



Stormwater Management for Coastal Homeowners

Are groundwater and surface water protected from drainage from your home?

You don't need a heavy rainstorm or a Hurricane Fran or Floyd to send pollutants rushing toward North Carolina's streams, wetlands, lakes, estuaries, and the Atlantic Ocean. A garden hose or sprinkler alone can supply enough water.

The next time you are home during a rain shower, head outdoors with your boots and umbrella and watch where the rainwater goes. Does water soak into the ground quickly, or does it collect in puddles and flow off lawns and driveways? Do you see a stormwater superhighway? Is your rooftop connected to a gutter system that is adjacent to a sidewalk or driveway that drains into a concrete-lined ditch? Soil type affects how water infiltrates (soaks into the ground). As you might expect, water quickly infiltrates sandy soil, such as in the coastal plain or sandhills, but has a hard time seeping into fine-grained clay soils, such as those found in the piedmont or the rocky soils of the mountains.

During your walk, note how far it is to the nearest storm sewer, ditch, wetland, stream, or body of open water. Note whether runoff flows onto your land from adjacent streets, lawns, or stormwater systems. If you live at or near the bottom of a hill, you may have problems unique to your relatively low-lying position. Be sure to go out during more than one rain shower to get a good understanding of runoff flow during small and large storms.

Reducing pollutants in runoff is important. Many homes along the coast are located near some body of water – tidal creeks, river, bays, or sounds. Many of these homeowners use fertilizer or pesticides on lawns, gardens, shrubs, and trees. Improperly storing and applying these products may result in fertilizer or pesticides moving through the soil into the groundwater or washing off into tidal creeks, rivers, estuaries, or bays. It is important to know how to maintain your yard while still protecting these waters. Proper application of fertilizers and pesticides, safe storage practices, and correct watering are all part of the overall protection plan.

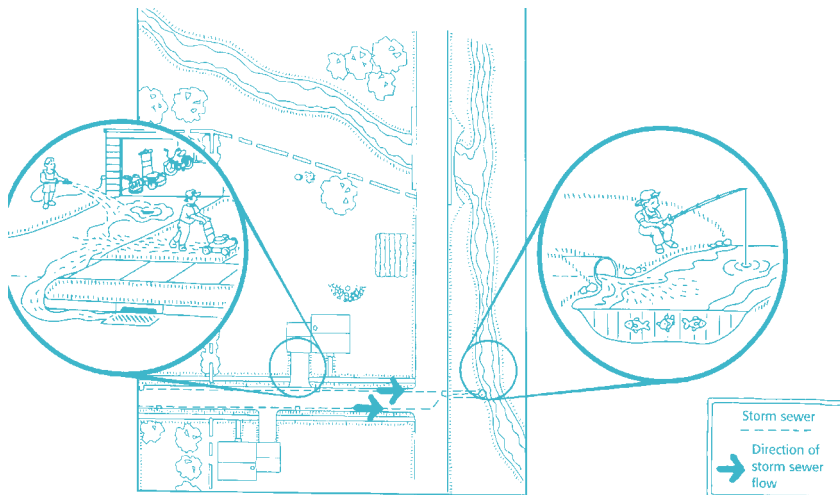
Landscaping and site management to control runoff is another method that homeowners can do to protect the water. Surface waters also need to be protected from lawn and garden activities that cause soil erosion. Land-disturbing activities, uncovered soil surfaces, and the absence of water-retaining structures may cause soil to move into streams, lakes, marshes, estuaries, and ultimately, the ocean. Excess sediment and nutrients from fertilizer in surface waters can kill important food sources for fish and harm the water quality. It is important that you keep your soil, fertilizers, and pesticides on your property.

Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Employment and program opportunities are offered to all people regardless of race, color, national origin, sex, age, or disability. North Carolina State University, North Carolina A&T State University, U.S. Department of Agriculture, and local governments cooperating.

What is stormwater, and why should you be concerned?

Stormwater is water from rain or melting snow that does not soak into the ground. It flows from rooftops, over paved areas and bare soil, and through sloped lawns. As it flows, this stormwater runoff collects, transports, and deposits into bodies of water the following pollutants:

- sediment
- pet waste
- pesticides
- fertilizer
- automobile fluids (oil, grease, gasoline, antifreeze)
- deicing products (road salt and fertilizers)
- grass clippings, leaves, and other yard waste
- cigarette butts and other litter



Runoff that flows along the “stormwater superhighway” goes into storm sewers that flow directly to streams and lakes without treatment.

