

PROJECT NATURE NEWSLETTER

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SEPTEMBER, 2019 ISSUE

Events



Hike To The Giants

Highbanks Metro Park - Oak Coves Picnic Area

7th September 2:00 pm - 4:00 pm

Take a rugged 4-mile off-trail hike to the 300-year old giant sycamores along the Olentangy River

Morning Coffee and Wildlife Watch

Blacklick Woods Metro Park - Nature Center

7th September 8:00 am - 10:00 am

View animals through the nature center windows and enjoy a cup of coffee

Weekly Bird Hike

Scioto Audobon Metro Park - Grange Insurance

Audobon Center

7th, 14th, 21st, 28th September 10:00 am - 11:30 am

Hike with experienced birders to find and learn about birds (Binoculars and field guides can be provided)

Morning Walk With The Bison

Battelle Darby Metro Park - Nature Center

7th September 7:00 am - 8:00 am

Join for a 1-mile hike to learn about this 2,000-pound animal while watching the sun rise

Going on a Bigfoot Hunt!

Battelle Darby Metro Park - Nature Center

7th September 5:00 pm - 6:00 pm

Learn how to track movement and life in the forest as we search for one of Darby's most elusive creatures

Insect Songs

Blendon Woods Metro Park - Group Shelter

7th September 8:00 pm - 9:00 pm

Listen and learn about the singing insects

BioBlitz

Gallant Woods Preservation Park

7th September 7:00 am - 10:30 pm

Document the flora and fauna and other natural features of the region in a day-long survey. For more information, Email: saksena.6@osu.edu

Crazy Caterpillar Display

Blacklick Woods Metro Park - Nature Center

7th & 8th September 8:00 am - 8:00 pm

Caterpillars come in all shapes and sizes, some you might not even recognize as caterpillars. View the display to see the crazy diversity of these larvae of moths and butterflies.

Sunny Sundays

Inniswood Metro Gardens - Herb Garden

8th, 15th, 22nd, 29th September 1:30 pm - 3:30 pm

On Sundays throughout the summer, members of the Herb Society of America, Central Ohio Unit, will be in the Herb Garden to answer visitors' questions

Migrating Monarchs

Battelle Darby Metro Park - Nature Center

8th September 2:00 pm - 4:00 pm

Monarchs are amazing butterflies! Come learn how researchers tag and monitor their movements to Mexico

Evening Garden Walk

Inniswood Metro Gardens - Garden Entrance

8th, 22nd September 6:00 pm - 7:00 pm

Take a guided stroll through the Gardens

Bucks and Buckeyes

Blacklick Woods Metro Park - Nature Center

8th September 6:00 pm - 7:00 pm

Take a 2-mile walk in search of our state mammal and state tree

Outdoor Inclusive Adventure

Prairie Oaks Metro Park - Darby Bend Lakes

8th September 11:00 am - 3:00 pm

Children with special healthcare needs, developmental disabilities are invited along with family, friends and the community to connect with nature and each other during an afternoon of canoeing, kayaking and fishing. Meet live reptiles and amphibians, make a nature craft to take home and touch real furs.

Events



Scioto Fest

Scioto Audobon Metro Park

12th - 15th September 9:00 am - 8:00 pm

Celebrate 10 years of adventure at Scioto Audubon Metro Park. Climbing, concerts, camping, and so much more will be part of this 4-day festival

Pawpaw Prowl

Blacklick Woods Metro Park - Nature Center

14th September 2:00 pm - 3:00 pm

Take a 1-mile walk to search the trails for our state native fruit. Sample some treats made from the fruit

Nature Journaling

Blendon Woods Metro Park - Nature Center

14th September 3:00 pm - 5:00 pm

Drop in to the Nature Center and make your own journal to carry with you on your nature hikes!

Creeking Adventure

Battelle Darby Metro Park - Cedar Ridge Ranger Stn

14th September 4:00 pm - 5:00 pm

Get wet as we catch fish, bugs, and crawdads in the Big Darby Creek

Full Moon Hike

Battelle Darby Metro Park - Cedar Ridge Ranger Stn

14th September 7:30 pm - 8:30 pm

Take a brisk 4-mile hike through fields and forests

Evening Wildlife Hike

Highbanks Metro Park - Nature Center

14th September 7:00 pm - 8:00 pm

Hike 1-mile as we search for wildlife in the forest and fields

Native Bees

Glacier Ridge Metro Park - Shelter House

14th September 2:00 pm - 3:00 pm

Learn about native bees and help install a bee hotel in the park

Butterfly Pursuit

Highbanks Metro Park - Big Meadows Picnic Area

14th September 11:00 am - 12:30 pm

Take a 2.5 mile hike to find some of the most beautiful butterflies of the season and learn how to identify them

Full Moon Hike

Clear Creek Metro Park - Park Office

14th September 7:30 pm - 9:30 pm

Enjoy views of the full moon on a 4-mile backcountry hike

Pawpaw Palooza

Blendon Woods Metro Park - Nature Center

15th September 3:00 pm - 5:00 pm

Travel 1.5 miles on the trails and find our state wild fruit

So You Want To Be a Metro Parks Volunteer!

