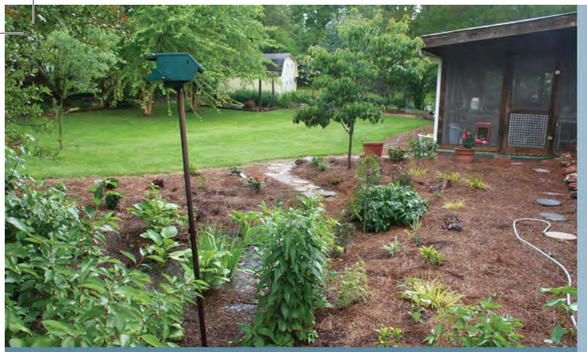


Rain gardens are attractive landscape features that protect the environment. Consider installing one on your property.

Simple actions can help protect your stream. Consider protecting your stream side area with native plantings.

WHERE TO GO FOR MORE INFORMATION

A good place to start is the Georgia Adopt-A-Stream website:

www.GeorgiaAdoptAStream.org

Here you'll find information on Georgia streams, lakes, wetlands and coastal waters, with links to resources and materials to learn more about the backyard stream protection information covered in this brochure.

This publication was developed in part by support from the Georgia Forestry Commission, Georgia Urban and Community Forest Grant, Upper Ocmulgee River RC&D, and through a grant from the US Environmental Protection Agency under the provisions of Section 319(h) of the Federal Water Pollution Control Act, as amended.

Parters responsible for the creation of this brochure include:
Natural Resources Conservation Service, Upper Ocmulgee River RC&D
Georgia Environmental Protection Dvision, Adopt-A-Stream Program
Southeast Waters
Georgia Department of Community Affairs
City of Atlanta, Department of Watershed Management
Gwinnett Soil and Water Conservation District

Thanks to the producers of the Ohio Life at the Water's Edge brochure.

Photographs contributed by Upper Ocmulgee River RC&D, Environmental Protection Division, Cobb County Water System, and Coosa River Basin Initiative.

For more information on the publication, please contact the Environmental Protection Division, Watershed Protection Branch at 404-651-8514.

Life at the Water's Edge

A guide to stream care in Georgia

A stream begins long before your property line and flows far beyond it…

Landowners around the state are becoming increasingly alarmed at the condition of streams on their property. The problems facing our streams, including eroding banks, flooding, loss of habitat and lack of clean water, are the result of increased development and other land use changes in our watersheds. These issues can seem complex, but there are many things that landowners and other citizens can do to help improve the conditions of our streams.

The purpose of this brochure is to provide information about:

- *Watersheds, streams, and the problems that they are facing.....pg. 2*
- *How to address problems with your backyard stream.....pg. 5*
- *Simple watershed stewardship practices anyone can implement on their property.....pg. 15*

Get Involved with Citizen Watershed Groups and Water Quality Monitoring

There are many local citizen watershed protection groups made up of people just like you who are working together to protect their water resources. Getting involved with one of these groups can be a great way to help protect the watershed beyond your property.

Georgia Adopt-A-Stream is a statewide stream monitoring program that encourages citizens to take ownership of local waterways. Participants safeguard local streams by monitoring the water chemistry and biological life, observing changes in the stream characteristics, and investigating the watershed. Participants are encouraged to work in partnership with their local governments and stakeholders.

These simple actions can make a difference. Volunteers can identify problems early on and address them through their network of partners.

Be Aware of Development and Construction Activity in Your community

Erosion and sedimentation (E&S) from building sites can have an immediate and devastating effect on stream health. Silt and other soil sediments are the main pollutant in our streams and cause serious damage to water quality and aquatic habitats.

Take the time to learn basic E&S practices and about the laws governing them. Georgia Adopt-A-Stream and the Georgia Soil and Water Conservation Commission can provide this information.

Once you know the standard practices and laws, report violations when you see them.

If you notice a development site without silt fences, gravel entrance pads, protective stream buffers or other controls, contact your city or county development department or code enforcement office to inquire about the site.

If the problem persists, call your local State Soil and Water Conservation Commission office or a Georgia Environmental Protection Division District Office to request a site visit to confirm compliance with applicable laws and regulations.

Our website lists regional and state contact numbers, as well as other options for getting involved.

OTHER SUGGESTIONS FOR GOOD STREAM STEWARDSHIP

Improve The Wildlife Habitat In Your Backyard

Trees, shrubs and leafy plants provide important food sources and shelter for birds, butterflies and other wildlife. The types of wildlife you attract will depend on your selection of vegetation. The best combination is a variety of native plants that flower and bear fruit at various times throughout the year. Some suggestions include:

TREES

Dogwood (Cornus florida)
American holly (Ilex americana)
Red maple (Acer rubrum)
Native Oaks (various Quercus spp.)
Loblolly pine (Pinus taeda)
Black cherry (Prunus serotina)
Green ash (Fraxinus pensylvanica)
Red cedar (Juniperus virginiana)
Musclewood (Carpinus caroliniana)
Serviceberry (Amelanchier Canadensis)
Southern crabapple (Malus angustifolia)

