TREE CANOPY
BENEFITS, POLICIES, & RESOURCES

Presentation to

Chesapeake Bay and Water Resources Policy Committee
&
Climate, Energy and Environment Policy Committee

July 26th, 2019

Multi-functionality of Trees

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- Improve water quality & mitigate stormwater runoff
- Absorb air pollution
- Sequester & store carbon
- Moderate air temperature
- Reduce energy use in buildings
- Increase property values

- Reduce stress
- Attenuate noise
- Attract customers to business districts
- Reduce crime
- Provide wildlife habitat

Categories of Services

- Social (*provide a sense of place*)

- Economic (*increase property values*)

- Environmental (*absorb nutrients and pollution*)

- Ecological (*provide wildlife habitat*)

- Human Health (*lessen hospital stays*)

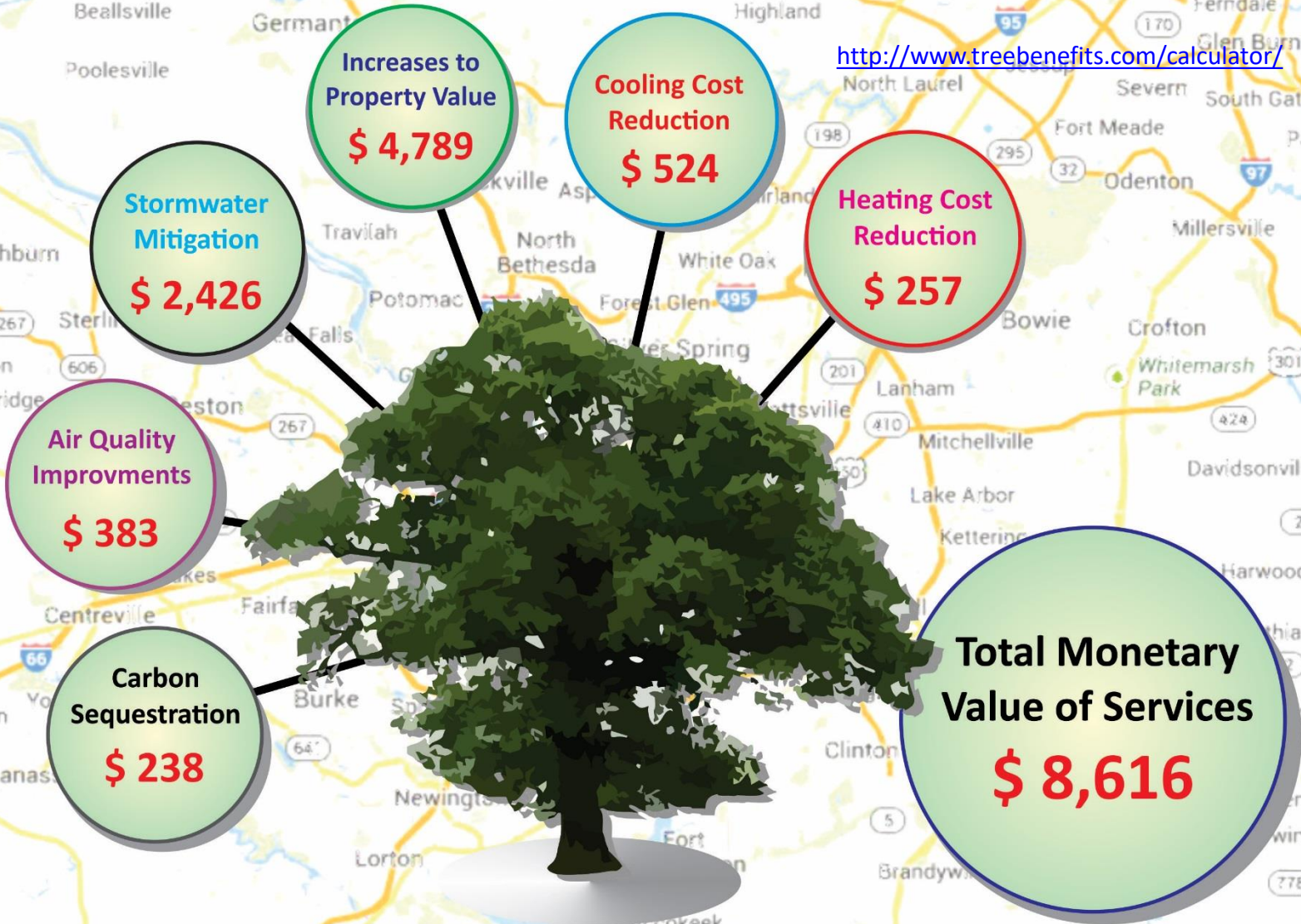- Wood and food products (*lumber, nuts, fruit*)

