

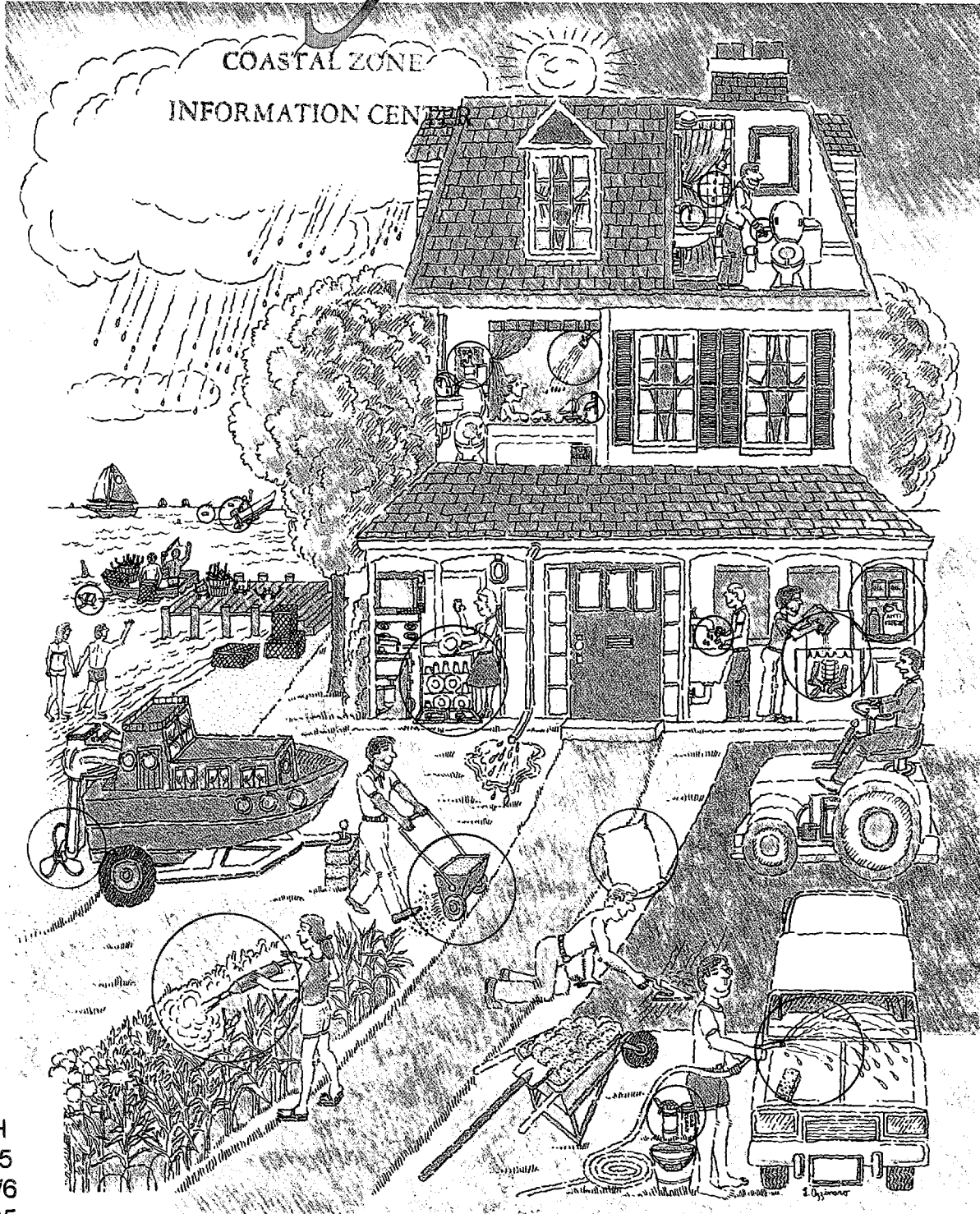
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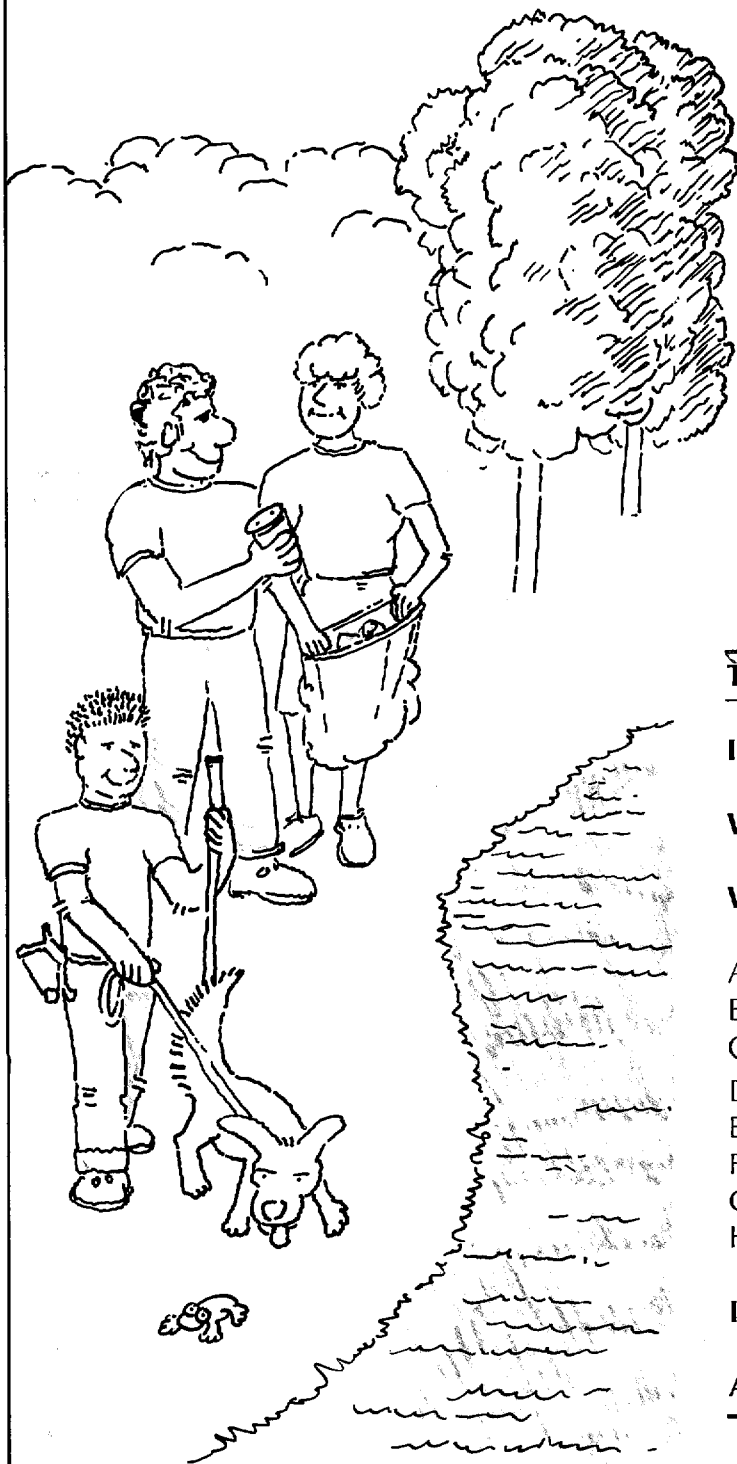
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A GUIDE TO REDUCING WATER POLLUTION AT HOME

Wisconsin Coastal Zone Management Program



The Baybook

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The Baybook

A Guide to Reducing Water Pollution in Your Home and Neighborhood

Wisconsin Department of Natural Resources
Lake Michigan District

1989

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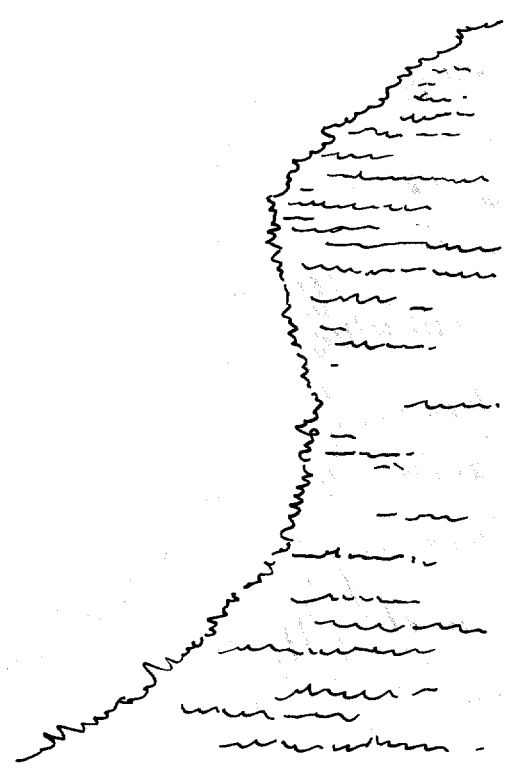
Financial assistance provided by the Wisconsin Coastal Management Program, State of Wisconsin, Division of Energy and Intergovernmental Relations, Department of Administration and the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resources Management, National Oceanic and Atmospheric Administration.

The Wisconsin Coastal Management Program was established in 1978 to direct comprehensive attention to the state's 820 miles of Lake Michigan and Lake Superior coastline. The WCMC analyzes and develops state policy on a wide range of Great Lakes issues, coordinates the governmental programs that affect the coast, and provides

grants to stimulate better state and local coastal management. Its overall goal is to preserve, protect and develop the resources of Wisconsin's coastal areas for this and succeeding generations.

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Introduction

The History of the Lower Fox River and Green Bay Recovery

The Lower Fox River and lower Green Bay are changing, and the changes are for the better. But much remains to be done, and there is plenty that you can do.

From the time of the earliest trappers and explorers until about the turn of the century, the Fox and lower bay were abundant in clean water, wetlands, fish and wildlife. Unfortunately, as the population and industries grew, the quality of the water and the quantity of the natural resources declined.

By the 1950's, the Fox River had lost most of its desirable resources. It had become little more than an open sewer for wastes and an obstacle to road traffic. Fish kills were routine, commercial and sport fisheries were gone, waterfowl populations declined and there was no recreational use. Lower Green Bay was not much better.

As the quality of the waters declined, people turned their backs to the shoreline. Shorefront property wasn't desirable, it was to be avoided.

The river was hidden; buildings faced away from it and parks and housing were developed elsewhere.

But in the early 1970's, an era of repair and damage control began. Effective water quality laws were written and enforced, and the dividends to the Fox and lower bay are now obvious. Fish are returning and so are fishermen. Some endangered bird populations are beginning to increase. Recreational boating demand outstrips the supply for boat launches and mooring slips, and property values and development are increasing along the shorelines. In many ways, people are turning back to these waters to use and enjoy.

The rehabilitation is far from complete, however. Toxic chemicals have been linked to reproductive problems in fish and birds. Public health advisories warn against eating certain river and bay fish. The waters are murky from excess algae and sediments - too murky to be considered safe for swimming.

One of the latest stages of repair is the Lower Fox River and Green Bay Remedial Action Plan, a long-range strategy for restoring beneficial uses to the river and bay. Some of the plan's goals include elimination of toxic effects on fish, wildlife and human health; clearer water; safe swimming; and sustainable and edible fish and wildlife populations. These goals require concerted action by government and industry, but there is much for the individual citizen to do as well.

An important lesson we have learned since the 1970's is that serious pollution can come from many small sources, not just from industry and municipal sewage treatment plants. Pollution from diffuse sources - called "nonpoint source pollution" because it isn't released from a specific point such as a discharge pipe - also has a serious impact on water quality. Nonpoint sources of pollution include both rural and urban properties.

Try to think of your home and property as a mini-ecosystem full of potential sources of pollution.

How many chemicals and other wastes are you releasing into the environment? Where are they going?

For example, pet wastes, fertilizers, herbicides and other substances from your property can be carried by rainwater into local streams through storm sewers. Toxic or hazardous household chemicals can find their way into our water supplies. Faulty septic systems can contaminate surface and groundwater, and rain can wash airborne chemicals into our waters.

The first section of the Baybook is designed to give you a feeling for nonpoint sources of pollution and how they affect the river and bay. Later sections will explain what you can do to prevent nonpoint source and other kinds of pollution. Although these sections may refer to the Lower Fox River and lower Green Bay, the guidelines can be used to protect lakes and streams throughout Wisconsin.

WHAT'S THE PROBLEM?

Nonpoint source pollution comes from many sources that are spread out over entire watersheds. Every chemical or waste product that can be carried by runoff into storm sewers or streams becomes nonpoint source pollution. Common examples are fertilizers, herbicides, insecticides, spilled motor oil, fuels, and animal waste from pets, wildlife and farm animals. In addition, soil particles are nonpoint source pollutants that can carry chemicals and nutrients adsorbed to the particles and become deposited as sediments on the river and bay bottom.

To visualize nonpoint source pollution, think of how snow looks along roadsides a week

or so after a snowfall. The dirt, grime, oil and grease blackening the soil are nonpoint source pollutants. As the snow melts, these pollutants are carried by the melt water to the river and bay.

Other sources of nonpoint source pollution include:

- Failing septic systems
- Erosion and runoff from construction sites and croplands
- Landscaping pesticides and fertilizers
- Streambank and shoreline erosion
- Cleansers, paint, and antifouling compounds used on boats
- Hazardous waste improperly

stored or discarded

- Acid rain from auto exhaust and other air emissions
- Runoff from roadways and road salting activities
- Improperly disposed waste oil
- Runoff from coal, salt and other stockpiles
- Barnyards and streambank pastures
- Leaking sewers
- Leakage and runoff from landfills
- Rooftop drains

To understand their environmental impacts, we can categorize these nonpoint pollutants and look specifically at how they affect us:

Nutrients: All plants require nutrients to grow and reproduce. Two important nutrients are nitrogen and phosphorus. When an oversupply of nutrients, particularly phosphorus, exists in natural waters, heavy algae blooms and aquatic weeds can become a nuisance. Green Bay suffers from an abundance of phosphorus and algae. Algae cloud the water and block sunlight from supporting rooted aquatic plants that are valuable for fish habitat and waterfowl food. When algae die and decay, they can cause low dissolved oxygen levels that threaten fish. Algae also impairs swimming and other recreational activities. The primary nonpoint sources of phosphorus are fertilizers, animal waste, soil erosion and failing septic systems.

Sediments: Sediments are soil particles carried into waterways. Sediments can accumulate and fill stream channels, lake basins and harbors, contributing to flooding and the need for navigational dredging. Soil particles also carry chemical pollutants and nutrients with them into the water. Finally, suspended soil particles in the water reduce the light needed for submerged plants, cover fish spawning grounds, clog the gills of fish and have other negative effects on aquatic life. Sediments result from soil erosion sites like croplands, streambank pastures, roadsides, construction sites and exposed shorelines.

Toxics: Toxics are chemical substances that can cause cancer or other harmful health effects in people and animals. Their impact on health may be *acute*, occurring quickly after exposure, or *chronic*, occurring over a long period of time. Toxics include metals such as lead, mercury, and cadmium, pesticides like dieldrin, and organic chemicals

such as PCBs and dioxins. Pesticides are substances used to destroy unwanted vegetation (herbicides), insects (insecticides), or animals.

Some of these compounds may be discharged in municipal and industrial wastewater, but toxic chemicals also may be present in a number of household and lawn and garden products such as cleansers, solvents, paints, petroleum products and pesticides. The presence of toxics in Fox River and Green Bay fish has resulted in health advisories being issued for eating certain kinds and sizes of these fish. Toxics are also suspected of causing birth defects, cancers and reproductive problems in Green Bay fish and wildlife.

