# "Improving Water Quality in Your Own Backyard"

*Stormwater Management Starts At Home*

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# Backyard Pollution Basics

We often think of agriculture, industries and big business when it comes to water pollution, but individuals contribute heavily to water pollution in North Carolina. We supply eroded soil, oil, pesticides, fertilizer, pet waste, trash and other contaminants, and rainwater carries them "away." While each individual's contributions to pollution may seem very small, the cumulative effect of over eight million people in North Carolina is significant.

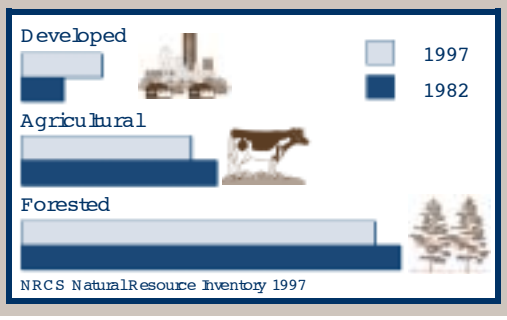
### Growth in NC

North Carolina's population has been doubling every 50 years for the past 200 years! What will the impact of 8 million more people be by 2050?

Of course, the weather is not the enemy. Rather, it is our changes to the landscape that have negative impacts. Rain that falls on land dominated by fields and forests trickles into the soil to recharge groundwater or drains slowly into rivers. In contrast, in heavily populated areas with lots of hardened surfaces such as streets, parking lots, sidewalks, roof-tops, and driveways, this rainfall cannot seep into the ground and instead flows through pipes, ditches, or other channels directly into streams and other waters we use for swimming, fishing, and drinking. Rainfall that doesn't soak into the ground is called stormwater runoff.

### NC Land Cover Change 1982–1997

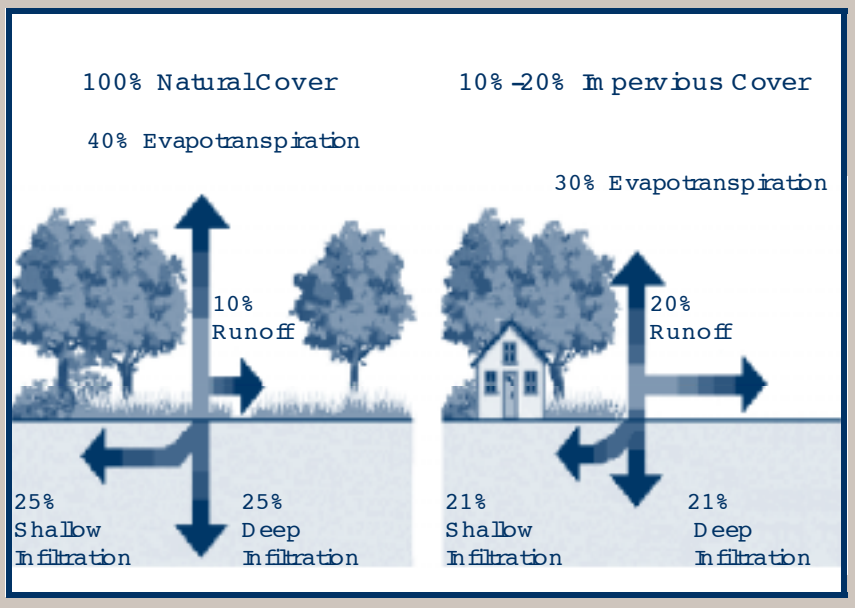
| | 1982 | 1997 | % Change |
|---|---|---|---|
| Developed Acres | 1,887,200 | 3,555,700 | +88.1 |
| Agricultural Acres | 8,678,400 | 7,518,900 | -6.9 |
| Forested Acres | 16,835,000 | 15,678,000 | -13.4 |



## Hardened Surfaces and Runoff

Unlike the water processed and discharged at wastewater treatment plants, stormwater flows untreated into streams, lakes and estuaries carrying pollutants it picks up along the way. Also, the pavement and gutters increase the speed and quantity of runoff, which erodes stream banks and channels, destroys fish habitat and carries sediment downstream where it may fill in reservoirs, estuaries, or cover aquatic habitat such as oyster beds.

