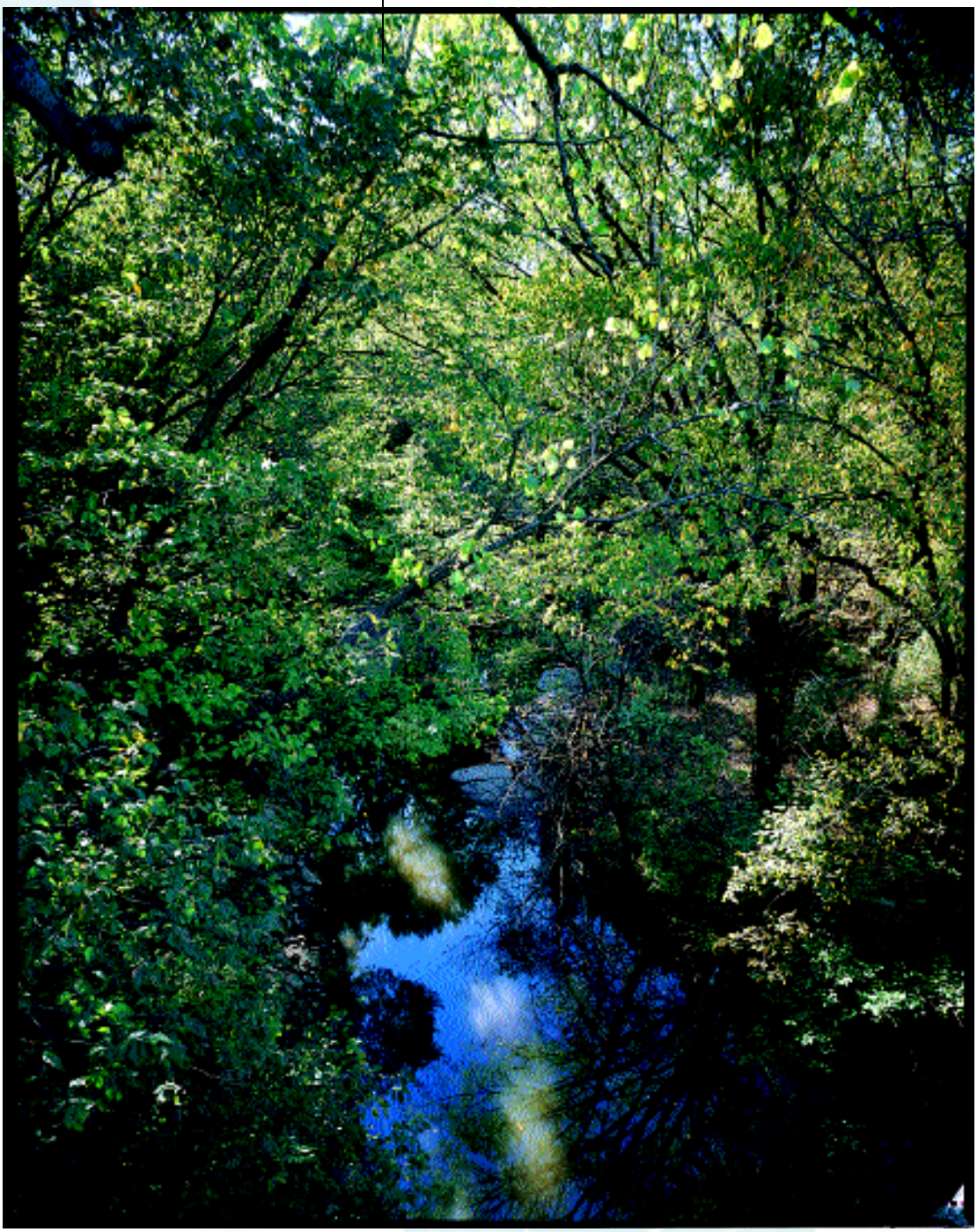
Water Quality Report

2000

Louisville and Jefferson County

Metropolitan Sewer District

A closer look at our local watersheds



"Because urban areas are increasingly devoid of any kind of natural environment, much of the country's youth grows up with little sense of geographic place...concepts of ecology and environmental education become too abstract."

Ann Riley, *Restoring Streams in Our Cities*

Our streams are dying

Jefferson County streams need your help. Although we've made some important gains in recent years, Jefferson County streams face serious problems. According to an eight-year monitoring program conducted by the Metropolitan Sewer District (MSD), most streams in Jefferson County are unsuitable for fishing or swimming. Many streams are being polluted by runoff from parking lots, streets and other paved surfaces and by runoff from lawns treated with chemicals, including fertilizers. Other factors, ranging from faulty septic systems to habitat destruction, also contribute to the problem. Big challenges remain—but simple actions on your part can help.

Assessing the challenges

The program found declining populations of crayfish, worms, insects and other invertebrates in and around streams throughout the county—findings that reflect moderate to severe water pollution and natural habitat destruction. These findings underscore the importance of balancing urban development and environmental protection.

On the positive side, significant gains have been made in some areas. Shutting down ineffective wastewater treatment plants has improved water quality in many areas. Sewer extensions, citizen-action projects, habitat restoration work and other programs have helped achieve measurable improvements.

Conducting the program

MSD monitors 11 streams and their watersheds (the land that drains into the streams). Each month members of MSD's Environmental Team collect data on water temperature, stream flow, alkalinity, fecal bacteria, dissolved oxygen and other chemical characteristics. Each quarter the team also tests for 18 metals, herbicides and pesticides. Every third year MSD conducts surveys to monitor the numbers and types of aquatic insects and fish in the streams.

This report takes a closer look at the factors that affect our streams and includes a review of each stream and its watershed. The report also describes ways that you can make a difference.

Upsetting the balance

Many factors can adversely affect water quality

Extremes in water flow

When rain hits unpaved surfaces, it soaks into the ground. Much of this water is absorbed by plant roots and is stored in soil. Some of the water gradually seeps from the soil and enters streams and creeks. Stream flow increases slowly and later decreases slowly.

When rain hits pavement and other impervious surfaces, the water does not get a chance to filter through the soil; it instantly becomes runoff. The runoff rapidly moves across land surfaces to streams and rivers, picking up sediment and pollutants as it travels. Once it reaches the streams and rivers, this runoff causes a rapid increase in flow, which can flush fish, insects and other creatures away before they have time to retreat to safe areas.

Particles transported by the rapidly moving water can act as a sandblaster, a process called scouring. Scouring can undercut root systems and destroy aquatic vegetation and aquatic animals. In addition, it can destroy microscopic organisms that larger animals, such as fish, feed on.

The rapid increase in flow also can cause habitat loss by eroding stream banks, adding sediment to streams and washing away vegetation and objects such as rocks and logs that provide shelter for animals living in the stream.

As a result of development, more water moves across the land surface and less water soaks into the ground, with little water being stored in soil. Water that was once gradually released from soil is no longer available to maintain stream flow during drier periods. This decrease in flow causes stream temperatures to increase, and this increase lowers the water's ability to carry oxygen. Low oxygen levels can kill fish. In addition, sometimes flow is so low that there is simply not enough water to support aquatic organisms.

Sediment

When too much sediment is washed into streams, it causes several problems. It can smother organisms that other creatures depend on for food. It can clog the gills of fish and other aquatic life. It can cover what had been suitable habitat. And chemicals in the sediment can deplete the oxygen that aquatic life needs.

Bacteria

Fecal coliform bacteria are found in the intestines and feces of warm-blooded animals, and the presence of these bacteria in water can indicate contamination from sewage. High levels of these bacteria can indicate the presence of organisms that cause contagious diseases, including hepatitis. According to the Kentucky Division of Water, high levels of these bacteria have made 15 segments of Jefferson County streams unfit for recreation involving contact with the water. The Jefferson County Board of Health recommends avoiding all contact recreation in all Jefferson County streams.

Pages 2 and 3:
An eroded stream bank illustrates the damage caused by rapid increases in water flow.

Chemicals

High levels of many chemicals can kill aquatic life or cause mutations in it. Similarly, extreme acidity or alkalinity can have a negative impact on aquatic life. Streams can become too acidic if too much organic matter is dumped into them during low flows. Conversely, they can become too alkaline when lime washes into them from chemically treated croplands, golf courses or lawns.

A similar problem involves high nutrient levels. Nitrogen and phosphorus found in streams are generally referred to as nutrients. Although the term nutrients usually has a positive connotation, high nutrient levels can harm or kill aquatic communities. High nutrient levels can be caused by a variety of factors, including discharge from small wastewater treatment plants, septic tank seepage, overflows from sanitary or combined sewers, fertilizer runoff or animal waste. Also, when people over-fertilize their lawns, the excess chemicals are washed into streams during rainfall. High nutrient levels can increase the growth of algae, which can deplete oxygen levels, suffocating fish and other aquatic life.

In winter, salt applied to parking lots and roads washes into streambeds, producing conditions unsuitable for life in the streams. Likewise, high levels of metals in waterways can be toxic to stream organisms. MSD tests for a wide range of metals, including mercury, arsenic, lead and cadmium, and has found unacceptable levels of one or more metals in every stream sampled in Jefferson County. However, metals violations can be the result of natural geology. For example, the shales in this area have a high metals content and may contribute to metals violations in Jefferson County streams.

Like metals, pesticides and herbicides can produce toxic effects in streams. Pesticides and herbicides are often found in streams after spring storms, when they are washed off the surrounding land. Area residents can reduce their dependence on pesticides and herbicides by planting more native plants, which are more pest- and disease-resistant than non-native plants; by mulching and using compost rather than using commercial fertilizers; and by planting trees and shrubs on some parts of their property now covered by lawn.

Habitat Loss

Riparian areas are important to the health of streams. A riparian area is land located along a body of water. A healthy riparian area has four features: a canopy of tall trees, an understory of smaller trees, a shrub layer and a layer of groundcover. Riparian vegetation helps to filter pollutants and debris, as well as to stabilize stream banks. Riparian areas also regulate water temperatures by shading the stream, which increases the stream's ability to hold oxygen.

