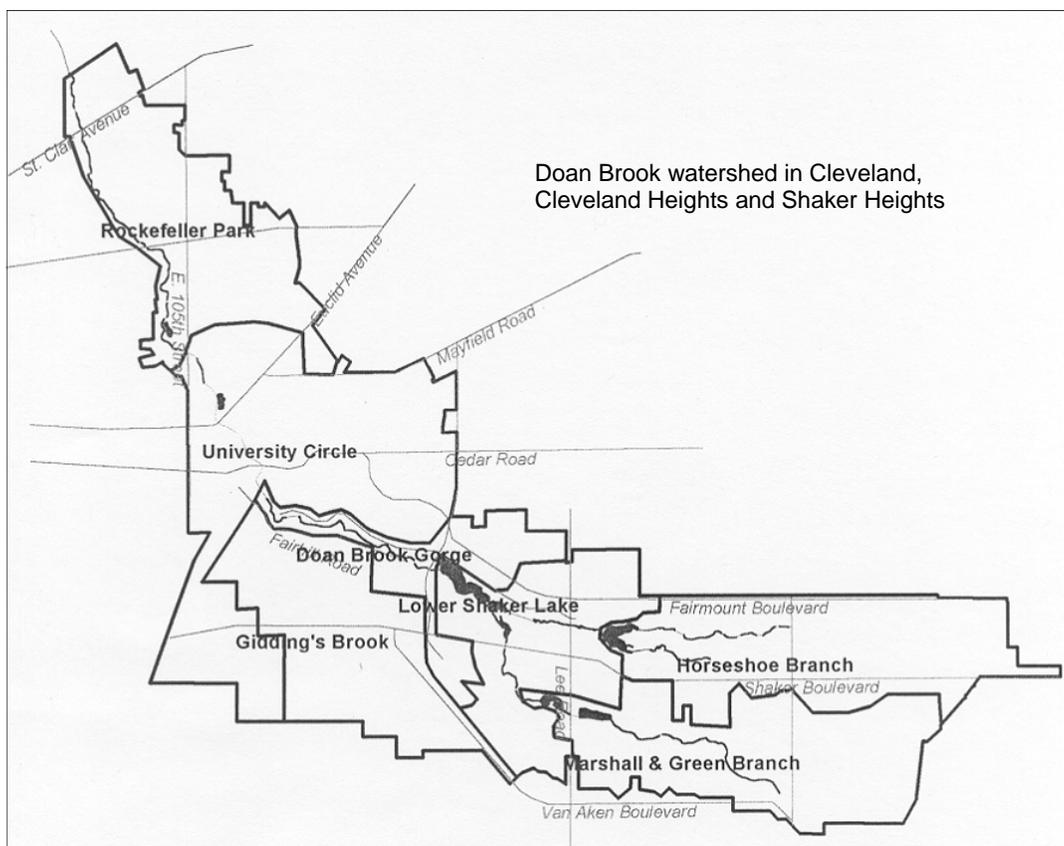


# Helping Doan Brook

Ideas for citizens and homeowners  
who care about water quality  
and urban streams in their community



Presented by  
EcoCity Cleveland  
and the Center for Watershed Protection  
with the support of the Northeast Ohio Regional Sewer District



#### About this insert

This insert summarizes recommendations made at a workshop organized by EcoCity Cleveland in May 2000. The workshop presented ways that homeowners and citizens can help improve water quality and ecological health in urban watersheds.

Although the workshop focused on the Doan Brook Watershed in the Cleveland area, the techniques presented can be helpful in any watershed with urban land or development pressures.

#### Sponsor

EcoCity Cleveland is a nonprofit organization that promotes a vision of ecological cities existing in balance with their surrounding countryside. Through its publications and projects, EcoCity Cleveland presents innovative ideas for regional land use planning, transportation systems, watershed restoration, ecological redevelopment and other issues. For more information, call 216-932-3007 or see [www.ecocleveland.org](http://www.ecocleveland.org).

