A publication of the Cayuga Lake Watershed Network

SMART STEPS for Clean Water

Water – the Gift of Life

The lake, streams and hidden ground water of the Cayuga Lake region are natural treasures for us to protect and enjoy. We cannot afford to wait for a disaster before we act.

A flock of migrating snow geese skids in on webbed feet for a sunset landing on the lake. A chorus of peepers rises from the marsh. A child quenches her thirst with water from the family well. Each of these is a small piece of the splendor of the Cayuga Lake Watershed whose natural bounty and beauty enrich our lives. Its clean water provides the basics of life, from the food we eat to the water (and wines) we drink, while the lake, gorges and waterfalls identify our region. Together, those rich resources contribute to the local economy by drawing businesses and people to the area, attracting tourists, and supplying abundant water to support thriving communities. The region's economy is dependent on having clean water.

Fortunately, these waters are of good quality, despite minor problems. If each of us pitches in, together we can restore the troubled areas and prevent further damage. *Smart Steps for Clean Water* is an introduction to the threats to our water and specific steps residents and visitors can take to ensure current and future generations continue to have clean water to sustain them.

PHOTO: LEE KARNEY

Why the Concern?

Earth is the only planet we know of with abundant water. For 4 million years Earth has had essentially the same amount of water, which recycles endlessly. Though the planet's surface is 71% water, less than 3% of this is fresh water. This life-giving resource can be easily degraded, since water is a universal solvent and most things dissolve in it. As it is used and moves over the landscape, liquid and solid contaminants can be picked up and carried along. This can mean trouble for creatures that live both in the Cayuga Lake Watershed and beyond. The lake flows northwards to the Seneca River, eventually draining into Lake Ontario. If we pollute our water, that pollution is passed on to the Great Lakes, which hold one fifth of the world's accessible fresh water.

Most people visualize water pollution coming out of a factory pipe, or a sinking

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PHOTO: SUSAN POWELL

oil tanker. These sources contribute that is known as point source pollution because there is an identifiable point of discharge. While these are a concern, the most common pollutants come from diffuse sources such as runoff from construction sites, residential lawns, septic systems, parking lots, and plowed fields. These are referred to as nonpoint sources of pollution because the contaminants are not discharged from a single source or point. No single nonpoint source causes a big concern, but the many small amounts add up to be a big problem. Because it is hard to pinpoint where nonpoint source pollution has come from, it is hard to control. Therefore, all of us play a role in combating pollution at home and as we travel throughout the community. *Smart Steps for Clean Water* provides action steps to reduce the amount of nonpoint source pollution that flows to and through our waterways.

In 2000, the municipal governments around Cayuga Lake combined forces to support a study on threats to the watershed. This study provided the baseline information for what is now the Cayuga Lake Watershed Restoration and Protection Plan.[1] This Plan identifies the two top threats to water quality as pollution from sedimentation (soil erosion), and phosphorous (a nutrient). To a lesser degree, heavy metals, coliform bacteria, pesticides, organic compounds, and exotic organisms were also identified as concerns.

A Watershed Approach

Understanding what a watershed is helps us discern how to tackle water pollution. Simply put, a watershed is all the land contributing rainfall to a given body of water. A watershed functions very much like a funnel with the water running downhill to the bottom, where the lake or stream is located. When rain falls it moves with gravity from higher ground to lower ground. Any water not quickly evaporated finds its way downstream through a system of road ditches, wetlands, ponds and creeks flows, eventually reaching the lowest point of the watershed, in this case Cayuga Lake. Groundwater, water below the earth's surface, is also slowly moving towards the lowest point. The highest points of land form the watershed divide between waterbodies. Rain that falls just outside of the Cayuga Lake Watershed contributes to the watersheds of Seneca Lake, Seneca River, Owasco Lake or the far away Chesapeake Bay.

What people do on the land – the way we live, work and play – is every bit as important to the watershed as the wetlands, ponds and streams where water travels. The Cayuga Lake Watershed covers 864 square miles and is home to more than 140,000 people. Every time you wash the dishes, do laundry, walk the dog, wash the car, change the oil, fertilize the lawn, or apply pesticides, a chain of events affects the watershed in some small way. Even if you don't live near a stream or the lake, wash water from your home is slowly making its way down to Cayuga Lake.

The south end of Cayuga Lake was originally a lush cattail marsh that filtered out sediments and nutrients from tributary waters before they reached the lake. Starting in the early 1900's this natural area, known as Renwick Marsh, was filled to reduce the risk of malaria and to make developable land.

The soil and vegetation have been naturally filtering and cleaning the water for millions of years. However, human activity can overwhelm nature's processes. With an ever-increasing number of people on the planet – and no new water – we rely on technology such as wastewater treatment plants to cleanse "used" water. While they can be very effective, only a small portion of the water we use ever gets directed into wastewater systems for treatment. And even if we could divert all our water to a treatment plant, taxpayers would find it prohibitively expensive.

You Hold the Solution to Water Pollution

People are smart and adaptable and no one wants to intentionally pollute the environment. Given a little accurate information we can each form simple, economical habits that benefit us and protect life-giving water for future generations. The Cayuga Lake Watershed Network has brought this information together for you in *Smart Steps For Clean Water*. This guide is organized to help you find the areas most relevant to your situation. It's easy to get started. Each section provides background information followed by specific action steps from which you can choose. Start with "Across the Land" to get the big picture then skip to whichever sections most interest you.

[1] An electronic copy of the Cayuga Lake Watershed Restoration and Protection Plan is available online at www.cayugawatershed.org and available on a CD-ROM from the Cayuga Lake Watershed Network.

The Cayuga Lake Watershed, the largest of the Finger Lakes watersheds, covers 864 square miles. It is part of a larger system known as the Oswego River Basin. This basin carries water from seven of the Finger Lakes, plus other streams and lakes as they drain north into Lake Ontario, one of the five Great Lakes. Together, the Great Lakes contain one-fifth of all the world's available fresh water. The health of our watershed is part of what determines the health of this vast and precious fresh water resource.

Canoga Marsh, a large shoreline wetland, provides food and shelter for resident and migrating waterfowl.

Lake levels are controlled by 6 gates at the north end of the lake, immediately west of Mud Lock.

PHOTO: BILL HECHT

Great Gully is one of the many ravines with picturesque waterfalls and delicate wildflowers.

In the 1800's steamers such as the Frontenac helped lakeshore resorts such as Sheldrake to flourish.

PHOTO: BILL HECHT

Unusual wetlands, called fens, are found near the headwaters of Fall Creek.

In ancient times, rivers here flowed to the south until they were dammed by debris from a melting continental glacier. As a result, the south end of the watershed is hilly compared to the flatter terrain at the north end.

Across the Land

PHOTO: BILL HECHT

Stormwater rushing across the land can cause water quality problems and flooding downstream. Keep pollutants out of the path of stormwater to keep it clean. Slow the flow of runoff so it can soak in.

PHOTO: KELLY SOMERLOT

Rain gardens capture runoff, allowing it to soak into the ground, filtering out pollutants and reducing flooding.

Stormwater Runoff: Always on the Move

Under natural conditions, rainwater and snowmelt can meet a number of fates. Some of the water soaks into the soil replenishing groundwater, some evaporates, some is taken up by plants and some runs over the land on its way to streams and lakes. Natural landscapes lush with trees, shrubs and herbaceous plants provide vital services for the watershed by slowing the water's flow, taking up nutrients and acting as living filters. When we alter natural landscapes, we alter these services, frequently causing problems with water *quality* and water *quantity*.

Keep It Clean: As stormwater moves across the land it picks up soil, excess nutrients (such as phosphorous and nitrogen), pet waste, pathogens, toxic chemicals, motor fluids, and trash. These tainted waters move quickly via stormwater systems that are made up of roadside drainage ditches, downtown storm drains, and culverts all designed to shunt water untreated to the nearest creek or to the lake. These artificial drainage patterns let less water seep into the ground where contact with plant roots and soil microbes could filter out some contaminants.

Keeping pollutants off the ground and out of the path of stormwater is critical to keeping water clean. Aquatic and terrestrial life – including people – pay the price when the storm runoff consists of more than water. Fish, ducks, and turtles can be sickened or killed from polluted water. People and animals higher up on the food chain can become ill from contact with contaminated water or fish. Additionally, preventing contamination from occuring is more effective and less costly then trying to clean water once it has been polluted.

Let it Soak In: When natural landscapes are altered, frequently there are more hard, non-porous surfaces (like streets, parking lots, roofs, etc) that prevent water from soaking into the ground. In addition, when forests or farmlands are developed for residential or commercial uses, the new roads and buildings have drainage that quickly diverts water away from structures and into the stormwater system. Together these changes mean that stormwater moves more quickly towards the lake and streams.

Storm drains and ditches concentrate stormwater as it is shuttled to the nearest stream. These additions of water collectively cause streams to rise more quickly. As the amount of water in a stream increases, the speed and the erosional power of the water also increases. Stream banks can be torn away, aquatic habitats wiped out and downstream property flooded. With the accumulation of areas impervious to stormwater, larger floods may occur more frequently. Buildings that may have stood by streams for a century may be at risk of flooding as more areas upstream are developed.

In high water, streams naturally flood their banks. Rushing water spreads out in wide, flat areas beside streams called floodplains. The extensive shallow water in the floodplains dissipates both water and the stream's force. Within the flood plains, streams naturally shift their course – cutting banks, and filling in meanders. This makes floodplains among the worst places to

PHOTO: SHARON ANDERSON

Without stormwater management:

- Sediment runoff from a construction site is 10 to 20 times greater than from agricultural lands.
- Each acre of land cleared for development can contribute 10 tons of eroded sediment per year.
- And after construction one acre of impervious cover results in 1 million gallons of runoff per year

pave or construct buildings.