SHRUBS

Bottlebrush buckeye (Aesculus parviflora)
Nanny berry (Viburnum prunifolium)
Inkberry (Ilex glabra)
Beauty berry (Callicarpa americana)
Sweetshrub (Calycanthus floridus)
St. John's wort (Hypericum prolificum)
Fothergilla (Fothergilla major)
Clethra (Clethra alnifolia)
Sweetspire (Itea virginica)
Wax Myrtle (Myrica cerifera)

FLOWERS, VINES, and FERNS

Cross vine (Bignonia capreolata)
Carolina jessamine (Gelsemium sempervirens)
American wisteria (Wisteria frutescens)
Black-eyed susan (Rudbeckia spp.)
Green & gold (Chrysogonum virginianum)
Joe-pye weed (Eupatorium purpureum)
Cardinal flower (Lobelia cardinalis)
Partridgeberry (Mitchella repans)
Showy goldenrod (Solidago speciosa)
River oats (Chasmanthium latifolium)
Sunflower (Helianthus spp)
Evening primrose (Oenothera biennis)
Cinnamon fern (Osmunda cinnamomea)
Christmas fern (Polystichum acrostichoides)

For more information on gardening for wildlife habitat, look on our website.
Other websites to start your search include the Georgia Native Plant Society www.gnps.org or the Georgia Wildlife Federation habitat gardening page www.guf.org/habitats.htm.

Keep Septic Systems in Good Condition

Septic systems can malfunction or simply wear out over time. Any plumbing that's not working properly is a source of pollution. Water that ponds above a septic tank is a signal that you need an immediate inspection.

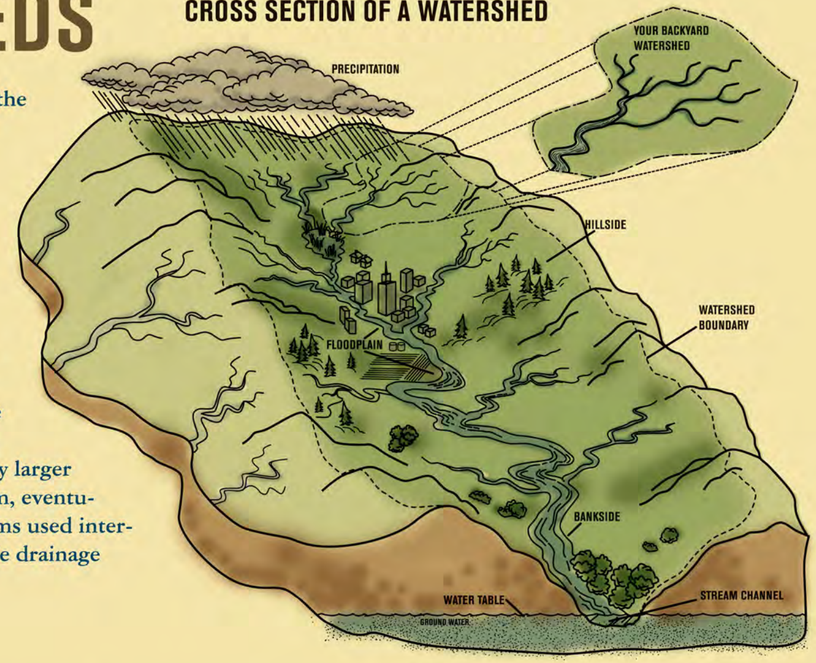
Here are some suggestions for maintaining your septic system:

- *Have your system pumped every three to five years.*
- *Don't put chlorine bleach, paint, chemicals, oil and grease down the drain.*
- *Contact your local County Board of Health for more tips.*

WATERSHEDS

To understand the importance of the health of your stream to you and those downsteam of you, or in the next town, or even in the next state, it's helpful to understand what a watershed is. A watershed is all the land from which water flows to a given stream. Your backyard stream has its own small watershed. The water moves through a network – underground and on the surface – and converges into streams and rivers, which become progressively larger as the water moves on downstream, eventually reaching the ocean. Other terms used interchangeably with watershed include drainage basin or catchment basin.

CROSS SECTION OF A WATERSHED



- *What a landowner does on their property affects both their own stream and the larger bodies of water downstream.*

HOW STREAMS WORK

Features of a healthy stream:

The health of a stream is determined by a number of factors, all of which point to one thing: A healthy stream supports aquatic life. Getting more technical, though, a healthy stream has a particular shape, good water quality, and a stable amount of water.

Shape

Streams are dynamic systems, which means they naturally change their shape and direction over time. Most streams form meandering, winding curves across the land.

In our area, many healthy streambeds have alternately spaced, deep and shallow areas called pools and riffles. Pools are deep areas that contain fine material such as sand, a good home for fish. Riffles are shallow and contain larger material like gravel and boulders – ideal spawning grounds for fish.

Healthy streams are also connected to their floodplain, the flat land next to a stream that periodically floods. Floodplains act as both filters and flood-storage – they absorb and clean excess stormwater, reducing streambank erosion and the amount of sediment and pollutants carried by the stream.