#### Presenter

This information was developed by the Center for Watershed Protection, a nonprofit 501(c)3 corporation dedicated to finding new, cooperative ways of protecting and restoring watersheds. Its principal functions are conducting independent research and providing technical support to local governments and watershed management professionals around the country to develop more effective urban stormwater and watershed protection programs. Since its inception, the Center has provided technical assistance to local governments in 30 states and the District of Columbia. Past and present projects include the development of stormwater design and guidance manuals for the states of Maryland, New York, Massachusetts, Texas, and Georgia as well as the District of Columbia. In addition, the Center has conducted more than 300 stormwater training workshops, and has conducted stormwater retrofit inventories throughout the country. The Center has a staff of 13 professionals and support personnel and is located in Ellicott City, Maryland. For more information, call 410-461-8323 or see [www.cwp.org](http://www.cwp.org).

#### Supporter

Funding to support the development of this insert was provided by the Northeast Ohio Regional Sewer District as part of its Doan Brook Watershed Study.

# What is a watershed?

A watershed can be defined as the land area that contributes stormwater runoff to a particular point along a waterway. Watersheds vary in size – they can be as small as your own backyard. Everyone lives in a watershed!

## What is my watershed?

If you live in Cleveland Heights, Shaker Heights, or Cleveland, you may live in the Doan Brook watershed. The Doan Brook begins in Shaker Heights and Beachwood, just east of Warrensville Center Road and flows westward through Shaker Heights and Cleveland Heights through the Shaker Lakes. Just past the Shaker Lakes, it continues flowing northwest through a gorge into Cleveland where it soon enters a culvert and flows underground for about a mile. It resurfaces just north of the Cleveland Museum of Art, and flows along Martin Luther King Boulevard until it enters Lake Erie.

The Doan Brook watershed is about 12 square miles. Of this, about 7.5 square miles, or 2/3 of the watershed, are in residential land use.

## How are we all connected in a watershed?

Even if you don't live next to the Doan Brook, what you do in your yard can still have a direct impact on your nearby water resources.

As the Doan Brook watershed has developed over the last 200 years, the natural water balance has been altered. Natural forest cover and wetlands have been

replaced with roads, driveways, parking lots, and buildings. These hard surfaces, or impervious surfaces, increase the amount of rainfall that flows over land and reduce the amount of rainfall that percolates into the soil or is consumed by plants and trees. Increasing the amount of rainfall that runs off the land leads to flooding.

As water flows over these paved surfaces, it collects soil, pet wastes, salt, fertilizers, oils, and other pollutants. It doesn't matter if your house is not on a stream or river – the rainwater flows down the street into a catch basin. Storm sewers carry this runoff directly to the nearest body of water, taking dirt and pollutants along with it.

## What are some of our concerns in the Doan Brook watershed?

One concern is flooding – increased impervious surfaces in the watershed have meant that more rainfall flows directly to the stream and less percolates into the ground. Another concern is pollution, especially bacteria and nutrients.

A significant source of bacteria in urban watersheds comes from our own pets. A single gram of dog feces contains 23 million fecal coliform bacteria. Nutrients include nitrogen and phosphorus, and one of the primary sources of these in an urban watershed is the fertilizer we use on our lawns and gardens.

## Easy steps to help Doan Brook and other urban streams

- Clean walks and decks with a broom rather than a stream of water. This will save literally hundreds of gallons of water every time you clean. And it will keep the pollutants that have accumulated on these surfaces from washing into the catch basin.
- Don't pour oil, engine fluids, cleaners, or household chemicals down catch basins or sinks. Recycle motor oil and household chemicals at approved facilities.
- Repair automobile leaks immediately.
- Use lawn and garden chemicals sparingly and wisely. Your garden may not even need to be fertilized, so do a soil test first. Organic fertilizers, such as mulch, composted manure, cottonseed meal, and blood meal can be applied if necessary. If you must use chemicals or fertilizer, check the weather forecast for rain so they don't wash away. Keep fertilizers and pesticides off sidewalks and driveways.
- Select nontoxic, alternative pest control measures. If a pesticide is needed, apply it at the correct time and rate.
- Collect and compost yard waste, or simply leave grass clippings on the lawn.
- Select the tallest acceptable mowing height on your mower. Taller lawns will shade weeds and retain soil moisture.
- Select landscape plants that are well adapted to the local climate and have low maintenance, chemical and water requirements
- Apply only enough irrigation water to satisfy plant needs. Never over water after pesticide or fertilizer applications.
- Adjust sprinklers to avoid watering paved areas.
- Pick up after your pets!
- Don't feed the ducks and geese. Ducks and geese can contribute significant loadings of bacteria to streams and lakes. Feeding encourages them to stay around.
- Wash your car on your grass instead of in your driveway and use non-phosphate soaps. Or take it to a car washing facility.
- Never use a catch basin to dispose of used water, cleaning solutions or anything else because the catch basins in the street take water, UNTREATED, directly to Doan Brook.

