

# Buffers For Clean Water

## The Challenge

Many people are drawn to North Carolina because of its diverse beauty and abundance of streams, lakes and coastal waters. But while growth is welcomed for its economic and cultural benefits, increased development can degrade our waters if care is not taken. One important way of keeping waterways clean and healthy is maintaining the natural trees and other vegetation along their banks.

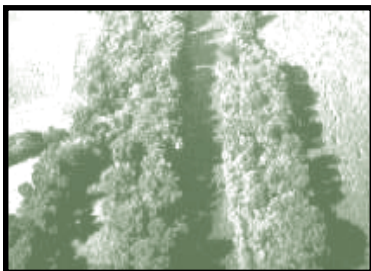
Development along streams, lakes and other waters can whittle away the first line of defense for clean waterways. When trees and other plants along the water's edge are removed, pollutants washed off the land by rainwater and melted snow have a direct route to the very place we don't want them to go. Instead of seeping into the ground or slowly traveling downhill to streams through leaf litter and vegetation, stormwater now increasingly rushes over hard surfaces such as roads, rooftops and parking lots or travels through storm drains carrying pollutants to streams and lakes.

Much money is used to battle water pollution today. But nature's way is surprisingly simple and effective. By preserving buffers today, we can help avoid the high costs of pollution and restoration tomorrow.



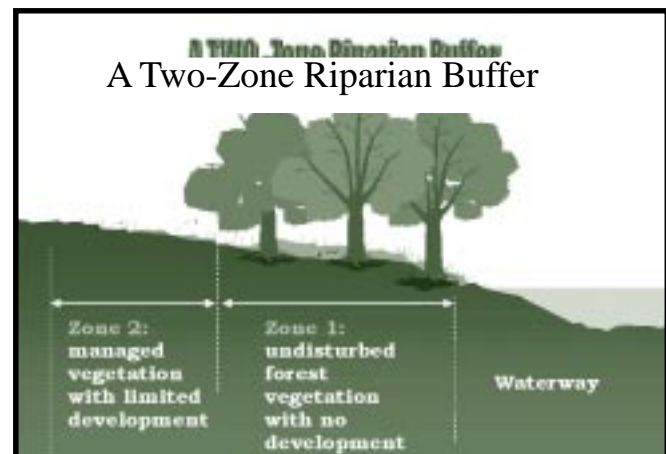
## What are Riparian Buffers?

The term *riparian* means related to the banks of streams, rivers, lakes, estuaries or other waters. A riparian buffer is simply a strip of forested or vegetated land bordering a body of water. A buffer may be any combination of trees, shrubs, native grasses and herbs, although deep-rooted, woody vegetation is best for removing nutrients and stabilizing streambanks.



Riparian buffers can be beneficial anywhere along a small creek or large river, on a farm, in a city or in the suburbs. They can help filter sediment and other pollutants from stormwater runoff and

groundwater. Buffers perform a broad range of functions with significant environmental, economic, and social value to people.



Riparian buffers are ideally managed as one or more integrated zones. The zone closest to the water stabilizes the streambank and provides shade and habitat for aquatic life.

It also acts like a filter and sponge to remove, transform or store nutrients and other pollutants. The outer zone slows and spreads out the flow of water coming from the land, trapping sediment and attached pollutants.

# Benefits of Riparian Forest Buffers

## They provide wildlife food and habitat.

Leaves fall into a lake or river, where they provide food and shelter for small insects and bugs that are critical to the aquatic food chain. Sticks and branches provide cover for fish in the stream. Plants in the buffer contribute to a diverse habitat for many animals including songbirds, eagles, foxes, turtles and amphibians. Buffers can also provide unbroken corridors for animals to travel.

## They are aesthetically pleasing.

Buffers absorb noise from waterfront activity and provide privacy for recreation. They offer places to enjoy nature, whether by picnicking, hiking, hunting or fishing.