Pathogens: Disease-causing bacteria and viruses, or pathogens, may be present in human or animal feces. The potential presence of pathogens is typically indicated by numbers of fecal coliform, a type of bacteria found in human and animal feces. In Green Bay, the

presence of coliform bacteria and murky, unsafe water prevents the reopening of Bay Beach to swimming.

Oxygen demand: Dissolved oxygen is a natural and necessary component of water. It is needed by all aquatic plants and animal life, including helpful bacteria that cleanse polluted streams by breaking down organic pollutants. The more polluted a stream, however, the more the bacteria compete with fish and other aquatic life for the limited oxygen dissolved in the water. Thus, high levels of organic pollution lead to low levels of oxygen, and may cause serious problems such as fish kills.

Physical habitat alteration: Activities such as construction, dredging, channelizing and filling of streams and wetlands can have serious impacts on wildlife, fish, and other aquatic life. These physical disturbances can resuspend sediments, nutrients and toxics as well as destroy aquatic habitat.

Nonpoint source pollution also affects people through:

- Increased costs of drinking water and wastewater treatment
- Loss of navigation, fishing, hunting, swimming, and other water recreation
- Increased flooding and other sediment damages
- Increased navigational dredging and associated costs
- Health effects from exposure to contaminants or pathogens

We must confront the problem of nonpoint source pollution squarely if we are to have a cleaner river and bay. Solving the nonpoint source problem will require the responsible and active participation of all of us. If you are interested in helping out, read on!

WHAT NEEDS TO BE DONE?

A. Protecting river banks and bay shorelines

The Fox River Valley, like all of Wisconsin, is blessed with an abundant network of streams, rivers, and lakes - many of which lead to the bay. They add greatly to the beauty of the environment and provide recreation, drinking water, fish and wildlife habitat, and a resource for manufacturing and other industries.

If you live on the river or near a stream (most of the following applies to lakes and the bay as well), ask yourself the following:

- Can you see rainwater or snowmelt running off from lawns, fields, farming operations, highways or parking lots into the waterway?
- Do livestock graze along the banks or enter the water?

- Are the banks bare or lacking enough vegetation to prevent erosion? Are there signs of erosion such as slumping in of the streambank?
- Is there a build-up of silt?
- Are the channels of the stream becoming wider and shallower?

If you can answer yes to one or more of these questions, your stream - and ultimately the bay - is in danger. Sediment from eroding streambanks can smother aquatic life, ruin spawning beds, clog fish gills and cut off needed light to underwater plants that produce oxygen.

Stream bank erosion typically occurs in areas where roads, parking lots, rooftops, compacted soil and other impenetrable surfaces prevent rain from filtering down into the soil. Instead, more rain runs

directly into the waterway, increasing the volume of water and sediment in the stream and causing the banks to erode.

You and your neighbors can minimize bank erosion by taking a few simple steps (see "What You Can Do"). Also, make sure your waterway is surrounded by plenty of trees or other vegetation. Vegetation is very important to both the stability of the banks and the health of the lake or stream itself. Roots hold the soil in place and vegetation filters and traps nutrients and sediments. Trees provide shade that helps lower stream temperature and thereby provide a suitable environment for fish.

Before you attempt to do any planting on the banks of your creek or along the lake or bay, call your local Department of Natural Resources (DNR), county Land Conservation Department (LCD), or County Extension

Agent to see what types of plants will do well in your area.

Sometimes bank erosion has progressed too far for simple measures, and structural restoration is necessary. Streambank restoration requires the assistance of a trained professional. Free advice on structural solutions is available from the county LCD and the DNR, and cost-sharing is available in some counties from the Agricultural Stabilization and Conservation Service (ASCS). A state permit from the DNR is required for any physical alteration of streams and other water bodies, including bank restoration. Contact the DNR for further information if you are considering this option.

What you can do

Here are a few of the many things you and your neighbors can do to minimize streambank and shoreline erosion in your community. To determine whether or not you need a permit, contact the Department of Natural Resources Area Office in Marinette (715-735-0101), Green Bay (414-497-4020) or Oshkosh (414-424-3050).

- Remove trash from your creek, marsh, or stream. You may not remove bottom materials such as soil, stones, or sand without a permit.
- Keep people, buildings, cars and grazing animals away from the edge of the water.
- Build steps or a ramp between the top and bottom of the bank if you need access to the water. Any construction in the water or on the bed may require a permit.
- Avoid placing heavy objects on the top of stream banks or shoreline.
- Plant and protect vegetation on the slopes of the stream banks and on the areas adjacent to the slopes.
- Consult a trained engineer or technician from the DNR or LCD about structural solutions for controlling erosion.
- Observe no-wake speed limits when boating.
- Encourage adoption of county and municipal stormwater management ordinances.
- Enroll, or encourage others to enroll, in cropland adjacent to streams in filter strip programs.
- Help farmers install cost-shared fencing or cattle crossings.



Eroding streambanks are common in suburban areas. Streams in this condition often support few living creatures.

A Word About Wetlands

Wetlands are very important! They provide a home for many species of birds and other wildlife, and a spawning ground for fish. Wetlands help reduce flood damage and erosion, recharge groundwater, and act as filters to trap sediments and nutrients running off the land. As a nation we have lost over one-half of the wetlands that were here before European settlers arrived. In the Lower Fox River and lower bay area, only 10

percent of the original wetlands remain.

People are beginning to realize that protecting wetlands is vital for the environment. Federal, state and county regulations exist to preserve and protect what is left of our wetlands.

How can you tell if there is a wetland area on your property? A wetland, under normal rainfall conditions, has enough water or moist soil to allow water-dependent plants, such as cattails, mosses (especially

sphagnum), wild irises and sedge grass to grow. If you are planning to purchase or build on property that you suspect contains a wetland, contact your county zoning administrator or DNR Water Regulations and Zoning Specialist for advice. You may also have to contact the U. S. Army Corps of Engineers or the U. S. Fish and Wildlife Service if you are told that the wetland falls under their jurisdiction.



Vegetation can be planted to stabilize streambanks and eroding shorelines. You can get advice on which plants are appropriate from the agencies listed in the Additional Resources section of this guide.

There are things you can do to protect and enhance your wetland.

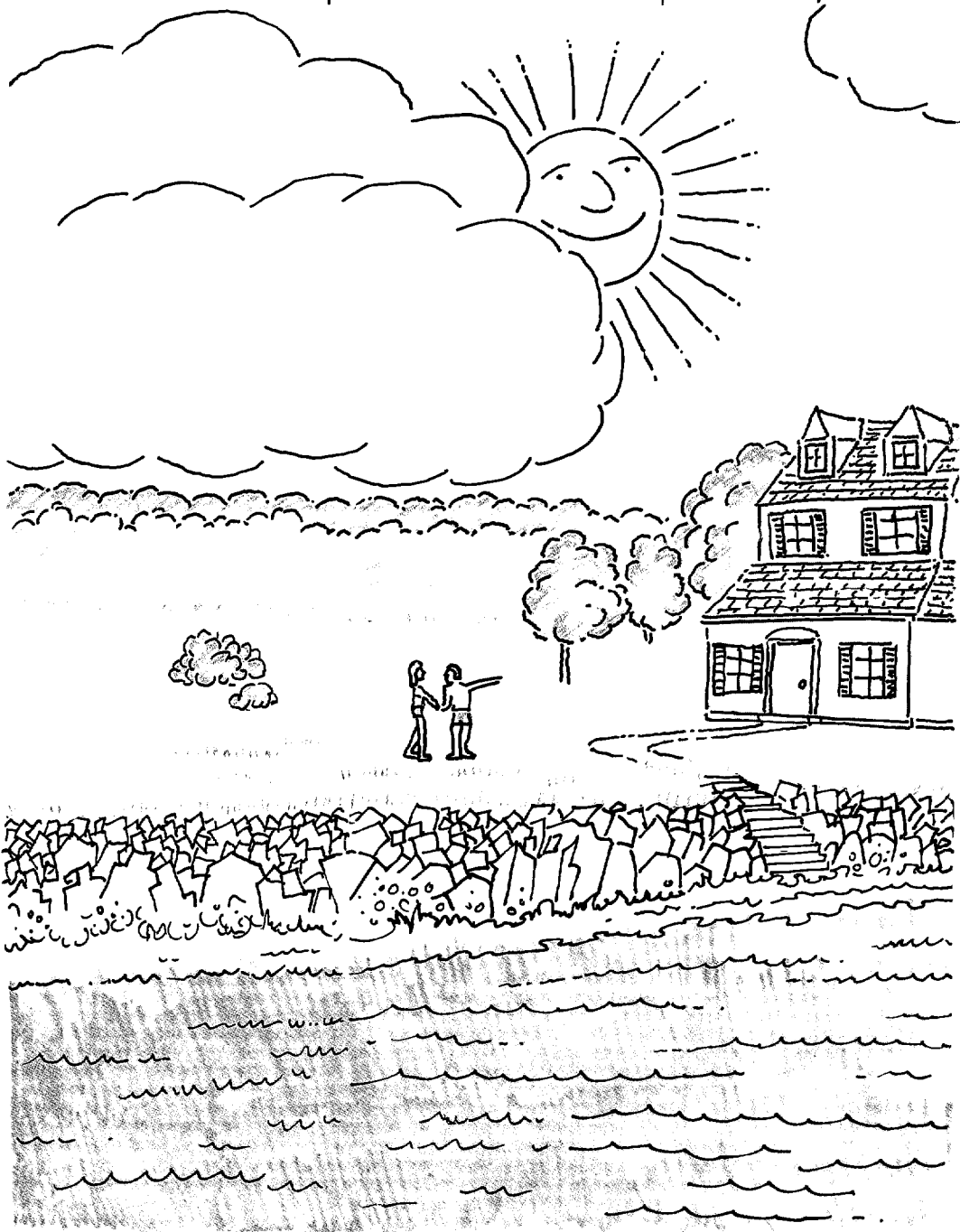
- Consider leaving a buffer of grassland between crop fields and wetland areas. This will filter soil eroding from your fields while providing nest cover for wildlife. Such "filter strips" are often eligible for enrollment in land owner compensation programs.
- Protect wetlands in drainageways adjacent to lakes or streams from grazing. This will greatly enhance their ability to purify runoff.
- Evaluate man-made drainage on your property. Many former wetlands can be restored on land no longer used for agriculture by disconnecting drainage systems. Be sure to consult Soil Conservation Service personnel in your county, to make sure you don't cause problems for neighboring landowners.
- Contact local DNR personnel about managing wetland vegetation. Proper management will maintain plant diversity, improve wildlife habitat and prevent non-native species such as purple loosestrife (a colorful plant with devastating effects) from taking over your wetland.

B. MANAGING STORMWATER

A major and perhaps the largest cause of nonpoint source pollution in both urban and rural areas is stormwater runoff not absorbed by soil and vegetation. Rainwater will carry chemicals, nutrients, sediments and other forms of nonpoint source pollution into streams, either directly or through storm sewers. Therefore, the major goal of stormwater management is to increase absorption of rainwater by soil and vegetation, usually by

reducing the speed of flow or by retaining the water in catch basins. This will reduce the pollutants carried into storm sewers and streams and also reduce flooding. Increasing soil absorption has the added benefit of maintaining groundwater supplies.

The U.S. Environmental Protection Agency is developing stormwater regulations to control pollutants from urban and industrial areas. Large cities will be addressed first, but eventually smaller cities will also be included.



Correcting shoreline erosion sometimes requires structural solutions, such as constructing stone revetments (ripraps). On steep banks, build steps to give you access to the beach.

Protecting Stormwater Collection Systems

Stormwater collection systems consist of catch basins, road gutters or ditches, storm drains and storm sewers. Storm sewers typically carry rainwater to an outlet on a stream, river or lake.

In the first rush of water from a rainstorm, much of the debris and other polluting substances on paved surfaces or in the stormwater collection system will be carried into the waterway. This can significantly add to water quality problems. It is therefore important to protect all components of the stormwater collection system from pollutants. The following should never be dumped down storm drains, road gutters or catch basins: motor oil, pet waste, grass trimmings, leaves, debris or hazardous chemicals of any kind. *Anything dumped in our stormwater collection systems or placed on a paved surface will be carried untreated into our waterways.*

Controlling Rainwater Flow

Nonpoint source pollution from your property can be reduced by decreasing runoff and increasing infiltration. There are inexpensive ways to control excess runoff created by patios, driveways, sidewalks and rooftops. Whatever the soil drainage condition in your neighborhood, landscaping and careful grading of your property's surface area can be used to increase infiltration, reduce the speed of runoff, and increase the time over which runoff is

Rainwater runs downhill, some of it filtering through the soil, and some running directly into nearby streams. By encouraging rainwater to move slowly across the soil so most of it soaks into the ground, you will help prevent erosion problems.

released. For example, land immediately adjacent to your house needs to have a downhill slope so that water does not seep through the foundation. Direct roof downspouts and drainage away from the house and paved surfaces. Once the water has been carried ten feet away from the house, the surface should be graded so that runoff soaks into the ground or is released gradually.

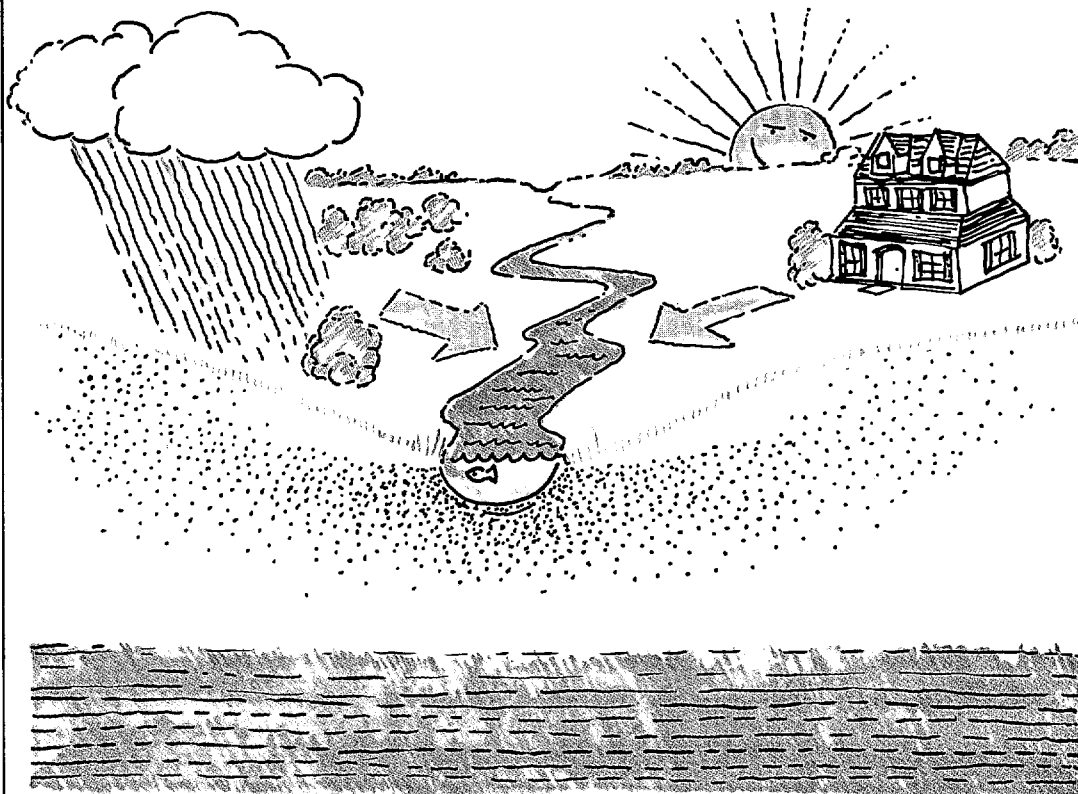
If you are building a new home or are in a position to consider regrading your property, you may want to create a depression that will hold all runoff and allow it to infiltrate into the soil. This should only be done where drainage is good or an infiltration device such as a gravel-filled seepage pit, Dutch

drain or gravel-lined detention basin is in use. You can also spread runoff over the land surface by using a series of terraces or runoff spreaders that promote greater infiltration by slowly spreading runoff in a fan-shaped pattern across a vegetated land surface.

