Citizens Guide to Restoring the Bay:

What Every Resident Can Do

MARYLAND
Smart, Green & Growing

Citizens Guide to Restoring the Bay:

What Every Resident Can Do

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Citizens Guide to Restoring the Bay: What Every Resident Can Do

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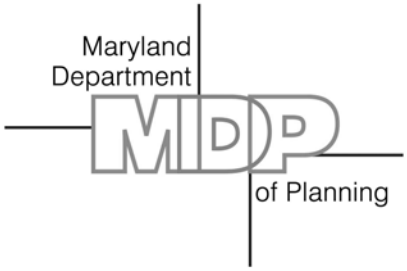

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Foreword by Governor Martin O'Malley

Restoring the Chesapeake Bay to health is a goal we all share as Marylanders. It is critical we succeed if we want to pass on a cleaner, greener Maryland to future generations.

That's why we have made restoring the health of the Chesapeake Bay one of the strategic goals for our state. Under this strategic goal, we strive to achieve a fully restored bay by 2025.

Working together, we have already made great progress. Maryland's cover crops program reports more than 415,000 certified acres in place in 2013 – a 232 percent increase since 2006. Maryland has upgraded 30 wastewater treatment plants to include enhanced nutrient removal, which greatly improves their efficiency and supports thousands of jobs for Marylanders.

When the U.S. Environmental Protection Agency developed the Chesapeake Bay Total Maximum Daily Load – what we call the pollution diet – to spur bay restoration efforts, Maryland developed a Watershed Implementation Plan that lays out a course for achieving a healthy bay by 2025. Landmark legislation in 2012 mapped out a path for the state to limit residential development with on-site septic systems – one of the unseen offenders of nitrogen pollution.

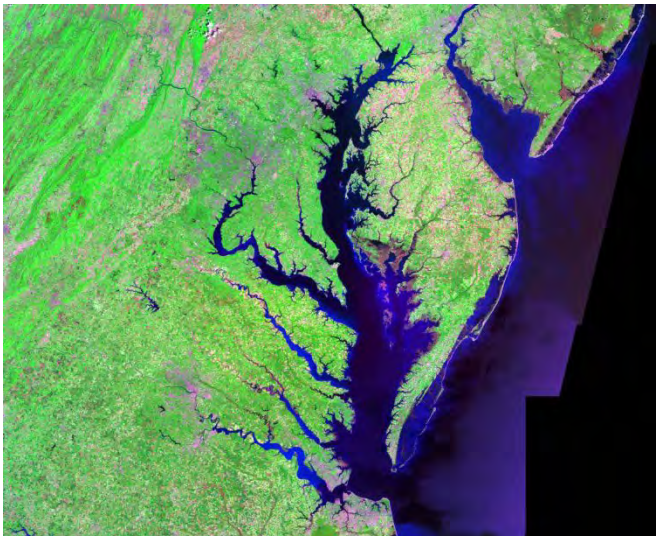
While your state government is working hard to save the bay, we can't do it without you. That is why we created a *Citizens Guide to Restoring the Bay: What Every Resident Can Do*. As homeowners, business owners, developers and farmers, you can play a significant role in accelerating bay restoration.

This guide outlines practical, easy-to-implement steps you can take to participate in protecting Maryland's most treasured natural resource. As you review this guide, consider how you might join us in achieving our shared goal of restoring the mighty Chesapeake Bay.

Introduction

The Chesapeake Bay, one of the largest and most biologically productive estuaries in the world, is a national treasure. The largest U.S. water body where fresh and salt water mix, the Chesapeake has been the focus of significant efforts by federal, state, and local governments and others to reverse and stem pollution and achieve water quality standards. The pollutants largely responsible for impairment of the Bay are nutrients – nitrogen and phosphorus – as well as sediment.

On December 29, 2010, the U.S. Environmental Protection Agency (EPA), with the Bay watershed states of Maryland, Virginia, Pennsylvania, Delaware, West Virginia, New York, and the District of Columbia, established a nutrient and sediment pollution plan for the Bay. Dubbed the "Bay diet," the plan measures the daily load of nutrients washed into the Bay and, consistent with Clean Water Act requirements, aims to guide and assist restoration efforts.



The Chesapeake Bay watershed encompasses over 64,000 square miles in 6 states and the District of Columbia. Approximately 96% of Maryland's land is within the watershed. The bay itself is shared equally by Maryland and Virginia.

The Chesapeake Bay Total Maximum Daily Load (TMDL) requires that all the jurisdictions in the Chesapeake Bay watershed significantly reduce the amount of pollution entering the Bay by 2025. The Bay TMDL is a limit of pollution that can enter the Bay and still allow the ecosystem to thrive. Currently, pollutants are entering the Bay at levels far above what the ecosystem can handle.

Excess nitrogen and phosphorus feed algae that, as it decays, robs the Bay of oxygen, producing dead zones that threaten fauna such as oysters, rockfish, crabs, menhaden, etc. Sediment – dirt, sand, and silt – blocks light from reaching the bottom of the Bay and prevents underwater grasses, which replenish oxygen in the water and provide safety for juvenile animals, from growing.

Reducing Nutrients

Crucial to the state's economy, heritage and culture, a healthy Bay would benefit Maryland's tourism, recreation, agriculture and fishery industries.

To succeed in restoring the Bay, Maryland government officials at all levels must craft and implement effective strategies. The counties and municipalities in Maryland within the Chesapeake Bay watershed – some 180 jurisdictions - have established strategies to reduce levels of pollution in a document called the Phase II Watershed Implementation Plan (WIP). Maryland finalized its Phase II WIP in October 2012 and worked with county and municipal leaders to garner commitments to meet the TMDL at local levels. Not only will fully implementing the WIP restore the Bay, it also will have a positive impact on local water quality and drinking water supply.

Nutrients and sediments enter local waterways and the Bay in a number of ways, including stormwater runoff, air pollution, and wastewater pollution. Reducing pollution before it gets into the water is the best way to restore the Bay and local waterways. This guidebook provides a list of solutions that residents, businesses and farmers can use to limit or prevent pollution to the Bay.

