

# BAY JOURNAL

SPRING 2022

LOCAL GOVERNMENT EDITION

## Beavers, mussels could be allies for clean-stream projects

### Quick Look

Increasing the presence of beavers and mussels in freshwater streams can be a cost-effective way to enlist nature's help in filtering pollution, rebuilding floodplains and boosting biodiversity.

**By Karl Blankenship & Whitney Pipkin**

Beavers are sometimes seen as more of a nuisance than a water-quality champion. But a group of “beaver believers” is hoping to transform the way the Chesapeake Bay region thinks about its waterways — and the role that North America’s largest rodent should play in restoring their health.

They want local governments to get credit toward meeting Bay restoration goals by allowing beavers and their dams — which can dramatically reduce nutrient and sediment pollution — to thrive.

That lesson is starting to be embraced in some places, such as Anne Arundel County, MD. Two decades ago, the county was working to preserve wetlands with rare plants that required groundwater seepage to survive. They designed projects to hold back stormwater and divert it into the soil.

“At some point, it clicked that, ‘Hey, this is very similar to what beavers do,’” said Erik Michelsen, deputy director of the county’s bureau of watershed protection and restoration. He also realized that beavers would do it for free.

Today, the county increasingly designs projects with the intent that beavers will move in and take over. And Michelsen is part of a group that wants the state-federal Chesapeake Bay Program to give states pollution reduction credits for beaver-assisted stream restoration.

It’s not the only attempt under way to

enlist nature’s help in cleaning up the region’s waterways.

A recent report from the Bay Program’s Scientific and Technical Advisory Committee concluded that the idea of restoring water-filtering freshwater mussels in rivers and streams is also worth exploring.

The report stemmed from a March 2020 workshop that brought dozens of mussel researchers and advocates together to crunch numbers and prove the thesis they’ve been operating on for some time: Mussels deserve as much discussion in clean-water conversations as oysters.

“The whole point of the workshop was really to raise freshwater mussels in the eyes of the Bay Program community and say, ‘Why are we not working on this?’” said Joe Wood, Virginia senior scientist for the Chesapeake Bay Foundation and an organizer of the workshop. “Because it sure

See **BEAVERS & MUSSELS**, page 8



Beavers were once hunted so aggressively that they had nearly vanished from the Chesapeake Bay region. Lost with them was the sweeping role they played in supporting healthy stream systems. (Dave Harp)

## Status check: Chesapeake Bay cleanup effort

### Quick Look

Challenges persist as the region approaches the 2025 deadline. Pollution from agriculture is the biggest hurdle, and new data suggest the cleanup may be even further behind than previously estimated.

**By Karl Blankenship**

With little more than three-and-a-half years remaining until the 2025 deadline for Chesapeake Bay cleanup goals, the region remains off pace for reducing nutrient pollution — and the challenges only seem to be getting bigger.

According to the most recent estimate,

released late last year by the state-federal Bay Program, the region had achieved only about 40% of its nitrogen reduction goal through 2020. That leaves the bulk of the work to be done from 2021–25.

But after those figures were released, the Bay Program partnership found that the data contained errors that inflated the amount of progress.

Further, the U.S. Environmental Protection Agency in January said it had “no confidence” that a cleanup plan written to offset the impacts of increased pollution flowing past Conowingo Dam could be implemented — because the plan lacks funding.

If states don’t find a way to pay for the work, the agency said it would require

greater nutrient reductions from each state to accomplish clean-water goals.

### How we got here

The Chesapeake Bay is the nation’s largest estuary — a productive waterbody where saltwater and freshwater meet. But its water quality has been fouled for decades because of increasing amounts of the nutrients nitrogen and phosphorus reaching the Bay.

The nutrients feed algae blooms that cloud the water, harming critical underwater grass habitats. When the algae die, they decompose in a process that draws oxygen from the water, creating “dead zones.”

See **CHESAPEAKE**, page 10

# ABOUT US

The *Bay Journal Local Government Edition* is published by Bay Journal Media to inform local leaders about environmental issues in the Chesapeake Bay watershed, help them find solutions for local water quality problems and support their role in the Bay cleanup effort. It has been distributed free of charge, with support from the Chesapeake Bay Program and Virginia Environmental Endowment. Views expressed do not necessarily represent those of any funding agency or organization.

## Why the Local Government Edition?

We've been reporting on environmental issues in the Chesapeake watershed for more than 30 years — and we know that the questions, challenges and daily tasks facing local government leaders on these topics are unique. We want to provide information that has been reported and written specifically with their needs in mind.

## Bay Journal Media

Bay Journal Media is a non-profit 501(c)3 organization providing independent environmental reporting for the Chesapeake Bay region. In addition to producing the *Bay Journal* and *Bay Journal Local Government Edition*, we operate the Bay Journal News Service, which distributes articles and op-eds to more than 400 newspapers. Our reporting reaches more than 250,000 each month.

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# EDITOR'S NOTE



## When 'new' solutions aren't really so new

Beavers. Mussels. Meaningful partnerships. None of these, by themselves, will clean up the Chesapeake Bay or the streams and rivers that flow into it. But articles in this issue of the *Bay Journal Local Government Edition* point to revived interest in these forgotten or neglected elements in our clean-water efforts.

Beavers and mussels were once abundant in freshwater systems throughout the region, working as nature's engineers to slow and filter the flow of water across the landscape. Mussels grew thickly there, too, with same pollution-filtering power as that of oysters in the salty water of the Bay. Now, advocates are calling for help in restoring these natural elements to our stream systems. In some ways, it's a new idea. It some ways, it isn't.

The call for meaningful, inclusive partnerships continues, too. There are new voices that champion this work, but the message itself is not new at all — and needs repeating. Projects that deliver the best results are often based on authentic, patient, wide-ranging partnerships, informed by a commitment to listen and let go of assumptions. You'll see examples in the Forum column and in articles about Operation Stream Shield and a university "green street."

At the *Bay Journal*, we believe that solutions also depend on the longstanding need for communication, analysis and objective reporting. We are committed to doing our part to support a public that is informed and engaged with environmental issues in the Bay region. But this is the last edition of the *Local Government Edition*. We bring it to a close, at least for now, without funds to support continued production. Thanks so much for being a part of our audience. I hope you have found it useful in your work, and I invite you to subscribe to our core publication, the *Chesapeake Bay Journal*, at bayjournal.com/subscribe. In print or via email, it's free! I hope you'll remain part of the *Bay Journal* community.

— Lara Lutz

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# Bay Basics: Climate change, adaptation and resiliency

## Staff Report

Warmer, wetter weather is already impacting the Chesapeake Bay region. Communities are grappling with flooding, and the rhythms of farmland and forests are changing. Wildlife migration patterns are shifting, and some species are losing vital habitat. Surges of stormwater are bringing more pollution into rivers and the Bay, making cleanup even more difficult.

Federal and state partners in the Chesapeake Bay Program are working to better assess the impact on the Bay and determine the best way to counter them.

### How is climate addressed in the 2014 Bay Watershed Agreement?

In the 2014 agreement, the Bay Program partnership — the six states in the Bay watershed, along with the District of Columbia, federal government and Chesapeake Bay Commission — didn't use the phrase "climate change." Instead, after much debate, they agreed to focus on "climate resiliency" to address the "adverse impacts" of a changing climate on wildlife, public infrastructure and communities. They agreed to monitor and assess trends and to continually pursue, design and construct restoration and protection projects that enhance the resiliency of aquatic ecosystems.

### How does climate change impact Bay restoration?

"All aspects of life in the Chesapeake Bay watershed — from living resources to public health, from habitat to infrastructure — are at risk from the effects of a changing climate," according to a strategic plan by the Climate Resiliency Workgroup. And there is real concern that the effectiveness of restoration and protection policies, programs and projects may change.

For example, more nutrient pollution is entering the Bay because of increased rainfall and more severe storms. Bay Program scientists predict that states will need to reduce an additional 5 million pounds of nitrogen a year, for a total of 55 million pounds, to meet the same water quality goals established in the Bay's "pollution diet" or total maximum daily load.

Warmer water in the Bay also contributes to more algae growth, which reduces oxygen in the water and triggers "dead zones."

Warmer temperatures have also contributed to the decline of eelgrass, which provides habitat for blue crabs, speckled



Tidal flooding washes over a street in Cambridge, MD. (Dave Harp)

trout, waterfowl and other species. According to the Virginia Institute of Marine Science, two-fifths or more of all eelgrass beds in the southern end of the Bay vanished during the last two years.

### Who is involved in climate work at the Bay Program?

Almost everyone. The Climate Resiliency Workgroup was established within the Bay Program to oversee and guide the work. But climate change impacts are so far-reaching that the workgroup has indicated that "most, if not all" of the strategies included in the 2014 Bay agreement should address climate change.

The workgroup believes that local participation is especially important, so its members team up with groups like the Bay Program's Local Leadership Workgroup to support education and outreach.

### How does it impact BMPs?

As the frequency and intensity of rainfall has changed, many people have questioned the effectiveness of best management practices aimed at reducing polluted stormwater runoff. This prompted Virginia and the Bay Program to commission research on the "intensity duration frequency curves" that engineers use to design BMPs. Their study developed "climate change-informed" curves for the entire Bay watershed.

