A Select Review of the Virginia State Code for Trees and Forests

A Summary Report for the Virginia Department of Forestry

Prepared by the Green Infrastructure Center Inc.

August 28, 2020

ABSTRACT

A review of the Virginia state code sections pertaining to tree conservation was conducted for the Virginia Department of Forestry. The review analyzed the effectiveness of Virginia's state codes for meeting tree conservation and replacement needs. The review was conducted in the Summer of 2020, with input from local government stakeholders and includes research and recommendations for how state codes can be improved or changed to better protect Virginia's forests.

The work upon which this publication is based was funded, in whole or in part, through an Urban and Community Forestry grant awarded by the Southern Region, State and Private Forestry, U.S. Forest Service and administered by the Virginia Department of Forestry.

The Green Infrastructure Center Inc. (GIC) is the technical services consultant for this project. All writing and graphics were provided by the GIC. The contents of this report do not necessarily reflect the views or policies of the USDA Forest Service, nor does mention of trade names, commercial productions, services or organizations imply endorsement by the U.S. Government or the Virginia Department of Forestry.

Publication Date: August 28, 2020.

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Introduction

There is growing recognition of the roles trees and forests play in protecting environmental quality, and creating vibrant, livable communities and strong economies. Our challenge is how to incorporate and maintain trees and wooded areas within communities as our population grows and we make more and more intense use of the land. Effective policy and planning tools are needed to meet this challenge and address the needs of communities, landowners, and developers.

In response to several inquiries from interested cities, the Virginia Department of Forestry (VADOF) contracted with the Green Infrastructure Center (GIC) to review state codes pertaining to tree care, conservation, and zoning. After a review of multiple codes by GIC, VADOF determined which codes to further investigate. For this review, the research was limited to those parts of the Virginia code that have an impact on urban trees and trees affected by development, rather than tree conservation generally.

Why this study is needed

Trees in Virginia and forest cover in general are declining. National results indicate that tree cover in urban areas of the United States is on the decline at a rate of about 175,000 acres per year – around 36 million trees annually (Nowak and Greenfield 2018). Although some former farmlands are returning to tree cover, VADOF estimated that Virginia is currently losing 14,000 acres annually to land conversion. While tree harvesting conducted by forestry companies is often regrown in tree cover, land conversions – from forests to housing developments, for example – are usually permanent. Cities, towns and suburbs need tools to prevent excessive land clearance, retain tree canopy, plant new trees, and care for those trees they currently have.

Virginia cities, towns, and counties need better tools for tree conservation; meanwhile, some of the tools that *are* available are underutilized. For example, best practices, such as conducting tree canopy assessments and inventories, or tree planting or mitigation programs, are available to local governments, but some are unaware of them.

This report focuses specifically on the tools needed to minimize impacts to trees from land development, such as lot-line to lot-line clearing, tools for keeping tree cover on site, or incentivizing tree protection while also enforcing prohibitions against tree removal.

VADOF administers the *Urban and Community Forestry Program*, which interacts daily with urban planners, arborists, and other forestry professionals, including conservation groups, garden clubs, tree boards and many related groups who want to understand and apply tools for tree retention, protection, and expansion, Unfortunately, Virginia lacks tools that are available to other states. In some cases, Virginia has good state codes in place for protecting trees, but their application is limited to fast-growing or non-attainment zones in the Commonwealth. As a Dillon Rule state,[1] localities only have powers expressly granted to them by the legislature.

In other cases, state code actually *prevents* localities from undertaking tree protection. For example, they cannot set local tree canopy standards. The state code actually sets a cap on how much canopy localities can require of developers to 20% for Residential, 15% for Planned Unit Developments, and 10% for Commercial zones. This is just one example of how the state code restricts local governments' management of trees.

Study Process

GIC researched a wide range of potentially applicable parts of the Virginia state code and met with VADOF staff to highlight the most relevant articles and to propose new legislative fixes. A series of briefing sheets were produced that summarize existing codes and possible fixes to improve them or to make accessible to all localities. In some cases, the existing code is recommended to be replaced with a more effective version.

The next step for this process was to survey and meet with those key local government stakeholders who had expressed an interest in improving state code. VADOF sponsored an on-line, 3-hour workshop hosted and facilitated by GIC on July 30, 2020 to solicit input.[2] A written survey provided in advance of the workshop informed the facilitation team of potential issues and provided additional ideas to VADOF.

Workshop participants reviewed each of the briefing sheets and provided insights about each article of code in question. Participants also brought up additional ideas, some from other states, for consideration. A meeting summary of the workshop was shared with participants, and was used to inform this report.

Why We Need Tree Protection and Restoration

Trees provide many benefits, some of which are formally recognized through landscaping requirements, while other benefits are less well-recognized. Trees can be considered as 'green infrastructure' because they are just as essential to healthy and functional cities as is 'gray infrastructure,' such as sidewalks or roads. Following are additional benefits trees provide for developing landscapes and for communities.

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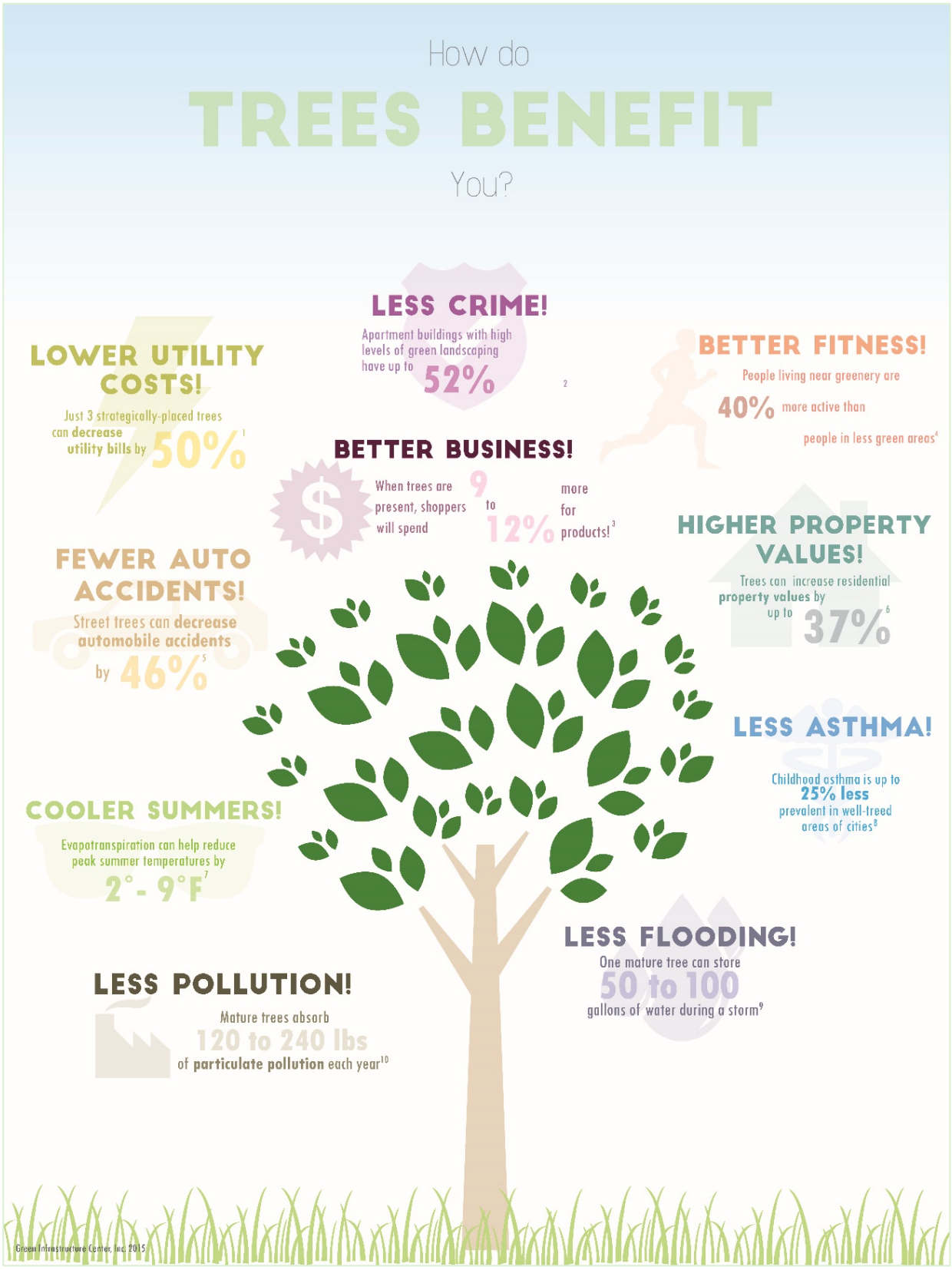
[1] The Dillon Rule refers to Judge Dillon who, in the late 19th century, developed the legal principle that local laws are *ultra vires*, which means "outside one's powers," such that local governments are limited to the powers expressly granted to them by their state. While 40 states are "Dillon Rule states", they vary in how strictly this principle is applied. Virginia follows a strict application of the Dillon Rule compared to neighboring states, such as North Carolina, which applies a lighter, less restrictive approach to the Dillon Rule Principle.