Some practices identified include:

- replacing paved, impervious surfaces with surfaces that allow rainwater to soak into the ground
- replacing old or failing septic systems with systems more efficient at reducing nutrient pollution
- connecting septic systems to more efficient wastewater treatment plants
- upgrading municipal wastewater treatment plants with technology that considerably reduces nutrient pollution.

The farming community has worked with the state to ensure they get credit for current nutrient pollution reduction practices. Farmers also have pledged to identify additional practices to reduce nutrient pollution and to update the system EPA uses to estimate pollution reduction from environmentally sound farming practices.

Ecosystems require a delicate balance in order to thrive. The nutrients we consider pollution are only detrimental in amounts that the ecosystem can't use.

The EPA will hold state and local jurisdictions accountable for implementing the WIP strategies. For example, if Maryland does not reduce pollution quickly enough to the Bay, EPA could issue new or more restrictive pollution reduction permits to ensure we achieve our WIP strategies. In addition, the WIP represents a solemn commitment to future generations in Maryland that we will strive to reduce the pollution going into the Bay. The longer we wait, the higher the cost.

For more information please visit:

www.chesapeakebay.net/takeaction/howtotips

www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/programs/waterprograms/tmdl/implementation.aspx

www.mde.state.md.us/PROGRAMS/WATER/TMDL/CHESAPEAKEBAYTMDL/Pages/programs/waterprograms/tmdl/cb_tmdl/index.aspx

www.epa.gov/chesapeakebaytmdl/

www.mde.state.md.us/programs/Marylander/outreach/Pages/ReclaimtheBay.aspx

Accounting for Growth and Offsetting New Pollution

As we implement the practices outlined in the WIP to reduce current loads to meet the Bay TMDL, Maryland will continue to grow. By 2040, Maryland will grow by 1 million people, which is nearly 60,000 people each year, or the equivalent of 17 cities the size of Rockville or Frederick. Houses, commercial and industrial buildings, schools and libraries will continue to be built, and pollution from urban and suburban development will grow. Bay restoration efforts need to keep pace with or exceed growth and development. Once we've met the Bay TMDL we must keep pollution levels static in order to maintain the health of the Bay. Growth and development, the fastest growing source of pollution in the watershed, will continue to add pollution to the Bay. Unless this pollution is mitigated with programs and efforts that go beyond the strategies listed in the WIP we will undo all the hard work of local governments, citizens, and the state to restore the Bay.

Development has a direct impact on Bay health. Growth closest to the Bay can have the most direct impact but even growth far from the Bay can have a negative impact on local streams and rivers. Those streams and rivers lead to the Bay.

Farmers already have a program to sell credits in Maryland (through nutrient trading) to wastewater treatment plant owners and others who might need to offset new pollution. For more information on nutrient trading, please visit:

nutrientnet.mdnutrienttrading.com/

A variety of practices can be put in place on farms to capture water running off the fields and the nutrients essential for plant growth.

The Role of Citizens

In the following sections, we present simple, straightforward pollution reduction practices for homeowners, business owners, developers and farmers to help restore the Bay. This list is not exhaustive: please see the webpages for the Maryland Department of the Environment (www.mde.state.md.us), the Maryland Department of Agriculture (mda.maryland.gov), the Critical Area Commission for the Chesapeake and Atlantic Coastal Bays (www.dnr.state.md.us/criticalarea), and the U.S. Environmental Protection Agency (www.epa.gov) for more information about nutrient and sediment reducing practices. Also, please contact your local government, University of Maryland Extension (extension.umd.edu), local Soil Conservation District, or your local watershed organization for technical assistance and additional guidance.

> The places where we live and work account for approximately half of all the pollution in the Chesapeake Bay (www.baystat.maryland.gov/sources 2.html). This includes runoff that washes across pavements, rooftops and lawns during rainstorms, and the wastewater treatment plants and septic systems that treat the water that leaves our houses and businesses

Homes and Businesses

There are a number of ways each of us can reduce pollution at home and the workplace.

Maryland's Lawn Fertilizer Law

Nutrients, primarily nitrogen and phosphorus, are key ingredients in lawn fertilizer, which is used on golf courses, parks, recreation areas, athletic fields, businesses and hundreds of thousands of suburban and urban lawns.

When it rains, excess nutrients can wash off the land and into the streams and rivers that feed the Chesapeake Bay. Once in our waterways, excess fertilizers fuel the growth of algae blooms that rob the water of oxygen, block sunlight from reaching Bay grasses and threaten underwater life.

Spreading of lawn fertilizers contributes to the nutrient (nitrogen) load in the bay. New regulations limit nutrient levels in fertilizer to help reduce pollution.

Lawn fertilizer accounts for approximately 44 percent of the fertilizer sold in Maryland. While restrictions on fertilizer use have been in place for farmers since 2001, homeowners and lawn care professionals also need to address fertilizer use if Maryland is to meet new nutrient reduction goals outlined in its Watershed Implementation Plan (WIP) to restore the Bay. Maryland's new lawn fertilizer law affects fertilizer manufacturers and distributors, lawn care professionals and homeowners. Specifically, the law prohibits labeling fertilizer as a deicer and requires specific language about applying fertilizer, both of which should reduce the amount applied, and prohibits lawn fertilizer from containing phosphorus (except for starter or organic fertilizer). For more information please visit the following link:

mda.maryland.gov/Pages/fertilizer.aspx

Permeable Pavers/Porous Pavement

We have designed systems to dispose of rain and snowmelt in ways that are easy to install and require little to no maintenance. Decades-old systems of concrete and asphalt efficiently move water from places we don't want it to the nearest stream or river. The problem is that any pollution (from the air, fertilizers, pet waste and other sources) within this stormwater goes straight from those hard surfaces into local streams. These collection systems also speed up and allow the sun to more easily heat the stormwater runoff, which then erodes stream banks and hurts fish and aquatic wildlife. Porous surfaces, sometimes called

Permeable pavers allow water from rain to flow through traditionally impervious paved surfaces into the ground thereby reducing run-off to streams

pervious surfaces, like permeable pavers and porous pavements, allow for water and pollution to flow through them, or infiltrate, into the ground. Water infiltration replenishes ground water supplies used for drinking water in wells and reservoirs. The pollution carried by the water is filtered through the ground and is either held in place or used by plants.