The Chesapeake Stormwater Network published a related report, *Vulnerability Analysis and Resilient Design Considerations for Stormwater Best Management Practices*. It states that "declining performance or outright failure of stormwater [BMPs] adds further challenges to meeting the water quality goals" for the Bay. The network recommends a regional effort to evaluate and update stormwater design criteria, as well as floodplain management regulations.

### Are some communities at greater risk than others?

Yes, underrepresented and underserved communities have greater risks for flooding, extreme heat and poor air quality. Some of the reasons for flooding vulnerability cited in the 2020 U.S. Water Alliance report, *Water Rising: Equitable Approaches to Urban Flooding*, include the high concentrations of low-income residents and communities of color in flood-prone areas and the poor condition of infrastructure in distressed communities.

A 2019 Bay Program forum found that the awarding of funds to mitigate climate-related flooding often use a cost-benefit analysis "that rarely takes into consideration the social aspects of a community and quality-of-life issues. The projects that are the easiest and fastest to complete are often the ones that get funded, while underserved

communities may be overlooked." The Climate Resiliency Workgroup has outlined actions to help address this inequity.

### What is the role of local governments in this work?

The Climate Resiliency Workgroup suggests that local governments should prepare for a wide range of impacts. They suggest that, "Local governments and planners can serve as partners with state and federal regulators and funders in identifying and undertaking implementation opportunities. Local communities, school districts and other public institutions can provide locations for pilot projects that support the monitoring and assessment objectives and can serve as a venue for showcasing successful projects throughout the watershed."

### What's next?

In October 2021, the Bay Program's Executive Council signed a "climate directive," pledging to weave climate actions into planning, computer-modeling and restoration activities. Members of the council include the governors of Maryland, Virginia, Pennsylvania, Delaware, New York and West Virginia; the mayor of the District of Columbia; the head of the Chesapeake Bay Commission, which consists of legislators from Bay states; and the administrator of the U.S. Environmental Protection Agency. All signed on to the plan except for West Virginia.

Ralph Northam, then council chair and governor of Virginia, said, "This directive should leave no doubt that this Executive Council acknowledges that climate change presents a severe threat to the investments we have made in restoring our Chesapeake Bay and that urgent action is required. We will use the best climate science to chart a path forward."

Some environmental groups criticized the agreement, saying it needs more specific goals and doesn't press hard enough to ensure action will be taken.

### Resources

#### Overview from the Bay Program:

Visit [Chesapeake bay.net](https://www.chesapeakebay.net). Click on "Learn the Issues," then "Climate Change."


#### To connect with the Bay Program

##### Climate Resiliency Workgroup:

Visit [chesapeakebay.net](https://www.chesapeakebay.net). Click on "Who We Are," then "Who's Who," and search by group for the climate team. ■

# Free ‘watershed 101’ modules get local officials up to speed

Quick Look



Free modules on the basics of clean water, designed to support educational outreach by and within local governments, are available in PowerPoint, video or PDF format.

## By Ashley Stimpson

Elected officials looking for a quick, reliable primer on issues related to the restoration and conservation of the Chesapeake Bay have a new resource. *A Local Government Guide to the Chesapeake Bay* is a seven-module series designed to bring officials up to speed while helping them connect the dots between a healthy watershed and their communities’ economic development, public health and infrastructure resiliency. “A brand-new elected official is thrown into watershed issues,” says Laura Cattell Noll, local government projects manager for the Alliance for the Chesapeake Bay. “But they may not know the ‘101’ things.”

Noll said the modules — free, self-guided presentations available in PowerPoint, PDF format or video — are designed to serve as a “baseline education.” They cover everything from the economic benefit of trees to the foundations of clean water. So far, more than 1,500 local officials have interacted with the modules in some way, according to Noll. This new resource is a part of a larger effort to ensure that community leaders in the watershed’s approximately 1,800 local governments have the knowledge they need to make informed choices for their local communities that benefit the Bay, too. In 2014, representatives from every Bay state and the District of Columbia signed the *Chesapeake Bay Watershed Agreement*, which established goals and outcomes for the restoration of the estuary, its tributaries and the land in between. One was the Local Leadership Outcome, which seeks to “increase the knowledge and capacity

of local officials on issues related to water resources and in the implementation of economic and policy incentives that will support local conservation actions.” To make this outcome a reality, the Bay Program convened a Local Leadership Workgroup made up of elected officials, environmental organizations, state agencies, and city and county associations. Working with a graphic designer, the workgroup created the modules and a set of one-page handouts. Each module contains learning objectives, a glossary, action items and, where applicable, available financial assistance to fund related initiatives. Resources for further learning are also provided. Recognizing that elected officials work in a wide variety of settings — from major metropolitan areas to rural boroughs — the workgroup made sure each module is easy to customize. “You could download the PDF and edit it for your community,

print it out as a handbook or pull one slide as an infographic,” Noll said. In Delaware, the Department of Natural Resources and Environmental Control tailored the modules specifically for Delaware officials and is sharing them in a series via city and town managers. In Virginia, the Rappahannock Rapidan Planning District Commission has used the modules as presentations during meetings of regional members. And the Academy for Excellence in Local Governance, a certificate program administered by the University of Maryland in partnership with the Maryland Municipal League and Maryland Association of Counties, has designed an elective course around one of the modules. Noll said the enthusiastic response to the education modules has inspired the workgroup to create more, as well as a permanent website and a training resource on how to put them to best use. ■ *To access the modules, visit the Local Leadership Workgroup’s page on the Chesapeake Bay Program’s website, [chesapeakebay.net](http://chesapeakebay.net).*

*“A brand-new elected official is thrown into watershed issues.”*  
— Laura Cattell Noll  
Alliance for the Chesapeake Bay

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# Operation Stream Shield benefits people and local waterways

## Quick Look



Fairfax County, VA, recently launched a successful program that removes litter and invasive plants from streams and helps develop the local workforce.

## By Ashley Stimpson

In 2021, more than 21 tons of litter were removed from streams, creeks and rivers in Fairfax County, VA. Behind that accomplishment is an innovative program that provides people experiencing homelessness with part-time work and the chance to care for the local watershed.

Operation Stream Shield, a partnership between the Fairfax County Department of Public Works and Environment Services and the Office to Prevent and End Homelessness, was piloted in 2019. Since then, “it has been extended up to five years and expanded to serve the entire county,” said public information officer Sharon North.

The program employs clients from area shelters to remove litter and invasive plants from waterways, maintain trails and perform basic landscaping in exchange for a stipend and on-the-job training — which in some cases has led to full-time work with the public works and environment office. Participating shelters include the Eleanor U. Kennedy Community Shelter, Bailey’s Crossroads Community Shelter, Embury Rucker Shelter and the Lamb Center. An



Workers in Operation Stream Shield remove invasive vines. (Fairfax County VA Department of Public Works and Environment Services)



Participants in Operation Stream Shield tend to a stream in Fairfax County, VA. (Fairfax County VA Department of Public Works and Environment Services)

average of 32 participants works eight hours a week for 11 dollars an hour.

Money for Operation Stream Shield comes from the county’s stormwater fund, a dedicated funding source for operations and capital project requirements. The program also helps the county comply with its Municipal Separate Storm Sewer System permit. Under the MS4, to legally discharge stormwater into local streams and rivers, the county must meet conditions outlined in its permit, such as cleaning and monitoring stream health.

Help for the area’s streams is sorely needed. Based on biological data collected at 40 randomly selected locations throughout Fairfax County in 2019, approximately 88% of the streams are in “fair to very poor condition.”

Homelessness is also a persistent problem in the county, a part of the Washington DC metro area. A point-in-time count taken in January 2021 found that 1,222 residents were experiencing homelessness, an increase of 17% over the year before.

Operation Stream Shield is an example of co-benefits from an environmental project: a win-win strategy in which one policy or program addresses two goals. Paul Kola, director of workforce development for New Hope Housing, a nonprofit that runs two of the shelters involved in the program, called it “an incredible partnership.”

“This has helped create a better and cleaner environment for all of us, while also combatting negative stereotypes about our homeless neighbors,” he said.

Beyond the founding partners and homeless shelters, a slew of additional organizations plays a role in the program. Staff from the county’s Stormwater Planning Division, the Fairfax County Park Authority, the National Park Service and the Virginia Department of Transportation work together to identify locations in need of a cleanup. They do this through their own reconnaissance as well as through the county’s interactive litter hot-spot map, which allows residents to report areas where trash, debris or invasive species have become a problem. The park authority and National Park Service also teach participants to identify nonnative plant species and best removal practices.

The county partners with groups like the Friends of Accotink Creek and Friends of the Dyke Marsh to help with logistics. The participating shelters, which screen and approve participants, handle transportation, supervise the cleanup and track and report the bags of litter filled during each outing. The Fairfax County Solid Waste Management Program collects and disposes of the full bags of litter and any bulk items found during the cleanups about once per week.

North said that in 2021, Operation

Stream Shield required \$347,000 in funding, mostly for supplies and nonprofit expenses. “Compared to costs to install and maintain instream trash-capturing devices, the program appears to be cost-effective,” she said.

The benefit it provides its workers are harder to quantify, but North said it’s “a positive environment to train and build skills for our most vulnerable members of the community.”

Kola of New Hope Housing echoed that sentiment: “Participants have taken the soft skills they’ve learned through this opportunity to help land full-time jobs elsewhere,” he said. “Those skills include working as a team, committing to be on time, and following multi-step directions.”

