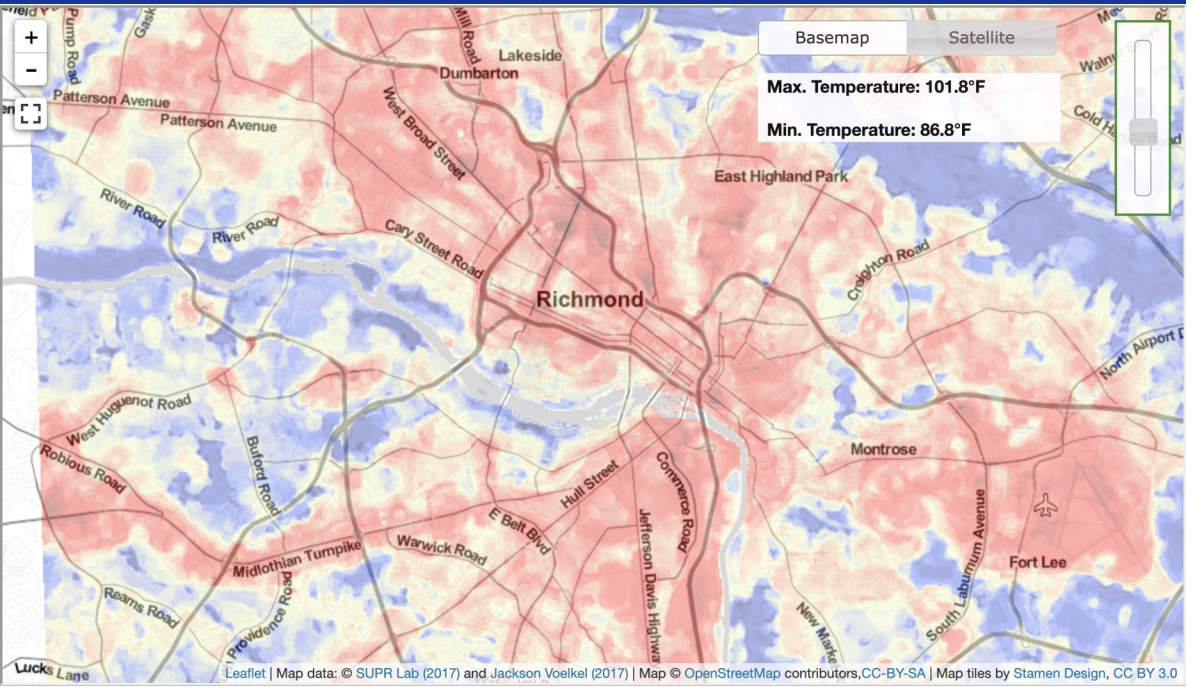


Capitalizing on the Benefits of Trees **Benefits to Your Community**

Check out and share this Urban Heat Island Poster for Vulnerable Populations.

Urban Heat Islands

Case study: Urban Communities



Map and study by Jeremy Hoffman, Throwing Shade RVA

A study from the Science Museum of Virginia found higher temperatures in historically redlined neighborhoods when compared to higher income, whiter neighborhoods in 94% of studied urban areas.

Redlining is the historical practice of refusing home loans or insurance to neighborhoods based on a racially motivated perception of investment safety. The historically redlined neighborhoods (predominantly lower income and communities of color) were up to 7° warmer, which was partly attributed to less tree cover. In your planning, consider and address such inequities so that everyone benefits from trees. Engage your community to make sure that your work addresses their needs and priorities.

Climate Connection

Warmer temperatures exacerbate the public health risks in heat islands. Heat island temperatures will increase with the rise in average air temperature, causing more deadly consequences.

Public Health and Safety

Trees are correlated with reductions in:

- Mental fatigue & aggression
- Gun violence
- Domestic violence

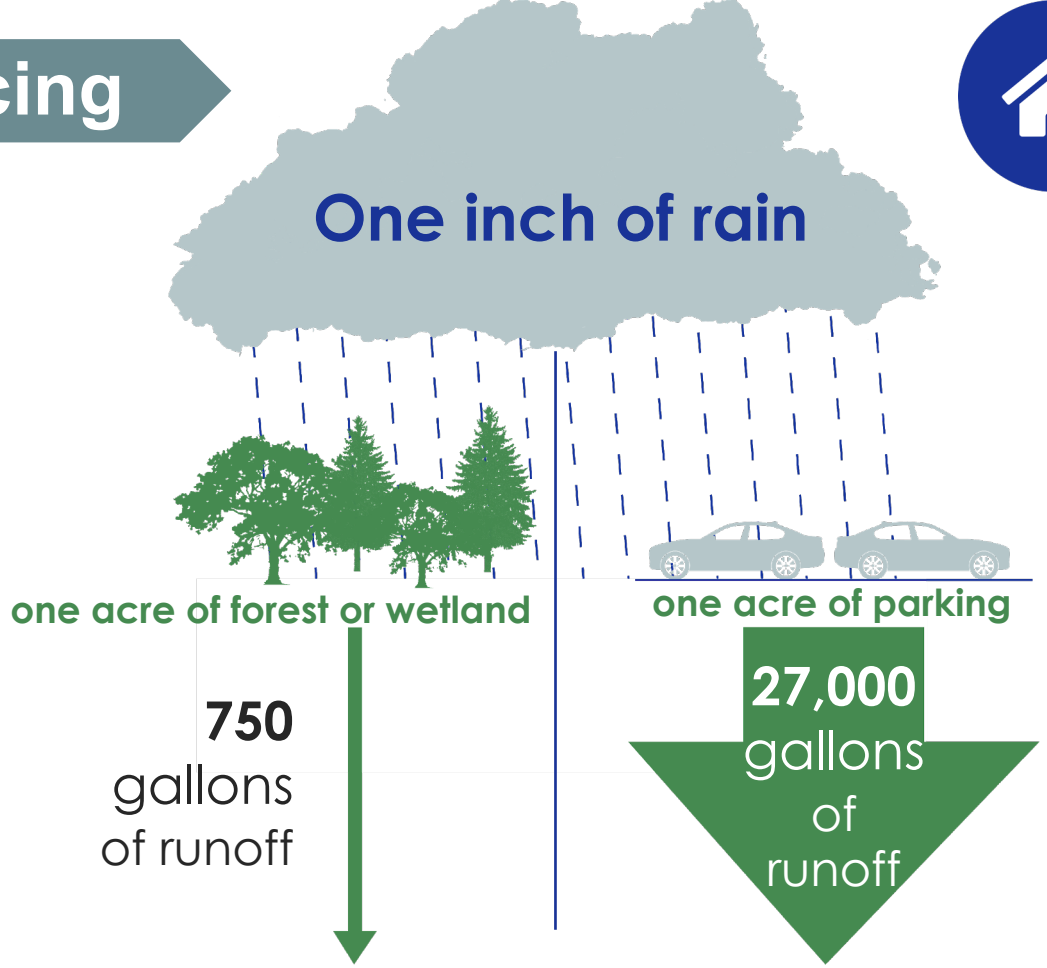
Many studies show that being in nature and forests, from taking a walk to practices like "forest bathing" where one immerses one's senses in the forest atmosphere, increases immunity and well-being.

Community trees also bring people together outdoors, leading to lower societal health care costs due to increased exercise and stress relief as well as higher neighborhood vigilance, which discourages criminal activity.

Explore more about how trees benefit your community's health at Healthy Trees, Healthy Lives.

Infrastructure Maintenance and Financing

Trees reduce runoff that can flood communities, stress storm drainage systems, discharge pollutants, and erode local waterways. See module 6 for more information on trees and stormwater resilience.



Trees save $$$

Trees planted along streams and rivers reduce nitrogen at a cost of $3.10/lb compared to $8.56/lb for wastewater treatment plants.

Case study: Prince George's County, MD

Prince George's County's existing trees reduce runoff by **4.3 billion gallons** per year, saving **$12.8 billion** annually on stormwater treatment costs.

Climate Connection

Warmer air holds more moisture, leading to more intense and frequent storms. Increased rainfall can overwhelm local waterways and stormwater systems, amplifying flooding and erosion risks.