In many instances, permeable pavers can replace concrete or asphalt as an easy do-it-yourself project. However, in places that support weight, like driveways or parking pads, it's best to get the help of a professional in designing and installing permeable pavers to ensure safety and durability.

Porous concrete is another solution to excess stormwater run-off that preserves the look of traditional concrete

Porous pavement works just like permeable pavers in that it allows water to flow through the pavement into the soils below but it otherwise looks and functions exactly like concrete. Because it is concrete and requires levels of substrate to support the weight of the concrete while allowing water to flow through, installation by a professional is required. Porous pavement must be cleaned periodically to remove small particles that accumulate and prevent water from flowing freely. Please visit the resources below for more information on permeable pavers and porous concrete:

stormwater.allianceforthebay.org/

www.lid-stormwater.net/permpavers_benefits.htm

www.lid-stormwater.net/permpaver_costs.htm

www.chesapeakestormwater.net/2012/03/design-specification-no-7-permeable-pavement/

Rain Gardens/Disconnected Downspouts

Water that runs off lawns, sidewalks, driveways, rooftops, and compacted soils in developments is full of nutrients that, in excess, are considered pollutants. In the right amounts, these nutrients and the water carrying them can help plants grow. In many places around the state and beyond, people are creating gardens that are designed to capture runoff from paved surfaces and rooftop downspouts.

Rain gardens combine aesthetics of landscape design and pollution reduction

Rain gardens are an excellent and simple way for homeowners and businesses to reduce nutrient pollution. They also offer an opportunity to plant native species that support wildlife and minimize the spread of invasive species. Rain gardens can be created in normal depressions in the landscape where water pools naturally according to the slope and contour of the site or can be part of a redesign that mimics normal hydrology (the path of water). Downspouts also can be reconfigured to direct water to these areas rather than allowing them to drain onto hard surfaces, into flower beds, or across lawns. Also, in more urban areas, pavement removal can open up new green areas for rain gardens.

State and local programs offer assistance to homeowners and business owners in designing and creating attractive and functional rain gardens. Please contact the Maryland Department of Natural Resources or a similar entity within your local government for more information about installing a rain garden. More information about rain gardens and their benefits can be found at the links below.

http://www.dnr.md.gov/sustainability/individuals.asp

www.rainscaping.org/index.cfm/fuseaction/home.showpage/pageID/5/index.htm

www.chesapeakeecologycenter.org/index.asp?Type=B_BASIC&SEC={BAE4FC0D-0CD9-4489-8247-4C1050587B0E}

www.bluewaterbaltimore.org/programs/clean-waterways/waterauditprogram/pavement-reduction/

Riparian Buffers

Restoring water quality in the Chesapeake Bay is dependent on preventing nutrients from washing into the Bay. Buffers between the land and water, sometimes referred to as "grass and forest riparian buffers," are landscaping methods that use trees and specific grasses around streams and rivers. Those buffers capture and treat stormwater that runs off the land or travels through the ground after rain events. Buffers can vary in widths, but it is generally accepted that buffers of at least 35 feet are necessary to provide nutrient reduction benefits. Wider buffers, such as those required in the portions of the Chesapeake and Atlantic Coastal Bays Critical Area that abut tidal water bodies, provide even more reduction potential.

Planting buffers on your property is easy, and some local governments have programs to help pay for native trees and shrubs. While a buffer of 35 feet or more is generally preferred, every planting does its part. The Chesapeake Bay Program gives credit for buffer plantings of 35 feet or more. Planting permanent grass or riparian buffers is one way that homeowners might be able to benefit financially from reducing nutrient pollution.

Tree and grass buffers on streams slow runoff, capture and hold nutrient pollution, keep local streams cool (which is good for fish) and prevent sediment pollution

To be most effective, multiple trees should be planted to provide the most beneficial buffer. Lawn size, site location (where the house and other landscape features are placed in reference to potential planting areas), scenic views, and types of buffer plants (big trees, small trees, grasses, shrubs, etc.) all need to be considered. Landscape architects and local watershed groups and resource professionals can lay out options and explain the potential on a property for homeowners.

The *Marylanders Plant Trees* program supports buffer planting at the state level. Please visit the link below for more information.

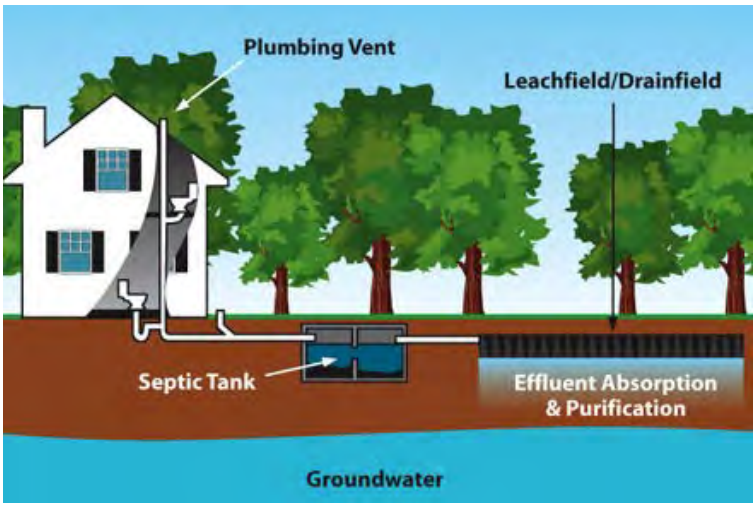
www.trees.maryland.gov/

Obtain specific information about Chesapeake and Atlantic Coastal Bays Critical Area program requirements at: http://www.dnr.state.md.us/criticalarea.