Highbanks Metro Park - Nature Center

15th September 2:00 pm - 3:00 pm

Discover several volunteering opportunities throughout the park district. Enjoy a guided hike, light refreshments and meet like-minded people

Pawpaw Prowl

Blacklick Woods Metro Park - Nature Center

14th September 2:00 pm - 3:00 pm

Take a 1-mile walk to search the trails for our state native fruit. Sample some treats made from the fruit.

Morning Birds

Blendon Woods Metro Park - Nature Center

21st September 8:00 am - 9:00 am

Explore the woodland trails on a 2-mile walk to find the migrating Warblers

Diamond Eyes

Battelle Darby Metro Park - Nature Center

21st September 7:00 pm - 8:00 pm

Go "diamond hunting" and discover how many spiders are watching you! Bring a flashlight or headlamp.

Events



Pawpaw Prowl

Sharon Woods Metro Park - Apple Ridge Bulletin Board

21st September 10:00 am - 11:00 am

Take a 1.5-mile walk in the forest to search for Ohio's state native fruit

Feed The Stream

Battelle Darby Metro Park - Nature Center

21st September 1:00 pm - 1:30 pm

Enjoy the fish feeding frenzy as you help feed them worms, crickets and minnows in the living stream at the Nature Center

Backcountry Gorge Hike

Clear Creek Metro Park - Park Office

21st September 10:00 am - 12:30 pm

Take a 4-mile hike to a gorge located in the backcountry

Fall Fungi

Blacklick Woods Metro Park - Nature Center

22nd September 2:00 pm - 3:00 pm

Learn about the role of fungi in a forest and look for mushrooms on a 1-mile walk

Wildflower Walk

Rocky Fork Metro Park - Bulletin Board

22nd September 1:00 pm - 2:00 pm

Learn about the beautiful fall wildflowers on a 1.5 mile hike on a grass surface trail

Hike All The Trails

Blendon Woods Metro Park - Nature Center

28th September 9:00 am - 12:30 pm

Hike approximately 6 miles for National Family Health and Fitness Day!

Crazy for Crayfish

Battelle Darby Metro Park - Nature Center

28th September 1:00 pm - 2:00 pm

Find crayfish in the creek and look for them underground

Hikin' for Lichen

Battelle Darby Metro Park - Nature Center

28th September 9:00 am - 10:30 am

Take a 3 mile moderately difficult Off-Trail Hike through the woods to look for lichen