The Impermeable Connection:
Hardened Surfaces and Stormwater Runoff




The relationship between impervious cover and surface runoff: Hardened surfaces in a watershed result in increased stormwater runoff because the water is not able to soak into the ground. The runoff picks up pollutants as it moves over impervious surfaces making it more likely that our waterways will receive harmful pollutants.

US EPA Image

## Polluted Stormwater Runoff

In urban areas, stormwater runoff and the pollutants it carries are the primary sources of degraded water quality. Here are a few ways storm water and what it carries can cause major problems in aquatic environments:

### *Stormwater and Major Pollutants*

**Eroded soil** - Sediment can smother bottom-dwelling creatures, suffocate fish and other aquatic life, block sunlight needed by aquatic plants, and bind to and carry other pollutants.

Runoff from streets, parking lots and homes, enters storm drains and usually flows untreated into our streams, rivers and lakes.

**Nutrients** - Nitrogen and phosphorus from human and animal waste, fertilizer, and detergents, are critical to plant growth. However, in excess they can overload aquatic systems causing algae blooms and fish kills.


**Toxic chemicals** - Antifreeze, motor oil, gasoline, solvents and pesticides can weaken or kill organisms and accumulate in the food chain.

**Excess stormwater flow** - The volume and speed of stormwater runoff can also be harmful, eroding stream banks, scouring stream beds, altering the temperature or salinity of receiving waters, at times even endangering aquatic life.

## Household Habits and Water Quality

The way we design and tend our landscapes, build and maintain our homes, and dispose of or treat our trash and other solid wastes impacts water quality. Although not everyone lives at the water's edge, all the water leaving our properties eventually ends up in a local river, lake, stream or estuary. Everyone lives in a watershed, the land draining to a body of water, and everyone depends on the cleanliness of that water.

### *Changing Household Habits*

You may be contributing to water pollution in North Carolina without even realizing it. The good news is that everyone can help improve the condition of our water. Before you exclude yourself as part of the problem, check off which of the following situations might exist at your home or apartment.

__ Leaking, overflowing or outdated septic tank
__ Vehicles that leak oil, antifreeze, transmission or brake fluid
__ Large paved areas or impervious surfaces that drain directly to streets or storm drains
__ Bare, unplanted areas from which soil erodes when it rains
__ Downspouts or drain pipes that empty water into the street or storm sewer system
__ Yard clippings, fertilizer, or pesticide left on streets and sidewalks
__ Hose used to clean driveway
__ Over watering of gardens or lawns
__ Pet or animal waste left in the street, on sidewalks or on the ground
__ Improper storage and disposal of pesticides, gasoline, oil, paint, etc.
__ Storm drain used to dispose of yard waste or chemicals
__ Lawns or gardens not fertilized deeply enough or over fertilized
__ Lack of landscaping that would allow water to infiltrate into the soil

## *Am I Contributing to Water Pollution at Home?*

Chances are, the answer is yes. Common building practices and activities we do around our homes can contribute to water pollution. There are specific actions you can take at your home to decrease the problem. You can adopt many practices easily and quickly, others may require more planning as you look for wiser ways to shape the landscape around your home. Attack the problem by using two major strategies – first, *reduce the volume* of your stormwater runoff and secondly, *reduce the amount of pollutants* that your runoff carries.

Are you contributing to polluted stormwater runoff?

Your activities, and those of all your "watershed neighbors," can overwhelm nature's capacity to filter out pollutants. By changing a few practices, you can significantly reduce the quantity and improve the quality of stormwater runoff.

Information Alert! There are many organizations that want to help you become a good "watershed neighbor". Websites and phone numbers of many of these organizations are listed throughout the brochure. Contact them for more information and assistance–they are ready to help!

US Bureau of Reclamation Image

## Strategy I: Reducing Runoff

By decreasing the amount of runoff that leaves your property, you can reduce the amount of pollution that gets into streams. You'll also lessen the surges of stormwater that can erode stream banks and cause flooding.