Riparian plants provide leaf litter to streams, and aquatic insects utilize this litter as a food source. When streams lose their riparian buffers, they become more prone to erosion, pollution and a decline in the number and diversity of aquatic communities.

Likewise, wetlands are important to the health of watersheds. Wetlands contain plants and microorganisms that help to filter excess nutrients and toxins before they can reach streams. Wetlands also function as sponges, absorbing floodwaters that otherwise could cause problems in residential or commercial areas. Wetland communities include riparian forests, swamps, wet meadows and hardwood bottomlands.

Biologically, wetlands are rich and diverse ecosystems, teeming with migratory birds, fish, amphibians and plants. Yet wetlands are often under-appreciated and are often filled or drained for development. Watersheds can be enhanced by preserving these vital ecosystems and by restoring them wherever appropriate sites are available.

The big picture

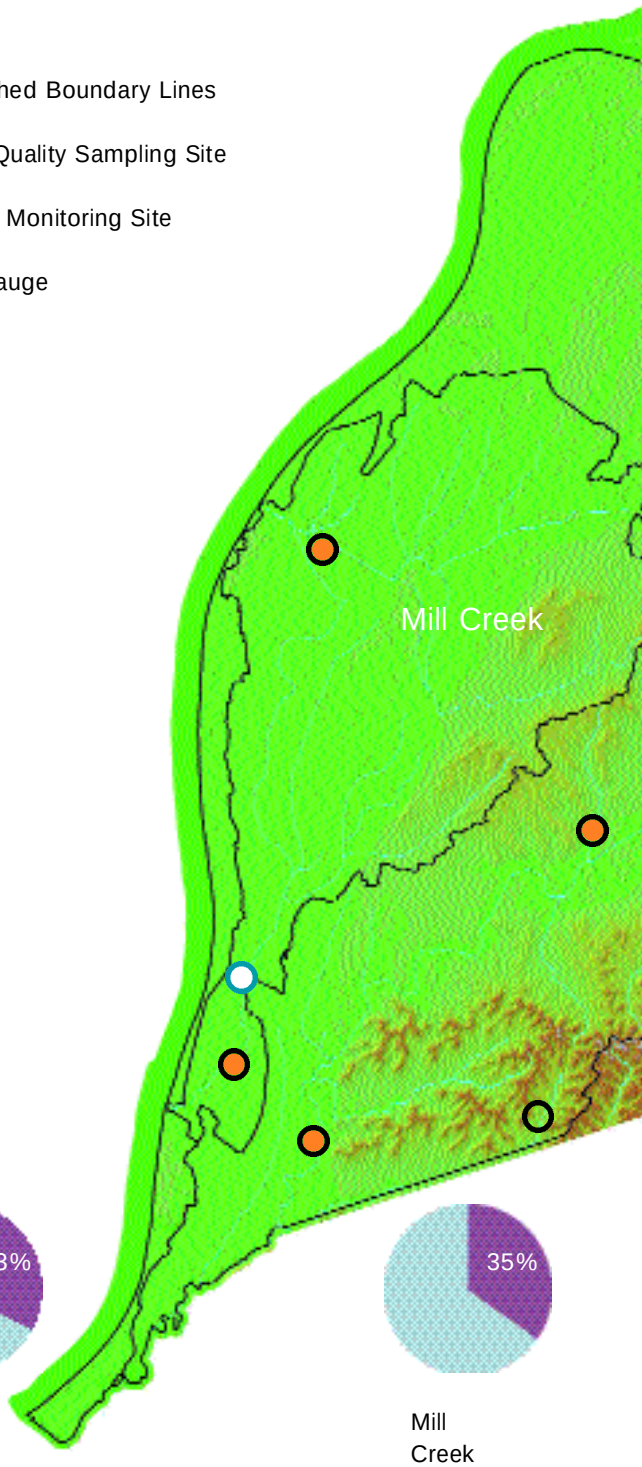
Collecting the fecal data

The findings in the graph below are based on water samples collected year-round for eight years and analyzed for fecal coliform. According to state standards, a minimum of five samples should be collected from a site each month from May to October. Because of limited resources, MSD collected samples from each site approximately once every four to six weeks.

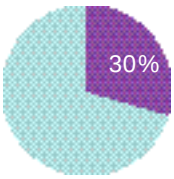
For more detailed information, see "Water Quality in Jefferson County, Kentucky: A Watershed Synthesis Report, 1991-1998."

Legend

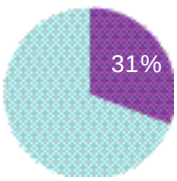
- Watershed Boundary Lines
- Water Quality Sampling Site
- Stream Monitoring Site
- Rain Gauge



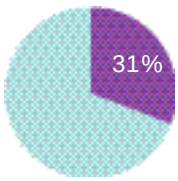
Fecal Bacteria Levels Exceeding Recreational Standards



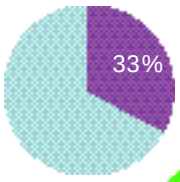
Cedar Creek



Harrods Creek

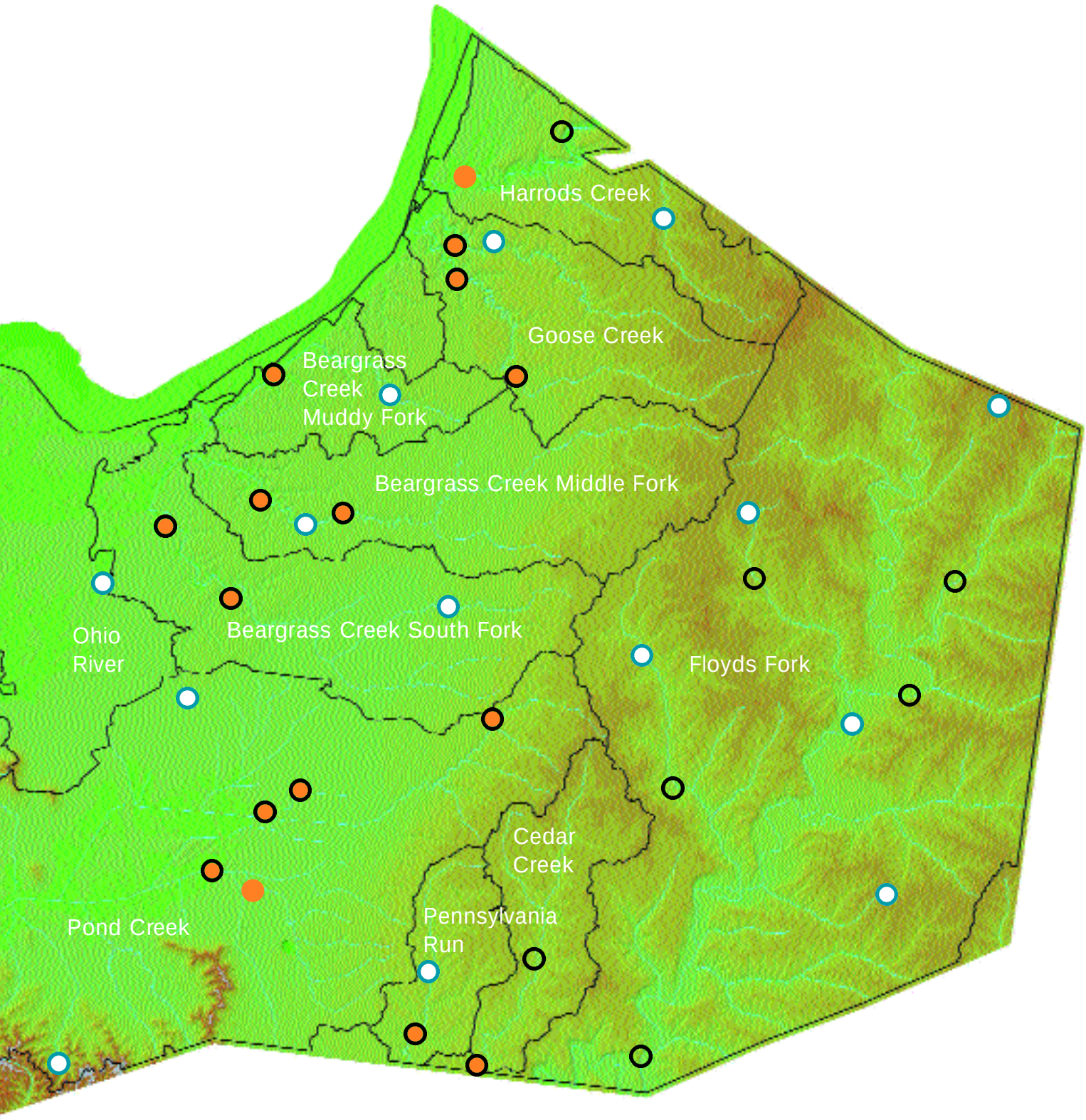


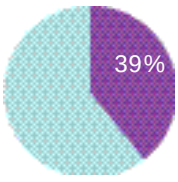
Beargrass Creek
Muddy Fork



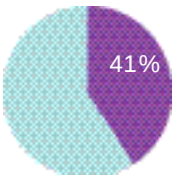
Goose Creek

Mill Creek

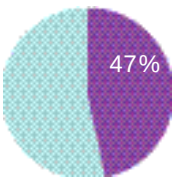




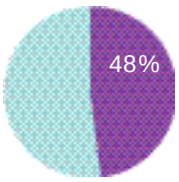
Floyds Fork



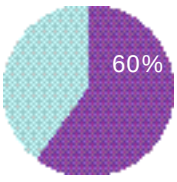
Pennsylvania Run



Beargrass Creek Middle Fork



Pond Creek



Beargrass Creek South Fork

YOU CAN MAKE A DIFFERENCE

Recycle your oil and antifreeze.

Motor oil and antifreeze contaminate water and can harm or kill animals and plants. Never pour used motor oil or antifreeze down a storm drain, onto the soil or into a waterway. Put used oil or antifreeze in a sturdy container and take it to a recycling center.

