

A Local Government Guide to the Chesapeake Bay

Module 11: Your Health and the Environment



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*Please refer to individual slide notes for data references and information sources.



A Guide For Local Governments

As a local leader, your decisions set the course for your community. Your actions determine the health and vitality of your jurisdiction, as well as that of your local waterways and the Chesapeake Bay. You can achieve win-win outcomes by prioritizing local economic development, infrastructure resiliency, public health and education while also protecting your environment.

This module is one in a series created by the Chesapeake Bay Program to support and inform decision making by local officials. We encourage you to examine the full suite of modules listed on the next slide.

To help local government representatives better understand how the information in the modules aligns with their priorities, look for these icons:



Economic
Development



Public Health & Safety



Infrastructure
Maintenance & Finance



Education

A Guide For Local Governments

Available Local Government Modules

1. How Your Watershed Works
2. Foundations of Clean Water
3. Healthy Water for the Economy
4. Capitalizing on the Benefits of Trees
5. Preserving Local Character and Landscapes
6. Protecting Your Infrastructure Through Stormwater Resiliency
7. Building the Workforce of Today and Tomorrow
8. Preparing Your Community for Water Extremes
9. Understanding and Supporting Your Agricultural Allies
10. Keys to Community Buy-In for the Environment
11. **Your Health and the Environment**

Laying Foundations

Environmental health has multiple implications for humans. It is important as a local official to know about the array of environmental health issues and the potential they have to harm residents in your communities. But how do you take action to protect your constituents from environmental issues, spur change, and provide benefits to your community?

NOTE - As you will see, environmental health is an extremely broad topic with multiple stressors and impacts. This is a lot to cover in a single module and we have endeavored to provide a solid overview in this limited space. We encourage you to independently explore additional resources on this topic.



What You'll Learn



Linking Toxins to Health

It's easy to understand how visible environmental hazards, like an oil spill, pose a risk to human health and safety. The connections are less clear when risks are not as visible, such as environmental toxins.



POP Chemicals

PFAS and PCBs are known as “persistent organic pollutants,” or POPs, or sometimes PFAS are called “forever chemicals”, because they resist breaking down in nature.

PFAS, or Per- and polyfluoroalkyl substances, are widely-used chemicals which break down very slowly over time. They are used in leather, textiles, paper, paints, cleaners, wire insulation, fire fighting foams, and more to help these products resist heat, water and grease.

PCBs, or polychlorinated biphenyls, are synthetic compounds whose production was largely stopped by the EPA and World Health Organization (WHO) in 1979. They were used in coolants, lubricants and building materials because they don't burn easily or dissolve in water. PCBs enter the environment from fires, hazardous waste spills and improper dumping, and impacts from PCBs are still evident today.

Negative impacts associated with PCBs and PFAS can be lessened by adopting stricter policies that ban their use or carefully regulating them when their use is essential.



PFAS are found in the blood of people/animals around the world. PFAS increase the risk of certain cancers, make childhood vaccines less effective and can raise blood pressure in pregnant women. Similarly, PCBs are a probable human carcinogen which endangers the reproductive, immune and neurological systems. Studies have shown PCBs are linked to cancer/tumor development in animals.



PFAS & PCBs persist in soils, contaminate streams and groundwater, and **bioaccumulate** in wildlife and fish. As a result, jurisdictions in the Bay watershed have fish consumption advisories that compromise the economic value of local resources and impact human health.



The Bipartisan Infrastructure Law provides the EPA with nationwide PFAS clean up funds of \$10 Billion. See more about EPA restoration funds from the Law [here](#).



Share Safer Fish

Polluted fish may cause cancer, developmental issues and other harm to pregnant women, children and adults.