Education

Trees and nature can improve academic outcomes in several ways:

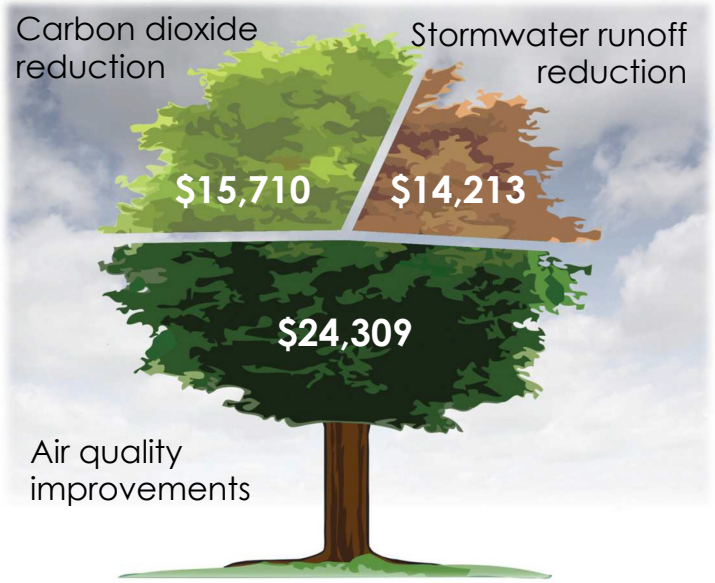
- Reading, writing, math, science and social studies improvements.
- Enhanced creativity, critical thinking, and problem solving.
- Increase in focus and attention and decrease in ADHD symptoms.
- Better engagement and enthusiasm for learning.
- More impulse control and less disruptive behavior.

Learn more at:
https://chesapeaketrees.net/category/schools/

Wider Benefits

Trees remove carbon dioxide from the atmosphere during photosynthesis and store the carbon as part of the tree. This reduces the amount of heat-trapping gases in the atmosphere and can help meet emission reduction goals set by states and cities.

A 2013 study found that the value of carbon sequestered by trees in cities alone is **$2 billion** annually, with the total value of sequestered carbon in city trees valued at **$50+ billion** in 2005.



Case study: Blades, DE

iTree calculates that Blades' community trees provide $54,232 in benefits each year. The graphic to the left shows the breakdown of where those benefits come from.

Use i-Tree Landscape to quantify carbon capture and storage potential of the trees in your community, along with other benefits.

For more about the economic benefits of a healthy watershed, see Module 3.

Enhancing Community Trees

Learn about how you can improve tree cover across your community to optimize benefits.

Tree Canopy

Tree canopy is the area of the leaves of a tree or group of trees. Chesapeake watershed communities now have access to highly detailed data, tools, and maps of tree canopy to determine how much they have and help set goals for the future.

Watch this video from the Forest Service to learn more.

Achieving a tree canopy goal = **Existing canopy** + **Planting** + **Growth (protection & maintenance)** - **Losses (mortality, removal, etc.)**

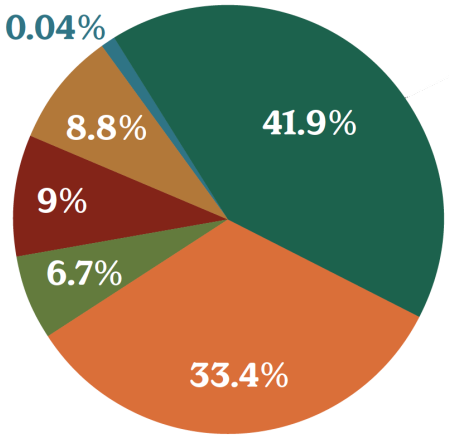
To achieve a tree canopy goal, taking care of your existing trees is just as important as planting new trees. To learn more, visit https://chesapeaketrees.net/understand-your-canopy/.

Tree Cover Data

You can take inventory of your community's trees and use high-resolution tree cover data to craft a tree canopy goal. The new tree canopy data available at the Chesapeake Tree Canopy Network can assist with this. For each community, you can see what's currently on the land *and* investigate changes over time.

What's in your report?

A chart of land cover in your county.