Not All Trees are Equal

- Mature trees can provide 60 times the level of services provided by newly planted trees
- Location of trees determine functionality
- Urban trees provide more socio-economic services
- Forests provide more environmental and ecological services
- Residential trees provide a different set of services than business and industrial trees
- Some trees display characteristics that can offset services over their lifetime

Annual Values Generated Using the National Tree Benefits Calculator

http://www.treebenefits.com/calculator/

Increases to Property Value
$ 4,789

Cooling Cost Reduction
$ 524

Stormwater Mitigation
$ 2,426

Heating Cost Reduction
$ 257

Air Quality Improvments
$ 383

Carbon Sequestration
$ 238

Total Monetary Value of Services
$ 8,616

Monetary Values of Socio-Economic and Environmental Services of

50-year Old Red-Maple in Residential Setting Located in D.C. Area

Reduced Runoff per ha of tree cover
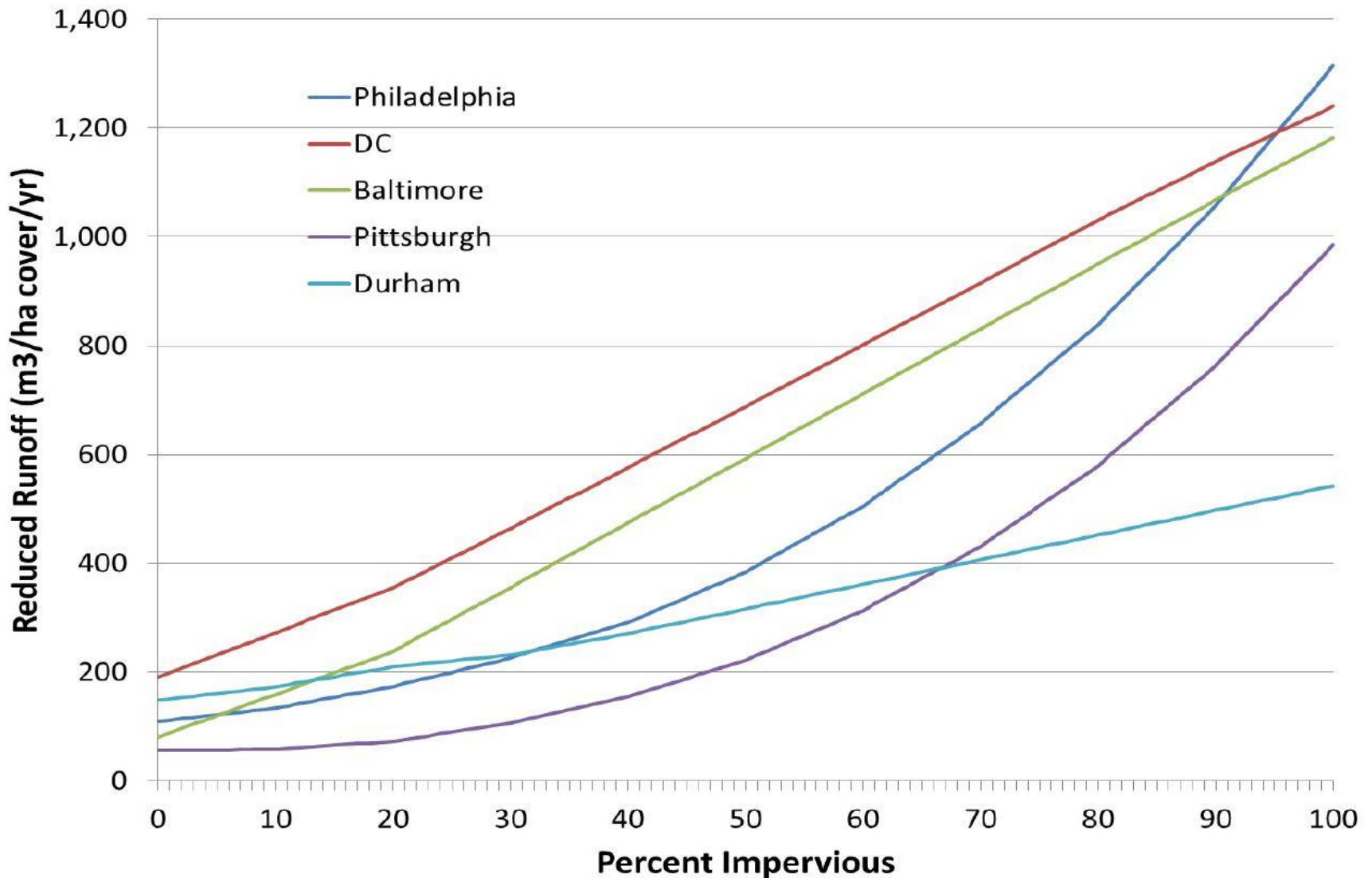
Trees and Water Quality