Enjoy Fish Safely

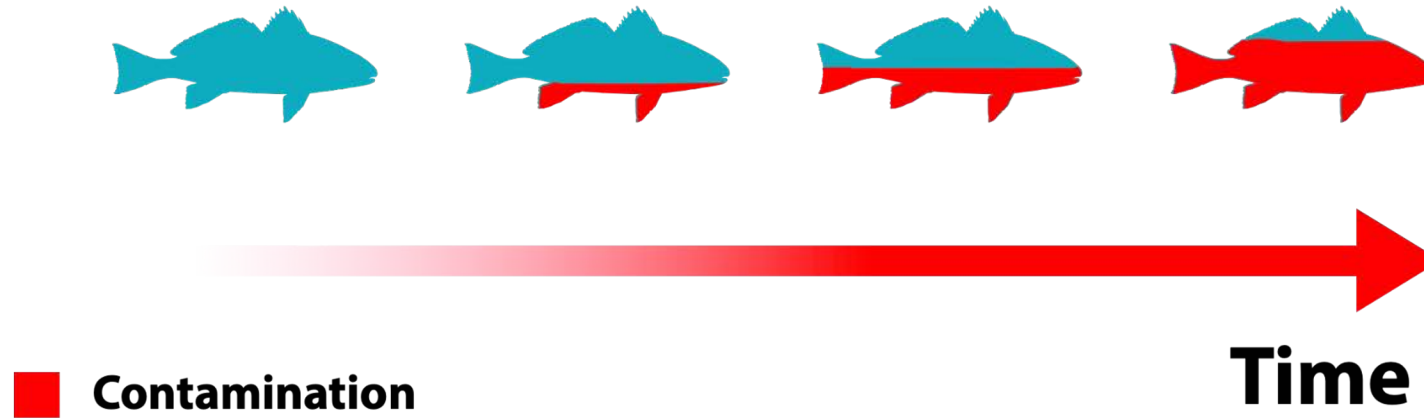
Follow local advisories. Eat the suggested portion size. Do not exceed the suggested frequency.

The Chesapeake Bay Program's (CBP's) Toxic Contaminant and Diversity Workgroups created a set of communication tools aimed at educating high risk populations, including children, pregnant women, and linguistically isolated communities along with those who do not access government publications. The purpose is to highlight the risk of PCB exposure to human health from consuming fish contaminated by waters impaired with PCBs. Explore the set of communication tools [here](#).

Bioaccumulation

Over time, when an animal, like a fish, accumulates a substance (including PCB's, mercury and PFAS) in its body, it is known as bioaccumulation. Consumption of contaminated fish can be harmful to humans. Fish and shellfish species are monitored across the Bay region to ensure that the public is informed of contaminant levels and recommended safe human consumption levels.

Bioaccumulation



Air and Water Contaminants

There are multiple contaminants that put our health at risk each day. Let's explore a few risks facing Chesapeake Bay watershed communities.



Contaminated Runoff

A variety of chemicals are used to “control” for environmental factors. Fertilizers provide nutrients for plant growth and pesticides reduce unwanted pests and weeds. There are a suite of potential environmental impacts associated with these chemicals.

Pesticides include insecticides and herbicides that protect plants and crops. Improper storage, use or disposal can result in these chemicals making their way into our air, stormwater runoff, local waterways and drinking water sources and lead to a variety of negative human and environmental impacts.



In addition to proper use and disposal of chemicals, Best Management Practices (BMPs) can help reduce exposures from pesticides, fertilizers, and other pollutants. Stormwater control practices, including forest buffers, retention ponds, and other measures aid in filtering out harmful substances.



Excess nitrates from fertilizer can be washed from yards and farm fields and into local waterways and into private drinking water systems. High levels of nitrates in drinking water are especially harmful to young children. Read more about nitrates in groundwater [here](#).

Microplastics

Microplastics are the tiny (<5mm) fragments, fibers, and microbeads that come from larger plastic litter breaking apart and persist in the environment for an extremely long time.

There are two types of microplastics:

- primary: small upon entry to the environment – from microfibers from clothes and manufacturing byproducts.
- secondary: larger plastic waste that breaks apart into smaller pieces after exposure to the elements – from plastic water bottles, grocery bags and Styrofoam.