41.9% Tree Cover[1]
142,219 acres

33.4% Agriculture
113,222 acres

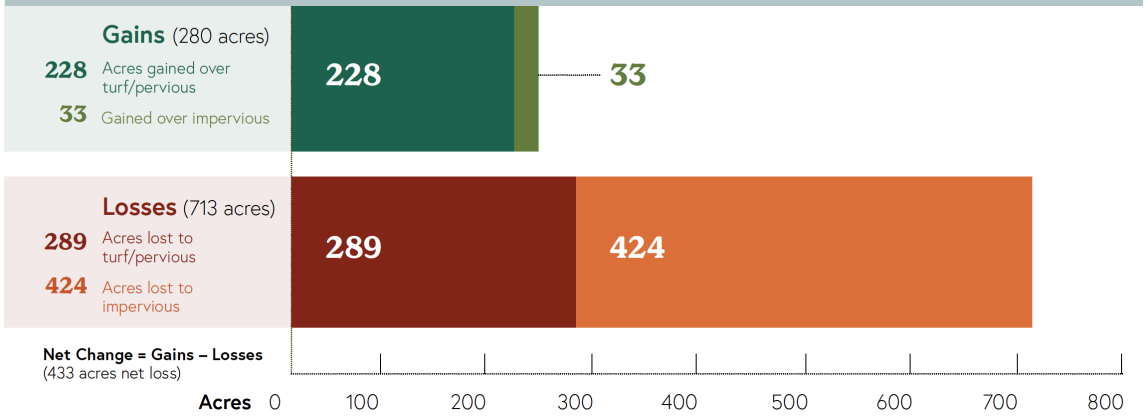
6.7% Turf Grass
(Lawns)
22,569 acres

9% Impervious
(Buildings/Pavement)
30,882 acres

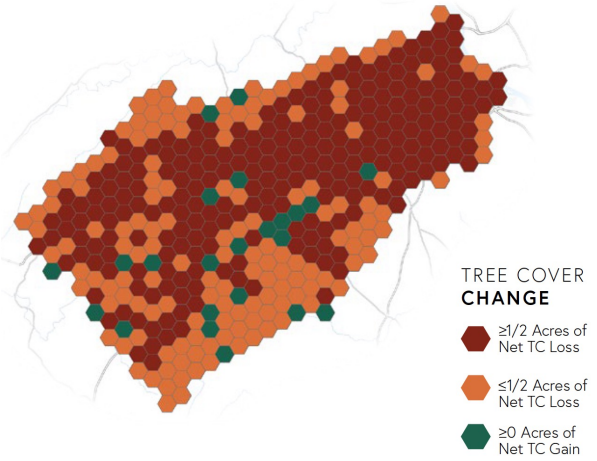
8.8% Other[2]
29,890 acres

0.04% Non-Forested Wetlands
163 acres

A graph summarizing gains and losses of tree cover.



A map showing what areas have increased or decreased in tree cover.

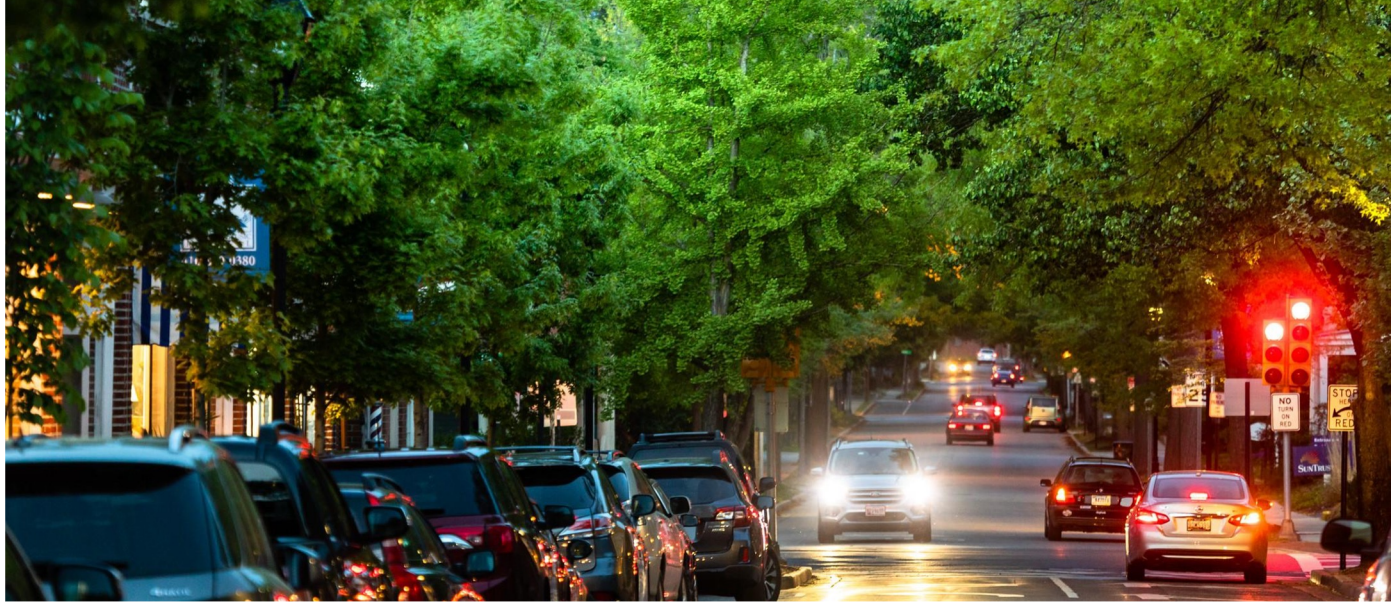


A summary of the benefits your tree cover offers your community.