## They filter runoff.

Rain that runs off the land can be slowed and absorbed by the buffer, which helps settle out sediment, nutrients and some other pollutants before they reach waterways. Depending on the width of the buffer and the type of plants, 50 to 100 percent of sediment and attached nutrients can settle out in this zone. Because excess phosphorus bonds to soil particles, a large percentage of phosphorus is stored in sediment captured by the buffer.

## They protect property.

Using vegetated buffers to set back human development a safe distance is a natural flood insurance policy. Retaining deep-rooted vegetation along streambanks helps prevent erosion and loss of land.

## They provide flood control and moderate stream flow.

By soaking up rainwater like a sponge and releasing it slowly, buffers detain stormwater and minimize flooding of downstream areas. Riparian buffers also slow runoff, allowing the water to infiltrate the soil and recharge the groundwater supply. Groundwater enters the stream at a much slower rate and over a longer period of time than water delivered as surface runoff. This stored groundwater helps maintain stream flow during the driest time.

## They control erosion.

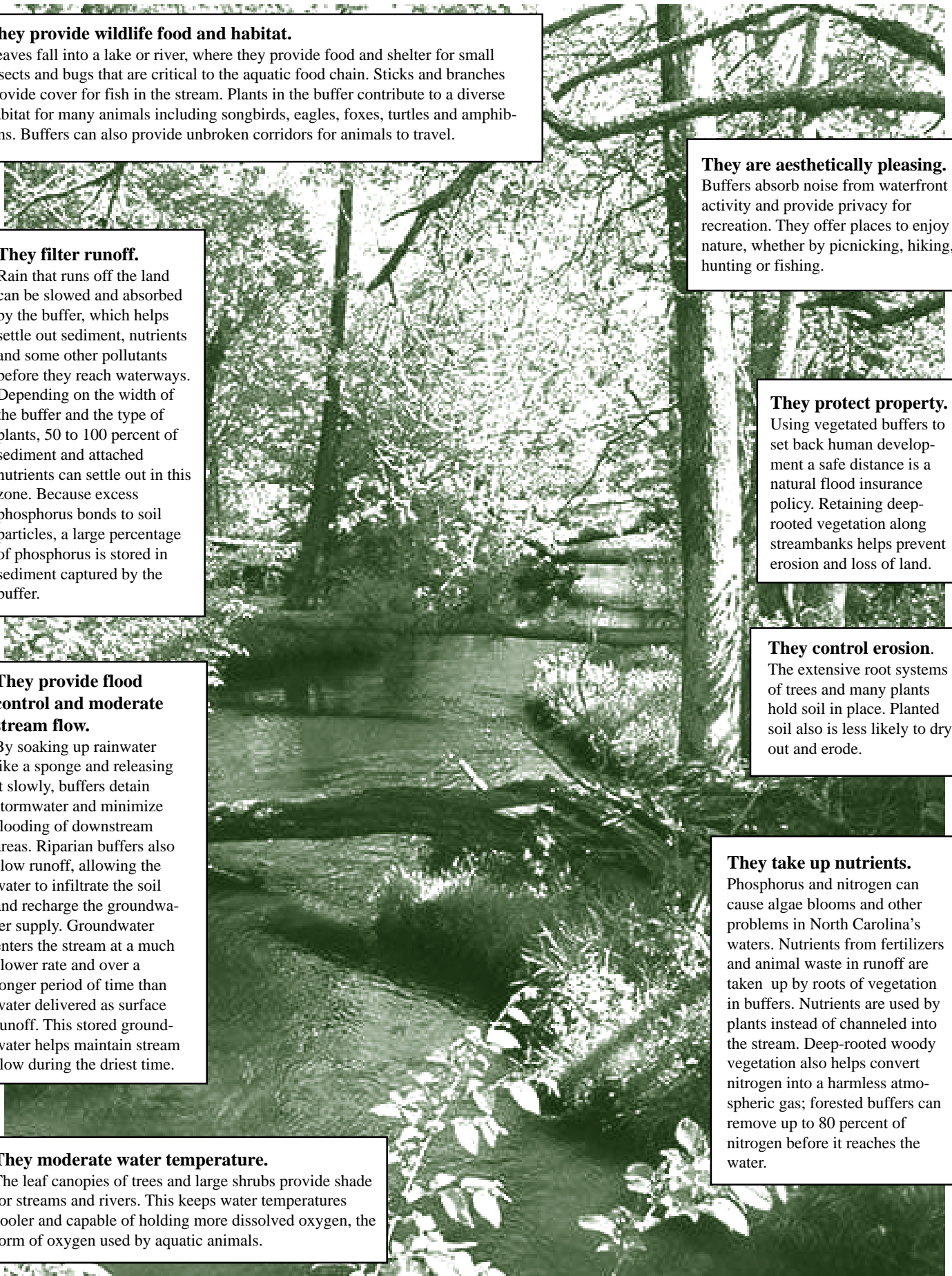
The extensive root systems of trees and many plants hold soil in place. Planted soil also is less likely to dry out and erode.

