Restoring Chesapeake Forests for Ecosystem Services, Climate Resiliency, and Environmental Justice

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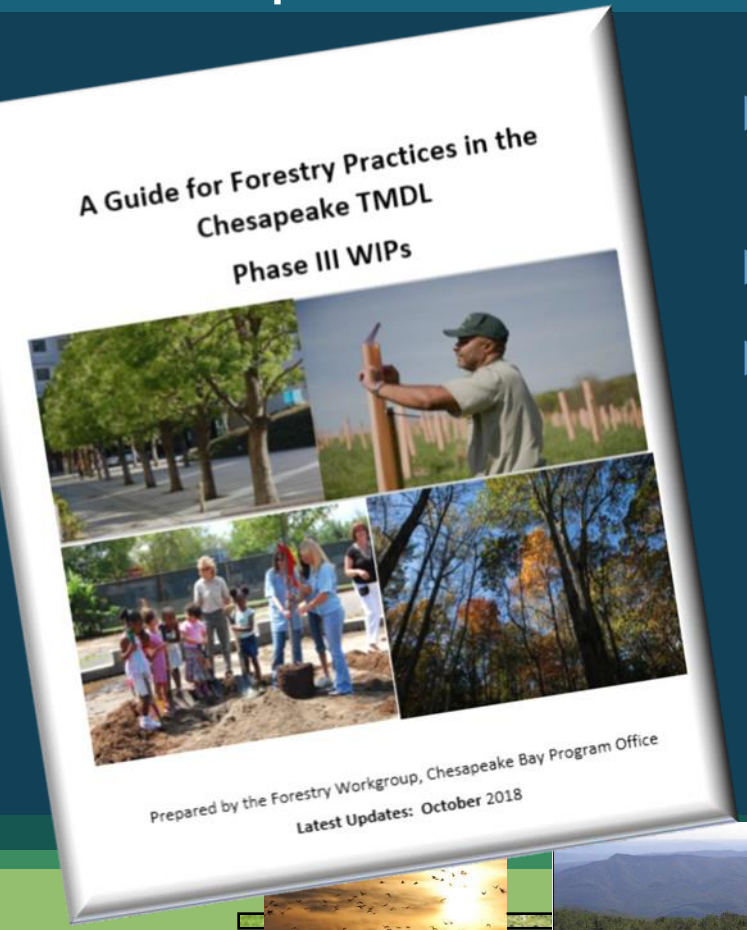
The Chesapeake Bay

- Nation's largest estuary
- 42 million acres
- 18 million people
- 3,600 other species
- 6 States + DC
  - Local governments
- 59% forested
  - mostly privately-owned

Chesapeake Total Maximum Daily Load (TMDL)



- Main stem of Bay listed for NPS pollution in 2010 and TMDL established
- All 42 million acres affected
- By 2025, reduce nitrogen 25%, phosphorus by 24%, and sediment 20%
  - All sectors (ag, developed, forest)
  - State Watershed Implementation Plans put out in 2019 detailing plans for achieving nutrient reductions

The Chesapeake Bay Program Partnership


NY


DC


VA


MD


PA


DE


WV

Bay Commission


Federal partners

A partnership of all the major players in the Chesapeake region, working collaboratively on science, policy and restoration efforts

Forestry Workgroup

- ✓ Formed in 1989 - state, federal, local, ngo members
- ✓ Monthly meetings to share information, discuss issues and identify opportunities to advance goals
- ✓ Source of forestry expertise at Chesapeake Bay Program
- ✓ Key partnership goals adopted:

1) Restore 900 miles of riparian forest buffer per year
2) Conserve 695,000 acres of high-value forest by 2025
3) Expand tree canopy by 2400 acres by 2025.