The quick channeling of stormwater to streams changes low flow as well as high flow. When rainwater and snowmelt soak into the ground it replenishes, or recharges, the water below the earth's surface. This groundwater interacts with water on the lands' surface – the lakes, wetlands and streams. Between rain events, the majority of the stream's flow comes from the release of groundwater to surface water. When water is prevented from soaking into the ground – because it is directed to the creek so quickly – the groundwater is not replenished. Therefore, less is available to be slowly released, feeding the streams during periods of no rain. The result can be unnaturally low stream flow between storms, which stresses fish and other aquatic life. Similarly, reduced recharge may result in insufficient groundwater to replenish drinking water wells.

Runoff, flooding and inadequate recharge of groundwater may become more serious as more land is covered with surfaces that are impervious to water. Since 1982, the amount of new land developed in the United States is equivalent to the size of New York State. Land has been developed at more than twice the rate of population growth. Near water, acres developed can increase at five times the rate of population growth. Too often development is done in ways that sacrifice natural areas and harm water quality.

Steps You Can Take...

To Slow the Flow and Keep Streams Clean:

Some of these steps require a little time to accomplish, but in the end, you can create a home environment that requires less work to maintain, offers greater variety, and supports a healthier, safer watershed.

Let your yard act as a giant sponge.
Direct flow from roof gutters and downspouts to vegetated, porous areas where water can soak into the soil. Keep it away from pavement, bare hillsides, and gullies. Consider collecting the runoff in a rain garden, which holds water for no more than 2 days before it soaks into the ground. Visit www.cayugalake.org for ideas. Maximize your lawn's ability to catch and hold water, by keeping grass dense and healthy (see "On the Lawn", page 9). If you have wet areas in your lawn, rather than fill or drain them, replace grass with some of the many plants that thrive in wet areas such as ferns, beebalm, astilbe and foam flower.

Avoid creating new paved areas.
Use gravel, bricks spaced with grass, or other porous options for patios, parking areas and walkways around your home.

Pick up after your pet.
Pet wastes may contain as many as 75 diseases and viruses such as salmonella, and giardia, among other pathogens. There are over 53 million dogs in the United States, which create an estimated 6.3 billion pounds of poop per year. If you dispose of dog poop down the toilet, the wastewater system will treat it. Otherwise, contain it in a plastic bag and throw it in the trash.

Never dump wastes or hazardous liquids down a storm drain or on the ground.
They flow untreated into groundwater and streams.

Keep woody plants on steep slopes and along creek banks and lake shorelines.
A mix of trees and understory shrubs will slow runoff and hold soil in place better than a lawn or other groundcover. Trees and shrubs, and the soil microbes associated with them, also filter out pollutants.

Retain wetlands...
if you are lucky enough to have some on your property. They are special ecosystems that naturally purify water and provide vital wildlife habitat. You may want to consider a conservation easement on your property for long-term protection of these watershed assets. Contact the Finger Lakes Land Trust for details.

Keep buildings off the floodplain.
Since creeks will naturally flood and change their course and the lake level fluctuates, set buildings (even small sheds) far back from the water's edge.

Protect your local creek.
Volunteer to plant trees and help with a creek or shoreline trash cleanup. Or become a creek water sampler. Citizens in several creek watersheds regularly collect water samples to learn about the health of their creeks. If your local creek doesn't have a protection group yet, why not start one? The Cayuga Lake Watershed Network can help you get started or connected to other sub-watershed groups.

Support local government efforts to protect water resources.
Encourage stormwater ordinances and legislation that are protective of wetlands and vegetative buffers along streams. See that water quality protection is included when comprehensive plans are reviewed.

In Your Home

Everyday choices at home can make a difference to the health of your family and the environment – and even to your wallet.

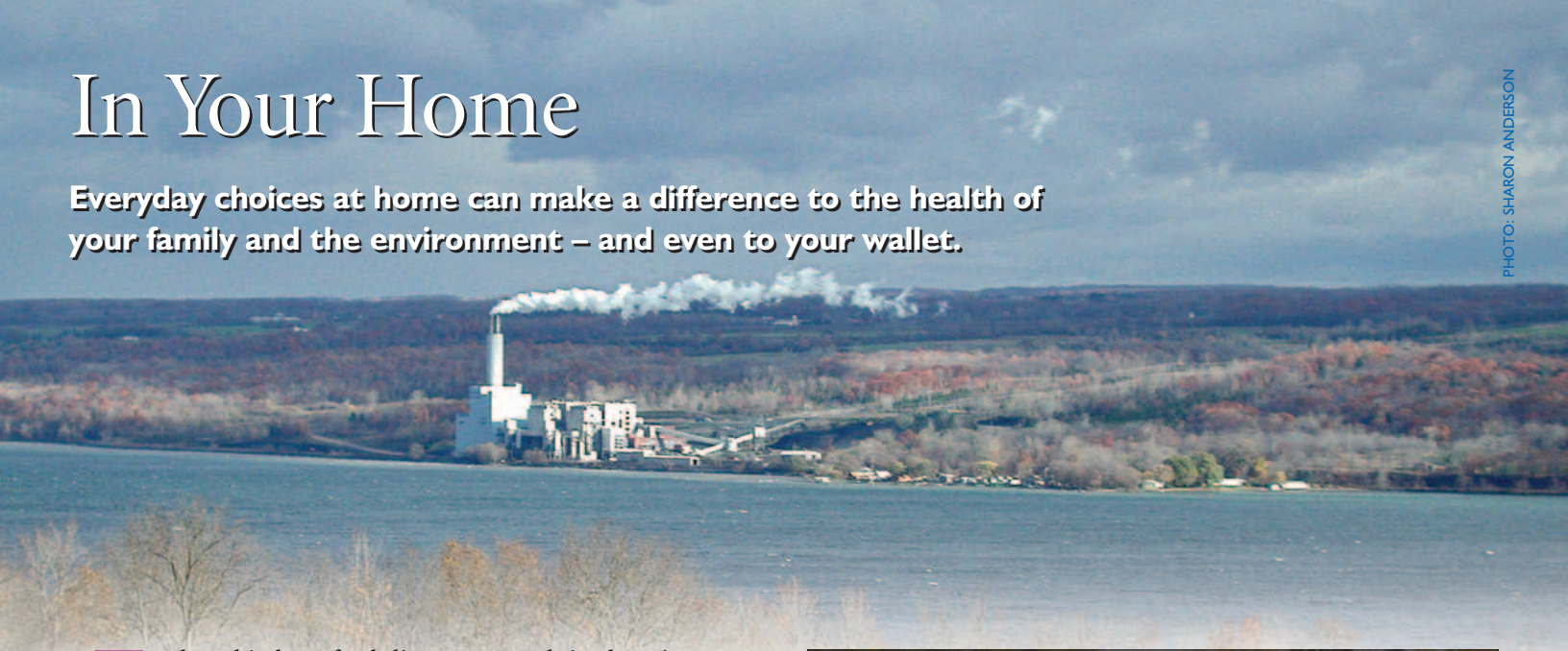

PHOTO: SHARON ANDERSON

A clean kitchen, fresh linens, warmth in the winter, and cool in the summer – these comforts make a home welcoming and comfortable. Our homes are our havens – and a place where we have great influence. This makes a home an ideal place to put into practice *Smart Steps for Clean Water*.

Home Energy Use

The typical household spends $1,500 a year on energy bills. Running an energy-efficient household can save you up to 30% – that's $450 every year. Pay particular attention to heating and cooling habits, which accounts for about half the energy used in homes.

It may surprise you how much energy efficiency can also help protect the water you drink and the air you breathe. Greenhouse gases, including carbon dioxide and other air pollutants, are collecting in the atmosphere like a thick blanket, trapping the sun's heat and causing the planet to warm. This global tread, referred to as global warming or global climate change, is expected to bring more severe weather conditions, including more hurricanes, flooding and droughts.

Coal burning power plants supply much of the electric power used in homes. These plants are the largest U.S. source of carbon dioxide pollution, producing 2.5 billion tons every year. That's nearly double the amount created by automobiles. If all Americans buying news appliances chose ones with "Energy Star" ratings over the next 15 years the reduction of greenhouse gases would be equivalent to taking 17 million cars off the road.

Plant new trees strategically. *If well placed, trees will provide shade over your home during hot summer months, reducing your expenses in air conditioning. Come fall, leaves drop, and the sun helps warm your home, reducing winter heating costs.*

Power plant that burn fossil fuels also release mercury, a potent neurotoxin that especially affects children. Once airborne, mercury settles into lakes, rivers, and oceans and contaminates fish. When humans and wildlife eat these fish, the mercury is passed on. New York and other states have issued advisories to limit the consumption of fish caught in the Great Lakes regions, where mercury is a pervasive pollutant.

Look for the "Energy Star" label when shopping for an appliance.

Energy Star is not a brand or model – it is a government rating system established to help customers quickly find energy saving appliances. Products rated "Energy Star" are the same or better than standard products, only they use less energy. To earn the Energy Star rating, they must meet strict government energy efficiency criteria.

Steps You Can Take...

To Reduce Energy Use And Greenhouse Gases:

These steps will save you money while maintaining or even increasing the comfort of your home.

Service your heating system annually...
and regularly replace any air filter. A dirty system can increase energy costs and damage the equipment, leading to early failure.

Turn down the thermostat and still stay warm.
A programmable thermostat can be set to automatically turn down the heat each night then turn the heat on again to warm the house before you get up. Add to your savings by turning down the heat a few degrees and increasing the humidity; your home to will feel just as warm. Together these can save up to $600 a year in energy costs.

Use fans and open windows to ventilate your home.
Fans use one-tenth the energy of an air conditioner. If your home comes equipped with an air conditioner, try setting it above 75F. Each degree above 75F saves 3% of the energy used to cool your home.

Turn down your water heater to 120 degrees...
and turn it off before leaving home for four days or longer. It can account for up to 1/3 of a home's heating costs. Many dishwashers will heat the water if it needs to be hotter.

Seal doors and windows to stop drafts.
Add insulation and fix leaks in heating and cooling ducts. A qualified contractor can perform an energy inspection of your home and suggest more ways to increase energy efficiency and save money in the long run.

