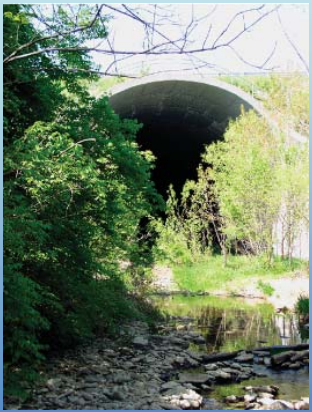


A Residents Guide to Protect...

The Upper Mill Creek



When it rains, all of the water cannot be absorbed by the ground or it hits an impervious surface such as asphalt or concrete. This excess rain water, or runoff, flows off of your yard or enters a storm sewer drain on your street picking up pollutants such as sediment, fertilizer, oil, and tire and brake residue as it goes.

The pollutant contributions that come from your property may seem tiny and insignificant, but when added to the pollutants coming from the thousands of other properties the problem quickly becomes massive. Essentially, everyone lives downstream. Just as we are affected by what people do to the water upstream, we too affect the people that live downstream from us.

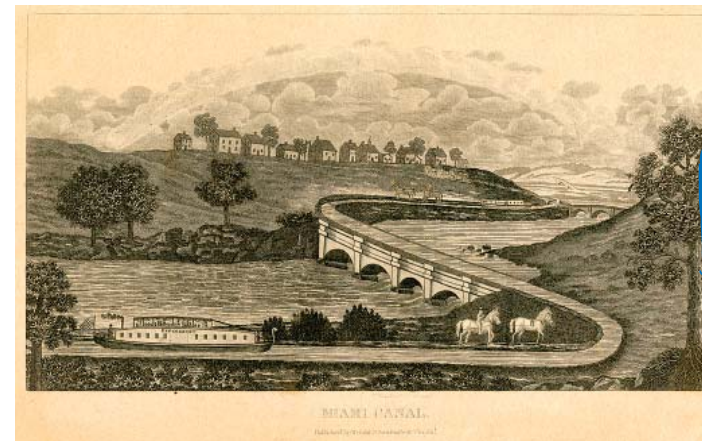
It is a common misconception that private landowners own the stream on their property. Yes, these individuals do own the land adjacent to and beneath the stream; however, the water within the stream is a “public good” owned by the State of Ohio and all of its citizens. Landowners have the right to use the water, but only in ways that do not infringe on the rights of others. Often people don’t realize that the decisions they make about their land can cause serious negative impacts to the water in the stream.

The health and abundance of our streams and the goods and services that they afford us are inseparable from everyone’s economic and civic well-being. We use our rivers, lakes and groundwater in agriculture, recreation, industry and for public water supply and (ideally) enjoy the abundance of fisheries. Without our interference, the water system naturally supports wildlife diversity, flood control, water storage and filtration, and biological productivity.

The purpose of this brochure is to provide the residents and landowners of the Upper Mill Creek Watershed several techniques and Best Management Practices (BMPs) to help keep the streams healthy and clean in their watershed and beyond.

The Mill Creek Today

Approximately 450,000 people currently live within the boundary of the entire Mill Creek watershed. The creek flows 28.1 miles from its headwaters in southeastern Butler County through central Hamilton County to its confluence with the Ohio River, just west of downtown Cincinnati. The predominantly urban watershed drains 166 square miles that encompass all or part of 37 political jurisdictions. Most of the Mill Creek flows atop a buried valley aquifer composed of highly permeable sands and gravel layers left behind eons ago by melting glaciers. This makes the Mill Creek valley highly vulnerable to groundwater pollution.



The Mill Creek drains 166 square miles of land. This once forested land was replaced by agriculture, which was in turn replaced by predominantly urban development.