Microplastics attract disease-causing organisms and chemicals that are dangerous for humans. Studies have found microplastics in breast milk, unborn baby placenta, baby digestive tracts, blood and the lungs.



33 billion pounds

of plastic entering our oceans each year.

That's a lot of trash!

It equals TWO trash trucks filled with plastic being dumped into the ocean every minute.



The restoration of the Chesapeake Bay watershed is at an increased risk of failure due to microplastics.

94% of microplastics that enter the rivers and streams of the Chesapeake watershed remain in watershed and the estuary and are not moving into the ocean. This, among other sources of stress and contamination, has the potential to impact species vital to the Bay ecosystem and economy.

What local government officials can do:

- Ban single use plastics, implement [trash traps](#).
- Adopt a plastics monitoring program.
- Support/follow guidance of the [Plastic Pollution Action Team](#).
- Enhance waste collection systems.



An EPA contract with Tetra Tech studied the impact of plastics on Striped Bass in the Potomac River. The results show Striped Bass ingest microplastics, resulting in a build up in their gut. While there are fish consumption advisories across the Bay watershed, they don't currently focus on microplastics. However, a microplastics monitoring program is being considered. Learn more about this study [here](#). UMCES is also conducting microplastics research which you can learn more about [here](#).

Air Quality

Air quality directly affects environmental health. Poor air quality in the Bay's airshed, which is 9x larger than the Bay's watershed, has negative impacts for people, our ecosystems and it hampers progress towards meeting Total Maximum Daily Load (TMDL) goals.



Air pollution contributes to respiratory issues (like asthma), heart disease and is linked to lung cancer.



Pregnant women exposed to Particulate Matter (PM) during the third trimester are at a higher risk of the baby developing autism or other development issues. There are costs associated with classroom support for students with different capabilities/needs.

$\frac{1}{3}$ of the nitrogen entering the Bay is from airborne sources.



Stationary or Point Source

Power Plants, Gas Stations



Mobile

Cars, Airplanes, Construction Equipment



Agricultural

Poultry and livestock operations – ammonia



Natural

Lightning, Forest Fires

Air Quality



Nationwide trees and forests, and the ecosystem services they provide, are valued at 6.8 billion U.S. dollars due to the benefits of removing pollutants like Particulate Matter (PM) on human health.



Adopting green infrastructure solutions helps people and the planet. Installing tree barriers, green roofs, urban forests, and roadside vegetative barriers reduces the negative impacts of air pollution. While installing green infrastructure projects is aimed at controlling contaminated stormwater runoff, there are co-benefits for improving air quality from taking these preventative measures.

Case study: Washington, D.C.



DC developed a clean fleet of buses to decrease harmful emissions, air pollution, reduce costs, and increase the use of public transportation. Learn more about the fleet [here](#).

Case study: National Park Service



Air quality in national parks is monitored by the National Park Service. A recent analysis of several parks within the National Capital Area determined that the trees in these parks remove over 1.2 million tons of air pollution every year. Trees absorb gaseous pollution like sulfur dioxide and carbon monoxide and particulate matter pollution is captured by leaves where it is later washed off by rain and transferred to the soil. The monetary value of this ecosystem service for just the Rock Creek, Monocacy, and Catoctin parks alone is over \$2.7 million per year. Find out more [here](#).

Lead



Lead is a naturally-occurring element found in the air, water and soil. Lead has some beneficial uses but is toxic to humans and animals.

In the past, lead has been used in paints, ceramics, pipes, plumbing, batteries, gasoline, makeup and more.



- Exposure to lead can cause: lower IQ, neurobehavioral issues including: ADHD, hearing issues and renal, immune and cardiovascular problems, among other avoidable health risks.
- Childhood exposure to lead, even in small amounts, is linked to issues with academic performance, learning, behavior, hearing, and speech that will need to be addressed in schools.

CDC Lead Resources for Further Learning:

- [CDC Lead Poisoning Prevention Resource Hub](#)
- [CDC Lead Surveillance Data by State](#)
- [CDC Blood Lead Levels in Children Handout](#)

Students from a school in Baltimore, MD, where lead exposure is impacting children, visit the Masonville Cove Environmental Education Center. The shoreline of the Center is an example of a successful project that capped toxic contaminants.

