The Tree Solutions Now Act of 2021

Final Plan for Growing 5 Million Trees in Maryland

5 MILLION TREES FOR MARYLAND

Prepared for:

Governor Larry J. Hogan
State of Maryland

and the Maryland General Assembly

October 28, 2022

Maryland Department of the Environment | MARYLAND DEPARTMENT OF NATURAL RESOURCES | MARYLAND DEPARTMENT OF AGRICULTURE | MDOT MARYLAND DEPARTMENT OF TRANSPORTATION | Chesapeake Bay Trust

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Letter from the Commission Chair

Maryland leads the nation in developing policies to build an equitable, decarbonized future with strong diverse economies and communities resilient in a changing climate. One leading initiative is the state's carbon mitigation goal to grow 5 million trees by 2031. This goal prioritizes tree planting in underserved, urban communities.

The Growing 5 Million Trees in Maryland Plan provides a roadmap that builds on Maryland's existing investments in climate action, ecosystem restoration, and forest management. The Commission for Innovation and Advancement of Carbon Markets and Sustainable Tree Plantings provided invaluable guidance for the planning process. I am pleased to report that within 18 months of the original legislation, trees have been planted in urban communities thanks in large part to the leadership in the Chesapeake Bay Trust and collaboration and coordination between state agencies and the Commission. The planning process strengthened existing interagency collaborations and charted new partnerships with communities, nongovernmental organizations, local governments, and businesses.

The plan uses best-available science to track and verify environmental outcomes to maximize the many benefits that trees provide, including carbon sequestration, reduced flooding, improved air and water quality, and reduced heat islands. While prioritizing co-benefits, the work of the Commission identified new opportunities to support local economies with a focus on workforce development to maintain forests and urban trees, industries that manufacture climate-smart forestry products, and effective engagement with carbon markets.

The Commission, along with the interagency leadership team, made progress in 2022 to build strategies to reach the 5 million tree goal by 2031. But, achieving the ambitious goal requires the support of all Marylanders. We welcome participation by community members in local tree planting events and home and business owners in planting trees on their properties. We look forward to even stronger coordination that helps farmers have more flexibility in planting fruit and nut trees and supports Maryland Department of Transportation in collaborating with nonprofits to expand the reach of their tree planting efforts. When more people plant trees, not only will we grow 5 million trees, we will grow equitable, resilient communities for all Marylanders. For more information, visit the Maryland Department of the Environment's Carbon Markets and Trees Commission Webpage.

Dr. Suzanne E. Dorsey, Deputy Secretary
Maryland Department of the Environment

Executive Summary

The Tree Solutions Now Act of 2021 (TSNA) established a statewide carbon mitigation goal to plant and maintain 5 million native trees in Maryland by the end of Calendar Year (CY) 2031. A key focus of this effort is supporting equity through the targeted planting of at least 500,000 of these trees in underserved urban communities.

To support planning, the TSNA established the Commission for the Innovation and Advancement of Carbon Markets and Sustainable Tree Plantings (Commission). This plan is a product of the Commission's work to chart a pathway to reach the 5 million tree planting and maintenance goal, recommend a framework for state engagement with the carbon market, and assess and review current tree mitigation policy in Maryland.

The Maryland Department of the Environment (MDE) is charged with coordinating the tracking and implementation of this tree planting goal with leadership support from the Maryland Department of Natural Resources (DNR), Maryland Department of Agriculture (MDA), Chesapeake Bay Trust (CBT or Trust), and Maryland Department of Transportation (MDOT). This plan outlines the implementing strategies and enabling infrastructure being advanced by these organizations based on best available science.

Specifically, this plan promotes:

- New forms of technical and financial assistance in rural and urban communities
- Strategies for increasing the state nursery's seedling stock
- Outreach and engagement strategies for riparian forest buffer plantings
- A new Urban Trees Grant program and plans to scale capacity-building
- Understanding of existing tree loss mitigation policy and current best practices
- Progress tracking in the development of new web and map-based tools
- Alignment of tree tracking with existing accounting frameworks for carbon and nutrients
- State engagement with the carbon market to clarify avenues for participation
- Models for long-term tree maintenance and management
- New and existing partnerships to connect communities-of-practice and amplify impact

The work of the Commission has also resulted in several recommendations that would allow the state to fully maximize the benefits of trees for all Marylanders, including their contributions to climate change mitigation.

1. Optimizing State Property: The Maryland General Assembly should expand the scope of site review criteria for state-owned real property within the State Clearinghouse for Intergovernmental Assistance to aid in the identification of properties with tree planting potential, including for state agency use under the Forest Conservation Act.

2. Supporting Long-term Management: In line with the Maryland Forestry Economic Adjustment Strategy, the Maryland Department of Commerce should build a targeted

incentive package to attract and grow forest product industries, like structural wood for construction and innovative use of fiber in manufacturing, that support sustainable forest management, and utilize forest products in a way that maximizes long-term carbon sequestration.

3. Engaging the Carbon Market: Led by MDE, Maryland state agencies should establish a common quantification, verification, and registration system for carbon credits/outcomes, clarify carbon ownership of state-funded projects, and detail conditions for state procurement of carbon outcomes.

4. Counting More Trees: The Maryland General Assembly should allow non-native, non-invasive fruit and nut trees in Maryland to count toward the 5 million tree goal to support food security, agriculture, and biodiversity while continuing to advance carbon sequestration.

Introduction

Purpose of this Report

The TSNA[1] established a statewide carbon mitigation goal to plant and maintain an additional 5 million native trees in Maryland by the end of CY31. A key focus of this effort is supporting equity through the targeted planting of at least 500,000 of these trees in underserved urban communities, as defined by the TSNA. The state also commits to optimizing tree plantings to realize multiple environmental co-benefits, including carbon sequestration, improved air and water quality, and reduced urban heat island effects.

To support goal planning, the TSNA established the Commission. In line with its legislative charges, this plan is a product of the Commission's work to develop:

> (i) a plan to achieve the state's carbon mitigation goal of planting 5,000,000 native trees by 2030;
>
> (ii) a plan to ensure that trees planted under this act are properly maintained;
>
> (iii) recommendations regarding the establishment of a Maryland–based carbon offset market to support the state's tree–planting goals; and
>
> (iv) recommendations on reviewing state policies to reduce and fully mitigate the clearing of trees during the construction of state highways and other transportation projects.

MDE is charged with coordinating the tracking and implementation of this tree planting goal with leadership support from DNR, MDA, the Trust and MDOT. This report provides an overview of the implementing strategies and enabling infrastructure being advanced by these organizations. Significant progress in year 1 has provided a roadmap for securing resources and partnerships in the years ahead.

Maryland has pledged this 5 million tree goal toward the U.S. chapter of the global 1t.org commitment to conserve, restore and grow one trillion trees by 2030.[2] This pledge recognizes the state's national leadership on climate change mitigation and ecological restoration, including through the Regional Greenhouse Gas Initiative, Chesapeake Bay Program (CBP), and U.S. Climate Alliance. This report provides detail on the supporting actions required to fulfill this pledge, including sustainable forestry management, nursery development, improved data and technological tools, science and technical assistance, forest product markets and innovation, workforce development, environmental education, and conservation finance.

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[1] Tree Solutions Now Act, Maryland Code, Agriculture Article § 8-706; Environment Article § 2-1212, 9-1605.2; Natural Resource Article § 5-1601, 5-1607, 5-1610.1, 8-1901, 8-1911, 8-2A-02, 8-2A-04 (2021)
[2] MDE, "Pledge by the State of Maryland - Growing Five Million Trees by 2030," U.S. Chapter of 1t.org, World Economic Forum, us.1t.org/pledge/state-of-maryland-growing-five-million-trees-by-2030/

Connections to State Goals

Maryland is responding to the challenge of a changing climate by building an equitable, decarbonized future with strong diverse economies and resilient communities, characterized by accessible green and blue spaces. Trees and forests are a shared investment toward that future. The state's 5 million tree goal is integrally connected to a range of existing state goals and commitments.

Strengthening Climate Action

Maryland's commitment to tree planting directly supports the state's greenhouse gas (GHG) reduction targets. The 2030 Maryland Greenhouse Gas Reduction Act (GGRA) Plan[3] lays out a pathway for achieving a 50% reduction in GHG emissions by 2030 relative to a 2006 baseline. An important component of this effort is growing the state's natural carbon sinks, including improved forest management, afforestation and reforestation, and urban tree planting. In 2022, Maryland adopted the nation's most ambitious climate mitigation goals aiming to reduce GHG emissions 60% by 2031 from 2006 levels and achieve net-zero emissions by 2045.[4]

Investing in a Resilient Chesapeake Bay

Tree planting bolsters Maryland's long-term investment in the health and resilience of the Chesapeake Bay and its watersheds. As a party to the 2014 Chesapeake Bay Watershed Agreement[5] Maryland has long supported the implementation of the CBP's two tree-related goals for the region, including planting 900 miles per year of riparian forest buffers and expanding urban tree canopy by 2,400 acres by 2025. In support of these restoration goals, Maryland's Phase III Watershed Implementation Plan[6] (WIP) highlights the state's investments in growing and managing trees throughout the state.

Supporting Environmental Justice and Equity

Maryland is committed to supporting environmental justice (EJ) and equity through the design, implementation, and long-term management of tree planting projects. State agencies are committed to implementing state laws and programs wherever possible in a manner that reduces existing inequities and avoids the creation of additional inequities in communities with EJ concerns.[7] Ongoing review of state laws and policy is further institutionalized within Maryland's Commission on Environmental Justice and Sustainable Communities and through the climate justice focus of the Maryland Commission on Climate Change.

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[3] MDE, "The 2030 Greenhouse Gas Emissions Reduction Act Plan," mde.maryland.gov/GGRA
[4] Climate Solutions Now Act, Maryland Code, Environment Article § 2-1204.1, 2-1204.2 (2021)
[5] CBP Executive Council, "Chesapeake Watershed Agreement" (2014, amended January 24, 2020), chesapeakebay.net/what/what_guides_us/watershed_agreement
[6] MDE, "Maryland's Phase III Watershed Implementation Plan (WIP)" (2019, amended in 2022) mde.maryland.gov/programs/water/TMDL/TMDLImplementation/Pages/Phase3WIP.aspx
[7] MDE, "Environmental Justice Implementation at the MDE" mde.maryland.gov/programs/crossmedia/environmentaljustice/Pages/index.aspx

Supporting Forest Conservation and Management

The state's afforestation[8] and urban tree planting efforts complement long-standing goals to promote forest conservation and healthy forest management. The purpose of the Forest Conservation Act (Maryland Code, Natural Resources Article §§ 5-1601 through §5-1613) is to minimize the loss of Maryland's forest resource during land development by making the identification and protection of forests and other sensitive areas an integral part of the site planning process. The Maryland Reforestation Law (Maryland Code, Natural Resources Article § 5-103) also seeks to protect Maryland's forests from removal without adequate replacement, focusing on acre-for-acre replacements during road construction.

Commitment to Science-Based Action

The state is committed to supporting and tracking its tree planting and maintenance goals using best-available science. This commitment includes providing technical assistance that helps landowners and communities obtain the information they need to establish healthy trees and forests and investing in tools that allow us to track tree planting over time and facilitate adaptive management toward shared goals.

All implementing partners are committed to executing a "right tree, right place, right way, right time" approach to tree planting that ensures trees remain healthy for a lifetime and continue to serve generations of Marylanders. Some basic considerations of this approach include:

- Right tree: Selecting the appropriate native tree species relative to the climatic and edaphic[9] conditions of the site, including consideration of tree function and tolerances.

- Right place: Identifying a place where there is sufficient space for the tree to grow without negatively impacting surrounding infrastructure.

- Right way: Planting trees using appropriate practices and quality nursery stock; focusing on after-care maintenance to support successful establishment.

- Right time: Planting trees during the appropriate time of year and often in stages to ensure diverse age cohorts and sustained canopy cover.

Trees provide an incredible number of environmental, social, and economic benefits. Spatial tracking of tree and forest plantings is important for quantifying, verifying, and monitoring these co-benefits over time. By investing in science-based tools that harness remote sensing technologies, ecosystem modeling, and field-based data, the state will be able to gather the information it needs to maximize the value of tree planting for carbon sequestration, reduced heat island effects, and improved water and air quality.

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[8] The establishment of tree cover on an area from which it has always or very long been absent, or the planting of open areas which are not presently in forest cover.
[9] Related to or caused by particular soil conditions, such as soil texture or drainage.

Beginning with the end in mind, this plan also considers the life cycle of Maryland trees and forests, and underscores the value of long-term maintenance and management. This long-term view on developing tree planting efforts that simultaneously strengthen long-term forest management is critical for building equitable and resilient Maryland communities. This includes explicit consideration of the role forests play in the global carbon cycle and climate change and exploring the role of circular economy[10] in a resilient forestry sector.

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[10] United Nations and The Food and Agriculture Organization of the United Nations, "Circularity concepts in forest-based industries" (ECE/TIM/SP/49, 2021), unece.org/forests/publications/circularity-concepts-forest-based-industries

Implementation Plan by Partners

Multi-Agency Approach

Achieving the state's tree planting goals requires a range of private and public partnerships. As an initial investment toward its success, the TSNA charges several state agencies and organizations with implementing key programmatic elements from a collective $15 million per year budget allocation. These agency-led implementation plans represent the state's efforts in this first year to build supporting infrastructure around new and existing tree and forest programs, identify remaining logistical or policy barriers, and seek future opportunities and partnerships that grow impact.

Maryland Department of Natural Resources

Summary: DNR currently manages a wide range of tree planting and forest management programs. The TSNA has provided additional capacity to support this work through 13 new contractual positions and additional funding to scale State Tree Nursery stock. In this first year, DNR has increased their tree planting efforts and engaged diverse communities in the work. The agency continues to make available native tree lists, guidance on tree planting and maintenance best practices, and maps of plantable areas in Maryland. Looking to the future, DNR will maximize and expand partnerships to pursue additional resources, including from state and federal partners.

Introduction

The DNR Maryland Forest Service (MFS) is coordinating with its partners to meet the objectives identified in the TSNA, including tree plantings, tree maintenance, and the provision of technical services. In addition, DNR's Chesapeake and Coastal Service (CCS) is playing a primary supporting role in directing funding for approved tree plantings and ensuring the many benefits of trees are maximized. In order to achieve the objectives of the 5 million trees initiative, DNR has been utilizing a combination of existing staff and programs.

Contributions of Existing Programs and Current Capacity

Existing Programs

DNR has a suite of programs for rural and urban tree planting, ranging from a discount coupon for a single tree to incentives for multi-acre plantings on large properties. Additionally, the agency manages several conservation and management programs to support the long-term

health and environmental benefits of existing forest areas. DNR has been utilizing these existing programs to support the state's 5 million tree goal.