THE MILL CREEK: A BRIEF HISTORY

The Mill Creek Valley was once abundant with wildlife such as the black bear, gray wolf, mountain lion, passenger pigeon, and Carolina parakeet. However, due to its nutrient-rich soils, ample groundwater supply, and close proximity to mills and markets, the Mill Creek watershed became the first land in southwestern Ohio to be extensively farmed. The change from forested land to farm land came at a cost. These once abundant animals disappeared from the Mill Creek watershed. This deforestation also increased erosion and sedimentation of streams and decreased shade. As a result, many Mill Creek fish such as the eastern sand darter, the river chub, the rosyface shiner, and the brook silversides also eventually disappeared.

After a visit to the area Charles Dickens described the Mill Creek Valley as "richly cultivated, and luxuriant in its promise of an abundant harvest."

Valley development continued. In the mid-1800s the construction of the Miami and Erie Canal parallel to the creek made the valley a prime location for industry growth. The Mill Creek Valley's easy grades led to the development of a rail line in 1851, followed a century later by the construction of Interstate 75.



In the early 19th century, industry in the valley boomed. Whiskey distilleries dumped about 500,000 gallons of hot slop water into the Mill Creek every day. By 1827, the continuous dumping of bloody waste by Mill Creek Valley slaughterhouses made the water unsafe for drinking, cooking or cleansing.

In 1902 a state Board of Health investigation determined that the Mill Creek was probably the foulest watercourse in Ohio.

The City of Cincinnati decided to create a "combined" sewer system in 1863 by mixing sanitary sewage and storm sewage in pipes directed to sewage treatment plants.

The system was intended to return the Mill Creek to a "state of sparkling purity." In reality, the sewer pipes cause millions of gallons of untreated sewage to overflow into the Mill Creek during stormy weather.

By the late 1970's the Clean Water Act helped to significantly reduce industrial discharges to the stream. Nevertheless, a 1992 Ohio Environmental Protection Agency survey found the Mill Creek to have the poorest water quality among all of Ohio's 55 principal streams and rivers. Non-point source pollution, which comes from a variety of diffuse sources, was cited as the largest contributor to the Mill Creek's degraded water quality. In 1997, the national river conservation group, American Rivers, designated the creek as "the most endangered urban river in North America."

Today, a variety of people are working to enhance the value of the Mill Creek, its tributaries, and its watershed. They do their part by planting trees, cleaning up streams, labeling storm drains, creating rain gardens, restoring wetlands, educating others and taking eye-opening excursions with the Mill Creek Yacht Club. The Yacht club is a loose knit group of kayakers and canoeists who paddle on the urban stream to raise public awareness.