Septic Systems

Septic systems have historically allowed development in areas not served with public sewer service. The systems have been used for a large amount of development in areas just outside suburban development and areas of rural development. Septic systems, even when functioning properly, leak nitrogen into the ground and eventually into groundwater and surface waters.

Septic systems treat bacteria and other pathogens but discharge nitrogen underground where excess amounts can flow into local streams. Average households on conventional septic systems produce 10 times more nitrogen pollution (wastewater and stormwater) to the environment than a house on upgraded sewer. In addition to wastewater impacts, homes using septic systems require more land to be cleared to accommodate drain fields and historically have consumed more land in Maryland than homes connected to a municipal wastewater treatment plant, resulting in greater stormwater runoff from the property. What this means is that households on septic systems contribute more pollution than comparable households served by public sewer.



Traditional on-site waste water systems (septic) pollute groundwater. BAT systems go further than these by removing some nitrogen before being introduced into the ground.

Recent advances in the technology of septic systems, such as Best Available Technology (BAT) systems, have made it possible to reduce nitrogen levels discharged per household by 50 percent or more. In 2004, the state enacted the Bay Restoration Fund (BRF) to upgrade wastewater treatment plants and help pay for plantings on agricultural lands that are not currently in production. The law also was enacted to reduce the amount of pollution from septic systems. The program prioritizes

replacement of failing septic systems, those not adequately treating pathogens, when they are located within 1,000 feet of tidal waters. It is there, in the Critical Area, where replacement of polluting systems will have the greatest beneficial impact on water quality in the Bay. The program also provides financial support for upgrading all systems to BAT. More information on the Bay Restoration Fee can be found here: www.mde.state.md.us/programs/Water/BayRestorationFund/OnsiteDisposalSystems/Pages/Water/cbwrf/index.aspx

Other options for reducing the impact from septic systems include connecting homes to a wastewater treatment plant or replacing multiple individual septic systems with a single community septic system. Under certain conditions, the Bay Restoration Fund can finance those options.

Through the 1997 Priority Funding Areas (PFA) Act, state funds support extending water and sewer lines for development within areas identified by the local jurisdiction as a PFA. PFAs are often, but not always, within a municipality or a municipal growth area. PFAs also can include areas outside municipalities that are identified by counties as growth areas. When septic systems are connected to a wastewater treatment plant that has enhanced nutrient removal technology, the entity that pays for the connection might be able to use the reduction in pollution to generate credits potentially available for sale. Where a county or municipality connects a house on a septic system to a public sewer system, the government can use this nutrient reduction to help meet their TMDL goals.

Reducing Vehicle Miles Traveled

Maryland drivers travel an estimated 10,000 miles per capita per year

As much as one-third of the pollution entering the Bay comes from the atmosphere – particles that fall from the sky onto the ground and water. Much of that pollution is attributable to power plants in the Midwest that burn fossil fuels to generate power but some portion is due to automobile and other exhaust generated in Maryland. For example, daily commutes in automobiles and other vehicles add pollution to the Bay through air emissions.

The federal government and Maryland have enacted programs to reduce the amount of pollution coming from power plants. Reducing pollution due to atmospheric deposition would create a positive impact in the water quality of the Bay. Ways to cut emissions from vehicles vary. Low-emission, hybrid, and all-electric vehicles can reduce air pollution. So can reducing travel, both in terms of time and distance. Homes and jobs located closer to one another and located closer to other places we frequent (shopping, recreation, leisure) can reduce Vehicle Miles Traveled (VMT). Shortening these trips will generate less pollution. Carpooling has long been touted as a great way to save gas and to help the environment. Mass transportation goes even further to limit the amount of emissions per person.

If we change the ways we develop, consume land and make choices about where we want to live we can make a significant impact on reducing air pollution emissions. By living within walking or biking distance of work and shopping, or using transit, we can cut our personal transportation emissions to near zero.

Use of public transit, such as buses and rail, helps to reduce VMT and harmful emissions

Please visit the link below for more information about VMT and air pollution in Maryland:

www.mde.state.md.us/programs/ResearchCenter/ReportsandPublications/Pages/ResearchCenter/publications/general/emde/vol4no2/vmt.aspx

The Development Community

Individuals and companies that develop property into homes, apartments, commercial buildings, and retail establishments base their development decisions on consumer demand, the regulatory environment, cost and providing an exceptional product or service. Developers can help reduce their impact on the environment by:

Redevelopment and re-use of existing structures utilizes less energy, produces less construction waste and takes advantage of energy efficiencies already embedded in buildings

- redeveloping existing sites or developing within infill areas between existing development
- building on smaller sites
- reducing construction waste
- lowering energy use
- locating developments to reduce vehicle miles traveled (VMT)
- addressing indoor air quality

Considering such measures in addition to the overriding challenge of making a profit, is a challenge.

Redevelopment/Infill

Each new house adds a new source of pollution through additional wastewater generation, and depending on where it's built, additional stormwater runoff and air emissions. However, there is an opportunity to reduce the potential pollution from new development, especially if it's built using existing water and wastewater infrastructure. Development can occur on undeveloped land, sometimes referred to as "greenfield" development, in areas that are already developed (redevelopment) or on property surrounded by development (infill).

Since new development is subject to erosion and sediment control and stormwater management standards that don't apply on the same scale as redevelopment (newer development areas will cause more land disturbance) there could be an advantage to redeveloping older areas from an environmental protection perspective.

Infill development seizes upon infrastructure and services that already exist in established communities

Homebuyers and home seekers as well as those looking to start a business may want to consider locating in existing communities. Choosing to live or conduct a business in an existing community can have a significant positive impact on the Bay as well as bolster local economic development.

Please visit the resources below for more information:

www.epa.gov/smartgrowth/water_resource.htm

www.smarte.org/smarte/home/index.xml;jsessionid=y1hdiwmvo0ms

Greenfield development: Creation of planned communities on previously undeveloped rural or agricultural land or unused areas on the outskirts of urban areas.