Critiquing the creeks: the condition of each watershed

Environmental professionals from many disciplines are engaged in the challenging task of protecting our urban streams. The emerging practice known as watershed protection requires a commitment from MSD and others to lessen the adverse impact of development on local watersheds. In order to improve water quality, we need to better understand the factors affecting our 11 watersheds.

BEARGRASS CREEK WATERSHEDS

South Fork

The South Fork of Beargrass Creek watershed encompasses about 27 square miles, including the southeastern portion of downtown Louisville. This watershed is the most urban of the 11 watersheds. The South Fork of Beargrass Creek begins above the Bardstown Road area and flows through the eastern section of downtown Louisville before emptying into the Ohio River. Several miles of the stream are enclosed in concrete, U-shaped channels.

The beauty of natural locations such as the South Fork of Beargrass Creek in downtown Louisville disguises the reality of our polluted streams.

Water-quality problems in this stream often are severe. A high percentage of the watershed is paved, and runoff contributes to high levels of nitrogen and phosphorus in the stream. The area also includes sewers that sometimes overflow. Fecal bacteria levels exceed water-quality standards more than half the time. In addition, fast-moving storm water scours the stream banks, causing erosion and damaging or destroying habitats.

MSD is working to reduce the number of sites where sewer overflows occur. Other solutions include revegetation of stream banks and modification of stream channels to slow the flow.

BEARGRASS CREEK WATERSHEDS

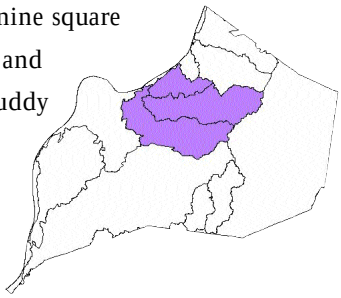
Middle Fork

This watershed covers about 25 square miles and includes an eastern section of metropolitan Louisville. The Middle Fork begins in the Middletown area, runs through St. Matthews, Cherokee Park and Seneca Park, and converges with the South Fork and Muddy Fork of Beargrass Creek. Overall impacts to this watershed are moderate to severe, but impacts here can be highly variable, depending on stream flow.

The area includes sites where sanitary sewers and combined sewers sometimes overflow. Fecal bacteria levels exceed water-quality standards about half the time. In addition, fast-moving storm water erodes stream banks and dumps sediment on streambed organisms. Runoff from extensive paved surfaces also diminishes water quality and habitat quality.

Solutions include reducing sewer overflows and runoff from paved surfaces. Revegetation of stream banks will improve both habitat and water quality.

Muddy Fork



This watershed covers about nine square miles, including Indian Hills and part of St. Matthews. The Muddy Fork runs along the Ohio River, converging with the South Fork and Middle Fork of Beargrass Creek just before emptying into the river. The Muddy Fork also receives backwater from the river. Water-quality problems in this watershed are moderate to severe. The causes include a high number of failing septic tanks and widespread use of lawn chemicals. Fecal bacteria levels exceed water-quality standards about a third of the time.

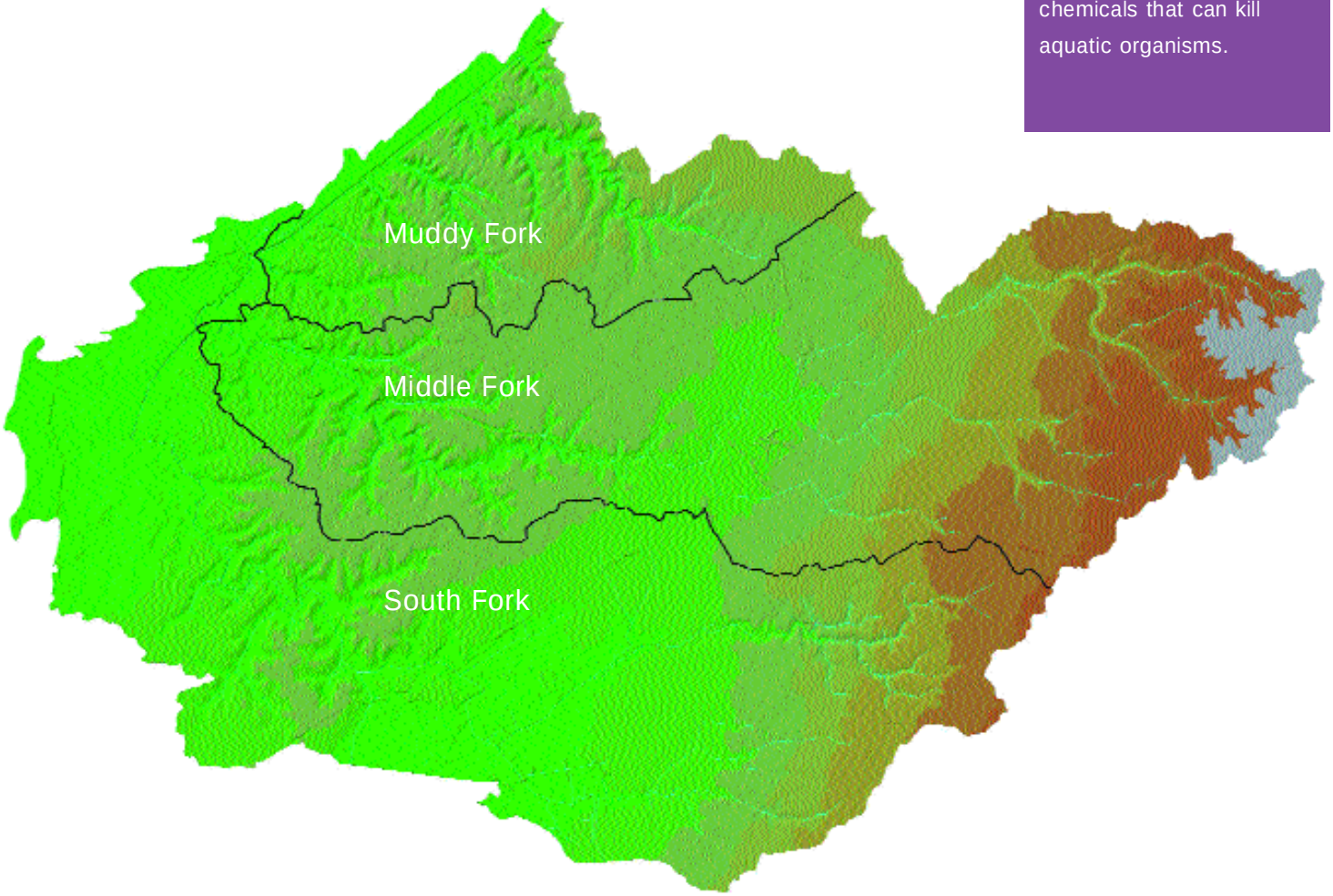
Much of the area consists of paved surfaces, and runoff from these surfaces causes various problems. Besides washing high levels of nitrogen and phosphorus into the waterways, fast-moving storm water scours stream banks, causing erosion. The rushing water also smothers some aquatic habitats with sediment and sweeps away others.

Sewers would alleviate some of the problems, as would a reduction in the use of lawn chemicals. Revegetation of stream banks and modification of stream channels to slow water flow would improve both habitat and water quality.

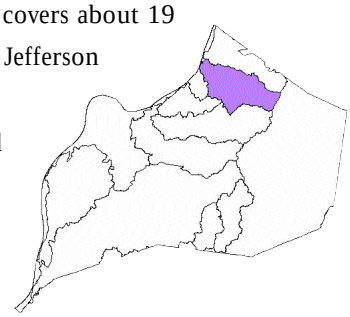
YOU CAN MAKE A DIFFERENCE

Choose not to litter or dump.

Street litter often gets swept into streams and storm drains. Recycle as much trash as possible and put other litter into garbage cans. Don't dump yard waste into or near waterways. When the discarded vegetation breaks down, it can decrease oxygen in the steams and release chemicals that can kill aquatic organisms.