- Total Air Pollution Removal Value
- Gallons of Reduced Stormwater Runoff Value
- Carbon Sequestered Value

Tree Canopy

Additional tools and information on funding and best practices for setting tree canopy goals can be found in the links at the end of this module.



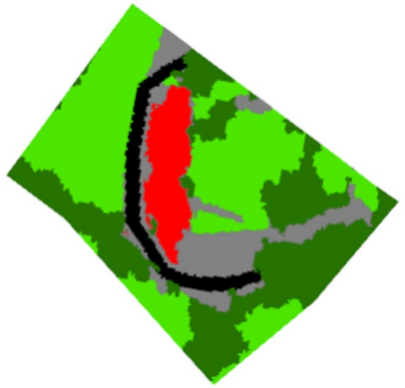
Case study: Columbia, PA

Columbia is working to meet their 50% tree canopy goal by improving local ordinances and policies as well as developing outreach and education strategies.

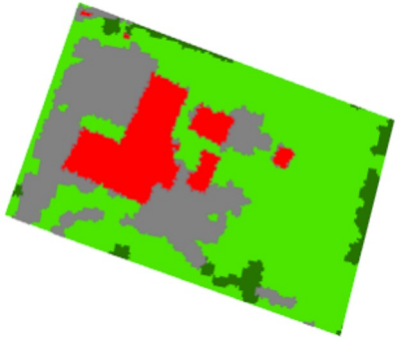
Columbia's Shade Tree Commission has planted and maintained approximately 850 community trees over the past 20 years. The Commission consists of residents and businesses that not only pay membership dues that fund the planting and care of trees, but also serve as a network of ambassadors.

Tree Canopy

Case study: West Virginia Schools



Springfield-Green Spring Elementary: 32% tree canopy with a potential of 52%.



Bedington Elementary: 5% tree canopy with a potential of 33.8%.

Building
Impervious
Vegetation
Tree Canopy
Road

West Virginia conducted a tree canopy analysis of all 87 public schoolyards across the Potomac Basin. Canopy coverage ranges from zero to 78% with the average tree canopy cover of school property at 15%. Tree canopy analysis can also show potential for improvement. The potential in the table below is how much canopy could be added if half of the grass area was planted with trees.

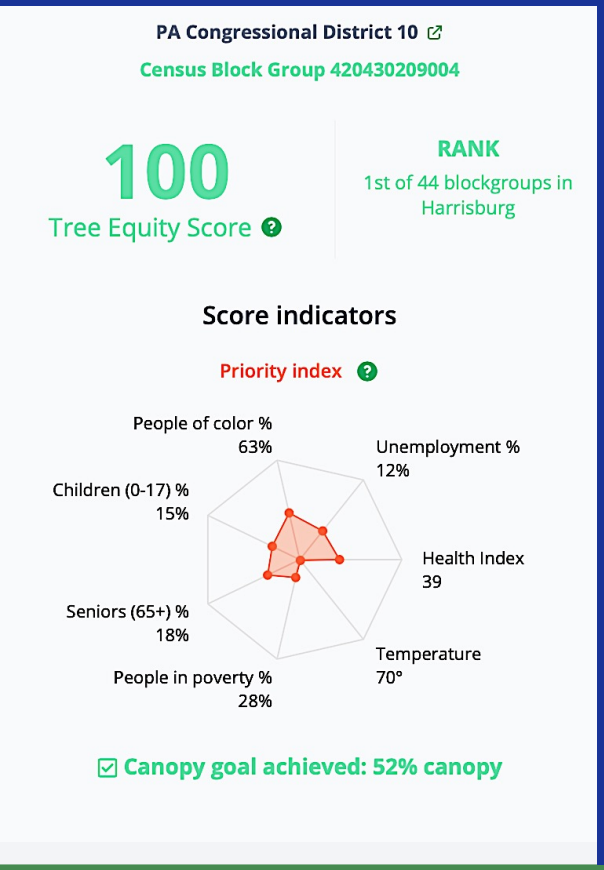
School	Acres	Tree Canopy	Potential
Augusta Elementary School	5.2	13%	25.0%
Back Creek Valley Elementary School	5.1	4%	39.9%
Bedington Elementary School	4.3	5%	33.8%
Berkeley Heights Elementary School	22.8	6%	34.3%
Berkeley Springs High School	11.8	2%	30.5%
Blue Ridge Elementary School	31.4	60%	71.1%
Brandywine Elementary School	3.6	13%	35.2%
Springfield-Green Spring Elementary School	14.7	32%	52.0%
Bunker Hill Elementary School	4.0	6%	42.8%
Burke Street Elementary School	4.0	1%	3.2%