Cincinnati Brewers

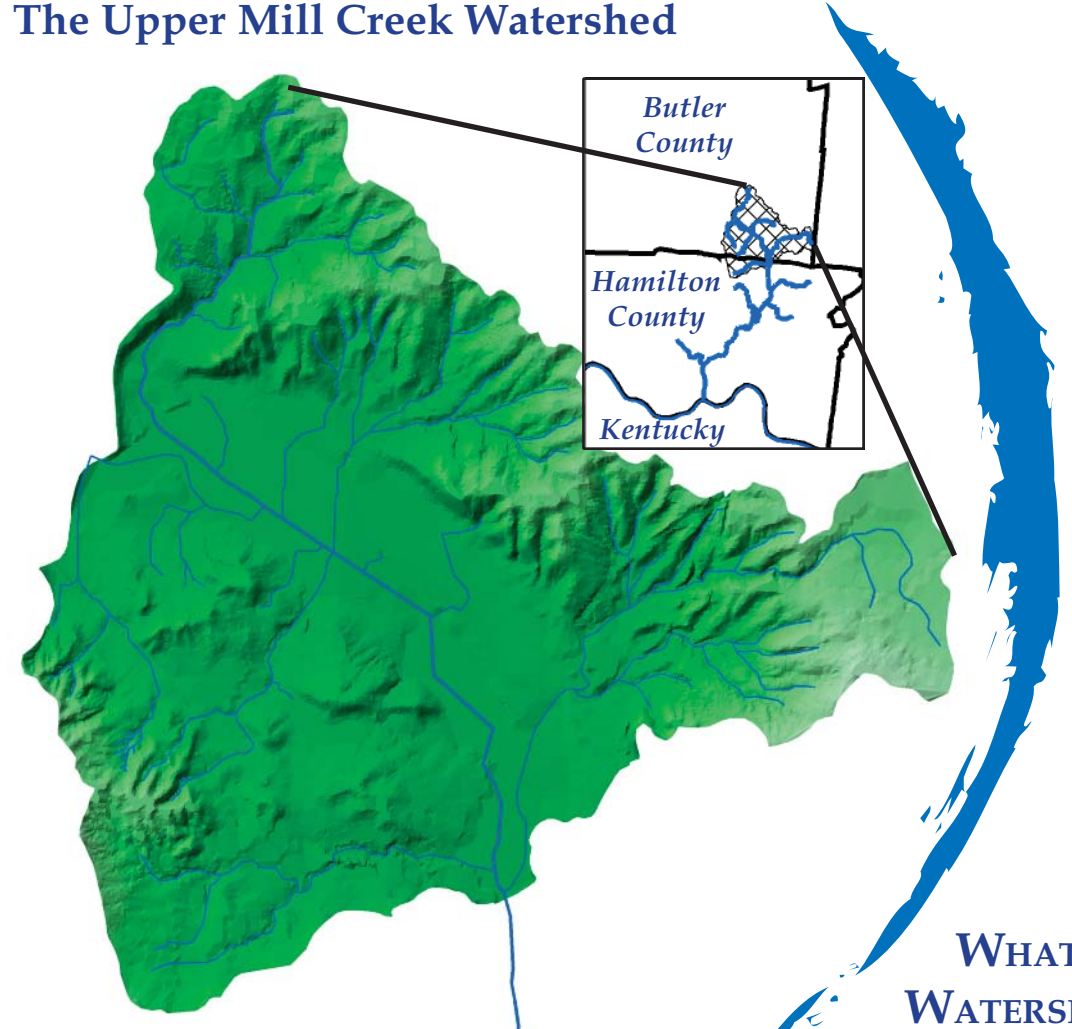
A watershed is an area of land that drains to a stream, river, or other body of water. When rain falls or snow melts in a watershed, the water can: (1) soak into the ground, (2) evaporate into the air, or (3) flow as runoff to a stream, river, pond or lake. In developing areas, such as the Upper Mill Creek watershed, the runoff picks up pollutants from busy roads, parking lots, trucking terminals, chemically treated lawns, fertilized fields, construction sites and other land uses. Much of the polluted runoff flows directly to a nearby stream without ever being cleaned. This stream joins up with other streams to form a larger stream. The larger streams again meet up with other large streams to form a river. These waterways receive polluted runoff, especially in urban areas with concrete, asphalt and other impervious surfaces.



The Mill Creek watershed is dominated by urban land uses. It drains 166.2 square miles covering all or portions of 37 political jurisdictions.

Image courtesy of NC Wildlife Resource Commission

The Upper Mill Creek Watershed



The Upper Mill Creek watershed covers about 45 square miles or 29,000 acres in southeastern Butler and northern Hamilton Counties.

Most of the watershed's 62,000 residents live in three Butler County townships - West Chester, Fairfield, and Liberty. Their populations have increased 476% in the last four decades.

WATERSHED

WHAT IS A WATERSHED?

A watershed is all of the land that drains into a stream, river, lake, or other waterway. High areas, such as ridges, are the boundaries between different watersheds. A large watershed can be composed of several smaller watersheds.

Stream systems are in a state of constant change. This can be attributed to two simple rules – water always takes the path of least resistance and soil will erode under nature’s forces. The same erosive forces of water that carved out the Grand Canyon are at work right now in your backyard. Stream bank erosion can be detrimental to homeowners by taking away valuable land and, in extreme cases, causing structural damage to the home.

The root systems of trees, shrubs, and some types of grasses are the strongest natural defense against stream bank erosion. By leaving a strip of deep-rooted vegetation, also known as a riparian buffer or stream buffer, along the stream’s edge you significantly improve the stability of the stream bank. This means keeping the lawn mower away from this area!