## They take up nutrients.

Phosphorus and nitrogen can cause algae blooms and other problems in North Carolina's waters. Nutrients from fertilizers and animal waste in runoff are taken up by roots of vegetation in buffers. Nutrients are used by plants instead of channeled into the stream. Deep-rooted woody vegetation also helps convert nitrogen into a harmless atmospheric gas; forested buffers can remove up to 80 percent of nitrogen before it reaches the water.

## They moderate water temperature.

The leaf canopies of trees and large shrubs provide shade for streams and rivers. This keeps water temperatures cooler and capable of holding more dissolved oxygen, the form of oxygen used by aquatic animals.



## How do Riparian Buffers Work?

Streams and other waterbodies receive water from rain and snow that falls into the water and drains from the land. They also are fed by groundwater, which flows beneath the earth's surface. This is what keeps streams running during dry periods.

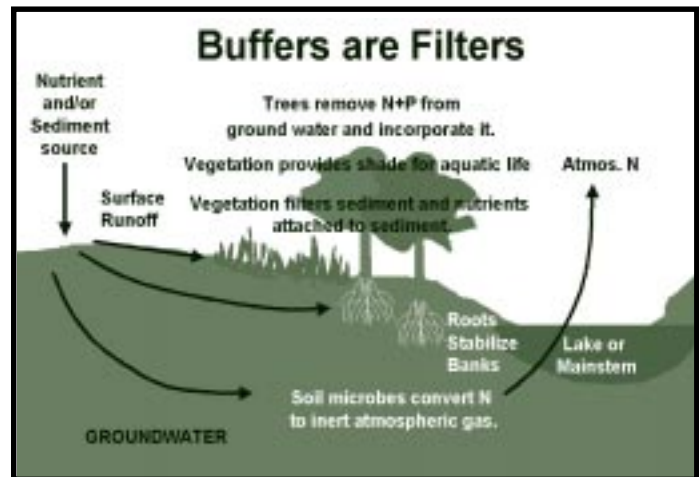
In areas where groundwater flows near the surface, large amounts of nitrogen can be removed before the water enters a stream. Plants take up and use some of it, and soil microbes around the roots convert much of the remainder to a harmless nitrogen gas that is released into the atmosphere. Even in areas where groundwater flows below the root zone, riparian buffers are still effective at trapping many pollutants at the surface.

As runoff moves through the buffer, it is slowed down and filtered by vegetation. The heavy sediment and attached pollutants such as phosphorus and metals settle out and are deposited in the buffer. Other nutrients and pollutants are also removed by the roots of the vegetation in the buffer.

All buffers aren't equal. The wider the buffer and the more diverse the plants, the more useful the riparian buffer will be in terms of environmental benefits. A buffer's cleansing ability may

be limited when it comes to persistent toxins such as heavy metals or pesticides.

Preserving and creating buffers doesn't preclude other traditional uses of the land. They are functional for people and the environment. They can provide their benefits at the same time they allow other uses, including timber harvest, agriculture, boating and fishing access, as well as greenways and other paths.