[2] The workshop was originally envisioned as a day-long workshop but was scaled back to a shorter on-line event to ensure participant safety during the pandemic.

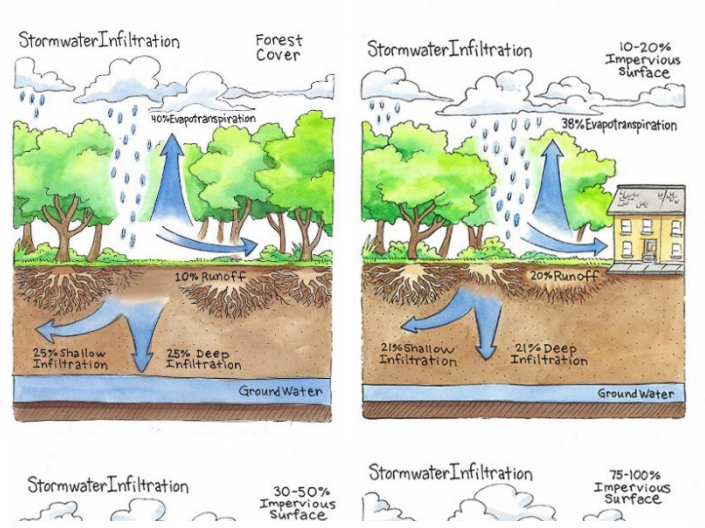


See Resources Section for source citations.

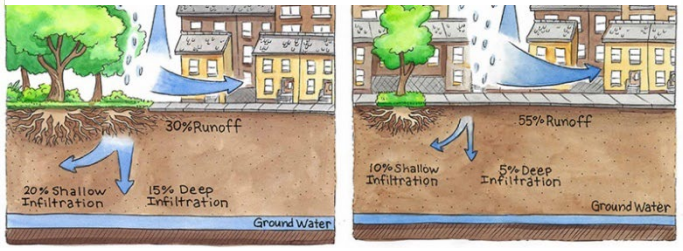
Reducing Stormwater Runoff and Filtering Pollutants

Trees protect cities from problems associated with stormwater runoff. As forested land is converted to impervious surfaces, runoff increases. Excess stormwater runoff can cause temperature spikes in receiving waters, increased pollution of surface and ground waters, and greater potential for flooding.

As tree cover is lost and impervious areas expand, excessive urban runoff results in pollutants, such as oils, metals, lawn chemicals (*e.g.* fertilizer and herbicides), pet waste, trash, and other contaminants reaching surface waters. Trees help capture and filter that urban runoff. Nitrogen and phosphorus are plant nutrients that cause harmful algal blooms, while sediment can clog fish gills, smother aquatic life, and necessitate additional dredging of canals and waterways. Algal blooms can also reduce oxygen levels, further harming fish and other aquatic life.



Runoff increases as land is developed. Data Source: Federal Stream Corridor Restoration Handbook (1998)



Trees reduce nitrogen, phosphorus, and sediment in stormwater runoff by cleaning rainfall of these pollutants. Increased nutrient loads in runoff can reduce oxygen in surface water, causing harm to fish and other aquatic life. The presence of trees means fewer pollutants reach streams, bays and the ocean.

During a one-inch rainfall event, one acre of pavement, such as a retail parking lot, will release 27,000 gallons of runoff. Compare this to an acre of forest, where only 750 gallons of water run off. While stormwater ponds and other best management practices are designed to mimic rainfall release by detaining and filtering runoff, they do not fully replicate pre-development hydrology. Additionally many urban areas of Virginia have no stormwater treatment because they were developed before Clean Water Act requirement for managing stormwater went into effect.

Buffering storms and flooding

Conserving trees and forests also buffers land against storms and losses from flooding. According to the U.S. Environmental Protection Agency (EPA), excessive stormwater runoff accounts for more than half of the pollution in the nation's surface waters and causes increased flooding and property damages, as well as public safety hazards. The

EPA recommends a number of ways to use trees to manage stormwater in its book *Stormwater to Street Trees*.

Retaining trees and forests along coasts provides a wind break and helps evaporate and reduce standing water. In addition, utilizing trees as green infrastructure provides a basis for reimbursement from FEMA for storm-damaged trees. To qualify, trees must be inventoried and specifically utilized for stormwater management, buffers or other 'green infrastructure' functions.

Health: Air Quality and Surface Heating

During Virginia's hot summers, more shade is always appreciated. Excessive heat can lead to heat stress, which especially affects infants and children up to four years of age, those 65 years of age and older, those with obesity issues, and those on certain medications (CDC 2020).

Tree cover shades streets, sidewalks, parking lots, and homes, making southern urban locations cooler and more pleasant for walking or biking. Multiple studies have found significant cooling (2-7° F) and energy savings from having shade trees in cities (McPherson et al 1997). Shaded pavement also has a longer lifespan, so maintenance costs associated with roadways and sidewalks are less (McPherson and Muchnick 2005).

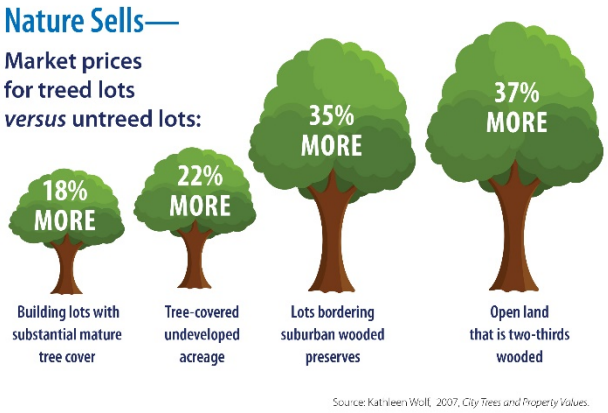
In addition to cooling surfaces, trees absorb volatile organic compounds and particulate matter from the air, improving air quality, and thereby reducing asthma rates. Trees also clean the air of ground level ozone (O_3), which can harm human health. Trees sequester carbon which forms greenhouse gases such as sulphur dioxide and carbon dioxide, thereby contributing to a warming planet. By storing carbon and preventing its release, trees mitigate the impacts of climate change. Even at the neighborhood level, trees reduce pollutants. Well-treed neighborhoods suffer less respiratory illnesses, such as asthma (Rao et al 2014).

Trees cause people to walk more and walk farther. This is because, when trees are not present, distances are perceived to be longer, hotter, less pleasant, and farther away, making people less inclined to walk than if streets are well treed (Tilt, Unfried and Roca 2007).

Economics: Increasing Property Values and Sales

Developments that include green space or natural areas sell homes faster and for higher profits than those that take the more traditional approach of building over an entire area without providing community green space (Benedict and McMahon 2006).

A study by the National Association of Realtors found that 57 percent of voters surveyed were more likely to purchase a home near green space, while 50 percent were more willing to pay 10 percent more for a home located near a park or other protected area. Trees on lots also add to property values.



Challenges

Common challenges faced by cities and developing areas for managing trees include lack of maintenance due to no/insufficient care after installation; removal of trees following storms, or before storms occur to reduce risks; improper planting methods; poor planting sites/conditions; interference from utilities (both old and newly installed); inappropriate species selection; or removals due to lack of permits or lack of compliance pre- and post-development.

Cities, towns, and developing counties need better legal tools to protect or restore their trees. The following section details the needs for improving legislative tools for tree protection in Virginia.

Need for New or Improved State Ordinances

A series of briefing sheets were prepared for each of the following topics. Briefing sheets are found in Appendix B on the following subjects:

- Clustering
- Tree Banking
- Heritage Trees
- Tree Replacement
- Trees as Stormwater BMPs
- Trees as Nutrient Credits

Cluster Ordinance

Overview

Cluster development is a type of site layout that maintains zoned densities (even density bonuses) for a given lot, but concentrates the development on a smaller footprint and preserves a portion of the lot as 'open space.' This type of development is seen as a compromise between a developer's need to maximize financial returns and the local jurisdiction's desire for conservation. Clusters allow for modifications to lot sizes and setback changes to achieve conservation of natural resources, views, and other amenities. This allows for the preservation of sensitive site features, such as steep slopes or wetlands, while still achieving allowed gross densities.

Conservation developments are another form of cluster development, in which significant natural resources are protected (usually at least 50 percent of the landscape) in open space, with development limited to a smaller portion of the site.

Problem

The state's current Cluster Ordinance was rewritten several years ago and specific prohibitions were added that:

- limit adoption to communities with greater than 10 percent growth rates
- disallow requirements to survey or consider sensitive resources (steep slopes, wetlands *etc.*) in planning for cluster developments.

At the time of writing, no localities in Virginia are experiencing 10 percent growth rates, thereby nullifying the ability to utilize this code.

This ordinance is less relevant to those communities that are fully built-out, such as Arlington County, and that lack larger undeveloped landscapes. Some localities, such as Albemarle County, have chosen not to update their cluster ordinance, so as to avoid having to limit identification of site constraints and sensitive natural resources, as the current state code requires new ordinances to do.

