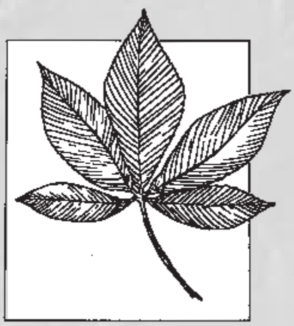
Guide to

PROTECTING URBAN RAVINES



A Community Resource for Ravine Areas

Compiled by Friends of the Ravines

Friends of the Ravines

MISSION STATEMENT

The mission of Friends of the Ravines is to protect, preserve, and restore urban ravine areas in Franklin County. The stability of the ravines has been threatened by development and human activity. Placement of utilities and uncontrolled invasive plant species are disrupting the natural ravine ecosystem. With the assistance of Friends of the Ravines' educational outreach programs and conservation activities, these valuable natural areas can be restored and preserved for future generations.

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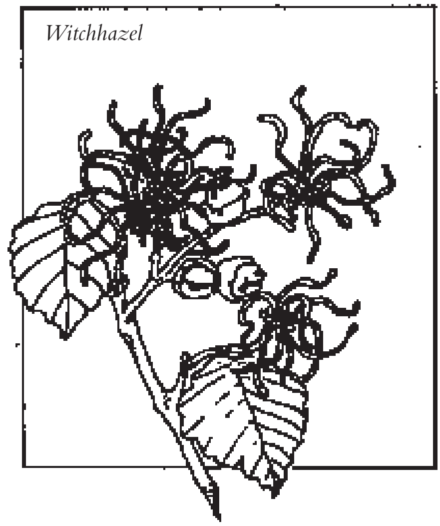

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INTRODUCTION

Between 14,000 and 28,000 years ago, the Wisconsin Glacier carved a network of ravines that forms a grid crisscrossing major waterways in Franklin County. These scenic ravines are choice settings for urban real estate and many have become overdeveloped. Even the healthiest urban ravines are fragile areas and require special care if they are to be preserved.

This guide identifies and explains problems of ravine properties and suggests methods to keep your and your neighbors' properties in the best possible condition. The guide also explains how to preserve the natural environment of ravines.

Not many urban areas in Franklin County enjoy the wooded beauty of ravines. Some ravines contain rare or endangered plant species and may justly be considered ecological treasures. Because of this unique beauty, ravine properties are desirable locations for homes.

A big threat to ravine property is water erosion, which can destroy slopes with startling rapidity. Erosion is a natural force that can be slowed, but not stopped. It can also be accelerated, so erosion-causing activity can and should be controlled.

This guide discusses the potential damage resulting from water erosion and provides methods of preventing this damage to the greatest extent possible.

Fig. 1
A Ravine Landscape

Maintaining Urban Ravine Property

Erosion and other damage in ravines

Ravines serve as natural drainage channels. Rainfall drains into ravines, forming streams that empty into rivers or lakes. Streams cut their channels at relatively slow rates as long as the velocity and volume of flow remain within natural geologic and climatic limits. Due to urbanization, however, ravines serve today as conduits for much larger volumes of water traveling at much higher velocities.

When impervious surfaces replace the natural soil, more water drains off more quickly into the ravines, increasing not only the total volume of water but also the velocity of the water flowing down the sides of the ravines and into the channels at the bottom. Erosion is accelerated (Fig. 2).

This higher rate of flow does much more damage than does a slow rate. Erosion is proportional to the square of the velocity. It damages the slopes and the bottom of the ravine by eroding it more rapidly into deeper and deeper channels. When the channels get deep enough, the banks along the channel are undercut and weakened. The weakened soil often slumps, carrying debris, together with trees and shrubs, into the channel. If the channel becomes blocked, the diverted water creates a new channel that may damage adjacent areas.

In most parts of Columbus, rainwater collected from the streets is discharged into storm sewers, which in turn empty into ravine streams. A major storm can pour large volumes into the ravines at high velocity.

Urban ravines are often surrounded by impervious surfaces that increase water flow on slopes. Excessive moisture contributes to slope instability. Water from house drains discharged onto ravine hillsides saturates the soil, making it more prone to movement and slippage. When the slope angle of the adjacent ravine is too steep, the saturated soil will give way and slump into the ravine. This exposes bare soil where the slump occurred, making it vulnerable to further erosion by water.

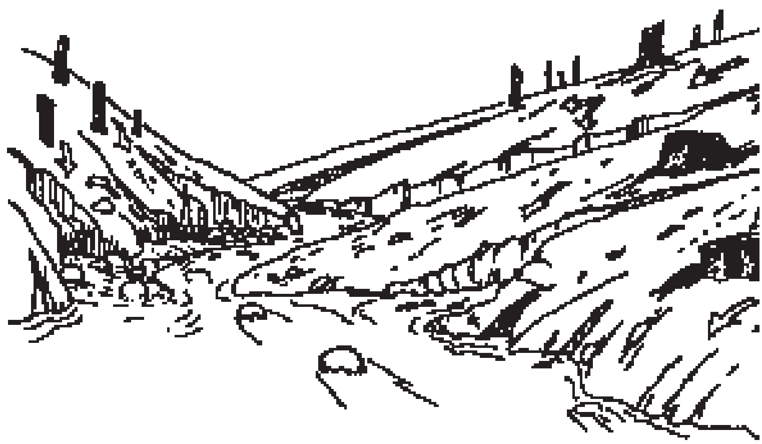


Fig. 2
Slope erosion

Vegetation

The ecosystem of a woodland ravine is made up of several layers: an upper canopy of deciduous trees, small trees, a middle layer of shrubs and plants, and a lower layer of ground cover. The tree canopy breaks the velocity of precipitation while the root systems and ground cover absorb and slow runoff. Vegetation contributes to slope stability and mediates temperature, humidity, precipitation, runoff, wind, and noise, providing relief from the extremes of seasonal changes (Fig. 3).