Common turf grasses like Fescue and Kentucky bluegrass generally have very shallow root depths (3 to 5 inches). Native vegetation, that is plants that have evolved locally, typically have root systems that grow many feet into the ground (the roots of the Common Nine-bark shrub can grow 16’ feet down). These native plants are more suited to local environmental stresses such as drought, disease, and insects.

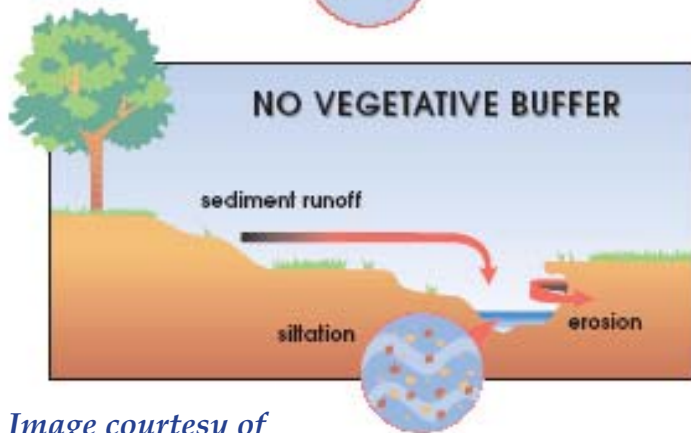
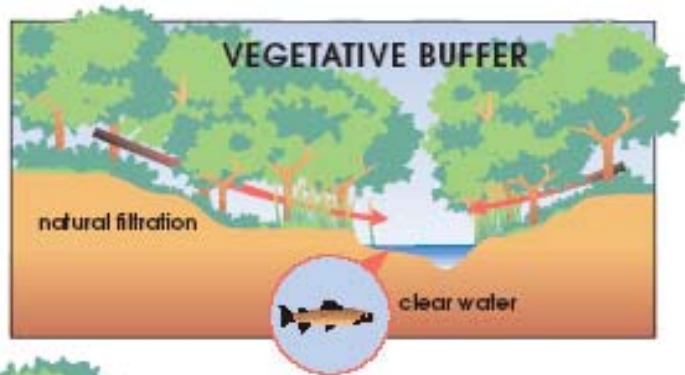


Image courtesy of NC Wildlife Resource Commission



A new riparian buffer was planted by volunteers along the Mill Creek near St. Rt. 747 in West Chester Twp.

Stream buffers also provide privacy and beauty which can potentially increase the value of a home. They filter out chemicals and sediment carried by storm water runoff from your yard, provide habitat for wildlife, and inhibit algae growth by shading the stream. Generally, for urbanized areas such as the Upper Mill Creek watershed, a stream buffer width of 10 to 20 feet is the minimum recommendation to improve the stream bank stability. For optimum benefits the buffer width should be approximately ten times the stream width, from bank to bank.

If your property is already experiencing stream bank erosion and you would like to learn more about stabilization techniques, contact Butler Soil & Water Conservation District (SWCD) at (513) 887-3720 or Hamilton County’s SWCD at (513) 772-7645.

Shallow roots on typical turf grasses do not provide effective buffers.



Buffers are strips of vegetation, such as trees and shrubs, along the banks of streams and rivers. They can reduce stream bank erosion, filter pollution and provide habitat

VEGETATED BUFFERS

Each year Americans spend countless hours striving for the perfect lawn. This can have environmental impacts, such as excess fertilizer and pesticides washing into storm drains and creeks. Lessening these impacts does not require abandoning our lush landscapes, just rethinking the practices and structures by which we achieve our landscaping goals.

Fertilizer

Wise usage of fertilizers and pesticides can reduce the amount of pollutants in our waterways, produce a healthier greener lawn, and ultimately save you money and time.

Researchers at the Ohio State University say that the typical four-step plan is often unnecessary. Their studies show that fertilization in the early fall (August or September) and late fall (October, November or December) is optimal for home lawns. Spring and summer fertilization can help your lawn; however, too much fertilizer at these times can cause disease and other problems.