# Reducing impervious surfaces

## What are impervious surfaces?

Impervious surfaces include driveways, sidewalks, patios, and rooftops – any surface that doesn't allow rainwater to percolate into the ground.

## Why should I reduce impervious surfaces?

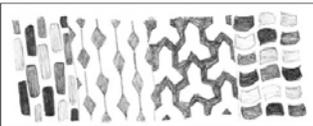
Impervious surfaces alter the natural water balance in a watershed. As you replace forests and wetlands with roads, driveways, parking lots and buildings, you increase the amount of rainfall that flows over land and reduce the amount of rainfall that percolates in the soil or is consumed by plants and trees. Increasing the amount of rainfall that runs off the land leads to flooding.

As water flows over these paved surfaces, it collects soil, pet wastes, salt, fertilizers, oils, and other pollutants. It doesn't matter if your house is not on a stream or river – the rainwater flows down the street into a catch basin. Storm sewers carry this runoff from your neighborhood directly to the nearest body of water, taking dirt and pollutants along with it. This runoff is the greatest source of pollution in many streams.

## How do I reduce stormwater runoff from my yard?

One way you can help to reduce stormwater runoff is to minimize the amount of impervious surfaces on your property. As you add or rebuild patios and garden pathways, consider alternative techniques to the traditional concrete or asphalt. For instance, paving blocks, permeable pavements, wood decks, wood chips, and crushed rock allow rainwater to soak through and help to reduce stormwater runoff.

**Paving blocks:** There are many types of grid or lattice paving blocks that have holes in the concrete blocks. These holes can be filled with soil and planted with grass, or they can be filled with gravel. A small fraction of stormwater



runoff is trapped in the shallow depressions in the paving blocks, and some may actually infiltrate into the soil. Not only do paving blocks help to reduce runoff, but also they often serve as a very attractive alternative to pavement. They typically come in different colors, shapes, and patterns. Paving blocks can be found at most major home centers. Also, traditional bricks can be used. As you lay them out, leave space in between the bricks. You can fill this space with sand or moss and the effect will be the same as using paving blocks. Just don't cement the bricks together!

**Permeable pavement:** Permeable pavement or concrete is similar to traditional pavement and concrete used on our sidewalks and roads, except that the gravel used in the mix is larger, which results in larger pore spaces in the pavement itself. The rainwater can then percolate through these pore spaces. Most pavement contractors should be able to provide you with more information about this option.

**Wood decks:** Wood decks allow rainfall to flow between the boards and percolate into the soil underneath. However, you should be careful in your selection of lumber for your deck – a lot of wood is treated with chemical preservatives and



can contain toxics such as arsenic, which can leach into groundwater.

## A Few things to consider

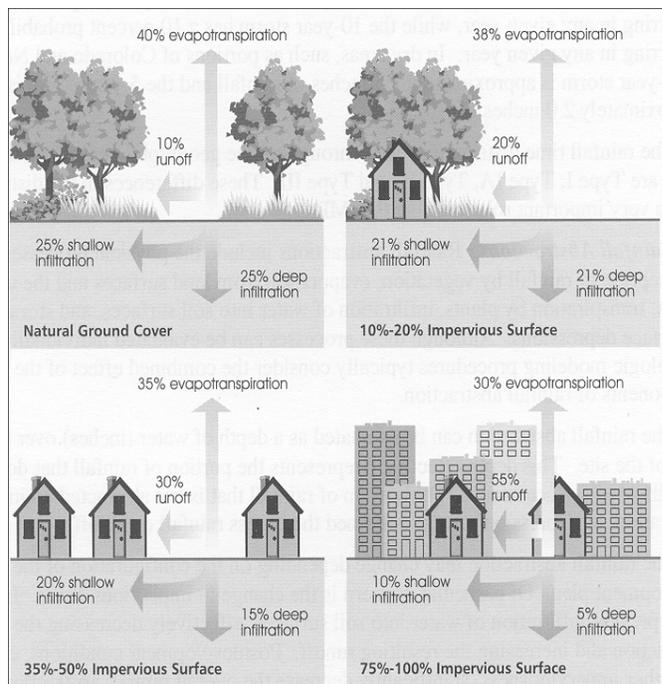
Before you replace driveways or sidewalks with grid pavers or permeable pavements, check with the building department of your

community. Most cities have regulations regarding the types of paving materials that may be used for driveways and sidewalks.