- Tree-Mendous Maryland. Program makes native trees and shrubs available at a reduced cost for residents to plant each spring and fall at schools, parks, public community spaces, and other public lands statewide.[11]

- Marylanders Plant Trees. Coupon program that gives $25 off the purchase of a native tree with a minimum retail value of $50 at 35 participating nurseries.[12]

- Gift of Trees. Any citizen wanting to plant a tree in honor or memory of family or friends can donate $40 to this program and a tree will be planted in the recipient's county.[13]

- Maryland Urban and Community Forestry Committee (MUCFC) Grants. The MUCFC program helps community groups fund tree planting and education projects statewide to enhance Maryland's urban forests. This program includes MDOT's Urban Tree Grant Program.[14]

- Backyard Buffers. A bare-root seedling giveaway program for any Maryland residents who have a drainage ditch, stream, creek, or river flowing through their property or live adjacent to a waterway.[15]

- Woodland Incentive Program. Cost-share program for private, non-industrial woodland owners who own 5 to 1,000 acres and agree to manage their forest for 15 years.[16]

- Forest Conservation Management Program. Any resident who owns over 5 contiguous forested acres can get a forest management plan drawn up by a forester while getting a break on property taxes for at least 15 years.[17]

- Environmental Quality Incentive Program. A U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) program through which MFS provides technical assistance to farm and forestry producers, advising improvements to agricultural and woodland practices that support landscape restoration and improved environmental benefits like wildlife habitat.[18]

- Conservation Reserve Enhancement Program (CREP). Program led by USDA Farm Service Agency (FSA), with technical assistance provided by the NRCS, Soil Conservation Districts (SCDs) and MFS. The TSNA authorizes an additional $1,000 per acre bonus for riparian forest buffers installed through CREP. DNR coordinates with

[11] DNR, "Tree-Mendous Maryland," dnr.maryland.gov/forests/Pages/treemendous/default.aspx
[12] DNR, "Marylanders Plant Trees," dnr.maryland.gov/forests/Pages/MarylandersPlantTrees/Introduction.aspx
[13] DNR, "Gift of Trees," shopdnr.com/tree-mendousmarylandgiftoftrees.aspx
[14] DNR, "MUCFC Grants," dnr.maryland.gov/forests/Pages/programs/urban/mcfc.aspx
[15] DNR, "Backyard Buffer Program," dnr.maryland.gov/forests/Pages/programs/Backyard-Buffer-Program.aspx
[16] DNR, "Cost Share Programs," dnr.maryland.gov/forests/Pages/programapps/costshareprograms.aspx#wip
[17] DNR, "Forest Conservation & Management Program,"
dnr.maryland.gov/forests/Pages/programapps/fcmp.aspx
[18] USDA, "EQIP," nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/

MDA, the agency that administers CREP and other farmland tree planting programs in Maryland, to fully utilize incentive funding.[19]

- MDA Conservation Buffer Initiative. Provides farmers with attractive incentive payments to plant streamside buffers on farms to improve the health of local streams and the Chesapeake Bay, including up to $4,500 per acre to install riparian forest buffers with pasture fencing (less without fencing). DNR will coordinate with MDA to support ongoing installation.

- Healthy Forests Healthy Waters (HFHW). A partnership between MFS, Alliance for the Chesapeake Bay and the Maryland Forestry Foundation, with grant funding provided by the DNR Chesapeake and Atlantic Coastal Bays Trust Fund (Trust Fund). HFHW provides participating landowners with a free tree planting project of an acre or more on open land they want to convert into a forest, including supplies, labor, technical advice, and at least 3 years of maintenance.

- Maryland Farm Stewardship Program. A Chesapeake Bay Foundation initiative that provides free plant material, implementation and 3 years of maintenance for streamside forest buffers and upland tree plantings. MFS currently provides coordination and technical service support for the program. This network has recently expanded to a Bay-wide effort through the Mountains to Bay Grazers Alliance, which brings additional resources to Maryland.

Current Capacity

The TSNA authorized the hiring of 13 new contractual staff within MFS to carry out the objectives of the 5 Million Tree program for activities needed through 2031. DNR began actively recruiting as soon as the funding appropriation was made available in July 2022. The first new contractual employee began on August 31, 2022. Two additional employees have been hired since then.

The highly competitive employment market, combined with the fact that these positions are contractual, has made recruitment challenging. Maryland Personnel rules do not support 9-year terms for contractual employees since contractual positions are designed for temporary employment. DNR will examine opportunities for contractual conversions to permanent positions in the coming years. In the meantime, a full training program has been developed to prepare new employees for the work ahead.

Expanding Capacity and Future Resources

Partnerships

In order to maximize existing resources and expand future opportunities, DNR has been working with a number of other partners to identify and pursue funding opportunities. These include:

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[19] DNR, "CREP," dnr.maryland.gov/wildlife/Pages/habitat/milo.aspx

- MDOT-Motor Vehicle Administration (MVA) Tree Planting Donation Opportunity - This is a new partnership between MDOT-MVA and MFS that creates the opportunity for citizens to make a voluntary donation to plant trees in Maryland when they register a new vehicle or renew an existing vehicle registration. The agreement establishing the program between the two departments has been signed and MDOT-MVA is currently finalizing the software changes needed to add this donation opportunity to their renewal processes.

- Trust Fund - MFS and CCS are coordinating plans to submit a tree planting project grant for Fiscal Year (FY) 2024 funding, with available funding up to $2.5 Million.

- America the Beautiful Challenge Grant - MFS collaborated with CCS and MDE to submit a grant request of $5 million to support program priorities of the 5 million trees initiative.

- Expected Increases in Federal Funding - DNR is monitoring potential funding opportunities associated with the federal Bipartisan Infrastructure Law and Inflation Reduction Act (IRA). In particular, the IRA provides $1.5 billion in competitive grants for state or local governments to plant trees.

- USDA Climate-Smart Commodities - MFS coordinated MDA on a grant application submitted through the National Fish and Wildlife Federation. The grant, if funded, would provide $500,000 for agroforestry and related tree plantings. MFS will work with MDA as a collaborative partner in implementing the agroforestry projects.

- Additional Partner Grants - MFS will continue to work with a number of conservation partner organizations, including CBT, to support and promote opportunities to plant trees through ongoing grant opportunities.

Planning for the Future

In addition to the aforementioned activities, MFS has initiated four key actions to accomplish the state goal of planting 5 million additional trees by 2031.

1. Increasing Tree Stock Availability - MFS has taken aggressive steps to increase tree stock availability by increasing seedling production at the State Tree Nursery and working with private nurseries to increase larger stocks.

    a. Increase seedling production at the State Tree Nursery. Based on the ambitious statewide planting goals, one of the first actions taken by MFS was to increase bare root tree seedling production. Seedling production is a multi-year effort, so prompt action was required to meet the levels needed. Once the TSNA was signed, MFS purchased additional native tree seed in summer 2021 and planted the seed in fall 2021. These seedlings are currently being cultivated and grown so that they can reach the proper size for shipping in spring 2023. Higher levels of seedling production have also been incorporated into ongoing production schedules, with increased seed being purchased in 2022 for cultivation and

growth in 2023, and shipping in 2024. Increased seedling production will continue annually as the 5 million trees initiative continues. In addition, MFS is allocating resources to upgrade production capacity through the purchase of a new tractor and by updating the Nursery's seedling coolers, which are over 30 years old. Further, one of MFS' new contractual positions will be assigned to the State Tree Nursery to provide the necessary staffing to facilitate the additional level of seedling cultivation, harvesting, and shipping.

    b. Increase larger tree stock at private nurseries. While bare root seedlings will make up the majority of tree plantings in rural areas of the state, larger tree stock will also be needed for tree plantings in urban and suburban communities. MFS has been coordinating with University of Maryland Extension and the Mayland Nursery, Landscape, and Greenhouse Association (MNLGA) to encourage private nurseries and associated supply chain vendors to increase the number and species of native trees available. These efforts will continue into the future.

2. Increased tree planting accomplishments. As spring 2022 was the first tree planting season under the TSNA, MFS worked diligently with existing staff to increase tree planting accomplishments. A total of 15,094 urban/suburban trees and 141,162 tree seedlings were planted above the baseline afforestation goal specified in the 2019 Draft GGRA Plan (figure 1).[20] In addition, MFS worked cooperatively with MDA to increase CREP tree plantings from 53.8 acres in 2021 to 91.3 acres in 2022. Although tree planting accomplishments will need to be increased to meet the goals established by the TSNA, the 2022 season results were impressive, and will continue to be increased as staff are hired and financial resources to support tree planting are expanded.

3. Increased engagement of diverse communities in tree planting accomplishments. MFS successfully engaged all four of Maryland's Historically Black Colleges and Universities (HBCUs) in tree planting efforts in spring 2022. Although tree plantings in partnership with HBCUs have been conducted in the past, 2022 was the first year that all four HBCUs participated. These efforts will continue and expand in the years ahead. In addition, MFS has leveraged federal, state and private funding to hire two Tree Equity Tree Planting Specialists. These positions will greatly assist MFS in increasing outreach and tree planting accomplishments in underserved communities, which is a significant focus area of the TSNA.

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[20] For more information about the GGRA baseline for tree planting, please see the "Progress Tracking" section of this plan.
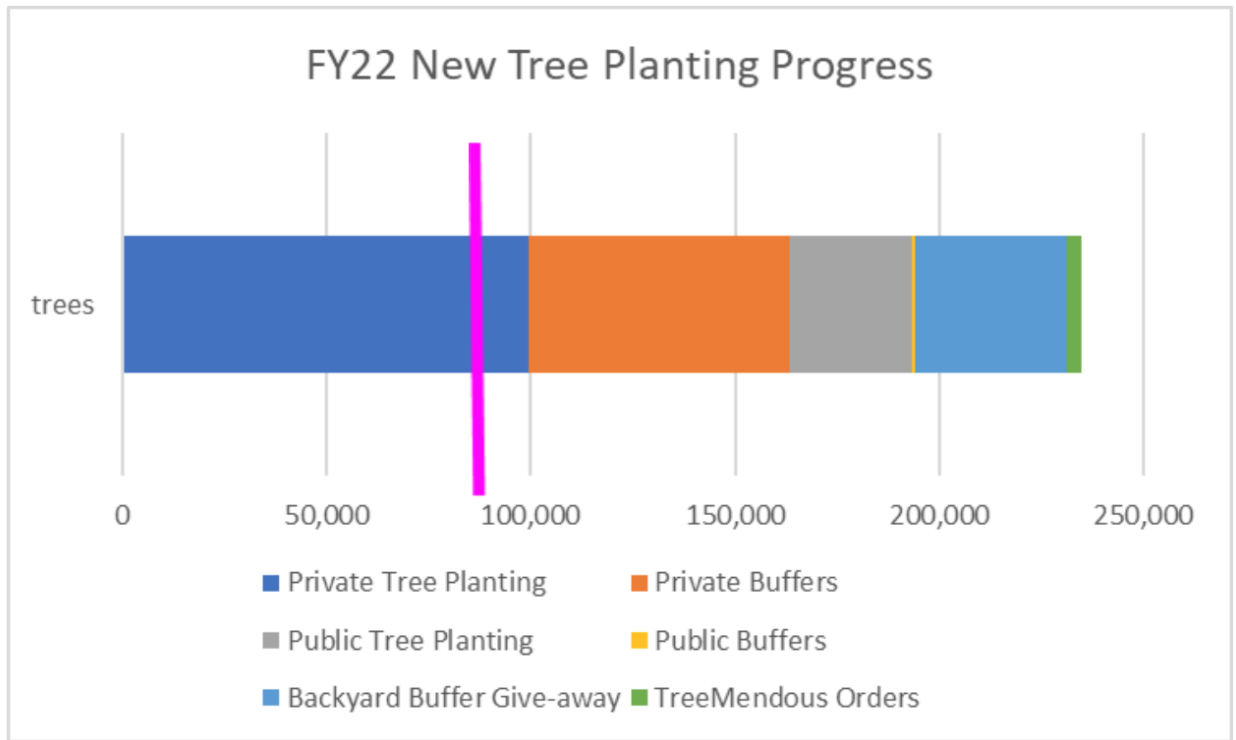
Figure 1: Number of trees planted through afforestation during FY 2022 in Maryland. The purple line indicates the baseline level of trees projected to be planted in the 2019 Draft GGRA Plan; only those trees planted above the baseline are counted toward the 5 million tree goal.

4. Improved tree planting opportunity mapping. As part of ongoing efforts to advance tree planting in the state prior to the TSNA, MFS had prepared a Tree Planting Opportunities map to identify potential plantable areas. This map was developed to account for prime agricultural lands and other conflicting land use classifications as well as avoid adverse impacts to sensitive species habitats. MFS has continued to refine this tool to focus our efforts on those areas of the state that offer the greatest opportunity to plant trees. MFS and Maryland Park Service (MPS) are also coordinating on tree planting opportunities on lands owned by the Department, with specific land management goals in mind. MPS already requires best management practices on agricultural leases on DNR-owned lands. In addition, DNR coordinated with the Maryland Department of Planning (MDP) on U.S. Census Bureau database layers to develop a map that identifies areas in the state eligible for tree plantings under the TSNA definition of underserved areas.

Native Tree List

For purposes of the 5 million tree goal, DNR is using the NRCS PLANTS database[21] as an authoritative list of native tree species. The database lists 388 tree species native to Maryland, and includes extensive documentation and information on species characteristics. Planting designs may include other plant types such as shrubs or herbaceous plants that are suited to

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[21] USDA, "PLANTS Database," plants.usda.gov/home

restoring a forest ecosystem. Species selection will reflect soil, light, moisture conditions on the site, and respond to landowner goals for the planting, such as having trees or shrubs that can bear fruit or nuts.

Abbreviated lists that better reflect common availability in Maryland nurseries are also available. These resources are being shared with private landowners:

- Marylanders Plant Trees Native Species list[22]
- The Alliance for the Chesapeake Bay Native Plant Center[23]
- Maryland State Archives Tree List[24]

Strategies for Dealing with Invasive Species

Early maintenance and ongoing management of new tree plantings are critical for addressing survival threats such as invasive species. Examples include weed control timed to avoid seeding from annual plants, late-season perennial plant control to maximize effectiveness, and annual inspection for early detection of invasive pests or diseases. Most funding programs, such as CREP, Conservation Buffer Initiative, Maryland Urban and Community Forestry Committee grants, and Healthy Forests/Healthy Waters, require maintenance to be included in the planting plan. Chesapeake Bay Trust grants for 5 Million Trees help pay for maintenance, as do many others for the first 2 to 3 years. The 13 new MFS contractual positions authorized under the TSNA will provide technical assistance to land managers and tree planting grant recipients, including invasive species management through ongoing maintenance. To assist land managers in dealing with invasive species, MFS has developed a management guide called the Good Green Land Manager's Guide to Managing Invasive Species.[25]

DNR maintains an Invasive Species Matrix Team (ISMT), and the issue of invasive plants in new plantings and existing forests has been submitted as a future agenda item. The ISMT is a point of coordination among all DNR units around invasive species issues. MFS and other units also participate in the Maryland Invasive Species Council[26], a statewide open point of coordination around invasive species issues.