Soil Test

Lawns typically require three key nutrients – Nitrogen (N), Phosphorus (P), and Potassium (K). A simple soil test will determine how much of each nutrient your lawn will need. Test kits can be purchased, or you can send a sample off to be analyzed. Your local Ohio State Extension Office should be able to provide you with a soil test packet with directions on how to do this. When you receive the results you can select the appropriate fertilizer nutrient ratio for your lawn. This ratio is always displayed on the fertilizer bag.



Weeds

Weed infestation in your lawn can be a nuisance. In most cases, preventative measures can eliminate the need for harsh pesticides. Weeds thrive in soils that have a high clay content or are tightly compacted, thus aerating your lawn and/or amending the soil with organic matter will greatly improve lawn health. Proper watering during the driest months can also deter weed growth. Lawns in SW Ohio require about one inch of water per week to remain green and growing. Over-watering causes the development of very shallow root systems. This can make the lawn more susceptible to certain kinds of pests. Finally, mowing your lawn too short can place a lot of stress on the grass and promote weed invasion. Lawns should be mowed to a height of about 2 to 3 inches.



Insects

Insects can wreak havoc on plants, but most problems can be prevented. Since insects are typically scavengers, they are attracted to rotting and unhealthy plant material. Removing this food source can reduce the attraction to the insects. If these methods are unsuccessful, there are now several natural, organic treatments and methods to control most insects in our area. Conventional poisons should be used cautiously and as a last resort.



Emerald Ash Borer a recent Mill Creek Valley pest

XERISCAPE

“ Xeriscape is not a specific look or specific group of plants. Xeriscape is actually a combination of seven common-sense gardening principles that save water while creating a lush and colorful landscape. These seven xeriscaping design principles are:

Plan and Design... for water conservation and beauty from the start.

Create Practical Turf Areas... of manageable sizes, shapes, and appropriate grasses.

Select Low Water Plants... and group plants of similar water needs together. Then experiment to determine how much and how often to water the plants.

Use Soil Amendments... like compost or manure as needed by the site and the type of plants used.

Use Mulches... such as woodchips, to reduce evaporation and to keep the soil cool.

Irrigate Efficiently... with properly designed systems (including hose-ends) and by applying the right amount of water at the right time.

Maintain the Landscape Properly... by mowing, weeding, pruning and fertilizing properly.



Ohio native plants include the bright yellow Blackeyed Susans

Xeriscaped landscapes generally require less fertilizer, maintenance, pest control and of course water than traditional landscapes. Xeriscaping is not just rocks or even a lawn-less landscape.

Yard and food wastes account for nearly 25% of the municipal solid wastes produced in the United States. By composting we can reduce the amount of waste sent to our landfills and create a rich material called humus. Humus is an excellent medium for plant growth.

Compost is one of nature's best mulches and soil amendments. Using compost loosens clay soils, improves soil structure, texture, and aeration while increasing the soil's water-holding capacity. In fact, compost can in most cases eliminate the need for fertilizers and pesticides.



The nutrient-rich qualities that make compost so beneficial also create a threat to the water quality in streams. When the organic materials (e.g. grass clippings, fruit and vegetable waste) decompose they release nutrients such as phosphorus, nitrogen, and potassium. If excessive amounts of these nutrients are introduced to a stream they can cause extensive growth of algae and low levels of dissolved oxygen, an



This friend of your yard can help create compost

essential element for life in the stream. For this reason compost piles should be located at least 50 feet away from streams or storm drains.

Composting is nature's process of recycling decomposed organic materials. Anything that was once living will decompose.

COMPOST

RAIN GARDENS

A rain garden is a planted depression in your yard that captures rainwater from roofs, driveways and walkways where rain water cannot be absorbed by the ground. The rain garden reduces runoff by allowing rainwater to slowly soak into the ground instead of flowing to storm drains and creeks. This reduces erosion, water pollution and flooding.