To protect the integrity of ravine woodlands it is important to select native species when planting. Non-native trees introduced into the ravine environment tend to develop dense canopies that block the sun and prevent other plants from developing. Aggressive non-native bushes, small trees, and ground covers eliminate more desirable woodland species.

Keys to Ravine Property Maintenance:

- good water management
- lush native plant vegetation
- proper setbacks from the edge of the ravine

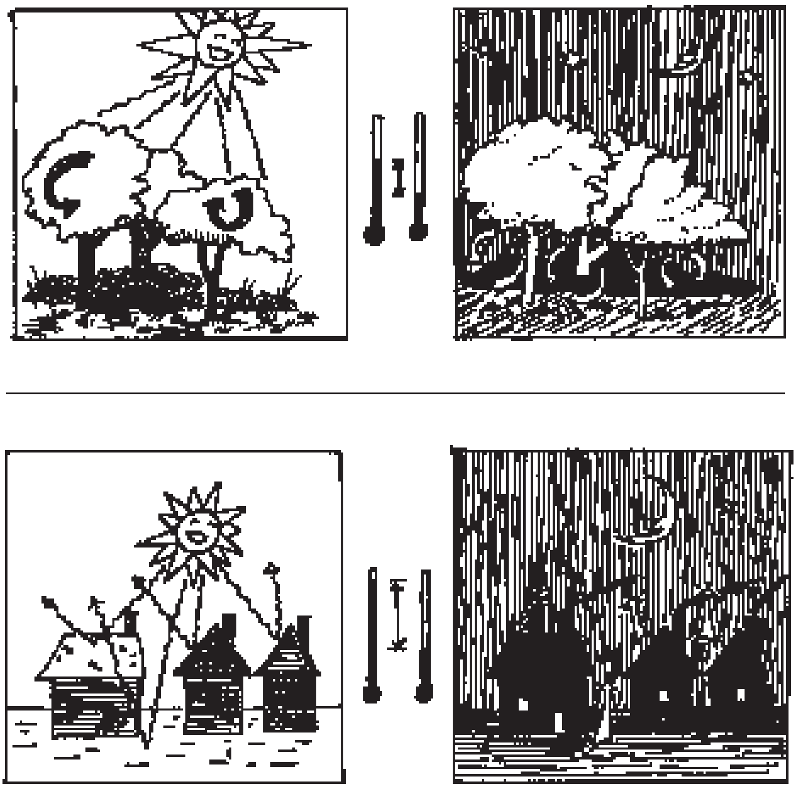


Fig. 3 Vegetation mediates temperature.

Fig. 4 A large canopy of trees with lush undergrowth stabilizes ravine slopes.

Consult a landscape professional experienced with ravine vegetation before removing or planting trees in a ravine. Some city regulations require a permit to remove any tree with a diameter of eight inches or more. However, even the roots of a much smaller tree make an important contribution to slope stability in a ravine, so it is important to get expert advice before removing even small trees.

Slope vegetation slows erosion, filters out impurities, and slows the velocity of runoff (Fig. 4). Any loss of vegetation rapidly increases erosion on the slopes. Vegetation can be destroyed or injured by constant trampling, by heavy machinery, by dumping material such as lawn waste on top of it, by poor drainage of water, or by overhanging structures that prevent light and rain from reaching the plants. For the health of a ravine ecosystem, avoid unnecessary foot traffic on ravine slopes.

Revegetate bare spots on slopes using plants that are best suited to the conditions of your ravine. Refer to the list of native plants suitable for ravines on page 13, or consult a landscape architect who is familiar with ravine vegetation.

New construction or remodeling

Before you begin any new construction or remodeling, a permit is almost always required. If construction is planned on land adjacent to ravines, it is imperative that you read and understand any ordinances on construction. Construction planned near the edge of the slope may require an engineering study, which may require soil borings to determine the nature of the soil at various depths, as well as the advice of a structural and/or soils engineer. In general, it is undesirable to build too close to the edge of a ravine or to build in or on the slope.

During construction, materials should not be piled up near the edge of the slope; insist that they be placed at least 20 feet from the edge. The same applies to material and debris from demolition or to piles of earth. Heavy machinery placed too close to the edge of a slope may put excessive pressure on the soil. Too much pressure can cause the soil to slump into the ravine (Fig. 5).

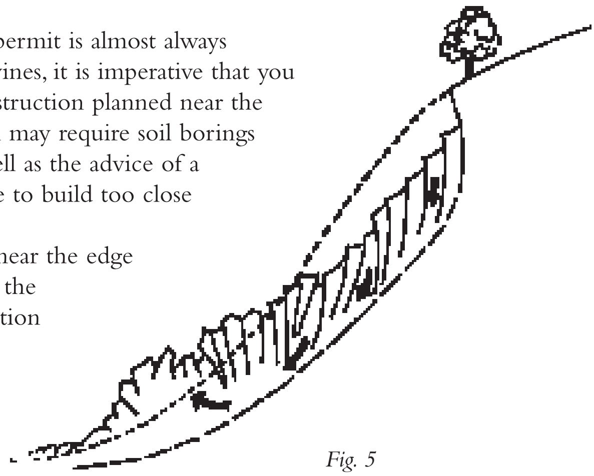


Fig. 5
Soil slump at edge of slope

Trees that are to be preserved should have their roots protected from the weight of piles of materials or heavy machinery (Fig. 6). If it is necessary to disturb a tree or cut some of its roots, consult a landscape architect as to the best means of keeping the tree alive. Some communities have an ordinance regulating the removal of trees. It is essential to be familiar with such an ordinance before you contemplate any construction.

If vegetation needs to be removed or disturbed for storage of construction materials, do not remove the vegetation more than 15 days before beginning construction. Disturbed soil should be covered with erosion control fabrics, mulch, silt fences, or straw bales and reseeded as soon as possible to prevent erosion. It may be necessary to use a seed mixture to get a quick, temporary cover until more permanent vegetation can take over.