General Tree Planting Guidance and Best Practices

The guiding principle is to match tree selection, stock type, site preparation and planting techniques to what the landowner or land manager is willing to care for over the long-term. The best approaches factor in site constraints such as overhead wires and major physical factors such as soils, wetness, and light levels. This is true for urban or rural sites, although they may use quite different planting stock sizes and planting techniques.

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[22] DNR, "Marylanders Plant Trees," Maryland Forest Service, dnr.maryland.gov/forests/pages/marylandersplanttrees/recommended-tree-list.aspx
[23] Alliance for the Chesapeake Bay, "Native Plant Center," nativeplantcenter.net/
[24] Maryland Manual On-line, "Maryland at a Glance," Maryland State Archives, April 2022, msa.maryland.gov/msa/mdmanual/01glance/html/trees.html
[25] DNR, "Good Green: Land Manager's Guide to Managing Invasive Plants," dnr.maryland.gov/forests/Documents/forest-health/Good-Green_LandManagers.pdf
[26] Maryland Invasive Species Council,mdinvasives.org/

Prior land use and existing invasive species are also elements that need to be factored into planting design, maintenance, and management. Where lands are becoming invaded with nonnative species, careful site preparation over one or two years, planting design for rapid shading, and consistent maintenance can help reclaim the site to greater ecological function.

Several detailed guidance documents are or will become available from DNR and its partners:

- MFS has produced a riparian forest buffer design and maintenance guide with an overview of a variety of planting techniques that is available on the CBP's website.[27] An updated version of this guide will soon be produced.
- MFS was recruited as a key partner for the Chesapeake Regional Tree Planting Techniques Task Force, which held its first meeting on July 27, 2022. This regional coordination and related outputs will inform ongoing tree planting techniques in the state.
- General guidance for urban tree planting is available through DNR's Marylanders Plant Trees website.[28] This guidance considers placement evaluation such as "right tree, right place, right way, right time."
- Guidance for backyard plantings in central Maryland can be found through DNR's "Building a Backyard Forest" guide.[29]
- DNR has developed a Riparian Buffer Care Calendar[30] to support early-stage development of recently planted riparian forest buffers (established less than 10 years ago). Riparian forest buffers are considered the 'last line of defense for our streams' by trapping and transforming nutrients and sediments before they enter our waterways as harmful runoff.

General Tree Maintenance Guidance and Best Practices

MFS seeks to follow best practices on tree maintenance and support climate adaptive plantings and management.

- Tree Shelters. DNR's Shelter and Seed Maintenance Guide[31] highlights the use of tree shelters (tubes) to help protect tree plantings from wildlife and other damage.

- Climate-adapted Plantings. How can tree plantings remain adaptive to climate change? Maryland's geographical location in the mid-Atlantic provides broad natural diversity, including many common tree species like oaks. Focusing on landowner objectives and site conditions can offer variability in choice of species, stocking rates, tree stock types, maintenance strategies, and tree protection. This variability is important for maintaining a

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[27] CBP, "Riparian Forest Buffer Design and Maintenance, chesapeakebay.net/what/publications/riparian_forest_buffer_design_and_maintenance
[28] DNR, "Marylanders Plant Trees", dnr.maryland.gov/forests/Pages/MarylandersPlantTrees/How-to-Choose-and-Care-for-your-Tree.aspx
[29] DNR, "Building a Backyard Forest", dnr.maryland.gov/forests/Documents/Building-a-Backyard-Forest.pdf
[30] DNR, "MD Riparian Buffer Care Calendar," Maryland Forest Service, dnr.maryland.gov/forests/Documents/MD-Riparian-Buffer-Care-Calendar.pdf
[31] DNR, "Shelter and Seedling Maintenance", dnr.maryland.gov/forests/Documents/Shelter-Maintenance.pdf

diverse and adaptive forest landscape. The adaptability of different species is evaluated through the USDA Forest Service Northern Research Station Climate Change Atlas.[32]

MFS has also participated in the Northern Institute for Applied Climate Science (NIACS)'s development of Ecosystem Vulnerability Assessments for Mid-Atlantic and Central Appalachian forest ecosystems.[33] Partners in the Washington D.C. area worked with NIACS to develop materials relevant to Maryland's central urbanized area.

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[32] USDA Forest Service, "Climate Change Atlas", fs.usda.gov/nrs/atlas/
[33] NIACS, "Climate Change Response Framework", forestadaptation.org/assess/ecosystem-vulnerability

Maryland Department of Agriculture

Summary: Under the TSNA, MDA has further incentivized riparian forest buffer installation through a one-time signing bonus of $1,000 per acre. This Conservation Reserve Enhancement Program incentive payment complements other existing MDA programs, such as the Conservation Buffer Initiative and Maryland Agricultural Water Quality Cost-Share Program. While signing bonuses, incentive payments, and cost-share has made tree planting more attractive, barriers to widespread adoption still remain. In addition to ongoing promotion of existing programs, MDA will explore incentives for in-field practices that integrate trees, more cost-share assistance for maintenance practices, and work with agricultural organizations to address farmer concerns.

Existing Programs and Resource Capacity for Tree Plantings

Maryland's Conservation Reserve Enhancement Program

Now in its 25th year, Maryland's CREP[34] is a federal-state partnership program that pays landowners to take environmentally sensitive cropland out of production for 10 to 15 years, and install conservation practices that protect water quality and provide wildlife habitat. Farmers receive attractive annual rental payments to take streamside property, certain highly erodible land, or wetlands out of production and maintain grass, shrubs, trees, or wetlands for the life of the contract. This voluntary program offers:

- A one-time signing bonus of $1,000 per acre (through 2031) to install riparian forest buffers; this bonus made available through TSNA funding.
- A one-time signing bonus of $100 per acre for other qualifying water quality improvement practices and all re-enrolled CREP practices.
- Attractive annual rental and incentive payments.
- Cost-share assistance of up to 100% to install streamside buffers, watering systems, livestock fencing, and more.
- Landowners have the option to sell a permanent easement on their land to the State of Maryland.

Program Strengths and Weaknesses

Early years of the program saw strong interest from farmers, but participation has declined despite ongoing outreach efforts. Decline is associated with several contributing factors, based on feedback received by the USDA FSA:

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[34] Maryland Department of Agriculture (MDA), "Conservation Has Its Rewards…CREP," Conservation Grants, mda.maryland.gov/resource_conservation/Pages/crep.aspx

- Contracts transitioning to permanent easements (~11K acres) rather than remaining under a renewable CREP contract.[35]
- Ground being returned to agricultural production (crop prices, enrollee's age, etc.).
- Difficult maintenance requirements of CREP contract.
- Program fluxes per federal administration.
- Staff capacity particularly at FSA – often redirected to other priorities such as the pandemic relief.
- Maintenance requirements for woody plantings. Many of the maintenance requirements are considered to be labor and time intensive by landowners, without additional funding:
  - Agreements require the grantee to maintain the project for the contract life, generally 10-15 years for a planting; however, funds to undertake the maintenance are not provided by the state.
  - Options in Maryland are prescribed burning, shallow/light/strip disking, overseeding/interseeding, strip spraying for plant diversity, spraying for wildlife, tree thinning and/or pruning, wildlife structures, early successional habitat development, and interplanting.
  - Prescribed on contract schedule per FSA and according to NRCS standards.

New Strategies to Increase Interest in Planting Riparian Buffers
- Starting in October 2021, MDA increased the signing bonus to $1,000 per acre for new riparian forest buffers (CREP CP-22) with new funding through the TSNA.
- Offered 100% cost-share to plant riparian forest buffers and install stream exclusion fencing.
- Offered a state signing bonus of $1,000 an acre for enrollees in USDA's Clean Lakes, Estuaries, And Rivers initiative (CLEAR30)[36] (i.e., farmers with expired CREP contracts opting for 30-year renewal).
- Enhanced education and promotion:
  - Farmer testimonial videos:
    - youtu.be/AHcYj9xCF4w
    - youtu.be/tgLWBIMzDwo
  - Enhanced social media, electronic newsletters, news releases, and blogs.
  - Agricultural agency and partner newsletters, publications, and presentations at farmer meetings.
  - Ongoing efforts to refine outreach and target priority areas for plantings.
  - Maryland CREP Advisory Committee to consider Agreement improvements with FSA.
  - Piloted state Conservation Buffer Initiative to complement CREP.

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[35] CREP easements are managed by DNR with more detail found here:
dnr.maryland.gov/land/Pages/crep.aspx#:~:text=A%20perpetual%20Conservation%20Reserve%20Enhancement,water%20quality%20and%20natural%20resources
[36] MDA, "Department Offering One-Time Bonus Payment for Approved CLEAR30 Enrollment," April 2022, news.maryland.gov/mda/press-release/2022/04/22/department-offering-one-time-bonus-payment-for-approved-clear30-enrollment/

Conservation Buffer Initiative

Now in its second year, the pilot Conservation Buffer Initiative (CBI) program complements CREP by offering attractive incentive payments to plant streamside buffers on farms to improve the health of local streams and the Chesapeake Bay.

Program Highlights

- Offers attractive incentive payments, a buffer option for field ditches, more flexible site management, and shorter contract terms.
- In FY22, MDA increased the payment rates for watercourse access control forest buffers next to pastures (35-100 ft wide, 10-year agreement term) to a maximum of $4,500 per acre (one-time).
- In FY22, MDA increased payment rates for watercourse forest buffers next to cropland (35-100 ft wide, 10-year agreement) to a maximum of $4,000 per acre (one-time).
- Expanded eligibility for highly erodible land and hydric soils.

Signup Results

- In FY22, 48 farmers applied for incentive payments to install 69 streamside buffer projects, and 7 of these projects are potentially riparian forest buffers.
- In FY21, 43 farmers applied for grants to jumpstart 62 streamside buffer projects on their farms to improve the health of local streams and the Chesapeake Bay. Three of these projects were riparian forest buffers.

Evaluation and Conclusions

- The 2022 CBI signup had more applications for tree buffers than the prior year, but requested acreage is similar in both years.
- Feedback from the SCDs suggest grass buffers remain most popular with farmers due to their increased flexibility.
- SCDs report that CREP is preferable for tree plantings because more funding is available (signing bonus + practice incentive payment + high annual rental payment).
- The federal administration's focus on "climate smart agriculture" may increase payments for tree practices within CREP. The CREP Advisory Committee, led by MDA, will monitor program updates through the next Farm Bill to determine if the state's MOU with the federal government should be updated.

Maryland Agricultural Water Quality Cost-share Program

The Maryland Agricultural Water Quality Cost-share Program (MACS) provides farmers with cost-share grants to install best management practices (BMPs) on their farms to control erosion, manage nutrients, and protect water quality. Today, more than 40 BMPs are eligible for cost-share. This program supports the following CREP practices: riparian forest buffers, stream fencing, livestock watering systems, and livestock crossings.

- In FY22, Maryland farmers installed 40 acres of riparian forest buffers on their farms.
- Since 1984, farmers have installed nearly 15,000 acres of riparian forest buffers on farmland (figure 2).
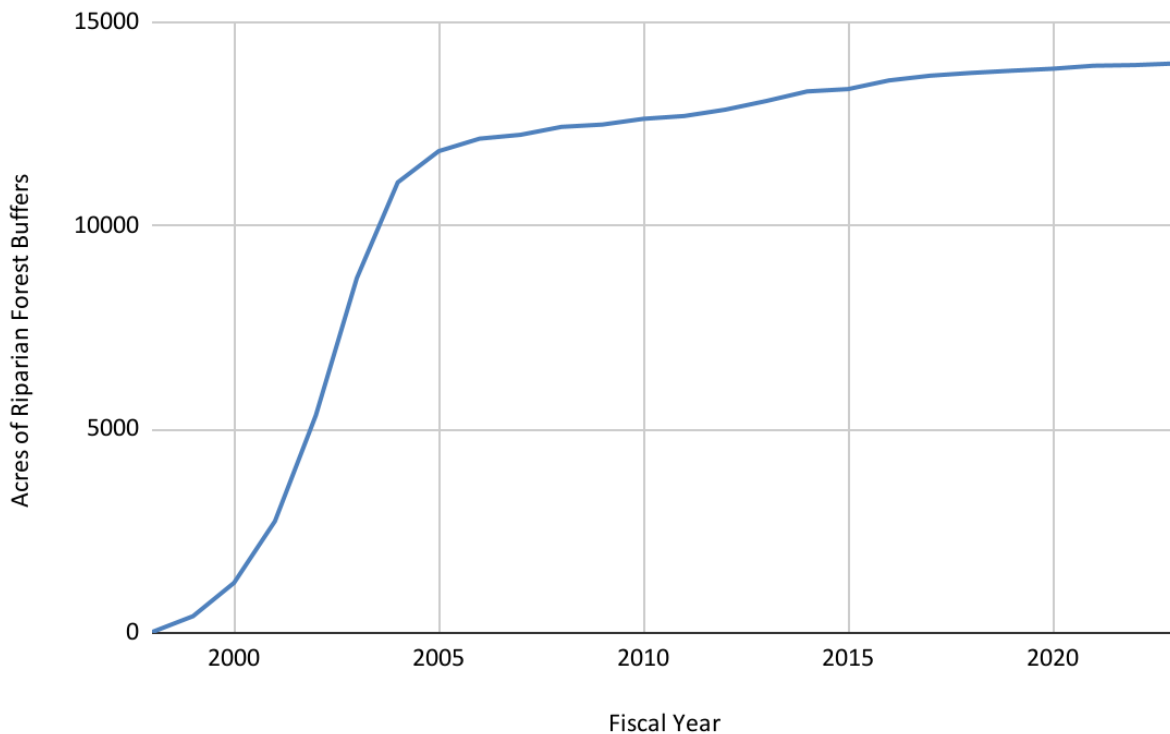
Figure 2: Cumulative acres of riparian forest buffers installed through the Maryland Agricultural Water Quality Cost-share Program (MACS) (FY98 - 23).[37]

Recent Program Enhancements
- In FY22, MDA received approval to cost-share up to 100% of eligible costs to install qualifying high-priority BMPs on farms.
- Riparian forest buffers now qualify for up to 100% cost-share.
- Stream exclusion fencing (a supporting practice) qualifies for up to 100% cost-share.
- In FY22, MDA raised the cost-share funding caps from $50,000 to $75,000 per project for 34 conservation practices financed through MACS, including practices associated with CREP.