A rain garden is not a pond, but more of an earthen sponge that soaks up runoff in a matter of hours. The garden is dry most of the time. A simple percolation test shows how fast your soil drains.

Rain gardens usually are filled with native plants. Why natives? Because they evolved to fit their environment. They are naturally drought, flood and pest resistant in their native region. That translates to less work for the novice gardener and the pro, once all the initial work is done.

Remember before you dig to call the Ohio Utilities Protection Service (OUPS) at 1-800-362-2764 to find out if there are any buried pipes or lines.



Cardinal Flower

Rain barrels, considered by many as outdated technology, are on the comeback. Sure, they are old fashioned. In fact, collecting rainwater for use in barrels or other containers is an ancient practice. Historical records show that they have been used in Thailand as far back as 2,000 years ago.

Residential water use typically increases 40 to 50 % during summer months due to outdoor water use. A rain barrel can reduce this usage by collecting and storing storm water from your rooftop. It is usually connected to a downspout from your roof gutters. Depending on the size of your house and the amount of rainfall, you can collect substantial quantities of rainwater with a simple system. This free water can noticeably cut your water bill.

Using rainwater instead of tap water can help to improve the health of your gardens, lawns, and trees. Rain is naturally soft water and devoid of minerals, chlorine, fluoride, and other chemicals. For this reason, plants respond very well to rainwater. After all, it's what plants in the wild thrive on!

To keep your rain barrel safe, make sure it has either a small enough opening that a child cannot fall in, or a safety strip reducing the size of the opening. Also make sure it is located in an area where there is no chance that it could fall over. A 55 gallon



drum weighs more than 450 pounds when full. Also make sure it has a screened in lid to keep out mosquitoes and other insects searching for a breeding ground.



Harvest rain water with a Rain Barrel

RAIN BARRELS

In the Upper Mill Creek watershed, water that goes down the storm drain on your street or in your yard DOES NOT go to a treatment plant. It goes directly to the nearest stream or waterway. That means pollutants must be disposed of properly in order to keep the streams clean and full of life.



Graphic Courtesy of San Bernadino County, CA Stormwater Program

Motor Oil – Oil does not dissolve in water, it sticks to just about everything; and it is toxic to humans, wildlife, and plants. One pint of oil can make an oil slick the size of a football field. Each year Americans spill 180 million gallons of used motor oil into our water. This is 16 times the amount spilled by Exxon Valdez in Alaska in 1989.

What you can do – Check for oil leaks from your car and other machinery regularly and fix them promptly. Clean up spills immediately and dispose of oily rags properly. Never dispose of oil or other engine fluids down the storm drain, on the ground, or in a ditch. Instead take them to an auto supply store to be recycled.

Concrete – Waste concrete washout is highly alkaline, making it toxic to fish and other aquatic organisms. It also contains sediment that coats the stream bed and destroys habitat.

What you can do – Never dump excess concrete waste down the storm drain and do not wash concrete off of equipment where it can be transported to the storm drain.

Pet Waste – Pet waste is full of dangerous bacteria. If not disposed of properly it can be washed down the storm drain resulting in streams and water bodies that are unsafe for swimming, fishing, and recreation. Pet waste may not be the largest or most toxic pollutant in urban waterways, but it is one of many small sources of pollution that add up to a big problem. The waste produced by Butler County’s dogs and cats is estimated to equal the waste of 50,000 people!

What you can do – Scoop the Poop! To dispose of it you have two options:

1- Flush it down the toilet- water from your toilet goes to a septic system or sewage treatment plant that removes most pollutants

2- Place it in the trash

What else can you do?

Volunteer to label the storm drains in your neighborhood with “No Polluting” signs. All of the supplies, (labels, glue, etc) will be supplied. To find out more contact Butler Soil & Water Conservation District at (513) 887-3720 or Hamilton County Soil & Water Conservation District at (513) 772-7645.



BMPs (Best Management Practices) are the most effective and practical methods in achieving an objective such as minimizing pollution.