The installation of various infiltration devices can enhance absorption even on sites with well-drained soils. It is important to remember that surface runoff cannot infiltrate soils that are at or past their saturation point or that contain a high percentage of clay. Seepage pits, gravel-lined recharge basins and terraces lose their effectiveness as infiltration devices when the land surface is

clogged with clay, silt or fine soil particles. Sediment traps, basins or grassed sediment filters can be installed to remove fine particles from runoff before they reach the infiltration device.

Alternatively, you may be able to create a gently rolling surface or a system of berms and swales to slow runoff. Berms and swales are slight elevations and depressions in the surface that provide channels along which water will flow. If you have a wet area, you may be able to move it to a less used area of the yard (around shrubs or trees, for example) by installing a swale to carry the water across the yard. Plant the new wet area with the kinds of trees and shrubs that thrive in wet soils.



What You Can Do

There are many ways you can improve absorption of rainwater by soil in your yard.

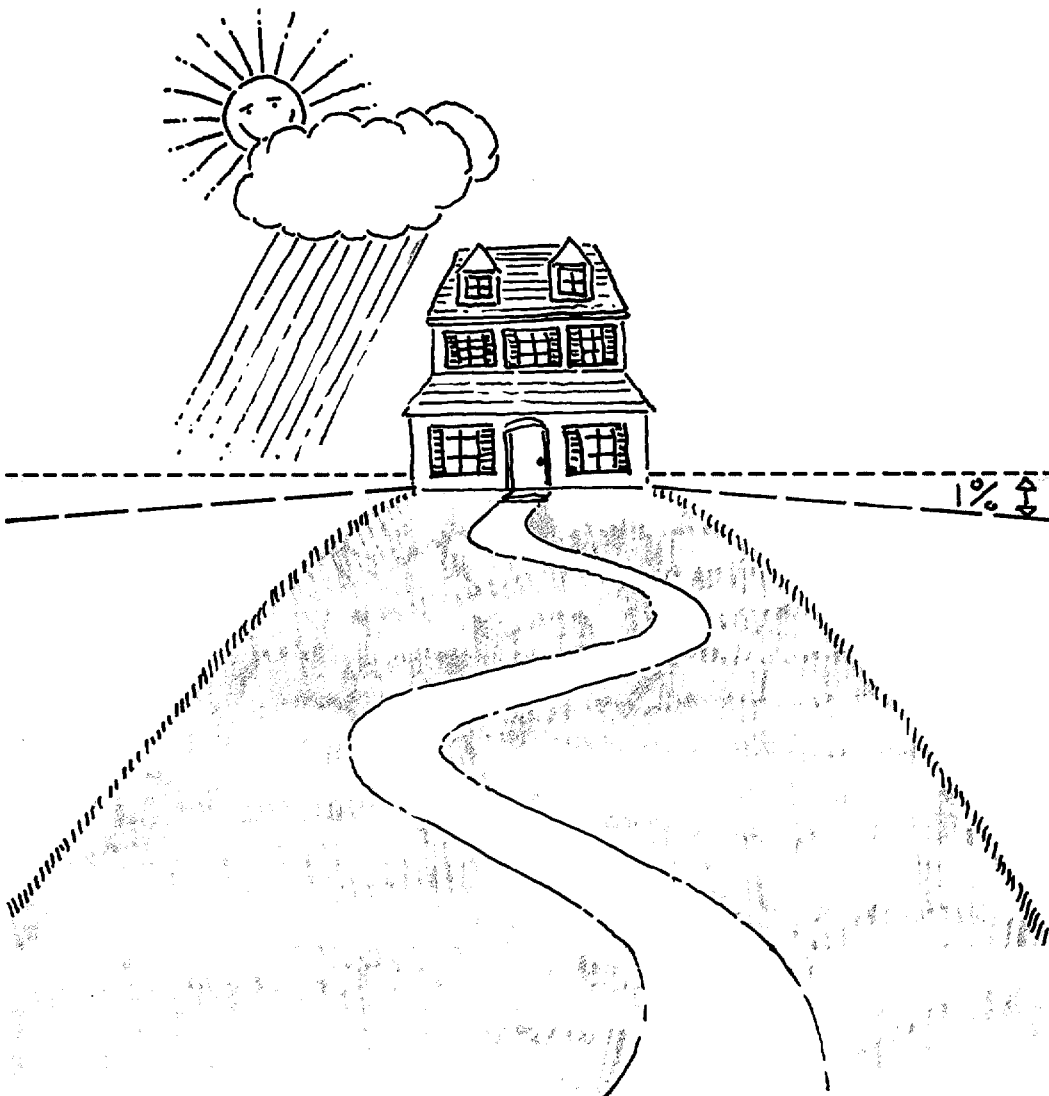
- Install gravel trenches along driveways or patios to collect water and allow it to filter into the soil.
- Direct roof drains and gutters away from paved surfaces and toward infiltration areas, or collect rainwater and use it to water your plants.
- Maintain a healthy lawn.
- Resod bare patches in your lawn as soon as possible to avoid erosion.
- Grade all areas away from your house at a slope of 1%.
- Use a grass swale (a low area in the lawn) to move water from one area to another.
- Plant shrubs and trees to promote infiltration (see chapter on landscaping).

Managing Animal Waste

Wastes from pets, wildlife and farm animals are a significant source of water pollution in some areas. A number of diseases, including tuberculosis and salmonellosis, can be transmitted to humans by bacteria in animal feces.

In some areas, "pooper-scooper" laws have been passed requiring that owners remove their pets' feces from paved surfaces and dispose of it in the toilet. This prevents the waste from being carried by storm water into streams and lakes.

If you have a pet, do not allow it to defecate on paved surfaces where feces can quickly be washed into sewers or waterways. Use your yard, or undeveloped areas to walk pets, avoiding natural or man-made waterways. Pick up and dispose of your pet's waste. You can use paper bags for this purpose.



Your house may not sit on top of a hill, but to avoid drainage problems, make sure the ground is graded away from the house at a slope of one percent or more on all sides.

Landscaping Strategies

Planting trees is one way you can protect your land and streams. We all appreciate trees for their beauty, but few of us realize that trees help minimize erosion by reducing runoff while enhancing the appearance and value of your property.

Plants and trees can create "outdoor rooms" in which your family can work and play. Well-planned landscaping can reduce heating and cooling costs for your house by as much as 30%. New shrubs and trees may attract birds and wildlife that eat harmful insects and other pests. Trees, shrubs and ground cover also require no herbicides and less maintenance than grass. Because trees and shrubs also require less fertilizer than grass, the chances of polluting the river and bay are lessened.

All plants require nutrients and sunlight to flourish. The most common mistake people make when landscaping their yards is to buy plants that need more or less moisture than the soil provides. Also, plants with high nutrient requirements will grow in poor soils only if you apply fertilizer. Plants susceptible to insect and disease problems will flourish only when these pests are controlled by some biological, chemical or mechanical means. By choosing plants appropriate to your soils, moisture condition and climate, you help reduce these potential problems. Ask a competent, professional nursery to help you select plants, trees and shrubs appropriate for your yard and soil type.

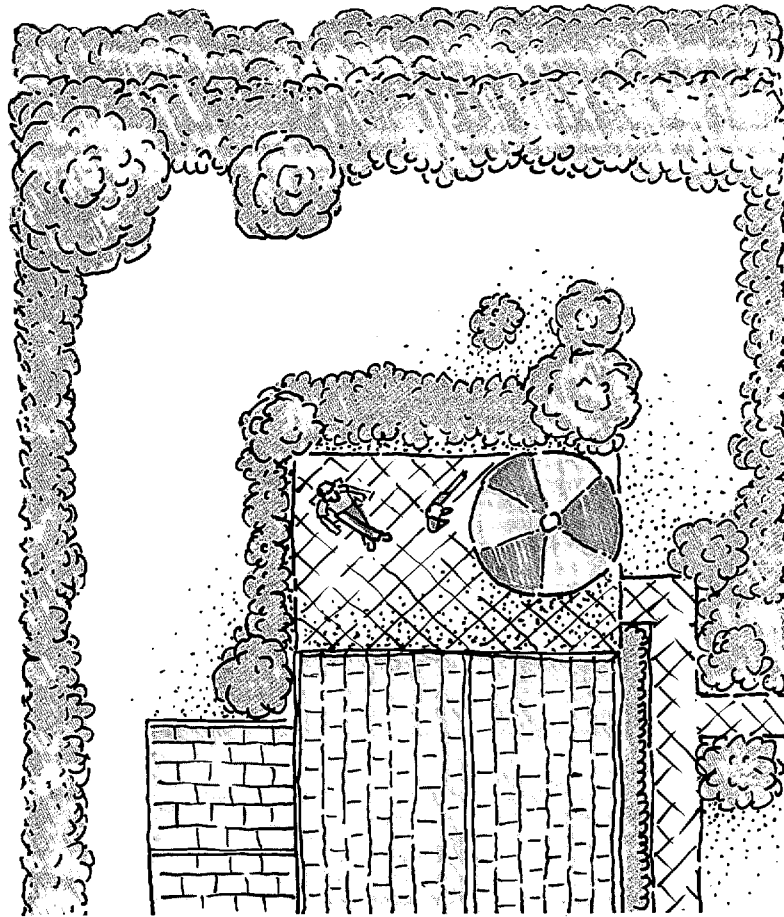
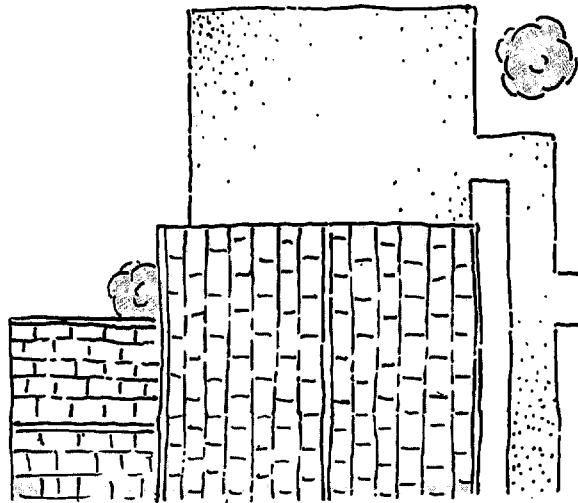
After—Landscaping your yard reduces the erosive force of rainwater runoff and increases the value of your home. By planting trees, shrubs and ground cover, you encourage excess rainwater to filter slowly into the soil instead of flowing directly into storm drains or nearby streams. Choosing trees and plants that are appropriate for your soil and growing conditions will ensure that you'll have a beautiful yard.

Before—Unlandscaped property causes more rainwater runoff, increases soil and channel erosion and delivers unnecessary sediment to local streams and lakes.

What You Can Do

By following a few simple guidelines, you can make your home more attractive and help prevent erosion:

- Maintain a healthy lawn.
- Landscape your yard to minimize rainwater runoff.
- Preserve the established trees in your neighborhood, which help minimize the damage caused by surface runoff.
- Choose appropriate plants, shrubs and trees for the soil in your yard; don't select plants that need lots of watering, which increases surface runoff.
- Consult a nursery for advice on which plants, shrubs and trees will grow well in your yard.



Permeable Pavement

A pavement that allows water to soak in may seem impossible, but there are many materials that provide the durability of concrete while allowing rainwater to filter into the ground. If you are planning a new patio, walkway or driveway, consider these attractive alternatives to concrete.

Wood decks, usually installed for their functional good looks, can serve as a form

of porous pavement. Redwood and treated southern pine are as durable as most other paving surfaces. Decking allows rainwater to soak into the ground beneath it. As long as some air space is maintained between the soil surface and the decking, wood rot can be minimized.

If you are installing a new patio or rebuilding a crumbling sidewalk, you don't need to use the typical slab concrete. Bricks, interlocking pavers, or flat stones can be used to construct an

attractive, durable surface. If placed on well-drained soil or on a sand or gravel bed, these modular pavers allow rainwater infiltration. Between the pavers, plants such as creeping lemon thyme can be grown to crowd out weeds and add beauty to the paved area.

Pre-cast concrete lattice pavers also rest on a bed of sand and gravel and allow rain to soak slowly into the ground. These kinds of paving materials can be used wherever natural

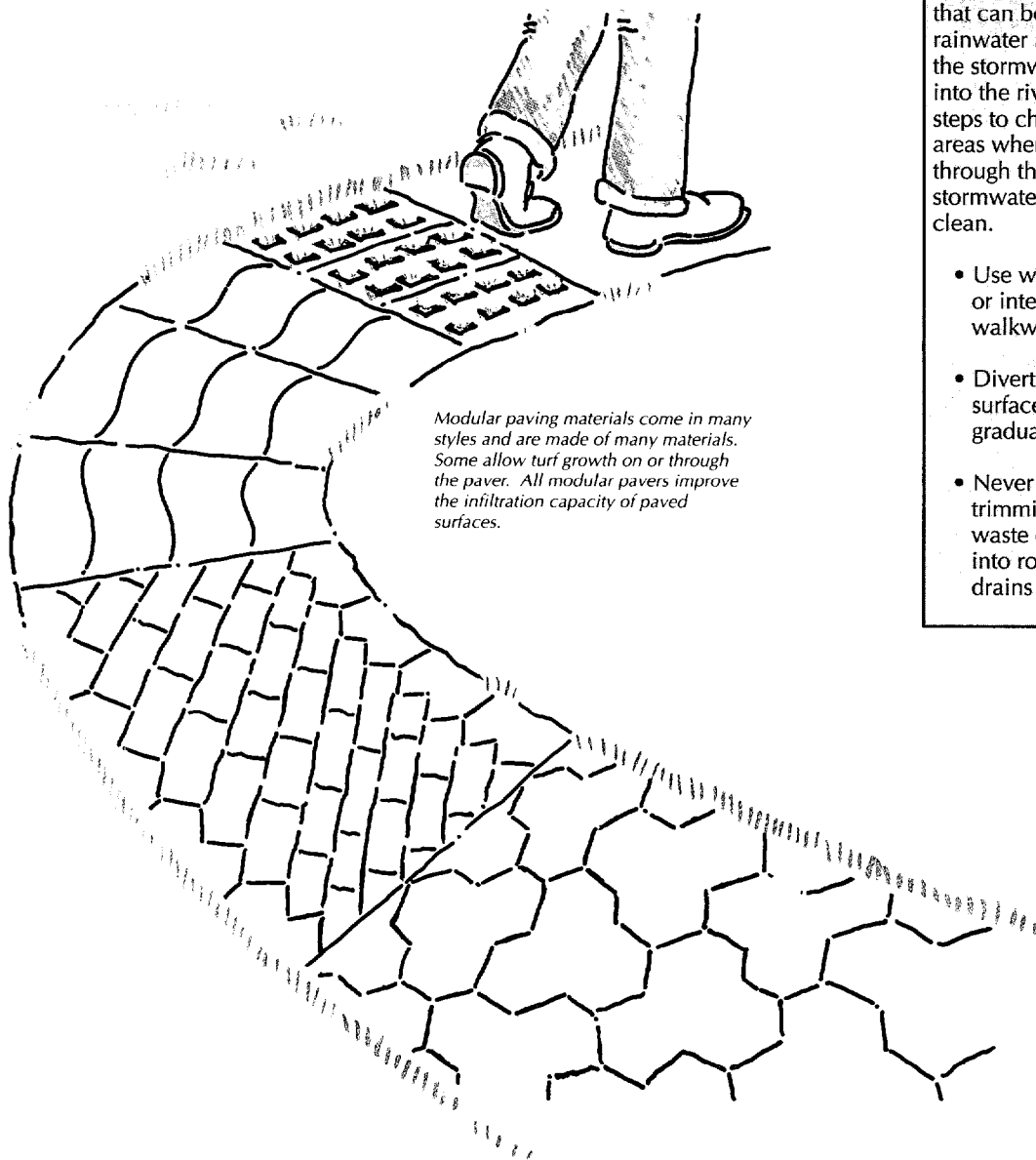
soil drainage is good and where there are no problems with bedrock near the surface. Lattice pavers won't work on clay or other soils that are already saturated with water.