Redevelopment: Any new construction on a site that has pre-existing uses, such as redevelopment of an industrial site into a mixed-use development and converting an industrial mill into housing lofts.

Infill development: Development that takes place on vacant or underutilized parcels within an area that is already characterized by urban development and has access to urban services.

Smaller Footprint/Clustering

A footprint is the area that a house and associated improvements (garage, carport, driveway, sidewalk, patios, swimming pool, etc.) cover on any given lot. Larger lots tend to be developed with homes with larger footprints, while smaller lots have less overall coverage. Houses with smaller footprints disturb less land than those with larger footprints. Homes with larger footprints are also

associated with more impervious surfaces and stormwater runoff. Homes on smaller lots also tend to be located in areas that are served by public sewer and water.

Clustering residential development and smaller structure footprints preserve natural lands while accommodating development. This technique balances the desire for rural homes, providing habitat for animals, and maximizing land that collects and filters rainwater

Clustering is a form of subdivision that groups lots closer to one another to preserve more common open space while still achieving permitted densities. Clustering is advantageous because it allows a housing developer to build homes on as many lots as would normally be allowed, but with a smaller overall footprint, since streets and other infrastructure will be minimized by being grouped closer together.

One measure of impact when evaluating the location of new or existing homes is the impact it may have on the environment based on the type of wastewater treatment available. Homes clustered on smaller lots served by public sewer and water can help minimize adverse environmental impacts.

Streets and Stormwater Management

Innovative street features, such as that pictured, provide aesthetically pleasing streets as well as help to take stormwater off the streets and into the ground

A narrower neighborhood street provides less impervious surface for pollutants to collect on and then get washed off during storms. Some local services, like firefighting, require streets of a certain width, but certain designs can allow for more environmentally friendly practices while also allowing access for emergency services. If the streets and the movement of stormwater are designed

using new, environmentally sound strategies such as Low Impact Design or Environmental Site Design, streets won't direct water immediately into storm drains where it's carried to the closest stream at high volume, speed and temperature. Slowing water traveling at high volumes and with high temperatures can reduce impacts on local streams and waterways. Eliminating or reducing the size of garages and driveways also limits stormwater pollution. The use of landscape features, including pervious patios and walkways, can divert stormwater to rain gardens, where the stormwater would soak into the ground, recharging ground water and funneling nutrients to provide sustenance to native plants.

Complete Streets are designed to enable safe access for pedestrians, cyclists, motorists and transit riders and make it easy to cross the street, walk to shops and bicycle to work. In addition they include features to minimize or eliminate stormwater run off.

Please visit the resources below for more information on stormwater management:

http://www.cwp.org/2013-04-05-16-15-03/stormwater-management

water.epa.gov/polwaste/green/index.cfm

www.epa.gov/oaintrnt/stormwater/index.htm

Green Building

The popularity of green or environmentally friendly buildings has increased in recent years. This is partly due to market demand for buildings that conserve energy, but also because of a greater awareness of the wider benefits of green buildings. Companies, organizations and government programs establish rating systems that determine the extent to which a building is green. These include the U.S. Green Building Council's LEED (Leadership in Energy and

A green roof is partially or completely covered with vegetation for the purpose of absorbing rainwater, providing insulation, creating a habitat for wildlife and helping to lower urban air temperatures and mitigate the heat island effect.

Environmental Design), EPA's Green Building Program, National American Home Builder's Green Guidelines, and Green Globes.

Those rating systems focus on a number of different sustainable elements:

- stormwater management, which has the most direct potential to limit new nutrient pollution
- site selection, which can limit new wastewater pollution (central sewer systems pollute less per home than septics)
- new air pollution (in cities and towns there is less need for automobiles, whose air emissions also impact our water bodies).
- energy conservation
- building reuse, use of local products and waste reduction (some of which reduces the amount of forest land that needs to be cleared)

High performance buildings integrate features that result in: cost effective facilities that save money over time by being efficient to build, operate and maintain; healthy working, learning and living environments with superior indoor air quality and practices that minimize environmental impact.

Maryland historically has been on the forefront of green building practices by being one of the first states to provide financial incentives through tax credits and one of few states with a Green Building Council. The council was formed after the Green Building Task Force, created in 2006 by the Maryland General Assembly, recommended that Maryland create a permanent governing group to stay at the forefront of green building policies. The council began its work by fostering legislation requiring new state-owned buildings of a certain size and type to be built to LEED Silver efficiency (or equivalent). That means that the building would have to be designed to meet LEED's third highest standard. Since then, the council has taken on a number of other important initiatives. Examples include defining and accepting standards equivalent to LEED Silver that would allow builders the flexibility to use rating systems other than LEED and discussing options for providing financial incentives for residential, commercial, or industrial buildings of certain sizes and types to use green building rating systems or practices.

Please visit these resources for more information about green building:

www.usgbc.org/

www.greenglobes.com/about.asp

www.epa.gov/greenbuilding/

www.greenbuildingnetwork.groupsite.com/main/summary

Alternative Energy

The use of alternative energy, such as solar panels reduces dependency on fossil fuels, which have an adverse effect on the environment.

Energy in Maryland generally comes from coal fired power plants, a large source of nutrient pollution through atmospheric deposition. Receiving power from large suppliers that rely solely on renewable energy sources like wind is an option that energy suppliers (utility companies) are increasingly offering. In addition, a number of companies install, maintain and lease renewable energy devices, such as solar and geothermal energy systems, in homes. As market demand for renewable energy sources rises, the products that property owners can purchase and install are steadily increasing, which in turn drives down the cost. Wind turbines, solar panels, and geothermal units are becoming more affordable, making them more attractive as options for energy production.

Please visit the Maryland Energy Administration's webpage for more information.

energy.maryland.gov/

Farmers

Maryland farmers play a key role in protecting water quality in streams, rivers and the Chesapeake Bay. Agricultural lands generate more than a third of the pollution entering the Bay from Maryland. (www.baystat.maryland.gov/sources2.html).