Tree Planting Practices

The MACS Manual[38] details the specifics of these best management practices, and includes forms and instructions needed for a project to qualify for payment. Additional tree planting practices financed by MACS include:
- Windbreak (Practice 380)
- Silvopasture (Practice 381)
- Hedgerow Planting (Practice 422)

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[37] Early CREP program years saw significant interest in enrollments, consistent with MACS cost shared acreage. While enrollment of new acres has declined, most original CREP tree plantings remain.
[38] MDA, "Maryland Agricultural Water Quality Cost-Share Program (MACS) Manual," Conservation Grants, mda.maryland.gov/resource_conservation/pages/macs.aspx

- Tree and Shrub Establishment (Practice 612)
- Forest Stand Improvement (Practice 666, under consideration)

Expanding Capacity to Achieve the State's Tree Planting Goals

MDA's BMP Verification Program estimates that there are currently 15,090 acres of forest buffers on agricultural land in Maryland (each acre is capable of supporting 300-400 trees). To expand and create additional capacity to support the state's 5 million tree goal, MDA will:

- Continue to work with its conservation partners (USDA-NRCS, local SCDs, etc.) to promote tree plantings to farmers.
- Continue promoting the $1,000 per acre CREP signing bonus for riparian forest buffers.
- Promote to farmers a one-time bonus payment of $1,000 per acre to transition qualifying land into long-term conservation contracts through USDA's CLEAR30. The incentive is available to farmers with existing CRP/CREP contracts that expire September 30, 2022.
- Build on and promote new cost-share practices such as Tree and Shrub Establishment and Silvopasture with native tree species.
- Study additional edge of field practices related to trees.
- Work with agricultural organizations to address the challenges of planting more trees on agricultural land.
- Review cost-share assistance for maintenance practices.
- Work to address farmer concerns over taking productive land out of production.

Moving forward, more consideration to non-native, non-invasive fruit and nut trees could increase farmer participation in tree planting and maintenance without taking additional land out of production. Allowing non-native fruit and nut trees under the TSNA could provide an additional incentive to farmers who wish to diversify their farming operations from more traditional crops and simultaneously ensure appropriate long-term tree maintenance and care, as farmers focus on capturing quality and yield.

Recommendation: The Maryland General Assembly should allow non-native, non-invasive fruit and nut trees in Maryland to count toward the 5 million trees goal to support food security, agriculture, and biodiversity while continuing to advance carbon sequestration.

Chesapeake Bay Trust

Summary: The Trust has developed an Urban Trees Grant Program to help the State meet its 2031 goal of planting 500,000 trees in urban underserved areas. The program's first request for proposals was a product of community listening sessions, engagement with experts, and coordination with other implementing partners. In year one, the Trust funded 33 grant applications requesting a total of $7.7 million to support the planting and maintenance of 40,000 trees. Ongoing work includes identifying additional capacity-building tools to reduce barriers to application, building a long-term maintenance program, and securing sufficient nursery stock.

Introduction and Goals

The TSNA instituted a target of planting at least 500,000 of its 5 million trees in underserved urban neighborhoods and communities across the state. The Trust, a nonprofit grant-making organization, was identified as the administrator of the urban tree portion, building on its 36-year history of distributing urban greening resources to communities across Maryland and the Chesapeake Bay watershed.

The goal of the Trust's Urban Trees Initiative is to enhance quality of life, improve human health, and increase community livability by improving air quality, reducing urban heat islands, and mitigating some of the effects of climate change. Improving tree quantity and quality in urban areas is a cost-effective way to improve the health of local waterways, strengthen the health of the Chesapeake Bay, provide urban wildlife habitat, help mitigate flooding issues in certain cases, and stimulate local green jobs markets to enable families to work where they live and play. This initiative will empower communities to gain better access to resources that support local improvements.

Strategy Development and Implementation

In accordance with the statute's requirements, several actions were taken by the Trust to establish an initiative to ensure that 500,000 trees are planted in underserved areas over the next 8 years. Actions below reflect year 1 progress. Work in future years will adapt as the Trust learns from project efforts in the first year, learns more about potential barriers, applies best practices, and builds upon successful program outcomes to meet the ultimate goal of thriving trees in ground.

One of the key mechanisms for achieving outcomes under the Trust's Urban Trees Initiative is an Urban Trees Grant Program to provide resources to underserved, urban communities. The focus during this first year was to establish the grant program for two purposes: 1) to make

progress toward the 500,000 urban tree goal and 2) to begin to identify real and perceived barriers to planting trees within our target audience that could guide work in year 2 and beyond.

To develop the Request for Proposals (RFP) in a way that was inclusive of the needs of the communities the grant program was intended to serve, the Trust offered three virtual listening sessions with key stakeholders in fall 2021. Each session was open to the public, with outreach targeting individuals interested in and expert in community improvement, neighborhood development, urban planning, urban greening, urban (and non-urban) forestry, community engagement, and tree planting. During these listening sessions, staff from MDE, DNR, and the Trust, along with various state legislators, introduced program goals and opened up the floor for participants to a) make requests for elements to be included in an RFP and b) identify potential limiting factors/barriers. The barriers identified in the first listening session were further explored with groups in the second and third listening sessions. Approximately 50-100 individuals attended each session. Topics discussed included community support, interest, and buy-in; technical issues such as tree pit criteria and species selection; site availability; materials availability; maintenance requirements and opportunities; how best to support entities who may have never planted trees or applied for grants; and more. Insights from these listening sessions helped shape the criteria for the RFP used to solicit grant proposals.

To support the program and be ready for planting projects to begin in fall 2022, a Program Manager was hired by the Trust to manage the Urban Trees Grant Program on November 15, 2021.

Based on success of the first year, the Trust plans to implement the Urban Trees Grant Program according to the following cycle for each year of the 5 million trees initiative (FY23-FY31):

- Fall: Release the Urban Trees RFP and promote the opportunity to eligible applicants, including local governments such as municipalities and counties; nonprofit organizations; schools; community associations; service, youth, and civic groups; institutions of higher education; forest conservancy district boards; and neighborhood/community associations.

- Fall-Winter: Advertise the grant program.

- Winter: Hold grant workshops open to the public to provide information to help applicants learn more about the Urban Trees Grant Program, the grant application process, and tips and tricks for submitting a robust, competitive proposal.

- Winter: Meet with prospective applicants who contact the Trust.

- Winter: Identify potential applicants in underserved communities who may not have heard about the opportunity but qualify per eligibility requirements established in statute.

- Winter: Provide technical assistance or connect applicants with technical assistance on topics such as landowner and tenant engagement, site preparation, tree species,

materials and services procurement, maintenance plans, budget development, project management, applicant process, and more.

- Early spring: Accept proposals. In the first year, 34 applicants submitted proposals for a total requested amount of $14 million for the $10 million made available by the law.

- Spring: Implement a Technical Review Committee to recommend proposals for funding.

- Spring: Prepare award agreements.

- Summer: Begin Management of Awards.

Key Elements of the Urban Trees Grant Program

Below are the core elements to be used and modified each program year, with the current RFP and supporting detail available online.[39]

Eligible Project Locations

Tree planting projects proposed as part of this program must occur in urban, underserved areas, as defined in Sections 8–1911 of the Natural Resources Article of the Annotated Code of Maryland. Projects must occur within:
- An urban area, as delineated by the U.S. Census Bureau AND
- An area that meets ONE or more of the following criteria:
  - Historic Disenfranchisement: A neighborhood that was, at any point in time, redlined or graded as "hazardous" by the Home Owners' Loan Corporation; OR
  - Unemployment: A census tract with an average rate of unemployment for the most recent 24-month period for which data are available that exceeds the average rate of unemployment for the state; OR
  - Household Income: A census tract with a median household income for the most recent 24-month period for which data are available that is equal to or less than 75% of the median household income for the state of Maryland during that period; OR
  - Housing Project: A housing project as defined in Section 12-101 of the Housing and Community Development Article.

Eligible Project Property Types

Tree planting projects can occur on sites including, but not limited to:

1. Streets and Right of Way projects
2. Vacant Lots
3. Institutional Grounds
4. Other types of public or private property

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[39] Chesapeake Bay Trust, "Urban Trees Grant Program," cbtrust.org/grants/urban-trees/

Proposed plantings must not be required as mitigation for new or re-development, regulatory offset, or for any other regulatory reason.

Project Duration and Phases

In most cases, the implementation phase of projects (tree project phase) will be completed within 12 months upon receipt of the award, with 2 years of maintenance required beyond implementation, leading to 3-year award durations. We recommend (but do not require) fall planting, when possible, to maximize survivorship. Applicants may request funds for multiple planting seasons that extend over multiple years. The Trust requires implementation and maintenance phases to be part of all requests to be eligible for funding. Projects may include other components, such as workforce development activities, but the tangible result of projects selected for funding in the first year of the program must be measurable trees in the ground. An assessment will be made after the first year of the program to determine barriers and capacity to meet the 500,000 urban, underserved tree planting goal, and therefore to determine whether to consider projects that do not have a direct planting or implementation component.

Project Phases Required I: Planning and Outreach

For projects to be most successful (i.e., surviving and thriving trees), the people who live in, work in, own property around, and need access to the sites should welcome the trees and help ensure their long-term sustainability. Trees planted in areas in which they are not welcomed for various reasons by any population such as residents, businesses, or owners of infrastructure face higher risk of vandalism, lack of maintenance, and even removal. Proposals should explain what buy-ins have already been secured. If additional community or stakeholder support is required for your proposal to be successful, explain your action plan to obtain the needed support.

Project Phases Required II: Implementation

As the key metric of success for this grant program is trees in the ground, all project proposals must include a tree planting implementation phase. Trees must be native, as per statute. Lists of eligible tree species can be found here:

1. Maryland State Archives Tree List[40]
2. The Maryland Department of Natural Resources (MDNR) recommended Tree list[41]

Several factors to consider when choosing a native tree species include a) purpose of the project, b) site constraints, c) aesthetics, d) tree maintenance needs and care, e) nursery stock availability, and f) site preparation.

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[40] Maryland Manual On-line, "Maryland at a Glance," Maryland State Archives, April 2022, msa.maryland.gov/msa/mdmanual/01glance/html/trees.html
[41] DNR, "Marylanders Plant Trees," Maryland Forest Service, dnr.maryland.gov/forests/pages/marylandersplanttrees/recommended-tree-list.aspx

Site Constraints

Below are common constraints that could affect what trees would be most appropriate for your project:

- Power lines: If your site has overhead power lines, you are encouraged to plant trees that will remain below a certain height. Utility companies such as BGE[42], Pepco, Delmarva Power, etc. provide guidance to help choose tree species for sites with immediate overhead power lines.
- Salt Tolerance: Consider tree susceptibility to salt damage from deicing streets and sidewalks during the winter. Adverse soil changes from road and sidewalk salts are unfavorable to trees, so you may want to choose trees that are salt tolerant.
- Parking: Many street tree projects are in areas with street parking. You will want to choose trees that have minimal bark, seed, sap, twig, and fruit litter.
- Tree pits: Small tree pits do not work for trees that will grow to be large. If your tree pit is 32 square feet or smaller, you will only be able to use smaller species of trees.
- Deer densities/access: If you are planting near forest fragments or in parks, deer rubbing on young trunks and deer browse can quickly damage a planting.

Maintenance Needs and Care

Different species of trees often require different degrees or types of maintenance. Consider factors about each potential tree species you are considering that drive different maintenance needs. For example, while all trees drop leaves, not all tree species drop leaves in the same way. Some drop significant amounts in the fall and therefore need clean-up scheduled to avoid clogging nearby storm drains. Other species such as evergreens do not drop as many leaves in fall. Yet others drop leaves in the fall, but the characteristics of the leaves are such that less intensive leaf removal is necessary.

Obtaining your Trees

The Maryland Native Plant Society maintains a self-reported native plant vendor list.[43] Not all of these nurseries will have sufficient supply to support the Urban Trees Grant Program. Grantees can contact their local plant nursery to inquire about native trees and stock availability. In addition, the Tree-Mendous Maryland program[44] offers native trees for certain types of property.

Project Phases Required III: Maintenance

Because tree planting projects that are not maintained, especially urban tree planting projects, are at risk of not persisting into the future, all requests to this grant program must include a written maintenance plan that describes at least 2 years of maintenance by the project leads. If project leads are doing work on land owned by someone else, permission and support for the maintenance phase by the landowner must be demonstrated in the proposal.

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[42] Baltimore Gas and Electric Company, Plant the Right Tree in the Right Place, Planting Trees, bge.com/SafetyCommunity/Safety/Pages/PlantingTrees.aspx
[43] Maryland Native Plant Society, "Buying Native Plants," mdflora.org/nurseries.html
[44] DNR, "Tree-Mendous Maryland Programs," Maryland Forest Service, dnr.maryland.gov/forests/Pages/treemendous/default.aspx

Eligible Project Expenses

Requested funds may be used for supplies, site preparation, personnel costs, and other expenses and materials related to planning, implementing, and maintaining tree-planting projects in underserved areas. Elements of all three stages (planning, implementing, and maintaining) must be included in each project proposal. Specific eligible expenses include project readiness (outreach and engagement activities to identify sites and engage residents/landowners); site readiness (tree pit creation, stump removal, etc.); tree planting (costs of trees, labor to plant the trees, tree shelters, mulch, and other materials); and tree maintenance.

Eligible Applicants

Funding partners and the Trust welcome requests from nonprofit organizations, schools, community associations; service, youth, and civic groups; institutions of higher education; counties; municipalities; and forest conservancy district boards and neighborhood/community associations. As per statute, grant applications from qualified organizations located in the underserved areas where the proposed tree planting projects will be implemented will be prioritized.

First Year Awards

In the first year of the grant program, applicants requested $14 million for the $10 million made available by the TSNA. The Trust awarded $7.7 million to 33 applicants to plant 40,000 trees beginning in fall 2022.[45] To accomplish the ultimate goal of planting 500,000 trees in underserved urban areas within 8 years, the Trust asked that applicants limit their costs wherever possible (though request enough for a successful implementation project). Generally, street tree project requests should result in a budget averaging $500 or less per tree (especially if tree pits need to be created or expanded). The Trust has an overarching goal of achieving an average cost of $180 per tree across all funded projects in the program.

Future Work

To address emergent challenges, the Trust will undertake the following activities:

1) Secure tree stock. Continuing to work with the Maryland Landscapers and Growers Association to ensure that there is enough tree stock to support the additional tree planting work. Progress has already been made in identifying species growers that are already growing and willing to expand.
2) Build a long-term maintenance program. Grant awards will require grantees to maintain trees for 2 years. The Trust aims to develop a program-level year 3-8 maintenance program, and will explore various green workforce development program options.

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[45] Chesapeake Bay Trust, "Funded Projects FY23," mde.maryland.gov/programs/air/ClimateChange/SiteAssets/Pages/Trees-Commission/TreesCommission _July8_Meeting.pdf

3) Identify additional capacity-building tools. The Trust will continue to identify barriers to application for Urban Tree Program funds. Tools to make it easier for applicants will be created, such as a tree selection tool that incorporates factors important to target communities.

4) Create a capacity building ladder. In year 2, the Trust will explore the value of a "Mini Grant Program," designed to remove barriers to entry for small communities. The goal of the program is to build the capacity of communities to manage larger projects.

Since the TSNA became law, under-resourced communities have expressed a desire to plant non-native fruit and nut trees to address food insecurity in their neighborhoods through the Urban Trees Grant Program. In its current form, the TSNA requires that native trees be planted in underserved urban areas; however, diversifying the types of trees could address this inequity by bridging gaps and access to fresh produce. Moreover, interest in planting fruit and nut trees would expand the Urban Trees Grant Program applicant pool for communities seeking to make a direct impact on human health to address hunger.