Lead

What is being done?

\$9 billion in 2022-2023 EPA funds to replace lead pipes and sewage systems to eliminate lead in waterways

What else can be done?



Increase monitoring and intervention.



Engage with local health professionals on developing policies for lead and lead poisoning.



Policy development to regulate lead.

Case study: Baltimore, Maryland



In 2015, Chesapeake Physicians for Social Responsibility used [data](#) from Maryland's Department of the Environment to show that children in several counties have elevated levels of lead in their blood. In some Baltimore neighborhoods, one in every six children has elevated lead levels. This is a public health crisis. A 2020 update reveals that adopting a proactive standard, where testing and enforcement occurs, dramatically decreases the likelihood of lead exposure. Learn about the data, policies, and changes happening across Maryland [here](#).

Wastewater

Wastewater is typically treated in one of two ways: onsite by a septic system or through municipal sewerage system and wastewater treatment plants. Municipal wastewater treatment facilities work to remove contaminants from household and industrial waste before releasing it back into local waterways. Wastewater commonly includes human waste, and pollutants like viruses, bacteria, oils, chemicals, metals, pesticides, pharmaceuticals, microplastics, and nutrients like nitrogen and phosphorus.



Wastewater entering local waterways from sewage overflows, nutrient runoff and system failures impairs the water quality of the Bay, endangers fish and wildlife and puts humans at an increased risk of disease and/or infection.



Increased rates of septic failures are anticipated due to sea level rise across the region. This further endangers humans by exposing people to drinking water contaminants and dangerous toxins, like *Vibrio* bacteria that cause blood and skin infections.

Wastewater



As more people move into the Bay watershed, more waste will be produced and flow into sewage treatment plants.

Upgrades to wastewater treatment plants to repair or prevent failures can cost billions. While costs are expensive upfront, it saves more money in the long run due to the effectiveness of **Biological Nutrient Removal (BNR)** and **Enhanced Nutrient Removal (ENR)** technologies that remove chemicals, including PCBs.

In addition to upgrades at treatment plants, Maryland, Pennsylvania and Virginia have adopted nutrient-trading programs which are designed to decrease the amount of nitrogen and phosphorus pollution entering the Chesapeake Bay watershed.

Case study: Coastal Virginia



In Gloucester Point, Virginia, sea level rise causes flooding, overly saturated soil, and is linked to septic systems failures in the Middle Peninsula region. Septic failures result in sewage leakages and creates a dangerous situation for humans and animals who live in and depend on the Bay and its resources. As a result, several key issues have been highlighted as areas for local officials to improve upon. 1) Gather more data on septic systems, 2) Create policies that take the financial burden of repairs off citizens, 3.) Increase regulations and enforce laws. Learn more about this work [here](#).



How waste, created by humans, is handled can impact environmental health. The two main methods are incineration (burning waste) and landfilling (burying waste).



Incineration

While incineration facilities can convert waste-to-energy, the byproduct is toxic ash that ends up in landfills. Incineration also releases cancer-causing chemicals and poses a greater risk for low-income and minority groups who often live near incinerators.



Landfilling

There are several types of landfills that sort waste based on its properties. Municipal Solid Waste (MSW) is the everyday waste we create and is the landfill most people think of when taking a trip to the local dump. Other types of landfills were created to handle other waste like industrial waste, Coal Combustion Residuals (CCR) and coal ash, hazardous waste, Construction and Demolition (C&D) and PCBs.

Waste Disposal

A byproduct of the landfilling process is leachate, a liquid that forms when rainwater travels through a landfill, interacts with waste, pulls out chemicals and flows into waterways.

Leachate → Nutrient Pollution → Dead zones



Proximity to a landfill hurts property values.



Landfills and hazardous waste incinerators are more likely to be located near low income and underserved and cause an increase in health problems.