- Decrease levels of stormwater runoff and pollutants before these reach waterways

- Stabilize soil, control silt and reduce erosion

- Reduce stormwater runoff by capturing and storing rainfall and releasing it into the atmosphere

- Promote infiltration of rainwater into soil especially in forested areas

- Transform pollutants into less harmful substances

Trees and Carbon Dioxide

Trees help mitigate climate change directly and indirectly by:

- Sequestration and storage of atmospheric carbon in wood tissue and forest soils
- Storing carbon over lifetime of tree/wood product
- moderating energy use in buildings
- reducing carbon dioxide emissions from fossil-fuel based power plants

Trees and Carbon Dioxide

Factors to consider

- Carbon/energy footprint of nursery production and transportation
- Carbon in forested soils
- Carbon/energy footprint of removal, maintenance, and utility line clearance
- Utilization of waste wood

Local Examples

Washington D.C. (2015)

Carbon sequestration: 26,700 tons/year ($1.90 million/year)

Carbon storage: 649,000 tons ($46.2 million)

Avoided carbon emissions: 2,360 tons ($168 thousand/year)

Fairfax County, Virginia (2010)

Carbon sequestration: 218,000 tons/year ($4.51 million/year)

Carbon storage: 3,879,000 tons ($80.2 million)

Avoided carbon emissions: 22,900 tons ($421 thousand / year)

Ton: short ton (U.S.) (2,000 lbs)

Benefits versus Costs

- USDA Forest Service study associates tree planting & maintenance with a $3.74:1 benefit–cost ratio *(McPherson, et. al. 2006)*

- In addition to costs of planting, maintenance and removal programs trees have potential to:

  - Damage buildings & property

  - Damage sewer & stormwater pipes

  - Clog sewers, dry wells, & flood-control systems

  - Require wide scale clean-up after weather events

  - Damage power lines

The study indicates that stormwater mitigation, increased property values, reduced energy use, & carbon sequestration services **offset costs**

TREE CANOPY MANAGEMENT STRATEGY
The Regional Tree Canopy Workgroup's Assessment of the Region's Tree and Forest Resources