If fire or other damage occurs to part of a structure, before rebuilding in the exact footprint of that structure evaluate the possibilities for changes, such as creating a setback from the edge of the slope or other changes that would make the new construction more in line with good practice.

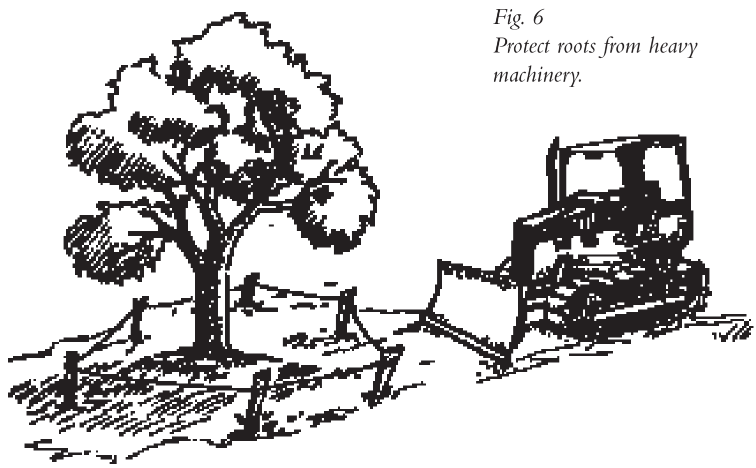


Fig. 6
Protect roots from heavy machinery.

Ways to Minimize Damage to Ravine Property

- Slope patios and driveways toward the street, away from the ravine. Do not discharge water at the top or on the side of the slopes.
- Drain runoff toward the street or by hose to the bottom of the ravine.
- Drain waterbeds by directing hose toward the street or to the bottom of the ravine.
- Construct buildings or swimming pools at least 20 feet from the edge of a ravine.
- Do not drain chlorinated water from swimming pools into streams.
- Terrace slopes only for stabilization–not for gardens or sitting areas.
- Inspect ravine channels for blockages, and remove debris clogging culverts or stream channels.
- Operate sprinkler systems manually. Automatic sprinklers can cause sheeting on ravine slopes.
- Hire yard workers and gardeners experienced in good ravine management.

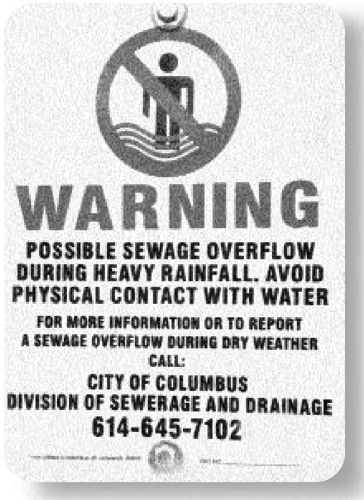


Fig. 7

Sewer lines in ravines

Many ravines in older neighborhoods have sewer lines running through them that combine sanitary and storm sewers. During heavy rains, sanitary sewers overflow and pollute creeks running through the ravines. (Combined sewer overflows are discharges of untreated sewage diluted by storm water from older combined sewer systems. Sanitary sewer overflows are discharges of untreated sewage from the sanitary sewer systems.) If you see an overflow warning (Fig. 7), avoid the general area especially following a heavy rain. High concentrations of bacteria may be present up to 72 hours after an overflow.

Make sure that your downspouts are not connected to the sanitary sewer. This practice is no longer permitted by city code. The excess water can overwhelm the sewage treatment system during wet weather. Columbus residents should report any sewer basement backups or suspected overflows into waterways to the 24-hour Sewer Maintenance Operations Center at 645-7102. Residents outside of Columbus should report any problems to their appropriate public works type offices.

Working with the Geology and Soils in Franklin County Ravines

The rocks and soils of Franklin County ravines tell a story of ancient oceans and recent glaciers and a long time in between. The bedrock in eastern Franklin County is limestone, shale, and a little sandstone. These Devonian and Mississippian sedimentary rocks formed between 400 and 340 million years ago. Fossil fish parts and corals tell us that central Ohio was once underwater, then near an ancient coastline of a former continent geologists call Laurentia, near the earth's equator. Limestone, shale, and sandstone present different problems for people building around ravines.

Like a great grandaddy carrying an infant on his shoulders, the area's ancient sedimentary rocks carry a mantle of glacial material. This thin sheet of glacial debris is till: a grab bag of rocks of all sizes from powder to house-size boulders, dropped by melting glacial ice approximately 12,000 years ago (Fig. 8). On top is a veneer of soil, formed recently under the humid conditions of the eastern deciduous forest.

Water erosion created our ravines. Water as a geological force has created Columbus's ravine topography. The streams dissecting the landscape in the Scioto River watershed in Franklin County include the north-to-south–flowing Scioto and Olentangy rivers and their major tributaries (Darby Creek, Alum Creek, Big Walnut Creek, Blacklick Creek, Little Walnut Creek) and numerous small intermittent creeks and man-made ditches. Some Franklin County ravines are now watered by storm sewer discharges in the valleys of former streams; some have seasonal streams or none.