TREES in COMMUNITIES

CREATE VIBRANT COMMUNITIES

- Incorporating trees into common spaces in public housing increases social activities.[1]
- Having larger trees in yards and on the street can improve home values by 3%-15%.[2]
- Shoppers will spend 9%-12% more in areas with better tree canopy.[3]

IMPROVE HUMAN HEALTH

- Trees help reduce stress, lower blood pressure, and boost the immune system.
- Shade from trees reduces radiation that causes skin cancer.

CONTROL STORMWATER

- Tree roots can trap sediment and filter contaminants from stormwater.
- One tree can reduce stormwater runoff by 13,000 gallons per year.[4]

REDUCE AIR POLLUTION

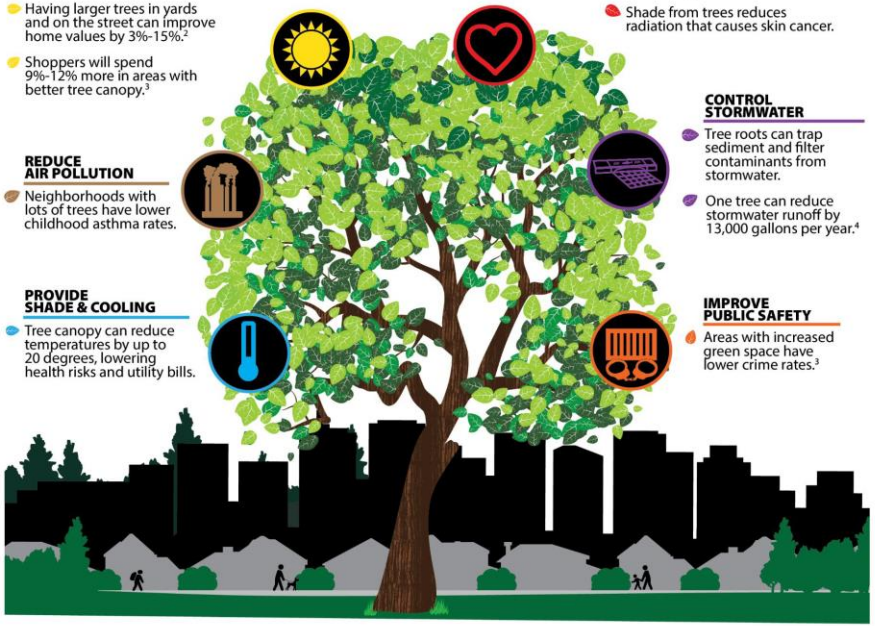
- Neighborhoods with lots of trees have lower childhood asthma rates.

IMPROVE PUBLIC SAFETY

- Areas with increased green space have lower crime rates.[3]

PROVIDE SHADE & COOLING

- Tree canopy can reduce temperatures by up to 20 degrees, lowering health risks and utility bills.



[1] Wolf, K.L., and M.A. Rozance. 2013. Social Strengths - A Literature Review. In: Green Cities: Good Health. College of the Environment, University of Washington. www.greenhealth.washington.edu.
[2] Wolf, K.L. 2010. Community Economics - A Literature Review. In: Green Cities: Good Health. College of the Environment, University of Washington. http://bit.ly/UWGreenHealth.
[3] Stamen, T. 1993. Graffiti Deterrent Proposed by Horticulturist [Press Release]. University of California Riverside.
[4] Plumb, M. 2008. Sustainable raindrops: cleaning New York Harbor by greening the urban landscape. Riverkeeper report. https://www.riverkeeper.org/wp-content/uploads/2009/06/Sustainable-Raindrops-Report-1-8-08.pdf.

Forest Service Eastern Region

TREES on FARMS

DIVERSIFY FOOD PRODUCTION

- Planting fruit and nut trees can diversify farm production systems.

REDUCE SOIL EROSION

- Deep root systems hold soil in place.
- Alley rows can reduce soil erosion up to 30%.[1]

PROTECT CROPS AND LIVESTOCK

- Trees can increase crop and livestock production by creating more favorable microclimates.
- Trees provide protection from extreme weather conditions.[2]

IMPROVE WATER QUALITY

- Trees buffer streams from excess nutrients, sediment and pesticides.
- Trees slow runoff from fields and animal enclosures.