Replace 5 or more of your most frequently used lights bulbs...
with energy efficient compact fluorescent lights or bulbs with Energy Star ratings to reduce energy use and reduce emissions.

Purchase power from less polluting sources...
that don't produce greenhouse gases, such as wind power. Locally, the Town of Caroline purchases all its power from wind energy. Voluntary contributions from citizens make up the cost difference.

Select a new appliance with an Energy Star label.
Products with superior energy efficiency exist for refrigerators, clothes or dish washers, heating and cooling systems, entertainment centers and much more. Talk to your local appliance dealer or visit www.energystar.gov to learn more.

Speak out.
Technologies exist today to decrease pollution from power plants and to make cars that run cleaner and appliance that are more efficient. The challenge is to use these solutions. Urge your elected officials to support energy-efficient legislation and reduce toxins like mercury that pollute our air and water.

De-Toxify Your Home

Cleanliness is an important part of keeping your home safe for you and your family. We are fortunate to have available products to meet every conceivable household cleaning need. Unfortunately, some everyday household products contain chemicals that can cause human health problems ranging from mild skin irritations, to mental retardation, to cancer.

Products you use at home may also cause environmental health problems when they are washed down the drain, when they evaporate into the air or are disposed of in a landfill. Nationwide, just the unused household chemicals that are thrown away each year total 14 million pounds of hazardous waste.

Without lowering your cleaning standards you can reduce the risk to your family and our water. Choose the least toxic option that will get the job done. Buy only what you will use and use no more than is needed to be effective. Safely store and dispose of containers.

While not toxic, phosphorus is an ingredient in some cleaning products that causes water quality concerns. Though it was banned from laundry detergents, it is still found in dishwasher detergents and other cleaners. Phosphate is one of the top concerns in the Cayuga Lake Watershed, contributing to algal blooms and excess growth of water weeds. Look for low or no-phosphate products.

Hazardous substances are not limited to cleaning products. Only a few decades ago lead was commonly use in house paint, water pipes, coins, and some types of glass. Lead never breaks down into a harmless substance; it lasts forever in the environment. In children and infants even very low levels of lead can slow mental development and cause behavioral problems. At higher levels, lead can damage the nervous and reproductive systems of adults as well.

Lead-based paint is the most common source of high lead exposure for children. Most exposure comes from contact with common household dust rather than from children eating paint chips. Vacuum and dust regularly to

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In Your home *continued from page 7*

remove tainted dust.

To remove lead paint hire a trained professional. When scraping non-lead paint or remodeling use a tarp to capture debris. To dispose of it with your household trash, double bag it, twist the top tightly closed and tape shut.

Many other substances that originate in homes are being found in waterways. This raises concern precisely because the health affects to humans or to the environment are not fully understood. For example, little is known about the danger of flame retardants found in the state's waters. More research is needed on these chemicals, which are widely used in foam for furniture, insulation, resins and adhesives.

A large group of products are lumped together under the label of pharmaceuticals and personal care products (PPCPs). Examples of PPCPs include commonly used items such as insect repellants, anti-bacterial soap, caffeine, pain killers, steroids, birth control pills, cholesterol reduction drugs, antiperspirants, and fragrances added to numerous products. PPCPs end up in our wastewater system when we shower or flush. Wastewater treatment systems (including home septic systems) are not designed to remove these products. This is illustrated in a US government study that detected PPCPs, at least at very low levels, in 80% of the waterways tested. Locally, the Finger Lakes Institute began studying PPCPs in some of the Finger lakes in 2005.

Little is known about the health affects of low levels of PPCPs found in water. The risk is likely greater to aquatic life than humans since drinking water treatment can remove many of the PPCPs. Some of the PPCPs found in waterways are known to disrupt the hormones and sexual development of some fish or other animals.

Proper disposal of PPCPs is a complex issue. As a way of handling unwanted medications, some communities in the US and other countries have undertaken carefully planned "take-back" programs for unused pharmaceuticals. They combine protection of human health with protection of water supplies.

Steps You Can Take...

To Keep Domestic Chemical Out of Our Water:

Remember the general rules of using the least toxic option, using the minimum needed to do the job and storing all chemicals safely.

Decrease the frequency of oven cleaning.
Bake food in appropriate containers, or put a cookie sheet on the lower rack to catch spills.

Seek out cleaning products that are non-toxic and don't contain phosphorus.
Read the product label or make your own effective cleaners, which frequently cost less. Visit the Smart Steps section of www.cayugalake.org for recipes.

Reduce the need for pesticides in and around your home.
Create physical barriers by plugging holes and closing screens. Clean regularly with a small amount of non-toxic cleaner. This discourages vermin such as ants (by disrupting their scent trails), and gets rid of food odors attractive to mice and moisture that lures cockroaches. Wiping up spills immediately has the added benefit of reducing staining.

Keeping surfaces dry to reduce the need for disinfectants.
Bacteria, mildew, and mold cannot live without moisture.

Detour rodents.
Keep bird feeding areas clean. Elevate compost piles or enclose with 1/2 wire mesh. Feed pets at regular times and remove uneaten food. Store pet food, bird seed and trash in secure metal, ceramic, glass or heavy-duty plastic containers. Remove possible nesting sites by clearing clutter, especially cardboard boxes, from inside and outside. Move stored items such as firewood and garbage cans away from the house.

Support research on flame retardants and PPCPs...
to increase understanding of their transport, break down and health affects. Urge the NY state government to follow Maine's example and legislate a PPCP take-back program to minimize the accumulation of drugs in our waters.

Choose unscented products...
when they are available.

Dispose of household waste responsibly.
Read the label for instructions on how to safely dispose of toxic products or the container once empty. Alternatively, call your landfill or recycling center to find out if there are periodic Hazardous Waste Drop-Off Days where you can leave your toxic products. Toxic chemicals should never be flushed down the toilet or sink, or poured on the ground or down a storm drain.

On the Lawn

Grow a lush green lawn to ward off pests and reduce dependence on chemicals controls.

The U.S. has 20-30 million acres of lawn, making lawns the 5th biggest crop in the US (behind corn, soy, wheat, and hay). A scant 10-20% of lawn owners use soil tests prior to applying fertilizer. As a result, more than half of the lawns are over-fertilized. On average, acre for acre homeowners use ten times more chemical fertilizers and pesticides than farmers.

(Adapted from www.watershed-pledge.org and Home*A*Syst)

Lawns are prominent features of most home landscapes, providing both environmental and aesthetic benefits. They are attractive green carpets that complement and tie together the property. Second only to trees and shrubs, dense grass reduces noise, cools the property during the summer, and improves air and water quality. Lawns are vital for retaining soil and reducing erosion on slopes and they even filter out some pollutants. Their shallow root systems make them ideal over septic system drain fields. Healthy lawns are safe and comfortable places on which to play and relax outdoors. It is no wonder so much time and energy is spent maintaining them.

Have A Green Lawn And Clean Water Too

You can have a green lawn while protecting water quality by following Integrated Pest Management (IPM). This fancy term is an organized way of growing healthy plants and using the least toxic techniques to manage pests. Although it requires a bit more patience, over the long run it has proven to be effective and beneficial to humans and the environment. The key to IPM is creating a healthy lawn because healthy grass has a far better chance of fending off pests.

When fertilizers and pesticides are deemed beneficial, use the smallest amount needed and apply at the appropriate time. Take care to keep chemicals away from environmentally sensitive areas such as near water bodies and drinking water wells, where the soil is sandy, or if the soil layer above bedrock or groundwater is thin.

A recent survey of home lawns in nearby Monroe County found that only 20% had a grub problem that required the wide-scale application of grub killer. This means that most homeowners who apply grub killer to their entire lawn are wasting both their money and their time. After switching to IPM one resident noted, "These simple lawn care practices mean I will save hundreds of dollars on fertilizers and lawn chemicals that I no longer need to buy."

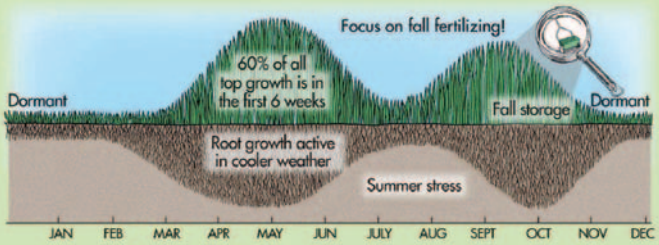

IMAGE: CORNELL COOPERATIVE EXTENSION

Since most lawns are privately owned and maintained, it is up to each one of us to treat our part of the lawn patchwork with care, knowing that it ultimately affects water quality downstream. If applied incorrectly, lawn fertilizers and pesticides may find their way underground as invisible, dissolved compounds. Carried by groundwater as it moves below the land's surface, pollution can spread and contaminate drinking water. Once contaminated, water may remain unusable for years or even decades since polluted water is very difficult and expensive to clean.

If you use a lawn care service choose one that follows IPM and customizes care to your lawn's needs. Many companies use a "one size fits all" standard mix of fertilizers and pesticides, which may not be the right amount for your lawn. Also encourage municipal parks and schools to follow these principles.

In order to appreciate the steps of IPM, it helps to understand basic information about fertilizers and pest control.

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Integrated Pest Management is as easy as these steps:

1. Test your soil for pH and nutrients
2. Fertilize based on soil nutrient test results
3. Choose grasses adapted to the conditions of your site
4. Mow to encourage healthy growth
5. Water properly (if at all)
6. Treat pests with the least toxic method

On the Lawn *continued from page 9*

Fertilizer Facts and Fallacies

Most lawn fertilizers contain three nutrients – nitrogen, phosphorus and potassium (N-P-K). Each bag of fertilizer lists the percentage, by weight, of N-P-K such as 21-3-20. Although these nutrients are needed to have a dense, healthy lawn, some homeowners apply up to seven times the amount of fertilizer that grass can use. To find out the amount of fertilizer that could benefit your lawn, have the soil tested for nutrients. Soil test results indicate the amount of fertilizer to apply over the course of one year. Applying extra nutrients wastes your money and can harm, rather than help, your lawn. Too much fertilizer can also harm our water.