### *How can I best manage rain that runs off my roof?*

- You can still keep your foundation dry while directing downspouts away from pavement and toward grassy, mulched or planted areas. Bonus: Decreases the need for watering these areas.
- If you don't have gutters, dig a gravel infiltration trench under the drip line. Bonus: Helps eliminate standing water on your land.
- Capture the flow from downspouts in a rain barrel or cistern; use later for watering. Bonus: Decreases your water bill and your demand for treated water supply.

Rain gardens, rain barrels, and cisterns all reduce the amount of runoff leaving your property. The N.C. Cooperative Extension Service offers programs and assistance to citizens who want a waterwise landscape. See http://www.ces.ncsu.edu/counties/

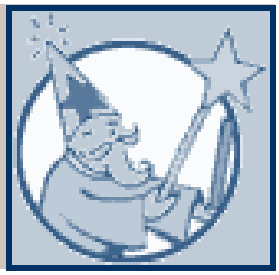
### *Where should I wash my car?*

- Park the car on the grass or on a surface that flows directly into grass. Washing on paved surfaces increases runoff; washing on bare earth increases soil erosion. Bonus: Helps water the lawn.
- Use designated car-washing facilities. Also, many apartment complexes now offer specific locations for washing vehicles that, like commercial car washes, contain oil /water separators and filtration for pollutants.

- In addition, harmful detergents and other cleaning chemicals can be carried into nearby streams. So be sure to use cleansers labeled "biodegradable."
- If you wash your car at home use a bucket of soapy water first and save the hose for a final rinse.

Washing your car over grass, gravel, or other permeable surfaces decreases the amount of runoff leaving your property and increases your water bill savings.

Let the "Purchasing Decision Wizards" help you find alternative cleaning products from the "Cleaning Products Pilot Project" at http://www.epa.gov/opptintr/epp. The U.S. Environmental Protection Agency is devoted to helping citizens find biodegradable alternatives to harmful cleaning products.



## *How can I water my lawn and garden to minimize water pollution?*

- Use a properly directed sprinkler or drip irrigation system instead of a hand-held hose. If you use a sprinkler, measure your application by placing shallow containers within the field of spray. Bonus: Plants will be healthier and develop deeper root systems.
- Water thoroughly and less often. Moisten the soil four to six inches deep each time. A good rule of thumb is to apply one-half to one inch of water per week during dry spells.
- Avoid watering sidewalks and streets.
- Water in early morning or late evening when coolest.

Why water the street? Direct your sprinklers to only water the lawn.

## *What landscaping techniques can I use to retain as much rainwater as possible?*

- Leave grass higher (remove no more than a third of the blade length at a time) and mow more frequently to retain more water and have a healthier lawn.
- Leave clippings on lawn to keep it fertile and moist. Grass clippings are 75 to 85 percent water and rich in nitrogen. Mulching mowers are readily available in most retail outlets.
- Create raised planting beds at the lowest point of your lot and keep them mulched. They help to capture stormwater.
- Convert your lawn to a mulched landscape area with shrub and tree plantings. These layers of vegetation intercept and store rainfall and runoff better than grass alone.
- Plant shrubs and trees along the edges of ditches, creeks or ponds to create a runoff absorbing buffer between waterbodies and developed land.
- Landscape with native and drought-tolerant plants. The Cooperative Extension Service can suggest appropriate species.
- Install a rain garden, also called a bioretention garden, at the low end of your lot. These work best in Coastal Plain and Sandhills soils in North Carolina, but can be designed with drains underneath to work in Piedmont and Mountain yards. Your county Cooperative Extension Service can provide you with landscaping tips for your area.
- When grading land for home construction or access roads, keep slopes as flat as possible. If you disturb more than 1 acre, you must submit a sedimentation plan to the Division of Land Resources or designated local program. Call 919-733-4574 for more information.
- Stabilize "cut and fill" areas with ground cover vegetation or erosion control materials like wheat straw immediately after soil disturbance.
- Create terraces on slopes to let runoff infiltrate, avoid erosion and make lawn maintenance easier.