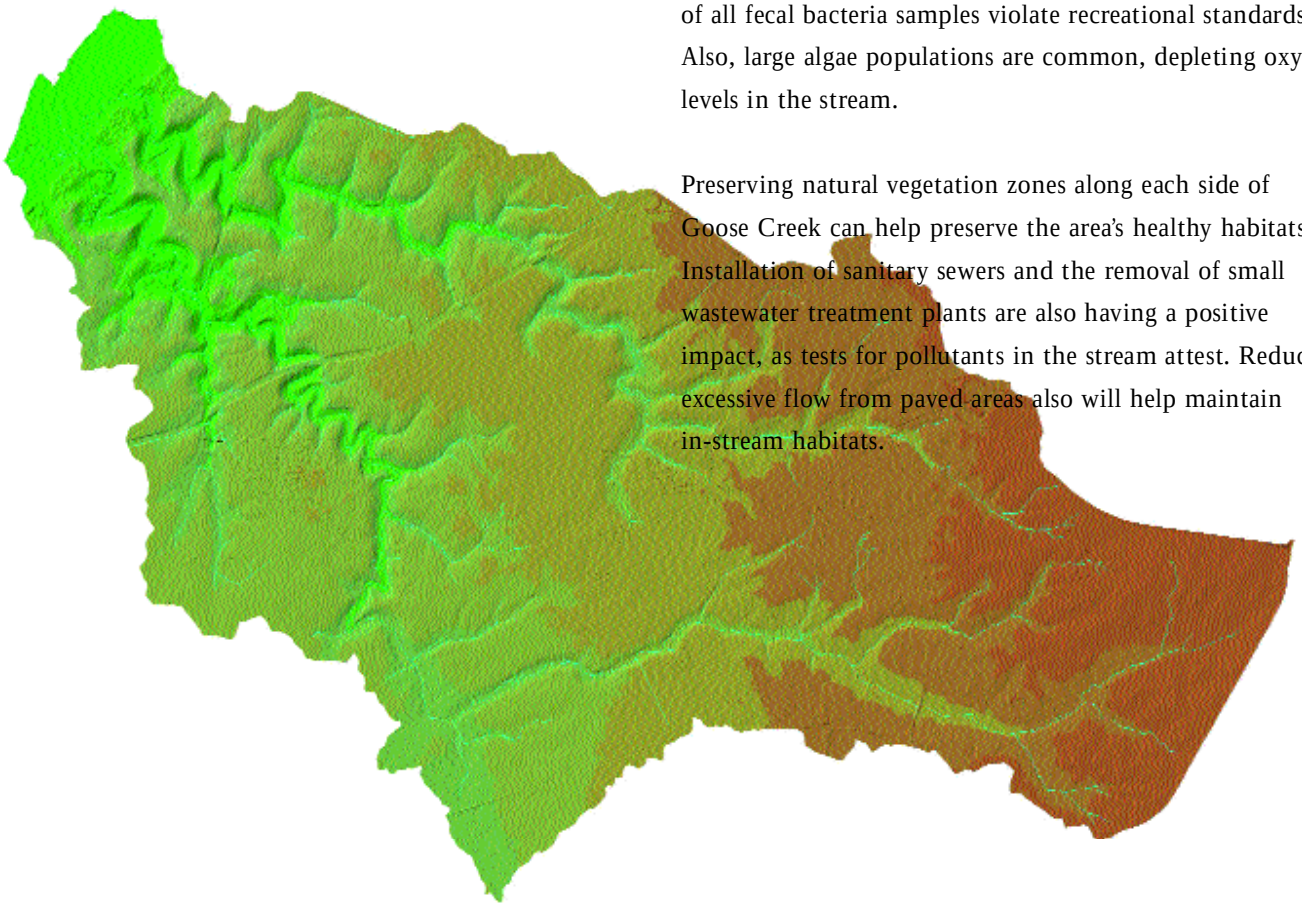
GOOSE CREEK WATERSHED



The Goose Creek watershed covers about 19 square miles in northeastern Jefferson County and consists of two sub-basins: Goose Creek and Little Goose Creek. This watershed still has some good-quality natural habitat; however, the area is undergoing intense development, and moderate water quality damage has occurred in some areas.

Construction sites have caused erosion, runoff and sedimentation, all of which have harmed water quality and aquatic habitats. High levels of nitrogen and phosphorus can be attributed to the use of lawn chemicals. About one-third of all fecal bacteria samples violate recreational standards. Also, large algae populations are common, depleting oxygen levels in the stream.

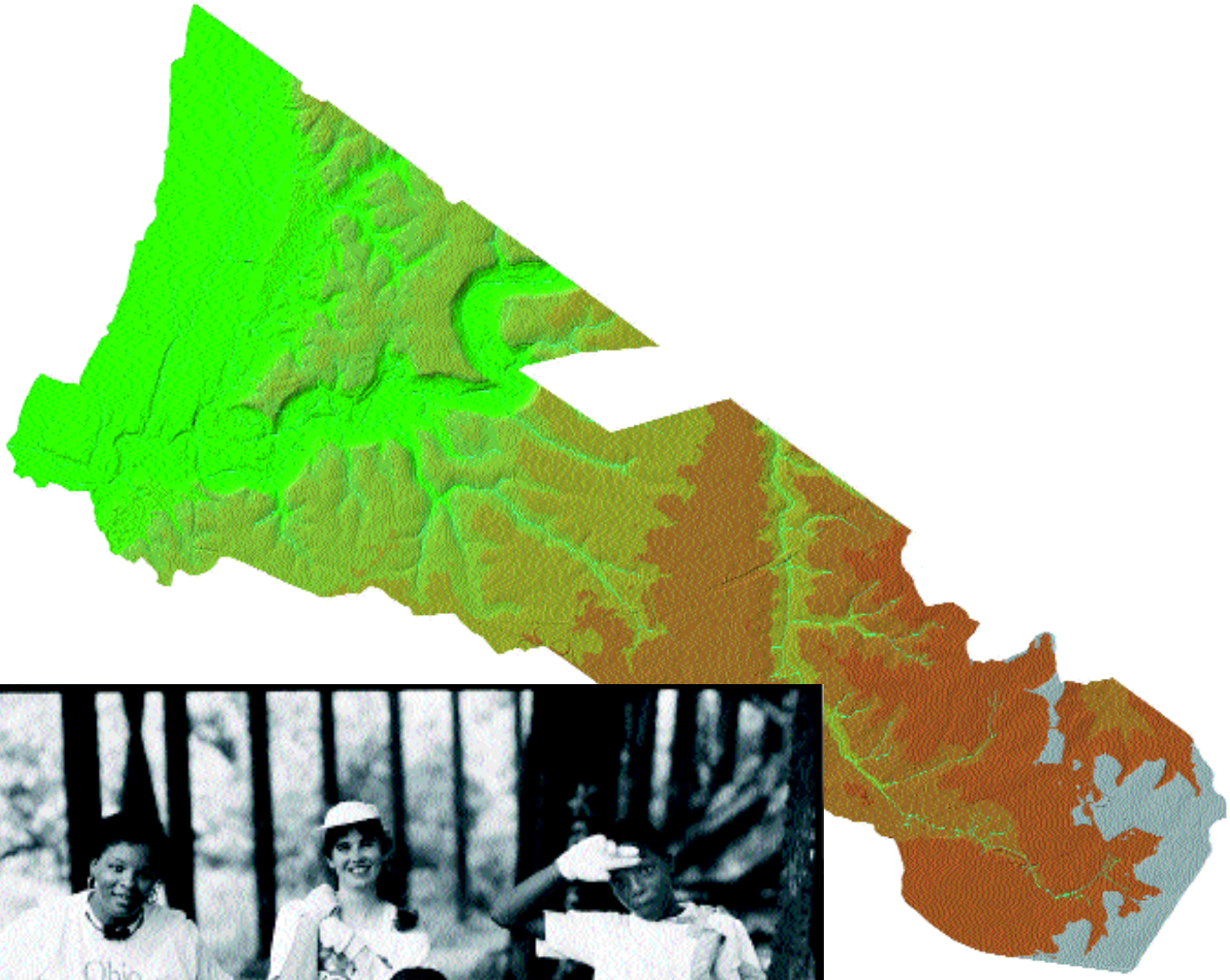
Preserving natural vegetation zones along each side of Goose Creek can help preserve the area's healthy habitats. Installation of sanitary sewers and the removal of small wastewater treatment plants are also having a positive impact, as tests for pollutants in the stream attest. Reducing excessive flow from paved areas also will help maintain in-stream habitats.



Collect animal waste.

Animal waste contributes significantly to the bacteria and organic matter in storm water runoff. Collecting animal waste and disposing of it in closed containers can reduce pollution in waterways.

Excessive algae growth absorbs oxygen, stealing this vital resource from fish and other aquatic species.

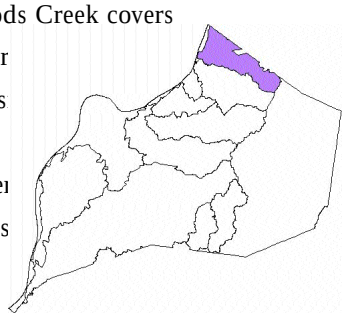


Marty Blemer

Volunteers of all ages participate in the Ohio River Sweep, a project that spans the meandering Ohio River watershed.

HARRODS CREEK WATERSHED

The drainage basin for Harrods Creek covers about 92 square miles, primar
County but also including a s
portion of northeastern
Jefferson County. Storm wate
runoff from construction sites
along with agricultural and
commercial development,
has produced a degraded stream with dramatically reduced habitat.



Levels of phosphorus and nitrogen are very high because of fertilizers used on lawns, golf courses and farmland. Faulty wastewater treatment plants and seepage from septic systems add nutrients too. About one-third of all fecal bacteria samples exceed recreational standards. Tree removal along stream banks has contributed to elevated water temperatures and algae growth, reducing oxygen in the stream. In addition, dredging has removed in-stream habitats.

Solutions include protecting remaining vegetation on the banks. This vegetation moderates water temperatures and creates a buffer from construction. Pollution will also be reduced as a result of MSD's recent agreement with the city of Prospect to assume operation of Prospect's small wastewater treatment plants. As MSD shuts down those plants, that sewage will be diverted to MSD's Morris Forman Wastewater Treatment Plant. Also, various community groups have begun sponsoring citizen-action programs dedicated to improving water quality in the watershed.

YOU CAN MAKE A DIFFERENCE

Adopt a stream.

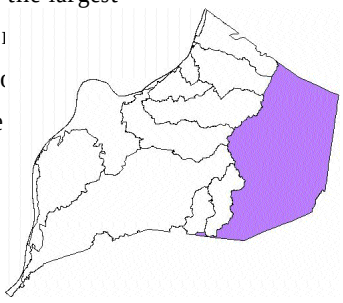
MSD sponsors an "adopt a stream" program to encourage stewardship of local waterways and watersheds. MSD will provide bags and gloves for any group that will "adopt" a section of a local stream and pick up debris along the stream. MSD will pick up everything collected and dispose of it.

YOU CAN MAKE A DIFFERENCE

Join a watershed group.

Jefferson County has many community groups working to protect waterways and watersheds. The Beargrass Creek Task Force, the Friends of Beargrass Creek, the Association of Chenoweth Run Environmentalists, the Community Leadership Alliance and the Floyds Fork Environmental Association are just a few of the active environmental groups in the community.