If you live in an urban area and your paving project involves a sidewalk or driveway apron located on the street right-of-way, you may be required to use an impermeable material such as concrete. Check with your local public works department for more information.

What You Can Do

Think about the ultimate destination of rainwater around your home and neighborhood. Consider the kinds of pollution that can be picked up by rainwater and carried through the stormwater collection system into the river and bay. Take steps to channel that runoff into areas where it can filter slowly through the soil, and keep your stormwater collection system clean.

- Use wood decking, bricks or interlocking stones for walkways and patios.
- Divert rain from paved surfaces onto grass to permit gradual absorption.
- Never dump motor oil, grass trimmings, leaves, animal waste or other pollutants into road gutters, storm drains or catch basins.



Modular paving materials come in many styles and are made of many materials. Some allow turf growth on or through the paver. All modular pavers improve the infiltration capacity of paved surfaces.

C. Managing Lawns and Gardens

Fertilizers and pesticides used on lawns, gardens and farms cause most nonpoint source pollution. Agriculture is a major source of these chemicals, and several federal and state programs have been implemented to encourage farmers to use what are called "best management practices" to prevent nutrient and pesticide runoff and soil erosion. Here are similar practices that you can apply around your own home.

Lawns

Most people want a dense, healthy lawn. A healthy lawn not only makes your home more valuable, but it also has important environmental benefits. Coupled with trees, shrubs, and ground cover, your lawn can help prevent erosion, moderate summer heat and act as a filter for rainwater from roofs, downspouts and driveways.

Fertilizing the Lawn:

The nutrients in fertilizers contribute significantly to water pollution problems. That's why it's important to apply fertilizer at the proper time and rate so that you use no more than is necessary. Avoid getting fertilizer on sidewalks and driveways, where it can easily be washed into storm drains.

To help ensure you'll have a healthy lawn, test your soil before seeding or applying fertilizers. Call your County Extension Service for assistance. Soil tests are inexpensive and will show how much lime, phosphorus and potash your lawn needs.

The numbers on a bag of fertilizer refer to the percentages of plant nutrients-nitrogen, phosphorus and potash-in the fertilizer. In a 100-pound bag of a 5-10-10 mixture, for instance, there would be 5% (5 pounds) nitrogen, 10% (10 pounds) phosphorus and 10% (10 pounds) potassium.

The wrong amount of

fertilizer applied at the wrong time can cause disease and weed problems, poor root growth, or excessive top growth. For best results, apply fertilizer in late fall when average daily air temperatures drop to 50°F or less for 3-5 days in succession. Follow up with a spring application in early June. Incorrect fertilization can reduce your lawn's ability to withstand extremes of temperature and moisture, and contribute to water pollution.

Lawn Pests:

Most homeowners consider both weeds and insects to be harmful to the lawn, but 90% of the insects in your lawn are not harmful. Furthermore, even healthy lawns will have some weeds, which should not be a problem unless the turf becomes weakened and thin. One square foot of soil contains up to 5,000 weed seeds. Maintaining a healthy lawn is the best way to prevent weeds from growing, not the use of herbicides.

Study your lawn before applying any herbicides or insecticides. If you suspect a problem, ask your County Extension Agent for help. The preferred means to a healthy lawn include using sound maintenance techniques, especially mowing and fertilization.

Lawns can withstand a tremendous amount of insect activity. Occasionally, insect activity may reach a level at which the use of an insecticide is considered. Careful spot application of insecticides may be necessary when high populations are discovered, if other control methods are not effective. Do not use insecticides to "prevent" problems or spray the lawn for one or two insects.

New Lawns:

If you are creating a new lawn, there are several factors to consider when deciding whether to use seed or sod. Seeding is initially less expensive but takes longer and may require weed

control measures. Seed mixtures should be selected according to growing conditions. A mixture of 70 percent Kentucky bluegrass, 20 percent fescue, and 10 percent perennial ryegrass is a well-rounded combination. In sunny areas, seed at a rate of 1.5 pounds per 1,000 square feet, and at 2.5 pounds per 1,000 square feet in shady areas. Sodding provides immediate erosion control, and a sodded area can be used at least a month sooner than a seeded area. For more information on the types of grasses recommended for your area, talk to your County Extension Agent.



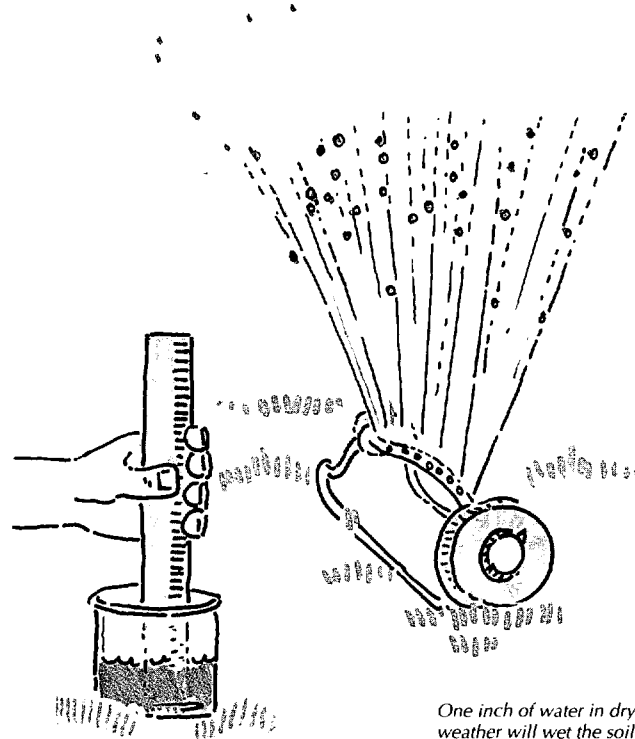
Applying the proper amount of fertilizer at the proper time will help to create a healthy lawn. A soil test will tell when and if you need fertilizer.

Watering and Mowing:

Overwatering and mowing too closely are the most common mistakes we make with our lawns. Once a lawn is established, water it only during very dry periods, giving it only as much water as the soil can absorb. Moisten the soil to a depth of six inches, which usually means using about an inch of water. Frequent shallow waterings on established turf will cause shallow rooting, invite crabgrass invasion and encourage disease. Water early in the day so that your lawn will dry before sundown; this will also reduce the likelihood of disease. Do not water during midday - it wastes water.

Mowing is crucial to the health of your lawn. According to turf specialists, mowing height is probably the single most important factor in the formation of healthy turf. Bluegrass or fescue should be from two to four inches in height and cut frequently enough that no more than a third of the leaf area is removed. Continuous mowing below one and a half inches tends to weaken turf.

Leave grass clippings on your lawn. It's good for your lawn and saves landfill space, not to mention extra work. Grass clippings decompose rapidly and return nitrogen to the soil, cutting down fertilizer costs. Use a sharp mower blade, or a mulching mower if you have one, for finer clippings that decompose quickly. Grass clippings do not add to "thatch".



One inch of water in dry weather will wet the soil to a depth of four to six inches.

In fact, thatch problems are rare in Wisconsin. But if you choose to collect your clippings occasionally, use them as mulch in your flower or vegetable garden. If you can't use grass clippings in your own yard, find a neighbor who can. Some communities have a composting program that will recycle your grass clippings.

A Word About Lawn Services:

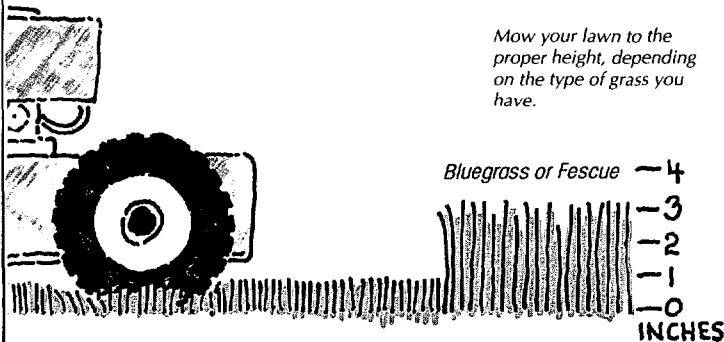
Lawn services are an increasingly popular alternative for lawn maintenance. Many of the lawn companies follow programs that have been prescribed by turfgrass specialists and use products that you can buy and apply yourself. Misuse of these chemicals can pose health risks to people, pets and wildlife around your home. Herbicide misuse can cause damage to susceptible plants.

Be sure the company you choose does a soil test before applying any fertilizer. Before signing a lawn care contract, make sure the company is reputable, tailors its chemical use to specific lawn needs, notifies you about the pesticides they are using, gives you a copy of the label, has adequately trained personnel, and has insurance. Only allow use of pesticides when the company can show there is a pest problem that exceeds the lawn's ability to out-compete the pest.

What You Can Do

Lawns benefit the environment and add to the value and beauty of your home. Keep these things in mind when planning and maintaining your yard:

- First, maintain proper soil pH; pH is a measure of acidity (lower than 7) and alkalinity (greater than 7). Neutral pH is 7. (Generally soil pH should be 6.0 to 6.5.)
- Plant the right grass for your locale.
- Test your soil every three or four years.
- Use the right fertilizer at the right time.
- Don't overwater your lawn.
- Mow to the proper height-this is critical to the health of your lawn.
- Consider using ground cover plants as well as grass.



Mow your lawn to the proper height, depending on the type of grass you have.

Your Garden

Many of us enjoy growing our own vegetables, fruits, flowers and herbs. By using the right gardening techniques, you can produce plants to be proud of while preserving the soil and its fertility, enhancing the absorption of rainfall and protecting streams from sediments and chemicals.

To get the most out of your garden, it's important to pick the right spot for planting. Choose a sunny location with good natural drainage. Plant your garden on a level site, avoid sloping areas and drainage channels, which let topsoil wash away during heavy rains.

Dealing With Slopes

If your garden has to be located on a slope, you can use the same techniques that farmers use on hilly fields to ensure good crops. Plant across the slope, not up and down the hill. This way, each row acts as a ridge to trap rainfall and eroding soil. Contour planting prevents soil and plant nutrients from washing downhill. On long slopes, it's a good idea to have strips of grass that also run perpendicular to the slope. This helps keep the rainwater and soil where it belongs by forcing runoff to slow down and soak in. Slopes can also be terraced for gardens. In addition, ground cover or wild flowers can be planted on steep slopes to beautify the landscape and stabilize the soil.

Enhancing Soil Fertility

Many garden soils can benefit from the addition of organic matter and other nutrients. Composted vegetable scraps, grass cuttings and leaves are excellent sources of both, and the more that goes in your compost pile, the less that goes into our crowded landfills. Mulching can also add nutrients, make the soil more workable, aid rainwater penetration and improve the moisture-retaining capacity of the soil.

You should also mulch to minimize bare, exposed soil in your garden. Unprotected ground can lose nutrients and

topsoil quickly during rainstorms. Mulch reduces temperature extremes, evaporation rates and weed problems. Besides mulching, consider close plantings of different, but compatible, plant species to make the most out of your garden area and reduce weeds and evaporation rates.

Winter cover crops are highly recommended for vegetable plots. Annual Rye grass is suitable for fall planting (two to three pounds of seed per 1000 square feet of ground). The cover crop holds the soil during the winter, breaks up pest cycles, and adds organic matter to the soil when it is turned under the following spring. You can also plant shrubs or small trees as windbreaks around the garden to control wind erosion in sandy areas.

Commercial fertilizers are designed to supplement the nutrients already present in your soil. (See the section on lawns for more detailed information on which fertilizer or combination of fertilizers is right for the soil in your garden.) Use a soil test kit to find out what your soil requires before you apply any fertilizer or contact your County Extension Agent for soil testing information.

Too much fertilizer can damage roots, and the excess can run off and lead to water pollution. For best results, always apply commercial fertilizers according to the soil test report or directions on the bag if a test is not available.

Pesticides and Pest Management

To many homeowners, pest control is synonymous with chemicals, and quick eradication is the goal. "Pesticides" is an umbrella term that includes herbicides, insecticides, fungicides, and rodenticides. Designed to kill "pests," this big family of chemicals can also be dangerous to human health and the environment. There is considerable controversy about the potential risks associated with some pesticides. Some health experts believe that

pesticides can trigger allergic reactions or cause chronic health problems, whereas others say that if used properly, pesticides pose no significant risks to human health unless a person is exposed to too much either through a large exposure (such as a spill) or through small exposures over a long period of time, particularly if no protective clothing is used.

Some pesticides that were once widely used have now been banned or restricted. These include DDT, chlordane, aldrin, heptachlor, dieldrin, silvex, and 2, 4, 5-T. Not all pesticides that are available on the market have been fully tested for environmental and health effects. It is important to be extremely careful in handling pesticides and to use safe alternatives wherever possible.

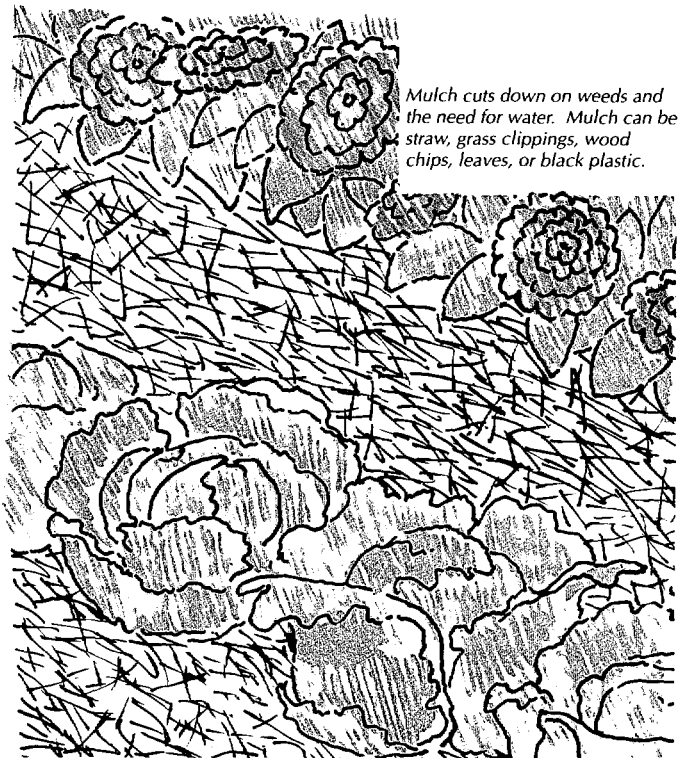
When used according to label instructions, the following two products are less toxic to the environment than other commercially available products. The products are available at larger garden stores.

• BT (*Bacillus thuringiensis*)

BT is a bacterium particularly effective against leaf-eating caterpillars. It kills them by paralyzing their digestive tracts.

• Dormant Oil Sprays

Oil sprays can be used during the dormant season, which is usually early April before new growth appears. Oil sprays control scale insects, red spider mites, mealybugs, and aphids on shrubs, evergreens, woody plants, fruit trees, shade trees, azaleas, roses and other ornamentals. Apply the oil according to label directions, avoiding injury to desirable plants. Timing is very important, so call your County Extension Horticultural Agent for more details.