Tree ID

Highbanks Metro Park - Nature Center

28th September 2:00 pm - 3:00 pm

Learn basic tree and leaf identification on a 1-mile hike

Collecting Leaves

Three Creeks Metro Park - Confluence Area

28th September 2:00 pm - 3:00 pm

Learn to identify, collect and preserve tree leaves for your leaf collection

Bugs and Blooms

Blacklick Woods Metro Park - Nature Center

29th September 3:00 pm - 4:00 pm

Take a 2-mile walk to look for fall flowers and the insects that visit them

Tree ID

Blendon Woods Metro Park - Nature Center

29th September 10:00 am - 11:00 am

Learn to identify the different trees in the park

Box Turtle Monitoring

Battelle Darby Metro Park - Indian Ridge

29th September 11:00 am - 12:00 pm

Help track down box turtles using radio telemetry methods

Welcome to The Fall Festival

Glacier Ridge Metro Park - Shelter House

29th September 1:00 pm - 4:00 pm

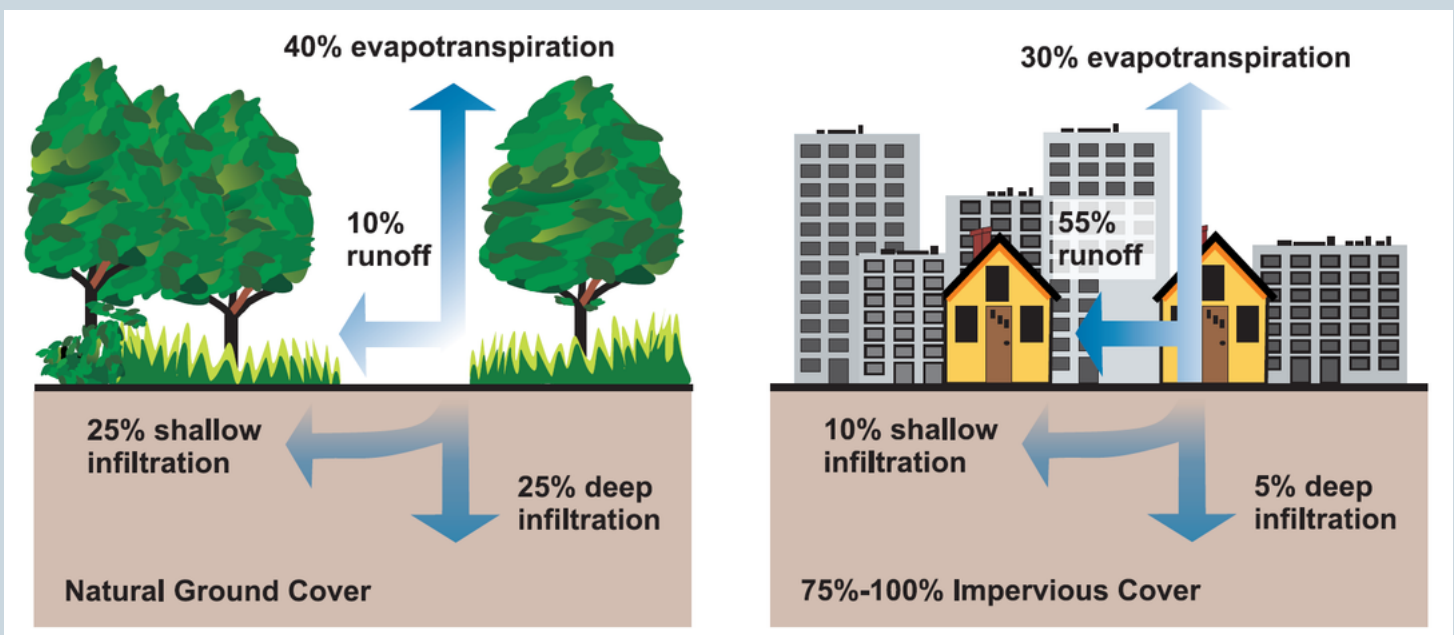
Celebrate the season with hayrides, crafts and activities

Runoff

Ever wondered why the rivers in cities look muddy-brown after a heavy rainfall? In contrast, water is much cleaner and clear in a river flowing through a forest! Unfiltered surface runoff in cities and agricultural fields is the cause!

Surface runoff is the overland flow of excess water leaving a *watershed* (or area of drainage) and flowing across the surface (not beneath the surface) to lower elevation. Hence, if the amount of water falling on a given area is greater than the rate at which it can soak into the ground (or infiltrate), the excess water flows across the surface of land and runoff occurs. This water can directly enter the rivers and streams, carrying with it oil, dirt, sediment, trash, chemicals, and other pollutants. In urban areas, impervious surfaces such as building rooftops, parking lots, roads, pavements etc do not allow the water to soak into the ground, causing surface runoff. Runoff is a major source of water pollution, contaminating rivers and lakes. All across the US coast, beaches are regularly closed after a heavy rainfall due to runoff, which includes sewage and medical waste.

In a natural landscape, such as forests, soil absorbs much of the water. Plants and vegetation not only improve infiltration but also slow down the runoff. A natural landscape almost acts like a sponge. In such areas, 50% of the precipitation infiltrates the ground and 40% evaporates, leaving only a runoff of about 10%. In an urban area with mostly impervious surface, only 15% of precipitation infiltrates the ground and about 30% evaporates. That makes a runoff of about 55% of the precipitation.



Comparison of surface runoff in a natural landscape and a typical urban area
Image Source: EPA factsheet on urban runoff

Watershed

A watershed is an area of land that drains all the precipitation from rain or snow and ice melt into a common body of water such as a lake, river or ocean. It is defined as the area or ridge of land that separates waters flowing to different rivers, basins or seas.