FLOYDS FORK WATERSHED

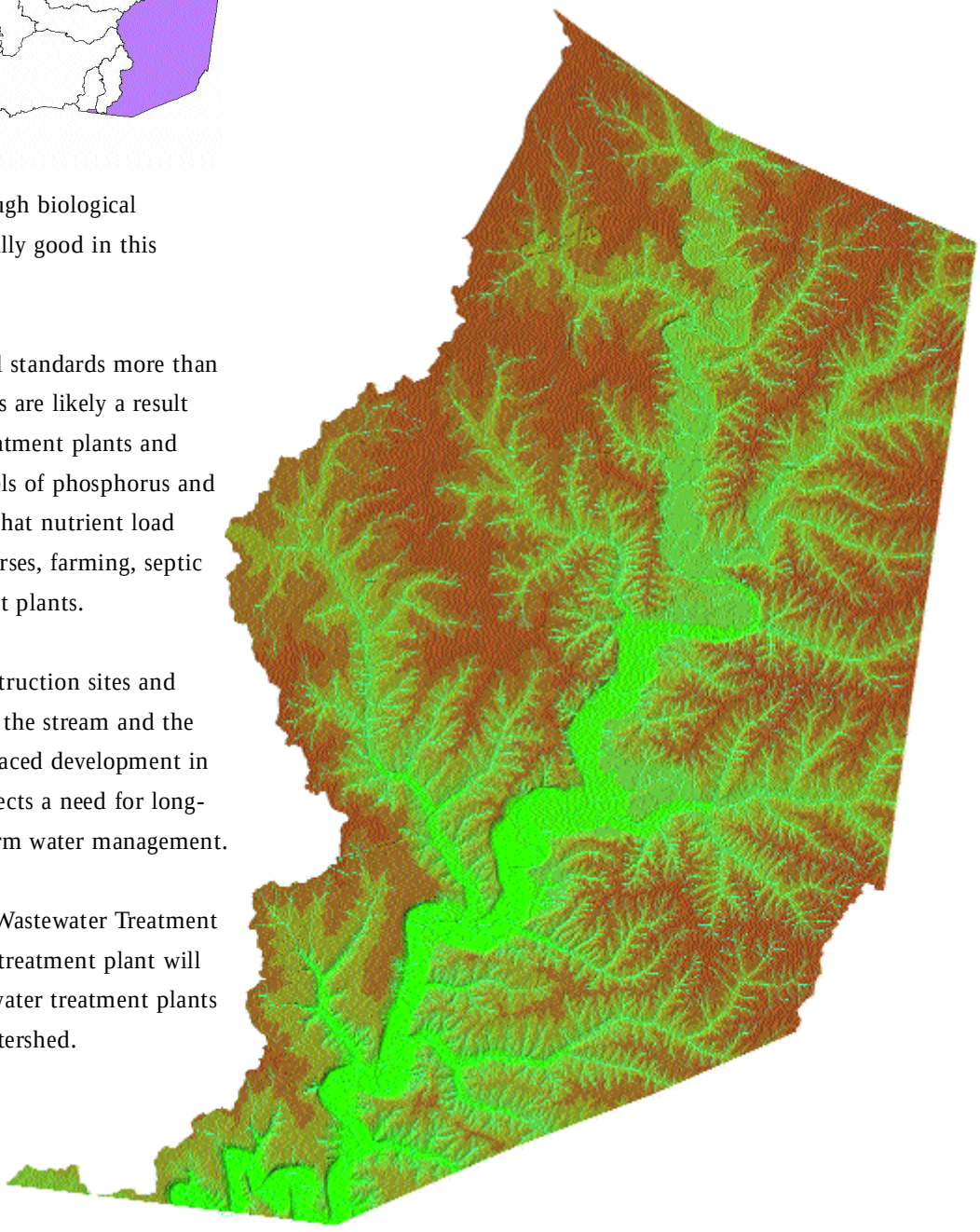


The Floyds Fork watershed is the largest watershed in the county, cover square miles in eastern Jefferso County. It remains one of the least polluted watersheds in Jefferson County, and it contains the largest, most diverse mussel population of any stream in Jefferson County. Although biological diversity and habitat quality are generally good in this watershed, they are declining.

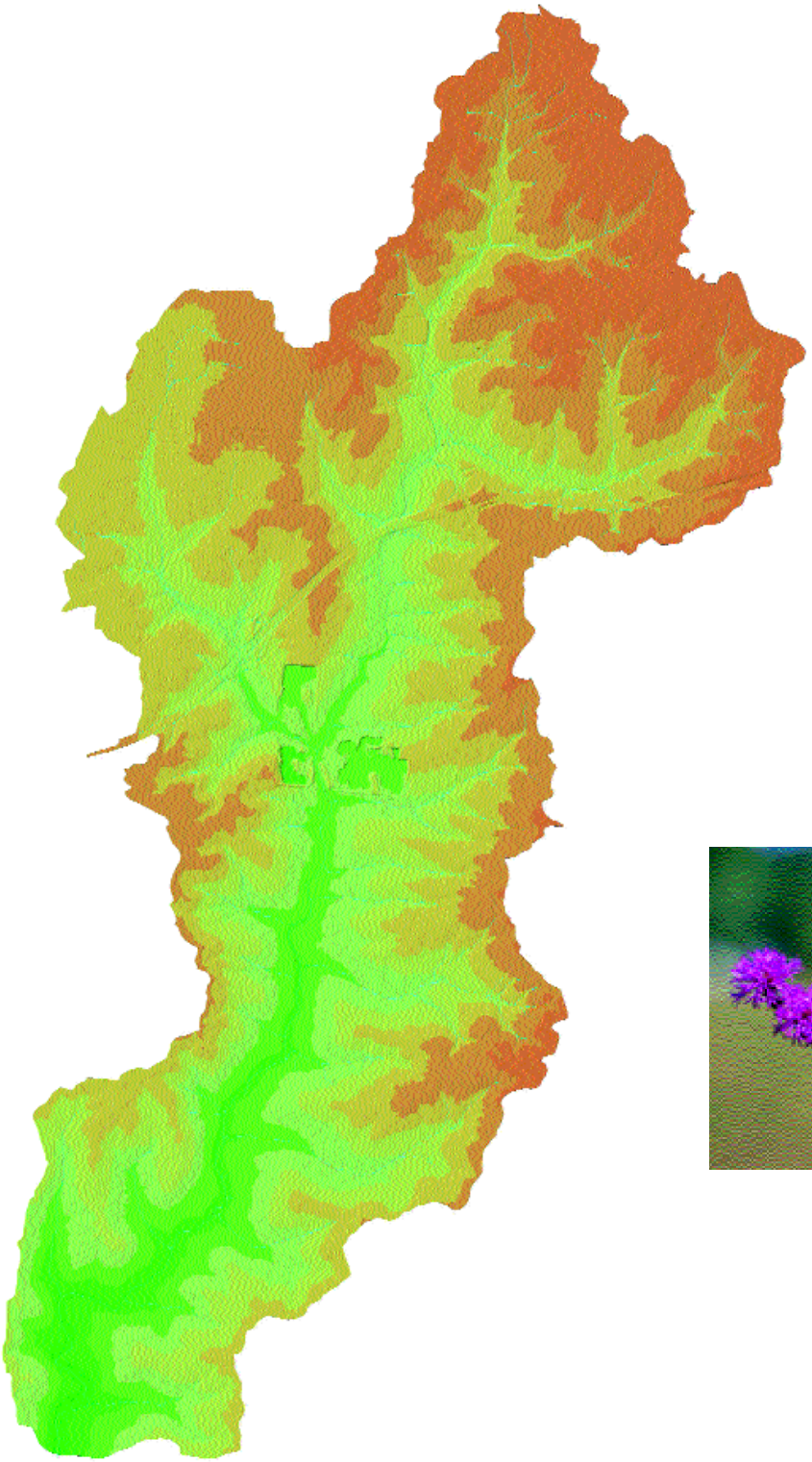
Fecal bacteria levels exceed recreational standards more than one-third of the time. These high levels are likely a result of septic systems, small wastewater treatment plants and animal waste from farms. Elevated levels of phosphorus and nitrogen are also a problem. Much of that nutrient load comes from treated lawns and golf courses, farming, septic systems and small wastewater treatment plants.

In addition, heavy silt loads from construction sites and agriculture threaten the habitat within the stream and the diversity of life that it supports. Fast-paced development in the northern half of the watershed reflects a need for long-range planning for wastewater and storm water management.

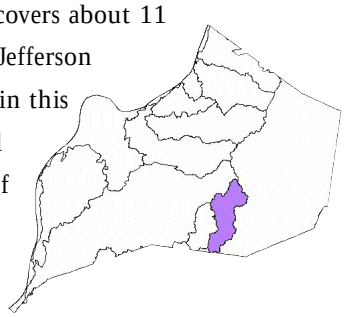
MSD is constructing the Floyds Fork Wastewater Treatment Plant just north of Interstate 64. This treatment plant will eliminate 10 less-efficient small wastewater treatment plants and dozens of septic systems in the watershed.



Declining populations of freshwater mussels indicate declining water quality.