Farms are a part of our history and character. From large, open pasture to small, family worked farms; they are part of our history, our culture, and our future

Maryland farmers have used thousands of conservation practices to protect natural resources and safeguard water quality in the Chesapeake Bay and its tributaries. This legacy of environmental stewardship dates back to the Dust Bowl years of the 1930s, when Maryland farmers first began working with newly created soil conservation districts to protect the soil from the devastating effects of wind and water erosion. Today, the Maryland Department of Agriculture's (MDA) Office of Resource Conservation—in partnership with soil conservation districts and a host of local, state and federal agencies—is working with Maryland farmers to place even more conservation practices on farmland—practices that balance crop and livestock production with the need to protect natural resources and the Chesapeake Bay.

As Maryland works to meet federally mandated nutrient reduction goals spelled out in its Watershed Implementation Plan (WIP) to protect and restore the Bay, the conservation work of farmers takes on even greater importance.

There are over 30 conservation practices—best management practices (BMPs)—identified in Maryland's WIP that farmers can use to maintain farm production, slow soil erosion, manage nutrients and safeguard water quality.

Conservation Choices includes information about BMPs, farm management considerations, financial assistance programs to help with installation costs and

information on USDA Natural Resources Conservation Service (NRCS) technical standards and maintenance requirements.

mda.maryland.gov/resource_conservation/counties/ConservationChoices_2012_FINAL%20%281%29.pdf

The EPA and Chesapeake Bay Program (CBP) office review and approve BMPs and their ability to remove or capture nutrient pollution. A work group within CBP constantly reviews additional techniques to determine their nutrient reduction efficiency and whether they can be included in the CBP Chesapeake Water Quality Model. The CBP Model predicts water quality and was used to set the TMDL. A list of currently accepted practices and their estimated nutrient reduction potential can be found here:

archive.chesapeakebay.net/pubs/NPS_BMP_Table1.8.pdf

Soil Conservation Districts: a statewide system for local delivery of agricultural programs

Soil Conservation District staff provides the necessary link between research, policy, and practices with farmers and land owners

Long before the term "environmentalist" was coined, field specialists from Maryland's Soil Conservation Districts were working with landowners with the aim of keeping farmland productive and waterways clean and healthy. Established more than 65 years ago, Maryland's Soil Conservation Districts began working with farmers to protect soil from erosion. Today, the districts provide technical assistance to implement BMPs that address a whole array of water quality and natural resource issues, both on and off farm.

The results of the work being done by Maryland's Soil Conservation Districts is taking place in the field – on the dairy farm that borders a local tributary, at the construction site for a new suburban shopping center or the crop field adjacent to a local drainage ditch. The Soil Conservation Districts ensure that local issues, such as poor water quality in a neighborhood stream, loss of wildlife habitat or flooding concerns, are addressed.

Comprehensive Farm Planning

Farmers install best management practices (BMPs) as part of a comprehensive farm management program documented in a Soil Conservation and Water Quality Plan (SCWQP). SCWQPs address existing and potential pollution concerns for the entire farming operation. These plans usually include several BMPs to be implemented by farmers with construction phased in over several years based on the time and resources available as well as the environmental need.

Farmers work hard and smart to earn a living and to protect and restore the Chesapeake Bay. Each farm is unique but often there are opportunities to put in place a number of practices that help absorb and hold nutrients, which are integral for crop growth, in the field and out of local streams.

A system of diversions and grassed waterways may be designed in the SCWQP to prevent soil from washing down a hillside. Cover crops and riparian buffers are often recommended to reduce the amount of nutrients entering local waterways. Other more complex and costly BMPs such as animal waste storage structures and heavy use areas provide water quality benefits by managing animal waste on livestock operations.

The Federal Food Security Act requires SCWQPs on all highly erodible lands enrolled in federal conservation programs. SCWQPs are also required on farmland enrolled in the Maryland Agricultural Land Preservation Foundation Program as well as farmland located in the Chesapeake Bay and Atlantic Coastal Bays Critical Area. Certain livestock and poultry farmers are required to implement SCWQPs as a condition for obtaining Maryland's Animal Feeding Operation (MAFO) permit. In addition, they are a key feature in Maryland's Watershed Implementation Plan to protect and restore the Chesapeake Bay.

SCWQPs are developed for free by technical staff working in Maryland's 24 soil

conservation districts. In addition, the Maryland Agricultural Water Quality Cost-Share (MACS) Program provides grants that cover up to 87.5 percent of the cost of installing eligible BMPs. Over the last 15 years, farmers have installed nearly 11,000 BMPs using $72 million in MACS assistance and matching it with $16 million of their own funds to protect water quality. Additional BMPs have been installed during this period with financial assistance from federal programs such as the NRCS Environmental Quality Incentive Program (EQIP) and Chesapeake Bay Watershed Initiative (CBWI).

The Maryland Department of Agriculture has required all farmers grossing $2,500 a year or more or livestock producers with 8,000 pounds or more of live animal weight to follow nutrient management plans when fertilizing crops and managing animal waste since 2001. These science-based plans help protect water quality by taking into account a variety of factors to determine how much fertilizer, manure or other nutrients may be applied to crops to address agronomic and environmental conditions. These plans help farmers manage fertilizer to achieve crop yields while preventing excess nutrients from running off. The program also may save some farmers money by reducing the cost of purchased fertilizers. However, even fully implemented nutrient management plans cannot eliminate all nutrient runoff because of the unpredictability of weather. More information about the Maryland Nutrient Management Program can be found here:

> www.mda.maryland.gov/resource_conservation/Pages/nutrient_management.aspx

Many practices and programs initiated and supported by the state and federal government offer financial incentives such as cost sharing to install BMPs to reduce nutrient runoff from farms . As noted above, the MACS program provides farmers with grants that cover up to 87.5 percent of the cost to install eligible BMPs to control erosion, manage nutrients and safeguard water quality in streams, rivers and the Chesapeake Bay. Approximately 30 BMPs are currently eligible for funding. More information on the MACS and other MDA programs can be found at:
mda.maryland.gov/resource_conservation/Pages/financial_assistance.aspx

USDA-NRCS currently provides 50-75 percent of the cost of installing eligible BMPs under their EQIP and CBWI programs. Farmers may utilize both state and federal programs to install BMPs, but the total cost share available per practice is capped at 87.5 percent.