## Landscaping For Water Quality

There is a wealth of information for homeowners interested in creating and maintaining a landscape that is both beautiful and water wise. Here are a few organizations that offer publications, online information, and workshops:

US Environmental Protection Agency
*Green landscaping with Native Plants*
http://www.epa.gov/greenacres/

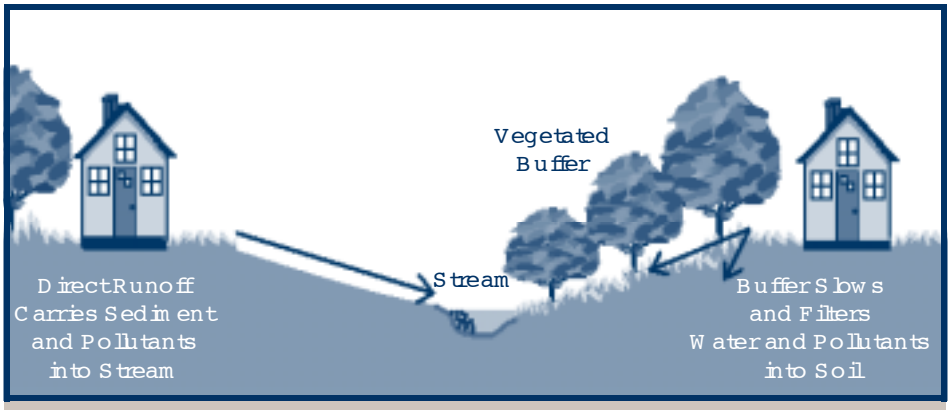
NC Cooperative Extension Service
*Water Quality and Home Lawn Care*
http://www.ces.ncsu.edu/TurfFiles/pubs/wqwm151.html
*Lawn Care*
http://www.ces.ncsu.edu/depts/hort/consumer/hortinternet/lawn1.html
*Native Tree & Shrub Fact Sheets*
http://www.ces.ncsu.edu/depts/hort/consumer/factsheets/native/index-native

Alliance for the Chesapeake Bay
Alliance for the Chesapeake Bay Online Publications
http://www.acb-online.org/pubs.cfm

Rain Gardens, like the one below, reduce polluted runoff and allow for groundwater recharge.

Native Plants used in landscaping reduce your water consumption needs.

US EPA Images




Vegetated Buffers help absorb and transform pollutants, anchor the banks to prevent erosion and shade the water to enhance its ability to hold oxygen. In some areas of the state you are required to protect or maintain riparian buffers on your property. Check the nearest regional NCDENR office or town or county manager office if you are unsure of requirements in your area.

## *In what other ways can I reduce the amount of runoff leaving my property?*

Consider Composting
Compost can be made up of branches, grass clippings, leaves, and other vegetation.

US EPA Image

- Put a spray nozzle on your garden hose.
- Use a broom, not a hose, to remove yard debris from sidewalks and driveways.
- Sweep debris into the yard or compost pile instead of into street gutters.
- Reduce the size of paved driveways; as repairs are needed, replace with materials that can absorb rainwater. Consider interlocking pavers, gravel or leave a vegetated center.
- Where possible, disconnect paved surfaces from streets, redirecting runoff into the yard.
- Design new construction to allow water to soak into the ground. For instance, use decking with gaps between the boards, select porous paving material such as bricks, concrete lattice pavers, or stones. A base of sand or gravel may be necessary for proper soil drainage.

## Strategy II: Reducing Pollutants in Runoff

Nutrients and soil may be good for the plants in your yard, but they can pollute our streams and rivers. Reducing the amount of contaminants at the source is the most effective way of improving the quality of stormwater runoff.

### *How can I use fertilizer most effectively?*

Nutrients in fertilizer, like nitrogen and phosphorus, can contribute to algae blooms in surrounding waters. Nitrogen is a severe problem in some watersheds. Because it is water-soluble, nitrogen is a particularly mobile nutrient that can flow through groundwater and surface runoff. The nitrogen your plants do not use will leach quickly through the soil.