May 2018

Metropolitan Washington **Council of Governments**

BENEFITS OF OUR URBAN FORESTS

Roads, buildings, stormwater facilities, and water treatment plants often come to mind when people think of public assets. However, natural resources such as represent assets as well. Research conducted over the past 30 plus years, and the practical application of information technologies to the field of urban forestry, has resulted in the availability of tools to quantify the services and values associated with trees. These values include monetary equivalencies and return on investment for the services and benefits provided by trees; both on an individual and community-wide basis. Irrespective of location, virtually all trees in the urban forest provide multiple services. As shown below, trees add benefits and increased values to regional environmental, social, economic and ecological processes that translate into beneficial impacts to our communities. These services should be viewed as vital to sustaining our quality of life, our local economy, and the health and functionality of our environment.

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Kathleen L. Wolf, Ph.D., Univ. of WA

Economic	Social	Environmental
Property value: Residential homes with healthy can increase property values as much as 20 percent (Management Information Services/ICMA).	**Public health:** Trees reduce UV-B exposure by about 50 percent. The canopy moderates air temperatures and quality.	**Air quality:** Trees improve air quality by mitigating the negative human health impacts of pollution by absorbing and offsetting air pollutants such as particulate matter, ozone, sulfur dioxide, carbon monoxide, and CO_2.
Energy conservation: Trees lower energy demand through summer shade and winter wind block, additionally offsetting carbon emissions at power plants.	**Crime and domestic violence:** Urban forests help build stronger communities. Nature and trees provide settings in which relationships grow stronger and violence is reduced.	**Water quality and stormwater runoff mitigation:** Soil aeration, evapotranspiration, and rainfall interception by trees increases water quality and reduces stormwater flow.
Stormwater facilities: Trees and forests reduce the need for or size of costly gray infrastructure.	**Noise pollution:** Trees reduce noise pollution by acting as a buffer and absorbing up to half of urban noise (U.S. Department of Energy study).	**Erosion control:** Tree roots hold soil together along stream banks and steep slopes.
Commerce: Trees are associated with retail and commercial districts where consumers spend more time and money.		**Increased wildlife habitat:** Urban forests promote biodiversity in urban areas.

Strategies, Policies and Programs

- **Adopting strong tree preservation ordinances**
- **Strengthening land use planning guidance and land development criteria to encourage tree conservation**
- Setting local tree canopy goals and related metrics
- Adopting local urban forest management plans
- Establishing outreach programs that encourage proper tree care practices
- Partnering with community-based tree planting groups
- Providing adequate staffing levels and fiscal support for local tree programs
- Conduct periodic cost/benefits analyses to communicate services and values of your community's trees
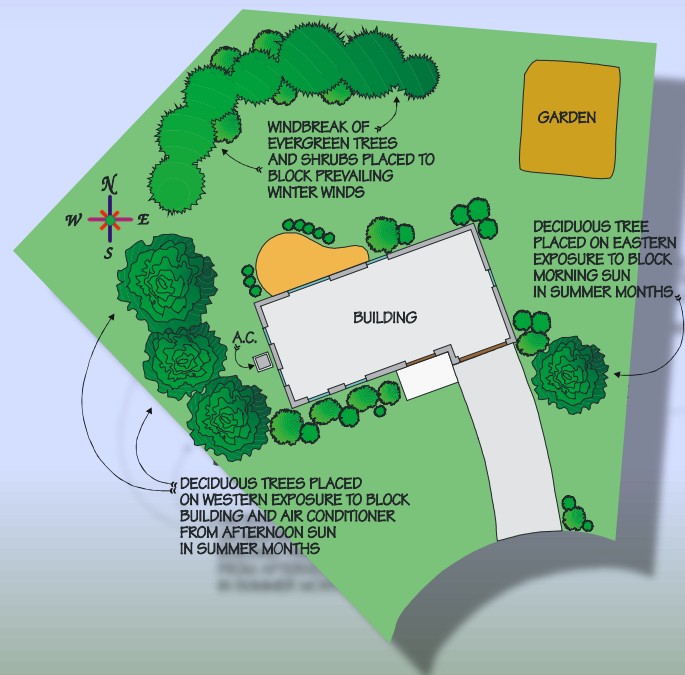
VA State Enabling Legislation