CEDAR CREEK WATERSHED

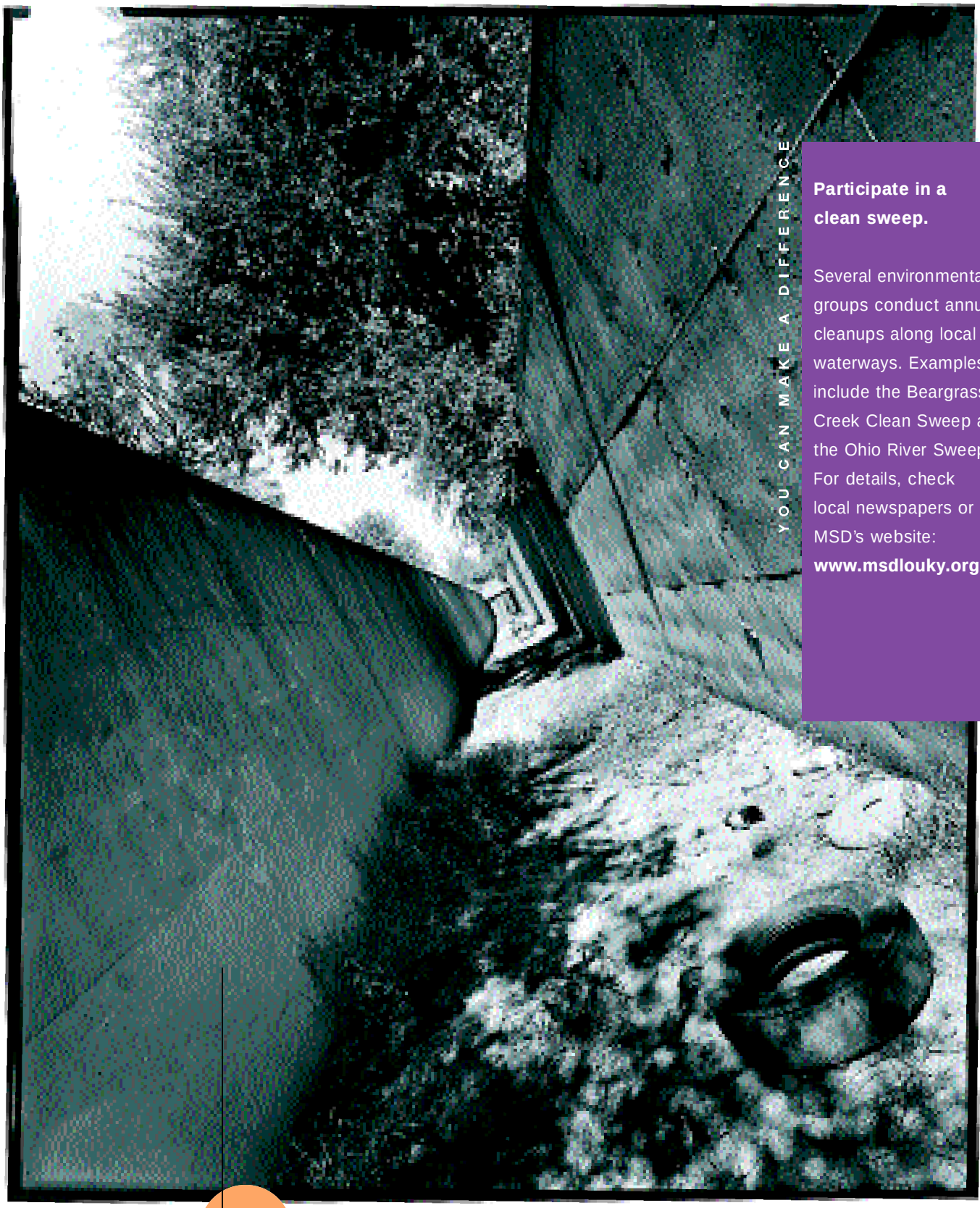


The Cedar Creek watershed covers about 11 square miles in southeastern Jefferson County. Fecal bacteria levels in this watershed exceed recreational standards about one-fourth of the time. This pollution is likely caused by septic systems, several small wastewater treatment plants and farm animal waste. High levels of phosphorus and nitrogen also are a problem. Many of these chemicals come from treated lawns and golf courses, agriculture, septic systems and small wastewater treatment plants. Heavy silt loads from construction sites and agriculture also are harming this aquatic habitat and the life within it.

The 1996 construction of the Cedar Creek Wastewater Treatment Plant allowed MSD to eliminate 10 small treatment plants and hundreds of septic systems, improving conditions in the watershed.

Compost your biodegradable waste.

Compost is easy to make and is great for lawns and gardens. It acts as a natural fertilizer and produces healthier plants; you can use it in your garden or spread it on your lawn or around trees. To make a compost pile, make a simple heap or fill a bin with grass clippings, leaves, plant trimmings and kitchen scraps (excluding meat). To speed up decomposition, occasionally aerate the pile by turning it section by section with a pitchfork. Compost is ready to use when it is dark, crumbly and slightly sweet-smelling.



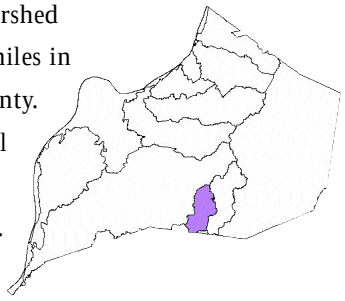
YOU CAN MAKE A DIFFERENCE

Participate in a clean sweep.

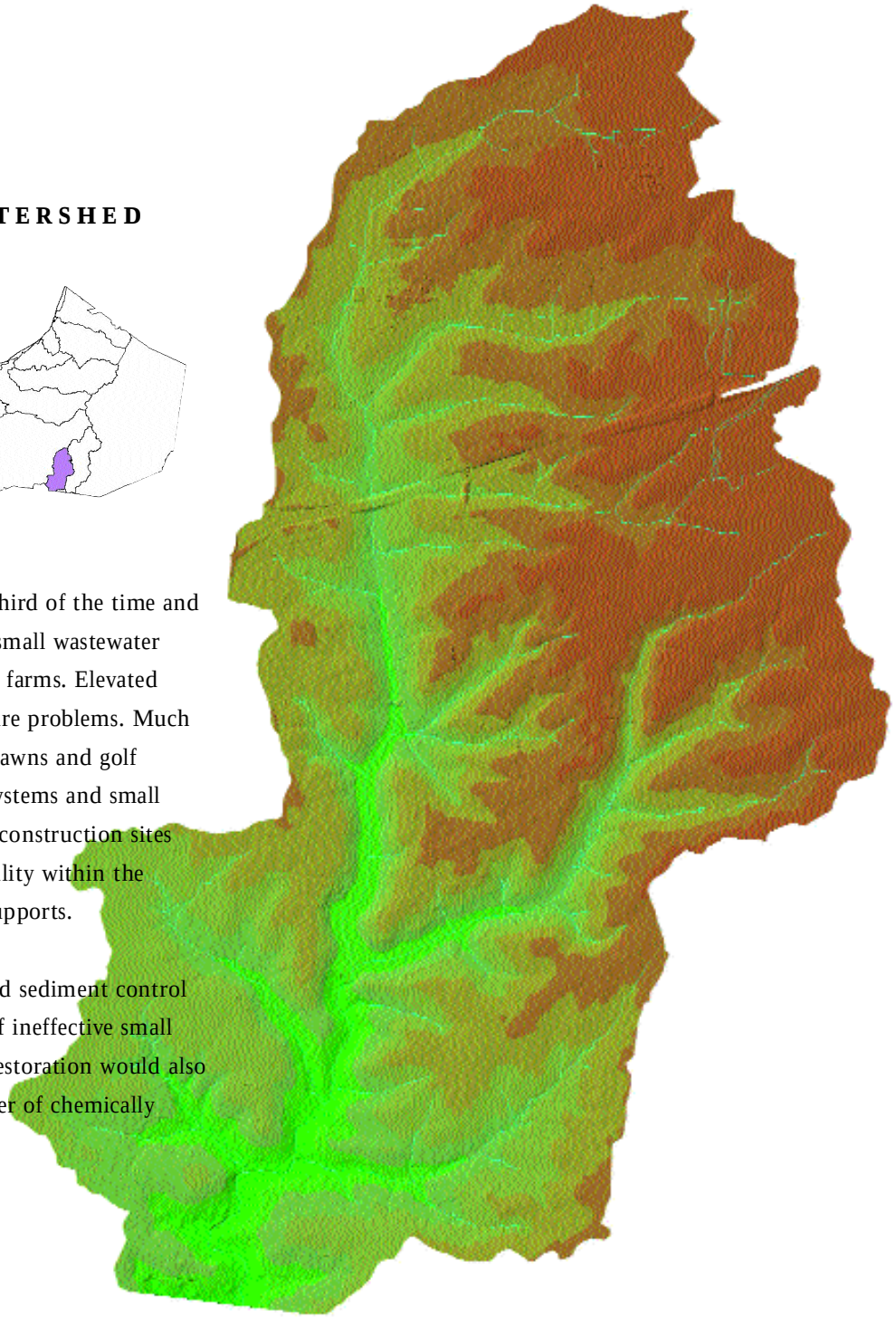
Several environmental groups conduct annual cleanups along local waterways. Examples include the Beargrass Creek Clean Sweep and the Ohio River Sweep. For details, check local newspapers or MSD's website: **www.msdlouky.org**

In contrast to the natural creeks of Pennsylvania Run, Mill Creek has been channelized extensively and has become a dumping ground for trash.

PENNSYLVANIA RUN WATERSHED



The Pennsylvania Run watershed covers about seven square miles in south-central Jefferson County. Water quality and biological diversity in the watershed show moderate impairment.



Fecal bacteria levels exceed recreational standards over one-third of the time and are likely due to septic systems, several small wastewater treatment plants and animal waste from farms. Elevated levels of phosphorus and nitrogen also are problems. Much of that pollution comes from fertilized lawns and golf courses, small-scale agriculture, septic systems and small treatment plants. Heavy silt loads from construction sites and agriculture are reducing habitat quality within the stream and the diversity of life that it supports.

Solutions include erosion prevention and sediment control at construction sites, plus elimination of ineffective small wastewater treatment plants. Riparian restoration would also help, as would a reduction in the number of chemically treated lawns and golf courses.

YOU CAN MAKE A DIFFERENCE

Limit your use of lawn chemicals.

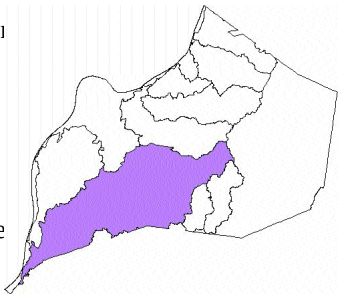
Over-fertilization is a common problem. Excess use of fertilizers can contaminate groundwater and streams. Test soil before applying fertilizers. Avoid using fertilizers near surface waters. Do not apply fertilizers before or during rain because they are likely to be washed into streams.

"Wetlands are America's most maligned environment."