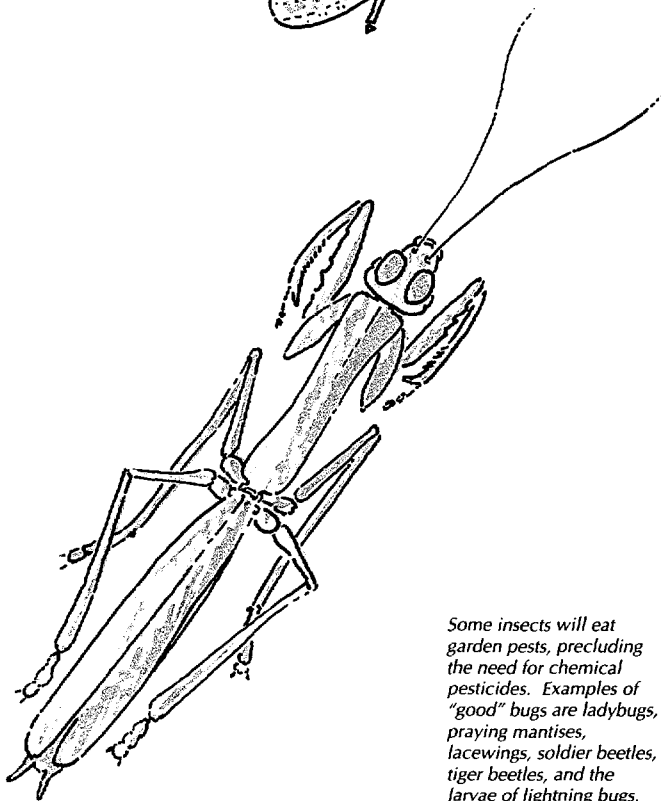
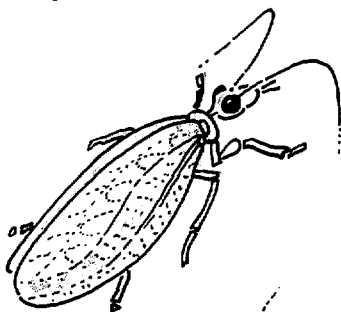
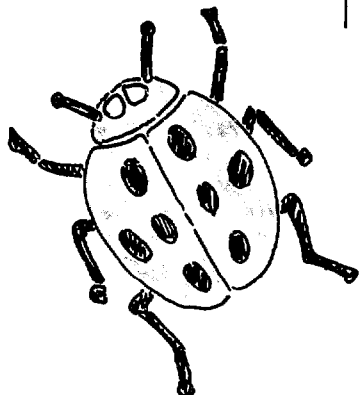


Mulch cuts down on weeds and the need for water. Mulch can be straw, grass clippings, wood chips, leaves, or black plastic.

Integrated Pest Management

The following are strategies that prevent large pest populations with minimal use of chemicals. When used systematically, these strategies are sometimes referred to as Integrated Pest Management (IPM).

- Use pest-resistant flowers, plants and vegetables whenever possible.



Some insects will eat garden pests, precluding the need for chemical pesticides. Examples of "good" bugs are ladybugs, praying mantises, lacewings, soldier beetles, tiger beetles, and the larvae of lightning bugs.

- Handle minor pest problems by hand weeding and destroying insects and removing diseased plant parts.
- Encourage ladybugs, praying mantises, lacewing larvae and other insects that eat garden pests.
- Rotate crops so that the same or a related crop does not occupy the same area every year. Repeated plantings encourage insect infestation and the build-up of soil diseases.
- Keep old sacks, baskets, decaying vegetables and other rubbish that may harbor insects and disease out of the garden.
- Time plantings to avoid the peak of insect infestations. For example, plant cabbage or broccoli early or late to avoid the peak of cabbage maggot emergence. Keep a record of the date insect problems occur for future reference.
- Inspect plants for egg clusters, caterpillars, and other insects early each morning. Hand-pick such pests and destroy them. The squash borer can sometimes be cut out of the stems with a sharp knife, providing you cut parallel to the stem and no more than halfway through.
- Dislodge pests with a spray of water. This works with aphids, red spider mites and mealybugs. Construct insect barriers. Place screens over the plants or wrap aluminum foil around the plant base to limit cutworm damage.
- If you're having slug problems, place flat boards next to the plants. After the slugs crawl under the boards to escape sunlight, lift the boards and destroy the slugs.
- Use mulches to reduce weed problems and conserve moisture.
- If you do use pesticides as a final alternative, follow the directions on the label carefully, and observe the following precautions:
 - Wash your hands immediately after applying the pesticide.
 - Use selective products rather than products that kill a wide range of pests.
 - Apply only the amount specified on the label, and only to the plants and areas listed in the instructions.
- Make sure people and pets are out of the area during application and until the spray has dried, or longer if indicated by the label.
- Cover or remove exposed foods, fish tanks, pet food and water dishes during and after application.
- Never apply pesticides near wells, streams, ponds or marshes unless the instructions specifically allow for such use.
- Never apply to bare ground or eroded areas. When it rains, many pesticides bind tightly to the soil and can be carried along with sediments to storm sewers and streams.
- Don't apply if rain is forecast, unless such application is otherwise specified on the label. Some pesticides do need to be watered-in after application.
- Choose the least toxic pesticide. All pesticides have precautionary statements on the label; the signal word "warning" indicates higher toxicity than "caution." Avoid pesticides with the words "danger" and "poison" if possible.

Storing and Disposing of Pesticides:

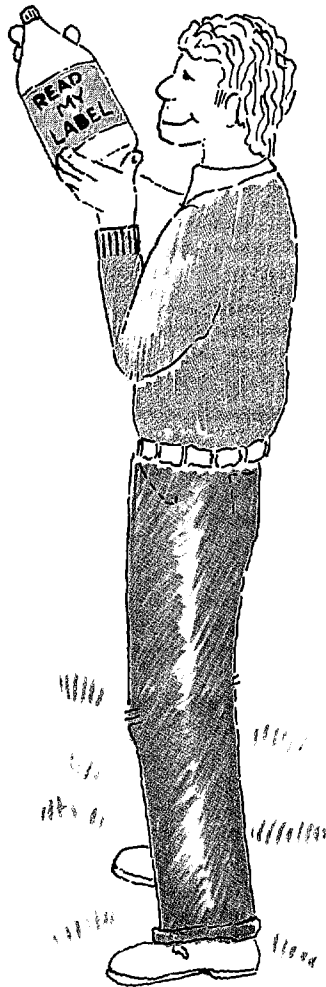
Pesticides can seriously contaminate the environment if they are spilled. You should store unused pesticides in an area away from living areas. The place you choose should have a cement floor and be well lighted and ventilated, insulated from temperature extremes, out of direct sunlight and out of a child's reach. For example, a locked metal cabinet in your garage is usually a good storage place for pesticides. Always keep pest control products in their original containers with labels intact. Most pesticides stored under these conditions should remain effective for two years, although this varies widely.

If a pesticide leaks or is spilled in the garage, on the driveway or on other outdoor areas, do not hose down the spill. This will cause further contamination and may carry the pesticide to storm sewers or other water sources. The best way to clean a small spill is to:

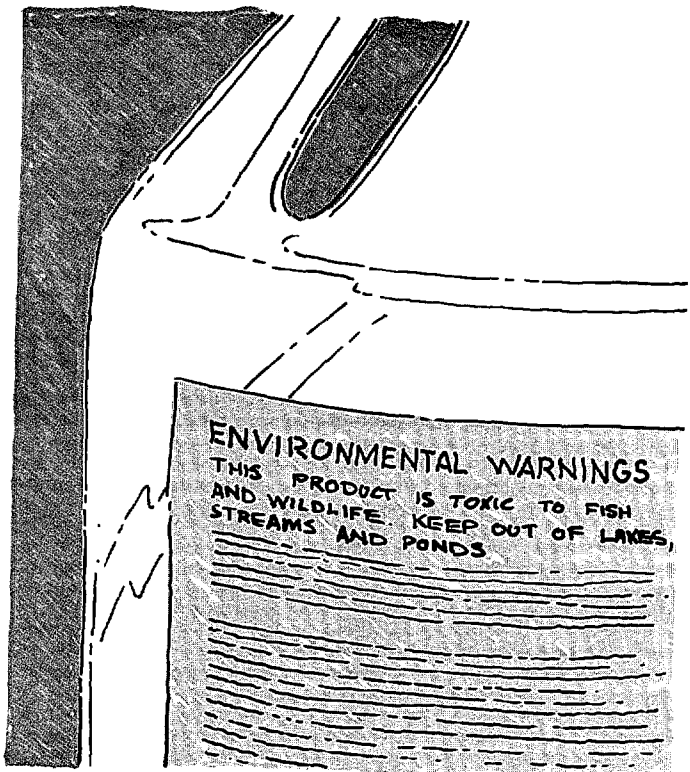
- Surround the contaminated area with dirt.
- Sprinkle kitty litter, vermiculite, torn newspaper, or some other absorbent material over the spill.
- Shovel or sweep the absorbent material into a sturdy plastic bag and put it in the trash.
- Wash down the area (if a garage floor or other hard surface) with water or detergent after removing as much of the pesticide as possible.
- When cleaning up a spill, wear rubber gloves, long pants, and rubber boots. Keep pets and other people away.

You can obtain additional information on specific pesticides from the National Pesticide Telecommunications Network, 1-800-858-7378 (toll-free number).

If significant amounts of pesticide spill directly into water, notify 1-800-TIP-WDNR (847-9367), or your local health department.



Pesticides can be toxic to humans, animals, aquatic organisms, and plants. Always read the label carefully before using a pesticide in or around your home.



Leftover pesticides and their containers should never be buried in your yard, burned, or poured down the drain, toilet, or storm sewer. Such practices may allow the hazardous chemicals to move directly into waterways where they can harm fish and wildlife. If you have leftover pesticides, consider giving them to a neighbor, as long as they are in original containers and registered in Wisconsin. If you cannot give them away, use them according to label directions.

When a pesticide container is empty, fill it up with water and spray the rinse water onto the original application area. Do this three times; otherwise chemical residues may remain in the container.

Dispose of empty, triple-rinsed pesticide containers as instructed on the label. Small containers can be wrapped in layers of newspaper or in a plastic bag and placed in the garbage on the day of pickup. Never burn or bury empty pesticide containers. The fumes from burning pesticide residues may be toxic, and buried containers could leak pesticides into your drinking water.

Sewage treatment plants cannot break down pesticides or neutralize the pesticide's harmful effects, septic systems can be harmed by pesticides as well. The best method for safely disposing of pesticides is to buy only as much as you plan to use within a two-year period, and to use them up according to label instructions.

Federal law now requires that pesticides made for home use be labeled as to the appropriate disposal method. Again, it is essential that you read the label carefully and follow its directions. Consult your County Extension Agent for guidance in disposal of older pesticides with unreadable labels.

Several counties in Wisconsin have organized "Clean Sweep" collection days for unwanted household pesticides and other hazardous wastes. Contact your County Solid Waste Department to learn if such pickups are planned in your county. These pesticides are incinerated at special facilities out of the state, a disposal method that is the safest available, but which is also extremely expensive.

D. Managing Septic Systems

Approximately 500,000 homes in Wisconsin use private septic systems. In areas with sparse populations, properly designed, installed, and maintained septic systems have little adverse effect on the environment. In fact, septic systems provide the benefit of recycling used water to groundwater supplies. However, in areas with dense populations, septic systems have resulted in contamination of lakes and wells.

How Do Septic Systems Work?

Septic systems have two key components - a septic tank and a soil absorption system (drainfield). The septic tank is a container, usually prefabricated from concrete. It receives wastewater from your bathroom, kitchen and laundry room and allows heavier solid particles to settle and light materials to float to the surface of the tank. These materials become sludge and scum (see diagram). Bacteria in the system are essential to help break down organic matter in the wastewater. Toxic material should never be flushed to the tank because toxics can kill the bacteria.

This process requires time. To permit enough time for settling and flotation, regulations require that septic tanks be sized according to the expected daily flow of wastewater from your home.

The soil absorption system generally consists of a distribution box and perforated distribution lines installed in subsurface gravel-filled beds or trenches. The soil absorption system receives wastewater from the septic tank and removes harmful, disease-causing microorganisms, organic chemicals and nutrients. For this part of the system to function properly, it must be constructed carefully in suitable soil.

The soil needs time to filter harmful materials out of wastewater. "Suitable soils" do not include coarse sand (which permits wastewater to pass through too quickly) or pure clay (which absorbs wastewater too slowly). State and local regulations that determine what constitutes suitable soil have been developed after careful consideration of many factors that affect a soil's ability to adequately treat domestic wastewater.

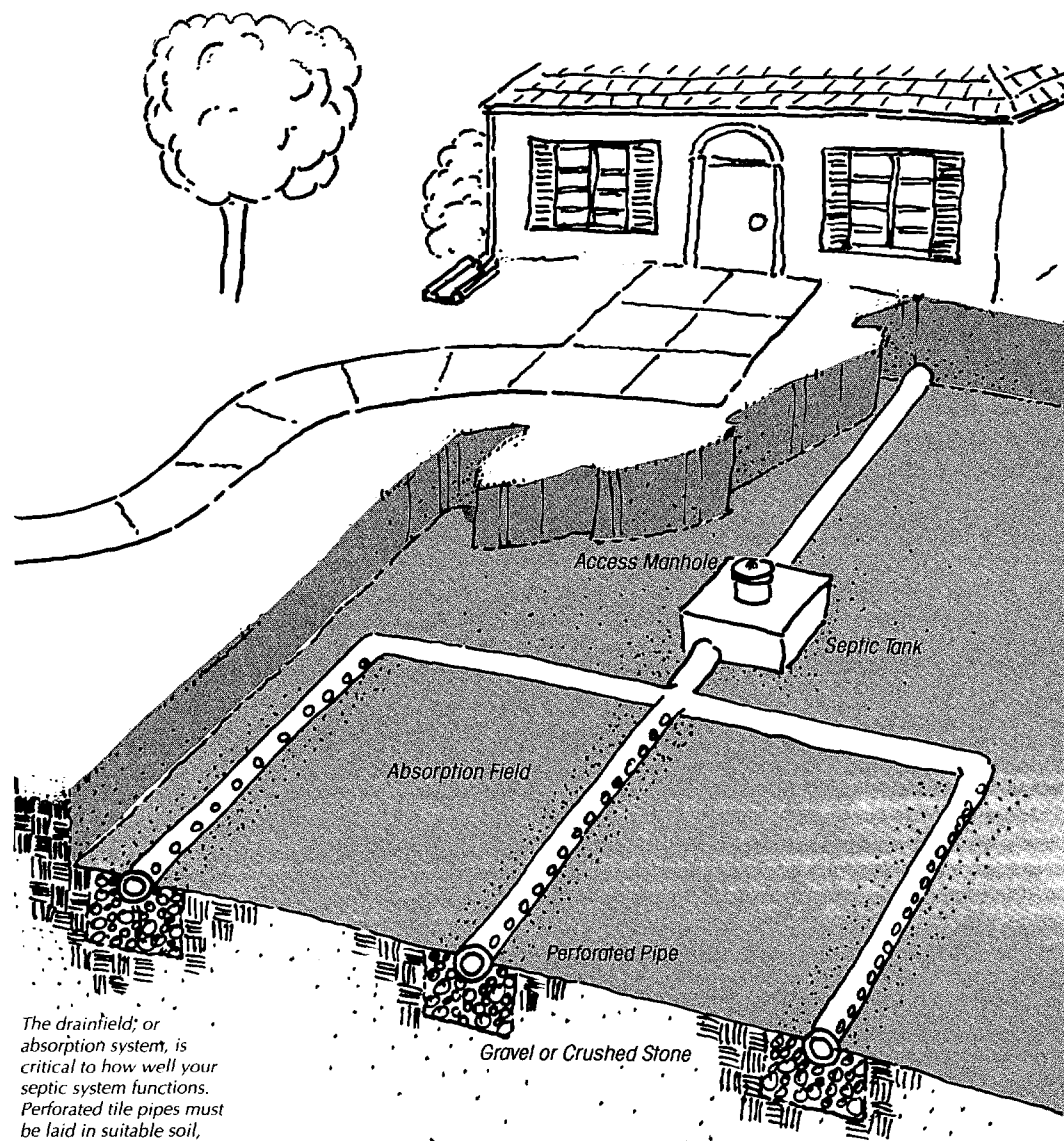
Before a septic system is built, state laws require a "perk" (percolation) test to determine how fast the soil absorbs water.