Recognizing the bedrock in your ravine will give you clues to hazards. The rocks under Ohio began as sediment washed down from the

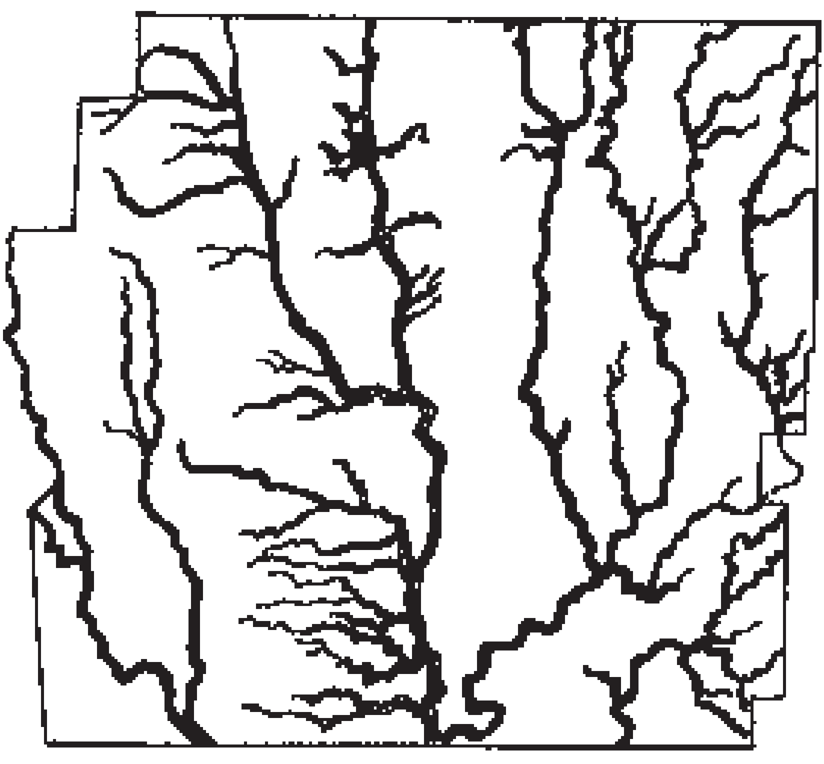
Fig. 8
Glaciated Ohio

ancestral Appalachian Mountains to our east and as reefs in the seas west of those mountains. Laid down in layers as a vertical stack, oldest at the bottom and youngest at the top, sediments sank into a sea, compacted, and cemented into rocks. Uplifted in the Cincinnati Arch of western Ohio and eastern Indiana, these rocks are now higher to the west and dip down to the east in Ohio. Erosion has exposed edges of these layers dipping eastwards into the subsurface, like a slice of layer cake leaning to one side. Long stripes of tilted formations now crop out on the surface in north-south ribbons, neatly planed flat by glacial scraping. Walking west to east across the state, or across Franklin County, means crossing the edges of progressively younger formations. Columbus ravines are streamcuts at different levels in the layers of rock.

West of the Scioto River is Devonian limestone. In western Franklin County, the bedrock is Devonian limestone. This is a soft rock composed of calcium carbonate, the material that coral and clam shells are made of. Corals grow in reefs in shallow, warm, clear seas like those around the Florida Keys today, and after they die their compacted remains become lime mud and limestone. Limestone can develop sinkholes. The roof of an underground cave, formed by rainwater dissolving the calcium carbonate, can collapse. There are numerous sinkholes in counties around Columbus. If you see a large depression in the ground near your house that seems to be sinking, stay away from it and call a geologist.

Farthest west, our oldest limestone is the massive gray Columbus Limestone, which contains fossil fish teeth. It's visible along the Scioto River, for example, around Marble Cliff, and near the Fishinger Bridge. Also visible along the Scioto River, on Slate Run, and on Hayden Run, is the younger Delaware Limestone above it, a bluish, cherty limestone with some brown, limey shale. It contains worm burrows, shark's teeth and other fish bones, and corals.

Fig. 9
Streams and rivers criss-cross the Franklin County landscape.



The most hazardous shales are east of the Scioto River. East of the Scioto River, shales appear on the surface. Shale is basically compacted mud from the sea bottom that splits easily into thin layers. It is a weak rock, prone to severe erosion and slumping. The Olentangy Shale, a soft, light blueish-green, limey, muddy, clayey shale with plant fossils, appears in Slate Run and in Highbanks Metro Park cliffs, where the Ohio Shale overhangs it from above.

The Ohio Shale, which extends eastwards for miles, is a slightly radioactive, soft, coaly, organic, black shale with dull brown iron pyrite that reddens as it weathers. In creek beds and cliffs, it often shows characteristic joints (cracks) in thin, splitty layers (Fig. 10). The joints go approximately northeast and northwest, creating jutting corners and ledges. This shale is famous for its large concretions, six feet or more in diameter: huge balls centered around a fossil or mineral nucleus. The Ohio Shale has few fossils, though, because it formed in oxygen-depleted conditions, like the Black Sea today, although some large fish skeletons have been found. It crops out at Highbanks Park, along Turkey Run, in Walhalla and Glen Echo ravines, and along Alum Creek.

Farther east, the younger Bedford Shale takes us closer to an ancient shoreline. This bluish-greenish-gray to red and chocolate brown clayey shale takes us across a time boundary into the Mississippian Period. It formed in quiet waters just offshore from a river delta along an ancient beach. Its gray mudstone appears east of Westerville and along the banks of Big Walnut and Rocky Fork Creeks. Washed by storm waves, it contains rippled layers, evidence of underwater debris flows, and is sandy towards the top. It has almost no visible fossils.

❧ **East of Columbus, there was once a sandy beach.** In the easternmost part of the county, there are sandstones as well as shale. Sandstone is made of tiny mineral grains no larger than two millimeters, naturally cemented together after being deposited on beaches or underwater shelves by rivers. Well-cemented sandstone is strong, and is often used for building stone; but where it overlies shale it can form overhangs that can fall down.

The Berea Sandstone, a fine-grained gray to buff, gritty sandstone, formed as a shallow shelf at a river delta by the seashore. The sandstone retains lumpy swirls from pounding surf in storms, ripple marks from shore waves, and some concretions, too. Along Rocky Fork east of Gahanna, decomposing iron sulfide in the Berea creates a hydrogen sulfide (rotten egg) smell in springs, and a layer of marcasite (decayed pyrite) occurs. Fossils are rare.