HELP CONSERVE WATER

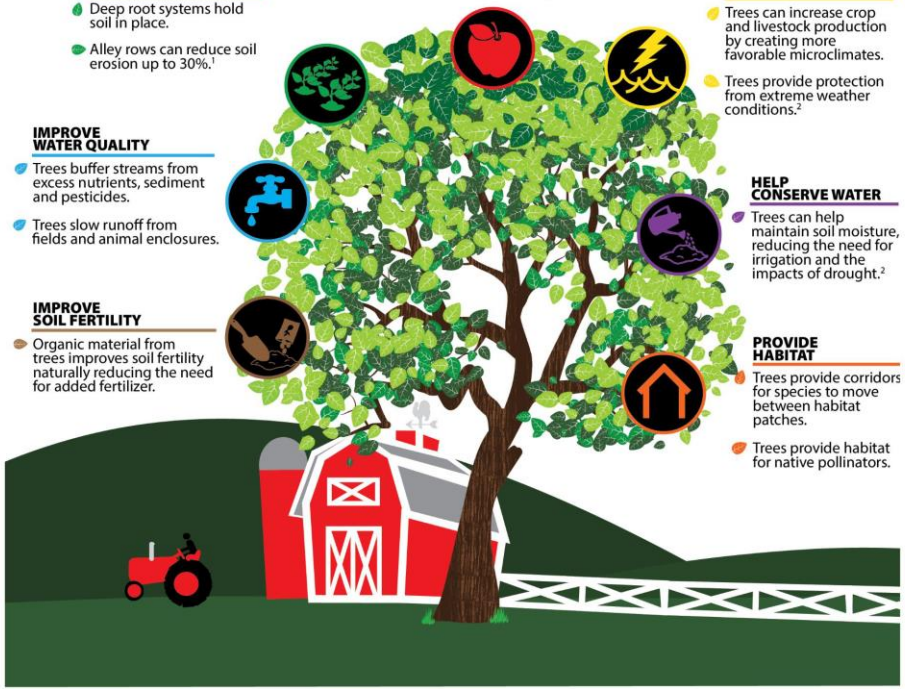
- Trees can help maintain soil moisture, reducing the need for irrigation and the impacts of drought.[2]

IMPROVE SOIL FERTILITY

- Organic material from trees improves soil fertility naturally reducing the need for added fertilizer.

PROVIDE HABITAT

- Trees provide corridors for species to move between habitat patches.
- Trees provide habitat for native pollinators.



[1] Udawatta, R.P.; Garrett, H.E.; Kallenbach, R. 2011. Agroforestry buffers for nonpoint source pollution reductions from agricultural watersheds. Journal of Environmental Quality. 40(3): 800–806.
[2] Dosskey, Michael G.; Brandle, Jim; Bentrup, Gary. 2017. Chapter 2: Reducing threats and enhancing resiliency. In: Schoeneberger, Michele M.; Bentrup, Gary; Patel-Weynand, Toral, eds. Agroforestry: Enhancing resiliency in U.S. agricultural landscapes under changing conditions. Gen. Tech. Report WO-96. Washington, DC: U.S. Department of Agriculture, Forest Service. 7-42.

Forest Service Eastern

What are some benefits of tree cover in New York*?

Total Air Pollution Removal Value
143.5 million lbs removed annually
$33.3 million saved annually
Total air pollution removal includes CO, NO_2, O_3, SO_2, and Particulate Matter (PM2.5, PM10).

Reduced Stormwater Runoff Value
1.8 billion gallons removed annually
$15.9 million saved annually

Carbon Sequestered Value
2.7 million tons removed annually
$458.4 million saved annually

*within the Chesapeake Bay Watershed

Calculated based on 2017 tree cover data using *landscape.itreetools.org*

What are some benefits of tree cover in the Chesapeake Bay watershed?