-Evans and Harker, *Landscape Restoration Handbook*

POND CREEK WATERSHED

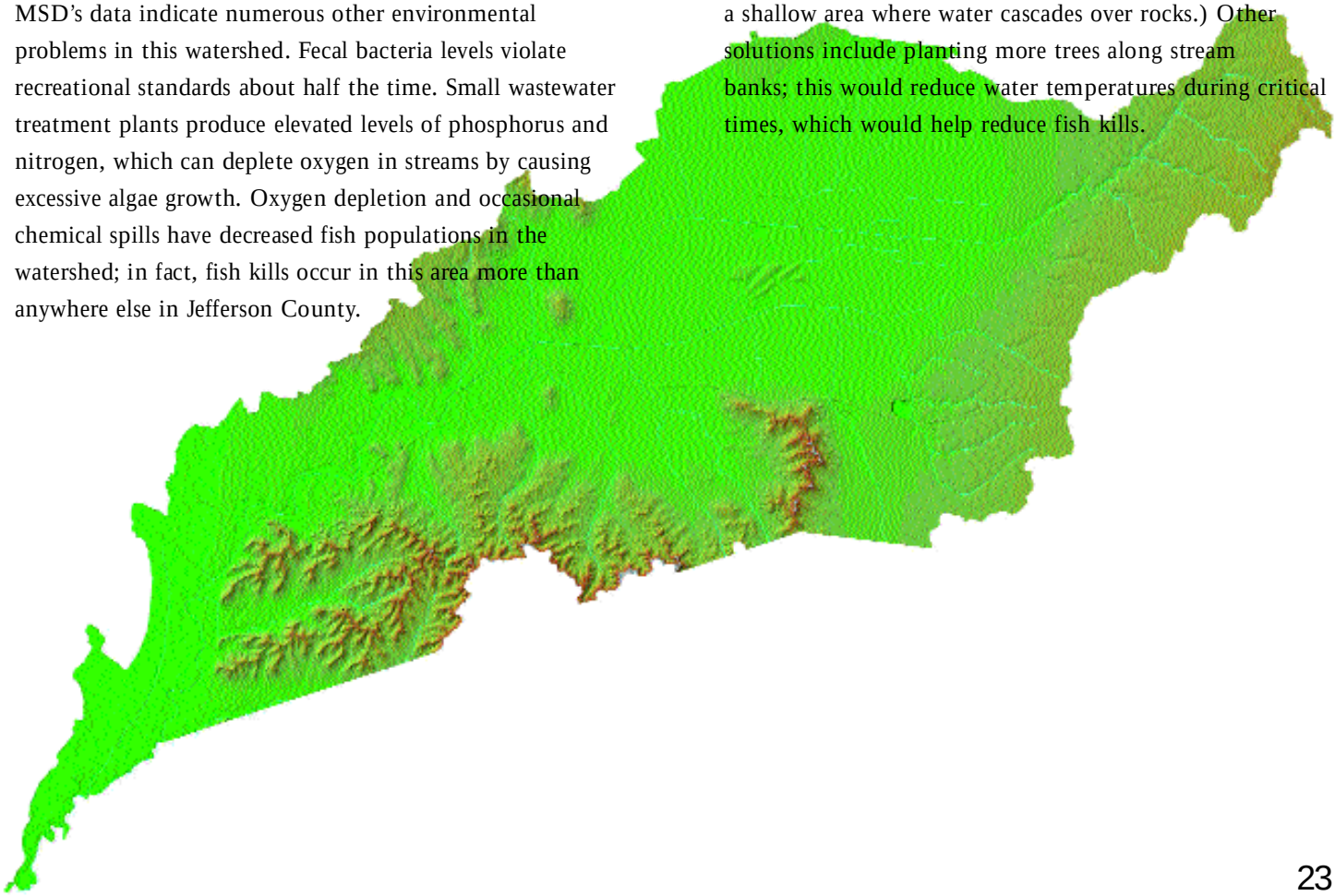
The Pond Creek watershed covers about 89 square miles in south-centr Jefferson County, including the Jefferson County Forest. Flooding is a serious problem in this watershed. The area historically has included more wetlands than any other watershed in the county, but development within the watershed has caused widespread destruction of wetlands, adding to severe flooding in the area. This destruction of wetlands also has reduced the watershed's ability to filter pollutants before they reach the stream.

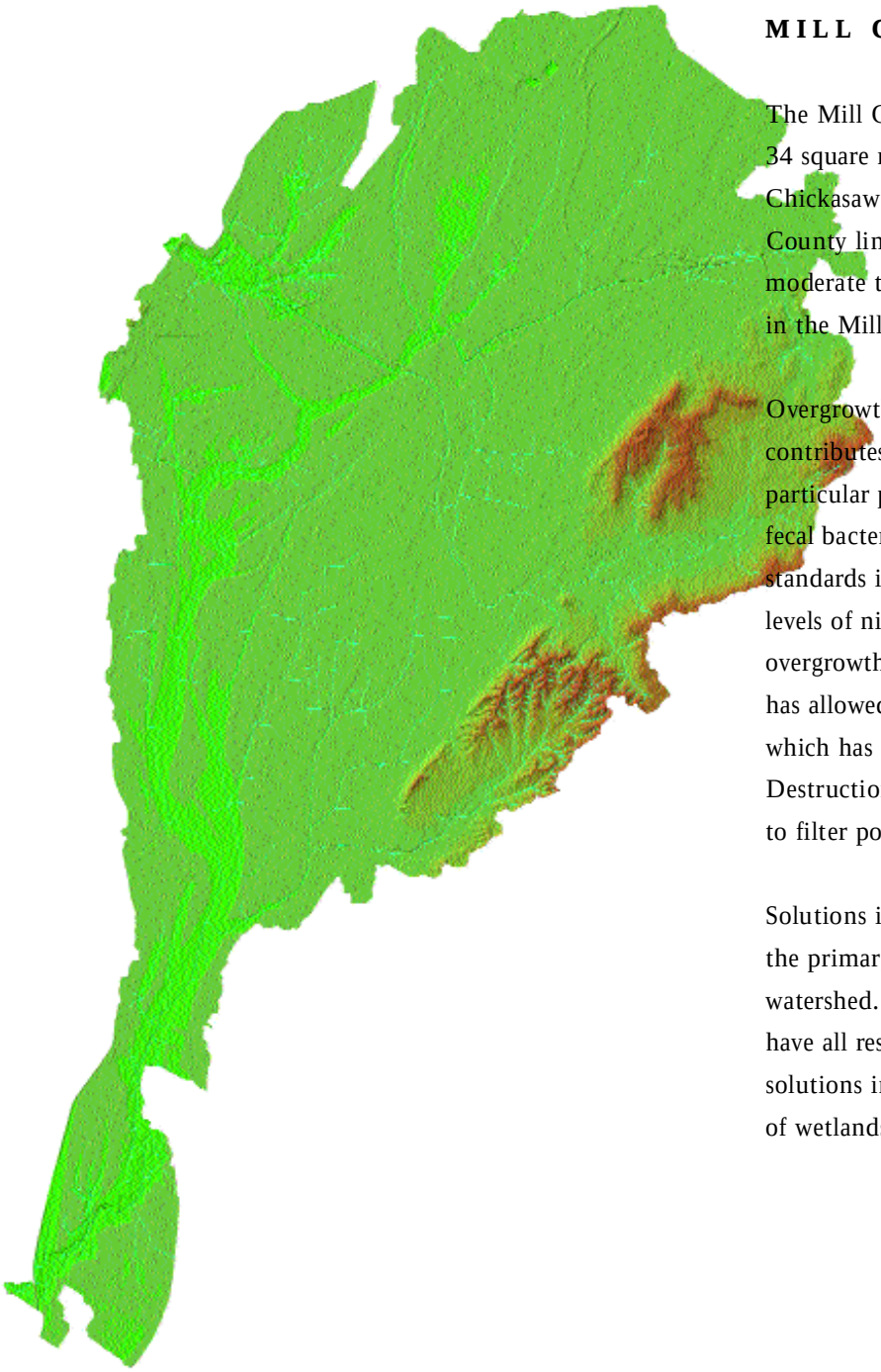


MSD's data indicate numerous other environmental problems in this watershed. Fecal bacteria levels violate recreational standards about half the time. Small wastewater treatment plants produce elevated levels of phosphorus and nitrogen, which can deplete oxygen in streams by causing excessive algae growth. Oxygen depletion and occasional chemical spills have decreased fish populations in the watershed; in fact, fish kills occur in this area more than anywhere else in Jefferson County.

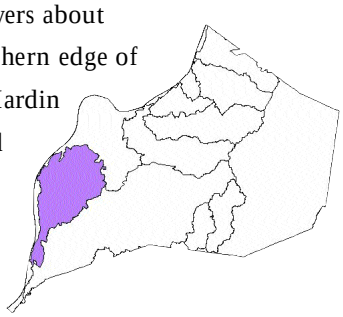
Removal of trees and other plants along stream banks has reduced habitat quality, as has extensive channelization (dredging and straightening of streams to increase flow rates). Many streams have been channelized to the extent that they offer little or no habitat for fish or invertebrates. Lack of stream bank vegetation has resulted in elevated stream temperatures during the summer.

MSD is developing a Pond Creek restoration plan to reduce flooding and to enhance water quality and watershed habitats. In conjunction with the plan, MSD is replacing small wastewater treatment plants and septic systems with sewers and is improving sites where sanitary sewers overflow during storms. Also, wetlands are being re-created for flood control and habitat enhancement. MSD also is developing re-aeration zones, areas in a stream that increase the level of dissolved oxygen. (An example is a riffle, a shallow area where water cascades over rocks.) Other solutions include planting more trees along stream banks; this would reduce water temperatures during critical times, which would help reduce fish kills.





MILL CREEK WATERSHED



The Mill Creek watershed covers about 34 square miles from the southern edge of Chickasaw Park to near the Hardin County line. The study found moderate to severe pollution in the Mill Creek watershed.