**Be smart when you use fertilizer:**

- Avoid the shotgun approach to lawn care, especially "weed and feed" products, which contain quick-release fertilizers and herbicides that may not be needed. Overuse can create unhealthy soil conditions and promote lawn disease.
- Determine how much fertilizer your plants actually need and apply only what they will use. Bonus: May save money on fertilizer purchases.
- Sweep up and remove fertilizer spilled on paved surfaces.
- Improve soil fertility before planting by adding compost and organic matter. Mix fertilizer into the soil before adding plants.
- When fertilizing in the fall, do so modestly, with a slow-release or natural (often labeled "organic") fertilizer.

Be sure to read and follow fertilizer and pesticide application instructions carefully.

Whoa! Too close to the street!
When applying fertilizers and pesticides, remember to use only the amount necessary and be careful to avoid paved or hardened surfaces that act as expressways for pollutants into our water.

Sweep it up!
For more information on how to use fertilizer wisely while protecting water quality see this North Carolina State University Publication:

*Fertilizer Recommendations and Techniques to Maintain Landscape and Protect Water Quality*

Find it online at
http://www.bae.ncsu.edu/bae/programs/extension/publicat.

## *How can I reduce the use of pesticides?*

Using commercial pesticides as the sole source of pest control may have short-term or lasting ill effects on the environment and human health. Before applying synthetic chemicals, consider the concept of integrated pest management (IPM). IPM is a popular, environmentally sound way to control unwanted lawn and garden pests. It involves a combination of techniques, including removing weeds and insects by hand, attracting natural predators (beneficial insects like ladybugs, praying mantises, soldier beetles and lacewings), varying planting times to avoid infestation, rotating garden crops, and selecting plants that are most resistant to disease and pests. IPM also includes applying less toxic products to control pests, such as insecticidal soaps, milky spore bacteria, dormant oil sprays or biological agents (such as the bacteria Bacillus thuringiensis or Bt) and planting native species. Native plants are adapted to your regional environment and provide some natural defense against predators. Pesticides—this includes herbicides, insecticides and fungicides—should be used as a last resort.

**If you must use pesticides, follow these guidelines:**

- Learn how to identify insects and their active periods so you can apply pesticides at the optimal time.
- Treat problem areas only. As an example, consider spot spraying of weeds with a hand-held sprayer instead of spreading pesticides over the entire lawn.
- Most pesticides don't discriminate; they also kill butterfly caterpillars and beneficial insects like honeybees and ladybugs.
- Don't apply on windy days or before a rainfall.
- Carefully mix and measure products according to the label. Avoid spills. Soak up liquid spills with an absorbent material like sawdust, clay-based cat litter or vermiculite.
- Calibrate spreaders or sprayers to apply the exact amount specified.
- Don't assume that if it's sold in a store, it's safe. Many chemical ingredients on the market have not been registered with the EPA.
- Control weeds in the fall.
- Buy only what you can use within two years to avoid having to dispose of any leftovers.
- Store in a dry place with lids securely in place and at least 50 feet from a well.
- Learn to live with a few insects and weeds.

For More Information on How to Wisely Control Pests
Check out the EPA's Guide to Pest Control and Pesticide Safety at
http://www.epa.gov/oppfead1/Publications/Cit_Guide/citguide.pdf.

The guide also discusses how to make the most of animals that control lawn and garden pests, like the ones below.


The Alliance for the Chesapeake Bay has their
*Integrated Pest Management: A Homeowner's Guide* online at
http://www.acb-online.org/ipm.htm.

## *Is it okay to maintain my automobile at home?*

Yes, as long as you practice good housekeeping. Used motor oil and other automotive fluids contain toxic chemicals and metals. Even small drips are harmful. The oil from one engine (4 to 6 quarts) can produce an oil slick of 8 acres; a single quart of oil can contaminate 1 million gallons of fresh water.

**When maintaining your automobile at home:**

- Use pans, newspaper, carpet or cardboard scraps to catch drips.
- Clean spilled or leaked fluids from paved surfaces with absorbent material like sand, sawdust or clay-based cat litter. Sweep and discard material with household trash.
- Place used oil in containers and take to a service station, auto parts store, or household recycling collection.
- Antifreeze is poisonous to people and animals. Never pour it on the ground or in any kind of drain. Ask a local service station attendant if it can be deposited in the on-site storage drum.
- Recycle old auto batteries at the place of purchase. One car battery contains nearly 18 pounds of toxic metals and a gallon of acids.