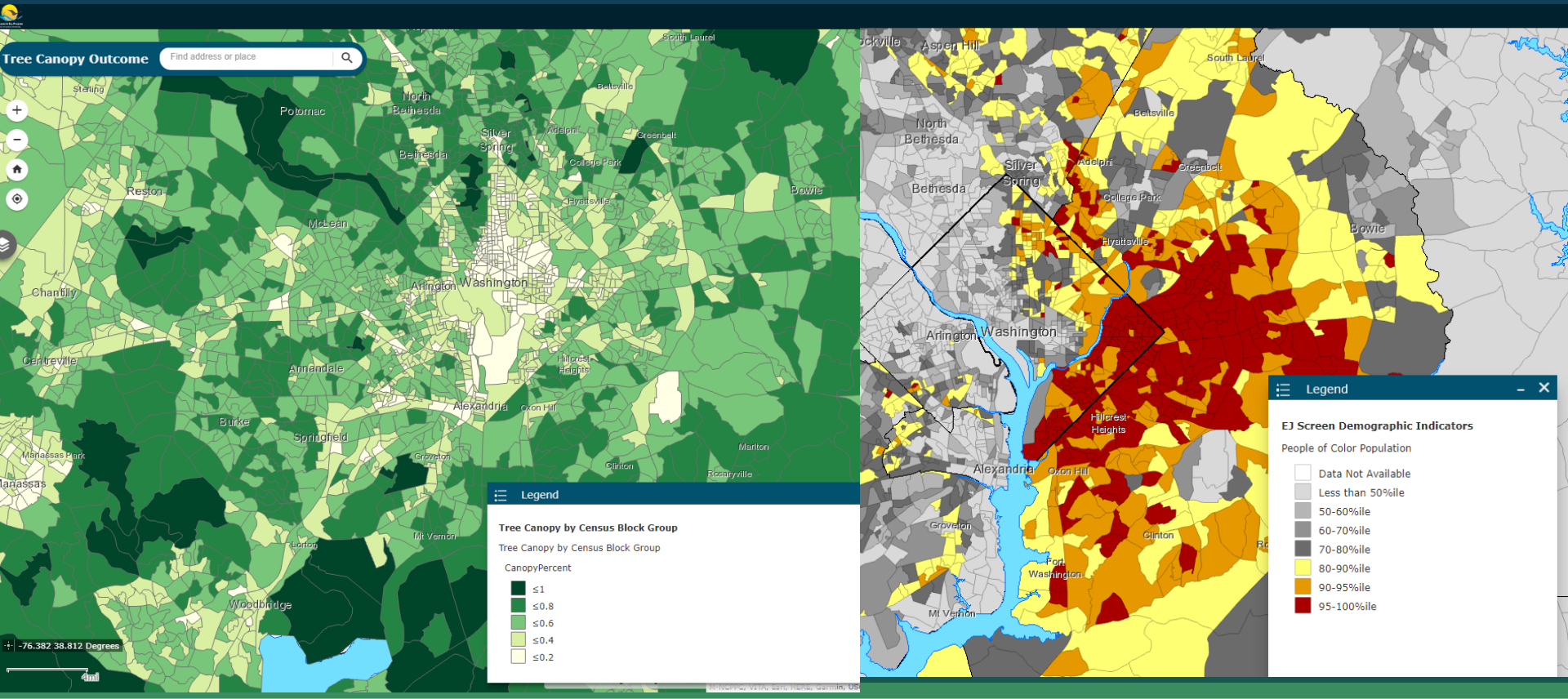
Total Air Pollution Removal Value
1.6 billion lbs removed annually
$595.1 million saved annually
Total air pollution removal includes CO, NO_2, O_3, SO_2, and Particulate Matter (PM2.5, PM10).