Ridges and hills that separate two different watersheds are called the drainage divide. Every place is in some watershed! Smaller watersheds may drain into a creek or a little stream, which then drains into a larger river, often referred to as a *basin*. Larger watersheds may contain several small watersheds. For example, the Scioto River watershed drains a total area of 6,513 square miles flowing through all or part of 31 counties, and contains several smaller watersheds such as the Olentangy watershed, Big Walnut Creek watershed, Big Darby Creek watershed, and others. Thus watersheds connect into other larger watersheds at lower elevations in a hierarchical manner. Scioto River watershed drains in the Ohio River Basin, which then drains into the Mississippi River Basin, which finally drains into the Gulf of Mexico.

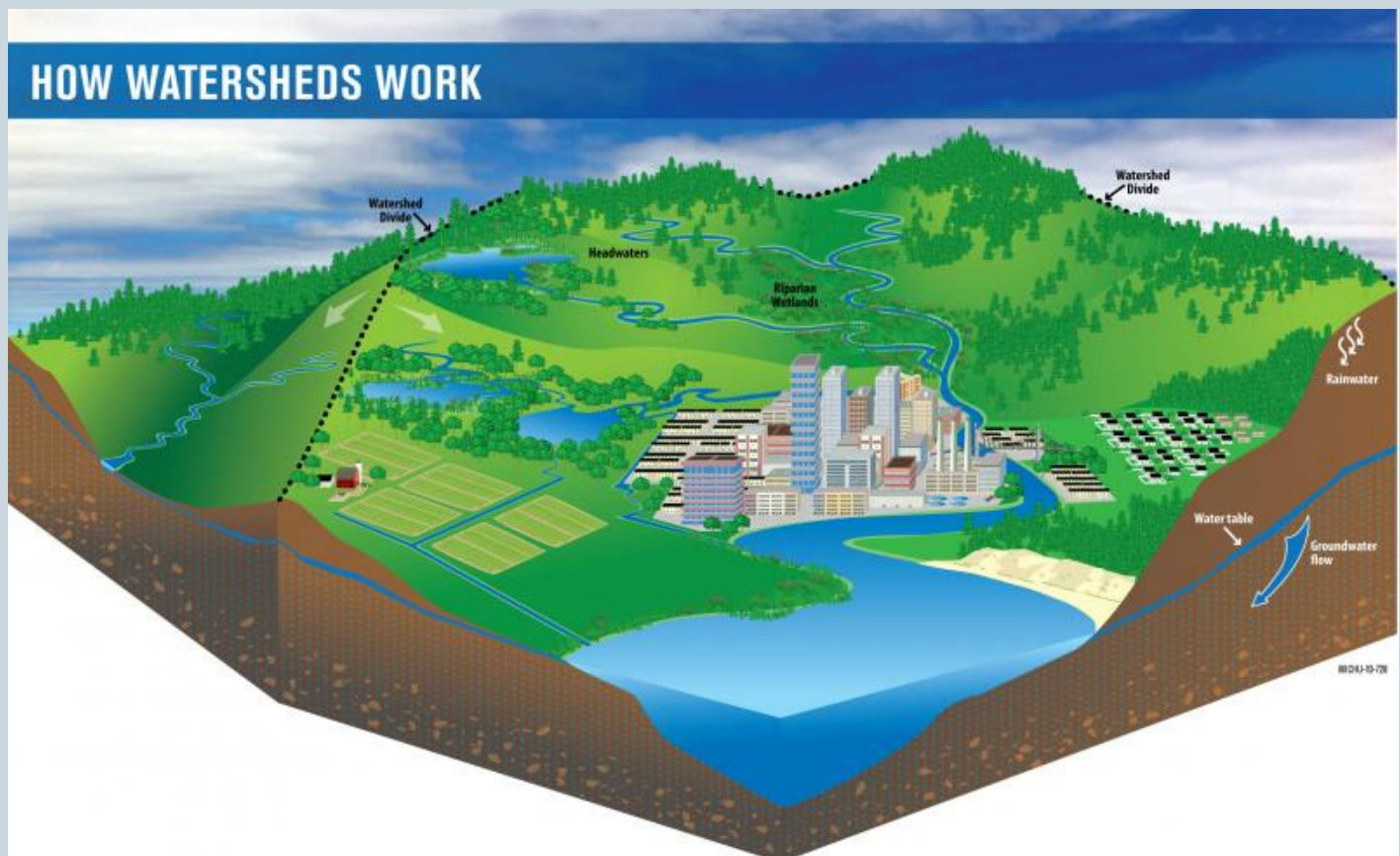


Illustration of a watershed
Image Source: www2.erie.gov
Photo courtesy: Michigan Sea Grant

Point Source and Nonpoint Source Pollution

There are two sources of water pollution from human activity - point sources and nonpoint sources. Point source pollution refers to discharge of pollutants from discrete sources such as industrial waste, sewage treatment plants, etc. Nonpoint source pollution or **NPS** comes from several diffuse sources. Runoff pollution is a nonpoint source pollution.