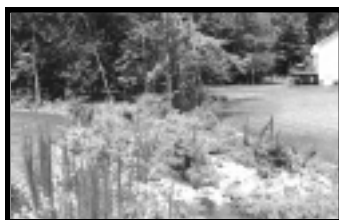


## How Can You Help Protect Riparian Areas?\*

### Examples of Healthy Riparian Habitat



**1.** Retain existing native plants and add other noninvasive plants. If a fast-growing buffer is desired, consider planting such tree species as river birch, ironwood, sycamore, willow or willow oak. These will develop root systems quickly and help hold soil on the banks.



**2.** Establish a buffer by planting native trees, shrubs and deep-rooted grasses along banks (if vegetation covers 80 percent of the bank area, fish habitat will be good).

**3.** Grow overhanging trees and shrubs to shade the water (at least 50 percent shading will ensure good fish habitat).

**4.** Exclude grazing animals from banks.

**5.** Exclude stormwater pipes from adjacent lands from the buffer (buffer areas promote sheet flow).



### Examples of Poor Riparian Habitat



**6.** Stabilize eroding banks by planting native vegetation.

**7.** Avoid maintaining lawns or fields at the edges of streams, lakes and rivers.



**8.** Limit tree-cutting in buffer zones. Leave stumps of fallen or previously cut trees.

**9.** Avoid or reduce application of fertilizer and pesticides in the buffer.

**10.** Keep all impervious surface, including roads and buildings, out of the buffer.



\*Before disturbing any vegetation in a riparian area, contact a regional office of the Department of Environment and Natural Resources. In some river basins, specific rules have been established for the protection and maintenance of riparian buffers. The most effective forested buffers are planned and implemented on a watershed scale.

## For More Information on Riparian Buffers, Check Out these Sources:

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### North Carolina Programs

- DWQ's 401 Wetlands Unit -- 1650 Mail Service Center, Raleigh, NC 27699-1650  
<http://h2o.enr.state.nc.us/newetlands/> or call 919-733-1786
- DWQ's Nonpoint Source Planning Unit -- 1617 Mail Service Center, Raleigh, NC 27699-1617  
<http://h2o.enr.state.nc.us/nps/bigpic.htm> or call 919-733-5083 extension 357
- North Carolina Conservation Tax Credit Program-- 1601 Mail Service Center, Raleigh, NC 27699-1601  
<http://ncctc.enr.state.nc.us> or call 919-715-4191
- NC Conservation Reserve Enhancement Program--1614 Mail Service Center, Raleigh, NC 27699-1614  
<http://www.enr.state.nc.us/DSWC/files/crepmain.htm> or call 919-715-6107

### General Buffer Information

- Chesapeake Bay Program (includes numerous publications on riparian buffers)--410 Severn Ave, Suite 109, Annapolis, MD 21403 <http://www.chesapeakebay.net> or call 1-800-YOUR-BAY
- Wye Research and Educational Center (includes 10 fact sheets highlighting buffer vegetation and design) --PO Box 169, Queenstown, MD 21658  
<http://www.riparianbuffers.umd.edu> or call 410-827-8056
- Connecticut River Joint Commissions, Inc. (includes 10 fact sheets for home owners, farmers and and communities)--PO Box 1182, Charlestown, NH 03603  
<http://www.crjc.org/riparianbuffers.htm> or call 603-826-4800
- Smithsonian Environmental Research Center (includes an annotated and indexed bibliography on buffer research)--PO Box 28, Edgewater, MD 21037,  
[http://www.serc.si.edu/SERC\\_web\\_html/pub\\_ripzone.htm](http://www.serc.si.edu/SERC_web_html/pub_ripzone.htm) or call 443-482-2200

### Riparian Buffers on Agricultural Lands

- USDA National Agroforestry Center--North 38th Street and East Campus Loop, UNL-East Campus, Lincoln, NE 68583-0822, <http://www.unl.edu/nac> or call 402-437-5178
- Buffer Notes--National Association of Conservation Districts, 509 Capitol Court NE, Washington, DC 20002-4946, <http://www.nacdnet.org/buffers/> or call 202-547-6223

### ***Buffers For Clean Water***



NCDENR / Division of Water Quality  
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Raleigh, NC 27699-1617