Water Quality

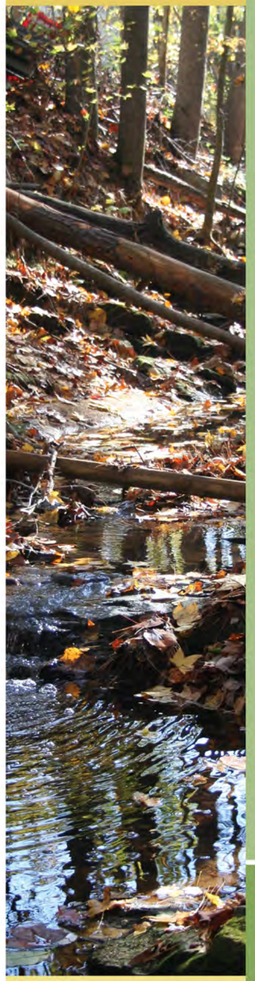
Healthy streams also have good water quality, which means low pollutants such as chemicals or motor oil, low amounts of washed-in sediment such as dirt or sand, and the right balance of oxygen and nutrients. If a stream gets too many nutrients in it (typically from fertilizer) or gets too warm because of lack of shade (which reduces oxygen levels in water), this balance can be disrupted.

Water Quantity and Urbanization

The right amount of water in a stream is also important. In a healthy watershed, much of the rain that falls is absorbed by the ground. Some of this water is used by plants, and the rest becomes groundwater that replenishes the stream. The relatively small amount of water that is not absorbed flows quickly over land to the stream, where it may fill the stream and spread out onto the floodplain.

In our cities and suburbs, the stormwater acts differently. We have paved much of these areas and removed much of the vegetation. In these areas, because of impervious surfaces, water that once soaked into the ground or was used by plants now runs directly to the stream. This results in much higher storm flows than before, leading to bank erosion and causing the stream to become straighter, wider, deeper, and less capable of reaching its floodplain.

Between storms there is little groundwater to replenish the stream, and the volume of water drops significantly.



3. Permeable Pavement

When installing driveways and patios, consider using a porous surface as an alternative to concrete or asphalt. There are a number of pervious surface options, but all incorporate the basic principle of increasing water absorption and reducing stormwater runoff. Examples include pavers with spacers for gravel or grass for use on patios and parking lots. There is even a permeable concrete with pockets that "breathe" and drain rainwater. Another alternative is to use wood chips on paths and parking spaces.

4. Rain Barrels

Rain barrels are a method for capturing rainwater and saving it for a day when your plants are thirsty. Whether you make your own rain barrel or purchase one, there are some basic principles to keep in mind. Mosquitoes breed in standing water, so make sure the top is covered. When positioning the barrel, consider how you will retrieve water from it, and make it high enough so that gravity will provide the necessary force to "pump" the water. Consider decorating your rain barrel or blending it into your landscape.

During rain events a rain garden will collect rainwater; if it fills, excess water will exit via the spillover. A rain garden of proper depth should not hold standing water for more than 48 hours. If this is not the case with your rain garden, consider lowering the height of your spillover area to allow water to exit more quickly.

There are numerous technical publications and guidelines on the Internet for sizing and placement of your rain garden. Our calculations are based on averages for the North Georgia Piedmont region.

2. Grass Swales

Grass swales provide homeowners with a simple and subtle (and usually mowable) method for slowing runoff and increasing water absorption. Runoff from your property or from a neighbor's can be captured, redirected and slowed by careful placement of a grass swale.

Benefits of Healthy Streams

Healthy streams are at the heart of a healthy environment- an environment that sustains humans as well as the rest of the life around us.

Habitat & Downstream Water Quality

Healthy streams maintain habitat for aquatic and terrestrial wildlife. Since all water flows downstream, any problems, even on the smallest stream, will affect everything and everyone downstream.

Poor water quality directly affects people, not just wildlife. So much of what we need relies on good water quality: drinking water, agriculture, fisheries, recreation, and more.

Property Values

- Appraisal values of houses with natural streams – stable banks and lots of plants – can be higher than those with bare or channelized streams.
- The closer a property is to a natural area, the higher its value.
- 60% of suburban residents enjoy wildlife viewing and are willing to pay a higher price for properties that are attractive to wildlife.

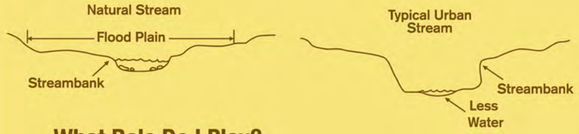
Components of an Unhealthy Stream

When a significant area of the watershed is covered with impervious surfaces such as paving or roofs, streams start to suffer.

- Streams become "flashy", characterized by heavy destructive flows during storms with low water level between them.
- Storm flows deepen and straighten (channelize) streambeds, cutting them off from their floodplain, increasing downstream flooding.
- Banks erode, causing loss of property and habitat.
- Streams lose instream habitat (pools & riffles).

Urban Development Affects Water Quality As Well

- A whole range of pollutants, from motor oil to fertilizer to pet waste, wash into our streams with every rain.
- Sloppy construction practices cause sediment to wash into waterways.
- Vegetated buffers – which stabilize banks, provide habitat, keep water shaded and cool, and clean stormwater – are often damaged or removed.