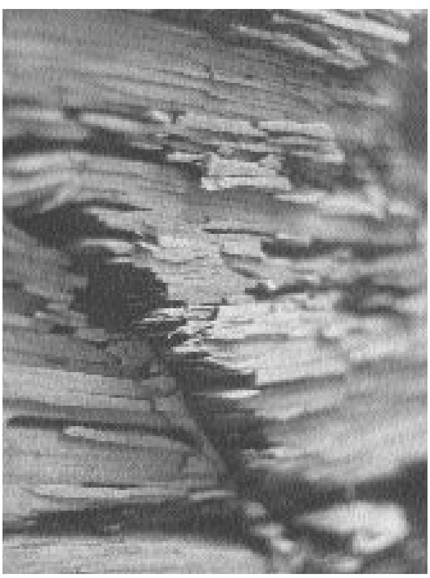


Fig. 10
Splitty shale layers

❧ **More weak shales occur in eastern Franklin County.** Still farther east, above the Berea, is the Sunbury Shale, a black, splitty, coaly, muddy, clayey shale, often stained with red iron oxide drips. Formed in similar oxygen-poor conditions to the Ohio Shale, it is weaker and more prone to falling apart, but has some fossil shells in it. Rocky Fork, northeast of Gahanna, has good exposures of the Sunbury Shale. Farther east, the Raccoon Shale, a part of the Cuyahoga Formation, appears: a bluish-gray, muddy, clayey shale, interbedded with fine-grained sandstone from a river delta. It makes ledges along Blacklick Creek and has a few fossil pieces of plants and worm burrows in it.

❧ **The stones in your yard may have come from up north.** Draped over the bedrocks like a lumpy coverlet is a layer of glacial rubble deposited as the mile-high ice sheet that covered Ohio during the last Ice Age melted and dropped its load. The Laurentide Ice Sheet advanced and retreated over the Midwest several times, carrying rocks from up north and dumping them as the ice front melted, like a conveyor belt, bringing to Ohio rocks from Canada and northern Ohio. Much of the glacial debris dragged south from northern Ohio is our hometown Columbus and Delaware limestone, as this limestone belt stretches north to Kelleys Island. Consequently, much of the glacial cover in central Ohio has created limey (alkaline) soil.

Glacial rubble is the bane of gardeners and builders. The ice sheet created eskers, long sinuous ridges of sand and gravel deposited by streams flowing under the ice. While some esker material still sits on the surface south of Columbus, most in Columbus has been reworked by urban development. In some places, the glacial material has been removed down to the bedrock and replaced with fill dirt. Gardeners and builders sometimes find Canadian rocks in Ohio's soils. Known as erratics, these boulders are distinct because they are clearly composed of rock not native to Ohio, such as metamorphic rocks or igneous rocks, like granite. Small ones are nuisances for gardeners; large ones on slopes can be problems if they slide downhill.

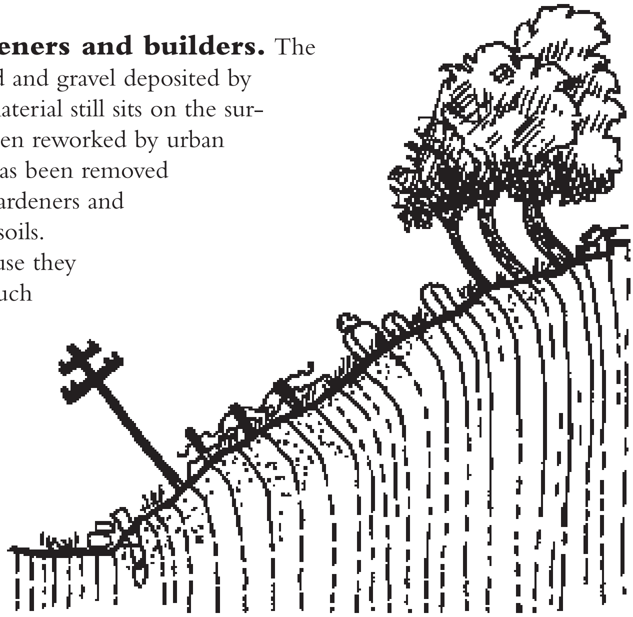


Fig. 11
Tilting poles, tombstones, and trees may indicate soil creep.

Franklin County Soils are derived from bedrock. The glacial limestone, shale, and sandstone loamy soils around Columbus ravines are derived from the limey bedrock and glacial till beneath them, modified by vegetation composting into acidic, organic loam. Soil test kits are available in local stores to determine how acid or alkaline the soil is in your yard. Lists of plants suited for particular soils are available on the Internet and from county extension offices. Most soils in Franklin County are fairly alkaline and need amendments, such as peat moss and manure, for growing gardens.

Ravine slopes can be hazardous: know the signs of danger. The soil on the surface of a ravine slope is always prone to moving slowly downwards due to gravity. Soil creep is a gradual, imperceptible, downhill movement, measured in a few millimeters per year. Downhill creep is common in shales and on steep slopes. Tilting telephone poles, leaning or bent trees, small horizontal ridges in the surface of a lawn, or in slope soil, or gaps at foundations are all indicative of soil creep (Fig. 11). Shallow soil slips can be repaired with small-scale terracing and planting vegetation to anchor the soil.

Watch out for slides, falls, and flows. Geological hazards of ravine slopes include landslides, rock or soil falls, and the flowing movement of saturated material. Learn to recognize the signs of danger before something bad happens. Signs of an unstable hillside include cracks in buildings, in walls, or under garage doors; windows or doors that stick; retaining walls, fences, or posts that lean or sway; underground pipes that break; swimming pools that crack or leak; water that seeps from the base of a slope; development of lumpy or step-like mounds of soil, especially near the base of a slope; cracks opening up in the ground; vegetation sliding off or bare patches appearing from surface mudflows; or any evidence of past hazards having occurred. Remember: the steeper the slope, the greater the chance of hazards. Building on or near a steep slope is asking for trouble.