Stormwater

Stormwater is generated from precipitation events such as rainfall or snow and ice melt. Urban areas have mostly impervious surface that doesn't allow enough ground infiltration, leading to surface runoff. Storm drains or storm sewers are infrastructure designed to collect and carry the excess water. Stormwater drainage systems often discharge water directly into the waterways without treatment.

Stormwater helps replenish groundwater and recharge rivers and lakes. It's an important resource for human civilization. But improper management of stormwater can lead to surface runoff causing three major problems - **water pollution, flooding and erosion**. Storm sewer systems are a network of straight and smooth conduits, allowing the collected water to gather speed. When this high-speed runoff discharges into the streams, it carries with it the force that can erode the streambanks, damage streamside vegetation and wipe out the aquatic habitat. **First flush** is the initial runoff after a rainstorm. During this phase, water entering the storm drains in areas with impervious surface is generally more concentrated with pollutants compared to the rest of the storm. This results in a rapid change in the water quality of rivers and streams. First flush is often at higher temperature owing to the fact that



Stormwater

Image Source: usgs.gov

Image Credit: Galen Hoogestraat, USGS

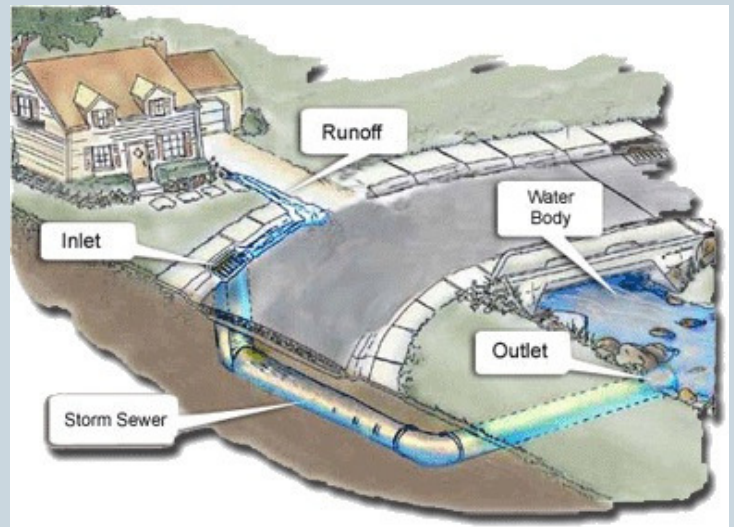
it is collected from hot surfaces such as rooftops, pavements, and roads. This water at elevated temperature entering the streams causes a sharp increase in the water temperature, which is extremely harmful to the health and reproduction of aquatic life.

Proper techniques for harvesting stormwater and its purification can help in reducing pollution and maintaining a cleaner environment.

Urban Runoff

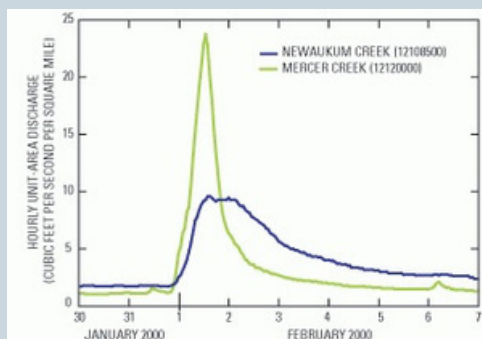
In urban areas, different pollutants carried by runoff include oil, grease and toxic chemicals from automobiles, pesticides and nutrients from lawns and gardens, viruses, bacteria, and nutrients from pet waste and failing septic systems, road salts, and heavy metals from roof shingles, among others.

The reduced ground infiltration of precipitation in urban areas has another profound and long-term effect. Not only does the loss of infiltration cause flooding, it also results in loss of groundwater recharge and may also cause lower stream flows in dry weather seasons. Additionally, removal of native vegetation, grading the land surface and constructing drainage networks, further adds to the runoff volumes and shortens the runoff time into streams.



Urban Runoff

Image Source: scienceaid.net



Streamflow in Mercer Creek, an urban stream in western Washington, increases more quickly, reaches a higher peak discharge, and has a larger volume during a one-day storm on February 1, 2000, than streamflow in Newaukum Creek, a nearby rural stream, a nearby rural stream that drains a basin of similar size.