Reduced Stormwater Runoff Value
30.9 billion gallons removed annually
$276.3 million saved annually

Carbon Sequestered Value
30.7 million tons removed annually
$5.2 billion saved annually

Calculated based on 2017 and 2018 tree cover data using *landscape.itreetools.org*

Trees and their benefits are not evenly distributed



- Strategy was the basis for a Chesapeake Shared Stewardship Agreement - first watershed-scale Shared Stewardship agreement!

- Strategy sections:
  - Urban and Community landscapes
  - Agricultural landscapes
  - Natural landscapes
  - Climate change and forest restoration

Chesapeake Forest Restoration Strategy




Forest Service

Eastern Region
State and Private Forestry

Climate change and forest restoration

Impacts of climate change on forests

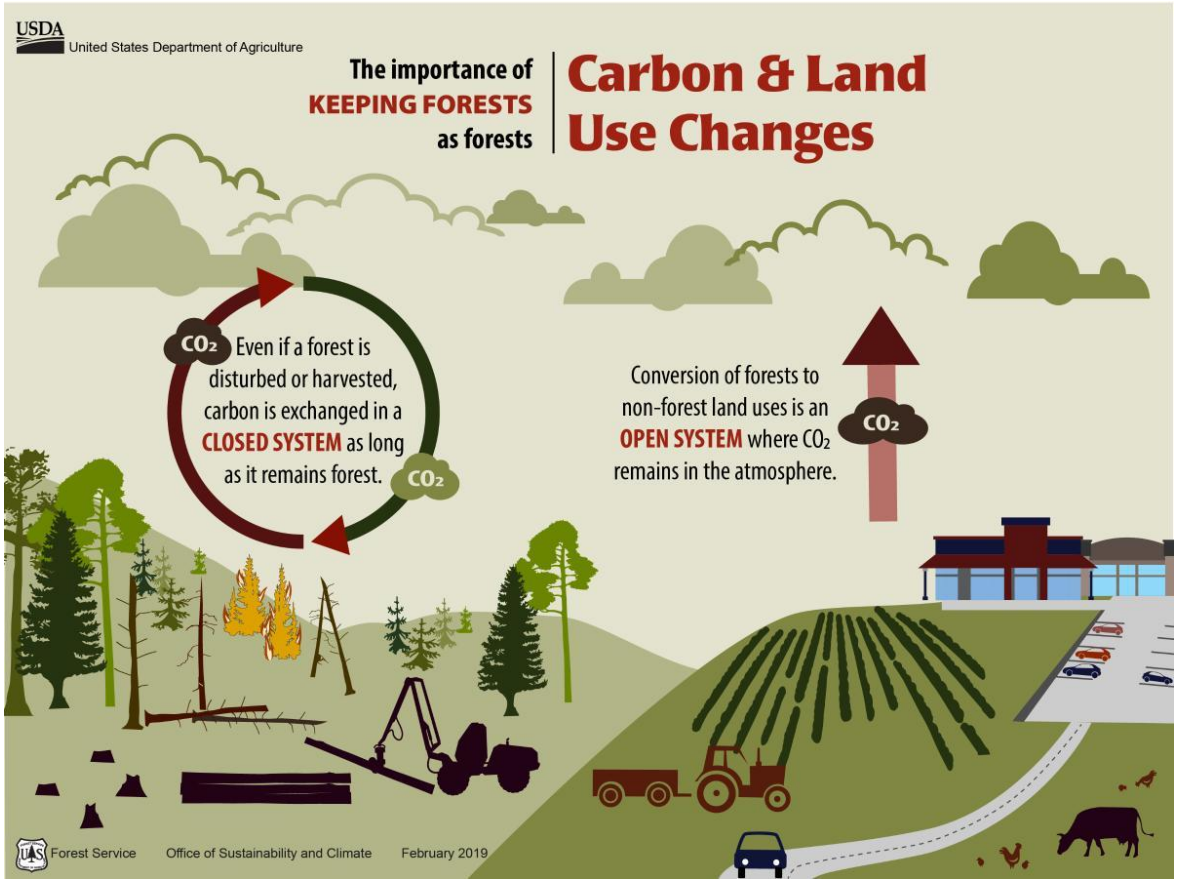
Forests and climate change mitigation

Forests and climate change adaptation

Planning resilient forest restoration projects

How might climate change impact Chesapeake forests?