> **Recommendation:** The Maryland General Assembly should allow non-native, non-invasive fruit and nut trees in Maryland to count toward the 5 million trees goal to support food security, agriculture, and biodiversity while continuing to advance carbon sequestration.

Maryland Department of Transportation

Summary: Although not originally named as an implementing partner in the TSNA, conversations with MDOT throughout the planning process have highlighted the agency's ongoing tree planting experience and commitments. While 1:1 tree mitigation does not count towards the state's 5 million trees afforestation goal, MDOT is working with MDE to ensure that all additional tree planting activity is appropriately counted and tracked. These activities include trees planted through MDOT's Urban Tree Program and MS4 and TMDL permits.

MDOT Urban Tree Program

The MDOT Urban Tree Program[46] provides for the replacement of trees removed during construction of a transportation facility project (historical or present), with priority funding given to communities affected by EJ or the heat island. The Urban Tree Program opens applications twice a year, with deadlines on February 15 and July 15, for spring and fall plantings, respectively. The grant application can be found online at the Maryland Urban and Community Forestry Committee (MUCFC) website.[47] The funds cannot be used for required mitigation and therefore will result in plantings over and above MDOT's mitigation requirements. Eligible organizations include nonprofits, schools, community or neighborhood associations, community business associations, homeowner associations, business service, youth, and civic groups, institutions of higher education, counties, municipalities, and forest conservancy district boards. The program has a $5,000 limit per application, with additional funds available for the planting of a pocket forest.

At the time of writing, the Urban Tree Program is in the process of awarding grants to applicants from their second round of funding. The first cycle (spring 2022) resulted in funding made available to three communities. The University of Maryland received funds for a planting on the campus, the Town of Edmonston received funds to address their tree canopy goals, and Hampden Elementary/Middle School received funds for an Arbor Day planting. The second cycle (fall 2022) selected three additional communities to receive funds for tree planting, including Hanlon Park, Springfield Woods, and the Village at Foxfield.

With support from MDOT, DNR has established a Tree Equity Specialist position to assist communities that have been impacted by transportation projects, environmental justice, or heat island in applying for tree planting funding. The Urban Tree Grant program and support for the Tree Equity Specialist demonstrate MDOT's commitment to tree planting above and beyond the mitigation required on a project-by-project basis. An annual review of the program will provide

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[46] MDOT - Urban Tree Program - Establishment, Maryland Code, Transportation Article § 2-103.8 (2021)
[47] DNR, "Maryland Urban and Community Forest Committee (MUCFC)," Maryland Forest Service, dnr.maryland.gov/forests/Pages/programs/urban/mcfc.aspx

MDOT with valuable information to inform future funding cycles, community needs, and opportunities for future tree plantings.

MS4 and TMDL Plantings

The MDOT SHA holds a Municipal Separate Storm Sewer System (MS4) Permit[48] for its management of stormwater from MDOT SHA roads and facilities. The permit coverage includes the following counties: Washington, Frederick, Carroll, Montgomery, Howard, Anne Arundel, Prince George's, Charles, Baltimore, Harford, Cecil, and the City of Salisbury. The permit requires MDOT SHA to treat 20% of existing impervious surfaces and address stormwater waste load allocations under EPA Total Maximum Daily Loads (TMDL). One of the strategies in the MS4 implementation plan includes tree plantings. Since 2010, approximately 1,900 acres of trees have been planted to meet the TMDL implementation plan required by the permit (figure 3). These acres of trees are over and above any plantings done to meet mitigation requirements and are therefore included toward the state's 5 million tree goal.
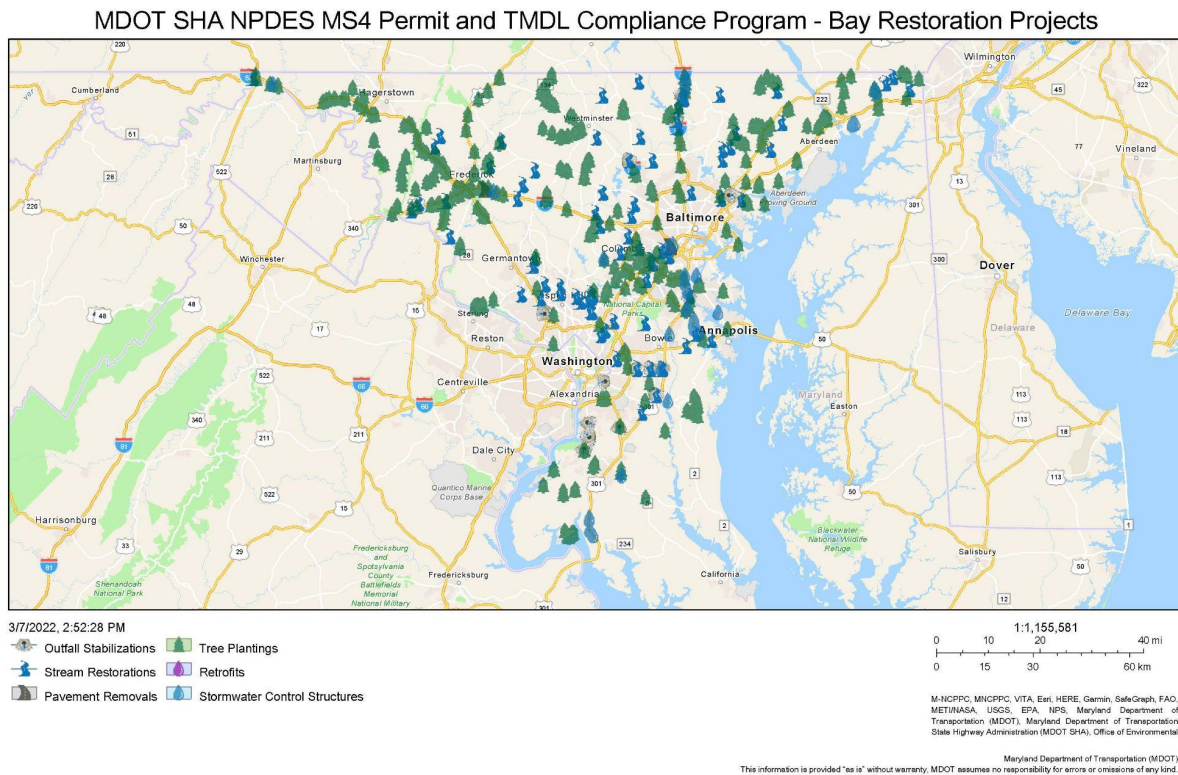

Figure 3: Statewide distribution of tree planting projects related to MDOT SHA's NPDES MS4 permit (2015 - 2020).

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[48] MDOT SHA, "Municipal Separate Storm Sewer System (MS4) Permit," Bay Restoration Strategies,.roads.maryland.gov/mdotsha/pages/index.aspx?PageId=336

Tree Loss Mitigation Policy and Practice

Summary: Three laws in Maryland currently govern the minimization and mitigation of tree clearing impacts from state highway and other transportation projects: Maryland Reforestation Law, Maryland Roadside Tree Law, and Maryland Forest Conservation Act. MDOT has established additional policies, operation guidance, and project recommendations to comply with these laws and implement best management practices. Where tree removal is unavoidable, MDOT has developed a prioritization approach that guides mitigation planning, as informed by regulatory requirements, best available science, and all safety rules. The agency's landscape design guidance and procurement process is reviewed regularly and provides an opportunity for ongoing partnership and alignment with other agency partners.

Legislative Charges

The TSNA charged the Commission with developing a report that includes "recommendations on reviewing state policies to reduce and fully mitigate the clearing of trees during the construction of state highways and other transportation projects" and "a plan for reviewing future transportation procurement to minimize and fully mitigate tree clearing." While 1:1 mitigation plantings will not be counted toward the 5 million tree goal, this section details mitigation policies, practices and recommendations responsive to TSNA.

As the primary responsible party for transportation projects, MDOT has a robust system in place to ensure that all projects reduce and fully mitigate tree clearing. This is achieved through a combination of policy required actions; landscape and tree planting best practices, including determinations for where, what, and when to plant; programs and partnerships to support tree planting above and beyond mitigation requirements; and project planning and design decisions focused on tree protection during active construction and the project life cycle.

Current Tree Mitigation Policies and Practice

MDOT is responsible for a large portfolio of state highway and other transportation projects that occur within the State of Maryland. These projects are governed by various state policies and guideline requirements for minimization and mitigation of tree clearing impacts. The three primary policies that govern this work are: Maryland Reforestation Law,[49] Maryland Roadside Tree Law,[50] and Maryland Forest Conservation Act.[51] Additional policies, operational guidance, and recommendations for state highway projects exist to support the minimization and mitigation of tree clearing. MDOT has established operational approaches that institutionalize efforts to comply with state policies, implement best practices, and ensure, to the maximum

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[49] Maryland Reforestation Law, Maryland Code, Natural Resources Article § 5-103 (1989)
[50] Maryland Roadside Tree Law, Maryland Code, Natural Resources Article §§ 5-401 and §5-406 (1914)
[51] Forest Conservation Act, Maryland Code, Natural Resources Article §§ 5-1601 through §5-1613 (1991)

extent practicable, that all tree clearing impacts are minimized, and then mitigated when necessary. MDOT achieves this through continued partnerships with sister agencies like DNR and MDE, internal partners across our Transportation Business Units (TBUs), and by routinely reviewing and updating our internal processes and guidance. Even when trees will not be removed during construction, there may be trees or important root systems within the Limit of Disturbance for a project that warrant appropriate planning.

For projects where tree removal is unavoidable, MDOT has developed a prioritization approach that guides mitigation planning. This prioritization approach was developed with guidance from DNR and informed by regulatory requirements, best available science, and all safety rules for plantings. This prioritization approach, combined with project specific considerations, is used to develop the individual mitigation plan when tree loss is not preventable for a transportation project:

1. Planting on site or in MDOT's right of way
2. Planting on state owned or other publicly owned land in the county or watershed of the project
3. Payment to a fee-in-lieu program

A mitigation requirement for a project can, and often does, use a combination of the three mitigation options. This may look like planting as much mitigation as possible on site, some within the watershed, and finally if needed, by paying into a fee-in-lieu program. The state policies that apply to various transportation projects are provided below, with detail on how MDOT interprets, complies, and tracks our efforts.

MDOT's comprehensive and robust approach to mitigation ensures that all tree planting is avoided or mitigated. While 1:1 mitigation plantings are excluded from the state's 5 million tree goal, MDOT's integrated approach ensures that plantings above and beyond the mitigation requirements can be tracked and included in the 5 million tree initiative accounting.

Maryland Reforestation Law

The Maryland Reforestation Law applies to MDOT for linear highway construction activity or if the total area of forest cut or cleared is one acre or more. MDOT must make every attempt possible to minimize the removal of trees. All projects include a thorough site review which includes field work surveys to determine the footprint, health, and composition of the forest and the presence of any state or county specimen trees. During the design stage, efforts are made to minimize impacts to priority areas, develop tree protection measures, and review impacts for pruning or removal. MDOT must consult with DNR to assure compliance with the Reforestation Law and mitigation requirements prior to cutting in or clearing a forest and before finalizing the proposed mitigation site. Mitigation must occur within 1 year of construction completion at a rate of 1:1. MDOT tracks their compliance with this law through a spreadsheet that contains all relevant project information, including but not limited to watershed, project description, approval date, forest impact (in acres), and information on the mitigation approach and amount. At the end of the year, MDOT provides the data collected to DNR for inclusion in the annual reporting.

Maryland Roadside Tree Law

Under the Maryland Roadside Tree Law, MDOT is required to obtain a Tree Care Permit from DNR before roadside trees are planted, removed, or trimmed. The majority of MDOT SHA projects are governed by this law. Tree Care Permits for tree removal require the replanting of tree(s) as a condition of the permit, unless otherwise noted. MDOT tracks compliance and mitigation by project.

Maryland Forest Conservation Act

MDOT activity that requires a grading or sediment control permit on areas 40,000 square feet or more must comply with Maryland FCA regulations, even if there is no tree removal. All mitigation plantings done under the FCA must be placed in permanent forest conservation easements. The rate of mitigation required for activities is determined by the FCA Worksheet and is based on net tract area, existing forest, on-site forest retention and surrounding land use. MDOT SHA has established "Off-site Forest Retention Areas" (Retention Areas), approved by DNR, that are commonly used for mitigation activities required under the FCA. Many of these areas are owned by MDOT, but DNR holds the permanent conservation easement on the property to ensure that the forested condition remains in perpetuity. MDOT utilizes Retention Areas due to the permanent easement requirement. Maryland currently has 182 acres, across 5 sites in Retention Areas with another 13 sites (approximately 490 acres) in process. Retention Areas are utilized to offset mitigation requirements for FCA projects at a ratio of 2:1. For example, if the mitigation requirement for a project is 3 acres, MDOT SHA draws down on 6 acres of credit from an established Retention Area within the project's watershed upon DNR approval. MDOT tracks compliance and mitigation by project. MDOT works closely with DNR throughout project implementation to ensure sound decision making and compliance with forestry policies.

Project Guidance and Procurement Review

As established, MDOT follows all required state policies and guidance for state highway and other transportation projects as it relates to tree planting, removal, and mitigation requirements. Compliance with these policies and guidance is successful due to the establishment of internal operational approaches and robust partnerships across both TBUs and sister agencies. Specific guidance documents, like the MDOT SHA Landscape Guide, and MDOT's operational approaches undergo periodic review to update best practices and integrate innovative solutions into operational approaches. Additionally, specific modifications to an approach can be requested for special circumstances on a project-by-project basis in order to get the best outcome for the state for every project.

Decision support for procurement and construction activities is essential. The MDOT SHA Landscape Design Guide[52] is one example of a decision support document that proves valuable during project design and planning. It provides project planners with policy and design principles

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[52] Maryland State Highway Administration, "Landscape Design Guide," December 2016, roads.maryland.gov/OED/SHALandscapeDesignGuide.pdf

that include standards for mitigation design, offset distances and other related topics. This comprehensive guide provides critical information to support sound landscaping decisions that provide "durable roadside landscaping that thrives in difficult situations with little need for maintenance or replacement." Section 4.0 on Compliance and Mitigation provides information on relevant policies that impact projects, as well as permit and mitigation requirements for forests and other related decisions including roadside design guide, environmental guidelines for construction activities, vegetation control for safety, and other topics. SHA policy currently recommends a higher planting density than is required by the Maryland Reforestation Law. With this more stringent policy, SHA continues to show leadership of and commitment to 100% mitigation and responsible forest policy in the state. This guide is routinely updated, to ensure the best available science, industry standards, and decision support tools are provided to those who need to make tree planting decisions. The next review and update for the guide will take place in FY23.

Tree Impact Analysis

As transportation projects move through planning and design, MDOT strives to minimize impacts to existing trees. Early project planning, including site and forest delineations and mitigation planning, are required components before projects are approved and work can start. This ensures that before any tree impacts are realized, there is a comprehensive, approved plan to minimize and mitigate unavoidable tree loss as well as protect remaining trees. However, final tree impacts are typically not known until closer to project advertisement, and after regulatory agencies have had a chance to review the project. Regulatory review may result in adjustments to the limits of disturbance which can change any proposed impact analysis.