Landslides have happened in Central Ohio ravines. Some landslides occur as slumps. A slump works like a giant ice cream scoop slicing into a slope and ladling out a bowl of rock and soil (Fig. 5). Slumps are common in shales because they are weak, non-resistant rocks, being composed of many thin plates of small particles, often weakly cemented together. Shales contain many potential planes of failure, and it does not take much weight to overload them.

Small-scale slumps can sometimes be seen after rainstorms in the Ohio Shale in Columbus ravines. Rain saturates the surface material and creates a plane of failure between the surface material and lower, less saturated material. The surface material then lacks sufficient resistance to the force of gravity to hold the slope surface in place.

Leaning trees and utility poles are clues to slumps. A slump can be recognized by trees leaning with their tops inwards towards the slope as their roots slide down, by telephone or other poles leaning inwards on slope tops, by mounds of lumpy soil accumulating at the bottom of a slope, or by utility cables that are sagging, crooked, or pulled too tight (Fig. 11).

There are many types of landslides. Debris slides are made up of a large mass of vegetation, soil, and rock sliding suddenly downhill as one block. Debris falls are made up of loose rocks, soil, and vegetation falling from an overhang or steep cliff. Along creek and riverbanks where a stream has undercut the bank, the entire bank can fall into the stream, taking part of your yard with it. Debris flows and avalanches occur when soils are saturated. Soil and rocks roll downhill, often dragging vegetation with them, gathering momentum and loosening more material as they flow. The weight of debris slides and debris flows on a slope only 30 or 40 feet high can be sufficient to crumple a house and kill its inhabitants. Rock falls occur where weak rock, like shale, has stronger rock on top. Rock falls occur in Ohio where sandstone overlies shale, as it does in eastern Franklin County. Mudflows consist of muddy surface stream channels suddenly flowing downhill and usually occur where there is no vegetation. They are caused by the soil absorbing excess water after a heavy rainstorm. Hillsides with evidence of previous surface mudflows indicate unstable slopes where further hazardous movement could occur.

Don't build on tops or toes. Bad building practices can create landslides. Overloading a slope's top can destabilize it because the top is too heavy for the bottom to hold it up. Undercutting the toe (the bottom or base) of a slope can remove the material holding up the slope. An increase in the level of water saturation, a creek undercutting and eroding its banks, or a hill flattened to build a roadway can cause a landslide. Anything that increases the weight load on a slope could cause a landslide. It is best not to build on any part of a ravine slope.

Some problems require engineering and protective remedies. Remedies can involve removing buildings from the crest or the toe of a ravine slope, regrading slopes, or benching the slope by removing the top of the slope and placing the material at the bottom. More effectively, draining the surface and subsurface and planting vegetation to reinforce the toe of a slope can solve other problems. Rerouting some storm sewer discharge to prevent sudden surges in streams can reduce stream bank erosion. Before you begin any work on a ravine slope, it is best to consult a qualified engineer.

Fig. 12
Build away from crest of the ravine.

INVASIVE PLANTS IN FRANKLIN COUNTY

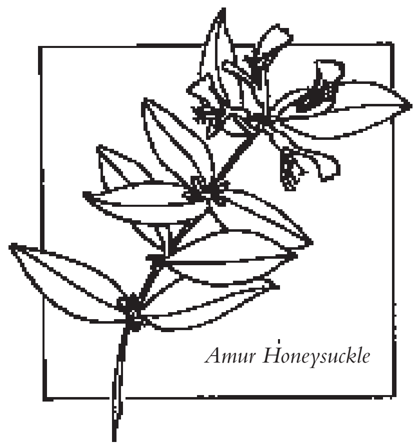
Aliens invade your backyard!

Though your backyard and neighborhood ravine look like tranquil areas of nature, a war is being waged: a war that most native Ohioans are losing. This war is between aggressive, non-native plants and the beautiful Ohio wildflowers and trees that have existed in these places for hundreds of years. The aggressive plants are called invasive species or aliens. These plants eliminate the natives and create a habitat where only one or two invasive species exist, threatening the biodiversity of our ecosystems.

In Ohio, invasive species are the biggest threat to rare and endangered species. The invasive plants out-compete and eliminate our native plants in a variety of ways. Some have longer growing seasons. This gives them a jump on the native plants and robs them of sunlight, water, and soil nutrients. Some produce large quantities of seeds, eliminating natives by outnumbering them. Others deal in chemical warfare. They send toxic chemicals into the soils that kill off any other plant trying to grow near them.

Though most invasive plants were introduced for landscaping, erosion control, wildlife habitat, or garden plants, they have now found their way into every habitat type across Ohio.

Garlic Mustard

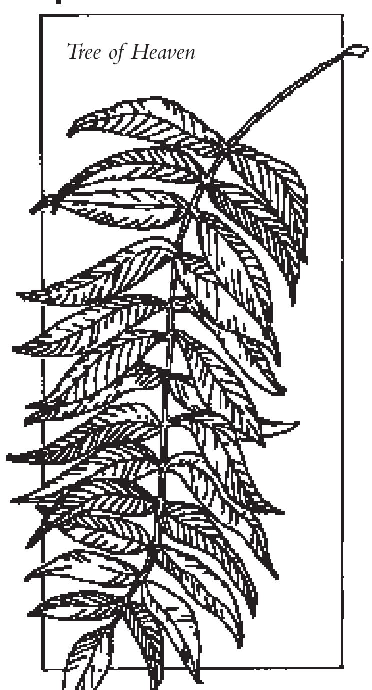


Amur Honeysuckle

What can you do?

The first step is not to select invasive plants for your backyard. Though the war is currently favoring the invasive plants, you can help turn the tide. Because of the invasive plants' aggressive behavior and seed dispersal, they spread quickly from your yard into the ecosystem. Do not to plant these plants in your backyard. The next step is to eliminate those that currently grow in your yard.