Even if your house is not on a waterfront, storm drains and storm sewers efficiently carry runoff from your neighborhood to the nearest body of water. Consider a rooftop connected to a gutter system that is adjacent to a sidewalk. This sidewalk may drain to a concrete-lined storm sewer leading to a stream. This system can quickly transport pollutants into water. This series of connected impervious areas may be thought of as a “stormwater superhighway.” Contrary to popular belief, storm sewers do not carry stormwater to wastewater treatment plants — storm sewers directly lead to streams (see figure above).

Polluted stormwater degrades streams, rivers, ponds, wetlands, sounds, and bays. Soil clouds water and deteriorates habitat for fish and plants. Nutrients such as nitrogen and phosphorus promote the growth of algae, which crowd out other aquatic life. Large amounts of nutrients can cause a water body to become hypoxic, or lacking in oxygen. This lack of oxygen is believed to be the primary culprit for fish kills in some North Carolina rivers and estuaries. Another contributor to the fish kills

North Carolina Coast*A*Syst Publications

- *Protecting Well Water in Coastal Communities*, #1
- *Improving Storage and Handling of Household Hazardous Waste for Coastal Communities*, #2
- *Improving Septic System Maintenance in Coastal Communities*, #3
- *Improving Lawn Care and Gardening in Coastal North Carolina*, #4
- *Stormwater Management for Coastal Homeowners*, #5
- *Dock and Pier Construction in Coastal Communities*, #6

How can this publication help?

The North Carolina Coast*A*Syst program will help you understand how your actions could pollute lakes, streams, estuaries, coastal waters, and groundwater. After you have read this publication, walk around your property and answer the questions in the margins. Your answers will help you see any potential problems.

- If you answer a question with **a**, you have few problems with household activities.
- If you answer a question either **b** or **c**, there may be a problem with the way you care for your property and you will want to consider making changes in your caring for your property in order to protect water resources.

If you would like further help in assessing how your household activities affect stormwater and the environment, please contact your nearest Cooperative Extension center and talk with your Extension agent.

is harmful algae blooms that thrive in environments with unbalanced nutrients. *Pfiesteria piscicida*, a microscopic dinoflagellate, can also contribute to fish kills and appears to enjoy the same type of environment as the algae. Toxic chemicals, such as antifreeze and oil from leaking cars, carelessly applied pesticides, and zinc from galvanized metal gutters and downspouts, also threaten the health of fish and other aquatic life. Bacteria and parasites from pet waste and leaking septic tanks can make nearby lakes, sounds, and bays unsafe for wading and swimming after storms and have caused many tidal waters to be closed to shellfish harvesting.

As many people have discovered, stormwater is not only a problem with water quality. It can cause severe damage to homes and property. Flooding causes damage that is difficult and costly to clean up. Stormwater can flow down a poorly sealed well shaft and contaminate drinking water. In areas with very porous soils or geology, pollutants in runoff may reach groundwater and eventually coastal waters.

Across the country, public officials are redirecting their pollution control efforts from wastewater discharges to stormwater management in urban and rural areas. Stormwater pollution cannot be treated in the same way as water pollution from discharge pipes because stormwater comes from many sources (see table below). It is carried by runoff along the stormwater superhighway from every street, parking lot, sidewalk, driveway, yard, and garden. The problem can only be solved with everyone's help.

Common Sources of Stormwater Pollutants

| Pollutant | Common Sources |
|---|---|
| Silt, sand, and clay particles and other debris | Construction sites; bare spots in lawns and gardens; wash water from washing cars and trucks on driveways or parking lots; dust; dirt roads and driveways; unprotected streambanks and drainageways |
| Nutrients | Fertilizers; pet waste; grass clippings and leaves left on streets and sidewalks; leaves burned in ditches; rainfall; dust |
| Disease organisms | Pet and wildlife waste; garbage |
| Hydrocarbons | Car and truck exhaust; leaks and spills of oil and gas; used oil dumping; burning leaves and garbage |
| Pesticides | Pesticides overapplied or applied before a rainstorm; spills and leaks |
| Metals | Cars and trucks (brake and tire wear, exhaust); galvanized metal gutters and downspouts; industrial activities |

It is nearly impossible to get pollutants out of our water or our homes once they get there. Clearly, it is much more effective to keep pollutants out than to try to clean them up afterward.