Kola pointed out that Operation Stream Shield is different from most day-labor positions, which can be low-stakes and sporadic. The stream program functions more like a conventional job, where participants who land one of the coveted places on the crew “are able to keep that spot so long as they show up for work on time. If a worker does not show up on time for work and fails to communicate their absence, they lose their active spot and are placed on the bottom of the waiting list,” which can be long. Kola said there are “many individuals eager to work as soon as an opening comes.” ■

# American Rescue Plan boosts clean water work in Bay region

## Quick Look



State and local governments are just beginning to incorporate funds from the federal American Rescue Plan Act into projects that reduce pollution and address environmental justice.

## By Jeremy Cox

When Congress hit the start button one year ago on a massive \$1.9 trillion COVID-19 aid measure, it also sent a surge of spending toward environmental efforts.

The American Rescue Plan Act was largely directed at providing a financial stimulus to households and speeding the country's response to the pandemic.

But the aid package also delivered \$100 million to the U.S. Environmental Protection Agency, which was split in half: \$50 million for environmental justice initiatives and \$50 million for air-quality monitoring.

It also set aside \$350 billion for states and local governments, with modest restraints on how it could be spent. The fate of much of that total is up in the air, as jurisdictions grapple with spending plans and, in some cases, the capacity to implement them.

Last summer's first wave of payments largely went toward plugging budget gaps caused by the pandemic's economic fallout. To prepare for the second wave, due to begin in May, many cities and counties over the past few months arranged in-person and online meetings to seek ideas for how to best spend the money. In some places, officials and community members are advocating for clean water and conservation projects, pointing out that some projects bring multiple benefits, such as outdoor space for recreation, "green" jobs and the reduction of urban "heat islands."

All funds must be committed by the end of 2024 and spent by the end of 2026.

Across the Chesapeake Bay region, some funding announcements are trickling in. Here is a look at some of the recipients (and proposals) in the "green" sector.

## District of Columbia

The District received \$2.3 billion. As of the end of last August, the deadline for the first federal reporting period, the District had spent \$83 million of that sum.

- \$16 million to the DC Department of Energy & Environment and the DC Sustainable Energy Utility to provide grants



*The rooftop of the Maycroft Apartments in the District's Columbia Heights neighborhood is covered with photovoltaic panels, squeezed in among air conditioning units, skylights and vents. The District's Solar for All program aims to provide 100,000 low-income families with the benefits of locally generated clean energy and cut their energy bills in half in the process. (Timothy B. Wheeler)*

to "under-resourced" buildings to conduct energy audits and predevelopment design and construction work. Eligible facilities include senior care centers, schools, hospitals and places of worship.

- \$17.5 million to DOE's Solar for All program to provide solar energy assistance funds to an additional 3,800 low- and moderate-income households and install more community solar projects.

## Maryland

The act set aside about \$3.9 billion for state government. This year's budget swallowed about \$2.1 billion of that sum. About \$1.7 billion remains.

City and county governments across Maryland will divvy up a separate pot of \$2.3 billion.

- \$200,000 for Baltimore's YH2O mentoring program, an on-the-job training program for young adults. Participants are involved in water quality monitoring, sampling and reporting — skills that will help them transition into water infrastructure jobs. To be eligible, they must be 18–24 years old, have a high school diploma or GED and be unemployed or underemployed. The new funding is drawn from \$50 million set aside nationwide from EPA

funds dedicated to environmental justice.

- \$13,000 to the Ward Museum of Wildfowl Art in Salisbury to develop materials for a new series of artwork highlighting Black experiences on Maryland's Eastern Shore. The funding comes from an Institute of Museum and Library Services grant program tied to the rescue plan.
- \$1.5 million to Baltimore County (proposed) to plant trees in less-affluent areas where the existing tree canopy is often thin.
- \$6.6 million to Baltimore County (proposed) to complete a living shoreline and aquatic habitat project along the Middle Branch of the Patapsco River.
- Nearly \$23 million to Prince George's County to address stormwater problems, flooding and stream restoration needs, including \$2.3 million to develop a stormwater management plan. One of the projects will restore 3,100 linear feet of streams in the historically Black community of Eagle Harbor, where a nearby power plant has exacerbated flooding in recent years.

## Virginia

Virginia received \$4.3 billion at the state level, while its cities and counties got \$2.9 billion. The current state budget is absorbing \$3.2 billion of the funding, leaving \$1.1

billion to be spent in the future.

- \$50 million to the Department of Health to support equal access to clean drinking water in small and disadvantaged communities.
- \$125 million to the Department of Environmental Quality to help pay for sewage treatment plant upgrades aimed at reducing the frequency of overflows. Alexandria and Richmond would each receive \$50 million, while Lynchburg would get \$25 million. Each city must provide 100% matching funds.
- \$75 million to DEQ for septic, pipe and sewer system repairs and upgrades.
- \$2 million to Norfolk (proposed) to reduce flooding along Surrey Crescent, a residential road in the low-lying Larchmont/Edgewater neighborhood.
- \$850,000 to Norfolk Botanical Garden (proposed) to establish "Nature's Wonderland," which would include a new destination exhibit, renovations to the butterfly house and the creation of a staff-guided kayak program on Lake Whitehurst.
- \$1.5 million to Richmond to acquire land for new parks on the Southside, a historically underserved section of the city. The goal is to reduce the number of residents who don't have access to park space within a 10-minute walk of their homes.
- \$19 million to Richmond in environmental spending, including \$12.5 million in stormwater system upgrades and \$1.5 million for a climate-risk assessment plan.
- \$1 million to the state Department of Conservation and Recreation to be provided to Fairfax County for trail system connections at Lake Royal Park.
- \$25 million to DCR to cover outdoor recreation area maintenance and construction needs.

## Pennsylvania

The act made available about \$7.2 billion for the state government. The state's current budget used about \$1 billion of that total, leaving \$6.2 billion to be spent by the 2026 deadline.

Federal officials allotted \$6 billion for local governments in Pennsylvania. In Lebanon County, Palmyra Borough received \$752,000 to bore a stormwater pipe below a rail line and extend the system elsewhere.

Also, bills are pending in the General Assembly that would apply more still funds from the American Rescue Plan Act to clean water projects across the state. ■

# Money grows on trees for landowners who save small forests

## Quick Look



Protecting public forests is just one way to help meet land use and conservation goals. Privately owned forests matter, too. Two new programs are helping owners of small, private forests receive financial benefits for preserving their woods.

## By Ad Crable

In an effort to combat climate change, some owners of small forests in Chesapeake Bay drainage states are being paid to either delay harvesting trees or take other steps to make their woods better at capturing carbon dioxide from the air.

Until recently, owners of the nation's largest forests — paper companies and others with 3,000 acres or more — are the ones most likely to benefit from exploding private carbon markets that pay owners to keep forests intact.

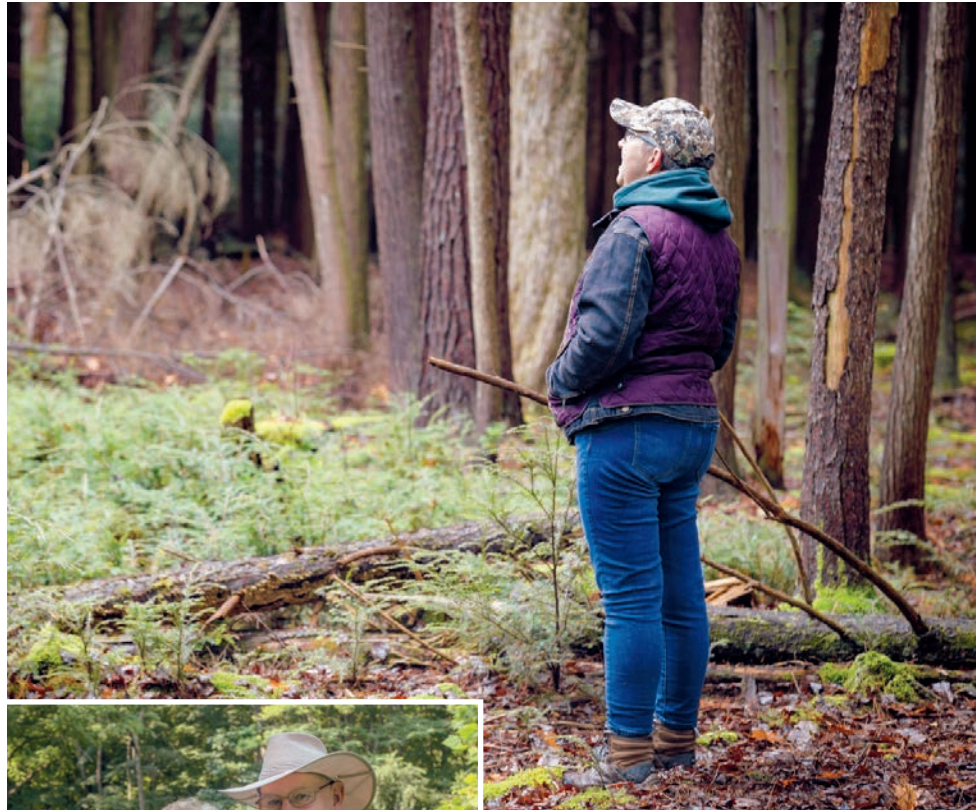
Now, two separate programs are targeting owners of smaller forests to enhance the considerable carbon-capturing abilities of trees. Their pitch: Improve your forest's health, aid wildlife, improve water quality and discourage wildfires, all while fighting climate change.