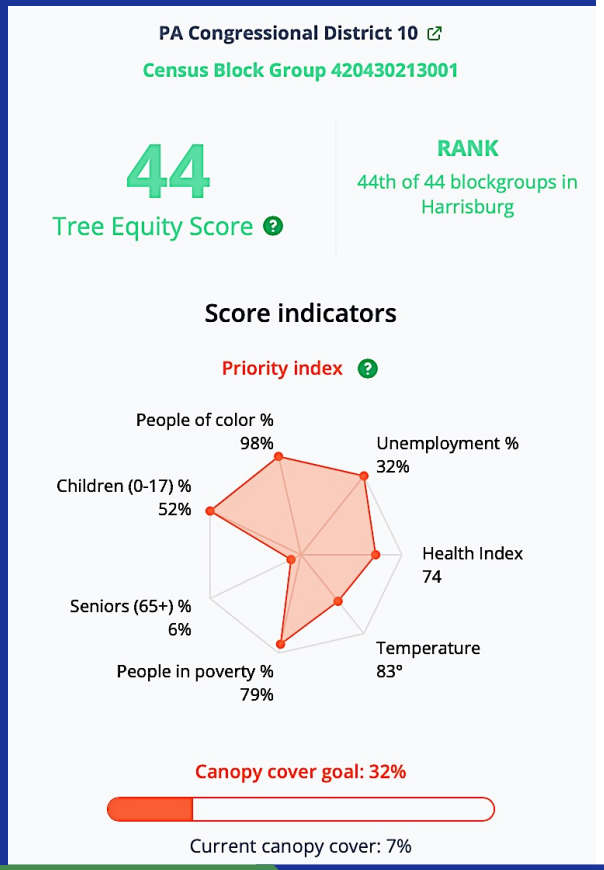
Tree Equity Score

Visit treeequityscore.org to explore your tree equity

Tree canopy is not always shared equitably. A Tree Equity Score combines 8 priority indices for neighborhoods within census-defined urban areas to help prioritize tree protection and planting efforts.

Case study: Harrisburg, PA





Compare the highest and lowest tree equity scores in Harrisburg, PA to the right.

One census block has met the 52% tree canopy goal and has lower priority scores for every indicator, earning a Tree Equity Score of 100.

The other block has a current canopy cover of only 7% and has high percentages of children, people of color, unemployment, and poverty. These priority indices combined into a Tree Equity Score of 44.

Forest Buffers

Riparian forest buffers are stands of trees, shrubs, and grasses strategically planted or conserved directly adjacent to waterways. Planting forest buffers helps clean and cool streams, which can make the water in our streams more swimmable and drinkable for us and wildlife.

Forest Buffers

Planting trees has helped some counties meet their Municipal Separate Storm Sewer System (MS4) requirements. Learn more about MS4s in Module 6.

Case study: Frederick County, MD

Frederick County's Creek ReLeaf Program has planted 200+ acres of forest, mostly as riparian buffers. The program was started in 2017 to help meet MS4 requirements.

The program, funded through multiple sources including MD's Chesapeake & Atlantic Coastal Bays Trust Fund, offers property owners free native plants and the first five years of forest maintenance as well as a permanent reforestation easement at 75% of fair market value.

The program has also reforested public lands.

Conserving Forests

Forest conservation is the retention or protection of existing forests and the benefits they provide to communities.

Retaining your tree canopy offsets future expenses.