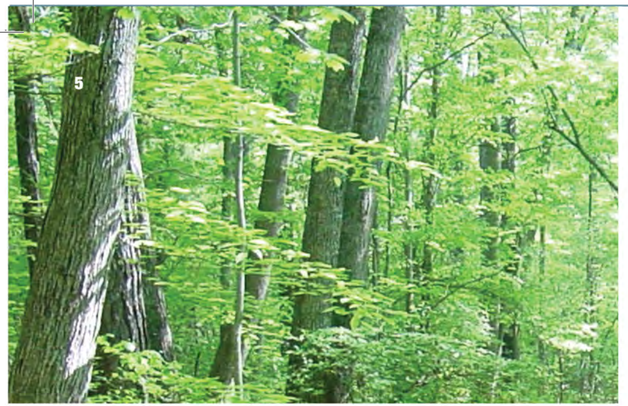


What Role Do I Play?

As a landowner, you can have either a positive or negative impact on your stream. Any activities or changes you make to your land or the stream channel itself can affect:

- How a stream flows.
- What the water contains.
- The quality of habitat in and around the stream.
- The value of the very property you've tried to protect and improve.

As an individual landowner, you may only be able to have a minor impact on the health of the entire stream. But you can affect the condition of your own streambanks, and you can maintain your property in a way that will positively affect the entire watershed. The following pages contain strategies for property maintenance and enhancements that will benefit your stream and the entire watershed.



LET'S LOOK AT YOUR STREAM, ITS BANKS, AND ITS SURROUNDING LAND

Your Stream Buffer Zone

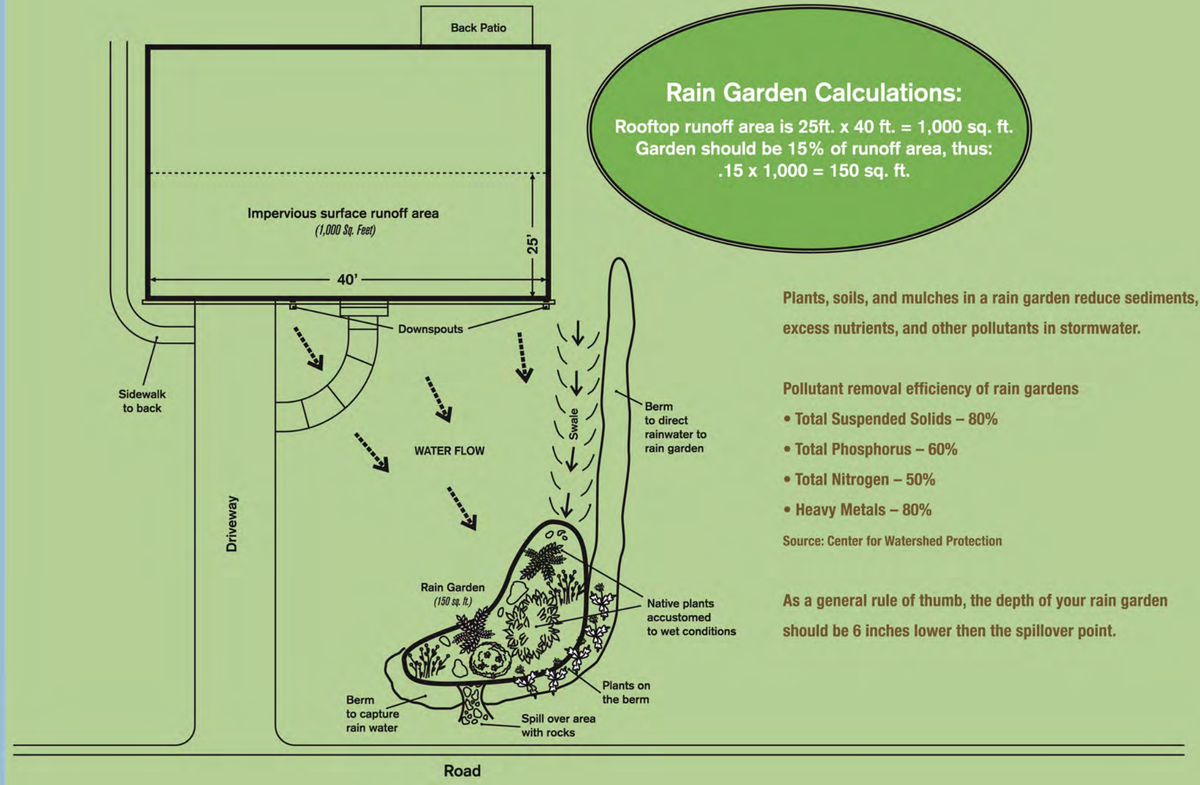
A stream's buffer zone (also called the riparian buffer area) is the strip of vegetation along the banks. A healthy undisturbed buffer keeps the banks strong and separates the flowing water from developed areas (lawns, buildings, driveways, etc.).