In terms of ecosystem solutions to limit climate change, management of privately held forests in the United States is second only to reforestation in reducing the carbon dioxide piling up in the atmosphere, according to a 2018 study funded by NASA and private foundations.

Reaching owners of smaller forests is especially important in the Chesapeake region, where the majority of each state's forests are held privately, often in small tracts and often by families or individuals. "It's an incredible time to be a small forest landowner. They're starting to get the recognition and value that they've always deserved," said Elizabeth Greener of the American Forest Foundation.

The Family Forest Carbon Program, run by the foundation and The Nature Conservancy, recently expanded into all of Pennsylvania and West Virginia, as well as five counties in western and central Maryland: Garrett, Allegany, Washington, Frederick and Carroll. The program is expected to offer enrollment in Virginia this fall as part of a mission to go nationwide.

The expansion follows a 2020–21 pilot



*Susan Benedict, the owner of a small forest in Centre County, PA, takes in her woods. (American Forest Foundation)*



*Laura and Mike Jackson, landowners in southcentral Pennsylvania, have been paid to improve their forest's ability to capture carbon dioxide, a greenhouse gas. (Submitted photo)*

effort in 29 counties in Pennsylvania. Approximately 2,000 private forest landowners, collectively owning more than 26,000 acres, inquired about participating. Sixty of them, together owning nearly 10,000 acres, qualified for the program in the first year.

An approved forest management plan, written by a certified forester, is required. The program provides a forester to help those who don't have a plan.

Payments are offered for commitments to either 10-year or 20-year stewardship plans. It gives those who own forests of 30–2,400 acres a one-time upfront payment of \$100–\$230 per acre to restrict timber harvests over the next 20 years. Timber removal that creates a healthier forest is

allowed. Or, it pays \$50–\$280 per acre, depending on the size of the woods, to landowners who "enhance" their woods over a 10-year period. That can mean removing invasive plants that strangle new trees and native plants, taking out lower-quality trees left behind from previous timber cuts and other practices that increase forest growth that will, in turn, absorb more carbon.

"Our program is more than just carbon," said Kevin Yoder, a conservation forester with the conservancy. "We are looking at helping the landowner steward that property. That sets our program apart."

That's exactly what appealed to Laura and Mike Jackson when they enrolled 113 acres in southcentral Pennsylvania into the program. When Laura inherited the family farm, she knew that two past timber cuttings had removed only commercially valuable trees and left the woods in bad shape. So had a gypsy moth infestation.

"The first thing we did was cry," Laura said. Then, with payments under both parts of the program, the Jacksons removed invasives, reforested gaps in the canopy and even managed 29 acres to attract ground-nesting golden-winged warblers and American woodcocks.

"So many landowners don't value their forests because of economics," she said. "They value their well-being when they're in the forests. This way, landowners get money without cutting the trees. It gives landowners something to understand how important their forests are to alleviate climate change."

The Natural Capital Exchange started a different nationwide initiative in 2021, allowing entry into carbon markets by all forest owners, whether they own 2 or 2 million acres. Six counties in Pennsylvania were the test market.

So far, it has paid 240 landowners in Pennsylvania, Maryland, Virginia, West Virginia and New York, with a collective ownership of 222,000 forested acres, for one-year agreements to not harvest timber. At a recent carbon auction, eligible Pennsylvania forest owners received from \$5–\$10 per acre, depending on such variables as tree species, stand density and maturity.

"At NCX, we help forests and communities thrive by democratizing the benefits of carbon-removing incentives," said Zack Parisa, co-founder of the San Francisco-based company.

One big difference between the two programs is that the Family Forest Carbon Program seeks to consult with landowners in the long-term to create a healthier forest, while the exchange focuses on connecting forest landowners to carbon markets where they can sell credits to companies with a net-zero carbon pledge.

The family forest program pays landowners directly, hoping to recoup those costs once carbon credits are sold to Amazon, REI Co-op, The North Face and other Fortune 500 companies that have signed on to the effort.

Under the exchange, landowners accepted into the program — often those who actively harvest timber — are paid only after the carbon credits are sold at auction. The exchange has sold customers' carbon credits to companies such as Royal Dutch Shell and Microsoft.

Managers of both programs say landowners should do their homework and learn which program best fits their needs and goals. Each has restrictions that prevent a landowner from participating in both efforts simultaneously. ■

*Information about the programs can be found at [familyforestcarbon.org](http://familyforestcarbon.org) and [ncx.com/landowners](http://ncx.com/landowners).*

## BEAVERS & MUSSELS *from page 1*

fits with a lot of the things that we say we care about.”

The notion of involving beavers and mussels in Bay cleanup efforts highlights a growing interest in finding new ways to meet those goals as traditional tactics to control stormwater or reduce runoff from farms are falling behind schedule.

Restoring the natural water-cleaning services once provided by mussels and beavers can achieve similar results, advocates say, potentially at much less cost.

### Lessons learned from other places

The ideas are not novel. Beaver-based restoration is actively embraced in the Pacific Northwest, where conservation groups and federal agencies are enlisting the rodents in low-cost, low-tech efforts to restore stream systems that are vital for salmon.

In the Delaware River watershed, there’s a new 8,500-square-foot freshwater mussel hatchery at Bartram’s Garden in Philadelphia. Supported by the Partnership for the Delaware Estuary and Pennsylvania Infrastructure Investment Authority, the hatchery aims to produce up to a half-million mussels a year for regional streams.

So far, efforts in the Chesapeake region to enlist nature’s help have focused largely on rebuilding populations of oysters in salty Bay water. Those efforts have been costly and complex, and they provide benefits confined strictly to tidal waters.

The potential role of beavers and mussels, though, has been underappreciated, in part because of what advocates call “ecological amnesia.”

Beavers and mussels once played critical roles in maintaining healthy waterways, but their populations have plummeted.

Beavers were eliminated altogether in the region, and freshwater mussels are the most endangered class of organisms in the country. The Bay watershed is thought to have lost 90% of the mussel population it once had.

Lost with them was their critical importance in the ecosystem. Few people today realize the role they once played or consider the potential of their restored abundance.

Mussels are cornerstones of their habitats, providing food for other animals and often improving water clarity. Like oysters, they filter dissolved material from the water column, enhancing the removal of nitrogen — a key nutrient that fouls the Bay — as well as potentially removing other pollutants.

Similarly, allowing beavers to replumb stream systems and help restore their



*The amount of hatchery-grown mussels is set to increase in the Chesapeake Bay region as enthusiasm and funding for freshwater mussel restoration continues to grow. (Whitney Pipkin)*

original condition can sharply reduce pollution. The revitalized streams would also increase the diversity and productivity of streams for frogs, birds and fish, including some rare species; moderate fluctuations in stream temperatures; mitigate floods; and allow more water to soak into the soil, reducing runoff and recharging groundwater.

### Mussel power

While the benefits of restoring mussels cannot be precisely quantified, the recent scientific panel report said there are hints that mussels might reduce pollution as well as or better than traditional “best management practices,” such as planting forested buffers along streams.

Based on rough estimates, the report calculated that the Susquehanna River — the largest waterway feeding the Bay — in its pristine past might have supported enough mussels to remove as much as 8% of its current nitrogen loads to the Chesapeake. Today’s depleted population would remove only a fraction of that amount.

Restoring mussel populations, though, is not as easy as throwing them in the water. The report also calls for research that would help ensure such efforts succeed.

Surveys of historical and existing mussel populations are limited, making it difficult to know where efforts should be focused. There is also a lack of data on what caused certain mussel populations to decline in the first place, though poor water quality, developed watersheds and a loss of host species are among the likely factors. While

some mussel species are hardier than others, conditions may need to be improved before adding mussels to the system.

And while mussels help remove nitrogen from the water, they are often spread across a stream bottom — not clustered in reefs like oysters — and different species in various locations might filter at significantly different rates.

### Taking the lead, locally

Still, buoyed by a flurry of research and excitement around mussels, water quality

groups have begun spreading bivalves in areas where they’ve had a historical presence.

The Anacostia Watershed Society started growing mussels in floating baskets in 2018 after surveys dredged up evidence of eight native freshwater mussels in the Anacostia River, a heavily urbanized waterway that runs through the District of Columbia and part of Maryland.

Jorge Bogantes Montero, a natural resource specialist with the society, said the mussels have exceeded expectations with high survival and growth rates.

With grants from the District of Columbia Department of Energy & Environment, the National Fish and Wildlife Foundation and others, the nonprofit has since released about 19,000 mussels, mostly to the river’s Kingman and Kenilworth lakes. The mainstem of the river is expected to be dredged in the coming years to remove legacy toxics from the sediment and could one day be a candidate for mussels, too.

“We’ve been talking about wetlands for decades, and they’re important and cool,” Montero said. “But they just don’t catch the same attention as mussels. We get new members and donations just because of the mussel project.”

Emily Franc, vice president of development and philanthropy at the Potomac Riverkeeper Network, watched the growth of mussels in the Anacostia while serving as its riverkeeper from 2015 to 2018. She’s also seen the health of both rivers improve as sewage overflows have begun to be sharply reduced in recent years.

“I thought, ‘Wow, we’re really at that tipping point now where we’ve managed our



*Mussel enthusiasts have been working in the Anacostia River watershed for years. Shown here in 2016, Jorge Bogantes Montero of the Anacostia Watershed Society leads a group surveying for mussels through marshy areas of the river at low tide. (Dave Harp)*

pollution issues enough that we should be able to help mussels recover,” she said.