Expensive costs associated with cleaning up landfills, leachate and contaminated lands – often [superfund](#) or [brownfield](#) sites.

Case study: York, Pennsylvania



The Lower Susquehanna Riverkeeper group conducted water sampling from a discharge pipe leading into Kreutz Creek from Modern Landfill. The results revealed high levels of PFAS. EPA data further suggests that discharge of nitrogen, boron and fecal coliform is coming from the landfill's discharged, treated wastewater. As a result, the landfill has built a \$23 million treatment plant. This investment protects local residents from respiratory issues, cancers, diseases/illnesses and other health impacts. Read more about what happened at Kreutz Creek [here](#).

Diversity, Equity, Inclusion, Justice (DEIJ)

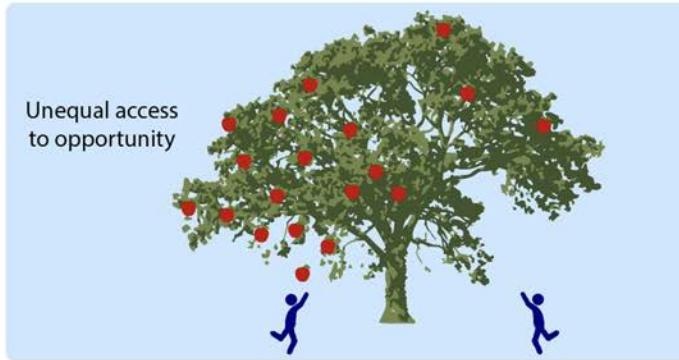
When discussing environmental issues and their implications for human health and safety, there must be a consideration of how to be more inclusive of the different identities and groups of impacted peoples.

Who is being excluded from the decision-making process?

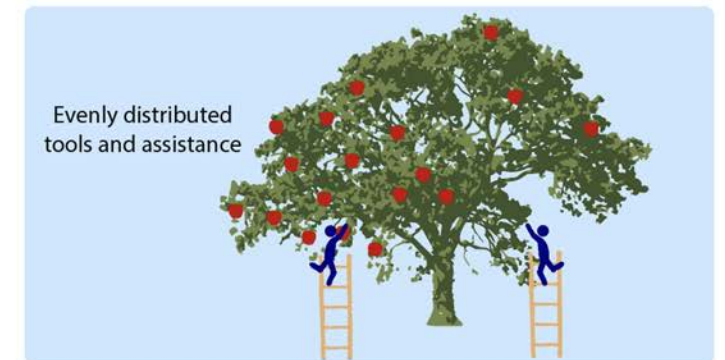


Environmental degradation does not impact all communities equally.

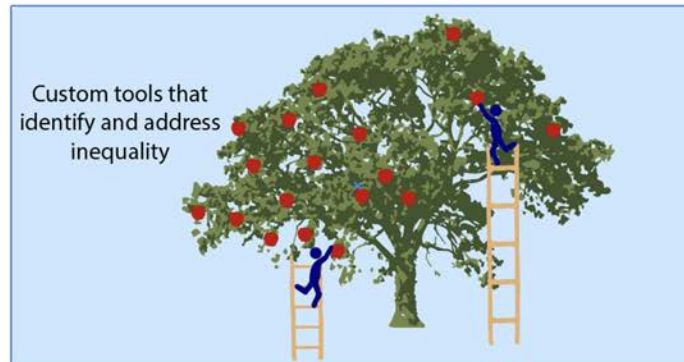
Communities of color and low-income community members suffer from the impacts of environmental hazards at a disproportionate rate compared to wealthier and/or majority white communities. Local government officials should consider Diversity, Equity, Inclusion, and Justice when addressing environmental justice concerns.



Inequality



Equality



Equity



Justice

Recreated from Tony Ruth's depiction of Shel Silverstein's Giving Tree available at <https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=43924>

Environmental justice (EJ) 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.