Our close working relationship with the MDE is essential to understanding the impact of any tree loss on carbon sequestration. MDE completes a triennial carbon accounting of Maryland's trees and forests to evaluate progress under the GGRA. The data that MDOT annually submit to DNR will be used to support modeling and calculations for this GHG inventory. While MDOT understands that transportation projects can influence carbon emissions as well as sequestration, we do not calculate carbon impacts on a project-by-project basis as it relates to tree loss and planting.

Selection of Tree Planting Locations

Decisions on where to plant trees for both mitigation requirements and other MDOT initiatives are driven by policy and statutory requirements and the project or site-specific factors. Optimal planting locations are determined by considering site location, land use, environmental conditions, safety set back requirements, availability of species, policy or funding requirements, and future intended use of the area. Some laws, like the FCA, require mitigation to be placed in permanent easements. In those instances, mitigation options are dictated largely by the statutory requirements. In other instances, planting decisions are driven primarily by the site conditions. These decisions are based on the site size, amount of mitigation required, and the

recommended planting density and species which can be informed by the MDOT SHA Landscape Guide.

MDOT SHA has identified limited availability of planting opportunities in the right of way and is making plans to increase the amount of acreage in Retention Areas to compensate for this reduced capacity. Plantings near roadways must follow certain set back and safety standards, which can further limit the land available. Decisions are made on a project-by-project basis after weighing all the environmental and policy factors and determining the best planting locations based on site and species characteristics.

One avenue for identifying additional tree planting sites is through expanded criteria used in review of proposals related to State-owned real property use, easements, declarations of surplus needs, and excess property disposition by the State Clearinghouse for Intergovernmental Assistance, a unit housed within the MDP.[53] Maryland Code (34.02.02.02) which governs this review process indicates that "this program will reduce the necessity for the expenditure of state funds for the acquisition of real property when state agency needs can be met by utilizing real property currently owned by the state, and insure that maximum benefits to the state are realized by the utilization or disposal of this property for the most appropriate use which is compatible with the plans and programs of state and local agencies." Expanding proposal review to include tree planting viability would align this process with the state priority of planting 5 million trees.

This modified review criteria would identify properties suitable for tree planting. A change to the proposal review process could enable the state to optimize already held properties to expand tree canopy cover, either through tree plantings on unimproved land or through placement of conditions on properties transferred among government agencies. It may also support the development of tree planting or retention conditions on surplus properties disposed of by the Maryland Department of General Services. Additional opportunities for mitigation exist if the tree plantings are placed in perpetual easements.

Any site identified and used for tree planting by MDOT SHA is subject to requirements for agency maintenance under guidelines set by the MFS, and carried out by the responsible party or agency. If the planting is done to meet a mitigation requirement for a transportation project, MDOT would be the responsible party for maintenance. The specific agency that owns the land, or the party utilizing the space for their planting needs would be primarily responsible for tree maintenance.

Recommendation: The General Assembly should expand the scope of site review criteria for state-owned real property within the State Clearinghouse for Intergovernmental Assistance to aid in the identification of properties with tree planting potential, including for state agency use under the Forest Conservation Act.

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[53] MDP, "State Clearinghouse," planning.maryland.gov/Pages/OurWork/GrantResources.aspx

Ongoing Collaboration

MDOT has established a successful operational approach to minimizing and mitigating all tree loss associated with its transportation facility projects. This is achieved through a combination of policy-required actions; landscape and tree planting best practices including determinations for where, what, and when to plant; programs and partnerships to support tree planting above and beyond mitigation requirements; and project planning and design decisions focused on tree protection during active construction and the project life cycle.

Periodic reviews of MDOT's tree planting operations will ensure best management practices continue to be prioritized. Through these reviews, whether related to a permit implementation, plan update, grant cycle renewal, policy changes, or the annual review with data submission, MDOT is committed to continuing its partnership with DNR and other state agencies to ensure that tree loss is minimized and fully mitigated.

Additional partnerships and collaboration with agencies like MDP allow for explicit consideration of new tree planting locations and streamlined incorporation of tree planting commitments into various planning documents, like state and local Comprehensive Plans.[54] With support from participating agencies, Maryland's new Green and Blue Infrastructure Policy Advisory Commission could review existing county and local development plans to evaluate current prioritization of tree canopy expansion and additional opportunities to align state designated priority funding areas[55] with green infrastructure goals. These and other reviews of state policy could result in a more robust partnership between state agencies and local governments to expand tree planting across the state.

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[54] MDP, "Comprehensive Plans," planning.maryland.gov/Pages/OurWork/compplans/welcome.aspx
[55] Maryland Code, State Finance and Procurement Article §5-7B-03(h)(5)(i) (2021)

Progress Tracking

Summary: MDE is leading the development of a web-based data tracking platform to promote, facilitate, and align the state's efforts to achieve the established goals by consolidating data on tree plantings from multiple sources. These data will serve as the official basis for reporting against the 5 million goal. MDE's intention is to count every tree, ensure no double counting, provide clarity in reporting, facilitate transparent spatial tracking, and build broad ownership and trusted accounting of the work. The state's existing commitment to using best-available science to meet water quality and climate change goals provides supporting infrastructure to translate the known benefits of 5 million trees into quantifiable and verifiable outcomes.

Data Platform for Tracking 5 Million Trees

The TSNA charges MDE with coordinating the implementation of the state's 5 million tree goal. In addition to supporting the work of the Commission and interagency implementation team, MDE's program coordination shall promote, facilitate, and align the state's efforts to achieve the established goals by consolidating data on tree plantings from multiple sources. MDE's intention is to count every tree, ensure no double counting, provide clarity in reporting, facilitate transparent spatial tracking, and build broad ownership and trusted accounting of the work.

To meet these data management priorities, MDE is developing a web-based data tracking platform that:
1. allows for state partners and the public to register tree planting projects with key information about site specific plantings,
2. maintains all spatial and non-spatial data in a central and accessible database, and
3. publishes the spatial locations of these projects on a public facing interactive online map.

All implementing partners will submit data through this platform, and MDE will provide ongoing data quality checks and assurance. To support public engagement, MDE will develop outreach and training materials, including videos, webinars, and tool demonstrations.

MDE's tree tracking tool will provide insight into native tree plantings accomplished through state partners, and through the efforts of nonprofit and private organizations. The tool will also serve interested landowners who can find more information about qualifying planting programs, and seek financial and technical assistance. This tracking platform is expected to be available in FY23, and will be critical as the basis for official reporting against the 5 million tree goal.

Alignment with Existing Tree Planning and Verification Tools

Transparent and consistent accounting is vital for evaluating tree planting progress and generating accurate co-benefits. The state's existing commitment to using best-available science to meet water quality and climate change goals provides supporting infrastructure to translate the known benefits of 5 million trees into quantifiable and verifiable outcomes. MDE currently receives data from its sister agencies to monitor progress toward shared nutrient and greenhouse gas (GHG) reduction goals, including tree planting metrics such as acres of riparian forest buffers, acres of afforestation and reforestation, and number of urban trees. These data are then translated into potential carbon sequestration and nutrient reduction outcomes using peer-reviewed models[56] and incorporated into the state's respective Greenhouse Gas Reduction Act (GGRA) and Watershed Implementation Plan (WIP) (figure 4).
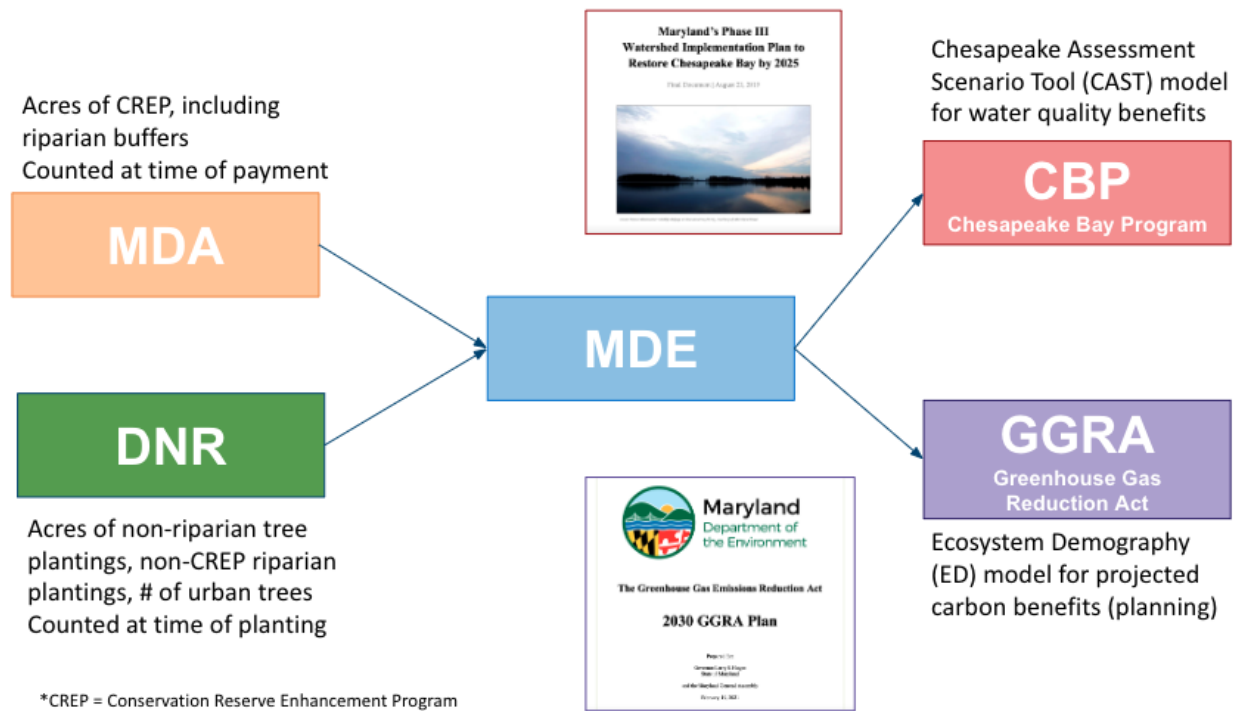

Figure 4: Current reporting streams for tree planting activities related to projected nutrient and greenhouse gas reduction outcomes.
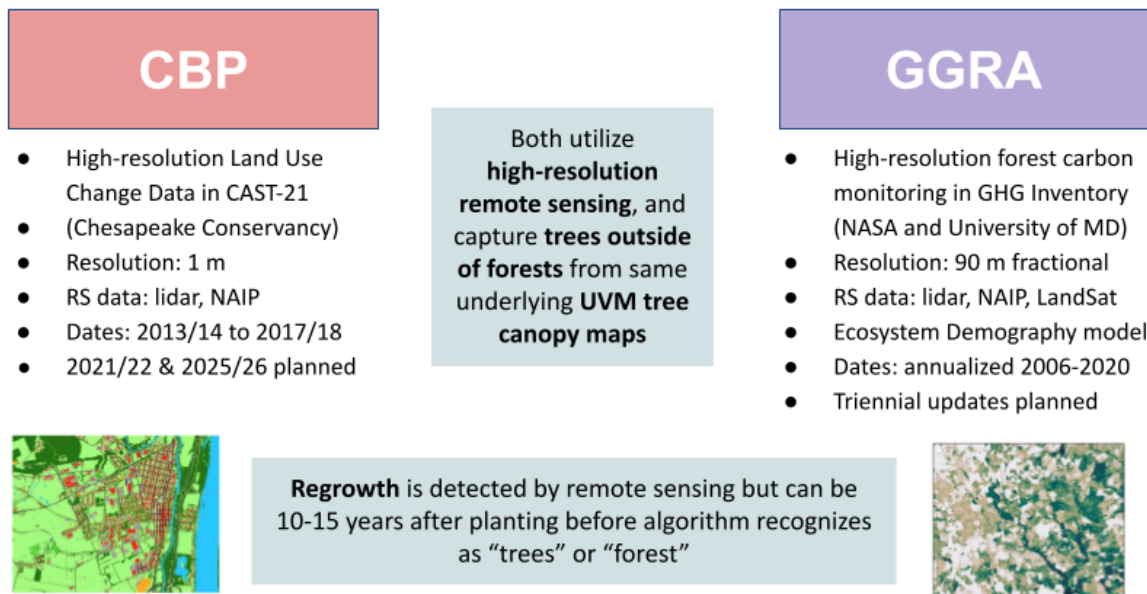
The focus of the state's 5 million tree goal is on afforestation, or the creation of new trees and forest areas where trees have long been absent. The 2019 Draft GGRA plan[57] has existing tree planting goals, including annual afforestation targets. The TSNA specifies that the 5 million tree

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[56] For nutrients: CBP, "Chesapeake Assessment Scenario Tool," cast.chesapeakebay.net; For forest carbon: Hurtt, G., et al. "Beyond MRV: High-Resolution Forest Carbon Modeling for Climate Mitigation Planning over Maryland, USA." *Environmental Research Letters* 14, no. 4 (April 2019): 045013. doi.org/10.1088/1748-9326/ab0bbe.

[57] MDE, "The 2019 Draft Greenhouse Gas Emissions Reduction Act Plan," mde.maryland.gov/programs/Air/ClimateChange/Documents/2019GGRAPlan/2019%20GGRA%20Draft%20Plan%20(10-15-2019)%20POSTED.pdf

goal should be in addition to any trees planned in the 2019 Draft GGRA Plan.[58] Qualifying plantings will also be above and beyond 1:1 mitigation. Ongoing tracking and reporting structures will ensure that all tree planting activity and related co-benefits are accounted for appropriately toward state goals.

CBP and MDE (figure 5) provide independent validation of tree-related outcomes. Specifically, the CBP, in partnership with Chesapeake Conservancy, utilizes high-resolution 1m tree canopy change data[59] to assess progress against the 2025 Chesapeake Bay watershed tree canopy and riparian forest buffer goals. These data are subsequently included within the Chesapeake Bay Assessment Tool to quantify progress on nutrient reductions. MDE, in partnership with the NASA Carbon Monitoring System and the University of Maryland, utilizes high-resolution remote sensing and USDA Forest Service Forest Inventory and Analysis plot data within a process-based ecosystem model to detect, quantify, and validate annual changes to Maryland's tree and forest carbon stocks.[60] This data is integrated into the state's GHG Inventory to assess progress against Maryland's GHG reduction goals.