While researchers continue chipping away at the science of mussels, Franc wanted her group to serve as a catalyst. The network launched the “50 million mussel project” in 2020 to elevate the work under way and inspire more.

“If we can really explode this conversation, people will get excited,” Franc said. “People have been well-educated about oysters, so we think about them and fund them. We want to do the same with mussels.”

## Building better streams with beavers

Four hundred years ago, the Bay watershed was largely forested, dominated by old-growth trees with soft, spongelike forest floors that absorbed most of the rain before it had a chance to reach a stream. Most water flowed to streams through groundwater, not runoff.

Often, streams were not the single-channel waterways people envision today. Instead, they consisted of multiple braided rivulets. When it rained, water from those rivulets quickly spread across the floodplain, where wetland plants slowed the flow, allowing much of the water to soak into the ground.

The downstream flow was further hindered by the huge beaver population. Using twigs, sticks, small trees, mud and stones, their sturdy dams stood several feet high and could hold back acres of water.

Slowing stream movement also promoted natural processes that removed nitrogen from the water and captured phosphorus on the landscape.

Today, the notion that water should be kept on the landscape is often at odds with human perceptions of how streams should function and traditional approaches to restoring waterways. Essentially, modern stream restoration efforts often seek to establish stable channels that efficiently move water downstream to prevent flooding.

“Usually, we’re kind of gun-shy about having water stick around too long on the landscape,” Michelsen said.

But those engineered streams are costly. They typically require driving bulldozers into waterways to gouge away centuries of built-up sediment along steep streambanks and reconfigure channels. They sometimes draw controversy for cutting down trees in the process.

With beaver-based restoration, instead of excavating sediment along a deeply incised stream at huge expense, beavers are allowed to build a cascading series of dams that raise the stream level, allowing it to spread



*Beavers moved into this stream in Baltimore County, MD, and enhanced the engineered restoration work that had taken place there. (Dave Harp)*

over a new floodplain.

Getting beavers on the job can be tough, as rapidly flowing water in many of today’s degraded streams can blow out any beaver dam. The use of wooden “beaver dam analogs,” which mimic beaver dams, can reduce the flow until beavers take over.

Scott McGill, who heads Ecotone, an ecological restoration company, said that a traditional stream restoration costs, on average, about \$500

a foot. But simple techniques using beaver dam analogs are a fraction of that cost. There are trade-offs.

Beaver engineers are less predictable than their human counterparts, and their timetable is often longer — the stream transformation may take years.

But, McGill points out, the Bay watershed is drained by more than 100,000 miles of streams and many, if not most, are degraded. Beavers are the only available work crew with the potential to take on the job.

“We’re not going to be able to fix all these streams with rocks and logs and bulldozers,” McGill said. “How are we going to scale up restoration to make a difference? The only way is using nature to restore nature.”

## Incentivizing beaver work

Not everyone appreciates the beavers’ hard work. Flooding from their dams can

impact buildings, roads and sewer lines that have encroached into floodplains. Road culverts are a problem because the sound of water rushing through the narrow openings attracts beavers who treat it as a leaking dam and seek to “patch” it.

Flooding can often be managed by installing beaver-tricking devices. Typically, they include pipes that drain water from the top of a beaver pond — limiting the height of the water — and send it downstream, usually underwater so as not to alert the beavers.

One study in Virginia found that every \$1 spent on flow control devices at these culverts saved more than \$8 in beaver-related maintenance expenses.

Still, beaver boosters acknowledge that there are places where the rodents will never fit in. The Beaver Institute, a non-profit that seeks to build awareness of the beavers’ ecosystem benefits, estimates that trapping remains the most viable option for about 25% of conflicts.

Nonetheless, their pollution reduction potential is huge — if people can learn to live with them. Research at the Smithsonian Environmental Research Center in Maryland found that after beavers dammed a stream they were monitoring, it reduced nitrogen by 18%, phosphorus by 21% and sediment by 27%. That was a similar impact to a traditional stream

restoration project that later took place on the same waterway.

To encourage beaver recolonization, Michelsen, McGill and others are working on a proposal that would give local governments and landowners nutrient reduction credits toward Bay cleanup goals for having beaver dams on their property.

The idea is simple: Such credit is given for land planted in trees, turned into storm-water detention ponds or transformed by stream restoration projects. Why shouldn’t land covered by a beaver pond be treated the same?

Michelsen said that nutrient reduction credits would help local governments and others put a price on beaver benefits. That might lead them to provide additional protection for low-lying areas already susceptible to flooding in anticipation that beavers will eventually arrive. Land conservation programs might target those areas as well.

“So much of what we do, whether in business or in government is really trying to do a cost-benefit analysis,” Michelsen said. “We know pretty well what the costs are, whether it is having to trap beavers out or take steps to adaptively manage them or replace infrastructure that might be at risk. But we don’t have a sense of the quantifiable benefits. So, it’s really an attempt to sort of even that scale.” ■

After the region failed to achieve other nutrient reduction goals in 2000 and 2010, the EPA imposed what is known as a total maximum daily load, sometimes called the Bay’s “pollution diet.” That essentially sets a limit on the amount of nitrogen and phosphorus that can enter the Bay while maintaining adequate water quality to protect aquatic life.

As part of that, the EPA assigned maximum “loads” of nutrients that each state can send to the Bay. States have written plans showing how they will reach those goals, which they are supposed to fully implement by 2025.

Measuring cleanup efforts

Using computer models, the Bay Program assesses the amount of progress states make each year. The models incorporate a huge amount of information — land uses, discharges from wastewater treatment plants, the impact of air pollution, fertilizer use, the amount of manure generated from farm animals, and much more — to estimate the amount of nutrients that could reach the Bay.

Then, it incorporates data about steps

taken to reduce nutrient pollution, such as upgrading wastewater treatment plants, increasing streamside forest buffers, using stormwater control devices and planting cover crops. That produces an estimate of the amount of progress states make each year toward their goals.

But the findings of the models may differ from what actually happens in the Bay for a number of reasons. The estimates calculate nutrient reductions based on “normal” weather conditions. In reality, wet years tend to drive more nutrients into the Bay, while dry years wash in fewer nutrients.

Also, the estimates assume all nutrient reductions provide immediate results. While that is largely true for wastewater treatment plant upgrades, it often takes time — years in some cases — before the efforts aimed at controlling polluted runoff create a measurable impact.

For instance, trees in a newly planted streamside buffer can take years to become fully effective. Also, it can take a long time for the effects of upstream actions to reach the Bay. Much of the nitrogen is carried to streams through slow-moving groundwater, and phosphorus typically attaches to sediment particles that move slowly down

streams. As a result, it can take years for the impact of many nutrient control actions to be “felt” by the Bay.

How are we doing overall?

Overall, the region is attempting to reduce the amount of nitrogen that annually reaches the Bay by 71.5 million pounds. That’s based on a reduction from 270.8 million pounds in 2009 to 199.3 million pounds by 2025.

Through 2020, according to the latest model estimates, the region had taken enough actions to reduce the amount of nitrogen reaching the Bay by 29 million pounds a year, for a total annual load of 241.5 million pounds.

The phosphorus goal calls for an annual load reduction of 3.86 million pounds, from 17.17 million pounds in 2009 to 13.31 pounds in 2025. According to computer estimates, actions taken through 2020 were enough to reduce that to 14.72 million pounds.

Of the two nutrients, nitrogen has been more difficult to control. Unfortunately, it also tends to have the greater impact on Bay water quality.

Progress also varies by the source of the pollution. Most nutrient reductions have

come from wastewater treatment plant upgrades. Collectively, wastewater plants have already met their 2025 goals, though a few plants remain to be upgraded. On the other hand, according to the models, little progress has been made in controlling runoff from farms and developed lands.


Progress also varies by jurisdiction. The District of Columbia and West Virginia have largely met their goals. The others have not, and most of them are not working at a pace to do so.

Measured in pounds, Pennsylvania’s shortfall is by far the greatest. That state sends more nutrients to the Bay than any other jurisdiction, and most of them come from the more than 30,000 farms in its portion of the watershed.


How are individual states doing?

Here are the Bay Program’s computer model estimates of changes in nutrient loads from 2009 through 2020.

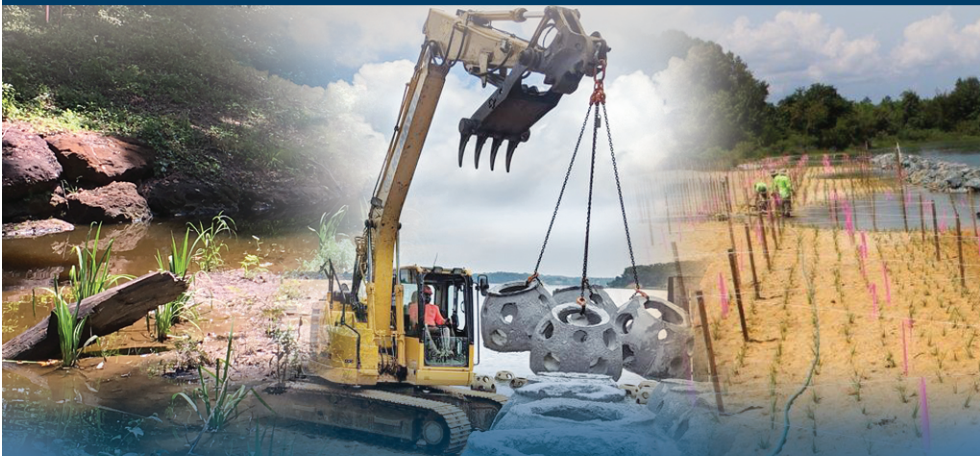
■ **New York** reduced its nitrogen loads from 14.42 million pounds in 2009 to 13.24 million pounds in 2020. Its goal is 11.8 million pounds. It reduced its phosphorus load from 739,129 pounds in 2009 to 577,824 in 2020. Its goal is 475,556.