- Original legislative proposal submitted in 2000

- Signed by VA Governor March 2008

- First broad tree conservation legislation passed in Virginia

- Built upon existing tree cover requirements at § 15.2-961

- Written with feedback from local and State building industry groups and No VA Urban Forestry Roundtable

- Linked to Federal Air Quality Standards

Applicability

"Any locality within Planning District 8 that meets the population density criteria of subsection A of § 15.2-961 and is classified as an eight-hour nonattainment area for ozone under the federal Clean Air Act and Amendments of 1990, in effect as of July 1, 2009."

Fairfax County Virginia is only jurisdiction to adopt a local ordinance based on § 15.2-961.1?

GARDEN

WINDBREAK OF
EVERGREEN TREES
AND SHRUBS PLACED TO
BLOCK PREVAILING
WINTER WINDS

DECIDUOUS TREE
PLACED ON EASTERN
EXPOSURE TO BLOCK
MORNING SUN
IN SUMMER MONTHS

BUILDING

A.C.

DECIDUOUS TREES PLACED
ON WESTERN EXPOSURE TO BLOCK
BUILDING AND AIR CONDITIONER
FROM AFTERNOON SUN
IN SUMMER MONTHS

Features of §15.2-961.1

- Increases 20-year canopy requirements in residential zoning districts – up to 30% from 20%

- Reverses the focus of 20-year tree canopy requirements in §15.2-961 from tree replacement to tree preservation

- Introduces concept of "proportional stewardship" i.e., the more predevelopment tree canopy on development site the greater the expectation to preserve on-site trees

- Provides reasonable deviations to ensure that tree preservation is realistic and takes place within context of allowable uses and densities

Features of §15.2-961.1

- Provides incentives to preserve endangered forest communities, historic, and specimen trees

- When existing trees do not exist or do not meet standards for post-development health and condition allows balance of requirements to met through tree planting

- Provides incentives to plant trees for air quality, reduction of greenhouse gases, energy conservation, stormwater and water quality improvements, wildlife benefits, and for use of native trees derived from local genotypes

- Provides for establishment of local tree planting funds and tree banks

Features of §15.2-961.1

- Allows for use of tree seedlings in certain applications

- Allows jurisdictions to set standards for tree health and structural condition, and for removal of trees that are dead, dying, or hazardous due to construction impacts

- Describes plan submission requirements, plan review process, and basis for approval and denial

- For example of local ordinance based on enabling language of §15.2-961.1 see:

https://www.fairfaxcounty.gov/landdevelopment/sites/landdevelopment/files/assets/documents/pdf/pfm/chapter12.pdf

Resources

USDA Forest Service ECO tree benefits software (free)
https://www.itreetools.org/tools
https://www.itreetools.org/tools/which-tool-should-i-use

Piedmont Community Tree Guide:Benefits, Costs, and Strategic Planting
https://www.fs.fed.us/psw/publications/documents/psw_gtr200/psw_gtr200guide.pdf

Climate Central: *The Power of Trees*
https://www.climatecentral.org/gallery/graphics/the-power-of-trees

Sustainability Times: *By planting 1 billion trees we 'could offset our CO2 emissions'*
https://www.sustainability-times.com/environmental-protection/by-planting-1-billion-trees-we-could-offset-our-co2-emissions/

Questions?

Michael Knapp, Chairperson
Washington Council of Governments Tree Canopy Subcommittee
Michael.knapp@montgomerycountymd.gov