Potential Fixes

- Remove prohibitions against natural resource inventories and mapping of sensitive site features.
- Remove prohibitions that exclude sensitive habitats or open space from density area calculations.
- Strike the 10 percent growth rate restriction from the law and allow *any* locality to implement a cluster ordinance.
- Increase flexibility for localities who have ordinances predating the new law to allow them to update them without penalty.

Tree Banking Ordinance

Overview

Tree Banking is a funding policy to allow for offset credits for a development, when the requirements for tree canopy cannot be met on site due to impracticality or an unreasonable hardship.

Problem

The language allows for exceptions to the tree replacement requirements based on unnecessary or unreasonable hardship for the developer. The code does not allow tree bank funds to be dispersed to nonprofit community organizations, thereby limiting a locality's ability to plant trees on private property. In highly developed communities, available land for mitigation may be lacking. However, the code limits expenditures to

the non-attainment area in which credits were generated. Funds could be more adaptable by allowing jurisdictions to apply tree banking on a regional or watershed scale. Finally, the state caps the amount a locality can impose as a cost for tree removal during development, and thus levied fines do not reflect the "true" value of large, mature trees.

In some areas, high real estate values mean that the value of developing the land is greater than the fines for illegal tree removal. Developers sometimes consider the fine as a necessary cost of doing business and are willing to take out a tree, even if it means they will be penalized. State code should be amended to allow for adopting a fine high enough to deter this practice and fully compensate the community to replace the lost value of its mature trees. Virginia generally has lower caps on such fines than other states. There should be significantly higher penalties for code violations to provide a true disincentive for tree removals.

Fixes

- Remove cap limits on the amount of fines that can be levied to mitigate a tree's removal.
- Allow non-profit organizations based in localities outside Planning District 8 to receive funds from localities for tree planting.
- Allow trees to be planted on private property in addition to public lands.
- Allow tree banking to occur at larger landscape scales outside of jurisdictional boundaries, such as watersheds, or to be applied statewide.

Heritage Tree Ordinance

Overview

Tree conservation ordinances are used to protect and preserve trees by classifying them with special designations, such as 'heritage', 'specimen', and 'memorial'. Definitions of these special designations are listed in the state code. These designations give trees an additional layer of protection by requiring special review before permits are granted for their removal or by imposing a financial penalty.

Problem

The *Takings Clause* within the code (requiring a payment for lost development value) is a high detriment to widespread adoption of this code. Arlington and Fairfax counties are the only localities known to use it.

While it is a well-intended law, the Heritage Trees Ordinance is difficult to implement. Localities have to measure and record nominated trees, but they could still be removed because of the low penalties applicable for tree removal. Perceptions by residents that trees may be designated by third parties who are not the landowner has also led to confusion since the landowner must agree to the protection of a tree on private property.

Fairfax County requires that protected trees have an established conservation easement that is onerous to establish and takes up staff time. The county noted that it could require a deed restriction for protected trees, but that this requires funding a full-time position to monitor compliance.

Fixes

- Provide education to the general public on the process for the various designations of protected trees.
- Create a streamlined, simple system to identify and protect trees after designation without placing undue burden on local governments to enter into legal contracts, such as conservation easements, deed restrictions, *etc*.
- Rewrite the law to provide greater clarity on the Takings Clause.
  One example for how this might be done is found in language used by Fairfax County: "*the application of this Chapter [shall] not result in any taking of private property for public purposes without the express written consent of the owner. To the extent that the owner's express written consent grants the County any rights, that grant of rights is a gift.*"

Tree Replacement Ordinance

Overview

A *Tree Replacement Ordinance* establishes maximum tree canopy coverage by zoning classes. VA Code §15.2-961 is designed to provide for tree canopy during the development process, through conservation or replacement. This is regardless of whether a municipality has the more progressive standards found in §15.2-961.1.

Another tree conservation ordinance, §15.2-961.1, allows for greater canopy cover requirements and provides additional protections, but its application is limited to non-attainment areas in Planning District 8. Communities outside Planning District 8 have indicated an interest in utilizing these higher standards, and should be allowed to do so.

In addition, some localities offer bonus credits for protecting existing mature trees on site to meet tree cover standards.

Problem

Most localities are eligible to use the §15.2-961 ordinance; however it has a low adoption rate in Virginia, with only 18 jurisdictions utilizing it at this time. Canopy percentage targets in the code are inflexible at the state level, since the section caps canopy to 20% for Residential, 15% for Planned Unit Developments, and 10% for Commercial zones. This prevents local governments from setting higher standards for canopy coverage in these zones.

Fixes

- Educate and promote this policy tool to communities throughout the state and encourage widespread adoption of this ordinance.
- Create new articles, or amend the existing code §15.2-961.1, to allow any locality in the state to adopt this ordinance (not just communities within Planning District 8).
- Remove the caps on canopy percentages in §15.2-961.

Trees as Stormwater Best Management Practices (BMPs)

Overview

Trees provide many environmental benefits to the landscape, including capturing and infiltrating stormwater, reducing erosion, and limiting nonpoint source pollutants from entering local waterbodies. Currently, individual trees are not considered a best management practice (BMP) for managing stormwater in the state's BMP clearinghouse. Accepted practices for Run-off Reduction Method Calculations (RRM) are currently limited to: sheet flow to a conservation area (forest) or filter strip, rooftop disconnection, rain gardens, cisterns, dry wells, green roofs, grass channels, permeable pavement, bioretention, dry swales, infiltration, and extended detention ponds. Trees should be added to this list.

Arlington noted that they are interested in using trees as a stormwater BMP, especially in places where soils have been conditioned to infiltrate stormwater.

Problem

Existing trees are often removed prior to development. Tree and forest cover loss leads to increased stormwater impacts on urban landscapes. If trees were recognized by the state as an acceptable way to manage stormwater, they are more likely to be conserved onsite during construction. While it is true that developers only need to treat new stormwater from cleared land, lots are often fully cleared before site design begins.

The Center For Watershed Protection has conducted some work on stormwater volume and nutrient and sediment reductions from individual trees. They have developed a tool to calculate volume benefits per tree, which is available at: https://www.cwp.org/making-urban-trees-count/.

The Center used the water balance model to develop two tree planting credits (see diagram following). Credits apply to trees planted in the urban environment, except for planted riparian buffers, large-scale reforestation projects, or trees planted in engineered soils (such as bioretention or structural soils).

The Credit Calculator calculates the credit associated with planting a specified number of trees, based on user inputs. The calculator provides an example of how the credit works and can also be incorporated into the TMDL planning and crediting process. Results reflect the annual pollutant reduction benefits provided by trees at maturity. Adopters of this credit framework may opt for a credit release schedule to incentivize tree care and ensure the tree reaches maturity.

STEP 1	Select Climate Zone:			
	South			
STEP 2	Select Soil Type:			
	HSG D			
STEP 3	Select Land Cover:	Default TN Concentration (mg/L)	Default TP Concentration (mg/L)	Default TSS Concentration (mg/L)
	Pervious	1.45	0.25	140
		User-Defined TN Concentration (mg/L)	User-Defined TP Concentration (mg/L)	User-Defined TSS Concentration (mg/L)
STEP 4	Enter User-Defined Pollutant Concentrations (Optional) >>			
STEP 5	Have all the qualifying conditions listed below been met?			
	Yes			
	Qualifying conditions:			
	Maintenance plan is in place			
	Qualified professional (e.g., licensed arborist, urban forester) was consulted on selection of appropriate species, site preparation and siting to provide sufficient soil volume			
	Leaf litter pickup program is present for the planting site (required only when seeking credit for trees planted over impervious cover)			
STEP 6	Select Tree Type:			
	Broadleaf Deciduous medium (BDM)			
STEP 7	Enter Number of Trees Planted:			
	750			
	RESULTS:			
	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	TSS Reduction (lbs/yr)	Runoff Reduction (gallons)
	26	4.5	2,492	2,136,896

GIC has created a tool to calculate volume and pollutant reductions (nitrogen, phosphorus and sediment) at the acreage level and that tool (available at: http://www.gicinc.org/trees_stormwater.htm) can be used for watershed planning.

Harrisonburg, Virginia, USA* — Urban Tree Canopy Stormwater Model — version July 2, 2019

The Green Infrastructure Urban Tree Canopy Stormwater Model estimates stormwater runoff yields for current and potential land cover. The methodology is based upon the NRCS TR-55 method for small urban watersheds. It is used to provide better estimates using GIC's high-resolution land cover and modeling of potential canopy area.