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- **Pennsylvania** reduced its nitrogen loads from 113.23 million pounds to 105.99 million pounds. Its goal is 73.49 million pounds. It reduced its phosphorus loads from 4.46 million pounds to 3.75 million. Its goal is 2.9 million.
- **Maryland** reduced its nitrogen loads from 57.61 million pounds to 47.96 million pounds. Its goal is 45.83 million pounds. It reduced its phosphorus load from 4.15 million pounds to 3.69 million. Its goal is 3.67 million.
- **Virginia** reduced its nitrogen loads from 67.91 million pounds to 58 million pounds. Its goal is 52.95 million. It reduced phosphorus from 6.98 million pounds a year to 6.06 million. Its goal is 5.58 million.
- **West Virginia** reduced its nitrogen loads from 8.04 million pounds to 7.96 million pounds, surpassing its goal of 8.23 million pounds. It has reduced phosphorus from 630,660 pounds to 444,950. Its goal is 432,834.
- **Delaware's** nitrogen loads increased from 6.85 million pounds to 6.9 million pounds. Its goal is 4.55 million pounds. It has reduced phosphorus from 132,238 pounds to 121,154 pounds. Its goal is 108,446.
- **The District of Columbia** reduced its nitrogen loads from 2.76 million pounds to 1.42 million pounds, surpassing its goal of 2.42 million pounds. It has reduced phosphorus from 72,040 pounds to 63,496 pounds. Its goal is 130,065 pounds.

### Those numbers will change

But the Chesapeake region appears to be even further away from meeting its goals than those figures suggest.

After the 2020 estimates were released, the Bay Program found that a large amount of fertilizer data had been accidentally excluded from information fed into the computer models.

As a result, the models underestimated the amount of nutrients being applied to the land as fertilizer. Meanwhile, updated agricultural data revealed the presence of more farm animals than previously estimated, as well as changes in cropland.

Those data revisions, part of a model update submitted to states for review in February, increase the estimated amount of nitrogen entering the Bay in 2020 by 6.2 million pounds a year. That would place nutrient reduction efforts for 2025 even further offtrack.

Because the revisions mostly affect agriculture, the changes largely offset the amount of model-estimated progress made



*The reservoir behind Conowingo Dam on the Susquehanna River has filled with sediment, which means that more nutrient pollution is now washing past the dam toward the Chesapeake Bay. A regional plan was created to help offset the increased load of pollution but funding for the work remains uncertain. (Dave Harp)*

in reducing nutrient runoff from farmland in Maryland, Pennsylvania, Virginia and Delaware.

### The shadow of Conowingo

Another problem facing the region is figuring out how to handle increased nutrients washing past the Conowingo Dam on the Susquehanna River.

The 94-foot-high dam had been trapping some of the nutrients and sediment flowing down the river since it was completed in 1928, helping to reduce the amount reaching the Bay.

Although it had long been known that its reservoir would eventually fill, resulting in more nutrients flowing downstream, analysts didn't think that would happen until after 2025. But more recent work showed that it is already taking place.

Because that discovery was made after the EPA had assigned nutrient load reductions to the states, the region's states decided to handle the issue by developing a separate cleanup plan to offset the increased loads in the most cost-effective way possible.

That resulting plan aims to achieve annual nitrogen load reductions of more than 6 million pounds by installing more controls upstream of the dam, primarily in Pennsylvania, where controls are most cost-effective.

States have not yet come up with a way to jointly pay for the plan, estimated to cost more than \$50 million a year. The EPA said in late January that if watershed states did not find a way to do so within 60 days, it would spread responsibility for making the needed nutrient reductions among all

of the states in the watershed.

Those reductions would still meet the overall Bay water quality goals, but it would require places with less impact on the Chesapeake to do more — and that

means it would probably cost more to achieve the goals.

The rationale is that all jurisdictions benefited when Conowingo was helping to improve Bay water quality by trapping nutrients and sediments. That, in turn, lessened the allocations each state was assigned in the total maximum daily load.

Therefore, all states have some role to play in solving the problem.

### Is any help coming?

States have been receiving significantly increased federal funding, both from unspent COVID-relief money and the recently passed infrastructure bill. Further discussions are under way about giving a meaningful boost in the amount of federal agricultural money available for conservation practices in the Bay watershed.

Also, states have long contended that they are not getting full credit for existing runoff control practices in the complex system used to credit those activities in the computer models. Those procedures are getting a new look and may be revised.

The ultimate goal is to achieve cleaner water in the Bay itself, not in computer models. Model estimates do not always align with monitored trends. In some places, water quality is improving better than might be expected, and in other places, improvements are more muted. ■

*For information about the challenges, goals and status of the regional effort to restore the Bay, visit [chESAPEAKEbay.net](https://chESAPEAKEbay.net) and [chESAPEAKEprogress.com](https://chESAPEAKEprogress.com).*

*The Bay region may be even further away from meeting its goals than earlier computer modeling suggests.*



# UVA's 'green street' project earns top nod in BUBBA contest

## Quick Look



Stormwater work, combined with high aesthetic standards and the need to serve a public gathering space, transformed a highly developed area at the University of Virginia. The project team won a regional award for their accomplishments.

## By Ashley Stimpson

In their public-facing projects, stormwater management professionals must strike a balance between form and function. This can be especially difficult in highly urban areas, where impervious surfaces complicate management strategies and lots of eyes mean appearances count.

At the University of Virginia in Charlottesville, officials rose to that challenge with the newly completed Brandon Avenue Green Street, a 7.5-acre project that transformed a busy cul-de-sac into a “green district.” There, a four-cell bioretention basin treats runoff while serving as an

inviting gathering space for thousands of students and employees each day.

The project was honored with a 2021 BUBBA award from the Chesapeake Stormwater Network for Best Ultra-Urban Project. (An acronym within an acronym, BUBBA stands for Best Urban BMP in the Bay Awards, and BMP is short for best management practices.). The category recognizes the best application of green infrastructure in areas where impervious surface makes up more than 75% of existing groundcover.

“The project presented a vision for public spaces that are mixed-use and student-oriented, while being visually interesting and functional from a stormwater perspective,” said David Wood, stormwater coordinator for the Chesapeake Stormwater Network. Wood noted that UVA’s success can serve as “a potential model for other campuses, and larger, highly impervious public spaces around the watershed.”

## Challenges of historic proportions

The Brandon Avenue project was nearly 15 years in the making; it was first outlined

in the university’s 2008 masterplan for campus growth. But UVA’s commitment to balancing the constructed environment with the natural one can be traced back to its founder, Thomas Jefferson. The nation’s third president carefully conceived his “Academical Village” — which still serves as the heart of campus today — by emphasizing the “powerful contrast between built geometry and the softness of natural form.” Jefferson was so successful that the campus he designed eventually became a UNESCO world heritage site.

But much has changed since Jefferson’s days in Charlottesville. Both the town and school have experienced tremendous growth, leading to a proliferation of concrete and untreated runoff. To begin to remedy this, officials identified Brandon Avenue, a 1,000-foot no-outlet street surrounded by parking lots, as an ideal redevelopment site because of its low-lying topography. “It’s one of the lowest points in the local watershed,” said Julia Monteith, UVA’s associate planner.

Brandon Avenue also is a central location on campus, connecting the university’s

health system and arts and science building with the historic Academical Village. Instead of an unattractive, underutilized thoroughfare, officials envisioned a fully realized mixed-use space that would enhance existing pedestrian connections while treating stormwater in a highly impervious area.

But there were a number of challenges, the first of which was designing stormwater treatment infrastructure that would blend in with the beauty of UVA’s existing campus. Second, construction would take place in a densely populated area, where maintaining emergency access and utility services for surrounding buildings was paramount. The site would also need to be safe for pedestrians, cars and large vehicles delivering construction materials.

## Pooling private & public support

To complete this \$20 million dollar project, UVA assembled a team of partners

*Above: An artist’s work depicts the design and features of Brandon Avenue at the University of Virginia, compared with its previous state as shown in the inset photo from Google Earth. (Perkins & Will)*

that included civil and structural engineers, urban planners and construction specialists. The Charlottesville community also played a large role in developing plans for the Brandon Avenue Green Street. When the university was creating its 2008 master plan, it hosted a number of workshops and townhall-style meetings to generate concepts for the new district.

In 2014, when the university's Office of the Architect began developing a design for Brandon Avenue, it again called on the community to contribute ideas, one of which was the central green space that came to define the project. As work continued, project leaders invited residents from adjacent neighborhoods to community meetings where they could review and provide feedback on the plan, which considered how the project might alleviate stormwater issues for downhill, downstream neighborhoods as well.