Issues facing these communities include, but are not limited to:



Higher Rates of Exposure to Air and Water Pollution



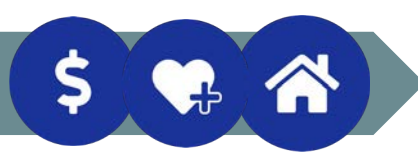
Food Accessibility



Affordable Housing/Lack of Green Spaces



Representation in Decision-Making Spaces

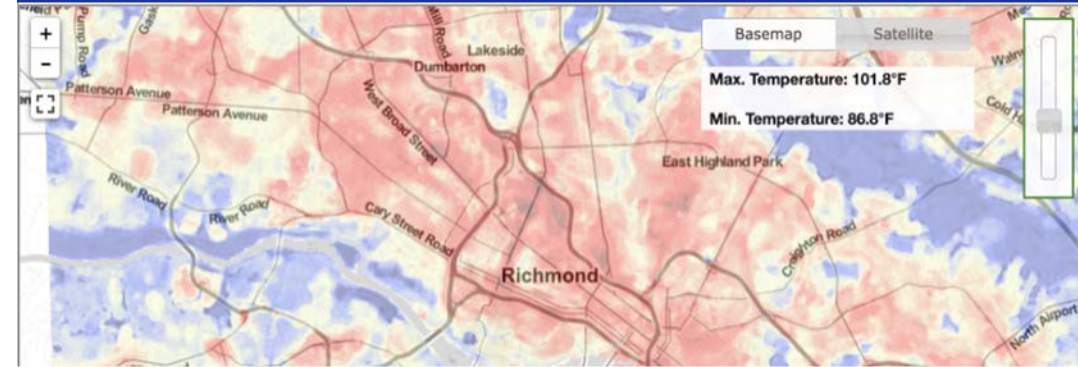


According to the NAACP, issues of Environmental Justice are considered Civil Rights issues. In fact, “Communities of color are disproportionately victimized by environmental hazards and are far more likely to live in areas with heavy pollution.”

Where to begin?

- Chesapeake Bay Environmental Justice and Equity Dashboard is a starting point for any local government official interested in learning more about risks to their vulnerable communities. You can explore this Dashboard [here](#).
- The EPA’s EJScreen is a mapping and screening tool that incorporates national data to inform demographic and environmental indicators into maps. EJScreen is available [here](#).
- The NAACP has its own list of Environmental Justice policy recommendations. Check them out [here](#).

Case study: Urban Heat Islands



[A study from the Science Museum of Virginia](#) found higher temperatures in historically redlined neighborhoods when compared to higher income, whiter neighborhoods in 94% of studied urban areas.

Redlining is the historical practice of refusing home loans or insurance to neighborhoods based on a racially motivated perception of investment safety. The historically redlined neighborhoods (predominantly lower income and communities of color) were up to 7° warmer, which was partly attributed to less tree cover. In your planning, consider and address such inequities so that everyone benefits from trees. Engage your community to make sure that your work addresses their needs and priorities.

What You Can Do



Know the risks so you can help your community stay safe. By knowing what environmental risks exist and how they can affect the health and safety of your community, you'll be better prepared to take action.



Look for solutions to reduce the risk. When exposures pose risks to human health and safety, we must always ask the question, "how can we avoid or minimize the risk?" Then, we can take steps to address the problem to protect our communities.



Provide support. Support looks different for different risks and demographics. Sometimes support takes the form of policy recommendations, legislative action, funding, research and more.

To Learn More

- [Chesapeake Bay Program: Chemical Contaminants](#)
 - Learn more about the chemicals, metals, pesticides, pharmaceuticals, and more that impair the Chesapeake Bay
- [Chesapeake Bay Program: Groundwater Risks](#)
 - Explore what groundwater is, how it is contaminated, and how it impacts the Bay and its ecosystems
- [Chesapeake Bay Program: Environmental Justice](#)
 - Understand what environmental hazards pose a threat to at risk communities
- [U.S. Environmental Protection Agency: Air Quality Dashboard](#)
 - Explore your area to understand how air quality impacts your everyday life
- [U.S. Environmental Protection Agency: Lead Facts](#)
 - Find out more about lead and how it poses a risk to human health and safety
- [U.S. National Park Service: Air Pollution Removal by Urban Foresters](#)
 - Learn about the ecosystem services provided by trees and how urban trees remove air pollutants and protect human health

Glossary

- **PFAS**

Per- and polyfluoroalkyl substances, are widely-used chemicals which break down very slowly over time. They are used in leather, textiles, paper, paints, cleaners, wire insulation, and more to help these products resist heat, water, and grease.