Green Infrastructure Center

				million gallons																9727	9	777	13	851	11
TOTALS		26.6%	38.4%	7.9	5.7	1.6	34.8%																	
	Statistics by Drainage Basin (current settings)							Variable									Variable	Statistics by Drainage E						
	Area	Current Tree Cover	Current Impervious Cover	Tree H_2O Capture	Increased H_2O wlxx% tree loss	Added H2O Capture wlxx% PPA	Tree Cover Goal	Pick an Event	Pick a loss scenario	Converted Land			Canopy Added	Enter % to be planted	Non-Point Pollution Captured by Existing Trees (% = percent of total load without trees)								
		%		million gallons			%	Event	% UTC loss	% FOS Loss	% Imperv	PCA	PPA	% of Land	% of PPA	N lbs/yr	N (%)	P lbs/yr	P (%)	SED t/yr	SED (%)
1	Blacks Run	24.9%	41.6%	6.2	4.31	1.25	33%	1 yr / 24 hour	10%	10%	40%	40.9%	15.9%	8.0%	50%	11,442	8	913	11	1,012	10
2	Cooks Creek	33.4%	23.3%	1.1	0.91	0.21	43%	1 yr / 24 hour	10%	10%	40%	53.2%	19.8%	9.9%	50%	2,854	15	231	20	191	17
3	Dry Fork	37.1%	23.4%	0.5	0.37	0.06	45%	1 yr / 24 hour	10%	10%	40%	53.7%	16.6%	8.3%	50%	1,221	18	99	23	76	19
4	Linville Creek	21.1%	44.4%	0.1	0.04	0.02	29%	1 yr / 24 hour	10%	10%	40%	36.4%	15.3%	7.6%	50%	65	3	5	5	11	10
5	Mill Creek-North River	36.5%	34.2%	0.1	0.07	0.01	45%	1 yr / 24 hour	10%	10%	40%	53.5%	17.0%	8.5%	50%	215	16	17	24	13	19
6	Town of Keezletown-Cub	61.0%	0.7%	0.0	0.02	0.00	77%	1 yr / 24 hour	10%	10%	40%	93.9%	32.9%	16.5%	50%	80	46	6	51	4	54

Although, the state's BMP database does not currently include trees as an accepted stormwater BMP, they can be used (in larger acreages) to comply with the Chesapeake Bay Program Watershed Implementation Plan (WIP). The VA Department of Environmental Quality provides for widespread tree planting as part compliance with the state's WIP (see https://cast.chesapeakebay.net/Documentation/DevelopPlans).

Several developed localities in Northern Virginia noted that it is difficult to find available lands on which to plant large number of trees (rights-of-way, *etc.*).

Examples of other places where trees are currently used as a BMP include:

- Pine Lake, GA: A 10 gallons of water credit per inch of the diameter at breast height (DBH) is allowed for preserving existing trees under 12" DBH, and 20 gallons of credit per inch of DBH is given for preserving existing trees over 12" DBH.

- ❑ Washington D.C.: A 20 cubic feet of water volume reduction credit is given for each preserved tree, and 10 cubic feet for each planted tree. Trees planted as part of a BMP, e.g. in a bioswale, get 10 cubic feet water credit. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6134866/
- ❑ Portland: A 'tree credit' can be used to offset 10 percent of a site's impervious surface as stormwater management, and trees can also be used as a BMP. https://www.portlandoregon.gov/bes/article/582102>

Fixes

- The Virginia Department of Environmental Quality has been tasked with convening a stakeholder advisory group for the purpose of studying the planting or preservation of trees as a stormwater BMP. The advisory group is expected to meet this fall, with a subsequent report issued in early November 2020.
- Prevent the development of land where the trees were recently removed under the silvicultural water quality exemption. Currently, in some localities, a developer can clear lands not zoned for development as part of a forestry operation and then immediately apply for a permit to rezone the land for development. This precludes a discussion with local planners about what forested areas might be conserved. Some states have waiting periods to prevent this wholesale clearing for development under the guise of a forestry operation. For example, some localities in the State of South Carolina have waiting periods (of up to 3 years) for any land development applications following for land that was recently harvested. Trees can be harvested as part of a forestry operation, but that land may not immediately be converted to a development plan.
- Forested areas are undervalued by the general public. The state and other advocacy groups should increase public education about the importance of trees and sustainably managed forests to ensure greater community support for maintaining forested landscapes.
- The state should develop a program for localities to purchase or conserve forest land or other natural area lands specifically for stormwater management.
- Localities can consider providing credits for tree planting or forested areas as *Stormwater Utilities*. Communities that have stormwater utilities usually offer credits for nutrient removal under §62.1-44.19:20 Nutrient credit certification. Most (if not all) Stormwater Utilities in Virginia do not offer credits for trees, but rather for constructed BMPs, such as raingardens or permeable pavement.

Trees as Nutrient Credits

Overview

Nutrient credit trading started in Virginia in 2005 and was originally designed to trade point source pollution. It evolved in 2009 to allow for trading between point sources and agricultural non-point sources.

Any time a site goes from a forested to non-forested state, the developer must mitigate any water quality impacts, either on-site or off-site. If the site is less than 5 acres, or if mitigation of less than 10 lbs. of phosphorus is needed, credits can ensure water quality compliance. For larger sites, 75% of the impacts must be met with on-site practices, while 25% can be purchased with off-site credits. The number of credits generated is determined by the non-point source runoff calculations of the Chesapeake Bay Model.

This credit trading program operates statewide, with banks throughout. Service areas for credit trading can happen within an 8-digit Hydrologic Unit Code (HUC) watershed or adjacent watershed.

Problem

The nutrient credit trading program does not apply to nutrient run-off from urban lands or redevelopment. While nutrient credits for stormwater management can be purchased for mitigating land disturbing activities subject to a stormwater management permit, preservation of existing forested land is not eligible for credits and there are no net-loss verification standards. In fact, the credit program has minimal standards that do not reflect the values provided by natural forest structure and composition.

Fixes

- Convene a stakeholder advisory group to revisit and update guidelines and standards for the Nutrient Credit Program.

Additional research and data

The Virginia Department of Forestry could conduct an assessment to understand the current extent of canopy coverage in urban areas, the rate at which urban canopy loss is occurring, and those mitigation practices communities are employing to prevent canopy loss across Virginia.

Further research is needed to determine how community forest programs are operating and to determine the biggest challenges they face in managing their forests. A statewide survey, code review, and interview process could be conducted to create a detailed and rigorous '*strengths and needs' assessment*. This work would inform the Department of Forestry's understanding as to which localities already have strong ordinances for tree cover/protection. The VADOF could also adopt recommendations for optimal legal protections and programs localities should consider for conserving or restoring trees and forests.

Summary Next Steps:

- ❑ Share this summary with urban foresters and local governments for feedback.
- ❑ Share this summary with other interested stakeholders as background for upcoming discussions.
- ❑ Continue to gather additional data and research on urban forest practices and ordinances.
- ❑ Convene working group of local government representatives to develop legislative proposals to address gaps.
- ❑ Share legislative proposals with all local government stakeholders for input.
- ❑ Share legislative proposals with other stakeholders for feedback.
- ❑ Convene a working group representing all stakeholder groups to find consensus where possible.

Appendices

A: References

____ Federal Stream Corridor Restoration Handbook (NEH-653) https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/manage/restoration/?cid=stelprdb1043244

_____Runoff and infiltration graphic. EPA Watershed Academy Website. Accessed February 19, 2019: < https://cfpub.epa.gov/watertrain/moduleFrame.cfm?parent_object_id=170>

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B: Policy Briefing Sheets

The following briefing sheets were prepared by the Green Infrastructure Center Inc. to inform discussion with stakeholders concerning key legislation affecting trees in developing landscapes. All information was current as of 08/12/2020.

Briefing Sheet 1: Cluster (and Conservation) Development Ordinance

§ 15.2-2286.1 Provisions for clustering of single-family dwellings so as to preserve open space.

Background

Urbanization is the leading cause of permanent forest and tree canopy loss in the State of Virginia. The net loss of forest land conversion to other land uses in 2010 was 27,000 acres per year, with an estimated loss of 1 million acres of forest over the next 25 years. The Virginia Department of Forestry (VA DOF) is pursuing policy and legislative options to strengthen codes that protect or conserve trees or tracts of forests within rural, suburban, and urban areas of the state and that support the practice of forestry.

Cluster development is type of site layout that maintains zoned densities (even density bonuses) for a given lot, but concentrates the development on a smaller footprint and preserves a portion of the lot as "open space." This type of development is seen as a compromise between a developer's need to maximize financial returns and the local jurisdiction's desire for conservation. Clusters allow lot sizes and setback changes to achieve modified lot arrangements. This preserves sensitive site features, such as steep slopes or wetlands, while still achieving allowed gross densities.
Conservation developments are the private equivalents to cluster developments where significant natural resources are protected (usually at least 50 percent of the landscape) in open space, with development limited to a smaller portion of the site.

Benefits:

- In urban areas, it protects sensitive environmental resources while, at the same time, it creates more compact development patterns, which leads to the more efficient delivery of infrastructure.
- In rural areas, it helps protect sensitive natural resources or views, while conserving agricultural and forest lands.
- Lots within cluster or conservation subdivisions are often valued more highly than conventional lots, due to their proximity or access to natural features.

Challenges:

- The permitting and approval process can be longer and more complicated than a standard "by right" development.
- It does not fully protect rural lands from sprawl; however, combined with other zoning and land use policies (e.g. Agricultural/Forestall Districts and conservation overlay districts), it can be employed more effectively.

Current Policy

§ 15.2-2286.1 Provisions for clustering of single-family dwellings so as to preserve open space. The following excerpts are included to highlight limitations of the existing law. For a full review of the code, please click on the hyperlink above.