During the construction phase, the team had weekly multiparty coordination meetings to navigate logistical challenges like managing traffic, utilities and access. Team leaders also requested regular site visits from the Virginia Office of Safety and Health to ensure no safety risk had been overlooked. During the 30 months and 130,000 work hours that it took to complete the Brandon Avenue Green Street, no recordable incidents or lost-time injuries were reported.

Form & function

Today, Brandon Avenue is a vibrant, student-oriented, mixed-use district connected by a working landscape. “As beautiful as it on the surface,” Monteith said, “the real complexity is what’s going on underground.”

The centerpiece of the area is the bioretention median that bisects two, wide walking paths and treats runoff from nearly 5 acres of largely impervious surfaces. Stormwater from the street and nearby roofs is channeled into the median, where it is distributed evenly among the multiple cells, slowed down and given time to infiltrate the soil and gravel reservoir. The bioretention system provides total pollutant reductions of 4.95 pounds of phosphorous and 41 pounds of nitrogen each year. For every 1.0 inch of rain, the system reduces runoff by 40%.

Four resilient plants — switchgrass, Virginia sweetspire, winterberry and common rush — grow in the bioretention median, carefully chosen for their aesthetic value, ease of maintenance and suitability for climatic conditions. Monteith said that the landscaping was “custom-designed,”



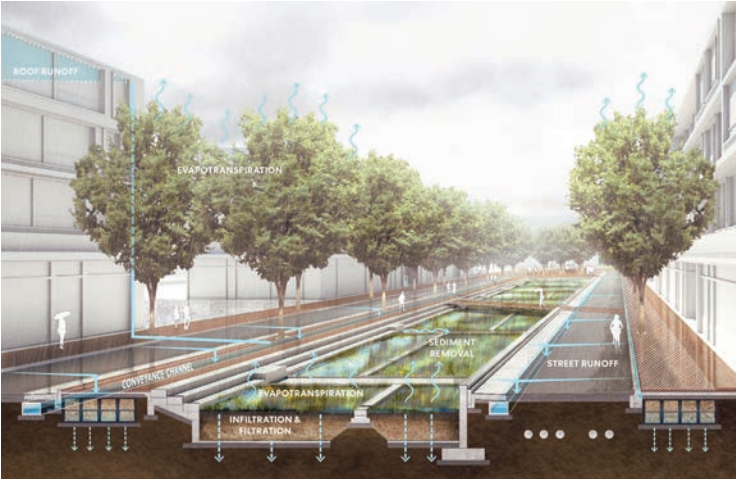
with a variety of plants to be visual interesting. “So it really does feel like an urban landscape, not a stormwater feature.”

The team also collaborated with UVA’s landscape architects to ensure continuity between the historic areas of campus and the new green space on Brandon Avenue. The landscape plan also increased the urban tree canopy with 65 new trees along Brandon Avenue — red maple, black gum, bald cypress and willow oak — planted along the street and in connecting parks and landscape spaces.

Because an estimated 95% of students walk, bike or use university buses, project leaders prioritized mobility and accessibility. A one-way vehicle loop gives pedestrians and bicycles a wide berth, while existing large surface lots are slated to be replaced with building-integrated parking or additional green space. Because of existing street grades, ADA access on existing paths and sidewalks was a challenge. The team worked with the university to create alternative routes through the district.

Finally, to ensure the new district would fit in with its attractive surroundings, the design team added thoughtful touches. For example, the concrete dissipaters in the retention basin that slow the flow of stormwater are imprinted with a wave pattern, echoing the movement of water through the feature. A gentle cascade of steps flanks the east side of the median, inviting people

*The reinvention of Brandon Avenue involved an intense and complicated construction process in a densely developed area. Stormwater management was designed to capture all of the runoff from the site, including and existing buildings. (Above, Barton Mallow / Right, Perkins & Will)*



to gather in the shared space and interact with the stormwater infrastructure. When construction on the entire district is complete, seven LEED-certified buildings will frame the green street, adding nearly 500,000 square feet of mixed-use space, including student housing and a student health center.

A learning opportunity

Stormwater management solutions rarely take center stage when it comes to the design of a public space. Most often, stormwater infrastructure is hidden from view, channeling water and runoff away from common areas with as little fanfare as possible. But the Brandon Avenue project turns that convention on its head, making the bioretention basins the centerpiece of

the redevelopment effort. Project staff hope that this strategy will serve as an educational function for the school’s students, its presence encouraging questions and discovery about the role of stormwater management in a healthy watershed. They envision the green street will also serve as a “living laboratory” for university classes to study engineering, design and sustainability. According to Monteith, students have taken part in stormwater monitoring at the site, and professors at the university’s school of architecture have begun incorporating Brandon Avenue Green Street in their lesson plans. “The students are using the space casually, but studying it, as well,” she said. ■

Barbara Humes has been involved with clean water and land issues in Jefferson County, WV, as both a volunteer and an elected member of the Harpers Ferry Town Council.

Barbara served on the town council from 2017 to June 2021 and is a member of the Safe Water for Harpers Ferry Partnership. She previously served as the Harpers Ferry water commissioner, chair of the Elks Run Watershed Study Committee and municipal liaison to the Jefferson County Planning Commission. She has also been a member of the Harpers Ferry Planning Commission, Harpers Ferry Comprehensive Land Use Plan Committee and Jefferson County's Envision Jefferson 2035 Steering Committee. She is currently a member of the Board of Directors for the Land Trust of the Eastern Panhandle, as well as chair of the Harpers Ferry Woman's Club scholarship committee and a member of the Jefferson County Youth Board.

Barbara is a native of Martinsburg, WV. She graduated from Shepherd College (now Shepherd University) and the University of Maryland. She is retired from the U.S. Department of Education and lives in Harpers Ferry.

### What experiences have influenced your work in public service?

**Barbara:** My parents were very focused on learning and education. Sundays after church, dad would drive us around Martinsburg and the Eastern Panhandle, pointing out historic places. He'd tell stories about Shepherd College and Harpers Ferry, which was still a ghost town then, old mills and back roads. My mother got us involved in 4H, but I didn't enjoy the projects designed for girls, like packing lunches, cooking and sewing. So I started to introduce projects like tree identification and photography. In Martinsburg, 4H wasn't centered around farm animals. The experience was different — how to run a meeting, give a public talk. It was a foundation for public service, and as officers for the club we gave talks and wrote reports. I got comfortable with public speaking.

### Why did you run for office?

**Barbara:** I wanted to make a difference in the community. I didn't run for power or financial gain. I wanted to do the best I could to help the community thrive. And as chair of the water commission, I



Barbara Humes is a leader in land use and clean water issues in Jefferson County, WV. (Submitted photo)

built relationships with elected officials. Eventually, I decided to run for public office in order to help move a major water infrastructure project ahead. As an elected official, I was able to make sure it was brought to fruition expeditiously.

Before that, though, and before my being on the water commission, I was the chair of the Elks Run study committee, appointed by the local mayors. That came about in response to West Virginia's Source Water Assessment and Protection Plan. At the time the SWAP was presented to the town council, I was attending council meetings as an amusement. The council hadn't thought much about what was going on at the water plant or how to plan for its future, for optimum operation. They seemed stumped with how to proceed, so I raised my hand and said, "I could do something to help with that." I was a program officer at the U.S. Department of Education, so I had skills to help the town get on their feet with a source water protection plan.

### What do you think gets people interested in clean water projects?

**Barbara:** I am a citizen not a scientist. I take a wider view and try to see the whole picture. In addition to scientists, I had to engage public officials, public schools, public media, newspapers, TV and radio. You have to get to the basics with the

general public. You have to protect your natural resources. Here it's Elks Run and the Potomac River. That's our drinking water source. If we didn't understand where our water comes from, we could lose it without even knowing what happened. Educational outreach had to be done in a way that was in layman's terms, so that people could make the connection between what we were drinking and where it came from. The stream runs through the county through farms and woodlands and urban areas and underground and along a railroad track. It meanders through a lot of different environments, from rural to urban, so it was necessary to understand that. And it was necessary to appreciate what has to happen at the treatment plant, so that what we get out of our faucets is clean.

You also have to have interesting activities, something people can attend or read or bring kids to. Kids are an important tactic. When you get the kids involved, they get their families involved.

### What is one of your greatest accomplishments and what did you learn from it?

**Barbara:** Earlier in my life, I was active in historic preservation in Silver Springs, MD. At the time, the historic character of the community was being threatened by new development. I lived in the

Falkland apartments complex, the first garden apartment complex built through a public-private partnership during the FDR administration, with actual gardens. We managed to preserve a large portion under a historic designation, and we exercised a county ordinance that gave us first right of refusal to fend off the developer. Our tenants group put down the couple hundred dollars required to hold it, and we flipped it to a developer who was going to preserve it. And we kept it as low- to moderate-income apartments. I learned how to use the government process and how to use media to raise awareness about issues impacting the community.

### How did your experience in local government inform your work in the community today?

**Barbara:** I learned that the wheels of bureaucracy turn very slowly. You have to follow the rules and the laws. People get in office thinking they'll be able to change things quickly, but they can't. In order to cross the T's and dot the I's, you have to follow the rules and the processes. For example, if a proposed ordinance requires two readings, it may take two months or more. To purchase services, you have to release a request for proposals and follow the rules.