- Changes in species composition
- Longer growing seasons
- Increased flooding impacts
- Increase risk of moisture stress
- Increased wildfire risk
- Increased impacts from insects, pathogens and invasive species
- Increased impacts from sea level rise


USDA
United States Department of Agriculture
The importance of
KEEPING FORESTS
as forests
Carbon & Land Use Changes
CO_2
Even if a forest is disturbed or harvested, carbon is exchanged in a CLOSED SYSTEM as long as it remains forest.
CO_2
Conversion of forests to non-forest land uses is an OPEN SYSTEM where CO_2 remains in the atmosphere.
CO_2
Forest Service
Office of Sustainability and Climate
February 2019

Forest restoration and climate adaptation

Benefits for projected increases in rainfall

- Flood mitigation
- Soil erosion control

Benefits for projected increases in temperature

- Stream cooling
- Urban environment cooling

Source: CBS

Climate-informed forest restoration: Tree species selection

WINNERS	LOSERS	NEW SPECIES
American hornbeam	Bigtooth aspen	Longleaf pine
Blackgum	Eastern white pine	Sugarberry
Eastern redcedar	Gray birch	Sweetgum
Loblolly pine	Paper birch	
Mockernut hickory	Pawpaw	
Northern red oak	Quaking aspen	
Southern red oak	Red pine	
Sweetgum	Serviceberry	
White oak	Striped maple	
	Swamp white oak	
	Sweet birch	
	Tamarack (native)	

Source: Based on modeling approach described in Iverson and others (2019)

Climate-Informed Forest Restoration: Other considerations

- Species diversity
- Genetics
- Site selection
- Timing of plantings
- Maintenance
- Environmental justice considerations