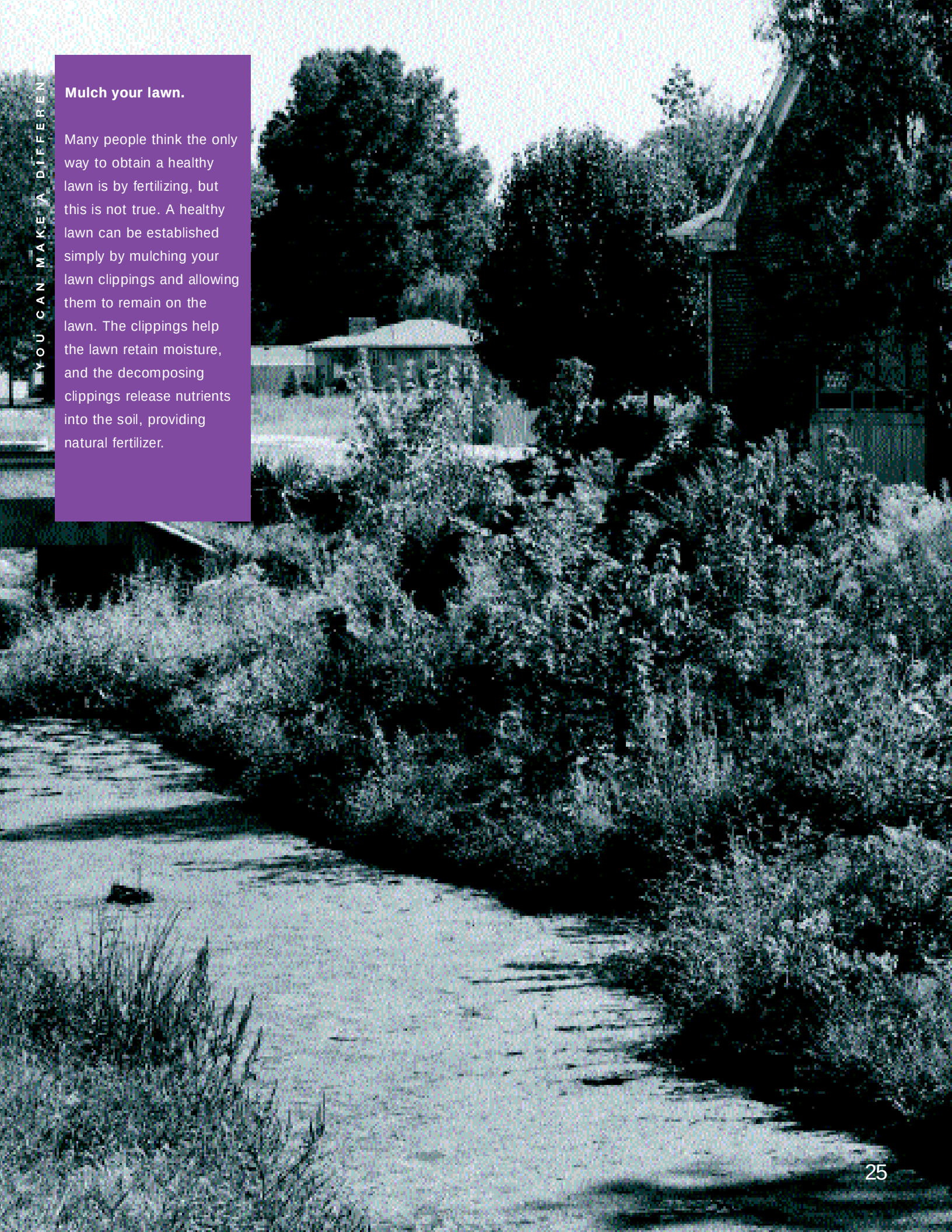
Overgrowth of algae - which contributes to fish kills by depleting oxygen - has been a particular problem at the Mill Creek Cutoff. In addition, fecal bacteria levels in the stream have exceeded recreational standards in about one-third of the water samples. High levels of nitrogen and phosphorus - which cause algae overgrowth - are common. Removal of trees along the banks has allowed sunlight to sharply raise the water temperature, which has threatened aquatic plant and animal communities. Destruction of wetlands has reduced the watershed's capacity to filter pollutants and to absorb floodwaters.

Solutions include elimination of septic systems, which are the primary means of wastewater treatment in the watershed. MSD has established a target date of 2005 to have all residents of the watershed on sewers. Other solutions include revegetation of stream banks and creation of wetlands.

Landscape buffers can greatly reduce storm water runoff from yards. This Mill Creek resident has created a "no mow zone" along the stream, filtering any runoff.

Mulch your lawn.

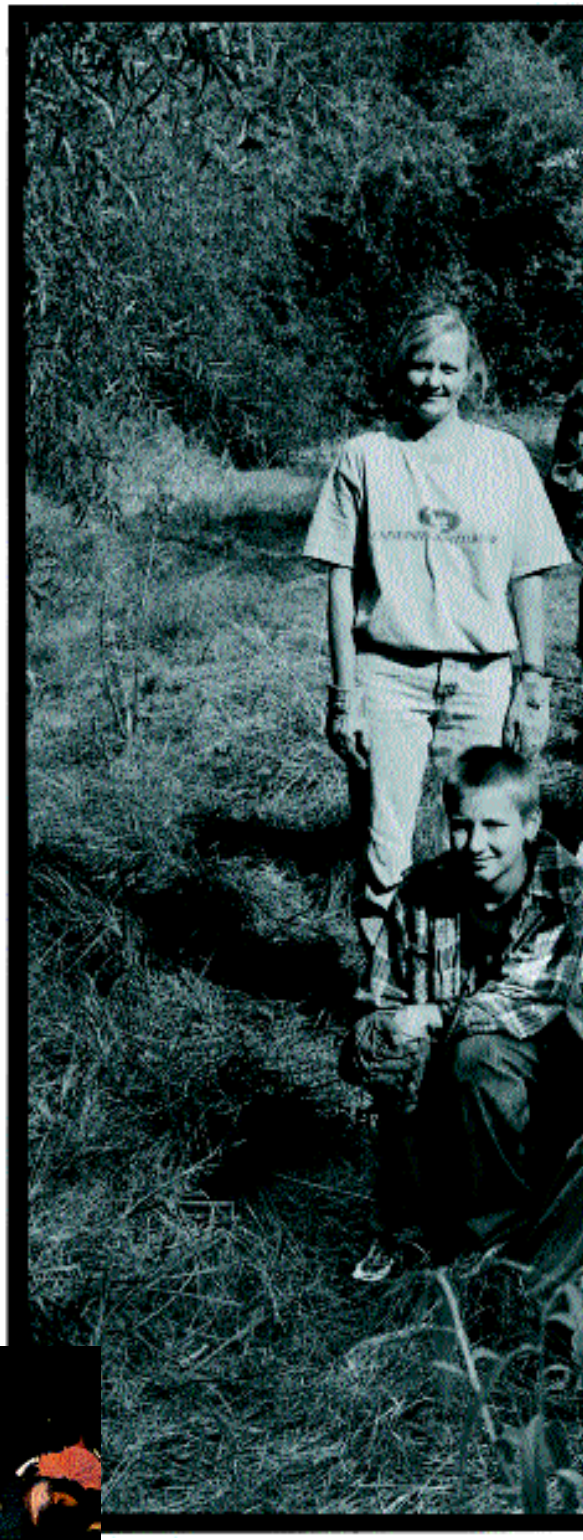
Many people think the only way to obtain a healthy lawn is by fertilizing, but this is not true. A healthy lawn can be established simply by mulching your lawn clippings and allowing them to remain on the lawn. The clippings help the lawn retain moisture, and the decomposing clippings release nutrients into the soil, providing natural fertilizer.



OHIO RIVER WATERSHED

The Ohio River watershed includes both sides of the Ohio River as it wends its way through 11 states. In Jefferson County the watershed covers roughly 40 square miles, including downtown Louisville. The river attracts heavy recreational use, including boating and fishing. However, fish have been shown to contain PCBs and chlordane, both toxic substances. PCBs leak from old electrical transformers that have been dumped in streams or buried. Chlordane was once used in pesticides; although it is now illegal, it remains in the environment for many years. Other sources of pollution include runoff from the almost completely paved surface area of downtown Louisville and from combined sewer overflows during heavy rains. Most sewers in the watershed are combined sanitary and storm sewers.

Solutions include better storm water management and watershed “clean sweeps,” sponsored by various groups, including the Ohio River Sanitation Commission (ORSANCO), a federal watershed management commission.



Help with an MSD project.

MSD sponsors various volunteer projects, including projects involved with water quality monitoring, revegetation efforts and watershed protection. MSD remains committed to promoting environmental stewardship in our community.

Volunteers for the Ninth Annual Beargrass Creek Clean Sweep gathered along the South Fork of Beargrass Creek at Taylorsville Road and Hurstbourne Parkway.

For more information on how to improve water quality and reduce environmental damage, contact MSD Customer Service at **502 587-0603**.

For more detailed information on the condition of our local watersheds, refer to the MSD website at **www.msdlouky.org.**

Second chances

The health of waterways can be most easily maintained when the health of surrounding natural habitats also is maintained. But a successful long-term strategy depends on the commitment of both the public and private sectors.

Making a difference

MSD has adopted a number of measures to preserve natural habitats:

- *Employing a landscape restoration specialist, two wetlands specialists, a soil bioengineer, several aquatic biologists and other members of an environmental staff, all of whom review the likely impact of MSD projects on natural habitats;*
- *Conducting an ongoing streams-monitoring program;*
- *Appointing five area teams to oversee the county's watersheds, with each team responsible for a specific area. Allowing each team to focus on a designated geographic area enables the team to become familiar with the problems and unique features of that area.*

You can help

Despite such efforts, successful management of watersheds can be attained only with citizen involvement. Whether participating in a "clean sweep" or simply making responsible decisions about caring for your own property, you can make a difference.

One of Kentucky's 27 native goldenrods is often mistaken for the allergen-producing plant ragweed.

Louisville and Jefferson County
Metropolitan Sewer District

700 West Liberty Street
Louisville, Kentucky 40203-1911

502 587-0603
www.msdlouky.org

Project Coordinator: *Phyllis Croce*
Graphic Design: *Good Design*
Copywriting: *Karen Bosc*
Photography: *Dawghaus*
Maps: *Scott Dickison, FMSM Engineers*
Printing: *Fetter Printing Company*
Paper: *French Frostone, 70lb. Cover*
Publication date: *4/2000*
Production: *10,000*

Printed on recycled paper with soy ink.

A portion of the post-consumer waste used in this paper was provided by MSD.

Front Cover:
South Fork of Beargrass Creek near Baxter Avenue in the heart of downtown Louisville

MSD

Table of Contents

For more detailed information on water quality in Jefferson County, contact MSD for a copy of "Water Quality in Jefferson County, Kentucky: A Watershed Synthesis Report, 1991-1998."