Soil examination by a professional soil scientist can provide a more reliable assessment of the capacity of soil to accept wastewater. When designing a system, your design engineer should check the water table level to be sure it is at least three feet below the bottom of the subsurface disposal area.

Caring For Your Septic System

If your septic system is not maintained, the groundwater may be contaminated with nitrates. Nitrate is oxidized nitrogen, which can interfere with the blood's ability to carry

oxygen, particularly in infants less than 6 months old. Nitrate, expressed as nitrate-nitrogen, in concentrations exceeding 10 parts per million (ppm) has been reported to cause methemoglobinemia in infants ("blue baby syndrome"), an illness in which the infant's coloring takes on a bluish cast. The illness is rare and easily reversible once diagnosed, but it is not fully known what health effects result from long-term exposure to low levels of nitrates. If you rely on a well and septic system, have your well water tested periodically for nitrate-nitrogen to ensure that the level is less than the state



The drainfield; or absorption system, is critical to how well your septic system functions. Perforated tile pipes must be laid in suitable soil, away from tree roots and manmade structures. The drainfield must be large enough to absorb your home's daily wastewater.

standard of 10 ppm. Nitrate-nitrogen is more than a health threat - it is an indicator. If the nitrate-nitrogen concentration is greater than 10 ppm, other contaminants may also be in the well.

If the septic system is not functioning properly, it can also release disease-causing bacteria and viruses. The principal signs of septic system problems are easy to detect - effluent rising to the ground surface, or drains and toilets that operate sluggishly or not at all. Septic system problems can be minimized by understanding the needs of your system and observing several precautions.

Toxic and hazardous chemicals should never be disposed of through your septic system, as these can disrupt its functions. Such chemicals include paints, varnishes, pesticides, solvents and drain-openers. (See the section in this booklet on disposal of chemicals.)

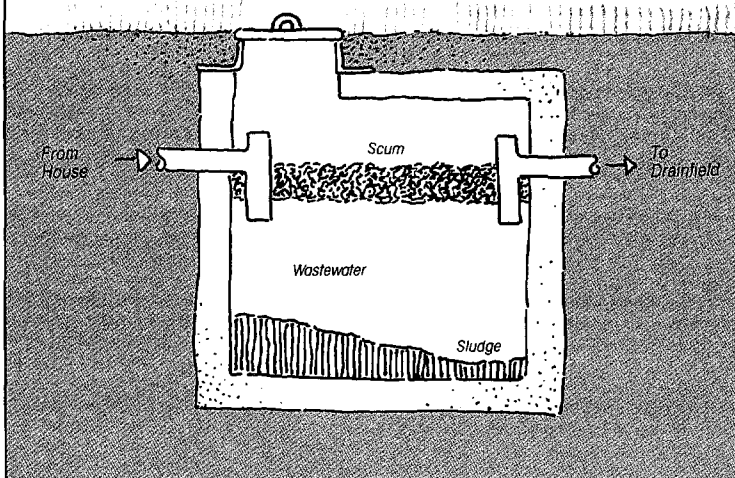
Inert or non-biodegradable materials also should not be disposed of through your septic system. Examples are cat box litter, disposable diapers, coffee grounds, sanitary napkins and paper towels. These items quickly fill up your septic tank, decrease its efficiency, and will require more frequent pumping of the tank.

Large quantities of cooking grease and fats should not be allowed into septic systems. These can contribute to blockage within the system. The use of garbage disposal units should be avoided, as these increase the amount of solids in the septic system, requiring more frequent pumping.

The performance of your septic system will be improved if you cut down on water use so that a smaller volume of wastewater passes through the system. Water saving showerheads can be easily installed and may reduce both your water use and heating bill. Be careful to turn taps off when not in use, and repair or replace leaking faucets.

Your soil absorption system will not work well if there is too much water in the soil. Water drained from basement floors, footings or roofs should be

Septic tanks are made of steel or concrete and must be large enough to hold one day's flow of wastewater from your home. Solids settle to the bottom, light materials float on the surface, and only the wastewater filters out into the drainfield.



directed away from the disposal area to some other area in your yard. This is also true of backwash from water softeners. Your yard surface should be graded so that stormwater drains away from the septic drainage field and not toward it.

In addition to monitoring what goes into your system, you will also need to routinely inspect and pump out your system. Systems should be inspected once a year and should be pumped out every two to three years on the average.

Caution: Toxic gases can accumulate in septic systems, so use extreme care when opening your septic tank. If you use a service to pump out your system, make sure the service is licensed according to Wisconsin law.

Never dispose of septic tank sludge near waterways.

A final source of septic system malfunctions are problems that occur during construction. These include soil compaction due to excavation at times when soil moisture is high, pipes laid on improper grades, incorrect joints and alignments between system components and pipes broken or crushed during construction.

Holding Tanks

A holding tank is just that - a large container made of steel, concrete or fiberglass, buried next to your house, which collects and holds all the wastewater that flows out of your home.

What You Can Do

Maintenance is the single most important consideration in making sure a septic system will work well over a long period of time. The following maintenance practices will keep your system running smoothly:

Know the location of all components of your septic system. Keep heavy vehicles away from the system to prevent soil compaction.

- Direct water from downspouts and roof, footing and basement drainage away from the disposal field.
- Dispose of household chemicals properly - do not pour them down the toilet or drain. They can destroy the bacteria in the septic system and contaminate local groundwater.
- Don't use garbage disposals. They contribute unnecessary solids and grease to your septic system.
- Conserve water whenever and wherever possible.
- Don't use toilets as trash cans. Dispose of solid wastes in your garbage.
- Monitor your septic tank yearly and have a reputable contractor remove sludge and scum every two to three years. This helps ensure that there is enough space in the tank for wastewater and prevents solids from escaping into and clogging the absorption system.
- Don't plant trees or shrubs near drain tiles since their roots can clog drain lines.
- Don't connect the basement sump pump to the septic tank.
- Don't rely on septic tank additives. There are plenty of bacteria in the tank to break down materials. Additives do not eliminate the need for pumping every 2-3 years.

Holding tanks are installed in rural homes where soils are not suitable for proper operation of a conventional septic tank and drainage field. These watertight tanks are used only for collecting and storing household wastes. No treatment or cleaning of the wastes takes place inside these holding tanks. When the tank becomes full, it must be emptied

and the contents properly disposed of so as not to create a health hazard or pollute ground and surface waters.

It is your responsibility to be sure the wastewater from your holding tank is properly and legally disposed of. Your choices are:

Call a commercial pumper. The pumper will haul the wastes to a municipal sewage treatment plant or landspread it in some areas.

You may be able to obtain a permit from the DNR to pump the holding tank yourself and spread the contents on your field, provided certain conditions are met.

No other methods of disposal are permitted.

Health Hazards

Holding tank wastes may look and smell much like the animal wastes farmers spread on their fields, but they are different. Approximately 40 types of viruses and 1,500 types of bacteria can live in holding tank wastes. They can cause hepatitis, meningitis, cholera, salmonella, dysentery and other illnesses. Health protection is everyone's concern. Proper disposal of holding tank wastes is vital to ensure that no one becomes ill by coming in contact with improperly handled wastes.

Some people are finding that the cost of pumping and disposing of the contents of their holding tanks is a burden. To avoid the costs, a few are emptying their tanks in ways that are endangering health or polluting our waters.

Reducing Your Costs

The best and only legal way to reduce the cost of pumping and disposal is to limit the amount of wastewater that flows into the holding tank. You can:

Put water conservation devices on shower heads and faucets.

Wash full loads rather than several smaller ones.

Adjust toilet tank float valves so the flushing action uses the smallest amount of water.

Make sure leaking faucets are repaired.

An average home uses

75-100 gallons of water per day for every person living there. Anything you do to cut the amount of wastewater flowing into your holding tank will save you money.

For Additional Answers Call:

- County Zoning Administration
- Department of Natural Resources Area Office
- Department of Industry, Labor and Human Relations
- County Cooperative Extension Service

E. DISPOSING OF HOUSEHOLD CHEMICALS

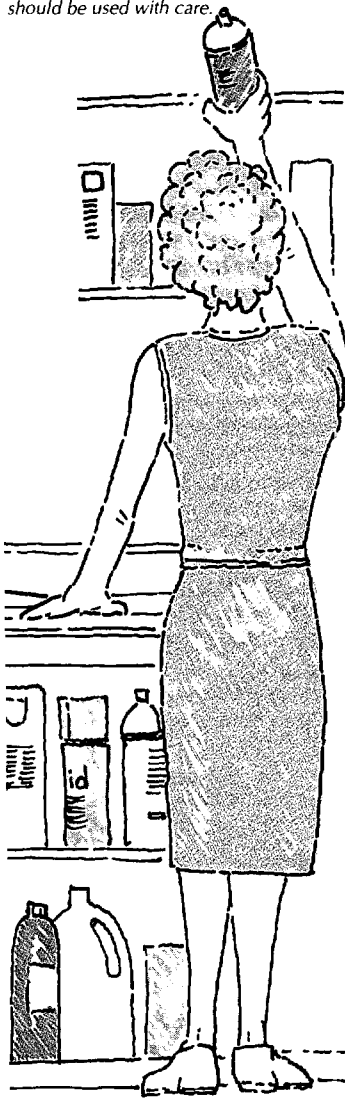
Many of the products used at home, such as soaps and detergents, are meant to be washed down the drain. These products are biodegradable and, if the wastewater from your home is properly treated, pose no problem to the environment.

However, there are products commonly found on kitchen shelves that are toxic to people and to the environment. Oven cleaners, floor wax, furniture polish, drain cleaners and spot removers are examples. Check the labels of products for toxic components such as lye, phenols, petroleum distillates and trichlorobenzene. Products containing such chemicals pose a potential threat to health, if improperly used, and also present real environmental hazards when improperly disposed. Proper disposal of these chemicals (usually through high-temperature incineration) may cost several times as much as the original purchase price.

The best way to avoid disposal problems is to avoid purchasing products with toxic ingredients in the first place. It is often possible to use an alternative, nontoxic or less toxic method to clean or polish. Ovens, for example, can be cleaned by applying table salt to spills, then scrubbing with a solution of baking soda and water. A combination of lemon oil and linseed oil makes a good furniture polish. Clogged drains can sometimes be cleaned with

a metal "snake" instead of toxic chemical cleaners. When you feel that it is absolutely necessary to use a product containing toxic chemicals, some cautions should be observed. Buy only as much of the product as you need, so that you don't have to worry about left-overs. Read the label and use the product only as directed. Never apply more than the directions recommend. Protective clothing and rubber gloves may be necessary; good ventilation is a must. Some products become even more dangerous when mixed with others; for example, never mix chlorine bleach with ammonia because deadly chlorine gas can result.

Household chemicals, especially petroleum based formulas, are potentially toxic and not readily biodegradable. All household chemicals should be used with care.



A word about detergents

One of the most-used home cleaning products is detergent. Many detergent products used to contain phosphorus, which contributed to water quality problems in lakes and streams. The detergent industry has responded to this problem by developing products that contain little or no phosphorus. Although Wisconsin law restricts the sale of certain cleaning products containing phosphorus, care should be taken to buy products containing the lowest amount of phosphorus available. The product label will clearly tell you the phosphorus content.

Home maintenance products

Among the most toxic household products are those used for home repair and maintenance. Paints, preservatives, strippers, brush cleaners and solvents contain a wide range of chemicals, some of which are suspected carcinogens (cancer-causing substances). These products should never be put into sewer or septic systems - in other words, never poured down the drain.

To reduce disposal problems, buy only what you need and always follow the label instructions for proper use and disposal. Using more product than recommended by the label does not necessarily mean the product will do a better or faster job. Used turpentine or brush cleaner can be filtered and reused. Share unused, unwanted paint with neighbors or donate it to drama clubs or housing service organizations. If recycling paint is not possible, remove the cover and allow the paint to dry, if possible, before placing in the trash. Lead based paint should be taken to a hazardous waste collection site or "Clean Sweep" collection. Several counties in Wisconsin have organized "Clean Sweep" collection days for drop-off of household hazardous wastes which are then sent out of the State for disposal.

Hobby supplies such as photographic chemicals are also hazardous and should not go down the drain.

Here are some alternatives to hazardous household products:

Instead of:	Use This Alternative:
Silver Polish	Soak in boiling water, baking soda, salt and a piece of aluminum foil
Oven Cleaner	Baking soda and water; salt; or a quarter cup of ammonia overnight
Toilet Cleaner	Toilet brush and baking soda or mild detergent
Disinfectants	One-half cup of borax in 1 gallon of water
Drain Cleaner	Plunger, metal snake, or flush with one-fourth cup baking soda and boiling water or 2 oz. vinegar
Rug and Upholstery Cleaners	Dry cornstarch sprinkled on rug and vacuumed
Floor and Furniture Polishes	One part lemon oil with two parts olive or linseed oil; mineral oil with lemon oil or Carnauba wax
Bleach Cleaners	Use powdered bleach, not liquid
Mothballs	Cedar chips; newspapers; lavender flowers
Ammonia-based Cleaners	Vinegar or salt and water mixture for surfaces; baking soda and water for the bathroom
Powder or Abrasive Cleaners	Rub area with half a lemon dipped in borax and rinse; baking soda and mild detergent; elbow grease
Spot Removers	Club soda; immediate cold water; corn meal and water soak; lemon juice
Window cleaners	Wash with vinegar and water and rub windows with newspapers
Fungicides	Do not overwater; keep areas clean, dry, and ventilated
House Plant Insecticide	Spray on a mixture of bar soap and water, insecticidal soap or old dishwasher, and then rinse
Arsenicals (arsenic poisons)	Live traps; remove pest food supply
Garden Insecticides	Insecticidal soap; import predators such as ladybugs and praying mantis; weed garden and remove plant debris or wood from garden
Flea Collars and Sprays	Pennyroyal ointment; herbal collar; brewers yeast in pet's diet
Roach and Ant Killer	For roaches use traps or baking soda and powdered sugar mixture; for ants use red chili pepper to discourage entry
Rat and Mouse Poison	Live traps; cats; chopped bay leaves and cucumber skins; remove food supply
Herbicides	Strong hosing or hand weeding, keep grass mowed properly
Insect Repellent	Screens; protective clothing; creams or lotions

*References: "The Household Hazardous Waste Wheel" by Environmental Hazards Management Institute and "Don't Poison the Ones You Love" by the City of Madison, Citizens for a Better Environment and the Wisconsin Department of Natural Resources

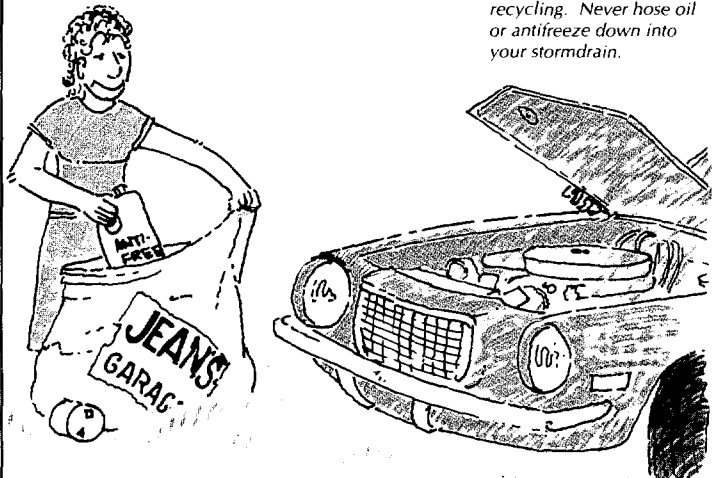
Car care

Motor oil, battery acid, gasoline, car wax, engine cleaners, antifreeze, degreasers, radiator flushes and rust preventatives are examples of automotive products containing toxic chemicals. Some car owners do their own maintenance work; 25% change their car's oil, and many of these people pour the used oil down the storm drain. You probably wouldn't think of dumping a quart of oil over the side of a boat, but pouring it into a storm sewer is exactly the same thing since storm sewers usually lead directly to rivers and lakes. One quart of oil can contaminate up to 2 million gallons of drinking water. The oil from one engine - four to six quarts - can produce an eight-acre oil slick.