If plants can't use all the nutrients that are applied those nutrients may run off or seep into groundwater. Increased amounts of nutrients entering waterways can stimulate algae blooms and the growth of water weeds. Boating, swimming and fishing become difficult and lakes and streams look, smell and taste bad. The cost of treating public water supply may increase in order to remove bad tastes caused by excess algae.

A Time for Everything

Correct addition of nutrients promotes healthy grass; a soil test will tell how much a particular lawn needs. New lawns, especially those established on heavily disturbed soils, benefit from added nitrogen (N). Even established lawns typically need some added nitrogen each year. Nitrogen is important for dark green color and for increasing turf density that reduces runoff. But remember, too much nitrogen actually weakens the turf and unneeded amounts of nitrogen can contaminate groundwater.

Phosphorus (P) is beneficial when new grass is planted because is helps with seed germination. Once the lawn is established turf typically needs little to no extra phosphorus. In other words, no benefit comes from adding more. Potassium (K) is needed to help improve the turf's tolerance to drought, high and low temperatures and wear stress.

The best time to apply fertilizer is early September (around Labor Day). The recommended amount can also be divided in half for an early application mid-May to early June (around Memorial Day). Avoid the temptation to apply fertilizer in early spring or late fall. Your grass may green up sooner in the spring but this practice will not encourage the dense root system needed to prepare the turf for harsh summer conditions. Also, there is the possibility of fertilizer leaching out of the soil with spring rains, before plants are growing enough to take up nutrients.

And speaking of timing, the best time to seed a lawn is late summer to early fall. Cool temperatures prompt root growth, the foundation of a healthy lawn. If you need to seed a lawn in the spring, follow the steps in the Home Lawn Bulletin (IB185), available through Cornell Cooperative Extension.

Keep Pests in Perspective

The first step in pest (insect, weed or disease) control is following good fertilization practices that promote healthy grass. Healthy grass can better ward off pests of all kinds. The next step is early detection and diagnosis of problems, which can allow you to reduce or eliminate pesticide use.

Periodically check your lawn for insects, weeds and diseases and familiarize yourself with the lawn's natural cycles. If there is a problem, correctly identify the pest and the extent of its damage before deciding if treatment is necessary. With insects this is important because healthy lawns can take a certain amount of insect pressure without suffering any damage and many insects found in lawns are not even harmful. Some weeds attract beneficial insects and some enhance a landscape by adding beauty or being edible. Lawn diseases are primarily caused by fungi. The few fungi that are potentially harmful usually can co-exist with grass without damaging it as long as the grass is not stressed by improper lawn maintenance or environmental conditions.

After you have identified the problem ask yourself these questions. How serious is the problem? Is it affecting a small or large part of your lawn? Is action really necessary? If so, think what changes you can make (in watering, mowing and fertilizing practices) to improve turf density so the lawn can better deal with pests. Before turning to chemical treatment investigate alternatives. For example, when it comes to managing weeds some can be dug or pulled out. Mowing will take care of taller weeds. In areas where the turf is thin, you can plant new seeds to stop weed encroachment, which has the added benefit of preventing soil erosion.

Frogs exposed to a mixture of pesticides were studied by researchers at U.C. Berkeley. The level of each pesticide was well within levels considered safe. Yet, the mixture suppressed the frogs' immune systems resulting in deadly infections and the development of tadpoles was slowed, reducing chances of survival.

Steps You Can Take...

For an Integrate Pest Management Approach to Lawn Care:

Applying excess chemicals to your lawn wastes your money and time and can threaten our waterways. A healthy lawn is the best defense against pests.

1 Test your soil for pH and nutrients.

Before selecting or planting new grass, or deciding to apply fertilizer, know the existing soil conditions. Soil pH and fertility are determined by analyzing a composite soil sample from different locations throughout your lawn. Fertility describes the presence of nutrients and minerals in the soil, while pH measures acidity/alkalinity levels. Together the results tell what, if any, soil amendments are needed. Soil testing is recommended every three years. For soil sampling instructions and soil testing fees check with your local Cornell Cooperative Extension office.

2 Fertilize based on soil nutrient test results.

A soil test analysis details how much fertilizer is needed in one year for the specific grass you are growing. Fertilize once in early September, or divide the recommended amount in half and apply the first half in mid-May to early June and the second half in early September. Remember, there is no benefit from over fertilizing your lawn and this practice wastes money and may harm the environment.

Sweep up any fertilizer that lands on driveways or sidewalks. Do not use fertilizer beside water bodies and consider having a buffer of trees and shrubs between your lawn and a waterway.

3 Choose grasses adapted to the conditions of your site.

Select a grass mixture adapted to your site, such as a shady seed mix for a shady site. Buy the best grass seed you can – one with improved varieties that may be naturally greener in color and have more resistance to pests. Do not buy cheap or bargain-bin seed; you will pay for it later. Cheap seed often contains "undesirable species" (such as clump forming grasses better suited for pastures) and some even contain a high percentage of weed seed.

Keep in mind that a site that is too steep, too shaded or too acidic may be more suitable for a ground-cover than a lawn. Instead of grass consider perennials that require little or no supplemental water, pesticides or fertilizers. Some groundcovers such as ajuga, creeping thyme and *Mazus reptans* will tolerate being walked on, as long as the foot traffic is light.

4 Water properly (if at all).

If you must water do it right. Over-watering can be harmful. Healthy, actively growing grass thrives on 1 inch or less of water per week. To measure the amount of precipitation use a rain gauge, which can be as simple as placing a can in your yard. If supplemental watering is desirable, the best time to water is early morning when evaporation losses are low and leaves dry quickly. Cool season grasses will naturally go dormant in the summer. You can let nature takes its course knowing the grass will grow and be green again when rains increase.

5 Mow to encourage healthy growth.

Set the mower height for 3 inches or higher and remove no more than 1/3 of the grass height with each mowing. Keeping the grass longer means mowing less often. Even so, you may need to mow twice a week during the peak growing season. If you keep up with mowing, leave the clippings on the lawn because they supply some nitrogen. If you must remove them, compost them or use them as mulch around landscaping. Do not dispose of grass clippings in water bodies, wetlands or in the street where they can get into the stormwater drainage system.

Sharpen mower blades after every 4 to 6 hours of use. Dull mower blades shred the ends of the grass. This increases the potential for disease and lawn browning and it uses more fuel.

6 Treat pests with the least toxic method.

Following the steps above will help keep your lawn dense and healthy, able to fend off much of the damage caused by pests. If you still have problems, choose the least toxic option that is likely to be effective. Then use only as directed, taking precautions to protect your family and the environment.

For help with identifying pests and for guidance on alternative pest management strategies, contact Cornell Cooperative Extension. They will help you decide if pesticide treatment is appropriate, which pesticide to use, and when and how to apply it effectively and safely. Note that if you decide to apply pesticides, some counties, such as Tompkins, have laws requiring that neighbors be notified. Contact your county Department of Health to ask if your county has a Neighbor Notification Law and if so, follow correct procedures.

From The Well

Homeowners with wells can provide their family with the best drinking water available by taking a few simple steps.

Water is vital to all life. Turning on the tap most of us are fortunate enough to get cool, clear, life-sustaining water. Keeping clean water running takes special care for those not connected to a municipal or community water supply. Families and landlords with private drinking water wells have sole responsibility for ensuring their drinking water is safe and plentiful enough. A private well usually provides clean drinking water as long as it is properly constructed and maintained. But without proper care, drinking water can become contaminated, leading to added costs and serious health risks.

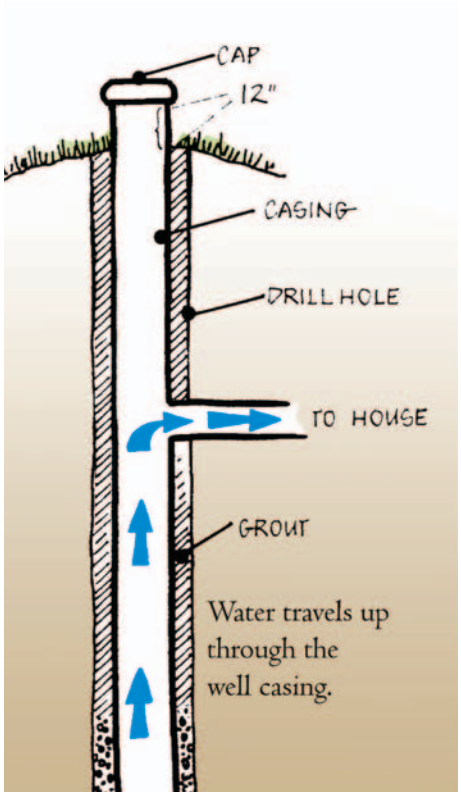
Understanding Your Well

Ideally, a well draws water from deep underground that is free from bacteria, viruses, other organisms, and chemical pollutants. The safest wells are drilled wells designed to let only groundwater into the well. Groundwater is the water below the earth's surface that fills in the spaces between soil particles and fractures in rocks.

During the construction of such a well, a steel or plastic pipe casing is installed. The well casing extends above the ground at least one foot, ending with a well cap. The well cap fits tightly and has a downward facing, screened vent to keep out vermin and insects. The ground slopes away from the well casing so that water will drain away. The space between the casing and the soil around it is sealed with grout, usually cement or special clay called bentonite. This grout prevents rainwater from running down the outside of the casing where it might enter the well without the benefit of being filtered through the soil. Rain that flows over the land's surface can carry contaminants.

Beyond a properly constructed well, you can ensure that your well is free of contamination by having the water tested at least annually. Coliform bacteria and nitrate are two excellent indicators that are commonly used to assess the overall health of a well. Their presence indicates that the well is susceptible to contamination, and that other more harmful organisms or chemicals may be able to enter the well. Laboratory testing for bacteria and nitrate is relatively easy and inexpensive. If a test of your well water shows any coliform bacteria or levels of nitrate above 10 milligrams per liter, contact your county Health Department for further advice and assistance. Contamination from a failing septic system is a common culprit when bacteria or nitrates are found in drinking water.