- **PCBs**

A chemical contaminant that was once used as a flame retardant in electrical equipment. Though their production has been banned since 1977, PCBs persist in the environment, posing a risk to humans and wildlife.

- **POPs**

Persistent organic pollutants (POPs) known as polychlorinated biphenyls, or PCBs, which last in the environment for years.

- **Bioaccumulate**

The uptake and storage of chemical contaminants by living animals and plants. This can occur through direct contact with contaminated water or sediment or through the ingestion of another organism that is contaminated.

- **Microplastics**

The tiny (<5 mm) fragments, fibers, and microbeads that come from larger plastic litter breaking apart and persist in the environment for an extremely long time

- **Trash Traps**

[Trash traps](#) serve to collect litter, sediment, and other pollutants that are washed into river systems from rainwater concentrated on hard surfaces (i.e. roads).

- **Airshed**

The area of land over which airborne pollutants can travel to reach a particular river, lake, bay or other body of water. The Chesapeake Bay's [airshed](#) is 570,000 square miles, stretching north to Canada, west to Ohio and south to South Carolina.

- **Total Maximum Daily Load (TMDL)**

The federal "pollution diet" that sets limits on how much pollution can enter a waterbody to meet water quality standards for that specific pollutant

- **Particulate Matter (PM)**

PM stands for particulate matter (also called particle pollution): the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope.

Glossary

- [Green Infrastructure](#)

Nature-based solutions that use soil and vegetation to help slow the flow of runoff and manage rainwater where it falls

- [Wastewater](#)

Wastewater is used water. It includes substances such as human waste, food scraps, oils, soaps and chemicals. In homes, this includes water from sinks, showers, bathtubs, toilets, washing machines and dishwashers. Businesses and industries also contribute their share of used water that must be cleaned.

- [Vibrio Bacteria](#)

An infectious bacteria present in brackish coastal waters, such as the Chesapeake Bay and its tributaries. As waters warm, concentrations of *Vibrio* rise and spark health concerns.

- [Biological Nutrient Removal \(BNR\)](#)

Wastewater treatment technology that uses microorganisms to remove nitrogen and phosphorus from effluent.

- [Enhanced Nutrient Removal \(ENR\)](#)

Wastewater treatment technology that improves upon the nutrient reductions achieved through biological nutrient removal (BNR).

- [Leachate](#)

Formed when rainwater filters through wastes placed in a landfill. When this liquid comes in contact with buried wastes, it leaches, or draws out, chemicals or constituents from those wastes.

- [Superfund](#)

CERCLA, or Comprehensive Environmental Response, Compensation and Liability Act, is informally called Superfund. It allows EPA to clean up contaminated sites. It also forces the parties responsible for the contamination to either perform cleanups or reimburse the government for EPA-led cleanup work.

- [Brownfield](#)

A property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Glossary

- [Environmental Justice \(EJ\)](#)

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.

- [DEIJ](#)

Diversity, Equity, Inclusion, and Justice

- [Diversity](#)

The practice of including the many communities, identities, races, ethnicities, backgrounds, abilities, cultures, and beliefs of the American People, including underserved communities as defined in Executive Order 14035 “Diversity, Equity, Inclusion, and Accessibility in the Federal Workforce”

- [Equity](#)

The quality of being fair or impartial

- [Inclusion](#)

The practice or policy of providing equal access to opportunities and resources for people who might otherwise be excluded or marginalized, such as those who have physical or intellectual disabilities and members of other minority groups.

- [Justice](#)

The quality of being fair and reasonable; just behavior or treatment

Images and Graphics

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