- If you live in Cleveland Heights, contact the Division of Building at 291-4900.
- If you live in Shaker Heights, contact the Building Department at 491-1460.
- If you live in Cleveland, contact the Division of Building and Housing at 664-2790. In Cleveland, no permit is needed to construct or alter a residential driveway, but it must be paved with concrete or asphalt. For information on driveway aprons, contact the Division of Streets at 664-2158. For information on sidewalk construction or repair, contact the Bureau of Sidewalks at 664-2474.

As you are laying out your new patio or pathway, grade the surface so that it slopes to natural areas, such as garden beds. You don't want rainwater flowing off of this surface to head towards the street or the foundation of your house!

When it comes times to clean your patio, deck, sidewalk or driveway, use a broom rather than a stream of water. This will prevent the pollutants that have accumulated on the surface from entering the catch basin. Also, this will save literally hundreds of gallons of water every time.



Runoff variability with increased impervious surfaces.

# Rain barrels

## What is a rain barrel?

A rain barrel or cistern is an automatic rainwater collection system that stores rooftop runoff to be used later for activities such as lawn and garden watering, car washing, and window cleaning.

## Why use a rain barrel?

Residential irrigation can account for 40% of domestic water consumption in a given area. This can be a problem particularly in summer, when the majority of outdoor water use occurs, and also the time when there is likely to be a water shortage. Collecting rainwater from your roof during storms by using a rain barrel can not only lower your water bills, but also help to decrease water demand during the hot summer months. Rainwater collection and reuse is beneficial to the environment because the stored water would otherwise run off into the storm sewers, bringing pollutants such as oil and grease, bacteria, and nutrients with it. Once water gets into a storm sewer, it eventually ends up in our streams and rivers. Also, the more rainwater that is reused, the less need there is for chlorinated or chemically treated tap water.

## Where can I get one?

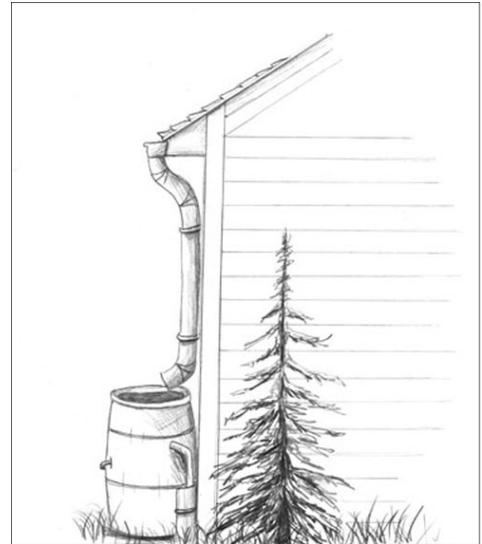
You can purchase a rain barrel at most major lawn and garden centers. Call your local center to see if they carry them or if they can order one for you. Or, if you are feeling especially creative, you can make your own rain barrel using a large trashcan, agricultural supply container, or other large container and a little ingenuity. Listed below are some links to rain barrel sources online. Barrel sizes range from 50 to 250 gallons, and prices range from \$99 to \$325 plus shipping charges.

- Watertanks.com at [www.watertanks.com/rainwatertank.html](http://www.watertanks.com/rainwatertank.html).
- The Garden Watersaver at [www.gardenwatersaver.com](http://www.gardenwatersaver.com).
- The Spruce Creek Rainsaver at [www.sprucecreekrainsaver.com](http://www.sprucecreekrainsaver.com).
- Plastmo at [www.rio.com/~plastmo/gardnh2o.html](http://www.rio.com/~plastmo/gardnh2o.html).
- The Urban Rain Barrel at [www.greenculture.com/ps/pp\\_ws.html](http://www.greenculture.com/ps/pp_ws.html).

## How do I install it?

Most rain barrels are easy to install; however, actual installation methods may vary depending on the individual brand of rain barrel. Installation

of a typical barrel will involve disconnecting your downspout, cutting off a portion of the downspout and redirecting it into the top of the barrel (see diagram). Most rain barrels have an overflow pipe that redirects the rainwater back into the downspout or onto your lawn or other surface in the event the barrel becomes full. If you live in an area where soils have a high clay content, such as Cleveland, it is essential to use a rain barrel with a feature that redirects any overflow back into the original downspout drain. This will avoid soggy lawns and wet basements. Other features may include safety features, spigots, connector barrels, mosquito proofing, and even water filters. Always be sure to empty your barrel before winter comes so you don't end up with a barrel full of ice!