Source: usgs.gov

The hydrograph presented here illustrates the aforementioned concept. It shows the streamflow in a rural creek (blue curve) compared to that of an urban creek (green curve) after a one-day storm. The interesting part about this graph is that the total volume of water that flowed by the measurement location might be nearly the same for both creeks (computed from the area under the curve), but there's a very sharp increase of flow in the urban stream following the storm. Also, the urban stream quickly falls back to the *base flow* (sustained flow of stream in the absence of runoff). In contrast, the rural stream rose very gradually, reached a much lower peak and took a long time to fall back to the base flow. The result is almost no flooding and

less erosion. In 2001 during a major storm in Atlanta, Georgia, the amount of water that flowed into the Peachtree Creek in a single day was 7 percent of all the streamflow for the whole year.

Managing Urban Runoff

To decrease polluted runoff, several alternative measures can be employed to areas traditionally covered with impervious paved surfaces. Innovative solutions such as green roofs, constructing rain gardens and bioswales help reduce urban runoff.

Greenroof or vegetative roof or rooftop garden is a ballasted roof partially or completely covered in vegetation. It consists of a waterproofing membrane, a growing medium (soil) and plants overlying a traditional roof.

Rain Garden is a garden of native plants planted in a shallow depression, usually along a natural slope. It is designed to temporarily hold rainwater runoff from rooftops, pavements, driveways, patios, lawns, etc.

Bioswale is much like a rain garden but a little deeper. These are linear channels, greater in length than width, and are mostly vegetated with native plants.

Constructed or Treatment Wetland are human-made wetlands that use natural processes involving vegetation, soil and associated microbes to improve the water quality. Wetlands serve as a natural filter for pollutants.

City planners and developers should use low-impact development strategies that include conserving natural areas, particularly sensitive hydrologic areas like the floodplains and vegetation along the river riparians, and reduce surface runoff by maximizing surface roughness, and conserving areas with infiltrable soil. Creating wet ponds, such as *stormwater retention ponds* that are runoff holding facilities, helps mitigate the impacts of runoff. Stormwater is held in these ponds temporarily and then released to maintain healthy downstream habitats. If properly constructed, these ponds can be highly effective in removing sediment and reducing nutrients. Wet ponds are usually vegetated and the plants' roots help hold the sediment and absorb the nutrients from the urban runoffs.

Yet other solutions to mitigate urban runoffs include using innovative porous materials for paved surfaces such as parking lots, pavements, driveways, etc. that allow the precipitation



http://visibleearth.nasa.gov/view_rec.php?id=1064
NASA Visible Earth

Runoff pollution seen from space

Dec 16, 2002. The east coast of Florida is mostly clear while the shallow western coastal water is very turbid, due to the runoff from a storm that passed a few days earlier

Image Credit: NASA Visible Earth

Agricultural Runoff

The US has over 330 million acres of farmland and its agriculture is known worldwide for high-productivity, quality and efficiency. However, because of the large-scale nature of farming in the country, improper farming practices can lead to severe problems with runoff pollution. In the 2000 *National Water Quality Inventory*, states reported that agricultural non-point source pollution was the leading source of impacts on water quality in the surveyed rivers and lakes. It was the second largest contributor to affecting the water-quality in wetlands and a major cause of pollution in the surveyed estuaries and groundwater. Agricultural activities that cause NPS pollution include poorly located or managed animal feeding operations; overgrazing; plowing too often or at the wrong time; and improper, excessive or poorly-timed application of fertilizers, irrigation water and pesticides.

Sedimentation is the most prevalent source of runoff pollution from agricultural fields. Soil that is washed off the fields enters the waterways. This sediment makes the water turbid, reducing the amount of sunlight penetrating the water and affecting the aquatic ecosystem (for more on aquatic life and water quality, refer to the July issue of Project Nature newsletter).

The fertilizers, pesticides and nutrients such as nitrogen, phosphorous and potassium used in agricultural fields enter the rivers and lakes with the runoff water, causing algal blooms and depleted oxygen-level, affecting not only the aquatic life but also creating a foul taste and odor in the drinking water. In 2014, Toledo experienced widespread water contamination, that prompted a "do not drink" advisory for parts of three days. The city of Columbus has experienced nitrate advisories in the past, following which, the city updated its water filtration systems.