### What are you most excited to work on in the coming year?

**Barbara:** At the land trust, we're hoping to encourage more private landholders to consider putting important natural lands under conservation easements. I'm excited to be a part of that effort, and I'm working with very talented people. The visioning process is under way, looking at complementary properties like forest land that protects viewsheds and historic properties. The water-land connection is a big driver. Water is more important than gold.

### Do you have a favorite quotation or source of inspiration?

**Barbara:** A poem called *To Be of Use*, by Marge Piercy. This stanza stands out in thinking about public service:

*I love people [...] who strain in the mud and the muck to move things forward, who do what has to be done, again and again.*

## Sustainable communities are key to environmental justice

By Jasmine Gore

As we continue our crusade as stewards to conserve the Chesapeake Bay and its tributaries, it is impossible not to think of the 18 million people who live, work and play in its watershed.

Environmental protection is a job for all of us. But, as local governments leaders, we are the secret weapon for strengthening the connections between residents, their communities and their environment to maintain sustainable practices over the long term and reach our local and common goals. Local elected officials have the opportunity to understand the complex environmental needs of their communities and voice those concerns.

The end result should be to create and maintain a resilient society that promotes ecological wellness and improved health for all, right? To achieve our common goals, we must have real and frank conversations about environmental justice.

According to the U.S. Environmental Protection Agency, environmental justice is “the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income, with respect to the development, implementation and enforcement of environmental laws, regulations and policies.” The movement began during the Civil Rights era, when individuals fought against hazardous dumping sites that bordered their communities and caused numerous health concerns.

Similar documented cases of residents fighting for equitable support led to a first-of-its-kind toxic waste study by the United Church of Christ Commission on Racial Justice in 1987. The commission found that “over 15 million African Americans, 8 million Hispanics, and half of all Asian/Pacific Islanders and Native Americans resided in communities with at least one abandoned or uncontrolled toxic waste site.” This study showed the disproportionate correlation between race and socioeconomic status and the placement of hazardous sites.

These situations can be directly traced to redlining, which established neighborhood boundaries that limited or restricted access to certain amenities and services based on discriminatory social constructs. It derived



Equal access to the decision-making process is a key element in environmental justice. Here, a group gathers for an empowerment forum in Newport News VA. (Darius Stanton/Chesapeake Bay Program/2017)

from an era when the Home Owners' Loan Corp. designed color-coded maps of major cities to inform financial lenders of mortgage risks in certain areas. According to the National Community Reinvestment Coalition, “Neighborhoods considered high risk or ‘hazardous’ were often ‘redlined’ by lending institutions, denying them access to capital investment which could improve the housing and economic opportunity of residents.” The impact of environmental inequities on historically redlined communities still exists prominently today.

For the EPA, environmental justice is achieved when everyone has the same degree of protection from environmental and health hazards *and* has equal access to the decision-making processes that ensure a healthy environment.

It is important to remember that these goals do not pertain to low-income or racially marginalized communities only. When we talk about environmental justice, we talk about equity among diverse societies and landscapes as well. For example, a bustling urban sector and an active coastal town do not experience the same challenges. Factors associated with climate, population density, air quality, infrastructure and recreational access, to name a few, all vary by location and should not be generalized or dismissed. As local elected officials, understanding our communities’

demographic, regional and land use data is paramount to creating equitable and sustainable strategies.

We also must do our part to inform and engage our constituents on policies that promote a sustainable society. We have an obligation to translate how protecting the land we live on, the water we drink and the air we breathe is critical to the everyday lives of local residents. We can do this by acknowledging our current needs, future goals, and truths related to the environmental inequities we identify and assess.

So, how can local decision-makers challenge injustice in their communities? Sustainable neighborhoods are key. Here are some actions that can meaningfully integrate environmental justice principles into advocacy and decision-making while fostering a sense of place among residents.

■ **Identify smart growth solutions.** Smart growth is a concept that prioritizes meaningful societal development by encouraging collaboration and the implementation of “green” initiatives. It supports inclusive housing according to the culture of the community, safe walkable neighborhoods, incorporating green spaces and the analysis of innovative long-term developmental strategies. This approach aims to connect residents to their neighborhoods, and local governments to the development process, in an efficient and sustainable manner.

■ **Support efficiency measures in affordable housing.** It may sound costly, but the installation of energy-efficient devices within residential buildings and affordable housing can have many benefits. The EPA’s *Energy Efficiency in Affordable Housing* guide for local governments analyzes the potential impacts. It explains the benefits, such as improved housing costs for low-income communities and reduction of greenhouse gas emissions. Insufficient planning for residential neighborhoods, including both the misuse of energy-conscious external (windows, insulation, etc.) and interior materials (paint, indoor appliances, etc.), can lead to the overproduction of nearby industry, increased environmental and public health risks, and higher displacement of residents.

■ **Invest in green infrastructure.** Installations of forest buffers or rain gardens help beautify the community while capturing polluted runoff. They also help combat climate-related problems. Green infrastructure may meet with reluctance, though. Check out the EPA’s guide to *Overcoming Barriers to Green Infrastructure* to understand what can work best.

■ **Create workforce benefits.** It’s important to understand the return on investment from establishing careers dedicated to launching and maintaining green initiatives. Building a green workforce can stimulate the local economy, create opportunities for a diverse public and improve the value of sustainable practices on a consistent basis.

The impact of sustainable communities can lead to increased life expectancies, an influx in the local economy and the attainment of your environmental goals. And that can affect your community for generations to come.

So the next time you think about conservation, ponder the gaps between the communities you serve. Only together can we protect our local waterways, so let’s encourage each other and get on the same page. Are you doing your part to fight for all through environmental justice? If not – talk about it. ■

*Jasmine Gore is a councilmember in Hopewell, VA, chair of the Local Government Advisory Committee to the Chesapeake Bay Executive Council.*

## Ask the Expert: Climate action at the local level

**Question:** I want to help address the challenges of climate change with local projects and policies. But can local governments with limited resources really make an impact? *This answer is from guest columnist Adriana Hochberg, climate change officer for Montgomery County, MD.*

**F**irst, take a deep breath. Climate change is here and now, and it will continue to be a menace in the decades to come. Tackling climate change is going to be a long-term effort, and I'm glad that you are actively considering how to get started. Working on climate change issues is akin to taking part in an ultra-triathlon — you need to flex different types of muscles and have both a plan and the tenacity to carry it out, even when success is not assured.

Local governments have an important role to play in reducing greenhouse gas emissions and increasing resilience to a changing climate. Through building codes, ordinances, financial incentives, purchasing decisions and transportation policies, our local-level actions can make a real impact.

### I don't have dedicated staffing or a budget for addressing climate change. How do I get started?

The most important piece of advice I have for you is to build a team. Addressing climate change is not a one-person job. It takes a coordinating team to plan, identify resources and take action. Look to your county or municipal departments for help, and to your community. You already have talent on your bench.

Addressing climate change does not have to be yet another thing on top of everyone's day-to-day jobs. Climate change considerations can be incorporated into the work that people are already doing. And, if you are a Maryland or Pennsylvania community, your employees can get free

climate change training through the Maryland Climate Leadership Academy or the Pennsylvania Climate Leadership Academy.

Also consider partnering with a university or community college. They may be able to provide technical assistance to your community on climate issues. One example is the Environmental Finance Center at the University of Maryland. Student interns can expand your capacity to get climate work done. Graduate students are often looking for semester-long research projects for course credit.

### What should I focus on first?

There is a lot to be done, and it can feel overwhelming. But you can't do everything at once. So, you will need to prioritize what you can tackle in the short-term. You need a plan of action. Decide whether you are first going to focus on reducing greenhouse gas emissions from your government operations, take a communitywide approach to reducing emissions or address ways to become more resilient to climate hazards. Or perhaps you want to address some aspects of all of these simultaneously. There is no wrong starting point, but you need to be clear about what you are attempting to do.

Conducting an inventory of your greenhouse emissions is a basic step, but it's not an essential first step. There are shortcuts to estimate your emissions. You can start by looking up your state's emissions inventory. You can also look at the inventories of other communities in the region with a size comparable to your own. These will give you a good order-of-magnitude baseline of your own community's emissions.

Even without knowing your community specifically, I can already tell you that a large share (at least 40%) of your



*In many communities, energy use for existing buildings is the main source of greenhouse gas emissions, followed by the transportation sector. (Dave Harp)*

community's emissions are coming from existing buildings, and another large share (at least 25% and likely higher) is coming from the transportation sector. The remaining emissions in your inventory most likely come from a mix of drinking water and wastewater treatment processes, solid waste management, refrigerant emissions, fugitive emissions from natural gas pipelines and industrial processes.

Because most of your community's greenhouse emissions come from buildings and transportation, you should identify strategies to reduce those emissions, as well as strategies to procure or generate more carbon-free energy. You will also need strategies to reduce risks from climate hazards impacting your community — extreme precipitation and extreme heat are two of the bigger ones. The U.S. Climate Resilience Toolkit is a

helpful resource.

Issues of racial equity and social justice tie directly into all of this. Black, Indigenous and other people of color are disproportionately impacted by climate change. Your actions must prioritize and support the needs of these community members.

My parting advice is to be flexible because you will need to adjust your plan as you go. This work is challenging and complex, but opportunities abound to build a stronger, healthier community now and into the future. ■

*Adriana Hochberg is a certified climate change professional and founding member of the Maryland Climate Coalition of local governments. As the climate change officer for Montgomery County, MD, she leads the county's efforts to combat climate change.*