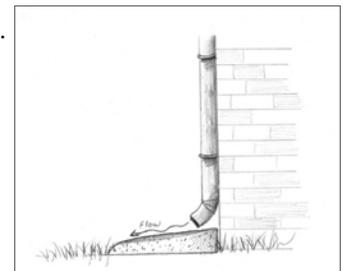
## Cisterns

A cistern is similar to a rain barrel, but has much greater storage capacity and requires a little more engineering. You can use a cistern to collect rainwater from your roof, filter the water, store it, and reuse it for your lawn and garden, or in your house for toilet flushing, clothes washing, etc. A cistern is considerably more expensive than a rain barrel, but will provide for much of your water needs, and may pay for itself in the long run.

## Spreaders

A spreader is a small slab that can be placed underneath your downspout to direct rainwater away from your house. This reduces soil erosion because it slows down the rooftop runoff, and it helps keep your basement dry by directing rainwater to another area of your lawn or garden. You can purchase a spreader at your local home and garden center.

*Caution: Before installing rain barrels or spreaders, contact your city about regulations concerning downspout connections.*



## Pet waste management



### Do you...pick up after your pets?

#### You should!

Animal excreta add both phosphorus and harmful bacteria to local waterways. According to recent research, non-human waste represents a significant source of bacterial contamination in urban watersheds. These bacteria can pose health risks to humans and other animals, and result in the spread of disease. Pet waste may also be a factor in eutrophication of lakes. The release of nutrients from the decay of pet waste promotes weed and algae growth, limiting light penetration and the growth of aquatic vegetation. This in turn can reduce oxygen levels in the water, affecting fish and other aquatic organisms.

#### Easy ways to pick up

- When going for dog walks, take plastic bags (recycled Plain Dealer bags work well). When your dog poops, turn a bag inside out over your hand and use it as a glove to pick up the waste. When you get home, flush the waste (not the bag!) down the toilet.
- Another disposal strategy is to dig a small trench where your pets tend to defecate and toss the feces in the trench, cover with a layer of leaves, grass clippings, and dirt.
- Train your cat to use a cat box even if it is an “outdoor” cat.

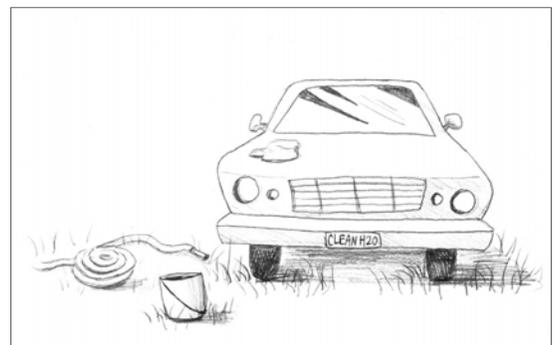
## Car washing

### Do you...wash your car? You shouldn't!

Well, it's okay to wash it once in a while. But when you wash your car in your driveway, the dirty water runs down the driveway into the street and eventually into a catch basin. Storm sewers deliver this water, quite efficiently, directly to the nearest stream or lake. The wash water from the car may contain many pollutants, such as oils and grease, which will be delivered to the stream as well. And, the soap may contain phosphates, which promote weed and algae growth, limiting light penetration and the growth of aquatic vegetation. This in turn can reduce oxygen levels in the water.

#### What should you do?

- Never use a catch basin to dispose of used water, cleaning solutions or anything else because catch basins take the water, **UNTREATED**, directly to Doan Brook.
- Wash your car on grass rather than on driveways or hard surfaces.
- Wash your car at a commercial facility that treats its water.
- Use non-phosphate soap. Phosphates are nutrients that can cause environmental problems if washed into streams or ponds.