The Georgia Erosion and Sedimentation Act requires that all waters in the state must have at least a 25-foot buffer of natural vegetation. Streams in North Georgia that support populations of trout must have a 50-foot buffer. Many cities and counties mandate larger buffers than those required by the State. Contact your local municipality, the Soil and Water Conservation District, or the Environmental Protection Division for more information.

Many homeowners – particularly in urban areas – have much narrower buffers than that.

Some stormwater reaches streams directly from storm drains in the street, and some gets there through the buffer zone. A thick layer of plants and roots reduces the volume and speed of such runoff and lets the ground absorb some of the water before it reaches the creek. Well-planted buffers result in more stable streambanks.

Rain Garden Model



Rain Garden Calculations:

Rooftop runoff area is 25ft. x 40 ft. = 1,000 sq. ft.
Garden should be 15% of runoff area, thus:
.15 x 1,000 = 150 sq. ft.

Plants, soils, and mulches in a rain garden reduce sediments, excess nutrients, and other pollutants in stormwater.

Pollutant removal efficiency of rain gardens

- Total Suspended Solids – 80%
- Total Phosphorus – 60%
- Total Nitrogen – 50%
- Heavy Metals – 80%

Source: Center for Watershed Protection

As a general rule of thumb, the depth of your rain garden should be 6 inches lower then the spillover point.

Here are some basic recommendations and guidelines for installing a rain garden:

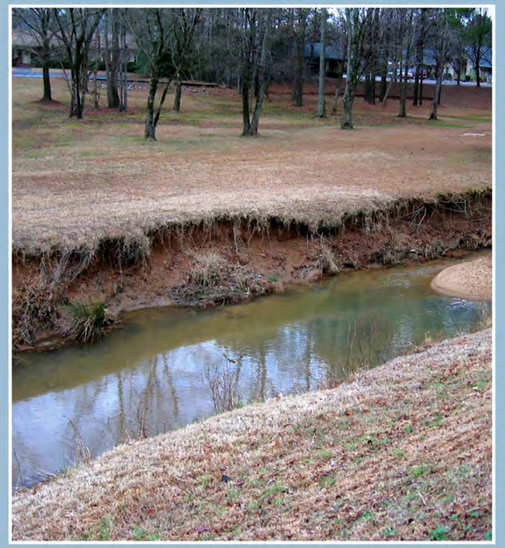
Place your garden in a low area away from your house.

- Make sure stormwater from impervious surfaces is directed to your rain garden. This may require the installation of swales to redirect water from gutter downspouts.
- On the lower side of the garden, install a berm to capture and hold the rainwater. Make sure the berm is level.
- Install a spillover to release excess water from the berm. The spillover can be reinforced with medium sized stone and can be planted with a hardy ground cover to keep soil from eroding.
- If your rain garden is over 300 square feet, consider creating two separate gardens.
- Mulch your rain garden. There are many types of natural mulches that will protect your soil and reduce the need for watering, but pine straw is the ideal choice. Pine straw is a cheap and readily available mulch and will form a tight-knit web that won't flow away with large rains.
- Plant appropriate – ideally native – vegetation. There are numerous resources with extensive plant lists, but the best option is to consult your local botanist, nursery or native plant garden center for plants that can tolerate "wet feet" and periodic dry periods.

Eroding Streambanks

Mowing right to the stream edge may look nice and neat, but it's a not a good idea. If you eliminate a buffer zone's natural plants and bushes, you also lose the root systems that hold the soil in place. The result: the banks erode faster… they destabilize… and they crumble and cave in.

Land loss to stream erosion is costly and difficult to restore; prevention is the key. In the photo to the right, a vegetated buffer zone could have helped prevent the streambanks from eroding.



DON'T MOW IN THE BUFFER ZONE

- *Keep your stream's buffer zones "mower-free".*
- *If your buffer zones are healthy . . . MAINTAIN THEM.*
- *If your buffer zones are degrading . . . IMPROVE THEM.*

For existing urban backyards, a buffer zone of thick vegetation is essential. Grass alone won't protect your property. A combination of ground covers, shrubs, and trees is vital. Consider installing a buffer zone wider than the minimum requirement. The wider the better, but even narrow buffer zones are better than none.