Reducing Pollutants in Runoff

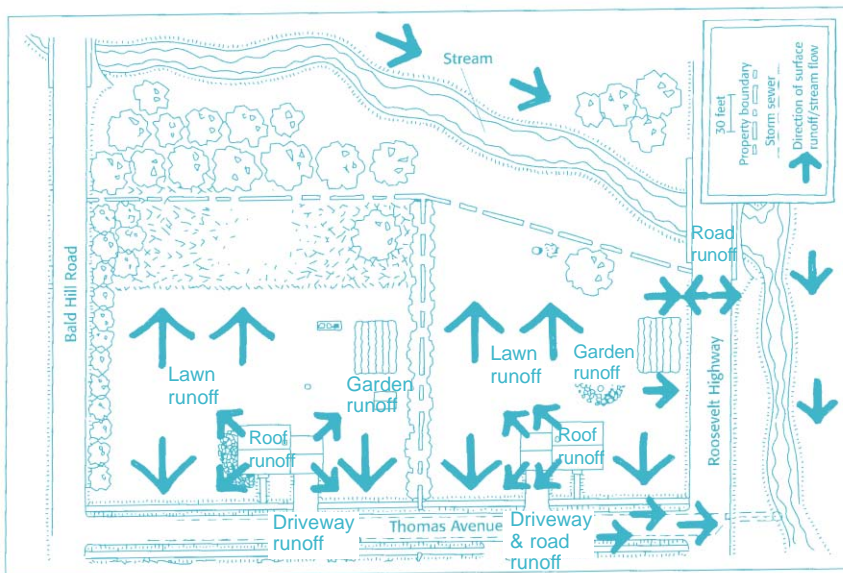
Stormwater is unavoidable, but its polluting effects can be reduced by keeping harmful chemicals and other materials out of runoff. This section offers ways to minimize major potential sources of contamination.

Where does stormwater runoff go?

This runoff collects and carries soil, pet wastes, pesticides, fertilizer, oil, leaves, litter, and other potential pollutants into a stormdrain or directly into a body of water. **Storm drains found along curbs do not go to wastewater treatment plants.** These drains lead directly to the nearest body of water carry all that stormwater picks up along the way.

1. Are any car or truck wastes being carried away by stormwater?

Oil stains on your driveway and outdoor spills of antifreeze, brake fluid, and other automotive fluids are easily carried along the stormwater superhighway during a rainstorm. An oily sheen on runoff from your driveway is a sure sign that you need to be more careful. Pans, carpet scraps, and matting can catch drips. Routine maintenance can prevent your car from leaking and help identify potential leaks. If you change your own oil, be careful to avoid spills and collect waste oil for recycling. The North Carolina Cooperative Extension has a *Help the Environment by Recycling Oil* (HERO) program in many counties. Every county in North Carolina has at least one used motor oil collection site available to its citizens. Store oily car parts and fluid containers where rain and runoff cannot reach them. **NEVER DUMP** used oil, antifreeze, or gasoline down a storm drain, in a ditch, or on the ground. These wastes will end up in a nearby lake or stream, or they may pollute your drinking water.



Map showing direction of surface runoff and stream flow in a neighborhood.

Washing your car in the driveway creates runoff without the help of a rainstorm—your hose provides the water. The dirty, soapy runoff drains directly into storm sewers, picking up oil and other pollutants as it goes. If possible, try washing your car on the lawn. Better yet, take it to a commercial car wash or spray booth that sends its dirty water to a wastewater treatment plant.

1a. Circle the answer that best describes how you handle automotive wastes.

- a. Oil drips and fluid spills are cleaned up. Dirty car parts and other vehicle wastes are kept out of reach of stormwater runoff.
- b. Drips and spills are not cleaned up. Car parts and other vehicle wastes are left on unpaved areas outside.
- c. Used oil, antifreeze, and other wastes are dumped down the storm sewer, in a ditch, or on the ground; OR you do not know.



1b. Circle the answer that best describes how you wash your car.

- a. Cars and trucks are taken to a commercial car wash or spray booth that sends its water to a wastewater treatment plant.
- b. Cars, trucks, or other vehicles are washed on a lawn or gravel drive.
- c. Cars, trucks, or other vehicles are washed on a driveway, street, or other paved area; OR you do not know.