Septic systems – both your own and your neighbors' – should be at least 100 feet away and preferably downhill from your well. Even the wastes of pets and wildlife in the well area can threaten drinking water with bacteria and nutrients. Hazardous chemicals (all fuels, paint, fertilizers, pesticides, etc.) if spilled or used too close to a well can pollute drinking water.



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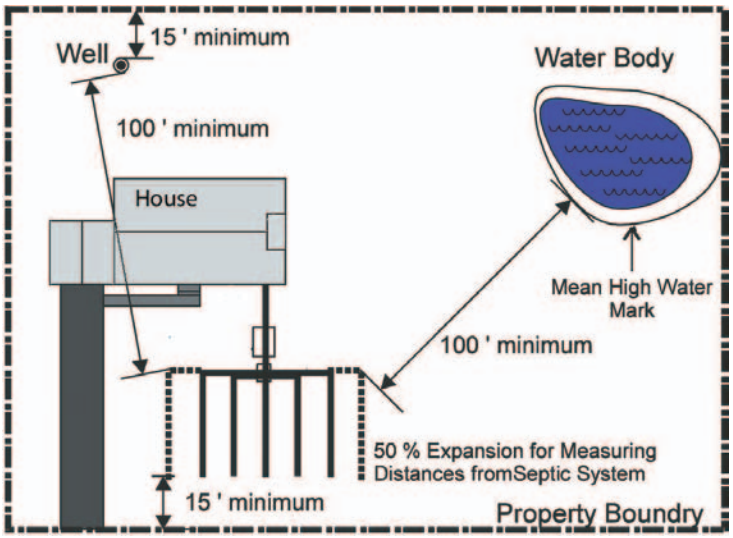

A well should be 100 feet from any septic system.

Underground tanks were once common for storing home heating fuel. We now know there are better ways. Metal underground tanks can rust through without anyone noticing. By the time a leak in an underground tank has been identified, chances are the groundwater has already been contaminated. If you have an underground storage tank that is still in use, your fuel provider should inspect it annually. When possible, underground tanks should be replaced with above ground storage tanks that can easily be inspected for damage.

Contaminants on the ground's surface in one area can seep into the ground and move unseen to another area via the groundwater. Polluted groundwater is very difficult and costly to clean up. Once deep underground, pollutants may persist for a long time because of the scarcity of microbial organisms and the lack of light, heat, and oxygen that can normally break them down. Since some pollutants can travel long distances, protecting drinking water is truly everyone's responsibility.

Steps You Can Take...

To Protect Your Well Water:

Test your water at least annually for coliform bacteria and nitrate...
(and keep records of the results and date). Test more often if there is a formula-fed infant, or a pregnant or nursing mother in the household; if someone develops an unexplained illness; or if you notice a change in taste, odor or appearance of your water. If you suspect contamination from a historical use or upstream source, you may want to run additional tests for the presence of suspected pollutants. All water testing should be done by a state certified laboratory (they follow rigorous quality control measures). A list of certified laboratories can be obtained from the county Health Department.

Inspect your well periodically such as before your annual water test.
Check the fit of the well cap and the integrity of the screen. Ensure the ground slopes away from the casing and that it is securely seated in the ground. Make any repairs before testing your water since repairs may let in bacteria.

Disinfect your well any time you remove the well cap or make repairs to your water system.
The process is commonly called shock disinfection or shock chlorination. County Health Departments have detailed instructions. You will need to wait until chlorine from the shock disinfection process is no longer present in the well water before taking a water test.

Properly use and dispose of hazardous chemicals
such as fuels, paint, fertilizers, and pesticides. Keep them away from the well.

Underground storage tanks should be replaced...
when practical. Remove tanks no longer in use. Annually inspect tanks currently in use.

Keep animal wastes away from your well.
Pick up after your pets. Pet waste can be flushed down the toilet or wrapped and thrown in the trash. Place bird feeders and other wildlife attractants at a distance from your well.

Pass on to the new owner all information available...
about the well when you sell your house.

Down the Drain

A few preventative steps can significantly improve your septic system's efficiency and save you money over time.

PHOTO: SHARON ANDERSON

Wastewater from rural homes is usually treated on the property by what is commonly called a septic system. When septic systems are properly designed, installed and maintained, they are an effective and economical way to treat wastewater. Regular maintenance can prolong the life of your septic system and is a wise and cost-effective investment. However, when water from a residential well is unsafe to drink, one of the most common culprits is a septic system that is failing to treat wastewater and sewage. A failing system poses serious health threats to you, your neighbors, and the watershed. Plus, repairs or replacement costs range from hundreds to thousands of dollars.

"Out of sight, out of mind" is too frequently true when it comes to treating wastes. Let's change that by looking at how a septic system works and exploring how maintaining these on-site wastewater treatment systems protects human and environmental health.

Understanding On-site Wastewater Treatment

A typical system removes and breaks down contaminants in a two-step process. First, wastewater from your home flows into a septic tank. There, heavy solids settle to the bottom forming a layer of sludge. Light solids and grease float to the top, forming a layer of scum. Bacteria begin to break down the solids into nutrients, gas and water. The partially treated wastewater between the scum and sludge layers is called effluent. In order to keep the layers from mixing, the tank contains two barriers known as baffles or tees. They aid the separation process by controlling the flow of water. The outlet baffle is especially important because it keeps the scum and the sludge in the tank as the effluent moves to the second step of the treatment process.

In the second step, effluent flows out of the septic tank into a distribution box that delivers the liquid into perforated pipes that then allow the water to disperse into the soil. This specially designed area of gravel and soil is referred to as a leach field, drain field or soil absorption field. Here microorganisms in the soil further purify the wastewater, by using nutrients and destroying harmful pathogens, including bacteria, viruses, and protozoa.

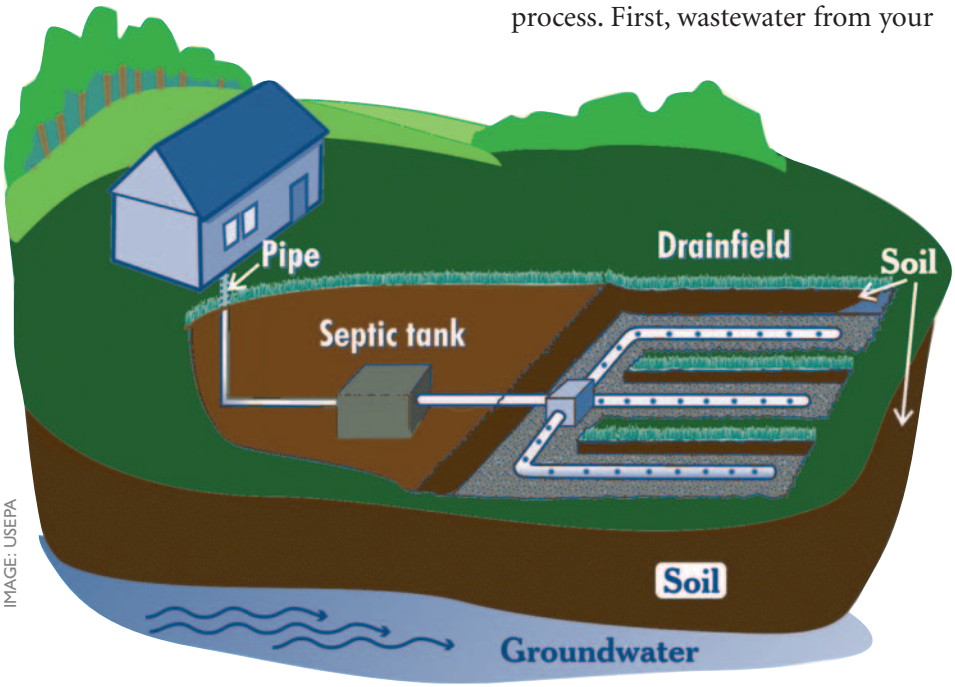

IMAGE: USEPA

As the more solid sludge and scum layers build up in the tank, they must be regularly pumped out by a professional in order to maintain an adequate reservoir for the effluent. Each time the tank is pumped, have the baffles inspected. Regular pumping of the tank and intact baffles together prevent solids from escaping to the drain field where they would cause system failure by clogging the perforated pipes and preventing wastewater treatment. Untreated, pathogens and disease from a failing system can spread via groundwater to nearby drinking water wells, recreational waters and wildlife habitat.

When Good Things Go Bad

Septic systems don't last forever, even when they are maintained properly. On average, a sewage system can be effective for treating wastewater for 15 to 40 years. In addition, older systems may be undersized or too close to bedrock or groundwater for adequate treatment. Watch for one or more of these signs of system failure: sogginess, bright green grass over the drain field, foul odors, and household drains that back up or drain slowly. Addressing these symptoms promptly may allow you to save money by repairing rather than replacing your system. Contact

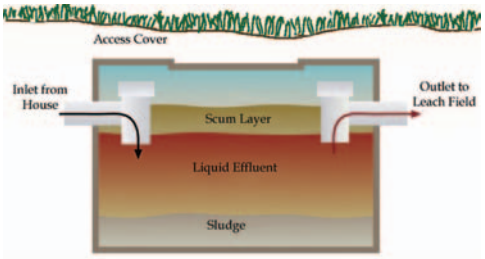

IMAGE: CORNELL COOPERATIVE EXTENSION

your local health department for assistance, information about your current septic system, and for obtaining any necessary permits. Test your well water for bacterial contaminants if you suspect any nearby sewage system is malfunctioning.

Steps You Can Take...

To Help Prevent Septic System Problems:

Septic systems truly are wastewater treatment systems. They process our used water before that water moves on to the lake, a stream… or a neighbor. By acting to prevent and promptly remedy troubles that may be brewing you are being a good watershed citizen plus saving money in the long run.

Have your septic tank pumped and inspected regularly.
This routine maintenance is the most effective way to prolong the life of your sewage system. Annual pump-out and inspection is best if the system is nearing the end of its effective life, is close to the lake or other environmentally sensitive areas, or is undersized for your water usage. Otherwise, every 3 to 5 years is typically sufficient.