A. The provisions of this section shall apply to any county or city that had a population growth rate of 10% or more from the next-to-latest to latest decennial census year, based on population reported by the United States Bureau of the Census. However, the requirements of this section shall not apply to any such county or city that has a population density of more than 2,000 people per square mile, according to the most recent report of the United States Bureau of the Census.

B. Any such locality shall provide in its zoning or subdivision ordinances, applicable to a minimum of 40% of the unimproved land in residential and agricultural zoning districts classifications, standards, conditions, and criteria for the clustering of single-family dwellings and the preservation of open space developments.

   For any "open space" or "conservation areas" established in a cluster development, the locality shall not (i) require in such areas identification of slopes, species of woodlands or vegetation and whether any of such species are diseased, the locations of species listed as endangered, threatened, or of special concern, or riparian zones or require the applicant to provide a property resource map showing such matters in any conservation areas, other than that which may be required to comply with an ordinance adopted pursuant to § 15.2-961 or 15.2-961.1 or applicable state law; (ii) require such areas be excluded from the calculation of density in a cluster development or exclude land in such areas because of prior land-disturbing activities; (iii) prohibit roads from being located in such areas for purposes of access to the cluster development, but the locality may require such roads be designed to mitigate the impact on such areas; (iv) prohibit stormwater management areas from being located in such areas; or (v) require that lots in the cluster development directly about such areas or a developed pathway providing direct access to such areas.

D. Notwithstanding any of the requirements of this section to the contrary, any local government land use ordinance in effect as of June 1, 2004, that provides for the clustering of single-family dwellings and preservation of open space development by right in at least one residential zoning classification without requiring either a special exception, special use permit, conditional use permit, or other discretionary approval may remain in effect at the option of the locality and will be deemed to be in compliance with this section. Any other locality may adopt provisions for the clustering of single-family dwellings, following the procedures set out in this section, in its discretion.

Limitations

Localities experiencing high population growth (10% or greater) are mandated to have cluster development as by right without requiring special permit. Currently in Virginia, no locality meets this exceptionally high growth rate requirement. This law does not apply to counties or cities that have a population density of 2,000 people or more per square mile further limiting its effectiveness. Based on the previously described provisions, this law is not applicable to any jurisdiction in the state. Other limitations of the law include these provisions:

- Prohibits requiring any prior site assessment or resource map of the open space to determine conservation value.

- Prohibits any special resource areas or the open space from being excluded in the density area calculation.
- Designated open space for the cluster can have prior land disturbance activities or be used for managing stormwater runoff from the development.
- A locality may not require direct access in the form of a pathway between developed portions to the open space.
- A locality can be exempted from these provisions if they had a cluster ordinance prior to 2004; however, this limits the ability of localities to update their code in response to changes in growth and development.

Practice

Many localities across the state have cluster development codes despite the shortcomings of the state law. Requirements are variable and inconsistent between jurisdictions. Practices can range from mandatory to voluntary, and minimum percentages of open space can vary from a low of 15% to a high of 70%. Some flexibility of requirements is preferred and recommended, since localities are better positioned to manage and adapt to development patterns within their jurisdictions.

Loudoun County. Voluntary rural cluster. In the AR-1 District, a minimum lot size of 20 acres is required, unless lots are clustered. In this case, a lot yield of one lot per 5 acres is allowed, with cluster lots of at least 20,000 square feet and not more than four acres in size, with at least one lot of 15+ acres, and at least 70% of the land in the cluster subdivision in common open space.

Hanover County. Mandatory rural cluster to obtain maximum permitted density. Sixteen clustered lots are permitted per 100 acres, with a minimum of 70% open space required (slightly more than six acres per lot, on average). If a cluster is not used, the minimum lot size/density is 10 acres per dwelling in the agricultural zone.

Albemarle County. Cluster ordinance pre-dates 2004, making the county exempt from the code's prohibitions. Albemarle's code is an example where the locality requires the exclusion of specific resource types, which naturally limits development from being calculated as part of the open space. "*If open space is required by this chapter, not more than 80 percent of the minimum required open space shall consist of the following: (i) land located within the 100-year flood plain; (ii) land subject to occasional, common or frequent flooding as defined in Table 16 Soil and Water Features of the United States Department of Agriculture Soil Conservation Service, Soil Survey of Albemarle County, Virginia, August, 1985; (iii) critical or preserved slopes; and (iv) land devoted to stormwater management facilities or flood control devices, except where the facility or feature is incorporated into a permanent pond, lake or other water feature deemed by the agent to constitute a desirable open space amenity.*

2020 General Assembly Legislation

HB 2549 Cluster zoning; density calculation. Prohibits localities from including areas designated as Resource Protection Areas in accordance with the State Water Control Board in a cluster zoning density calculation and provides that nothing in the statute shall require a locality to allow a greater overall density for a clustered development than would be required on a non-clustered development.

Status: 02/05/19 House: VOTE: BLOCK VOTE PASSAGE (99-Y 0-N); 02/24/19 Senate: Failed to pass in Senate.

Briefing Sheet 2: Tree Banking

§ 15.2-961 and § 15.2-961.1 reference Tree Banking and the establishment of a fund.

Background

Tree Banking is a funding policy to accommodate a developer when the requirements for tree canopy cannot be met onsite due to impracticality or an unreasonable hardship.

Benefits:

- Provides a way for localities to plant new trees off-site when a development cannot reasonably fit enough trees on-site to meet minimum tree canopy standards.
- Maintains no net loss of tree cover for a jurisdiction.

Challenges:

- Trees banks are not generating the "true" value of a tree when removed as a result from caps on fines.
- Tree banking can result in forest or tree cover being disaggregated across the landscape.
- Tree banking could be misdirected to only planting on public lands or rights-of-way.
- A locality may not have enough plantable space for new trees.
- Few urban or suburban sites have conservation easements where trees could be planted and protected.
- It may discourage large tree preservation, since it may make it easier to remove large, mature trees by providing a mechanism to meet site design and zoning code standards at a lower cost than protecting large trees during construction.
- Current code does not provide the authority to plant across jurisdictions or consider the landscape scale (i.e. watersheds). For example, a county that is experiencing rapid growth and is generating large sums in its tree fund, cannot disburse those funds to a neighboring jurisdiction, even if the rapid growth jurisdiction lacks enough plantable space for new trees.

Current Policy

§ 15.2-961. Replacement of trees during development process in certain localities.

The following excerpts are included to highlight limitations of the existing law. For a full review of the code please click on the hyperlink above.

E. The ordinance shall provide for reasonable exceptions to or deviations from these requirements to allow for the reasonable development of farm land or other areas devoid of healthy or suitable woody materials, for the preservation of wetlands, or otherwise when the strict application of the requirements would result in unnecessary or unreasonable hardship to the developer. In such instances, the ordinance may provide for a tree canopy bank whereby a portion of a development's tree canopy requirement may be met from off-site planting or replacement of trees at the direction of the locality. The following shall be exempt from the requirements of any tree replacement or planting ordinance promulgated under this section:

dedicated school sites, playing fields and other non-wooded recreation areas, and other facilities and uses of a similar nature.

§ 15.2-961.1. Conservation of trees during land development process in localities belonging to a nonattainment area for air quality standards.

G. The ordinance shall provide for the establishment of a tree canopy bank or fund whereby any portion of the tree canopy requirement that cannot be met on-site may be met through off-site tree preservation or tree planting efforts. Such provisions may be offered where it can be demonstrated that application of the requirements of subsection C would cause irresolvable conflicts with other local site development requirements, standards, or comprehensive planning goals, where sites or portions of sites lack sufficient space for future tree growth, where planting spaces will not provide adequate space for healthy root development, where trees will cause unavoidable conflicts with underground or overhead utilities, or where it can be demonstrated that trees are likely to cause damage to public infrastructure. The ordinance may utilize any of the following off-site canopy establishment mechanisms:

1. A tree canopy bank may be established in order for the locality to facilitate off-site tree preservation, tree planting, stream bank, and riparian restoration projects. Banking efforts shall provide tree canopy that is preserved in perpetuity through conservation easements, deed restrictions, or similar protective mechanisms acceptable to the locality. Projects used in off-site banking will meet the same ordinance standards established for on-site tree canopy; however, the locality may also require the submission of five-year management plans and funds to ensure the execution of maintenance and management obligations identified in those plans. Any such bank shall occur within the same nonattainment area in which the locality approving the tree banking is situated.

2. A tree canopy fund may be established to act as a fiscal mechanism to collect, manage, and disburse fees collected from developers that cannot provide full canopy requirements on-site. The locality may use this fund directly to plant trees on public property, or the locality may elect to disburse this fund to community-based organizations exempt from taxation under § 501(c)(3) of the Internal Revenue Code with tree planting or community beautification missions for tree planting programs that benefit the community at large. For purposes of establishing consistent and predictable fees, the ordinance shall establish cost units that are based on average costs to establish 20-year canopy areas using two-inch caliper nursery stock trees. Any funds collected by localities for these purposes shall be spent within a five-year period established by the collection date, or the locality shall return such funds to the original contributor, or legal successor.