Impervious Surfaces seal the soil surface, preventing rainwater from entering the soil. These are mainly constructed surfaces - rooftops, sidewalks, roads, and parking lots - covered by impenetrable materials such as asphalt, concrete, brick, and stone. On an impervious surface, water is forced to travel downhill until it reaches a place it can soak into soil or enter a river, creek or other waterway. As it travels - or runs off - these impervious surfaces, water can pick up pollutants (like oil or fertilizer) and carry these materials to the creek.

Native Vegetation Consists of plants, shrubs and tree species that have evolved locally and are therefore better suited to local stresses such as drought, disease, and climate.



Non-Point Source (NPS) Pollution is pollution that cannot be traced to a single point because it comes from many individual places or a wide-spread area. Examples include, oil leaks from vehicles, drainage from agricultural fields, and chemicals applied to lawns.

Pervious Surfaces allow water to soak into the ground through porous layers such as gravel, crushed stone, lawns, forested areas, fields, etc.

Point Source Pollution is pollution that can be traced to a single point such as a pipe, ditch, sewer, tunnel, or containers of various types. This type of pollution is typically associated with industry.



Pollutant A pollutant is any substance in water, soil, or air that degrades the natural quality of the environment; offends the senses of sight, taste, or smell; or causes a health hazard. An example could be soil. The soil that is in our yards, construction sites and farms - where it should be - is not a pollutant. However, soil can be a pollutant if it is washed away into our streams where it can harm fish and other aquatic organisms.

Rain Garden (or Bio-Retention Basin) Conventional gardens are usually planted on mounds or raised beds. A rain garden is located in a depression that captures rainwater from roofs, driveways and other impervious surfaces. The depression is typically planted with native plants that mimic the natural absorption and pollutant removal abilities of a forest or meadow.

Riparian Zone is the strip of land next to a stream, river, lake or wetland. Riparian vegetation includes plants and trees that thrive along the banks of these waterways.

Storm Drain is the opening typically found along the sides of roads that are designed to drain excess rainwater away from roads and parking lots. Drains lead to **Storm Sewers** which are underground pipes that carry this water to a nearby stream, pond or other waterway.

Storm Water Runoff is the rainwater that is not absorbed by the ground. It drains from roads and parking lots, to eventually enter a storm drain.

Vegetated Buffers are strips of plants along the banks of streams and rivers. They can reduce stream bank erosion, filter pollution and provide habitat for many kinds of wildlife.

Watershed is an area of land that drains down to a stream, pond, lake, or other body of water.



Ridges along high areas of land are the boundaries between different watersheds.

Volunteers planting a buffer in the riparian zone

This publication was developed through
a partnership between

Butler County Department of
Environmental Services

Butler County Engineers Office and
Storm Water District

Butler Soil & Water
Conservation District

Greenacres Foundation

Mill Creek Watershed Council of
Communities

OKI Regional Council of
Governments

Schumacher Dugan Construction, Inc.

University of Cincinnati

West Chester Parks and Recreation

West Chester Township

This brochure was funded by:

OhioEPA through Section 319 of the Federal Clean Water Act

For more information please visit

Backyard Conservation

www.nrcs.usda.gov/feature/backyard

Water: For Kids

www.epa.gov/water/kids.html

Composting

www.epa.gov/compost/

Erosion

Local Soil & Water Conservation Dis-
trict. Navigate to Offices/SWCDs at
<http://dnr.state.oh.us/soilandwater>

Mill Creek Information

www.millcreekwatershed.org

Rain Gardens

www.millcreekwatershed.org/rain-gardens.html

Water: What Can You Do?

US EPA

www.epa.gov/water/citizen.html

Ohio EPA

www.epa.state.oh.us/water.html

Ohio Department of Natural Resources

www.dnr.state.oh.us

U.S. Geological Survey

<http://oh.water.usgs.gov>

Xeriscaping

<http://ohioline.osu.edu/hyg-fact/1000/1643.html>

Special Thanks To:

Dr Stanley Hedeey , the Cincinnati Historical Society
and the Lane Public Library: Cummins Collections