Source: CBP

Opportunities

Putting new data to use

New investments

Informing recommendations for the Chesapeake Bay Program beyond 2025

Putting new data to use: State of Chesapeake Forests 2.0 Storymap

SCAN ME

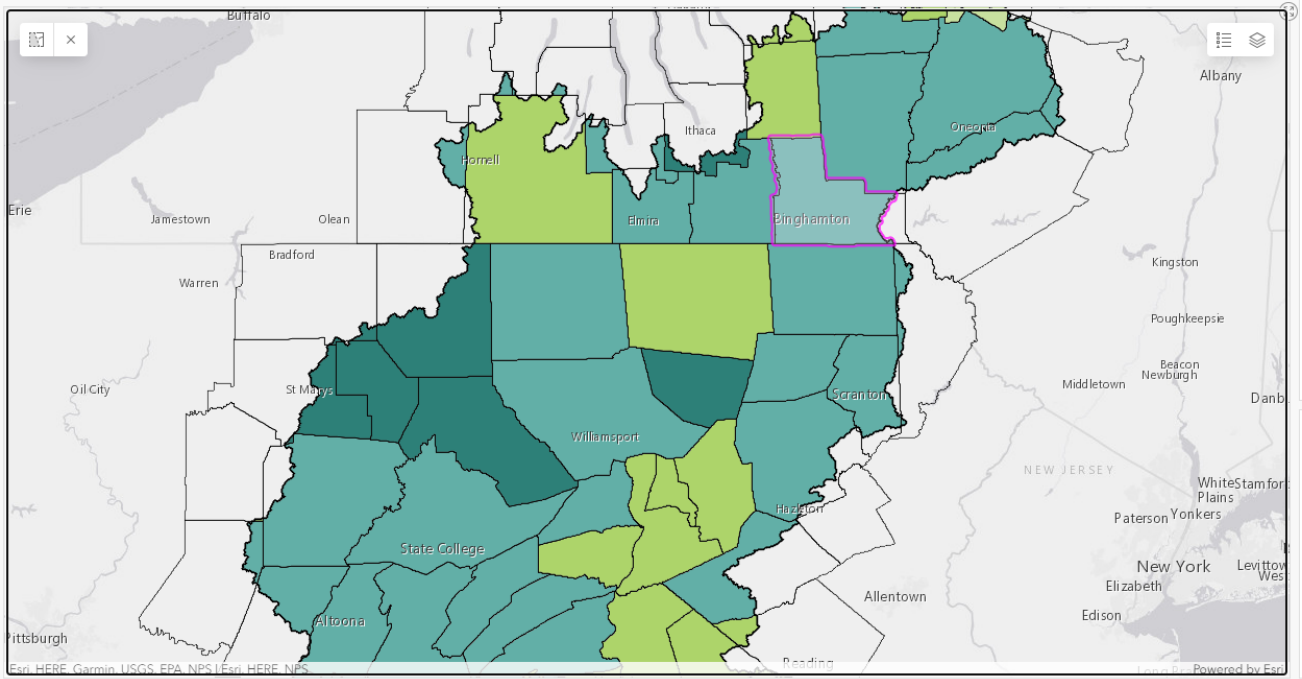
State of Chesapeake Forests 2.0

Forest and tree distribution | Tree cover (2017/18) | Forested extent (2017/18) | Tree cover change | Forested extent change | Next Steps

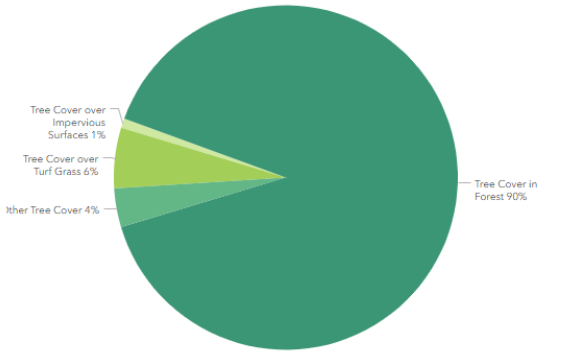
Broome County, NY

Percent Tree Cover: 62.8%

Within the Chesapeake Bay Watershed

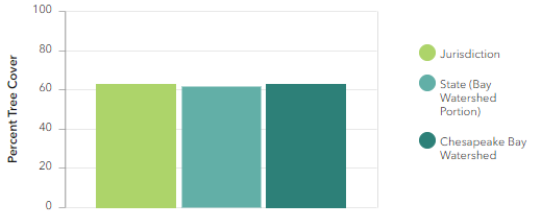


Distribution of Tree Cover Classes



Tree Cover in Forest: Patches of tree cover 1 acre or greater, with a minimum patch width of 72M
Other Tree Cover: smaller patches of tree cover that are assumed to have an unmanaged understory

How Does Your Jurisdiction Compare?



Putting new data to use: Tree Canopy Status and Change Factsheets

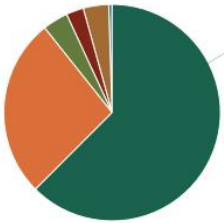
Tree Cover Status & Change
FOR TIOGA COUNTY, NY

62.5%
Total Percent of County with Tree Cover

$41.2 Million
Annual Benefits provided by Tree Cover (in reduced air pollution, stormwater, & carbon dioxide)

-5 Acres
Net Loss of Tree Cover on Developed Lands, 2013 to 2017

What is the land use/land cover breakdown in your county?
330,635 ACRES OF LAND AREA
IN TIOGA COUNTY



62.5%	Tree Cover [1] 206,742 acres	2.6%	Impervious (Buildings/Pavement) 8,480 acres
26.8%	Agriculture 88,661 acres	3.8%	Other [2] 12,528 acres
3.8%	Turf Grass (Lawns) 12,672 acres	0.5%	Non-Forested Wetlands 1,553 acres

1. Tree cover includes all trees occurring on all land uses, such as individual trees found over turf, impervious, agricultural, wetlands, or other lands. It also includes areas of "forest," defined in this dataset as patches of tree cover 1 acre or greater, with a minimum patch width of 240 feet.
2. Other includes a mixture of non-treed land uses not captured in the main pie chart categories. See the *Data Guide* for detailed definitions of "other" and all the land use categories.