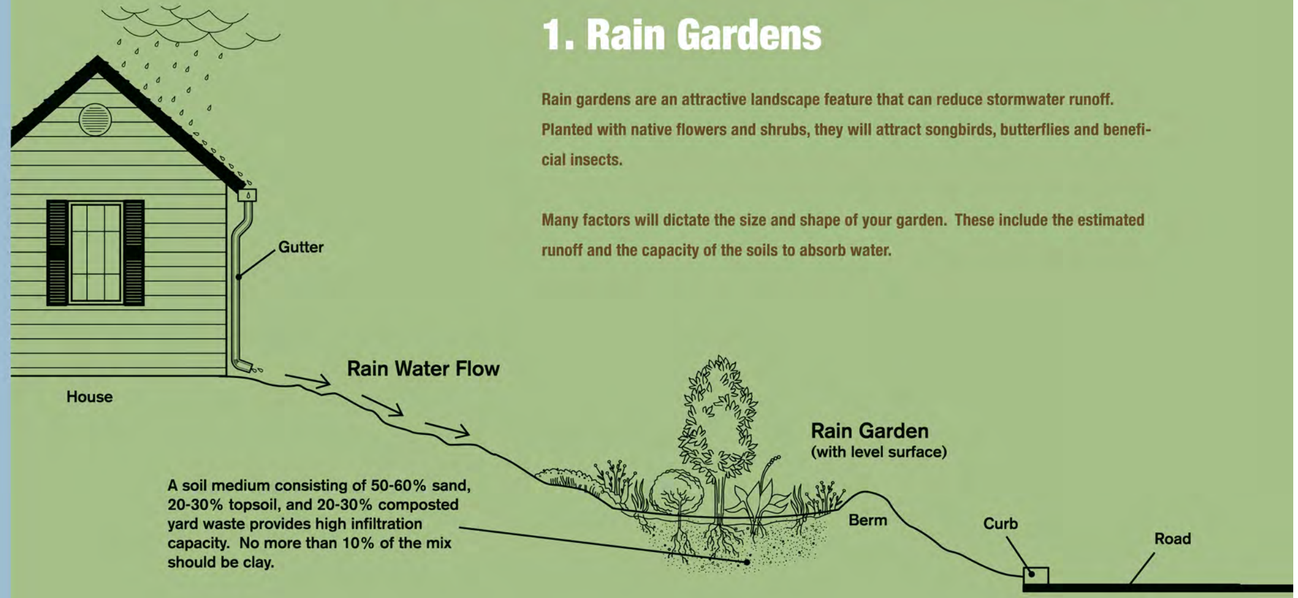
What Healthy Buffer Zones Do:

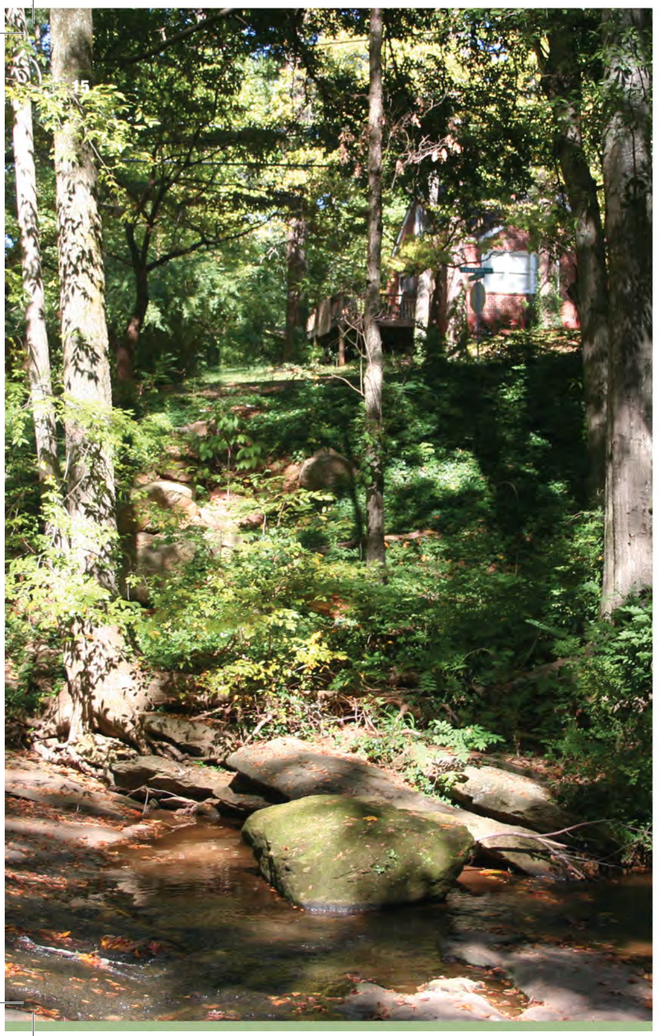
- *Stabilize streambanks*
- *Reduce erosion*
- *Provide wildlife habitat*
- *Increase beauty*
- *Reduce sediment and chemicals from rainwater runoff*
- *Provide shade to keep stream water at cooler temperatures for healthy plants and animals*
- *Reduce algae growth*
- *Increase your property value*

1. Rain Gardens

Rain gardens are an attractive landscape feature that can reduce stormwater runoff. Planted with native flowers and shrubs, they will attract songbirds, butterflies and beneficial insects.

Many factors will dictate the size and shape of your garden. These include the estimated runoff and the capacity of the soils to absorb water.





LIVING WITH YOUR STORMWATER

In the next 20 years, Georgia's population is expected to double. This growth will bring huge amounts of new urban and suburban development. Unless we radically change the way we build, this growth will result in more impervious surfaces: roads, rooftops, driveways, and parking lots. More impervious surface leads to more stormwater runoff, more unhealthy streams, more eroded banks, more flooding, and more degraded wildlife habitat.

While a solution to this problem is complex, there are a few simple things that anyone can do on their property that will help reduce the impacts of stormwater runoff and beautify their yard at the same time. Following are 4 simple practices that will work anywhere in the watershed – you don't need to live next to a stream to help keep them healthy.