# Naturescaping



## What is lawn conversion?

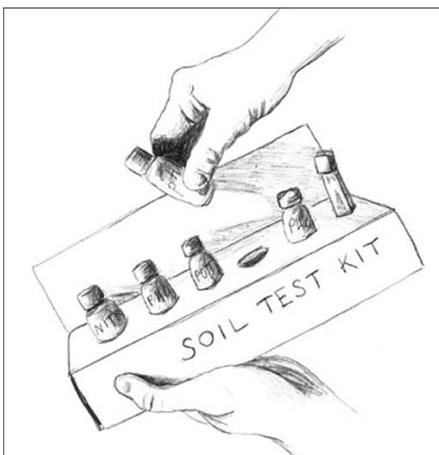
Many homeowners today are choosing to convert their lawns or a section of their lawns to a more natural state. This includes planting hardy native plant species of grasses, shrubs, wildflowers and/or trees, which require less maintenance than the conventional bright green lawn. This is a smart choice, given that the estimated 25 to 30 million acres of residential lawns across the county make for a lot of mowing!

## Why convert your lawn?

The use of native plants can be a very aesthetically pleasing landscaping choice, while preserving native species and biodiversity and creating habitat for wildlife. Native plants tend to be better adapted to local environmental conditions and therefore require less maintenance than typical lawns. In the long run, this can save you precious time, money, and energy, not to mention the added benefit to local water bodies of requiring little or no fertilizer or pesticides. Native plants may even be used to solve landscaping problems such as shady or wet areas.

## How do I convert my lawn?

Before converting a section of your lawn to more natural conditions, it is important to first assess the conditions of the site in order to choose plants that are well suited to those conditions. Keep in mind that soil in urban areas tends to be very infertile,



compacted, and not well suited for vegetative growth, so it may require some initial work before planting. Some other factors to consider are sun exposure, soil texture, pH, fertility, moisture conditions, pest problems, and history of use. If your soil is very acidic or compacted, soil amendments may be required. Since the type of plants needed will vary with lawn conditions, it may be useful to talk with a local extension agent or lawn and garden center about what species to plant and how to test your soil. In general, native prairie or meadow plants work well in sunny open areas or areas with poor drainage. Woodland plants are generally well suited for fertile, moist areas with high organic content. Provided below is a list of plants native to northeastern Ohio. Since soils in the Cleveland area tend to have high clay content, those plants with a tolerance for clay have been starred (\*).

### Grasses and sedges

- Andropogon gerardii (Big Bluestem)
- Bouteloua curtipendula (Side-oats grama-grass)
- Carex grayi (Gray's sedge)
- Carex muskingumensis (Palm sedge)
- Carex plantaginea (Wide leaf sedge)
- Elymus canadensis (Canada wild rye)\*
- Eragrostis spectabilis (Purple love grass)
- Juncus effusus (Soft rush)
- Milium effusum (Golden wood millet)
- Panicum virgatum (Switchgrass)
- Sorghastrum nutans (Indian grass)
- Spartina pectinata (Prairie cord-grass)

### Vines and groundcovers

- Campsis radicans (Trumpet creeper)
- Clematis virginiana (Virgin's bower)
- Gaultheria procumbens (Checkerberry or creeping wintergreen)
- Lonicera sempervirens (Trumpet honeysuckle)
- Parthenocissus quinquefolia (Virginia creeper)

### Herbaceous vines and creepers

- Adlumia fungosa (Climbing fumitory)
- Mitchella repens (Partridge-berry)
- Phlox stolonifera (Creeping phlox)
- Phlox subulata (Moss phlox)
- Potentilla simplex (Common cinquefoil)
- Waldsteinia fragarioides (Barren strawberry)

### Medium height plants

- Allium cernuum (Nodding pink onion)
- Asclepias incarnata (Swamp milkweed)
- Asclepias tuberosa (Butterfly weed)
- Aster azureus (Sky blue aster)
- Aster ericoides (White heath aster)
- Chelone glabra (Turtlehead)
- Heuchera americana (Alumroot)
- Lupinus perennis (Wild lupine)
- Rudbeckia hirta (Black-eyed Susan)
- Solidago nemoralis (Grey goldenrod)\*

### Tall plants

- Aster novae-angliae (New England aster)
- Cassia hebecarpa (Wild senna)\*
- Helianthus giganteus (Giant sunflower)
- Helianthus strumosus (Woodland sunflower)
- Helianthus tuberosus (Jerusalem artichoke)
- Silphium perfoliatum (Cup-plant)

### Conifers

- Juniperus communis (Common juniper)
- Juniperus virginiana (Eastern red cedar)
- Larix laricina (Eastern larch)
- Pinus strobus (White pine)
- Taxus canadensis (Canadian yew)