Don't be a drip!

Catch auto fluids on scrap material and soak up spills and leaks with sawdust or clay-based cat litter.

Contact your city or county for permanent or periodic collection sites for hazardous materials. Your county Cooperative Extension Service may also sponsor a collection day.

Check with local automotive repair stations to find one that recycles oil, antifreeze and old fuel.

## *Do I have an erosion problem on my property?*

Any erosion of your property is a problem. Soil and attached pollutants (like pesticides and fertilizer) that run off your landscape and your neighbors' property are harmful to surrounding waters. When you establish a lawn, till a garden or neglect to mulch or plant a cover crop in bare gardens, soil erodes and stormwater can carry this soil to a stream.

**To prevent erosion:**

- Seed bare areas to establish a quick ground cover.
- Use appropriate best management practices for controlling sediment in construction areas. For more info, visit http: //www.dlr.enr.state.nc.us /erotechass.html.
- Apply a thick layer of leaves, wood chips or other mulch in barren spots.
- Re-grading or structural controls may be necessary if slopes are steep.

## *How should I deal with my pet's waste?*

Solid waste from pets contains disease-causing bacteria and nutrients that can run off your property.

- Collect droppings and dispose of them in a sanitary landfill or with your other household waste.
- Bury droppings away from water sources (contact your local health department for advice).
- Install a pet "septic system" available from some manufacturers.
- Consider purchasing a bag dispenser that attaches to a pet leash or scoop. Most pet stores carry these.
- Never leave pet droppings on streets or sidewalks.

Be sure to pick up after your pet. Pet waste left on the lawn washes into your local streams adding bacteria and pathogens.

## *Do I have hazardous materials that can degrade water quality?*

Hazardous household materials include products like oven cleaners, drain cleaners, floor and car waxes, gasoline, mothballs, paints, polishes and solvents. Products marked CAUTION are less toxic than those labeled WARNING. Products that are ignitable, toxic or corrosive are marked DANGER; highly toxic products are POISON. However, all can pose problems if they get into runoff. Follow these suggestions when handling hazardous substances:

- Rather than dumping old fuel, dilute it with new in a 1:5 ratio (Five gallons of new with every one gallon of old fuel).
- Dry paint cans and wrap in paper or plastic before throwing in trash. Better yet, take empty containers to a hazardous waste collection.
- Store all hazardous materials in a temperature-regulated, dry place, with lids securely in place.
- Never pour chemicals down the drain, in the toilet or on the ground.
- Use up or share products rather than throwing them away.
- Reuse solvents like turpentine and paint thinner.
- Read labels; know what you're buying and how to use it safely.

**Hazardous Waste Disposal**
Some communities have special collection sites for hazardous waste disposal separate from other waste disposal areas. Your county's Cooperative Extension Service can help you learn how to safely dispose of leftover chemicals or containers. Find your county's office at http://www.ces.ncsu.edu/counties/.

## *Can I use salt or de-icing products to improve safety in the winter?*

De-icers contain salt or other chemicals that can pollute streams so remember these tips in the winter:

- Chip ice off pavement with a shovel.
- Limit use of de-icer products.
- Sweep up excess salt and return it to the container after ice melts.
- Use clay-based cat litter or small amounts of sand, never fertilizer.

## *How does my septic system work?*

Your drains and toilets send water to either a municipal wastewater treatment plant or to a home or community septic system. Half of all homes in North Carolina use a home septic system to treat wastewater. A conventional septic system has two parts: a septic tank and a drain field. The tank - usually made of concrete - collects, stores and treats solids. The drain field, made from pipes and gravel, allows liquid waste flowing out of the tank to filter through the soil, where it is further treated by the soils and microorganisms.

## *What do I need to know about my septic system?*

- Leaking or failing septic systems can contaminate groundwater, wells and nearby streams, endanger human health, and cause a foul odor. Signs of a malfunctioning system include backed-up water in drains or toilets, abnormally green vegetation over drain field, or soggy areas over the drain field.
- Septic systems must pass inspection before new homes will be supplied with electricity. You must receive a permit from your county health department before installing or repairing any septic system or expanding your residence.
- Home buyers should be aware of and make sure the septic system is operating properly as part of the purchase agreement. Septic system inspections are not required at the time of re-sale.
- Locate septic systems at least 100 feet from your well and allow access for maintenance and repair. Minimum setbacks are listed in the state rules.
- Know the location, age, size and condition of your system.
- Most systems require periodic maintenance.