Septic tank additives are never needed.
Even a freshly pumped tank contains all the microbes needed to work properly. Some additives merely waste your money while others can harm your septic system and pollute the groundwater.

Grasses and other shallow-rooted plants are the best cover for the drain field.
Since tree roots can clog the distribution pipes in your septic system, it is best to maintain more than a ten-foot separation between any trees and the outer perimeter of wastewater treatment system.

Protect the drain field.
Never pave, erect structures, or drive a vehicle heavier than a lawn tractor over any part of the septic system.

Do not dispose of harmful chemicals down the drain or toilet.
They kill beneficial bacteria and upset the functioning of the system. Proper use of household cleaners and small amounts of paint thinner rinsed away when cleaning brushes will not harm the system.

Conserve water...
by using water saving devices and fixing leaks promptly. This will extend the life of your septic system. In addition, divert water from a basement sump pump and runoff from roofs, patios, driveways, etc., away from your drain field. Extra water saturates the system, reducing its ability to process wastewater. Your wastewater system is designed only to treat household wastewater, not these additional sources of water.

Avoid using a sink garbage disposal...
and don't dispose of food grease down the drain since these dramatically increase the solids that build up in the tank. Likewise, do not use the toilet as a trash can. Paper towels, dental floss, feminine hygiene products, cigarette butts, cat litter, etc., can clog and damage septic system components.

Support local laws...
to have septic systems pumped and inspected regularly.

Encourage municipal wastewater treatment plants to be maintained and operated at peak efficiency.
In areas where soils and groundwater preclude on-site systems from adequately treating waste, support extension of municipal sewer lines.

In Your Car

Reducing fuel use saves you money and reduces air and water pollution.

According to EPA, "If all the oil from American do-it-yourself oil changers were recycled, it would be enough motor oil for more than 50 million cars a year. Imagine how much foreign oil that would eliminate."

Cars represent the ultimate mobility and most people take advantage of this, whether as the driver or as a passenger. Cars are closely associated with convenience, but mechanized convenience doesn't stop there. Some families also own a lawnmower, snow blower, chainsaw, tractor, boat and snowmobile, all of which require the burning of fuel. Even electric engines rely on the burning of fuel to generate electricity. While this section focuses on cars, keep in mind that much of the information on gas, oil and the related emissions applies to other machines as well.

Understanding the Link Between Air and Water Pollution

Every time fuel is burned some fumes are airborne. These fumes contain pollutants such as nitrogen dioxide, mercury and fine particulates that rise in the air to combine with clouds or settle on trees, buildings and other objects where they build up. With nature's next shower of rain or snow, these pollutants are washed back to the ground where over time they will flow into the lake and streams. This interaction between air and water creates one of the links between air pollution and water pollution.

Not only are air and water linked, but also watersheds are linked. For example, clouds blown in from further west rain down on the Cayuga Lake Watershed, depositing their contaminants in our watershed. Water leaving Cayuga Lake carries those contaminants, along with ones added locally, downstream to Lake Ontario and eventually down the St Lawrence Seaway to the Atlantic Ocean. Some contaminants such as nitrogen compounds that aren't a big problem locally can cause havoc in marine environments.

On an even larger scale, use of fossil fuels contributes to global climate change, which is expected to produce more locally-severe weather conditions such as flooding and droughts. When we reduce use of fossil fuel, we reduce the carbon dioxide that contributes to global climate change. For every mile driven in an average size car, approximately one pound of carbon dioxide is emitted. International collaboration is vital for reducing global warming, but high-level agreements are meaningless unless individuals reduce their contribution, sometimes referred to as our "carbon footprint". Visit www.cayugalake.org for links to websites that let you calculate your household's carbon foot – the quantity of carbon dioxide emitted to the atmosphere in one year as a result of transportation, household energy use, and waste disposal.

Sixty percent of Americans change their own oil, generating 200 million gallons of used oil annually – but only 20 million gallons are collected through recycling. This leaves 180 million gallons of used automobile oil that is unaccounted for each year, some of which gets dumped on the ground, in drains and in the trash. Help improve these statistics by recycling used oil. Gas and service stations that change oil and businesses that sell at least 1,000 gallons of oil annually are required by law to accept used motor oil for recycling.

– ADAPTED FROM CHESAPEAKE BAY FOUNDATION.

Keeping Cars – and Water – Clean

Unfortunately, what gets into the air is only part of the picture. Engine grime and oil from unnoticed leaks drips onto roadways and parking lots. With a rainstorm or winter snowmelt, contaminants from miles of roads and acres of parking lots are carried via the storm runoff to groundwater, streams, and the lake.

While large oil spills get a lot of media attention, large spills account for a small percentage of the oil entering our waterways. The amount of oil and grease that runs

PHOTO: SUSAN POWELL

Make the link: Polluted air transfers its pollutants into water bodies via rain and snowstorms. There are five categories of air pollutants most likely to degrade water quality through atmospheric deposition: nitrogen compounds, mercury, other metals, pesticides, and combustion emissions. The largest single source of NOx (various nitrogen compounds) to the atmosphere is the combustion of fossil fuels. Use less fuel, spend less money, and keep pollutants out of the air and water.

ADAPTED FROM WWW.EPA.GOV.

off developed areas every 8 months equals the 11 million gallons spilled by the Exxon Valdez. Because oil and water don't mix, oil spreads out into a thin layer meaning "one single quart of oil can contaminate 2,000,000 gallons of water. Four quarts of oil can form an oil slick covering more than 10 acres." according to the Chesapeake Bay Foundation.

Grime from the roadways also splashes up onto cars. Washing off this mix of dried engine fluids, oil, dirt, salt and heavy metals protects and extends the life of the car. If this grime mixture is bad for the body of your car, what might it do to the nearest body of water? When you wash your car at home, the grime is washed "away" – most likely to a drainage ditch or storm drain that eventually empties into a stream. Next time your car needs cleaning, go to a car wash where the wash water is collected and treated. Water conservation is an added benefit. Washing a car with a garden hose typically takes 25 to 100 gallons of water compared to a self-serve car wash where you can get the job done with only 12 to 16 gallons of water.

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PHOTO: GIANT BICYCLE

PHOTO: SHARON ANDERSON

PHOTO: SALLY ELLER

Shop locally and buy local goods when you can to reduce transportation-related pollution. Shorter transportation distances mean less fuel is burned, which reduces airborne emissions. Plus, there are other benefits. It's easier to learn about and support producers that are good environmental stewards. By supporting local businesses your money stays in the community. Taking agricultural as an example, at a farmers market, 80 to 90 percent of every purchase stays with the farmer and can be re-invested in the community. Produce from local farmers markets and Community Supported Agriculture are likely to be fresher and picked closer to peak flavor.

Steps You Can Take...

To Reduce Fuel Use, Save Money and Protect the Planet:

Even though each individual car, or other engine, represents only a tiny part of the overall pollution problem, the cumulative effect is great. These easy steps have direct benefits to you, your community and the environment.

Keep tires properly inflated.
An estimated one third of the tires on the road are under-inflated and the resulting drag reduces fuel efficiency by as much as 10 percent. Under-inflated tires wear out faster and can make the car harder to handle, contributing to car crashes.

Regularly maintain your car and other engines...
they run better, last longer and are more fuel-efficient. A car in need of a tune-up can cause fuel use to go up 20 percent. A 10 percent increase can come from a clogged air filter alone.

Develop driving habits that minimize gas use.
Go easy on the brakes and gas pedal, avoid hard accelerations, reduce time spent idling and unload the junk in your trunk. Use the car air conditioner sparingly.

Give your car a break.
You can make a difference by eliminating as little as one 20-mile trip by car per week. Is there one day a week you can car pool or take the bus? Can you combine several errands into one trip – which can save you time and gas money as well. Instead of using a car for short trips, can you walk or bike? The resulting exercise has great side benefits.

Not all engines were created equal.
There are dramatic differences in the amount of air pollution and greenhouse gases produced by different models, even within the same class of vehicles (sedan, wagon, SUV, etc.). Select a car that is a good environmental performer relative to other vehicles for a significant reduction in pollution. Ratings are available at www.epa.gov/greenvehicles where those vehicles with the highest environmental scores are given the SmartWay designation.

If you do your own maintenance, dispose of used oil, antifreeze and batteries at recycling stations...
or other official drop-off locations such as a service station or automotive store. Don't mix different types of automotive fluids since doing so can prevent them from being recycled. Containers of these fluids need to be kept out of the household trash because very likely the container will burst when it is compacted in the collection truck or at the landfill, releasing the contaminants. See "Across the Land" on page 4 to learn why these fluids also should not be poured on the ground or down a storm drain.

Take steps to prevent spills and drips.
Use funnels when working with liquid products. Use plastic tarps and drip pans when working on your car and when it's leaking. Fix leaks promptly. If a spill does happen, stop the flow at its source and contain the spill with sand, saw dust or kitty litter. To dispose of the contaminated material with your household trash, double bag it, twist the top tightly closed, double it over and securely tape it shut to avoid spillage.

Use a commercial car wash.
They are connected to water treatment facilities that treat wash water. If you wash your car at home, park it on the lawn (far from wells, streams, wetlands or the lake) so the grassy area and soil has a chance to filter the wash water. Using bio-degradable cleaners with no phosphates helps too.

Drive sensibly in winter.
Highway crews only need to use as much salt as necessary for public safety. Sensible driving is the prerequisite for sensible salting. Salt can damage plants, disrupt fish spawning in streams, disintegrate pavement, and cause metal corrosion of bridges, cars and plumbing. For home use, there are some good alternatives to traditional salt, though some alternatives are high in nutrients and therefore raise other concerns. For tips on sensible de-icing at home visit www.cayugalake.org.

SPEAK OUT FOR CHANGE.