Cover Crops

During winter months when traditional crops (corn, soybeans, etc.) aren't being grown, agricultural fields may lay fallow. This means that the soil is relatively bare and subject to soil and nutrient runoff. Many farmers plant small grains in the fall such as rye, barley, or wheat to provide cover for the soil, reduce runoff and tie up unused nutrients. This protects the soil and nutrients from runoff and causing potential impacts to nearby streams.

Barley, canola, rapeseed, kale, rye, ryegrass, spring oats, triticale, forage radish and wheat may be used as cover crops.

MACS provides cost share to farmers to defray the costs of seed and labor required to plant cover crops. Maryland farmers have surpassed WIP annual goals for cover crop acres planted since 2010; in the winter of 2012-2013, more than 415,000 acres were planted, exceeding Maryland's yearly commitment as a part of the Bay TMDL by 17 percent. Please visit the site below for more information.

mda.maryland.gov/resource_conservation/Pages/cover_crop.aspx

Conservation Reserve Enhancement Program (CREP)

Young trees planted along streams trap nutrients in runoff and use it to grow. These young trees are grown in tubes to protect them from wildlife from eating all their leaves.

Farmers have historically embraced programs that help establish BMPs to reduce pollution and provide natural resource protection. Maryland was the first state in the country to develop an agreement with USDA to implement a CREP. Maryland, in partnership with USDA, offers farmers annual soil rental payments during a 10-15 year contract as well as cost share for establishing BMPs when they convert highly erodible cropland and other environmentally sensitive areas to permanent cover, including riparian forest and grass buffers, wetlands, and habitat for declining species. Maryland farmers have enrolled approximately 70,000 acres in this program.

mda.maryland.gov/resource_conservation/Pages/crep.aspx

www.md.nrcs.usda.gov/programs/crp_crep/crp_crep.html

Riparian Buffers

Riparian buffers also provide shade to keep the water in streams cool, slow runoff from storms that can overload small streams and scour their banks, and provide habitat for many species.

Planting trees and grasses along waterways traps and uses excess nutrients, thus preventing them from entering agricultural ditches or streams that lead to the Chesapeake Bay. In some cases financial assistance is available to assist with installation of riparian buffers. For farmers obstacles include loss of income from productive farmland and management concerns and costs. Each farmer needs to determine whether riparian buffers can fit into their farm management. Local Soil Conservation District (SCD) staff is available to help. Locate SCD information here: www.mascd.net/districts/default.html

Conclusion

The Chesapeake Bay, the largest estuary in the United States, receives drainage from more than 64,000 square miles. It is Maryland's greatest natural resource, and we've watched it degrade over decades. Governments and non-profit organizations have tried various levels of management but haven't seen the Bay return to the productive ecosystem it was less than a century ago. The Chesapeake Bay Total Maximum Daily Load and corresponding Watershed Implementation Plans from state and local jurisdictions represent the latest, most ambitious commitments to restore the Bay.

The Chesapeake Bay has provided us with innumerable experiences in our history. Restoring, protecting, and enhancing this water body at the heart of our state will ensure that relationship for generations to come.

Governments aren't the only parties invested in Bay restoration. Residents of the Bay watershed jurisdictions make decisions, both positive and negative, that impact the Bay. Bay restoration, in fact, is dependent on what residents can do. Some are practices that we can undertake in our homes and businesses and on our farms. Other practices are larger projects to consider as we move from one house to another. And there is strength in numbers. Encouraging neighbors to participate in Bay restoration strategies can make a real difference.

Bay restoration isn't a goal line to reach; it's an ongoing effort. The phrase "death by a thousand cuts" is often used to describe the way the health of the Bay has been attacked. Similarly, we as residents of the Bay watershed need to apply a thousand remedies to restore the grandeur of our greatest natural resource.

Through outreach and education the Maryland Bay Cabinet agencies (MDP, MDE, MDA, DNR, MDOT, DGS, UMD) will work to communicate successes and encourage more Marylanders to get involved in restoring the Bay. Simple activities such as recycling, stormwater management in our backyards and relying less on vehicles to get around are just a few examples of easy changes everyone can make.

Bay restoration is a work in progress that will take the cooperation of government and citizens to fully achieve our 2025 goal. Learn what you can do to help restore the Bay. Please help us in our efforts to reclaim the Chesapeake Bay.

Foods that we identify as truly Maryland come from the natural bounty of the Chesapeake. Day-to-day decisions that focus on the Bay will guarantee that our tables will always include crabs, oysters, and rockfish.

Appendix

The following are larger-scale examples of practices that have been implemented in Maryland, using funding from the Maryland Department of Environment, the Maryland Department of Natural Resources Chesapeake and Atlantic Coastal Bays Trust Fund, and other sources. For more information on Maryland funding sources, go to:

dnr.maryland.gov/ccp/funding/trust_fund.asp.

www.mde.state.md.us/aboutmde/GrantsandFinancialAssistance/Pages/AboutMDE/grants/index.aspx

mda.maryland.gov/resource_conservation/Pages/macs.aspx

energy.maryland.gov/

1. Porter Run Stream and Riparian Buffer Restoration

In October 2009, Ecotone completed the restoration of approximately 1,080 linear feet of stream in LaVale, Maryland under the direction of the Allegany County Department of Public Works and the Allegany Soil Conservation District. As part of the project, Ecotone staff installed all riparian landscaping elements. Landscaping associated with the project was completed in stages. In conjunction with the installation of stream restoration structures, live willow and dogwood stakes were installed on the stream banks. In addition, permanent riparian seed and erosion control coir matting was installed concurrent with construction. The planting of woody tree and shrub species in the forest buffer was completed in April 2011. Trees and shrubs planted were four to five foot tall native hardwood species suitable to the rocky soils of the Allegheny Mountains. Soil samples were taken prior to planting, and fertilizer and lime was applied at specified rates to help ensure the success of the plantings and seed mixes.