It is estimated that there are about 238,000 working farms and ranches in the US that have animal feeding operations generating about 500 million tons of manure per year. If not properly managed, runoff from such facilities can carry pathogens such as bacteria and viruses, nutrients and other organic contaminants. Overgrazing exposes the soil that leads to erosion and sedimentation of water bodies. It also creates an opportunity for invasive plant species to grow. Poor irrigation practices can also be harmful. In arid areas where there is not enough precipitation for the rainwater to carry minerals deep into the soil, evaporation of irrigation water can concentrate salts on the surface. Conversely, excessive irrigation can cause erosion and runoffs.

In addition to being an environmental threat, agricultural runoff is also a severe economic one. Erosion from surface runoff carries with it the fertile layer of topsoil that farmers depend on to grow crops. Agricultural business loses millions of dollars to runoff every year!

Managing Agricultural Runoff

To reduce soil erosion and sedimentation, farmers can apply management practices that control erosion. Farmers should implement nutrient management plans in order to prevent nutrient runoffs. Animal feeding operations can limit discharges by storing and managing facility wastewater with appropriate waste management systems. In order to reduce the impact of grazing on soil and water quality, farmers and ranchers can modify grazing intensity, prevent grazing from sensitive areas, provide alternative sources of water and shade, and promote revegetation of pastures. Runoff from irrigation can be minimized by improving water use efficiency by measuring the actual crop needs and applying only the required amount of water. To reduce contamination from pesticides, farmers can also use the IPM techniques based on the specific soil, climate, crop and pest history. There are several government programs available to help farmers and ranchers with the design and management approaches to prevent and control runoff pollution.

Other Causes of Runoff Pollution

Hydromodification

Another cause of nonpoint source pollution is hydromodification, which includes modification of channels, dams, streambanks and shoreline erosion. Channelization and channel modification activities often result in diminished habitat for instream and streamside habitat for the aquatic wildlife.

Abandoned Mine Drainage

Abandoned mine drainage (AMD) is the runoff from areas with past mining activity, mostly coal mining. The type of contamination of the discharge from abandoned mines varies greatly, depending on the area's geochemistry. AMD typically has high concentration of metals, most common of which is iron. Other metals include aluminum and manganese. The drainage may raise the water temperature as well as alter its pH.

Abandoned mines impact the water quality in several ways

Acid mine drainage: It's the most prevalent form of pollution. When the polluted runoff from mining sites has a pH lower than 7, it results in acid mine drainage. Water flowing over the surface reacts with rocks containing sulphur-bearing minerals, forming sulphuric acid. Along the way, this acidic water picks up heavy metals that leach from rocks that come in contact with this acid. This process can be substantially enhanced by bacterial action.

Alkaline mine drainage: When the water flowing over mining sites has a pH greater than 7, the runoff is alkaline. This mostly occurs in mines that have minerals such as calcite, limestone or dolomite.

Metal mine drainage: Runoff over mines with high levels of lead or other metals leads to metal mine drainage.

The contaminated water from the mine drainage is highly toxic and when mixed with groundwater, surface water and soil, may have harmful effects on plants and animals, including humans.

There are several mechanisms by which AMD can be controlled. Different kinds of treatment can be employed to remove metals and other contaminants. Some passive treatments include creating wetlands or “*bioreactors*” where either a shallow pond on an abandoned mine site filled with aerobic (oxygen-rich) water, facilitates natural oxidation of metals that then precipitate out, or alternatively, deeper ponds filled with organic matter such as compost, allow the water to percolate through the compost, making it anaerobic (deprived of oxygen), which then causes the metals to precipitate as sulfides. Active treatments include sediment and erosion control to keep the contaminated soil from runoff. Other ways of minimizing abandoned mine drainage is by land reclamation (refer to the August issue of Project Nature newsletter).

Poor Infrastructure

Poor infrastructure compounds the problem of runoff pollution. Sewage overflows, leaky pipes, failing levees, etc further impact the water quality and the environment. In its *Report Card for America's Infrastructure*, the American Society of Civil Engineers gave a *D* grade to the current status of the country's dams, and a *D-* to the wastewater and drinking water systems. The US Environmental Protection Agency (EPA) states that the public health and environmental gains achieved since the passage of the *Clean Water Act* (passed in 1972 and amended in 1977 and 1987) are rapidly being reversed due to the crumbling infrastructure. Additionally, as the cities expand and get more populous, the systems originally designed for a much smaller population are unable to handle the load, causing sewer overflows that result in raw sewage mixing with rainwater. Such problems of outdated infrastructure are common in older cities, including Columbus. The City of Columbus Department of Public Utilities has several projects dedicated on addressing this very problem.