Flood insurance from the Federal Insurance Administration (FIA) and administered by the National Flood Insurance Program (NFIP) can be purchased to protect your property along the coast. Since the rates are set by the FIA, you should be given the same rate from a private insurer or you can buy directly from FIA. Premium costs can be reduced by electing higher deductibles or elevating your home from one to four feet above the 100 year base flood level. Contact the Federal Emergency Management Agency (FEMA) at 770-220-5400 or the Division of Coastal Management, NC DENR, at 919-733-2293 or 1-888-4RCOAST for more information.

2. Do you store household products outside the reach of stormwater?

Most people have lawn and garden products like herbicides, insecticides, fungicides, and fertilizers. If stormwater or floodwater reaches these products, it can transport them into surface waters and possibly your well. Pool chemicals, salt in water softeners, and a wide variety of other chemical products are also troublesome pollutants if they wash into stormwater runoff. Keeping such products in waterproof containers and storing them up high and out of the potential path of runoff or floods is important. You can avoid storage problems by buying only as much of a product as you need for a particular task. Sometimes you can avoid using these chemicals in the first place. Extension publications such as *Disposal of Hazardous Household Waste* (FCS 368-3/WQWM-62) can help you understand household hazardous waste.

3. Do you use and handle chemicals safely?

Safe storage is only the first step in preventing contaminated runoff. Mix chemicals within a washtub so spills will be contained. If you do spill chemicals, act quickly to contain and clean up the spill. This is particularly important on paved surfaces. Using more pesticides or fertilizers than you need invites problems. Timing of applications is also important. **DO NOT apply lawn and garden chemicals if rain is expected within 24 hours.** See Coast*A*Syst fact sheet #4, *Improving Lawn Care and Gardening in Coastal North Carolina*, for more information on the proper use and handling of yard and garden products that can pollute.

Act quickly to contain and clean up chemical spills.



4. Do you use road salt or other deicing products?

While snow along the North Carolina coast is a rare occurrence, some people will use road salt and other deicers on their driveways and sidewalks. Road salt and deicers eventually wash off paved surfaces and end up in the soil or water. The stormwater superhighway readily carries salt and chemicals into nearby estuaries and rivers. Salt harms wildlife and plants in high concentrations, so use as little salt as possible. Refrain from using fertilizers as deicers; sand is a less toxic alternative. Chipping ice off pavement is an even better choice, although care must be taken not to damage the pavement surface.

2. Circle the answer that best describes how you store pesticides, fertilizers, and other potentially harmful chemicals.

- a. Chemicals are stored in waterproof containers in a garage, shed, or basement that is protected from stormwater.
- b. Chemicals are stored in waterproof containers but within reach of stormwater.
- c. Chemicals are stored in non-waterproof containers outdoors or within reach of stormwater; OR you do not know.

3. Circle the answer that best describes how you handle and use pesticides, fertilizers, and other lawn and garden chemicals.

- a. Spills are cleaned up immediately, particularly on paved surfaces. Minimum amounts of chemicals are applied according to label instructions. Applications are timed to avoid rain.
- b. Spills are cleaned up immediately, particularly on paved surfaces. Minimum amounts of chemicals are applied according to instructions. Applications are NOT timed to avoid rain.
- c. Spills are not cleaned up. Products are used in higher amounts than is recommended on the label; OR you do not know.

4. Circle the answer that best describes your use of road salt and other deicing products.

- a. Sand, road salts, and deicers are not used to facilitate ice melt.
- b. Sand is used to deice driveways and sidewalks. Salts and fertilizers are not used.
- c. Fertilizers, salts, and sand are used to remove ice from driveways and sidewalks; OR you do not know.

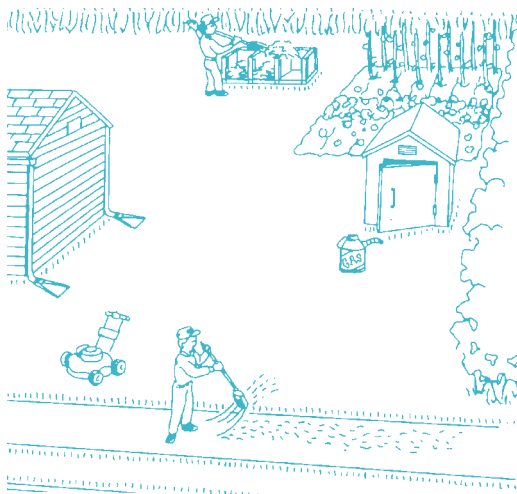
5. How do you keep animal wastes from becoming a pollution problem?