Client/Owner: Allegany County Commissioners
Contact: Adam Patterson, PE
Allegany County Dept. of Public Works

Completion Date:
Construction: October 2009
Planting: April 2011
Estimated Project Cost
Entire Project: $181,000
Planting: $34,500

Porter Run before - Scoured and muddy banks send sediment and phosphorus directly into streams.

Porter Run after - Plantings secure the banks to prevent sediment and nutrient pollution. The roots absorb the nutrients to help the plant grow and the roots hold the soil in place.

2. Bloomfield Park Permeable Pavers

Bloomfield Park is a 320-acre site located on Route 213 north of Centreville in the Corsica River watershed. This project represents the next phase of installing pervious pavement for the entire area, with an additional 200 parking spaces, and a pervious walking path to connected areas. 4.54 acres of permeable paver blocks will be installed as part of a three-phase permeable paver demonstration project on park land.

Watershed: Corsica River
Restoration Practice: Low impact Development (LID)
Status: Permits
State Funds: $330,000
Match Funds: $69,416

Fiscal Year: SFY 13
Funding Source: Trust Fund/ GO Bonds
Annual Reduction: 25 lbs. N; 2 lbs. P
Lifespan Reduction: 625 lbs. N; 50 lbs. P

Bloomfield Parking before - Asphalt or concrete heats run off and quickly transports it to local streams. Excessive heat and velocity are bad for local waters.

Bloomfield Parking after - Permeable pavers allow runoff to soak into the soil below and prevent heated and fast water from negatively impacting local waters.

3. Beaver Dam Site 20 Stream Restoration and Retrofit

The project consists of the following five elements: stream bank restoration, repair of a deteriorated storm drain outfall, removal of solid waste and trash from the stream channel, retrofit of an upstream stormwater facility for improved water quality performance and low impact development measures to treat stormwater runoff from an upstream storage facility.

The project will reduce severe stream bank erosion problems on an un-named tributary to Lower Beaverdam Creek and reduce turbidity levels in a stormwater quality pond at the bottom of the restoration stream reach.

Project Name: Beaver Dam Site 20 Stream Restoration and Retrofit
Watershed: Anacostia River
Restoration Practice: Stream Restoration
Status: Construction
State Funds: $350,000
Match Funds: $580,000

Fiscal Year: SFY 13
Funding Source: Trust Fund / GO Bonds
Annual Reduction:
183 lbs. N; 14.4 lbs. P; 2 tons S
Lifespan Reduction:
2,745 lbs. N; 216 lbs. P; 30 tons S

Beaver Dam before – Scoured and muddy banks send sediment and phosphorus directly into streams.

Beaver Dam after - Plantings secure the banks to prevent sediment and nutrient pollution. The roots absorb the nutrients to help the plant grow and the roots hold the soil in place.

4. Green Space at Lauretta Avenue and Kirby Lane

This project will remove impervious surface from a former playground to create a green space and landscaping. The Parks & People Foundation will remove 10,000 square feet of asphalt and replace it with permeable pavement. They will amend the soil and seed the area to provide additional space for existing trees and will plant 5 new trees.

Project Name: Ultra-Urban Stormwater Management: Ten
Watershed: Gwynn Falls
Restoration Practice: Stormwater Management
Status: Design

State Funds: $100,000
Fiscal Year: SFY 13
Funding Source: Trust Fund / GO Bonds
Annual Reduction: 2.2 lbs. N
Lifespan Reduction: 62.5 N

5. Kent County Buffer Restoration and Enhancement Project

Students, teachers, employees, and volunteers from the local community will take part in a planting that will create or extend existing forested stream buffers in the Sassafras Natural Resource Management Area (SNRMA) in Kent County. The 15-acre planting by an estimated 650 students will improve best management practices by restoring and extending existing riparian areas, reducing nutrient and soil runoff into the Sassafras River and one of its tributaries, Turners Creek.

Watershed: Sassafras River
Restoration Practice: Riparian Buffer
Status: Construction
State Funds: $47,556.85
Match Funds: $4,632.72
Fiscal Year: SFY 13

Funding Source: Trust Fund / Stream Restoration Challenge
Annual Reduction: 430.8 lbs. N; 28.8 lbs. P; 5.1 tons S
Lifespan Reduction: 6,462 lbs. N; 432 lbs. P; 76.5 tons S

Students learn about the relationship between what is on the land and the effect it has in the water. Standing in a field and seeing this relationship reinforces what they learn in the classroom by providing real-world context.

Hard work teaches students that restoring the Chesapeake Bay is hard work. But being able to look back at a field planted with trees provides a sense of accomplishment. In a few years this field will be a forest and these students will remember planting each tree

6. 2010 Conservation Reserve Enhancement Incentive

The funds will support the Conservation Reserve Enhancement Program (CREP). BMPs targeted include grass and forest stream-side buffers, wetlands and permanent stabilization of highly erodible land. Funds were used to provide the $100 per acre signing incentive for new and re-enrolled acres.

Watershed: Multiple
Restoration Practice: Targeted BMPs
Status: Complete
State Funds: $405,084
Match Funds: $224,681
Fiscal Year: SFY 10

Funding Source: Trust Fund
Annual Reduction: 59,653 lbs. N; 3,436 lbs. P; 873 tons S
Lifespan Reduction: 745,661 lbs. N; 42,950 lbs. P; 10,908 tons S

SFY 10 CREP Summary

Practice	New	Re-enrolled
Forest Buffer	129.9 acres	135.6 acres
Grass Buffer	478.2 acres	1,402.8 acres
HEL	837.9 acres	579.5 acres
Wetland	113.2 acres	109.7 acres
TOTAL	1,559.2 acres	2,227.6 acres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