Limitations

- The language allows for exceptions to the tree replacement requirements based on unnecessary or unreasonable hardship for the developer.
- § 15.2-961 does not allow for tree bank funds to be dispersed to 501(c)(3) community organizations for planting, thereby limiting a locality's ability to plant trees in private property.[3]

[3] State code 15.2-961.1 does allow localities in Planning District 8 to disburse tree funds to nonprofit entities for the purpose of planting trees.

- § 15.2-961.1 Tree canopy fund expenditures are limited to the same non-attainment area in which they were generated. Funds could be more adaptable to jurisdictions if the tree bank was serviced on a regional or watershed scale.
- The statewide caps limit what a locality can impose as a cost for tree removal during development and does not reflect the "true" value of large, mature trees.

Practice

Fairfax County – The county does not generate much funds when compared to the value lost from removing large, mature trees. The local government has plenty of public space with its boundaries to plant trees; however, tree removals are happening on private property and this policy does not address the loss of trees from those lands.

Maryland – The State of Maryland runs a tree banking program that is considered quite successful and addresses issues of geographic scale, where plantings can occur throughout the state.

2020 General Assembly Legislation

HB 1045 - Tree-replacement ordinance; banking. Authorizes any locality that has adopted a tree-replacement ordinance to require a developer to make up for any net loss in tree cover by planting additional trees on property protected by a conservation easement or paying the locality to do so.

Status: 01/31/20 House: Continued to 2021 in Counties, Cities and Towns by voice vote.

Briefing Sheet 3: Tree Conservation Ordinance

§ 10.1-1127.1. Tree conservation ordinance; civil penalties.

Background

Tree Conservation ordinances are used to protect and preserve trees by classifying them with special designations, such as "heritage," "specimen," "memorial," *etc*. Definitions of these special designations are listed in the state code below. These designations give trees an additional layer of protection by requiring special review and permitting for their removal or by imposing a financial penalty.

Benefits:

- They protect large, mature trees which provide greater ecosystem services (particularly in urban areas), such as stormwater capture and infiltration, shade, wildlife habitat, *etc*.
- They can promote a more environmentally-friendly site design by forcing development patterns to avoid existing trees.
- It can also reduce construction impacts to the site because designated trees must be protected from damage.

Challenges:

- The designation of special status for trees can limit future development on a site by either the locality or a future private landowner.
- Currently, the law does not require a permanent protection status to the trees similar to an easement or deed restriction.
- The law is voluntary on private lands, which can make up approximately 70-80% of a locality's land base.
- It requires payment for any loss to forgone development rights, and the calculation mechanism for such costs is unduly vague (see takings clause section D).

Current Policy

§ 10.1-1127.1. Tree conservation ordinance; civil penalties.

The following excerpts are included to highlight limitations of the existing law. For a full review of the code please click on the hyperlink above.

A. The governing body of any county, city or town may adopt a tree conservation ordinance regulating the preservation and removal of heritage, specimen, memorial and street trees, as defined under subsection B of this section, when such preservation and removal are not commercial silvicultural or horticultural activities, including but not limited to planting, managing, or harvesting forest or tree crops. Such ordinance shall consider planned land use by the property owner, may include reasonable fees for the administration and enforcement of the ordinance and may provide for the appointment by the local governing body of an administrator of the ordinance.

B. Any ordinance enacted pursuant to this authority may contain reasonable provisions for the preservation and removal of heritage, specimen, memorial and street trees. For the purpose of this section the following definitions shall apply:

"Arborist" or "urban forester" means a person trained in arboriculture, forestry, landscape architecture, horticulture, or related fields and experienced in the conservation and preservation of native and ornamental trees.

"Heritage tree" means any tree that has been individually designated by the local governing body to have notable historic or cultural interest.

"Memorial tree" means any tree that has been individually designated by the local governing body to be a special commemorating memorial.

"Specimen tree" means any tree that has been individually designated by the local governing body to be notable by virtue of its outstanding size and quality for its particular species.

"Street tree" means any tree that has been individually designated by the local governing body and which grows in the street right-of-way or on private property as authorized by the owner and placed or planted there by the local government.

The designation of such trees shall be by an arborist or urban forester and shall be made by ordinance. The individual property owner of such trees shall be notified prior to the hearing on the adoption of such ordinance by certified mail.

C. The provisions of a tree conservation ordinance enacted pursuant to this section shall not apply: (i) to work conducted on federal or state property; (ii) to emergency work to protect life, limb or property; (iii) to routine installation, maintenance and repair of cable and wires used to provide cable television, electric, gas or telephone service; (iv) to activities with minor effects on trees, including but not limited to, home gardening and landscaping of individual homes; and (v) commercial silvicultural or horticultural activities, including but not limited to planting, managing, or harvesting forest or tree crops.

D. In the event that the application of any ordinance regulating the removal of heritage, specimen, memorial or street trees results in any taking of private property for a public purpose or use, the governing body shall compensate by fee or other consideration the property owner for such taking and the ordinance shall so state thereby notifying the owner of his right to seek such fee or other compensation. The provisions of Chapter 2 (§ 25.1-200 et seq.) of Title 25.1 shall apply to the taking of private property for a public purpose pursuant to such local ordinance.

E. Violations of such local ordinance shall be punishable by civil penalties not to exceed $2,500 for each violation.

Limitations

- The language in section D concerning the taking of private property and compensation for public use can discourage localities from implementing this ordinance. The question of whether a locality is held liable for lost potential development value as a "taking" (e.g. a private landowner could claim they were going to build a large hotel on the property, but a designated tree was preventing it and file a claim against the locality for taking of private property).

- Currently there is no language in the state code requiring legal protection during title transfer on private properties. Some localities require the trees be specifically listed as protected on the title or deed in perpetuity. Other localities are exploring options for bonding the trees to provide permanent protection.
- Penalties for damaging or removing a special designation tree are capped at $2500 per violation.

Practice

Fairfax County. Fairfax County created a pilot database containing a few special status trees. The county has 16 trees designated under this status throughout the county. Within its municipal code, the county addresses the issue of personal taking with the following language: "*is the intent of Fairfax County that the application of this Chapter not result in any taking of private property for public purposes without the express written consent of the owner. To the extent that the owner's express written consent grants the County any rights, that grant of rights is a gift.*" Any special status designation for a tree includes an easement for the surrounding environmental setting that support the tree, "*designation of a tree under this Chapter may require all easements necessary to preserve and protect the tree, including the natural vegetation, topography, and other natural features within the critical root zone.*"

Arlington County. Arlington County has designated 16 Heritage Trees and produced a walking tour brochure. According to the Arlington Tree Advocacy Group (ATAG), the civil penalties for removing special designation trees, or trees in general, is too low and does not incentivize developers to conserve large, mature trees on site. The maximum civil penalty in the code cannot exceed $2,500 for each tree.[4] Compare this penalty for specimen or heritage tree removal in Washington D.C., where the fine is $300/caliper inch of the tree. A 60-inch caliper tree would cost a developer an $18,000 fine if that tree was damaged or removed. Other municipalities in the South, such as Beaufort, South Carolina, have civil penalties that are much higher for tree damage and removal.

2020 General Assembly Legislation

HB 221 - Tree conservation ordinance; Chesapeake Bay Preservation Act locality; designated trees.

Adds "Chesapeake Bay watershed tree," as defined in the bill, to the types of tree that a locality with a tree conservation ordinance is authorized to designate individually for preservation. Current law allows individual designation of heritage, memorial, specimen, and street trees. The bill contains technical amendments.

Status: 02/05/20 House: Continued to 2021 with substitute in Agriculture, Chesapeake and Natural Resources by voice vote.

Similar legislation: SB 184 failed to report (was defeated) in the Agriculture Subcommittee (7 yes, 7 no)

HB 1329 - Chesapeake Bay Preservation Areas; local governments to designate Areas, etc.

[4] In general, development fines/fees in Virginia are often capped at low levels, causing some to regard fines as part of the cost of doing business, rather than a true financial disincentive to violating the law.

Chesapeake Bay Preservation Areas; local ordinances; penalties. Directs localities in Tidewater Virginia to incorporate certain penalties into their ordinances protecting the quality of state waters in Chesapeake Bay Preservation Areas. As Introduced: Chesapeake Bay; Resource Protection Areas; tree removal. Directs the State Water Control Board, when developing criteria for use by localities in addressing Resource Protection Areas (RPAs) under the Chesapeake Bay Preservation Act, to require that any local ordinance addressing permitted modifications of the buffer area include specific penalties for the removal of trees from an RPA without the prior approval of the locality.

Status: 02/05/20 House: VOTE: Passage (55-Y 42-N); 02/25/20 Senate: Continued to 2021 in Agriculture, Conservation and Natural Resources (15-Y 0-N)

§ 15.2-961. Tree replacement of trees during development process in certain localities.

§ 15.2-961.1 Conservation of trees during land development process in localities belonging to a nonattainment area for air quality standards.

Background

A **tree replacement ordinance** sets maximum tree canopy coverage by zoning classes. It is designed to provide for tree canopy during the development process, through conservation and/or replacement. Some localities offer bonus credits for protecting existing mature trees on site to meet tree cover standards.