Support diverse transportation options in your community...
such as greenways, bike paths, walkable communities, improved bus service, and Park and Ride facilities. Comprehensive planning is one tool that promotes well-planned towns that produce less air and water pollution. If your municipality chooses zoning, make sure it allows for areas of mixed use such as residential, retail, small commercial building in close proximity.

At the state, national and international levels, support legislation and treaties...
that reduces fossil fuel emissions, gaining truly cleaner air and water. Our planet, our watershed, our future is in urgent need of further reductions in fossil fuel emissions to reach the critical limits required by healthy ecosystems (and to comply with air and water quality standards).

On the Water

What's better than a day by the water? It's a magnet for boaters, anglers, nature lovers, and swimmers. Enjoying the water is the best reminder of why protection is so important.

If you are attracted to a particular feature of the watershed, it is probably because the water is still clean, the surrounding landscape is beautiful, and the air is refreshing. The challenge to each of us is to keep our watershed this way.

'Plus One' — a Step Beyond 'Pack It In – Pack It Out'

More and more people are adopting a "plus one" policy. They take care of their own trash, plus they pick up a piece of someone else's junk. This effort is part of a habit to keep waterways free of both liquid and solid trash — spilled oil, a dirty diaper, a wad of plastic, fishing line, etc. Some trash harms fish, birds and people as well as being unsightly. Keep a trash bag handy, and once you are done enjoying the water, escort all trash to a trashcan. Properly dispose of even biodegradable items. Though they will break down naturally, it usually take months and biodegradable products may have been washed to the Atlantic Ocean before they significantly break down.

Keep Sewage Where It Belongs

This may sound like a nagging parent, but it really is a good idea to use shore restrooms before setting off to swim, fish or boat. Sewage contains harmful pathogens, such as bacteria, viruses, and parasites, as well as being a fertilizer that promotes an overabundance of water weeds. Therefore, Federal law prohibits discharging untreated sewage (even if dosed with a deodorant product) in U.S. waters within three miles of land, which includes all Cayuga Lake.

For boaters, an on-board toilet is convenient. Please use the nearest pump-out service whenever needed and before storing your boat for the winter. For a listing of marinas around the lake that provide pump-out facilities and more information on boating concerns visit www.cayugalake.org.

Healthier Without Handouts

Speaking of wastes… The deposits from ducks, sea gulls and geese are not only unpleasant, they contribute to water pollution. Feeding waterfowl encourages them to congregate in a small area, which can load nearby waters with nutrients and E-coli. And these birds are generally less healthy if they receive bread, popcorn, French fries and the like. These foods lack the variety and nutrition of their natural foods. The resulting concentrations allow disease, such as bird flu (avian influenza), to spread through a flock more quickly and too often the birds feed in the same area they defecate. Over crowding also increases competition for handouts, which puts the weakest and youngest at a disadvantage.

PHOTO: R. IRANI

"A lake is the landscape's most beautiful and expressive feature," wrote Henry David Thoreau. Let's expand that to include the streams, gorges and waterfalls that feed the lake. During hot summer days the cool water beckons swimmers. Adorned in fall colors, the water's edge is the perfect place to watch sunsets and bird migrations. Winter cold snaps set the stage for ice fishing, and the first warm spring days beckon boaters. It's no wonder that "water-based recreation attracts millions of boaters, beach-goers, and anglers …making it the most popular leisure time activity in the country," according to EPA.

BOATING

Keeping Shipshape

If your boat is used in a variety of waterways, watch out for unwanted hitchhikers. Invasive species brought in from outside the Finger Lakes region can cause havoc as they proliferate. Nuisance plants and animals such as zebra mussels, spiny water fleas and water chestnuts can clog boat channels, block swimming areas, and harm fish. Some invasive animals disrupt the food chain, robbing native fish and wildlife of food. Infested waterways decrease property values, hurt tourism, and cost communities money to

continued on page 20

On the Water *continued from page 19*

manage them. Once exotic nuisance species take hold, it is difficult, or even impossible, to get rid of them.

Frequently, invasive species are introduced into new waterbodies by boats, trailers, bait buckets and fishing tackle. Some nuisance species are so small they are difficult to see. To avoid transporting invasive species before moving your boat to another water body pull off all visible plants, animals and mud from the boat's hull, propeller and trailer. Empty bilge water and remove any bait from the live bait wells before they too are emptied. When possible, thoroughly hose down your boat, trailer and equipment before transporting it to another water body. High pressure and/or hot tap water are ideal especially if the boat has been moored for more than a day in a waterbody with zebra mussels. Alternatively, to kill aquatic nuisance species, take the boat out of the water and let it dry on land for at least 5 days, preferably in the sun.

Every boater faces choices when it's time for hull maintenance. To help reduce organism growth on boat hulls, many boat owners apply anti-fouling paints. Most of these paints deposit harmful heavy metals such as copper, mercury, arsenic or tributyltin into the water, where it accumulates. All are severely hazardous to human health and to underwater ecosystems. Seek out alternative antifouling paints based on silicone, epoxy or hydrogen peroxide.

Antifouling paint is expensive as well as toxic. You may be able to do without it. Try using regular paint and a coat of slick bottom wax. If you have a small boat, you can avoid using antifouling paint by storing the boat on dry land.

Whenever possible, perform all hull repairs and maintenance on land, away from the water's edge. When scraping or re-painting, use a tarpaulin to collect all dust, paint chips, and paint drips. Generally, waste from boat maintenance can be wrapped securely and disposed of with regular trash.

Use Fuel Without Others Calling Foul

The majority of boats on the lake and in the canal have a motor. Collectively they greatly influence water quality and the experience of others wanting to enjoy water recreation. Oil and fuel, which are toxic to aquatic life, can get into the water from improper refueling, bilge pumping, leaks and incomplete combustion. Prevention is the key.

Oil absorbent pads, bilge socks or pillows do a great job of selectively absorbing fuel while repelling water. They can be used for cleaning accidental spills and should be placed in the bilge of all boats with inboard engines. Some inboard boat owners have bilge switches installed to prevent oily bilge discharge. Alternatively, the vessel's bilge pump can be connected to a filter that removes petroleum products from the bilge water. For outboard engines, bilge socks can be used to absorb drips and spills.

Replace absorbent materials as needed. To extend their useful life use gloves to wring them out onto an absorbent rag and re-use them. Properly dispose of used oil, filters, oil rags and absorbent pads at facilities designed to handle these toxic items. For disposal instructions call your local solid waste agency or **1**-800-CLEANUP or visit www.cleanup.org.

If you have bad luck and spill oil or fuel in the water, stop the source of the spill first and then focus on containing it. When possible, cover the spill with absorbent materials.

Never use soap to clean up spills in the water because soap emulsifies oil, causing the slick to disperse and then sink. These compounds do not eliminate oil, most are harmful to aquatic life and its illegal to apply such "cleaners" to the spilled area. Similarly, never add bilge-cleaning detergent or emulsifiers to your bilge and then pump it overboard.

For a small fuel spill that cannot be reached with absorbent materials, let the fuel float at the surface where it will partially evaporate. Any large spills of petroleum or any other hazardous material should be immediately reported to the **NYS Spill Hotline at 1-800-457-7362** (24 hours/day, 7 days/week).

PHOTO: SHARON ANDERSON

When refueling, follow these steps:

- Ensure boat stability
- Use a container you can handle easily
- Pour fuel slowly and smoothly into a funnel or use a portable gas line with an automatic safety nozzle that stops when the tank is full
- Slow down at the beginning and end of fueling
- Fill only until 90 percent full to allow room for thermal expansion. Definitely avoid topping off the tank.
- If possible install a fuel/air separator along the vent line to allow air, but not fuel, to escape through the vent opening. Close the vent on portable gas tanks when the engine is not in use or when the tank is stored.
- Transport and store gasoline out of direct sunlight in a cool, dry place.

Pick An Engine for Power and Protection

The kind and care of an engine influences the amount of fuel consumed, the percentage that is burned, and the

amount released unburned. New four-stroke and two-stroke boat engines are more efficient. Plus, they start more easily, have faster acceleration and quicker throttle response.

Older boats (including older Jet Skis and other personal watercraft) are powered by carbureted two-stroke engines. These engines use gasoline and oil inefficiently. The fuel enters the combustion chamber from the carburetor while the exhaust is leaving the chamber. As a result, as much as 30 percent of the raw fuel gets ejected out of the engine along with its cooling water. Hydrocarbons, nitrogen oxides, and toxic constituents of gasoline present in two-stroke engine fuel are known water pollutants. The U.S. Environmental Protection Agency (EPA) set emission standards for all new boat engines. In response the boating industry developed more efficient four-stoke and two-stroke engines, both of which are now widely available.

Some states have chosen to go beyond EPA regulations. California municipal water districts have banned carbureted two-stroke engines from reservoirs due to the high levels of toxins found in association with them. New York State has failed to pass bills to ban carbureted two-stroke engines from its waterways, but some municipalities have ordinances that ban them.

- **Upgrade to a newer engine** that is quieter, makes less exhaust and causes less water pollution. These engines are pricy but you recoup the costs over time by saving consistently less on fuel and oil.
- **Follow the recommended maintenance schedule** set by the boat engine manufacturer so the engine runs at peak efficiency, reducing air and water pollution. Repair any oil or fuel leaks as soon as possible.
- **Limit full-throttle engine operation** and any unnecessary idling on the water to reduce fuel use.

Noise is a Nuisance

Emissions are not the only by-products of combustion engines. Engine noise is one of the most common sources of conflict between lake users. Some think of it as audible pollution. Engine noise can bother people who are far away from the boat because sound travels better over a smooth surface like water than over land.

In addition, noise over the lake is naturally amplified – much like a theater – because of the bowl shape created by the water and the rising landscape that surrounds it. New York State law limits boat noise to below 75 decibels as heard from the shore. For comparison, typically the noise of a vacuum cleaner is 70 decibels and a garbage disposal is 80 decibels.