Adopt a local ravine and eliminate invasives. You or your neighbors can adopt a local ravine. Teams can be formed to eliminate invasive plants in these special places. Together, we can win the war against invasive plants in our backyards and ravines.



Tree of Heaven

What are the alien plants and how did they get here?

Most invasive plants came from other countries and were brought to the United States in the last 100 years. Although there are over 75 different plant species that are invasive in Ohio, below is a list of the most aggressive. You might be surprised by some of the plants that are on this list.

Invasive Plants in Central Ohio

Name	Where it came from	How it spread
Wintercreeper Vine *(Euonymous fortunei)*	China, introduced in 1907	Escaped from cultivation. A major problem in our ravines!
Bush Honeysuckle *(Lonicera maackii, L. morrowii, L.tatarica)*	China, Japan and Korea, introduced in 1750–1900	Escaped from cultivation. A major problem in our ravines!
Japanese Honeysuckle *(Lonicera japonica)*	Eastern Asia, introduced in 1806	Escaped from cultivation.
Lesser Celandine *(Ranunculus ficaria)*	Eurasia	Escaped from cultivation.
Garlic Mustard *(Alliaria petiolata)*	Europe	Spreading weed. Widespread.
Common Privet *(Ligustrum vulgare)*	Europe and North Africa	Escaped from cultivation. Becoming a big problem.
Burning Bush *(Euonymous alatus)*	NE Asia, China, introduced in 1860	Escaped from cultivation. Widespread.
Japanese Knotweed *(Polygonum cuspidatum)*	Japan, introduced in 1850	Escaped from cultivation. Spreads rapidly.
Japanese Barberry *(Berberis thunbergii)*	Japan, introduced in 1864	Escaped from cultivation.
Purple Loosestrife *(Lythrum salicaria)*	Eurasia	Escaped from cultivation. Takes over wet areas. Becoming a problem in ravines.
Periwinkle, Myrtle *(Vinca minor)*	Europe, Western Asia, long cultivated	Escaped from cultivation.
Multiflora Rose *(Rosa multiflora)*	Japan, Korea and China, introduced in 1868	Used as "living fences" for soil conservation and wildlife habitat and escaped from cultivation. Widespread.
Day Lily *(Hemerocallis fulva)*	Eurasia, long in cultivation	Escaped from cultivation.
Crown Vetch *(Coronilla varia)*	Mediterranean region	Escaped from cultivation.
Tree of Heaven *(Ailanthus altissima)*	China, introduced in 1784	Escaped from cultivation. Naturalized over much of U.S.

Working with Native Plantings

Which native plants are suitable for ravines?

Ravines have steep slopes and rich moist soils and form along some streams. Their shaded banks typically have three layers: tall trees, small trees and shrubs, and low-growing flowers and ferns.

Native trees and shrubs provide the architecture of the landscape. They are the skeleton that anchors the slopes. Look first to make sure that good strong native trees and shrubs are in place. Suggested species are listed on page 13.

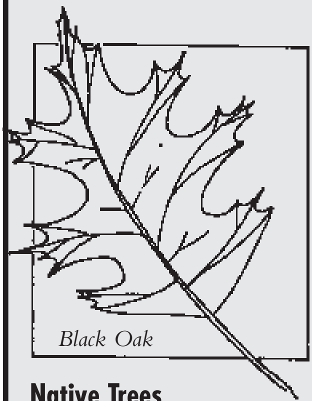
Second, remove invasive aggressive intruders. If patches of honeysuckle, euonymus, ivy, garlic mustard, etc., are taken out, native wildflowers can spring back to life. See the above list of invasive weeds.

Many ravine wildflowers are plants of shaded woodlands and appear in the spring before trees leaf out. Ferns also grow in ravines and provide visual interest in shady areas.

Ravines typically have shaded slopes with rich, moist soils, but there can be variation. Spots on slopes facing south or where trees have come down can be sunny and drier. Areas along streams or where soils have high clay content can be quite wet.

A plant that is native to an area is one that grows wild in that area without human intervention. All plants native to a given area once grew there in the wild, but many plants currently found in the wild may not be native; they may be introduced foreign species. Be sure to use nursery or home-produced plants and not those dug from the wild. Also, match the plant to the specific growing conditions it prefers. The following native plants are recommended for ravines in central Ohio.

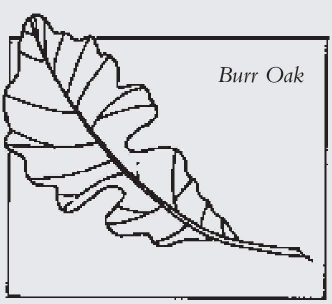
NATIVE PLANTS RECOMMENDED FOR FRANKLIN COUNTY RAVINES



Black Oak

Native Trees

Box Elder *(Acer negundo)*
Black Maple *(Acer nigrum)*
Red Maple *(Acer rubrum)*
Sugar Maple *(Acer saccharum)*
Ohio Buckeye *(Aesculus glabra)*
Bitternut Hickory *(Carya cordiformis)*
Shagbark Hickory *(Carya ovata)*
Hackberry *(Celtis occidentalis)*
American Beech *(Fagus grandifolia)*
White Ash *(Fraxinus americana)*
Green Ash *(Fraxinus pennsylvanica)*
Blue Ash *(Fraxinus quadrangulata)*
Kentucky Coffeetree *(Gymnocladus dioica)*
Black Walnut *(Juglans nigra)*
Tulip Tree *(Liriodendron tulipifera)*
Sycamore *(Platanus occidentalis)*
Eastern Cottonwood *(Populus deltoides)*
Wild Plum *(Prunus americana)*
Cherry *(Prunus serotina)*
White Oak *(Quercus alba)*
Swamp White Oak *(Quercus bicolor)*
Bur Oak *(Quercus macrocarpa)*
Chinquapin Oak *(Quercus muehlenbergii)*
Red Oak *(Quercus rubra)*
Shumard Oak *(Quercus shumardii)*
Black Oak *(Quercus velutina)*
Black Willow *(Salix nigra)*
American Basswood *(Tilia americana)*
American Elm *(Ulmus americana)*
Slippery Elm *(Ulmus rubra)*