CBP
- High-resolution Land Use Change Data in CAST-21
- (Chesapeake Conservancy)
- Resolution: 1 m
- RS data: lidar, NAIP
- Dates: 2013/14 to 2017/18
- 2021/22 & 2025/26 planned

Both utilize **high-resolution remote sensing**, and capture **trees outside of forests** from same underlying **UVM tree canopy maps**

GGRA
- High-resolution forest carbon monitoring in GHG Inventory (NASA and University of MD)
- Resolution: 90 m fractional
- RS data: lidar, NAIP, LandSat
- Ecosystem Demography model
- Dates: annualized 2006-2020
- Triennial updates planned

Regrowth is detected by remote sensing but can be 10-15 years after planting before algorithm recognizes as "trees" or "forest"

*CAST = Chesapeake Assessment Scenario Tool; NAIP = National Agriculture Imagery Program; UVM = University of Vermont

Figure 5: Current streams of independent verification of tree-related outcomes for the CBPand GGRA, including the use of several high and medium resolution remote sensing (RS) data from aircraft (lidar) and satellites (LandSat and NAIP).

MDE's 5 million trees tracking platform can help address the challenge that remote sensing instruments have in detecting newly planted trees. Coupling field data on recent plantings with

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[58] The 2019 Draft GGRA plan specifies an average annual target of 200 acres per year of afforestation activities, inclusive of riparian forest buffers but not including urban tree plantings.
[59] Chesapeake Conservancy, "Chesapeake Bay Watershed Land cover," Conservation Innovation Center, chesapeakeconservancy.org/conservation-innovation-center/high-resolution-data/
[60] MDE, "Greenhouse Gas Inventory," MDE Climate Change Program, mde.maryland.gov/programs/air/climatechange/pages/greenhousegasinventory.aspx

remote verification from optical remote sensing imagery will help confirm and more quickly capture the carbon impact of afforestation within the state's GHG Inventory. MDE is also exploring the inclusion of refreshed CBP's 1 m tree canopy data within its forest carbon monitoring approach to better represent fine-scale changes in tree area.

Securing Additional Social and Economic Outcomes

In addition to their many environmental benefits, trees provide a range of social and economic benefits that support livable and sustainable communities. For example, trees can improve physical and mental health, strengthen community ties, increase home prices and rental rates, reduce urban heat island effects, and lower energy use and bills.[61] Community supported models of tree maintenance and management can also enable workforce development and the broader forestry sector. MDE will continue working with its implementing partners to identify additional metrics that can support broader outcome tracking.[62]

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[61] Turner-Skoff, Jessica B., and Nicole Cavender. "The Benefits of Trees for Livable and Sustainable Communities." *Plants, People, Planet* 1, no. 4 (2019): 323–35. doi.org/10.1002/ppp3.39.
[62] DNR's Chesapeake and Coastal Service currently supports ecosystem service quantification and mapping in Maryland and will remain a key partner in this effort; DNR, "Ecosystem Services." Chesapeake and Coastal Service, dnr.maryland.gov/ccs/Pages/Ecosystem-Services.aspx

Enabling Carbon Markets and Financing

Summary: The current voluntary and regulatory markets for generating forest carbon credits in Maryland involve a wide range of partners, standards, protocols, and registries. Carbon credits from natural and working lands, including through tree planting activities, can be attractive in the carbon marketplace but there remain significant barriers to market entry. Establishing a state-supported quantification, verification, and registration system would specifically lend credibility to the market and drive high quality projects that center additionality. This effort seeks to leverage new financing tools available under the Conservation Finance Act (CFA), such as pay-for-success procurement and provide the necessary infrastructure to attract and grow private investment towards the state's tree planting goals. Ongoing alignment and accounting of carbon outcomes relative to the state's climate change mitigation goals is critical and requires careful tracking.

Current Landscape for Forest Carbon Credits in Maryland

Carbon markets function as trading systems through which carbon credits can be bought and sold among interested parties. One carbon credit is equivalent to one ton of carbon dioxide or the equivalent amount of a different GHG that is reduced, sequestered, or avoided through a given activity.

There are two types of market structures for carbon credits, voluntary and regulatory. The voluntary market features the issuance, buying, and selling of carbon credits on a voluntary basis among market participants. Demand for voluntary credits is driven by corporations and organizations with environmental, social and governance goals, including commitments to reducing the carbon footprint of their operations. The supply of and demand for carbon credits can depend on market structure. Regulatory compliance markets are created as a result of governmental policy or regulatory requirements from cap-and-trade programs or regulations that limit greenhouse gas emissions.

To facilitate carbon market interactions, some independent entities, such as the Climate Action Reserve and Verra, have created "carbon standards" for developing, quantifying, and verifying the GHG reductions associated with approved project activities (figure 6). These groups often supervise the process of developing new methodologies (or protocols) and may approve projects and registration of credits once independent validation is completed. With different approaches to quantifying and verifying carbon credits, the quality and monetary value of a single carbon credit can be wide ranging.

RGGI[63] is an example of a regulatory market in Maryland. While primarily a cap-and-invest system for carbon dioxide emissions, RGGI gives regulated entities the option to achieve

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[63] Regional Greenhouse Gas Initiative, "Elements of RGGI," rggi.org/program-overview-and-design/elements

compliance using a limited number of carbon credits generated under approved protocols.[64] Although forest-related projects are allowed within RGGI, no forest carbon credits have been generated to-date;[65] This is likely due to the relatively low trading price of RGGI allowances and the labor and cost-intensive nature of the existing protocols. RGGI is a potential source of demand for carbon credits generated in Maryland.

CSNA may provide Maryland with another opportunity to develop a regulatory market for carbon credits. MDE is considering whether buildings covered by forthcoming Building Energy Performance Standards (BEPS) could potentially utilize carbon credits to help meet compliance requirements. In regulatory markets, the state government provides full oversight over any carbon generating credit process and consequently certifies credit quality. A decision on including carbon credits in the BEPS regulation is expected in 2023.
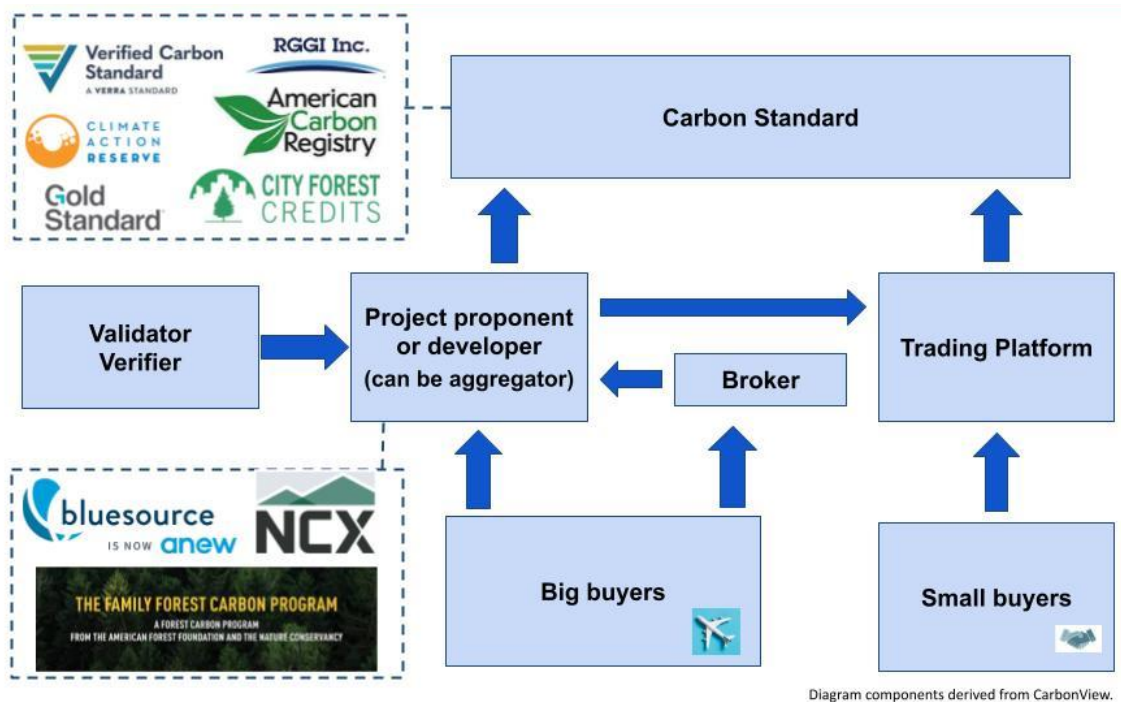

Figure 6. Common interactions among entities in the growing carbon market place, with examples of organizations providing carbon standards (top left box) and those fulfilling the roles of project developer or aggregator for forest carbon projects (bottom left box).

Carbon credits from natural and working lands, including through tree planting activities, can be attractive in the voluntary carbon marketplace. Voluntary buyers often seek to purchase carbon credits from projects that produce additional environmental and social co-benefits. Project developers (carbon credit sellers) look to carbon credits to cover costs associated with planting or maintaining the site. Despite these potential benefits, there are significant barriers to market entry. The most significant barrier is the low market value of carbon credits compared to the

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[64] Equalling no more than 3.3 percent of the entity's CO_2 emissions in a given period.
[65] Regional Greenhouse Gas Initiative, "Offsets," rggi.org/allowance-tracking/offsets

complexity and costs of project implementation, carbon quantification, and independent verification of carbon outcomes. Another barrier is the limited market access for small forest landowners and project developers who cannot produce enough carbon credits to justify the costs of participating in the market.

Project developers are required to demonstrate "additionality", that is, that the project would not have happened without the presence of a credit buyer or the prospect of selling associated credits on the market. For instance, given the uncertainties and risks in the marketplace a tree planting project that was initiated before securing a buyer for carbon offsets is very unlikely to have required those credits to finance the work. The concept of additionality ensures that greenhouse gas emitters don't use false offsets and make climate change worse.[66] While additionality is often interpreted subjectively, its definition and application is one of the central determinants of carbon credit quality.

There are a range of approved protocols providing technical guidance to quantify carbon credits on existing forests. More limited options are available for afforestation projects (figure 7). In Maryland, current afforestation protocols include those offered by City Forest Credits[67] and RGGI and one being developed by the University of Maryland in partnership with Second Nature.[68] The most successful efforts are likely to be those, which can harness new cost-effective technologies for quantifying and verifying reductions, support aggregation of projects and build economies of scale, and organize payment systems to facilitate regular payments as outcomes are verified.

[66] Stockholm Environment Institute, "Additionality," Carbon Offset Guide, offsetguide.org/high-quality-offsets/additionality/

[67] City Forest Credits, "Carbon Protocols," cityforestcredits.org/carbon-credits/carbon-protocols/

[68] Second Nature, "Carbon Offsets," secondnature.org/climate-action-guidance/carbon-offsets/
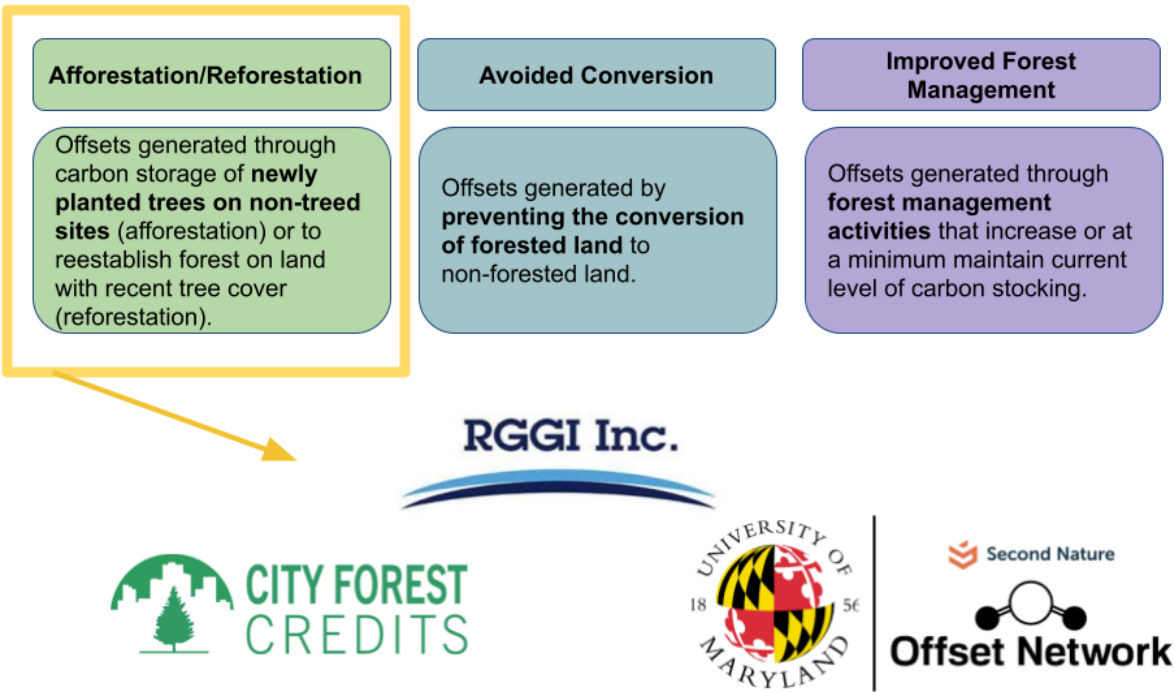
Figure 7. Three distinct categories of tree and forest protocols used to generate carbon credits, where afforestation goals under the TSNA are currently supported by a limited number of applicable protocols from City Forest Credits, RGGI, and the University of Maryland through Second Nature.

Voluntary carbon markets in Maryland include a range of standards, buyers, sellers, project developers, and registries. In this diverse landscape, it can be challenging for individual landowners to identify and choose among markets. For example, even where additionality is established, carbon credits may provide only a minor source of revenue and are unlikely to fully cover project implementation and validation processes at the project scale. It is in Maryland's best interest to make access to carbon markets achievable while ensuring that any credits generated in Maryland are additional and independently verified. Aggregation of smaller projects may be a mechanism for achieving economies of scale if there was a central state-supported process for quantification, verification, and registration of carbon credits.

Navigating the complexities of the carbon market must also be done with sensitivity to market alignment with the state's climate change goals and existing accounting frameworks for carbon sequestration on Maryland's natural and working lands. Where traditionally carbon markets and greenhouse gas reduction goals have operated in silos, there is increasing need and opportunity to clarify their intersections and what is in the best interest of Marylanders as we strive for a decarbonized future. Of particular relevance is carbon ownership on public lands or with projects that use public funding. Furthermore, the state must work to ensure no double counting across both the voluntary and the regulatory markets.

Clarifying Avenues for State Engagement

To support improved engagement with the growing carbon market, MDE, in partnership with its sister agencies, is committed to a series of state-supported actions to clarify avenues for participation in carbon markets while ensuring those markets align with state climate and nutrient reduction goals. Establishing a state-supported quantification, verification, and registration system would specifically lend credibility to the market and drive high quality projects. This effort seeks to leverage new financing tools available under the Conservation Finance Act (CFA) and provide the necessary infrastructure to attract and grow private investment toward the state's tree planting goals.