Over the course of 10-15 years, a forest retention analysis demonstrated that the cost of meeting federal pollution limits could be offset by modest forest retention effort.

In the Yellow Breeches Creek watershed (PA), over 15 years (2010-2025):

a 10% reduction in the rate of forest loss could save **$12.28 million.**

In a portion of the Rappahannock River watershed (VA), over 10 years (2015-2025):

a 10% reduction in the rate of forest loss could save **$125 million.**

In MD, the Forest Conservation Act requires surveys of current trees in large development sites and plans to retain & protect or plant & maintain trees. Learn more here.

Incentives

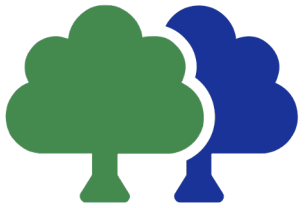
Incentives often garner more public support than punitive measures, making them an attractive option. Learn more about conservation tools in Module 5.

Case study: Albemarle County, VA

In the 1970s, Albemarle County's Department of Planning and Community Development designated Rural Areas with growth restrictions to encourage conservation.

Since then, the County has implemented a use-value tax assessment program to reduce the property taxes for landowners in agriculture, forestry, and other open space uses. In addition, the Acquisition of Conservation Easements program allows landowners to sell conservation easements to public agencies, with low-income landowners qualifying for higher payments.

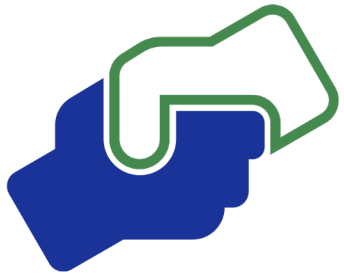
What You Can Do



Establish a tree canopy goal for your community. Engaging residents in creating and implementing a plan inspires them to be better stewards of their community.

Explore and diversify funding opportunities, like state and federal grants, stormwater management fees, and parks and recreation department funds, to ensure continuous funding to meet your community's tree goals.

Update local codes, ordinances, plans, and standards to encourage best practices for tree planting, maintenance, and conservation.



Get residents involved! Use internship programs to supplement staff on planting projects, support active tree commissions or boards, and explore opportunities to involve schools in stewardship activities.

To Learn More

- Chesapeake Tree Canopy Network
  - Connect with resources, stories, and best practices to understand, expand, and maintain your canopy
- Chesapeake Riparian Forest Buffer Network
  - Learn about building a forest buffer program, including funding resources
- Vibrant Cities Lab's Urban Forestry Toolkit
  - Explore step-by-step instructions, tools, and methods for enhancing urban tree canopy cover
- Financing Urban Tree Canopy Programs Guide and Online Course
  - Find practical strategies for funding municipal urban tree canopy programs and enroll in a course based on the guide
- Center for Watershed Protection's Making Your Community Forest-Friendly Worksheet
  - Use this checklist to review your local development regulations and see where you can make improvements
- Trees and Schools: Growing the Connection
  - Explore resources that connect students, schools, and trees

Glossary

- Stormwater Runoff

  Precipitation that does not evaporate or soak into the ground but instead flows over the land and into the nearest waterway

- Nutrients

  Refers to nitrogen and phosphorous, two nutrients that severely degrade local waterways and the Bay when discharged in excess

- Sediment

  Creates cloudy water which negatively impacts important species like underwater grasses and oysters

- Bacteria

  Microorganisms that can make humans and wildlife sick. Examples include *E. coli*, Salmonella, and Vibrio

- Microplastics

  The tiny (<5 mm) fragments, fibers, and microbeads that come from larger plastic litter breaking apart and persist in the environment for an extremely long time

- Agricultural Biproducts

  Pesticides, fertilizers, hormones, and more that can harm human and wildlife health. An example is antibiotics used to treat animals, which could facilitate antimicrobial resistance

- Urban Toxic Contaminants

  Metals, synthetic compounds, and more that can harm human and wildlife health. An example is mercury, which is toxic to nervous, digestive, and immune systems

- Urban Heat Island

  Urbanized areas that experience higher temperatures than outlying areas

- Tree Canopy

  The layer of leaves, branches, and stems that provide coverage of the ground when viewed from above

- Forest Buffer

  The trees and other plants that border streams and rivers

- MS4: Municipal Separate Storm Sewer System

  A collection of structures designed to gather stormwater and discharge it into local streams and rivers

Images and Graphics

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