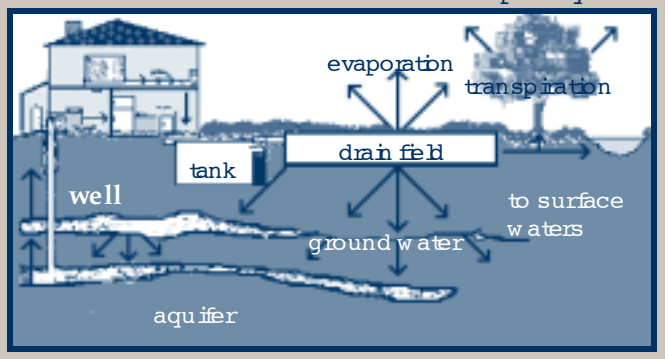
**Stop Septic Failures!** This leaking septic system is a threat to the health of its watershed as sewage puddles on the lawn and is carried away with stormwater runoff. You can help stop septic system failure and protect water quality! Call 1-800-9SEWAGE for technical assistance or to report straight pipes (non-permitted structure which carries waste directly into surface waters) and septic system failures.

## Where does your wastewater go?

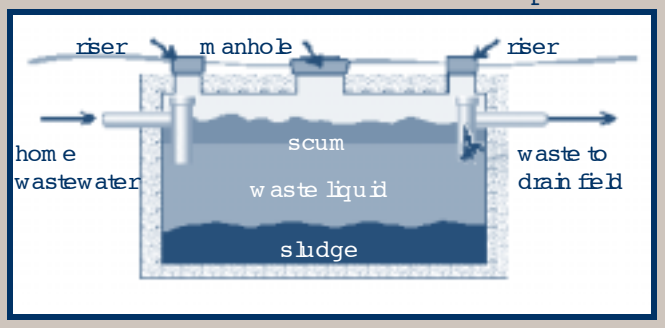
1. Wastewater from your toilets, sinks, and washing machine flow from your house into the septic tank.

2. In a properly maintained tank, the wastewater separates into a sludge layer of solids at the bottom of the tank while grease and fats float to the top in a scum layer with liquids in between. Bacteria in the septic tank start the process of breaking down the waste before it reaches the drain field for further processing.

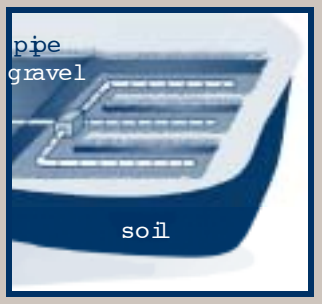
Home Septic System




Septic Tank




Drain Field




3. After leaving the septic tank, waste moves into the drain field, which is a collection of underground perforated pipes and gravel. Here it slowly percolates into the soil below.

4. When the waste filters through the drain field it is purified by organisms in the soil.

Learn more about your septic system from:

North Carolina Cooperative Extension, *Septic System Owner's Guide*
http://ces.soil.ncsu.edu/soilscience/publications/Soilfacts/AG-439-22/

North Carolina Home*A*Syst, *Improving Septic Systems*
http://ces.soil.ncsu.edu/soilscience/publications/farmassist/homeassist/Septic/

NC DENR-DEH, Onsite Wastewater Section
Information on rules, maintenance, and innovative systems.
http://www.deh.enr.state.nc.us/oww/index.htm

US EPA Images

## *How do I maintain my septic system?*

- Have solids pumped from tank every three to five years. Maintenance schedules may vary according to the size of your tank and number of users. Additives for septic systems to "clean, repair or rejuvenate, etc." have limited benefit and do not replace proper maintenance.
- Keep the soil over the drain field covered with grass or other shallow-rooted plants to prevent erosion. Deep roots can clog systems.
- Don't drive on or compact the soil above drain fields.
- Flush only toilet paper, human and pet wastes in toilets.
- Fix leaky pipes and dripping faucets.
- Avoid excessive water use, it will overload the system.
- Don't use toilet cleaners that hang in toilet tank. Keep bleach, solvents or other harmful chemicals out of drains and toilets. All of these products can destroy beneficial bacteria that help cleanse your sewage. They can also contaminate groundwater.
- Keep grease and oil (and their residues) out of the drain.
- Don't use a garbage disposal in your sink.