New Tools Under the Maryland Conservation Finance Act

Green Infrastructure Financing

State financing of green infrastructure projects is currently supported by Maryland's two revolving loan fund programs; the Maryland's Clean Water State Revolving Fund (CWSRF) and the State's Drinking Water State Revolving Fund (DWSRF). Since its establishment, the CWSRF has provided over $4 billion in low-interest loans and loan forgiveness to support clean water projects. Changes in federal law have opened up the CWSRF to new types of financing, including the development and implementation of watershed financing partnerships. Similarly, the DWSRF has provided over $750 million in low-interest loans and loan forgiveness to support a wide range of drinking water projects. Additional changes under the CFA make these revolving loan funds more accessible for tree planting and forest restoration projects:

- **CWSRF Programmatic Financing program** - promotes loans for bundles of projects to control nonpoint sources of pollution, including loans for forest conservation or restoration by fee or easement.

- **CWSRF Sponsorship program** - allows a local government to serve as the primary borrower and receive a loan for a publicly owned treatment works project if loan includes financing for a sponsored nonpoint source project managed by an organization eligible under federal law.

- **CWSRF Long-term or permanent green or blue infrastructure projects** - finances projects which provide a water quality benefit to Maryland's portion of the Chesapeake Bay, prioritizing green and blue infrastructure, with particular focus on natural areas or natural features.

- **CWSRF Enhanced opportunities under the federal Bipartisan Infrastructure Law** - provides additional loan forgiveness assistance to disadvantaged communities or those disproportionately burdened by environmental harms or risks.

- **DWSRF Pay-for-success contracts** - prioritizes support for local governments, community water systems, and other eligible partners by serving as a guarantee for

long-term pay-for-success contracts for the purchase of environmental outcomes that provide water quality benefits.

- **DWSRF Watershed protection** - provides supporting loans and loan guarantees for the protection of source water areas or Chesapeake and Coastal Bays watersheds through property acquisitions or easements for the purpose of controlling nonpoint source pollution.

MDE's Water Infrastructure Financing Administration (WIFA) has already taken several steps to improve fund access and utilization. For example, WIFA has reviewed and revised application scoring criteria to ensure green infrastructure projects, and their benefits to climate mitigation and nutrient reductions, are given appropriate weight and prioritization. WIFA has also worked with MDE's Water and Science Administration to develop the Maryland Forest Financing Implementation Tool[69] to support local governments, counties, and their partners seeking loans to fund forestry efforts and earn restoration credits for their stormwater permits. Both of these efforts seek to prioritize tree planting with environmental and economic co-benefits.

Pay-for-Success Contracting

When strategically aligned with the TSNA, the CFA further enables the state to reach its 5 million tree goal by attracting additional investment from private investors and buyers interested in carbon sequestration outcomes. Importantly, the CFA has elevated the pay-for-success model[70] of financing with an emphasis on the quantification, verification, and registration of environmental outcomes, including carbon sequestration. The CFA facilitates market-based transactions around carbon outcomes that are real and verifiable. The buyers and sellers of carbon credits and outcomes are likely similar, but the CFA elevates the role of the state as both a potential buyer and mediator of high quality projects. There are at least two financing models enabled by pay-for-success contracting:

- **State financing, private buyer:** A third party project developer, including local governments and sponsored organizations, receives low interest financing from a state revolving loan fund to cover project costs and uses the sale of quantified and verified carbon outcomes as a revenue stream to guarantee loan repayment. Here, the payor is a private entity, like an airline, that is likely seeking carbon outcomes or credits to reach their voluntary or regulated carbon reduction goals.

- **Private financing, state buyer:** In this scenario, a third party project developer, such as a nonprofit organization, secures capital from a private investor, like a bank, to cover initial project costs, with the expectation that the state will purchase or procure quantified and verified carbon outcomes and provide a return on the initial capital investment. As

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[69] MDE, "TMDL Implementation Toolkit"
mde.maryland.gov/programs/water/tmdl/datacenter/pages/tmdlstormwatertoolkit.aspx
[70] USDA Natural Resources Conservation Service, "Conservation Innovations: Pay for Success,"
blogs.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/features/?cid=nrcseprd1370854

the payor, the state must establish conditions for "success" and align public resources to strategically advance state goals.

The State of Maryland is in a position to further both of these pay-for-success models providing the quantification, verification, and registration of carbon outcomes is clear. In the first model, the state has an incentive to support carbon market development to build demand for high-quality in-state carbon credits. This means ensuring there is an established process in place to guarantee outcomes are real, additional, permanent, and not double counted. In the second model, the state must provide a process for quantifying and verifying related outcomes and ensure payment outcomes are a result of activities that go beyond any initial investment of public funds, including state grant funding. In both of these cases, model alignment and accounting relative to the state's climate change mitigation goals is critical and requires careful tracking. Further, while these financing models establish the twin role of the state as a project financier and outcome buyer, they do not directly address the role of the state as a potential seller of outcomes. Those cases must be evaluated carefully and again with attention to the long-term benefits of those actions relative to statewide goals.

Recommended Actions for State Agencies

Given the diverse landscape of both conservation finance and emerging carbon markets, the following recommended actions for state agencies are designed to support increased clarity and opportunity for private sector engagement. Importantly these steps seek to better align state resources to maximize outcomes for state-supported goals.

1. **Develop quantification and verification standards for carbon credits and other financing mechanisms that utilize state dollars to generate salable environmental outcomes.** As part of this work, state agencies will develop common guidance for project "quantification plans" as required under the CFA and establish a clear expectation for high-quality credits that assure outcomes are a) additional and verifiable; b) not overestimated and conservative; c) permanent and consider the life-cycle benefits of well managed systems; and d) not claimed by another entity. Additionally, projects should not result in significant social or environmental harms through their development.

2. **Establish a common registration system for salable environmental outcomes generated with co-funding from state dollars.** This state-supported registration system creates a vehicle for ensuring high-quality carbon credits in Maryland and offers the potential for a project to register for sale or trade multiple types of environmental outcomes such as nitrogen and phosphorus within a single platform. This registration system can support the development of high-value premium credits given thorough evaluation and oversight by the state, and open landowner access to a broader marketplace. This system would include registration of state-procured outcomes as well as outcomes from projects funded in part by state money (i.e., grants). This system may also serve as a vehicle for project aggregation, lowering the potential transaction costs of market participation.

3. **Clarify carbon ownership of projects co-funded by state dollars and portion of a project available for sale with the voluntary or compliance market.** This guidance will help to clarify economic opportunities for private investment beyond public investment. As the CFA now allows the state to "procure" outcomes in support of a specific public goal, it should be able to claim ownership of whatever portion of the carbon within a given project it already paid for with public monies.

4. **Clarify conditions under which the state would pay for or procure additional environmental outcomes, especially carbon.** The state may seek to procure additional environmental outcomes on private land as part of its effort to build carbon assets in support of Maryland's broader geographic-scale net zero greenhouse gas reduction goal. This procurement would need to be above and beyond those outcomes the state already paid for with public monies. Another option is for the state government to develop its own entity-scale net zero target, that is the state government must achieve a net zero footprint. Entity-scale GHG reduction goals follow established accounting and reporting standards,[71] which clarify carbon ownership on controlled and managed lands and make clearer the role of carbon purchase from private lands in support of these goals.

5. **Revisit state land eligibility for carbon credit sale on the voluntary carbon market.** If the state clarifies carbon ownership then decisions about state-owned carbon should be considered in the context of a potential state government net zero target. The state's GHG inventory captures all carbon outcomes within Maryland's geography. However, if public assets (e.g., forest carbon on state lands) are sold on the voluntary carbon market, their carbon ownership may be problematic in the long-term. If pursuing "entity scale" accounting then carbon on all state owned and managed land is considered to be "scope 1"[72] and consequently ineligible for resale on the voluntary carbon market.

> **Summary Recommendation:** Led by MDE, Maryland state agencies should establish a common quantification, verification, and registration system for carbon credits/outcomes, clarify carbon ownership of state-funded projects, and detail conditions for state procurement of carbon outcomes.

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[71] *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (GHG Protocol Corporate Standard* developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), is the global standard for companies and other organizations, such as NGOs, government agencies, and universities, that are preparing a corporate-level GHG emissions inventory; The U.S. federal government also has its own GHG reduction goals under Executive Order 14057 (sustainability.gov/federalsustainabilityplan/index.html).
[72] Scope 1 emissions are direct greenhouse (GHG) emissions or removals that occur from sources or lands that are controlled or owned by an organization.

MDE will continue leading this work in consultation with the Maryland Commission on Climate Change and the Green and Blue Infrastructure Policy Advisory Commission, recently established under the CFA. Further, MDE's Climate Change Program and Water Infrastructure Finance Administration will continue building guidance to clarify eligibility of tree planting and related environmental outcomes for state financing and carbon crediting programs.

Long-term Tree Maintenance and Forest Management

Summary: Long-term maintenance and management of tree plantings is important for tree survival and forest health. All implementing partners have included maintenance activities within their program plans, focusing especially on the first 3 years after tree planting when establishment is critical. However, models for long-term maintenance and management are still needed. Ongoing exploration will center workforce development, long-term forest management through climate-forward industries, and carbon market innovation.

Workforce Development

Urban trees planting programs, including those offered through the Trust, DNR, and MDOT, provide a unique forum for exploring green workforce development programs that feature regional approaches to maintenance. For example, instead of each individual project building maintenance plans into their respective grants, a fraction of each grant could be leveraged toward a regional contract for tree maintenance and management. A shared approach to tree care could reduce failure risk, while maximizing community-owned and led approaches to resource stewardship.

Forest Industry and Management

While many riparian forest buffer plantings and other forms of assisted natural forest regeneration may require less maintenance than urban street trees, long-term forest management is critical. For example, many mature riparian forest buffers can include invasive species that undermine forest health and require ongoing forest stewardship to maintain. DNR has developed a riparian forest buffer care calendar[73] that supports early-stage development of planted buffers <10 years post-establishment. However, after this period, sustainable forest management[74] could ensure ongoing forest health and build a climate-forward forestry industry in the State, including innovative use of fiber and long-lived wood products.[75]

Diverse forest markets are important to support healthy forest habitats and incentivize landowners to keep land in forest use. Markets for wood energy or wood fiber-based insulation can encourage displacement of fossil fuel products with renewable alternatives, and provide a

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[73] DNR, "MD Riparian Buffer Care Calendar," Maryland Forest Service, dnr.maryland.gov/forests/Documents/MD-Riparian-Buffer-Care-Calendar.pdf

[74] Principles of sustainable forest management include maintaining or increasing forest biodiversity, productive capacity, ecosystem health, soil and water resources, and contributions to the global carbon cycle. Additionally, sustainable management should advance the socio-economic functions of forests and ensure participatory decision-making, strong governance, and fair and equitable use of forest resources.

[75] DNR, "2020-2025 Forest Action Plan," Maryland Forest Service, December 2020, dnr.maryland.gov/forests/Documents/Maryland-State-Strategy_wAON%202020FINALpages.pdf

strategic use for tree tops and smaller trees otherwise disposed of through traditional thinning practices. These market investments are key for promoting climate adaptation, mitigating wildfire risk, and ultimately growing larger trees for durable and climate-smart wood products. Expanding support for new technologies, such as cross-laminated timber and other mass timber products for tall wood buildings, can also result in long-term carbon storage and replace more carbon-intensive products such as metal, concrete, and plastic.

Recommendation: In line with the Maryland Forestry Economic Adjustment Strategy, the Maryland Department of Commerce should build a targeted incentive package to attract and grow forest product industries, like structural wood for construction and innovative use of fiber in manufacturing, that support sustainable forest management, and utilize forest products in a way that maximizes long-term carbon sequestration.

Space for Market Innovation

While pay-for-success procurement and carbon credits can be a minor source of project revenue, they are not currently viable options for covering long-term maintenance costs. As the state establishes further guidelines for market engagement, including a clear quantification, verification, and registration system that centers additionality, premium carbon credits may become increasingly valuable and therefore a better source of maintenance financing. Further, as regulated industries in the state increasingly look for cost-effective ways to meet emission reduction targets, there may be a space for new forest carbon projects to occur at a competitive market price. In these cases, the cost of carbon credits is low enough to generate industry demand but high enough to incentivize afforestation projects with long-term maintenance that might not have otherwise occurred.

Partnerships for Action

Coalition Building

Organizations throughout Maryland are already engaged in tree planting activities to support the state's climate, water quality, and forest conservation goals. Accomplishing the 5 million tree goal will require creative and collaborative partnerships that leverage and build upon these existing networks. The implementation leads of the TSNA are committed to partnering with a range of community-based organizations, not-for-profit organizations, companies, and local governments to ensure the long-term success of all tree planting, maintenance, and monitoring efforts. Further, many Commission members have experience with tree planting and already serve as community partners. This plan can serve as a roadmap for further mobilization that brings additional resources to the work. In particular, long-term forest management invites more creative partnerships on workforce development and climate-forward leadership from the state's forest industry.

Communications and Marketing

Landowner engagement is critical for achieving the state's tree planting and maintenance goals. As highlighted throughout this plan, all implementing agencies and organizations are committed to consistent and coordinated landowner outreach to reduce barriers to financial and technical assistance. In addition to MDE's tree tracking website, which will serve as a central point for information dissemination about the 5 million tree effort, the Commission's work has also resulted in an initiative logo (as featured on the plan's cover) to build brand identification. Additional resources, such as planting toolkits and training materials are often already available through existing organizations, and can be collected and featured through the website. As tree planting and maintenance programs continue to develop in Maryland, ongoing feedback and iteration in their design will be important for ensuring programs meet strategic needs and opportunities on the ground.

National and Regional Leadership

Maryland is a national leader in tree planting and forest restoration. The recent GGRA Progress report highlights Maryland's progress against the 2030 tree planting and forest management targets and the ways in which the TSNA will scale impact and secure more benefits for Marylanders.[76] As highlighted through the U.S. Climate Alliance, Maryland is also the first state in the nation to monitor forest carbon changes using remote sensing data. This investment in best-available science enables spatial tracking of carbon sequestration that supports both the state's GHG inventory and carbon market applications. These advances are showcased through Maryland's pledge toward the global 1t.org commitment and participation in these communities-of-practice will continue to serve and strengthen the state's work.

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[76] MDE, *GGRA*, mde.maryland.gov/GGRA

Acknowledgements

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Jeannie Haddaway-Riccio, Secretary (Philip Hager, Assistant Secretary, designee)	Secretary of Natural Resources or designee
Joseph Bartenfelder, Secretary (Hans Schmidt, Assistant Secretary, designee)	Secretary of Agriculture or designee
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Initiative Logo

The logo featured on the Plan's cover is an image of a maturing White Oak (*Quercus alba*), the state tree of Maryland. This logo was developed to provide increasing brand recognition to Maryland's 5 million trees initiative and aid project developers in connecting local tree planting efforts with the broader state goal.

The logo is designed to highlight the multiple facets of tree growing. While the "right tree, right place, right way, right time" approach to tree planting itself takes effort (e.g., the inclusion of a shovel), it is a long term commitment to tree maintenance and management that will yield healthy forests (e.g. depiction of a larger tree with many leaves and branches).

We would like to acknowledge Gary Allen, Commission Member and President of the Maryland Forestry Foundation, for supporting the development of the logo and engaging the broader Commission and interagency team in its design.