Droppings from dogs, cats, and other commonly kept animals, such as exotic birds, rabbits, goats, and chickens, can be troublesome in two ways. First, pet wastes contain nutrients that can promote the growth of algae if wastes enter streams, lakes, and estuaries. Second, animal droppings contain bacteria that can cause disease. The risk of stormwater contamination increases if pet wastes are allowed to accumulate in animal pen areas or left on sidewalks, streets, driveways, or drainage ways from which they can be carried along the stormwater superhighway to water bodies. Instead of allowing pet wastes to accumulate or sending them to a landfill, consider flushing the wastes down the toilet or burying them. Manufacturers have produced a pet waste digester, which they claim to be effective. Some communities may have restrictions on disposing of pet waste. Check with your local health department for any limitations in your area.

6. Do you keep yard and garden wastes out of stormwater?

If left on sidewalks, driveways, or roads, grass clippings and other yard wastes will wash away with the next storm. Although leaves and other plant debris accumulate naturally in streams and lakes, homeowners can contribute excess amounts of plant matter, especially in areas with many homes. This can lead to water that is unattractive or green with algae, potential fish kills, and make areas unsuitable for recreation because of debris or algae blooms.

Burning yard waste is not an environmentally friendly alternative — and in some areas, it is illegal. Hydrocarbons and nutrients released by burning leaves contribute to water pollution as well as air pollution. Rain washes smoke particles out of the air, and runoff picks up dust and ashes left on pavement or in ditches. Avoiding the problem is easy: sweep clippings back onto the grass, and compost leaves and garden wastes on your property to recycle nutrients. For more information on composting and grass cycling, see the North Carolina Cooperative Extension publication *Grasscycling and Composting: A Guide to Managing Organic Yard Wastes*.



Sweeping grass clippings and fertilizer onto the lawn or composting them helps keep yard waste out of storm sewers.

5. Circle the answer that best describes how you handle pet and animal wastes.

- a. Animal and pet wastes are flushed down the toilet; buried away from gardens, wells, ditches, or areas where children play; digested in an in-ground pet waste digester; or wrapped and placed in the garbage for disposal.*
- b. Animal wastes are left to decompose on grass or soil. Wastes are scattered over a wide area.
- c. Animal wastes are left on paved surfaces, concentrated in pen or yard areas, or dumped down a storm drain or in a ditch; OR you do not know.

*Be sure to check local regulations regarding flushing, burying, or landfilling pet and animal wastes.

6. Circle the answer that best describes how you handle grass clippings, leaves, and other yard waste.

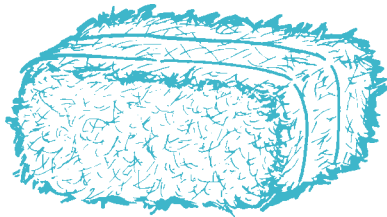
- a. Grass clippings, leaves, and other yard wastes are swept off paved surfaces and onto lawns away from water flow routes. Leaves and other yard wastes are composted.
- b. Leaves and other yard wastes are piled on the lawn next to the street for collection.
- c. Grass clippings, leaves, and other yard wastes are left on driveways, streets, and other paved areas to be carried off by stormwater; yard waste is burned on-site; OR you do not know.

Landscaping and Site Management to Control Runoff

You can reduce stormwater pollution risks by making simple changes to buildings, paved surfaces, the landscape, and soil surfaces. This section reviews some easily addressed problems, as well as major landscape alterations you might want to consider.

7. Are there areas of bare soil around your home?

Areas of bare soil often exist in vegetable and flower gardens, on newly seeded lawns, and around construction projects. Even on gentle slopes that are typical in non-dune environments, water from rain and snow can remove large amounts of soil and carry it to wetlands, streams, lakes, estuaries, and sounds. Planting grass or other groundcovers is the best way to stop erosion. Putting a straw or chip mulch over gardens or newly seeded areas will slow erosion. Straw bales, diversion ditches, and commercially available silt fences placed around construction sites can help slow runoff and trap sediment on-site. Construction sites can be terraced and construction can be conducted in phases to help reduce erosion and sedimentation. The state of North Carolina and many local governments require the use of these and other erosion control measures on construction sites.