PLANT IN YOUR STREAM BUFFER ZONE

Healthy buffer zones need a combination of plant materials: ground covers (which can be native unmowed grasses), small shrubs, and trees. This needn't be expensive; banks that remain stable will attract a host of beneficial species.

Green Ash

Buttonbush

Black Willow

One of the easiest and least expensive methods of planting around streams is using native plants adapted to the local climate. Some common plants you might consider in Georgia include the following:

Common Name:	*Scientific Name:*
Black Willow	Salix nigra
Silky Dogwood	Cornus amomum
Green Twig/Round-leaved Dogwood	Cornus rugosa
Buttonbush	Cephalanthus occidentalis
Green Ash	Fraxinus pennsylvanica
Willow Oak	Quercus phellos
Sweetgum	Liquidambar styraciflua

PLANTING TIPS: Plant in the fall and winter months for greatest success. Plant the top of the root ball even with the top of the ground, not deeper. Don't remove the burlap from large plants – the twine holding the root ball together will decompose over time. Most of these shrubs listed will have trunks about 2-3 inches in diameter and will reach heights of 6-18 feet. You might want to consult a local plant expert for the final word.

YOUR STREAM AND ITS BANKS

Inspect and Monitor

The first step in taking care of your streambanks is to inspect them. With a partner, walk down the middle of the stream during normal flows and examine your streambanks. Are the banks well vegetated? Are the banks low and sloping or high and sheer? Are there areas that are undercut or collapsing? You may want to take photographs or make drawings of the banks so that you can record any changes over time.

If there are no obvious erosion problems, that's great news. But if there are areas of bare unprotected soil or undercut banks, don't ignore them. The problems will only grow over time, and become more difficult to address.

Moderately Eroding Banks

If your banks display minor undercutting, a few patches of unprotected soil, or the potential loss of larger plants or trees, you may be able to prevent further damage by installing small structures of wood or stone and following up by planting appropriate plants on your banks. In some cases, especially where bare soil patches are evident, planting alone may be enough.

While the structural fixes mentioned above are small and relatively easy to install, specialized knowledge is helpful in installing them correctly.

Severely Eroding Banks

If your stream has vertical banks of more than a couple of feet and very few plants, or you are losing property at the edge of your stream, the solution is likely to be more complicated than just replacing lost plant material. You will have fewer options and the fixes will be more expensive and difficult than if the problem had been addressed earlier. There are things that you can do, but you will need expert guidance. Major work on a streambank, if not done properly, can make the problem worse. In addition, there are state and local laws governing what may be done to a streambank, even on your own property. You will need help to interpret these laws and obtain any necessary permits.

REMOVE TRASH IN YOUR STREAM

PROBLEM: TRASH IS UNSIGHTLY, UNSANITARY, AND UNSAFE FOR WILDLIFE!

- The best way to have clean streams is to prevent litter from getting into them in the first place. This requires education on all levels.
- Another approach is to organize a cleanup in your neighborhood. Don't know how? Complete guidelines and suggestions for how to organize a neighborhood cleanup can be found through Georgia's Rivers Alive program. For more information visit their website, www.riversalive.com.
- Don't have time to organize a cleanup? Join an existing cleanup event. Rivers Alive promotes cleanups across the state every fall. Other cleanups are organized through Keep Georgia Beautiful affiliates, local watershed groups, and civic organizations. All Rivers Alive events and many other cleanup events are posted on the Rivers Alive website.

Safety Tips

- When working in streams, make sure you wear strong footgear and gloves to prevent cuts and injuries.
- Always work in teams and have a first aid kit.
- Have a phone handy to make emergency calls.
- Remove old tires and other garbage from the water and streambanks, but not if removal will cause further erosion of streambeds and streambanks.
- Large drums or suspicious looking containers should be left alone. Report these findings to the Department of Natural Resources Hazardous Waste Management Branch at 404-656-7802.
- Have a plan for discarding removed trash – the public works department will help with trash pickup.

Rivers Alive cleanup emphasized

By CAROLYN LAMON
News Writer

The importance of keeping the local waterways clean was the topic of a speech given to Rotary by Liz Tannhauser, director of Keep Decatur County Beautiful.

Tannhauser

She said Tuesday that the Flint River begins as a drainage ditch near Atlanta's Hartsfield-Jackson International Airport, flowing through a number of watersheds until it becomes the beautiful river we know. Emphasizing that the water we have is all that we will ever have makes the point of the need to monitor the water quality.

For nine years the local organization has participated in Rivers Alive, a state-wide cleanup. Decatur County has utilized more than 1,100 volunteers who have picked up more than 40 tons of trash from the lower Flint River and Spring Creek watersheds.

The good news, according to Tannhauser, is that when they began nine years ago there were so many sites to be cleaned that they hardly knew where to begin. Those numbers have been reduced.

Some of the volunteers participating have been Cub and Boy Scouts, JROTC, Y-Club, Rutio Middle PREP Club, Habitat for Humanity, Bainbridge College; BHS National Honor Society, BHS Anchor Club and FFA.