Benefits:

- In urban areas, it can prevent canopy loss or maintain canopy cover over the long-term for the locality.
- It requires developers to mitigate losses to the urban tree canopy, while giving them some flexibility to achieve a locality's urban tree canopy cover standards. For example, through the use of a Tree Bank (see separate briefing sheet on this topic).
- The law is narrow in scope and prevents a locality from setting more progressive canopy standards to counter development impacts.
- Localities are restricted to a 20-year timeline for developers to achieve canopy cover requirements (with a few exceptions).
- Depending on the locality, mature trees can be sacrificed on site, as long as new tree plantings create the required canopy within the window of time.
- In Virginia, conditions and stipulations of state zoning laws and locally implemented zoning ordinances allow for building conditions that are in direct conflict with the conservation of trees, such as building set-back distances, lot coverages, or uses that allow for deviations and exemptions.

Current Policy

§ 15.2-961. Tree replacement of trees during development process in certain localities.

The following excerpts are included to highlight limitations of the existing law. For a full review of the code please click on the hyperlink above.

A. Any locality with a population density of at least 75 persons per square mile or any locality within the Chesapeake Bay watershed may adopt an ordinance providing for the planting and replacement of trees during the development process pursuant to the provisions of this section. Population density shall be based upon the latest population estimates of the Weldon Cooper Center for Public Service at UVA.

B. The ordinance shall require that the site plan for any subdivision or development include the planting or replacement of trees on the site to the extent that, at 20 years, minimum tree canopies or covers will be provided in areas to be designated in the ordinance, as follows:

1. Ten percent tree canopy for a site zoned business, commercial, or industrial;

2. Ten percent tree canopy for a residential site zoned 20 or more units per acre;

3. Fifteen percent tree canopy for a residential site zoned more than 10 but less than 20 units per acre; and

4. Twenty percent tree canopy for a residential site zoned 10 units or less per acre.

J. In no event shall any local tree replacement or planting ordinance adopted pursuant to this section exceed the requirements set forth herein.

§ 15.2-961.1 Conservation of trees during land development process in localities belonging to a nonattainment area for air quality standards.

B. 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, 2008, may adopt an ordinance providing for the conservation of trees during the land development process pursuant to the provisions of this section. In no event shall any local tree conservation ordinance adopted pursuant to this section also impose the tree replacement provisions of § 15.2-961.

C.

3. Fifteen percent tree canopy for a residential site zoned more than eight but less than 20 units per acre;

4. Twenty percent tree canopy for a residential site zoned more than four but not more than eight units per acre;

5. Twenty-five percent tree canopy for a residential site zoned more than two but not more than four units per acre; and

6. Thirty percent tree canopy for a residential site zoned two or fewer units per acre.

In meeting these percentages, (i) the ordinance shall first emphasize the preservation of existing tree canopy where that canopy meets local standards for health and structural condition, and where it is feasible to do so within the framework of design standards and densities allowed by the local zoning and other development ordinances; and (ii) second, where it is not feasible in whole or in part for any of the justifications listed in subsection E to preserve existing canopy in the required percentages listed above, the ordinance shall provide for the planting of new trees to meet the required percentages.

D. Except as provided in subsection E, the percentage of the site covered by tree canopy at the time of plan submission shall equate to the minimum portion of the requirements identified in subsection C that shall be provided through tree preservation. This portion of the canopy requirements shall be identified as the "tree preservation target" and shall be included in site plan calculations or narratives demonstrating how the overall requirements of subsection C have been met.

E. The ordinance shall provide deviations, in whole or in part, from the tree preservation target defined in subsection D under the following conditions:

1. Meeting the preservation target would prevent the development of uses and densities otherwise allowed by the locality's zoning or development ordinance.

2. The predevelopment condition of vegetation does not meet the locality's standards for health and structural condition.

3. Construction activities could be reasonably expected to impact existing trees to the extent that they would not likely survive in a healthy and structurally sound manner. This includes activities that would cause direct physical damage to the trees, including root systems, or cause

environmental changes that could result in or predispose the trees to structural and health problems.

Limitations

This code is limited to only jurisdictions within the Chesapeake Bay Watershed and/or jurisdictions with a population density of more than 75 people per square mile according to the latest U.S. Census. Localities are capped at the minimum covers unless they are located within the Planning District 8 in which case they can enact higher standards for tree cover and conservation in certain zones. This limits the ability of localities to take proactive measures at protecting tree canopy in their jurisdictions and setting higher standards.

Practice

Falls Church, VA. Generally, meets the desired goal of 20% canopy over 10 years. Canopy cover was not significantly different from 20% at the time of redevelopment (after trees were removed for construction) indicating that 20% threshold is probably too low. Prior to redevelopment, Falls Church's mean canopy cover was 52% and lots generally had large mature trees. When canopy cover is compared using other metrics, such as basal area, canopy cover as a metric was shown to ignore the importance and loss of large trees.\

Alpharetta, GA – Has minimum tree density requirements based on basal area per acre.

Section 3.2.7

A. All sites within the City other than 'For-Sale' residential lots shall maintain or achieve a Minimum Tree Density of 130 inches per acre. The owner shall be subject to the minimum tree density requirement set forth in this paragraph, but the owner shall base the density calculations on the net site area excluding the acreage required for Buffers and infrastructure improvements (roads, utility lines, detention ponds, etc.). In no event shall a parking lot be considered an infrastructure improvement.

B. All 'For-Sale' residential lots in the City shall maintain a minimum tree density of 130 inches per acre or provide a calculation as described in the Guidance Document that shows the lot meets or exceeds a 30% canopy coverage based upon trees growing within the property lines. For new construction or new plantings this calculation may be based upon the mature spread of the newly planted trees at 20 years after planting.

In total, 18 communities throughout Virginia adopted code 15.2-961, examples are: City of Alexandria, Albemarle County, Arlington County, City of Charlottesville, Chesapeake City, City of Manassas, City of Portsmouth, City of Suffolk, and City of Waynesboro. These localities fall within the parameters of the law. Further study is necessary to understand how effective this ordinance is at reducing canopy loss across jurisdictions.

Example of Virginia localities that have adopted the tree conservation (§ 15.2-961.1) are: Fairfax County. Fredericksburg pursued expanding this bill to include other jurisdictions with no success.

2020 General Assembly Legislation

Proposes to amend 15.2-961.1

HB 1624 - Conservation of trees during land development process. Authorizes any locality to adopt an ordinance providing for either the conservation of or the planting and replacement of trees during the land development process. Currently, only a locality within Planning District 8 with a population density of 75 persons per square mile and which 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, 2008, may adopt such an ordinance for the conservation of trees.

Status: 01/31/20 House: Continued to 2021 in Counties, Cities and Towns by voice vote.

Briefing Sheet 5: Trees as Best Management Practices for Stormwater

Article 2.3. Stormwater Management Act

Background

Trees provide many environmental benefits to the landscape, including capturing and infiltrating stormwater, reducing erosion, and limiting nonpoint source pollutants from entering local waterbodies. Currently, individual trees are not considered a **best management practice (BMP)** for managing stormwater.

Benefits:

- In urban landscapes, trees reduce the amount of stormwater runoff by capturing precipitation and infiltrating it onsite, reducing flooding and recharging groundwater.
- By infiltrating more stormwater onsite, trees reduce surface flows, which can transport litter, sediment, pesticides, nutrients, petroleum byproducts, and heavy metals into waterways.
- Trees can provide additional benefits to a site compared to other stormwater BMPs, such as wildlife habitat, shade, and aesthetics.

Challenges:

- Quantifying a standard volume for credits is challenging based on a wide range of variables including: species of tree, size, surface over which the tree will be planted, soils, land cover of the site, *etc*.
- The lag in timeline for compliance of stormwater management when new, young trees are planted for credit and when the tree will provide full benefits.
- Questions around long-term tree care and maintenance, especially in regards to tree mortality and replacement of large mature trees to maintain compliance.
- Variances in the rates of stormwater capture by different tree species (generally those with higher leaf area index are best at interception of rainfall).

Current Policy[5]

Virginia Stormwater Management Act

Best Management Practices (BMPs) for controlling or reducing stormwater on site do not include individual trees. Accepted practices for Run-off Reduction Method Calculations (RRM) are: sheet flow to a conservation area (forest) or filter strip, rooftop disconnection, rain gardens, cisterns, dry wells, green roofs, grass channels, permeable pavement, bioretention, dry swales, infiltration, and extended detention ponds.

The following excerpts are included to highlight limitations of the existing law. For a full review of the code please click on the link.