Straw bales placed around construction sites can help slow runoff and trap sediment.

8. Can you eliminate paved surfaces or install alternatives?

Concrete and asphalt roads, driveways, and walkways are impervious; they prevent rainwater from soaking into the ground. When you have the choice, consider alternative materials such as gravel or wood chips for walkways. Avoid paving areas like patios. Where you need a more solid surface, consider using a “pervious pavement” made from interlocking cement blocks, hard plastic grids filled with stone or earth, or rubber mats that allow spaces for rainwater to seep into the ground. Provided there is not a high water table, coastal sandy soils are excellent places to try permeable pavement. If you must pour concrete, keep the paved area as small and narrow as possible.

7a. Circle the answer that best describes the bare soil in your lawn or garden.

- a. Bare spots in the lawn are promptly seeded and topped with a layer of straw or mulch. Bare soil in gardens is covered with mulch.
- b. Grass or other ground cover is spotty, particularly on slopes.
- c. Spots in the lawn or garden are left exposed without mulch or vegetation for long periods; OR you do not know.

7b. Circle the answer that best describes how you handle bare soil during construction.

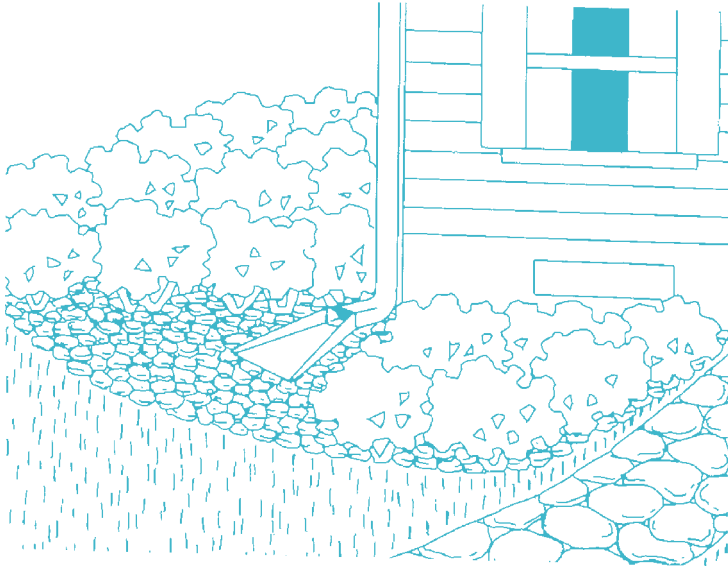
- a. Bare soil is seeded and mulched as soon as possible (before construction is completed). Sediment barriers are used until grass covers soil.
- b. Soil is left bare until construction is completed. Sediment barriers are installed and maintained to detain muddy runoff until grass covers soil.
- c. Soil is left bare and no sediment barriers are used; OR you do not know.

8. Circle the answer that best describes your use of paved surfaces.

- a. Paved surfaces are minimized. Alternatives such as wood chips or paving blocks are used for walkways, patios, and other areas.
- b. Some small areas are paved for patios or basketball.
- c. Paved surfaces are used extensively; OR you do not know.

9. Does your roof water flow onto pavement or grass?

Your house roof, like pavement, sheds water. If downspouts from roof gutters empty onto grassy or natural areas, the water will have a chance to soak into the ground. Aim downspouts away from foundations and paved surfaces. For roofs without gutters, plant grass, spread mulch, or use gravel under the drip line to prevent soil erosion and increase infiltration of water into the ground. Consider using cisterns or rain barrels to catch rain for watering your lawn and garden in dry weather.



Roof drainage should be directed to lawns or gardens and away from the foundation and paved surfaces.

10. Can you change the layout of your landscape to reduce runoff?

An essential part of stormwater management is keeping water on your property, or at least slowing down its flow as much as possible. Many lawns are sloped to encourage water to run off onto neighboring property or streets. An alternative approach is to create rain gardens (described in the following section). If your yard is hilly, you can terrace slopes to slow the flow of runoff. If you have a large lot, consider “naturalizing” areas with woodland or wetland plants. If your property adjoins a lake or stream, one of the best ways to slow and filter runoff is to leave a buffer strip of thick vegetation along the waterfront, which is called a riparian buffer. Many locales in North Carolina, such as counties in the Neuse and Tar-Pamlico River Basins, now require riparian buffers in new development. Good sources for ideas are Cooperative Extension, Natural Resources Conservation Service (U.S. Department of Agriculture), or Soil and Water Conservation District offices.