Tannhauser stressed that much of the litter found could be recycled. There are laws and ordinances governing littering and waste control, the minimum fine for littering being $200. "plus you have to clean it up," she added.

The Sheriff's Department now has an environmental officer to follow up on complaints of illegal dumping.

In addition to litter there are non-point sources of pollution occurring as a result of rain washing paved areas.

Sediment washed away by rains is the largest non-point pollutant carrying herbicides, fertilizers and disease-causing organisms, such as animal waste, into the streams.

Clean-up date for this year is Oct. 29. Volunteers will meet at the Bainbridge Boat Basin or the Brinson boat launch on Highway 84 West. Hours are 8:30-11:30 a.m.

A special appeal has gone out for persons with boats.

For more information, or to preregister, call 246-3611.

YOUR LAWN AND THE STREAM

Most of us know not to dump tires, oil from cars, pesticides, herbicides, and other trash into our waterways. But many people still believe it's OK to deposit organic material like leaves and grass onto a streambank or into the stream itself.

When it comes to stream dumping, even organic doesn't cut it. Yard waste (grass, leaves, pet droppings, etc.) is the second largest type of all discarded trash. When these materials reach the water – either directly or by stormwater – they decompose and use up critical, life-giving oxygen in the water. Such streams are often choked with algae and sometimes smell bad. With more than 30 million acres of lawn in the United States, stream-smart lawn maintenance DOES make a difference.

PROBLEM: LAWN CLIPPINGS THROWN INTO STREAMS OR ONTO STREAMBANKS

•*Compost clippings properly, away from the stream.*
Compost is nature's way of turning leaves, grass clippings and vegetable scraps into a soil conditioner. It's easy and can be a relatively quick process. Just remember - don't compost near your stream.

• *Mowing? "Cut it high and let it lie."*
Grass is its own best natural fertilizer. Clippings are 90% water and they break down quickly.

• *Fertilizing? Do it sensibly.*
Fertilizing directions are there for a reason. Many people use too much fertilizer. Heavy rainstorms carry excess fertilizers off the lawn and pavement, into storm drains, and into the waterways. Fertilizers pollute the water by encouraging too much algae growth. And when the algae dies, the oxygen levels decrease too much for fish and insect populations to be supported. Sweep any excess fertilizers off the pavement.

Both stream buffers and rain gardens will help capture excess fertilizer.

Don't Blindly Dump Concrete, Rubble And Rocks On Streambanks.

Rock and concrete – even large amounts of it – dumped on streambanks may offer some short-term protection, but if it is not installed carefully and augmented with plant material (usually very hard to do amid piles of rock), it is deleterious to the ecosystem and often becomes ineffective over time. Talk to a stream restoration specialist first; you may save time, money, and your streambank.

PROBLEM: INCREASED STREAM FLOWS HAVE ERODED YOUR BANKS AND WASHED AWAY PLANT MATERIAL

PLANT YOUR BANKS

As mentioned, once streambanks start to fail – particularly because of increased stream flows – repairing them is usually not as simple as just installing plant material. In some cases, though, you may be able to help protect your streambanks by planting live, dormant, un-rooted cuttings (no leaves or visible roots). Black willow (salix nigra) and silky dogwood (Cornus amomum) are particularly useful in sunny buffer areas. These plants develop a dense, fibrous root system that holds soil in place. (Consult a plant expert for advice on selecting other plants. The Georgia Native Plant Society has an excellent website with topics on native plants and nurseries throughout the state.)

Cuttings may be taken from live healthy trees in the dormant (non-growing) season. The easiest cuttings to work with are from 1-2 feet in length and at least 3/4 of an inch in diameter.

With a little investigation in your community, you might find a free source of live cuttings from established mature stands of willows. (Done properly, such cutting does not harm the mature trees.) Many shrubs are available through mail-order suppliers and local native plant suppliers. Search the web using keywords "bioengineering" or "willows" for Georgia sources.

Point the cutting downstream (so the water can flow around it easily during floods) and tap it in the ground using a dead-blow hammer or rubber mallet. About 2/3 of its length should be underground. Spacing should be 18-24 inches apart. Be careful to insert the cutting with the thicker end down and buds pointing toward the sky. If the end of the cutting is deformed by the hammer during installation, re-trim it neatly.

Under ideal conditions – cuttings planted in sunny conditions in cool, wet weather – growth will be detected within a few weeks after the end of the dormant season. Unless an extended dry period occurs, you will not need to water such cuttings.

These plants will generally grow in any wet sunny spot. They will provide a thick root mass, so plant as close to the edge of the stream as possible. The trick is to get the stakes to remain in place during high water stream events, such as heavy rains, while they're growing roots. Once they're established, they have great holding power.

The ideal time to plant is in the fall or winter. Planting later in the season means that fewer plants will grow and survive. In the summer heat, all bets are off.

Proceeding in stages and installing native plants over a several year period will minimize the disturbance during revegitation. If you would like to open up views to your stream, leave a thick layer of ground covers and low shrubs in place and carefully trim narrow corridors through the taller shrubs and trees. That way you can have a healthy stream buffer and still enjoy a view of the stream.