The only recommended way to dispose of used oil is to put it into a sturdy container, such as a plastic milk jug, and take it to a municipal garage or an oil recycling center. Contact the County Solid Waste Director or the Wisconsin Dept. of Natural Resources for the location of the waste oil collection facility nearest you.

Antifreeze is also a hazardous chemical and can be toxic in high concentrations. Never pour antifreeze into septic systems, storm drains, streams, or on the ground, where it can enter water supplies or poison pets and wildlife. Used antifreeze should be diluted by mixing 15-20 gallons of water with each gallon of antifreeze. It can then be put down the toilet if it is connected to a municipal sewer and treatment plant.

Oil can be recycled. Used oil and antifreeze should be taken to your local service station for recycling. Never hose oil or antifreeze down into your storm drain.



Disposing of other hazardous automotive products

Brake or transmission fluid	Some waste oil recycling stations take used brake and transmission fluid. If you have excess, unused fluids, store them safely for later use or give them to a neighbor.
Batteries	Bring them to a recycling business.
Carburetor cleaner or degreaser	Evaporate in an open, well-ventilated area away from flames, children and pets. Safely store used cleaners for later use or give them to a neighbor.
Car wax and autobody repair products	Evaporate in an open, well-ventilated area away from flames, children and pets. Then wrap the remaining dried product in newspaper and put in the garbage. Safely store unused products for later use, or give them to a neighbor.

these are being organized, or bring a container with you to pick up all litter in sight and dispose of it properly.

Boating

As a boat owner, you can play a major role in improving water quality. The first step is to understand the potential impact of your boating activities.

Boat wakes contribute to shoreline erosion. Although this loss of land is a problem for shorefront property owners, it also affects boaters. Eroded sediments create unwanted shoals, cause shallowing, cut off light to underwater life and can actually kill larval forms of aquatic life. All this creates problems for the ecosystem. To minimize shoreline erosion, boats should not produce wakes within 500 feet of the shore. In many tributaries, a boat speed of only eight miles per hour creates a wake with great erosive force. The impact of your boat's wake on shoreline erosion can be greatly reduced if you slow down before, not after, a speed limit marker. Speed limits were designed to protect both you and the aquatic environment.

Chemicals on Board

If the soap you use to wash your boat contains phosphates, it can contribute to excessive algal growth. Rinse and scrub your boat with a brush after each use instead of using soap. If your boat is stained, use phosphate-free soap or laundry detergent to get it clean. When possible, avoid products that remove stains and make your boat shine. They are extremely toxic. Products with warnings on the label can kill or contaminate aquatic life if washed overboard.

Fuel overflows from gas tanks are dangerous to people and toxic to fish and other aquatic life. The traditional method for determining if you have a full tank is to look for fuel spilled from the tank overflow vent. You can prevent these overflows by estimating fuel consumption relative to your tank capacity. With a little

practice, you will become an expert at gauging when your tank is full.

Many of Wisconsin's lakes and bays are suffering from the effects of nutrient enrichment, which contributes to algal blooms and oxygen depletion. Human and animal waste contains nutrients in addition to disease-carrying organisms. These pollutants can have a serious impact on public health and have resulted in the contamination of bathing areas. Boaters should know that it is illegal to dump raw sewage in Wisconsin waters. Use on-shore rest rooms as much as possible and always use pump-out facilities for emptying holding tanks. Request that your marina install and maintain adequate pump-out facilities. By minimizing or eliminating the discharge of boat sewage, boaters will be helping Wisconsin waters to survive and flourish.

Trash is the most visible kind of water pollution. You should designate a storage area on your boat specifically for trash. Beer cans and tabs, styrofoam cups, plastic bags, and other debris can trap, injure and kill aquatic life. Littering of these materials on land or water is illegal in Wisconsin. Bring recyclable items to a recycling center.

The kinds of household toxics described in this chapter should, in general, never be disposed of "down the drain". Your drain leads either to a home septic system or a municipal treatment plant, neither of which is designed to completely remove toxic chemicals from waste water. At least some of the toxics pass through the treatment process and end up in a stream, river or ground water.

If you have a septic system, be extremely careful not to dispose of toxic chemicals through the system. It can mean direct contamination of your well.

The products described in this chapter should also never be poured on the ground or into gutters where they will eventually enter storm sewers, which generally lead to nearby streams or lakes.

You can recycle your unwanted household chemicals by giving them to neighbors or local institutions, such as schools, that can use them. You might initiate an exchange program in your neighborhood in which neighbors circulate a list of all unwanted paints, solvents, cleansers, and so forth.

If you can't recycle your unwanted chemicals, call your county's Solid Waste Department for further advice.

F. MANAGING BOATING AND SWIMMING ACTIVITIES

Tourism is an important industry. In Wisconsin, recreational boating, swimming and other water activities provide countless hours of relaxation and enjoyment for tourists each year. In addition, rivers, lakes and bays provide spawning and nursery grounds for fish. However, there has been growing concern about degrading water quality and its effects on both public health and the beauty of the natural environment. Much can be done by individual citizens to help protect water quality.

Swimming

Be sure to clean up all wastes, including food leftovers, packaging and cans and take them with you when you leave the beach. Do not allow children or pets to urinate or defecate in the water or on the beach; take your children to rest rooms as often as needed. Encourage your municipality to maintain an adequate supply of rest rooms and trash containers along the shore. Participate in volunteer clean-up efforts if

Maintaining Your Boat

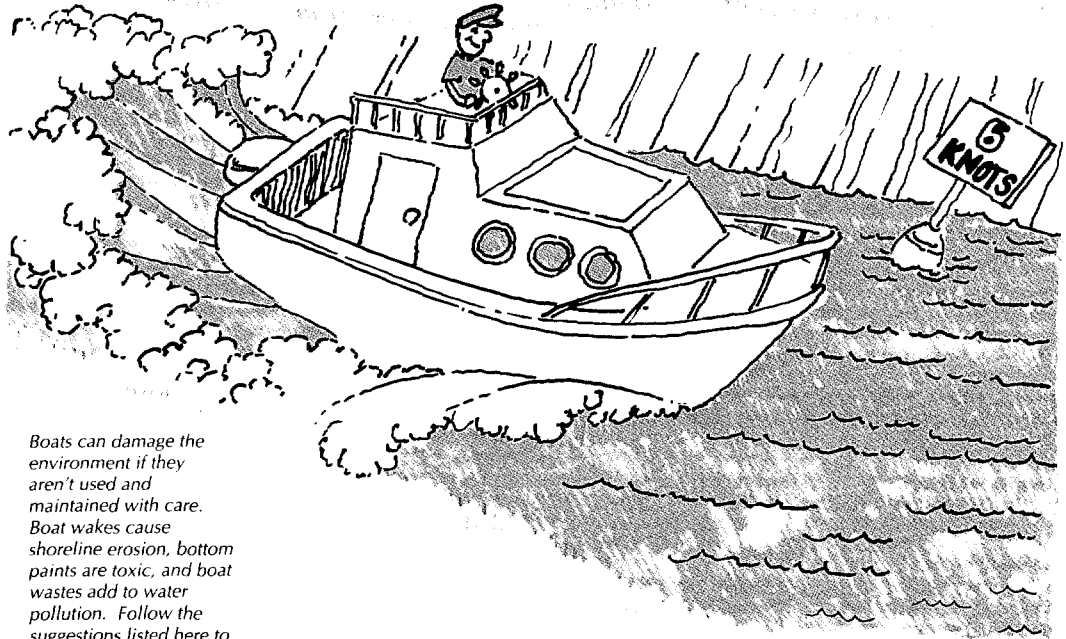
Large boats are normally hauled out once a year for repairs, painting and general maintenance. Many of the cleaning, dissolving and painting agents used for maintenance are toxic to aquatic life.

Copper and tributyltin (TBT) bottom paints, used to prevent fouling, cause particular environmental damage. Use of TBT is now banned in some countries. If boats are kept in dry storage, there should be no need to use antifouling paints. If you must use them, use as little as possible and control the amount that enters the water. When scraping the boat bottom, catch the scrapings with a drop cloth. Throw the cloth away when you're finished. If you don't have a drop cloth, sweep up the scrapings and throw them in the trash.

Marina owners and operators can participate in the effort. For example, by installing and maintaining a used oil drum, they make it easier to recycle your boat's oil. Marinas also provide logical places for the distribution of educational materials to boaters.

Swimming Pools

Many of us enjoy the pleasures of a backyard swimming pool. Pools require substantial doses of chemicals, especially chlorine, to keep the water free of algae and bacteria. If you have to drain your pool, take care to prevent the chlorine from contaminating storm drains or nearby streams. After chlorine use, allow the pool water to sit for a few days before draining. Wherever possible, drain your pool onto an expanse of lawn to take full advantage of the filtering capacity of the soil.



Boats can damage the environment if they aren't used and maintained with care. Boat wakes cause shoreline erosion, bottom paints are toxic, and boat wastes add to water pollution. Follow the suggestions listed here to make your boat a non-polluter!

What You Can Do

By observing the precautions outlined in this chapter, you will be helping to preserve Wisconsin's coastal and inland waters for the enjoyment of many more generations of boaters, swimmers and water sports enthusiasts.

- Observe posted marine speed limits.
- Do not produce wakes within 500 feet of the shore.
- Use phosphate-free detergents when you wash your boat.
- Never discharge raw sewage from your boat, and minimize discharge from marine sanitation devices.
- Do not throw trash overboard. Recycle as much as possible.
- Use extreme caution when using cleansers, paint, and antifouling compounds on your boat, and avoid using them whenever possible.
- Drain your pool only when necessary, and then onto a large expanse of lawn to allow the chlorine to dissipate and the water to filter slowly through the soil.

G. CONSERVING WATER

Water conservation is good for more than just the Bay. Reducing your water use can mean substantial savings on your sewer, energy, and water bills. For those with septic and holding tanks, conserving water reduces wear and tear on your system, saves pumping costs, and requires less energy for pumping well water.

Widespread reduction in water usage could reduce the need for new or expanded sewage treatment facilities. If the amount of water every family uses is reduced, so is the volume of water entering our sewage treatment plants. The tax dollars saved by not having to expand existing plants can be used to improve water treatment techniques.

Only four of the 75 to 100 gallons of water we each use every day are actually necessary. We can decrease water consumption in our homes 15 to 20 percent without major discomfort or expense. All we have to do is acquire good water use habits. Many conservation techniques are simple, common sense ideas.

The first step in conserving water around your home is to check for and eliminate any leaks in faucets, toilets, hoses, and pipes. At the water pressure found in most household plumbing systems, a 1/32" opening in a faucet can waste up to 6,000 gallons of water per month. A steady drip wastes 20 gallons a day. A leaking toilet can waste 200 gallons of water a day without making a sound.

Water conservation is as simple as thinking before you turn on the faucet. Many of us developed our water use habits before the time of water shortages and the recognition of water quality problems. Now that we understand the potential impact of the way we use water, it should be easy to make water conservation a part of our everyday lives.

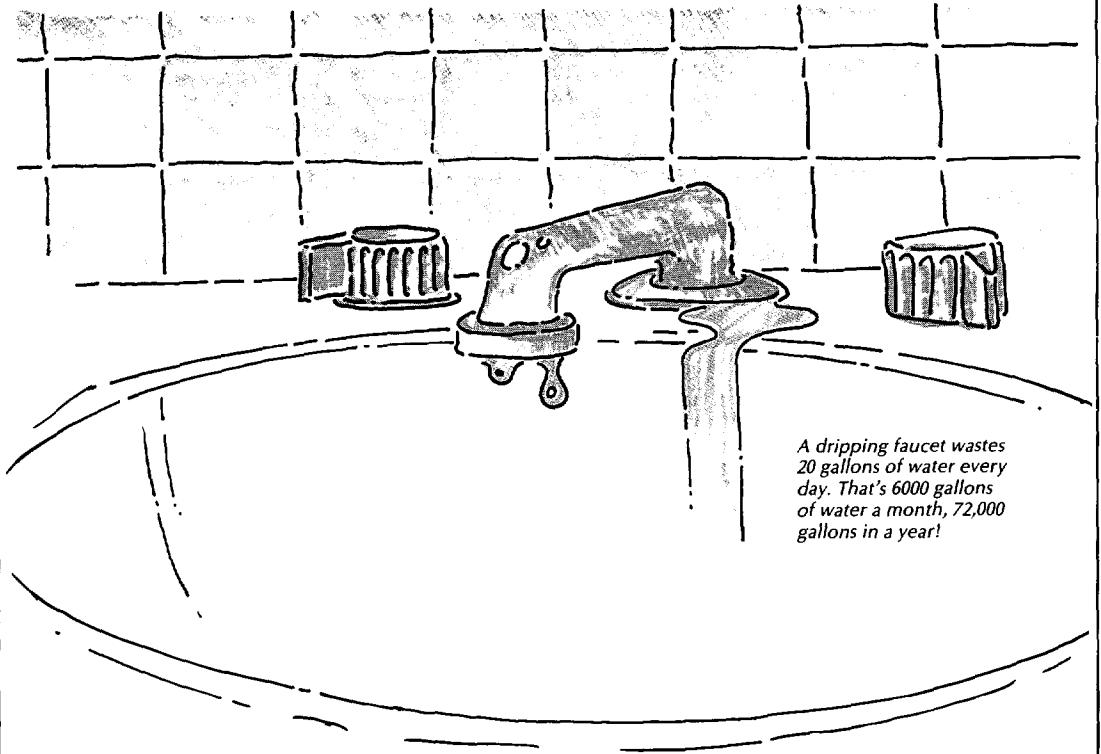
What You Can Do

Use these simple guidelines to make sure you aren't wasting water without knowing it:

- Test for a leaking toilet by adding food coloring to the tank. Without flushing, note if any color appears in the bowl after 30 minutes. If color appears, you have a leak.
- Check your water meter while no water is being used. If the dial moves, you have a leak.
- Run your dishwasher only when you have a full load. Use the cycles with the least number of washes and rinses.
- Don't run water continuously when washing dishes in the sink.
- Add your garbage to the compost or trash instead of putting it down the garbage disposal. Disposals use a great deal of water and also add solids to an already overloaded sewer system.
- Wash clothes only when you have a full load. Set the water level control appropriately. Permanent press cycles may use an additional 10 to 20 gallons of water.
- Buy a suds-saver washing machine when you need to buy a new machine.
- Install a water conservation shower head. It's inexpensive and reduces flow by at least 25 percent.
- Place two half-gallon plastic bottles filled with water in your toilet tank. This cuts the number of gallons used per flush from five to four.
- Take short showers instead of

a bath. Remember, baths can use 30 to 50 gallons of water. Do not let water run in the sink while shaving, brushing your teeth, or lathering your face and hands.