9. Circle the answer that best describes how you handle roof drainage.

- a. Downspouts and drip lines direct roof drainage onto a lawn or garden where water soaks into the ground.
- b. Some downspouts and drip lines discharge water onto paved surfaces or grassy areas where water runs off.
- c. Most or all drip lines or downspouts discharge onto paved surfaces, or downspouts are connected directly to storm drains; OR you do not know.



10. Circle the answer that best describes how you use landscaping and buffer strips.

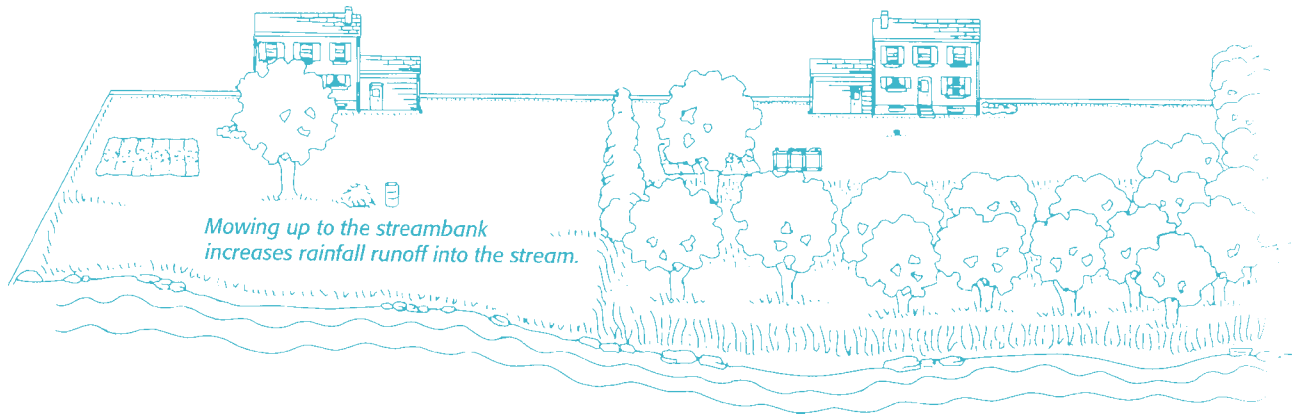
- a. Unmowed buffer strips of thick vegetation are left along streams, lake/bay shores or wetlands.
- b. No areas are landscaped to encourage water to soak in, but yard is relatively flat and little runoff occurs. Mowed grass or spotty vegetation exists adjacent to a stream, lake, or wetlands.
- c. There is no landscaping to slow the flow of stormwater, especially on hilly, erodible properties; stream banks or lake/bay shores are eroding; OR you do not know.

11. Are rain gardens appropriate?

Often runoff can be diverted to localized low spots in your yard. These areas, when planted with water-tolerant vegetation such as red maples, southern wax myrtles, buttonbush, yaupon holly, and sweetpepper bush, are called rain gardens. Rain gardens naturally filter water and provide an effective means for putting surface water back into groundwater. Rain gardens without designed underdrain systems work best in sandy soils, so their use is most appropriate in the coastal plain and sandhills of North Carolina.

11. Circle the answer that best describes how you divert stormwater runoff.

- a. Stormwater is diverted to engineered rain gardens in low-lying areas of your yard. Water is routed into and out of rain gardens.
- b. Stormwater is diverted to low areas without appropriate measures taken to make sure water will leave the site.
- c. Runoff leaves the yard without any treatment; OR you do not know.



To help prevent erosion, leave an unmowed buffer strip of thick vegetation along streams, lakes, and estuaries.