Biomagnification

Runoff pollution doesn't just impact the waterways and aquatic life, but the effect propagates to the entire ecosystem. Tiny microbes such as plankton or algae absorb the pollutants, which is then consumed by the aquatic macroinvertebrates, which in turn are consumed by the fish, increasing the level of pollutants in their own body. Animals such as birds consume the fish and the concentration of the pollutants continues to increase as it progresses up the food chain, including humans. This process is called *biomagnification*. Biomagnification implies that organisms higher up in the food chain have a higher concentration of pollutants. If the local water bodies are polluted, humans consuming fish from such water bodies, might be ingesting runoff pollutants from farms, sewage treatment plants, and city waste!

Stormwater Management

As the population grows, cities continue to expand and in order to meet the food demands, more and more natural landscape gets replaced by urban development or by agricultural fields. Unless managed well, the runoff from stormwater and other nonpoint source pollution will only contribute to further degrading our water quality.

Managing municipal stormwater is required by amendments to the Clean Water Act. Ohio EPA implements the federal stormwater program to ensure compliance with the Clean Water Act and National Pollutant Discharge Elimination System (NPDES) requirements. Ohio Department of Natural Resources provides published literature on Ohio's standards for stormwater management, land development and urban stream protection. The City of Columbus Department of Public Utilities has published Stormwater Drainage Manual to provide information to the general public on the City's stormwater policies and design practices, as well as assist developers and engineers with the review and approval of Stormwater Management Report and Construction Drawings for private and public development proposals. The Facilities Operations and Development (FOD) at Ohio State University provides an information sheet with guidelines for the campus community on preventing stormwater pollution. The OSU Master Plan lays stress on preserving the finite resources and environmental characteristics of the urban campus.

These policies, reports and manuals also offer Best Management Practices (BMP) for landowners, developers and citizens. BMP are methods of minimizing runoff pollution from contaminating the streams and waterbodies within a watershed. At local level, government entities such as Soil and Water Conservation Districts in different counties provide free or low-cost resources to local

government partners to meet this requirement. They provide assistance with natural resource evaluations that are helpful in identifying problem areas and prioritizing conservation activities in a watershed. For example, in 2016, **Franklin Soil and Water Conservation District (FSWCD)** assisted the City of Gahanna with an evaluation of Sycamore Run watershed. Using techniques like Geographic Information System (GIS), FSWCD mapped the watershed, highlighting critical areas of the stream that were degraded and negatively impacted that helped the city in addressing those specific points to improve the water quality.

Conservation Districts also work with communities and watershed groups, providing direct services to meet their stormwater needs as well as educating the communities including businesses and landowners about BMPs and raising awareness about runoff pollution. The majority of stormwater violations happen due to a lack of information and understanding rather than criminal intent. Hence it is extremely important to educate the citizens and landowners. FSWCD undertakes several outreach as well as engagement programs. Some of the programs to engage citizens and homeowners include **Central Ohio Rain Garden Initiative, Community Backyards Rebate Program, Get Grassy, Pick Up Poop (PUP), and Water Quality Partnership.**

Local communities and watershed groups play an important role in managing runoff and keeping the pollution levels low in local streams. In Central Ohio, there are several active watershed groups (listed below) that work hard to make sure our waterways are clean of pollutants.

- Friends of Lower Olentangy Watershed (FLOW)
- Friends of Big Walnut Creek
- Friends of Alum Creek and Tributaries (FACT)
- Friends of the Ravines - Central Olentangy and Scioto River Ravines

Useful Resources

FSWCD programs for citizens and communities to help minimize runoff pollution
<https://www.franklinswcd.org/community-outreach-programs>

Ohio's Standards for Stormwater Management
http://oilandgas.ohiodnr.gov/portals/oilgas/pdf/stormwater/RLD_11-6-14All.pdf

City of Columbus Stormwater Drainage Manual
<https://www.columbus.gov/utilities/contractors/Stormwater-Drainage-Manual/>

OSU Facilities Development and Operation information sheet on minimizing stormwater pollution
https://fod.osu.edu/sites/default/files/how_do_storm_sewers_work.pdf

Stormwater Awareness Week

Oct 20 - 26, 2019

October 20 - 26, 2019 has been designated as the *Stormwater Awareness Week* by the Franklin Soil and Water Conservation District. FSCWD encourages municipalities, townships, watershed groups, communities, schools or individuals to participate through events like neighborhood cleanups, installing native plants, installing rain gardens, educational events, adoption of Community Stormwater Resolutions, and other actions or events to raise awareness. For more information, visit

<https://www.franklinswcd.org/stormwater-week>



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