- Water your lawn and wash your car only when absolutely necessary.
- Wash your car on the lawn, if possible. It prevents phosphorus from washing into the storm sewer and also waters your lawn.
- Wash one section of the car at a time and rinse it quickly. Use a hose that is high pressure, low-volume and has a pistol grip nozzle.
- Water your lawn during the coolest part of the day to avoid rapid evaporation.
- Use mulch in your garden to hold in moisture.



H. BECOMING A PART OF THE PLAN

Getting involved and keeping informed about environmental problems is easy. The Public Education and Participation (PEP) Committee of the lower Green Bay/Fox River Remedial Action Plan (RAP) is working to provide ways for people to get involved and express their interest and support. A number of activities have been sponsored or are being planned.

The first River/Bay Clean-up Day for 1989 was held on Saturday, April 29. More than 200 people joined together for a few hours in the morning to pick up litter along the Fox River and Green Bay shorelines. Others got together on their own a few days before or after the event to clean up a site of their choice. A picnic following the clean-up added to the good feeling. The River/Bay Clean-up Day is now an annual event.

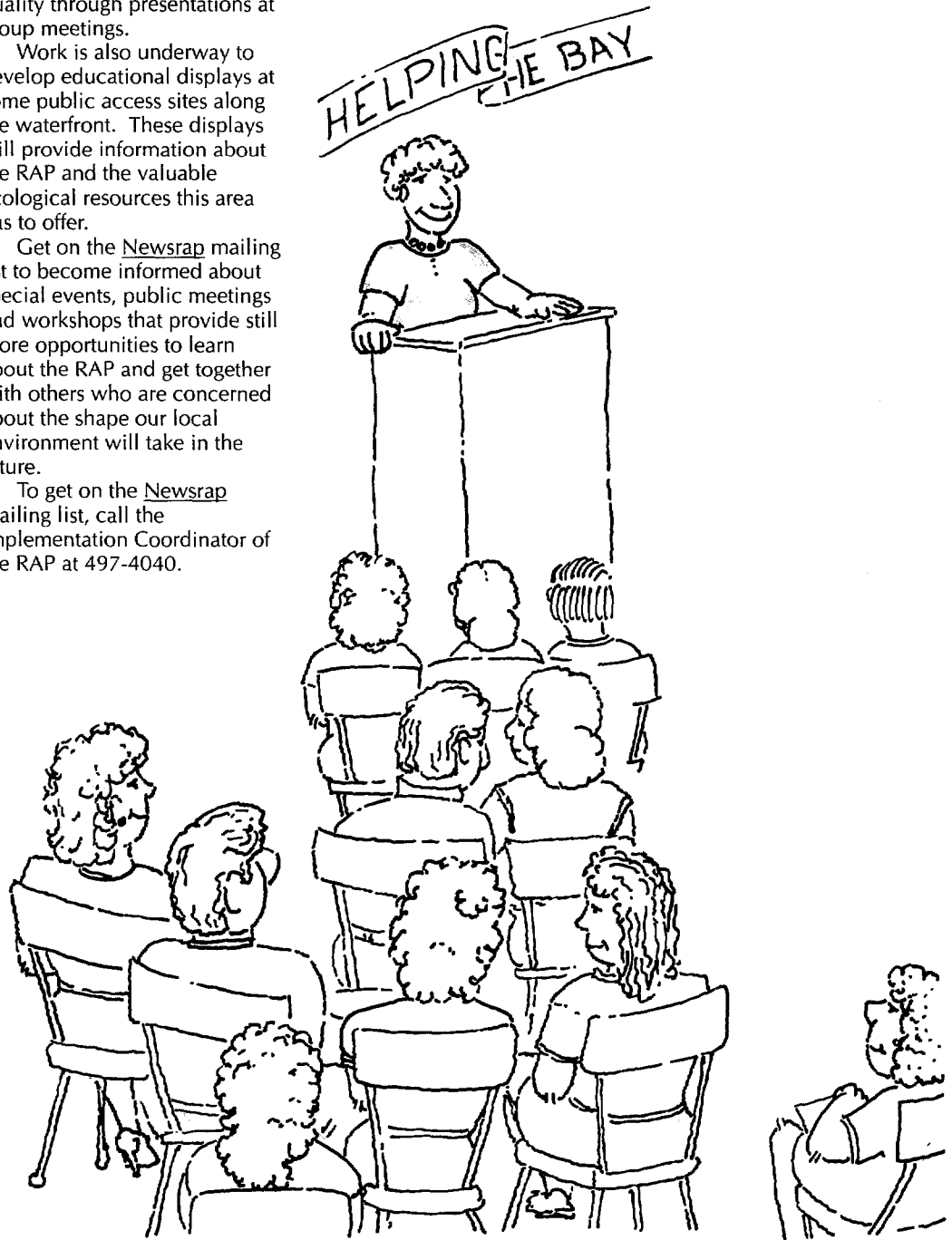
Another activity planned by the PEP Committee is an Adopt-A-Stream Program. The purpose of the program is to give people a chance to understand and become involved in the water quality of a favorite stream or river, in an enjoyable way. Some have also adopted wetlands. An information packet will be developed to provide a complete, step by step guide to: 1) picking a stream; 2) conducting a survey of stream quality, including simple summaries of water quality and biological activity; 3) identifying whether the stream shows signs of pollution and ways to identify the causes for that pollution; and 4) reducing that pollution. Most of all, the Adopt-A-Stream Program is a great way for you and your group or family to really get to know your favorite swimming or fishing hole.

A speakers bureau has been put together to be a resource for groups interested in learning about the RAP and local water quality through presentations at group meetings.

Work is also underway to develop educational displays at some public access sites along the waterfront. These displays will provide information about the RAP and the valuable ecological resources this area has to offer.

Get on the Newsrap mailing list to become informed about special events, public meetings and workshops that provide still more opportunities to learn about the RAP and get together with others who are concerned about the shape our local environment will take in the future.

To get on the Newsrap mailing list, call the Implementation Coordinator of the RAP at 497-4040.



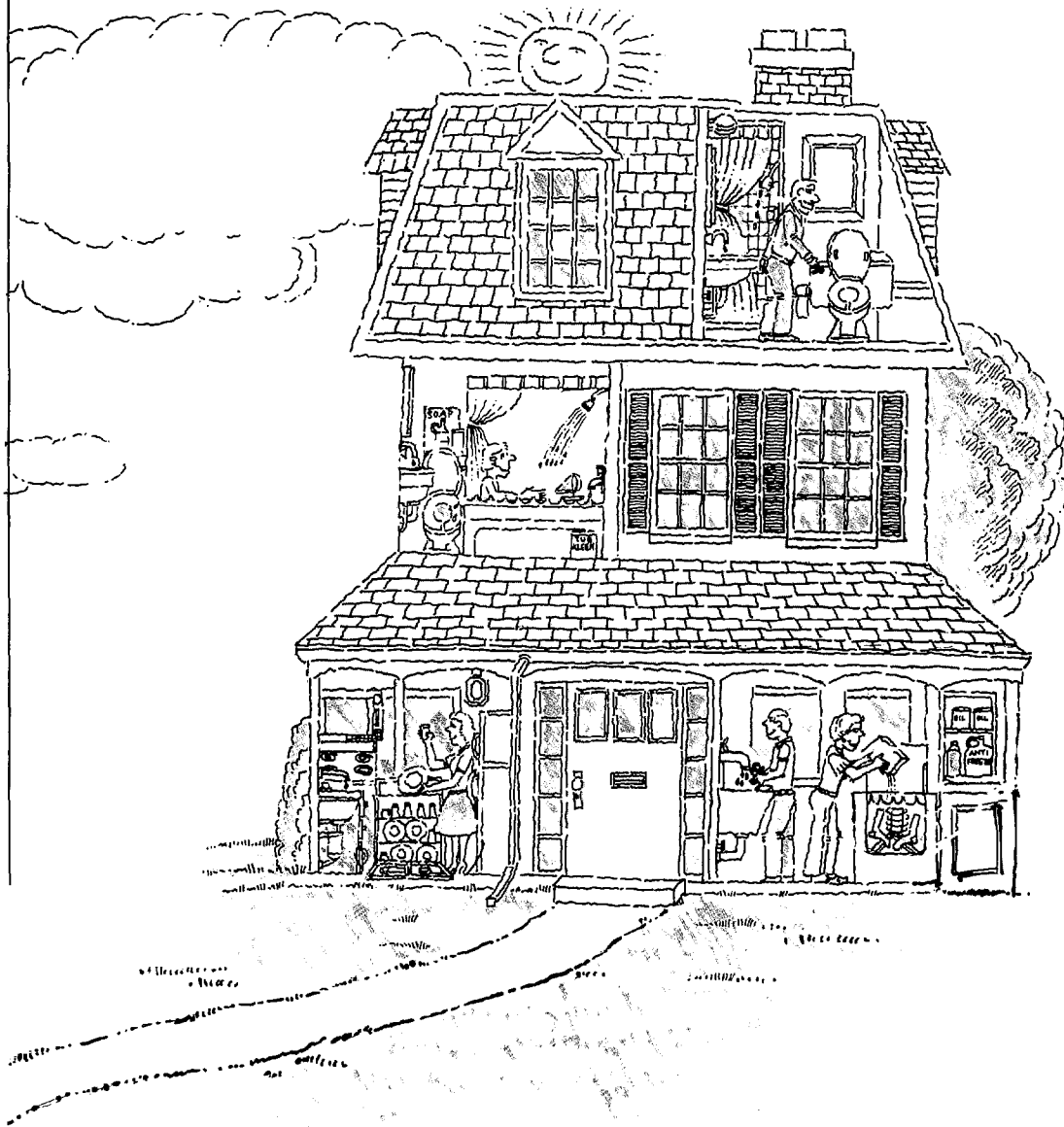
IN CONCLUSION

As noted in the introduction, the control of nonpoint source pollution rests to a great extent on you and your involvement as a concerned citizen. Those who contributed to the preparation of this handbook hope you will consider it an invitation to become an active and vigilant guardian of the environment in your own household and community.

After you read this handbook, recycle it by sharing it with friends and neighbors. Draw their attention to the importance of this topic as an issue that affects us all.

By carefully controlling chemical use, waste disposal and the course of rainwater around your own home, yard, neighborhood and community, you and your neighbors will be helping to improve our waters for all of us to enjoy.

Welcome to the new environmental challenge of nonpoint source pollution, in which clean water begins with you!



ADDITIONAL RESOURCES

For additional information on the following topics, contact the organizations or agencies indicated. Space is provided on the next page for additional telephone numbers.

CHEMICAL SPILLS AND RELATED EMERGENCIES

- Your local police or county emergency government
- WI Div Emergency Government 608-266-3232
- Chemical Referral Center 1-800-262-8200 (for answers about product questions)
- US Nat'l Response Center 1-800-424-8802
- Poison Control Center in your area

LAWNS, GARDENS, AND AGRICULTURE

- Cooperative Extension Service Offices
See the County Government listings in your telephone directory to find the office nearest you.
- Soil Conservation Districts
Listed under US Government in your directory.

PESTICIDES

- National Pesticides Telecommunications Network, provides emergency and general information 1-800-858-7378 (Toll free number)

PROTECTING STREAM CORRIDORS

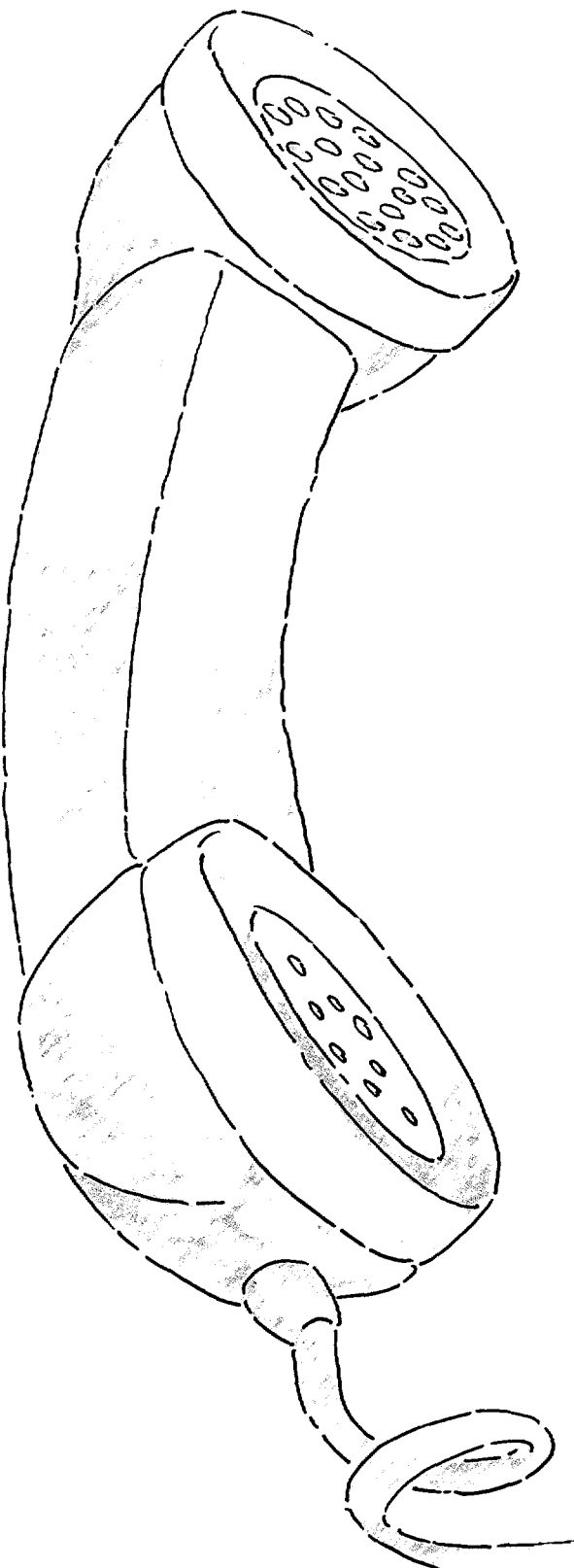
- Cooperative Extension Service Offices
Listed under County Government in your directory.
- Local WDNR, Water Resources Program
To set up a program in your own neighborhood for protecting a local lake or stream.

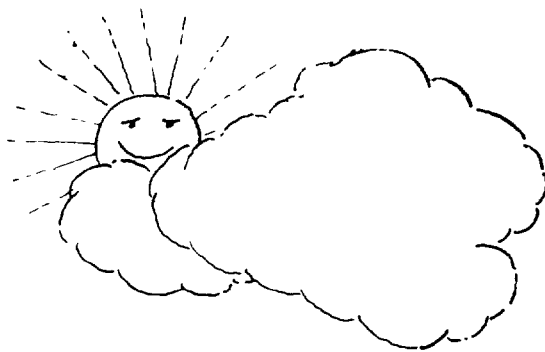
RECYCLING OR DISPOSAL OF HOUSEHOLD CHEMICALS

- District Solid Waste Management Officials
Listed under County Government in your directory.
- WDNR, (608)267-7565

SEPTIC SYSTEMS

- County sanitarian
- Local health department
- Local - WDNR Wastewater Engineer
Telephone numbers are listed in your local directory.





**Wisconsin Department of Natural Resources (WDNR)
Lake Michigan District**

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