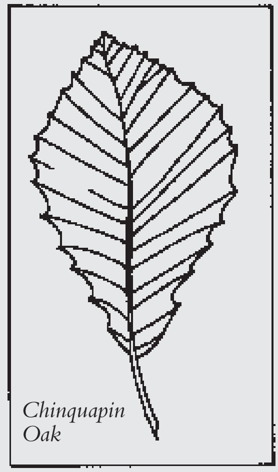
Burr Oak

Native Shrubs and Small Trees

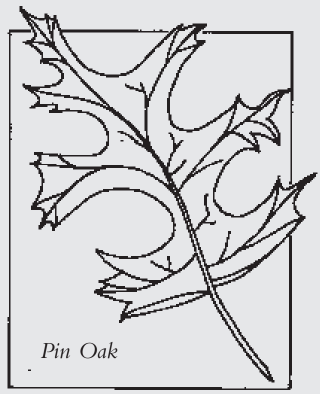
Serviceberry *(Amelanchier arborea)*
Pawpaw *(Asimina triloba)*
American Hornbean *(Carpinus caroliniana)*
Buttonbush *(Cephalanthus occidentalis)*
Redbud *(Cercis canadensis)*
Pagoda Dogwood *(Cornus alternifolia)*
Silky Dogwood *(Cornus amomum)*
Flowering Dogwood *(Cornus florida)*
Witch Hazel *(Hamamelis virginiana)*
Spicebush *(Lindera benzoin)*
Ironwood *(Ostrya virginiana)*
Hop-Tree *(Ptelea trifoliata)*
Fragrant Sumac *(Rhus aromatica)*
Smooth Sumac *(Rhus glabra)*
Elderberry *(Sambucus canadensis)*
Bladdernut *(Staphylea trifolia)*
Mapleleaf Viburnum *(Viburnum acerifolium)*
Arrowwood Viburnum *(Viburnum dentatum)*

Native Wildflowers

Common Water Plantain *(Alisma subcordatum)*
Columbine *(Aquilegia canadensis)*
Jack-in-the-pulpit *(Arisaema atrorubens)*
Wild Ginger *(Asarum canadense)*
Swamp Milkweed *(Asclepias incarnata)*
Turtlehead *(Chelone glabra)*
Dwarf Larkspur *(Delphinium tricorne)*
Trout Lily *(Erythronium americanum)*
Boneset *(Eupatorium perfoliatum)*
Snakeroot *(Eupatorium rugosum)*
Wild Strawberry *(Fragaria virginiana)*
Wild Geranium *(Geranium maculatum)*
Common Sneezeweed *(Helenium autumnale)*
Spotted Jewelweed *(Impatiens capensis)*
Blue Flag Iris *(Iris virginica var. shrevei)*
Cardinal Flower *(Lobelia cardinalis)*
Great Blue Lobelia *(Lobelia siphilitica)*
Virginia Bluebells *(Mertensia virginica)*
Wild Blue Phlox *(Phlox divaricata)*
Jacob's Ladder *(Polemonium reptans)*
Bloodroot *(Sanguinaria canadensis)*
Cup Plant *(Silphium perfoliatum)*
Large-flowered Trillium *(Trillium grandiflorum)*
Blue Vervain *(Verbena hastata)*



Chinquapin Oak



Pin Oak

Native Ferns

Maidenhair Fern *(Adiantum pedatum)*
Lady Fern *(Athyrium filix-femina)*
Lowland Brittle Fern *(Cystopteris protrusa)*
Hayscented Fern *(Dennstaedtia punctilobula)*
Narrow Leaved Glade Fern *(Diplazium pycnocarpon)*
Marginal Wood Fern *(Dryopteris marginalis)*
Sensitive Fern *(Onoclea sensibilis)*
Interrupted Fern *(Osmunda claytoniana)*
Christmas Fern *(Polystichum acrostichoides)*
Broad Beech Fern *(Thelypteris hexagonoptera)*

Shingle Oak

A WISE SAYING:

"Leaves of three let them be;
berries white, run in fright."

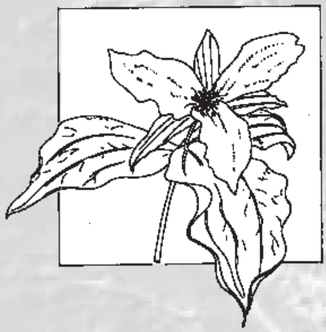
Poison Ivy

What is a weed? A plant whose virtues
have not yet been discovered.

RALPH WALDO EMERSON

Knowledge of a place—where you are and where you come from—is intertwined with knowledge of who you are. Landscape, in other words, shapes mindscape.

DAVID ORR



The name of Bill Moose Run in northern Clintonville links us with the Wyandot culture that existed in central Ohio until the 1800s. In the spring, Bill Moose's mature beech-maple forest hosts trillium, Virginia bluebells, mayapple, and trout lilies.

During the Early Woodland period, 3,000 to 2,000 years ago, native people built large earthen mounds in the Ohio River valley. Adena Brook, site of an Adena mound excavated in the 1950s, obtained its name from this culture.

The Jeffers Hopewell Prehistoric Mound in Worthington dates from c. 400 B.C. It is located between Linworth Run and an unnamed tributary ravine.

Over 40,000 slaves passed through Ohio during the Civil War. Some ravines in Franklin County are documented Underground Railroad sites, including Walhalla, Flint, and Iuka.

In 1906, a giant glacial boulder was found near Iuka Ravine. The rock was moved to the northwest side of Orton Hall on the OSU campus, where it stands upright.