Land use/land cover statistics were generated based on 2017 imagery using the 2022 edition of the *Chesapeake Bay Land Use and Land Cover Database*.

Where does tree cover occur in your county?
- **92.7%** is in forest (**191,608** acres)
- **0.8%** is over impervious (**1,604** acres)
- **2.8%** is over turf grass (**5,830** acres)
- **3.7%** is other tree cover (**7,701** acres)

What are some benefits of tree cover in your county?
Total Air Pollution Removal Value
11.5 Million lbs removed annually
$2.4 Million saved annually
Total air pollution removal includes CO, NO_2, O_3, SO_2, and Particulate Matter (PM2.5, PM10).

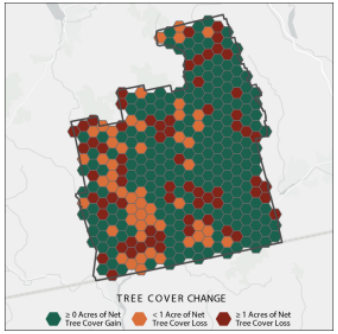
Gallons of Reduced Stormwater Runoff Value
115.8 million gallons reduced annually
$1.0 million saved annually

Carbon Sequestered Value
201,000 tons removed annually
$37.7 million saved annually

Calculated based on 2017 tree cover data using: *landscape.itreetools.org*

CHESAPEAKETREES.NET
PUBLISHED FEBRUARY 2023

How is tree cover changing on developed and developing lands?



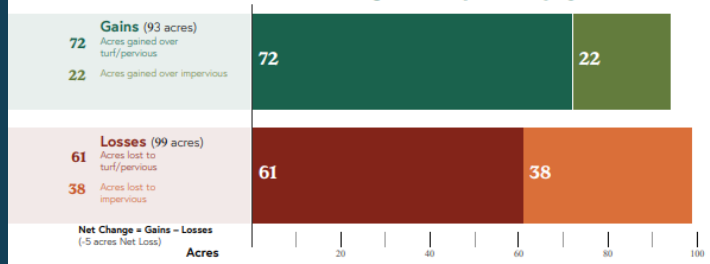
Understanding how your tree cover changes over time can inform the sustainable management of forests and community trees. The map to the left shows where your county has lost and gained tree cover from 2013 to 2017, focusing on land that is already or newly developed.

Tree cover can be lost quickly due to human activities (e.g., construction) or natural events (e.g., severe weather).

Tree cover can be gradually increased through tree planting and natural regrowth, but these gains may take 10-15 years to be detected in high resolution imagery.

Since mature, healthy trees provide significantly greater community benefits than newly planted trees, it is important to both preserve existing tree cover and seek opportunities to grow new trees and forests. Local land use planning, ordinances, and tree programs play a critical role!

Tree Cover Change on developed/developing lands (2013–2017)



Learn More:

Chesapeake Tree Canopy Network
Links to county fact sheets, user guides, map viewers, datasets, and more

Tree Equity Score
Explore maps of how tree benefits are distributed across communities

Capitalizing on the Benefits of Trees
A slideshow for local leaders featuring tree benefits, case studies and resources

State Urban and Community Forestry Assistance
(Gloria VanDuyne, New York Website)

Fact sheets produced through a grant from the USDA Forest Service. USDA is an equal opportunity provider, employer and lender.

SCAN ME

USDA Forest Service, Chesapeake Bay State Foresters Sign Shared Stewardship Agreement

Thank you!

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