### Small trees/large shrubs

- Acer spicatum (Mountain maple)
- Amelanchier laevis (Allegheny serviceberry)
- Asimina triloba (Common pawpaw)
- Carpinus caroliniana (American hornbeam)
- Cornus alternifolia (Pagoda dogwood)
- Cornus florida (Flowering dogwood)
- Crataegus punctata (Thicket hawthorn)
- Hamamelis virginiana (Common witchhazel)
- Prunus virginiana (Common chokecherry)
- Salix discolor (Pussy willow)
- Sambucus canadensis (Common elder)

### Large trees

- Acer nigrum (Black maple)
- Acer rubrum (Red maple)
- Betula lutea (Yellow birch)
- Carya cordiformis (Bitternut hickory)
- Celtis occidentalis (Common hackberry)
- Fagus grandifolia (American beech)
- Fraxinus pennsylvanica (Red or green ash)
- Juglans nigra (Black walnut)
- Populus grandidentata (Bigtooth aspen)
- Quercus coccinea (Scarlet oak)
- Quercus macrocarpa (Bur oak)
- Quercus palustris (Pin oak)\*
- Quercus velutina (Black oak)\*

# Integrated pest management

## What is integrated pest management?

Integrated Pest Management (IPM) is a holistic approach to pest control that uses a combination of cultural, mechanical, biological, sanitary, and chemical controls. The goal of IPM is to manage pests to an acceptable level with as little impact to the environment as possible.

## Why should I use integrated pest management?

Because IPM uses chemical controls only as a last resort, and even then uses the least toxic forms of chemicals, there is minimal impact on water quality. IPM is a good alternative to simply applying pesticides, which contaminate stormwater runoff and directly impact the health of aquatic organisms. The greatest source of pesticides to urban streams is home applications of insecticides and herbicides in the lawn and garden. Pesticides in stormwater runoff can also affect human health by contaminating drinking water supplies.

## How does integrated pest management work?

The basic principle of IPM is the acceptance of a certain number of pests and a certain level of damage to your plants. Preventative measures such as mechanical, cultural, biological, and sanitary controls are used to keep pest levels below a certain critical level. Once the number of pests reaches a certain threshold, a rescue treatment may be needed which can include chemical controls. There are different thresholds for different pests, and these may also vary for different plants. Listed below are specific eco-friendly actions for controlling pests.

### Cultural controls

**Crop rotation:** Plant a crop in an area of the garden where it has not been planted for a least a year. This prevents build-up of diseases in the soil and discourages insect infestation.

**Selection of disease-resistant plants.**

**Trap crop:** A trap crop can be planted just outside your garden as a decoy to attract pests. This will help keep the pests away from your garden, and you can remove the insects from the trap crop if you like.

### Mechanical controls

**Row covers:** Allow for the penetration of sunlight, air, and moisture, but not insects.

**Collars:** Place paper plates, aluminum pans, and tin cans around the bases of individual plants to protect them from insects.

**Traps:** Vary depending on the type of pests it will be used for, but some use pheromones, and sticky substances to attract and trap pests. Do not place traps directly in your garden.

**Removal of pests by hand or a vacuum**

**Sprayers:** Spraying your plants with a hose will dislodge and kill many pests.

**Weeding, mulching and hoeing for weed removal.**

**Fences, netting and tree-trunk guards:** These methods can be used to limit damage from small mammals and birds.

**Diatomaceous earth:** Diatomaceous earth works as a natural repellent, or, as a homemade alternative, you can blend and strain one head of garlic, ten red chili peppers, and four cups of water and spray on infested plants.

### Sanitary controls

**Removal of overripe produce and diseased plants:** This prevents the diseases from spreading to healthy plants.

### Biological controls

**Insect control:** Use naturally occurring beneficial insects to control pests. Examples include using ladybugs to control aphids, and using the praying mantis for most types of pests.

**Plant flowers such as dill and angelica to attract beneficial insects.**

Chemical controls should be used only as a last resort, and then only in the least toxic forms. Less toxic chemical controls include soaps and horticultural oils, inorganic pesticides such as lime sulfur and copper, botanical pesticides, and microbial pesticides.

Because thresholds vary with the pest and type of plant, each individual garden may require a different IPM approach. Contact your local lawn and garden center or extension agent for more information.