[5] Tree planting is an allowed BMP to achieve credit for nitrogen, phosphorus, and sediment reductions toward localities' Phase III Watershed Improvement Plan (WIP) targets. https://www.chesapeakebay.net/documents/BMP-Guide_Full.pdf

§ 62.1-44.15:34. Exemptions

3. Single-family residences separately built and disturbing less than one acre and not part of a larger common plan of development or sale, including additions or modifications to existing single-family detached residential structures. However, localities subject to the provisions of the Chesapeake Bay Preservation Act (§ 62.1- 44.15:67 et seq.) may regulate these single-family residences where land disturbance exceeds 2,500 square feet;

4. Land-disturbing activities that disturb less than one acre of land area except for land disturbing activity exceeding an area of 2,500 square feet in all areas of the jurisdictions designated as subject to the Chesapeake Bay Preservation Area Designation and Management Regulations adopted pursuant to the provisions of the Chesapeake Bay Preservation Act

Limitations

Currently individual trees are not considered a best management practice under the Virginia Stormwater Permit System nor are individual trees allowed in the Run-off Reduction Method (RRM) calculations. Currently only existing forest cover on site can be used in the RRM along with other BMPs such as cisterns, rain gardens, filter strips, grass channels, etc. Certain land disturbing activities are exempted from a required permit, including single family zoned sites where land disturbance is less than one acre and does not fall under the purview of the Chesapeake Bay Preservation Act.

Practice

Cities in other states and districts use trees as BMPs for stormwater management.

Examples:

Portland, OR: Trees can be used to mitigate up to 10% of impervious surfaces on sites with greater than 1,000 square feet of new or re-development. Small projects (less than a 1,000 square feet), such as new residential additions or detached structures, may be able to eliminate their stormwater requirement through tree credits. Stormwater credit for existing trees is 200 square feet for a tree caliper of 1.5 – 6 inches, while for trees 6 inches and greater it is 400 square feet per each 6 inches of caliper (for example a 24-inch caliper tree would get credit for 1,600 square feet). Existing trees must be at least 25 feet from impervious surfaces and newly planted trees must be within 10 feet. Nuisance trees cannot receive credit.

Washington, D.C.: Trees are given runoff volume credits that vary based on the mature canopy spread size or if the tree is either a "Special" tree (defined as a minimum 44-inch trunk circumference) or a "Heritage" tree (defined as a minimum of 100-inch trunk circumference). The runoff volume credits are 10 cubic feet for small canopy trees (less than a 40 ft. spread), 20 cubic feet for large canopy (greater than a 40 feet spread), 30 cubic feet for "Special" trees, and a 40 cubic feet for "Heritage" trees. Newly planted small canopy trees receive 5 cubic feet credit, while newly planted large canopy trees receive a 10 cubic feet credit.

Pine Lake, GA: 10 gallons of water credit per inch of the diameter at breast height (DBH) for preserving existing trees under 12" DBH, and 20 gallons of credit per inch of DBH for preserving existing trees over 12" DBH.

The Center for Watershed Protection has developed a calculator to determine stormwater uptake for individual trees. https://www.cwp.org/making-urban-trees-count/

The Green Infrastructure Center developed a stormwater calculator tool that calculates the cumulative impact of trees on stormwater at the landscape scale. The calculator can be found at: http://www.gicinc.org/trees_stormwater.htm

2020 General Assembly Legislation

HB 520 - Department of Environmental Quality; tree planting as land cover type, best management practice; stakeholder advisory group. Directs the Department of Environmental Quality (DEQ) to convene a stakeholder advisory group for the purpose of studying the planting or preservation of trees as an urban land cover type and as a stormwater best management practice (BMP). The bill provides that the stakeholder group shall be composed of development and construction industry representatives, environmental technical experts, local government representatives, and others and that technical assistance shall be provided to DEQ by the Department of Forestry and the Department of Conservation and Recreation. The bill directs DEQ to report the findings of the stakeholder group by November 1, 2020, and to include a recommendation as to whether the planting or preservation of trees shall be deemed a creditable land cover type or BMP and, if so, how much credit shall be given for its optional use.

Status: 03/23/20 Governor: Approved by Governor-Chapter 405 (**effective 7/1/20**)

HB 504 - Chesapeake Bay Preservation Areas; mature trees. Adds the preservation of mature trees or planting of trees, both as a water quality protection tool and as a means of providing other natural resource benefits, to the list of activities that the State Water Control Board is directed to encourage and promote as it adopts criteria for local governments to use as they consider development in Chesapeake Bay Preservation Areas.

Status: 04/22/20 House: Enacted, Chapter 1207 (**effective 7/1/20**).

Briefing Sheet 6: Trees as Nutrient Credits

§ Chapter 820. General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia

Background

Nutrient credit trading started in Virginia in 2005 and was originally designed for trading between point source pollution. It evolved in 2009 to allow for trading between point sources and agricultural non-point sources. Any time a site goes from a forested to non-forested state, the developer must mitigate any water quality impacts, either on site or off site. If the site is less than 5 acres, or if mitigation of less than 10lbs of phosphorus is needed, then credits can be used to fulfill the water quality compliance. For larger sites, 75% of the impacts must be met with on-site practices, while 25% can be purchased with credits. The number of credits generated is determined by the non-point source runoff calculations of the Chesapeake Bay Model. The credit trading program is statewide, with banks throughout. Service areas for credit trading can happen within an 8-digit HUC (Hydrologic unit code) watershed or adjacent watershed.

Benefits:

- Nutrient credits are authorized between point source to point source, and between point source to agricultural non-point source.
- A variety of nutrient best management practices can be used.
- Reforested land under this program is permanently protected.

Challenges:

- Only agricultural land is eligible for credits; forestland is excluded. This limits the incentive to preserve existing forests.
- Load reductions from urban lands or lands that are redeveloped are not eligible.
- Reforestation criteria are minimal, having planting densities of only 400/hectare.
- Land use status is set to a reference point of July 1st, 2005 when determining nutrient credit eligibility.
- Trading of credits can only occur within an 8-digit HUC or adjacent. If no such credits are available, then payments can be made into the Nutrient Offset Fund.
- The program does not offer a way to verify no net loss of forest cover.
- Newer iterations of the model calculate lower phosphorus runoff loads per acre, thereby reducing the amount of phosphorous credit a trader can get per acre for reforestation.

Current Policy

Chapter 820. General Virginia Pollutant Discharge Elimination System (VPDES)

Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia (9 VAC 25-820-10 et seq.)

The following excerpts are included to highlight limitations of the existing law. For a full review of the code please click on the hyperlink above.

§ 9VAC25-820-70. General permit

The regulation applies:

(a) When direct and representative monitoring of the pollutant loadings from a nonpoint source is performed in a manner and at a frequency similar to that performed at VPDES point sources and there is consistency in the effectiveness of the operation of the nonpoint source best management practice (BMP) approaching that of a conventional point source.

(b) When nonpoint source credits are generated from land conservation that ensures permanent protection through a conservation easement or other instrument attached to the deed and when load reductions can be reliably determined;

(2) Calculated using best management practices efficiency rates and attenuation rates, as established by the latest science and relevant technical information, and approved by the board;

(3) Based on appropriate delivery factors, as established by the latest science and relevant technical information, and approved by the board;

(4) Demonstrated to have achieved reductions beyond those already required by or funded under federal or state law, or by Virginia's Chesapeake Bay TMDL Watershed Implementation Plan;

(6) In the case of credits generated by land use conversions and urban source reduction controls (BMPs), the credits shall represent nutrient reductions beyond those in place as of July 1, 2005;

c. Until such time as the board finds that no allocations are reasonably available in an individual tributary, acquisition of allocations through payments made into the Nutrient Offset Fund established in § 10.1-2128.2 of the Code of Virginia; or

Limitations

The current trading system does not allow credits for nutrient reduction on urban lands, redevelopment, sites with pre-existing conservation easements or other legal protection, or for existing forest land. Criteria for reforestation credits does not consider tree species composition or added ecosystem service values, such as wildlife habitat. The trading system does not verify no net loss of forest cover to ensure unprotected forestland are not placed at greater risk for clearing or development.

Setting the date of July 2005 as the point of reference for nutrient load eligibility means if a piece of land was fallow (mixed open) at the time and the farmer decided to convert it to a higher nutrient load agricultural practice such as cropland, then if the farmer decided to reforest the land for nutrient credits, the land is only eligible for nutrient reductions based on the prior fallow land, not on the cropland. This prevents landowners from clearing land or intentionally changing practices to increase nutrient load levels in order to generate higher valued credits. However, this static point in time does not account for change in land use intensity by farmers over time.

Practice

Virginia has one of the most developed nutrient credit trading programs in the nation. Reforestation makes up 99% of nutrient credit best management practices. This translates into approximately 10,000 acres (rough estimate) of land reforested over 10 years through this program. The cost of credits can range from $12,000 - $25,000 depending on the current market price per pound for phosphorus and the designated tributary. Nutrient loads per acre for phosphorus are decreasing, thus limiting the amount a trader can get per acre for reforestation. Reforestation for land conversion is often for single species plantings, most commonly loblolly (personal comment.). Stormwater facilities such as bioswales, rain gardens, retention ponds, and filter strips are very effective at removing nutrient loads in dense urban landscapes and are already a best management practice (BMP), although individual trees are not included in this list.

2020 General Assembly Legislation

HB 504 - Chesapeake Bay Preservation Areas; mature trees. Adds the preservation of mature trees or planting of trees, both as a water quality protection tool and as a means of providing other natural resource benefits, to the list of activities that the State Water Control Board is directed to encourage as it adopts criteria for local governments to use in developing Chesapeake Bay Preservation Areas.

Status: 04/22/20 House: Enacted, Chapter 1207 (effective 7/1/20).