Wait! Don't pour that grease down the sink!

Grease and oil can harm the "good" bacteria in your septic system. Without the "good" bacteria your system may be susceptible to back-ups and other problems. Place oil and grease in a can or other container and dispose in household trash.

Not in My Septic System!

System Cloggers: Diapers, cat litter, cigarette filters, coffee grounds, grease, feminine hygiene products, etc.

"Good" Bacteria Killers: Household chemicals, gasoline, oil, pesticides, antifreeze, paint, bleach, etc.

## *I am ready to start improving water quality at*

You are the key to protecting North Carolina's water quality. When you and your family incorporate strategies listed in this brochure to reduce the amount of runoff leaving your home and reduce the amount of pollutants picked up by runoff you will improve the health of your water and that of your watershed neighbors. There are many state, federal, and non-profit organizations ready to help you create a water-wise household. Contact them for further information and assistance.

**NC Department of Environment and Natural Resources**
There are seven regional offices of the Department of Environment and Natural Resources. Contact the closest regional office for information specific to your community:

**Mooresville Regional Office**
919 North Main Street
Mooresville, NC 28115
(Courier 09-08-06)
704/663-1699

**Winston-Salem Regional Office**
585 Waughtown Street
Winston-Salem, NC 27107
(Courier 13-15-01)
336/771-4600

**Washington Regional Office**
943 Washington Square Mall
Washington, NC 27889
(Courier 16-04-01)
252/946-6481

**Wilmington Regional Office**
127 Cardinal Drive Extension
Wilmington, NC 28405
(Courier 04-16-33)
910/395-3900

**Asheville Regional Office**
2090 US Highway 70
Swannanoa, NC, 28778
(Courier 12-59-01)
828/296-4500

**Fayetteville Regional Office**
Systel Building,
225 Green St., Suite 714
Fayetteville, NC
28301-5094
(Courier 1456 25)
910/486-1541

**Raleigh Regional Office**
1628 Mail Service Center
Raleigh, NC 27699-1628
3800 Barrett Drive
Raleigh, NC 27611
(Courier 52-01-00)
919/571-4700

## More Resources for Improving Water Quality at Home

**NC Home* A* Syst**
*Environmental Stewardship for Homeowners*
http: //ces.soil.ncsu.edu /soilscience /publications /farmassist /homeassist

**NC Cooperative Extension Service**
http: //www.soil.ncsu.edu /extension /pubs.php
http: //www.ces.ncsu.edu /depts /hort /consumer /
Websites include these and other homeowner water quality and horticulture publications:
*Improving Storage and Handling of Hazardous Waste*
*Improving Lawn Care and Gardening*
*Stormwater Management for Homeowners*
*Water Quality and Home Lawn Care*
*Managing Lawns and Gardens to Protect Water Quality*

**WRAL-TV and the N.C. Coastal Federation**, October 1998
*Sound Advice: How To Live in Harmony with our Coast*
WRAL, PO Box 12000, Raleigh, NC 27605.

**South Carolina Department of Health and Environmental Control**, Clemson University Cooperative Extension Service (SC Home* A* Syst)
*An Environmental Risk-Assessment Guide for Protecting Water Quality*

**Western North Carolina Tomorrow. Western Carolina University**
*A Mountain Home Guide. Buying Mountain Property, Building a Mountain Home: Nine Factors to Consider*
http: //www.wnct.org /mtnguide.pdf

**The Oregon Environmental Council**, March 1999
*Fifty Ways to Love Your River*

**Maryland Coastal Bays Program**, May 2001
*Homeowner's Guide to the Coastal Bays*
http: //www.mdcoastalbays.org.

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