Related publications available from Cooperative Extension:

- *Be a HERO: A Guide for Do-It-Yourselfers*
- *Be a HERO: A Guide for Farmers*
- *Carolina Lawns* (AG-69)
- *Composting: A Guide to Managing Organic Yard Wastes* (AG-467)
- *Designing Rain Gardens/Bio-retention Areas* (AG-588-3)
- *Disposal of Hazardous Household Waste* (FCS-368-3, WQWM-62)
- *Grasscycling*
- *Improving Lawn Care and Gardening* (AG-567-5, WQWM-176A)
- *Improving Fuel Storage* (AG-567-2, WQWM-173)
- *Improving Septic Systems* (AG-567-4, WQWM-175)
- *Improving Storage and Handling of Hazardous Waste* (AG-567-3, WQWM-174)
- *Landscaping to Protect Water Quality: How to Plan and Design a Wise Water-Use Landscape* (AG-508-2, WQWM-124)
- *Landscaping to Protect Water Quality: Wise Water Use in Landscaping* (AG-508-1, WQWM-123)
- *North Carolina Erosion and Sedimentation Pollution Control Program* (AG-439-32)
- *Caring for Your Lawn and the Environment* (AG-597)
- *Protecting Water Supply* (AG-567-1, WQWM-172)
- *Soil Facts: Managing Lawns and Gardens to Protect Water Quality* (AG-439-21)
- *Urban Stormwater Structural Best Management Practices* (AG-588-1)
- *Water Quality and Home Lawn Care* (WQWM-151)

Other resources:

- For information on buffers:
<http://www.nrcs.usda.gov/feature/buffers/>
- For information about NCSU's Urban Stormwater Treatment program:
http://www.eos.ncsu.edu/eos/info/bae/cont_ed/index.htm
- For more information from the Natural Resource Conservation Division of the U.S. Department of Agriculture:
<http://www.nrcs.usda.gov/>
- For information on DENR's Division of Soil and Water Conservation:
<http://www.enr.state.nc.us/DSWC/> or call 919-715-3559

These publications are available at your county Cooperative Extension Center. You may also order these publications from Communication Services, Campus Box 7603, North Carolina State University, Raleigh, NC 27695-7603, or online at <http://www.ces.ncsu.edu> or <http://www.bae.ncsu.edu/programs/extension/stormh2o/stormwater.html>



REMINDER

If you circle **b** or **c** for any question, you may be causing water pollution.

Resources and publications:

- *Bay Book: A Guide to Reducing Water Pollution at Home*, 1993, by the Alliance for the Chesapeake Bay, 6600 York Rd., Baltimore, MD 21212 — (800) 662-2747 — <http://www.acb-online.org>
- *Site Planning for Urban Stream Protection*, 1995, by the Center for Watershed Protection, 8737 Colesville Road, Suite 300, Silver Spring, MD 20910 — (301) 589-1890 — <http://www.cwp.org>
- UNC Wilmington's *Paving the American Dream*, UNC Wilmington, Attn: Elaine Penn, Director of Special Projects, 601 South College Road Wilmington, NC 28403 — (910) 962-2657 — <http://www.uncwil.edu/smartgrowth/>

What is the North Carolina Coast*A*Syst Program?

The North Carolina Coast*A*Syst program is a series of publications that can help you in becoming a good coastal environmental steward and protect the health and well-being of your family. This publication leads you through an evaluation of your home and property to determine the pollution and health risks of your water protection practices from stormwater management. It also provides information on solving potential problems that you may identify. The publications also list the North Carolina state agencies responsible for helping you solve your particular problems.

This Coast*A*Syst program is modeled after the South Carolina Coast*A*Syst program. South Carolina was the first state to develop such a program.

The goal of the North Carolina Coast*A*Syst program is to help protect the health of you and your family and the coastal environment of North Carolina.



North Carolina's modification of Coast*A*Syst was coordinated by Deanna L. Osmond. Bill Hunt and Greg Jennings were the technical reviewers at North Carolina State University. Technical review was also provided by Gloria Putnam, North Carolina Department of Environment and Natural Resources (DENR), Division of Water Quality.

Prepared by

William F. Hunt III, Extension Specialist

Gloria Putnam, North Carolina Department of Environment and Natural Resources, Division of Water Quality

Lin Xu, North Carolina Department of Environment and Natural Resources, Division of Water Quality

Grace R. Lawrence, Coast*A*Syst Coordinator

Janet Young, Layout & Design Specialist

10,000 copies of this document were printed at a cost of \$2,085 or \$0.21 per document with funds provided by the National Oceanic and Atmospheric Administration (through the North Carolina Coastal Nonpoint Source Program administered jointly by the NC DENR Division's of Water Quality and Coastal Management).



Published by

NORTH CAROLINA COOPERATIVE EXTENSION SERVICE