Speed Limits

Each boating season, check municipal, county and state laws for updates on all boating regulations. An example of changing regulations is the speed limits set for the Erie Canalway in 2005. The speed limit in the human-made sections of the Canal is 10 miles per hour (mph). In the river and lake segments within the Canal the speed limit is 45 mph (Cayuga and Seneca Lake are both considered part of the Canal). Five mph is the limit within 100 feet of a dock, moored vessel, or bridge. The latter is consistent with the state no-wake zone regulations on lakes. Speed limits are in force for the state Canal season – May 1 through November 15. Some municipalities around the lake have instituted additional safeguards.

Slower speeds near shore are designed to protect the boater, other lake users and the aquatic environment. Waves from boat wakes pound the shoreline, causing erosion even on calm days. The resulting sediment clouds the water and can bury fish spawning grounds and other fragile aquatic habitats. Adhering to speed limits can help reduce erosion and prevent fish loss. Know your boat and the speed at which it produces the smallest wake.

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On the Water *continued from page 21*

FISHING

Cayuga Lake and its streams boast outstanding fishing for both cold and warm water species. Lake trout and land-locked salmon fishing ranks among the best in the state. Large and smallmouth bass are abundant with bass fishing tournaments held every weekend of the season.

Game fish are one link in a complex underwater food world that includes algae, aquatic plants, insects, and smaller fish, all of which need clean water. The plants may seem like weeds to us but for fish they are an integral part of the system providing cover from predators and shelter for the food fish eat. To make the scene complete, add in some woody debris and just the right mix of gravel for spawning grounds. Silt is an enemy of this watery scene. The gravel becomes useless for fish spawning if it becomes covered in silt. And silty areas, such as the mouth of streams, are the areas most likely to be colonized by invasive, non-native weeds.

PHOTO: SHAHAB FARANEGAN

Trees and branches that naturally fall into the water should be left there whenever possible. Collectively called "large woody debris" they improve habitat for fish and the insects upon which they feed. While woody debris is sometimes blamed for flooding, this is rarely the cause. Especially with larger floods, woody debris and log jams can slow the water in the stream reducing overall flooding and bank erosion. For safety, municipal staff may need to remove woody debris and logjams that occur near a bridge or culvert.

PHOTO: DANA WARREN

Trees along stream banks improve fish habitat by keeping water cool, adding woody debris, and reducing erosion.

STEPS YOU CAN TAKE...

To Help Keep The Fisheries Food Web Functioning:

Follow fishing regulations.
They are set up to ensure that the number of fish caught by all anglers still allows each species to maintain a healthy population. You can find fishing regulations for Cayuga Lake and its tributaries on the NYS Department of Environmental Conservation (NYS DEC) website www.dec.state.ny

Follow fish advisories...
for the amount of locally caught fish that's safe to eat. Eating more than advised can pose a health risk. For current advisories, contact NYS Department of Health or visit the Environmental Protection Agency's website: epa.gov/ost/fish.

Report illegal fishing activities...
to the NYS DEC by calling the toll-free confidential number 1-800-TIPP-DEC (24 hours/day, 7 days/week).

Release any fish you catch don't plan to eat.
NYS DEC suggests quickly playing and landing the fish, unhooking it in water and handling it carefully. You might want to try barbless hooks.

Don't release live bait into the water or onto land.
It's a sweet idea, but you may be introducing foreign species to the lake. Some of them out-compete the stream or lake's own species, throwing the ecosystem out of balance. Freezing is considered the most humane way to kill leftover bait prior to disposal.

Exchange your lead fishing sinkers...
for equally good – and available – alternatives. As of 2004, the sale of small lead fishing sinkers is prohibited in New York State. Ingestion of lead fishing tackle is the leading cause of pre-mature death in loons and also deadly for swans, herons, and other water birds.

Properly dispose of unwanted fishing line.
Discarded monofilament line is a hazard to wildlife. Many tackle shops maintain recycling programs where you can turn in used line. Alternatively, before throwing it in the trash, tightly bundle it so that it is less likely entrap or strangle wildlife.

Help restore the resource you cherish.
Annually the Cayuga Lake Watershed Network seeks volunteers to help with stream and lakeshore clean-ups. The organization also provides free shrub willows for volunteers to plant along shorelines with fishing access to reduce erosion and improve the fishery.

All Life is Dependent Upon Water

"Water, not unlike religion and ideology, has the power to move millions of people. Since the very birth of human civilization, people have moved to settle close to water. People move when there is too little of it; people move when there is too much of it. People move on it. People write and sing and dance and dream about it. People fight over it. And everybody, everywhere and every day, needs it. We need water for drinking, for cooking, for washing, for food, for industry, for energy, for transport, for rituals, for fun, for life. And it is not only we humans who need it; all life is dependent upon water for its very survival," wrote Mikhail Gorbachev.

Smart Steps for Clean Water is one of many outreach efforts that recognizes everyone's role in the future of this gorgeous watershed. Recommended actions for watershed residents are simple and economical – and their combined effects across the watershed will be felt for generations to come.

Abundant clean water characterizes the Cayuga Lake Watershed. The day-to-day choices of residents and visitors can protect and enhance the lake, streams, groundwater and wetlands that sustain all that live, work and play here. If each of us chooses those *Smart Steps for Clean Water* that best mesh with our life style, the precious water resources will be here for the enjoyment of current and future generations.

The Pledge for Clean Water...

is an Internet-based companion to *Smart Steps for Clean Water*. Its free and easy for anyone to pledge the steps they will take to protect our vital water resources. Visit *www.cleanwaterpledge.org* to select the specific actions you will take to keep our watershed healthy. The Pledge for Clean Water is a way to have your efforts counted as part of a community-wide endeavor to protect water resources. Both the Pledge web site and the website for the Cayuga Lake Watershed Network, *www.cayugalake.org*, provide resource links to help you become more involved with watershed protection.

PHOTO: HOLLY PAYNE

In recognition of their commitment to clean water, Pledge participants will receive from the Cayuga Lake Watershed Network a complimentary newsletter, or other publication for those that are already members. In addition, residents of Tompkins County will receive a magnet thanks to funding from the Stormwater Coalition of Tompkins County. The Pledge for Clean Water is a joint production of the Cornell Cooperative Extension of Tompkins County, the Cayuga Lake Watershed Network and the Stormwater Coalition of Tompkins County, created with funding from the New York State Department of Environmental Conservation.

This is the goal of the Cayuga Lake Watershed Network, a community-based non-profit organization, that protects and enhances the ecological health, economic vitality and overall beauty of the watershed through inspiring local involvement, fostering collaborations and sharing information.

The Cayuga Lake Watershed Network plays a unique role in conservation by providing a whole-watershed perspective. We build connections across social and political boundaries, connecting people to watershed science and management. We work with private citizens, businesses, farms, local governments, schools, universities, and others in the watershed. Beyond this watershed, the Cayuga Lake Watershed Network collaborates at regional, state and national scales.

The suggestions in these pages are only some of the actions that protect water resources. If you are looking for additional ideas and information, contact the Cayuga Lake Watershed Network and the others organizations that help protect water resources such as the US Environmental Protection Agency; NYS Department of Environmental Conservation; and county Cornell Cooperative Extension, Soil and Water Conservation Districts, Health Department and Planning Department.

Sediment – the "Natural" Pollutant *continued from back page*

75 million dollars in wages for Cayuga, Seneca and Tompkins Counties. While less dramatic, removing sediment from drinking water taken from the creeks and lake adds greatly to the cost of filtration, and cleaning out roadside ditches eats into highway department budgets.

Smart Steps for Clean Water contains action steps to help stop erosion and reduce other contaminants that can travel with runoff. Choose the ones that make sense for you and your family and do your part in preserving and improving precious water resources. Everyone benefits from fresh water and everyone's efforts are needed to protect it.

Adapted from "Brown Water, Green Weeds" a publication of the University of Wisconsin Extension.

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Sediment – the "Natural" Pollutant

Sediment resulting from soil erosion is one of the greatest threats to water quality according to the management plan for the Cayuga Lake Watershed. If soil is natural, and eventually will settle out to the bottom of the creeks and lake, why is it a problem?

Some erosion is natural and inevitable, especially at the south end of the watershed where glaciers left behind steep slopes. However, human activity on the land increases the sediment that gets eroded. Often this added erosion is the easiest and most cost-effective to reduce.

PHOTO: HOLLY PAYNE

In addition to soil, sediments can contain tiny bits of metal, pesticides, automotive fluids and nutrients such as phosphorus. This mixture is picked up from people's yards, construction sites, cropland, stream banks, and roadways. Sediments are transported to the streams and lake with melting snow and rainfall the runs off the land, traveling untreated down roadside ditches and storm drains.

Sediments cause the water to become murky, making it difficult for fish to see and feed properly. Sediments damage fish gills and impair the breathing process in aquatic insects that serve as fish food.

Many fish and aquatic insects lay their eggs on gravel beds. When sediments are deposited on stream and lake bottoms, they cover this spawning habitat. They also can destroy a stream's natural "riffle and pool" pattern that adds needed oxygen to the water and provides a variety of habitat for small aquatic critters.

In high water, when the most sediment is suspended in the water, millions of fast-moving, abrasive soil articles scour aquatic plants and animals removing them from their habitat. Sediments cloud the water and cover plant leaves, reducing sunlight penetration and photosynthesis (plant food production). With less photosynthesis, desirable plant populations are reduced meaning reduced habitat for fish and the small organisms they feed on. The disturbances caused by sediments accumulating at the mouth streams, often bury native plants and provide ideal conditions for non-native invasive plants to become established.

Sediments carry and store toxic materials that can be released whenever the sediments are stirred up, such as by wave action or boat traffic in shallow areas. Some toxins are taken in by plants, which are eaten by fish and waterfowl. As the toxins are passed up the food chain they accumulate causing illness, birth defects and death.

Sediments fill in shallow areas, increasing the chances of propellers, rudders and keels running aground or hitting underwater hazards. Sediments can make swimming unsafe and unpleasant both when it is still suspended and when it settles to create a soft unstable lake bottom.

Sediment costs communities economically when degraded fishing, swimming, boating and aesthetics negatively affect tourism and property values. Each year tourism accounts for

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