

# Riparian Buffers

## Mountain Horticultural Crops Research and Extension Station of NC State

### What is a riparian buffer?

A riparian buffer is vegetated land adjacent to a stream or water body. The vegetation benefits water quality and habitat by helping to regulate temperature, add organic matter (leaves and twigs), assist in pollution reduction and provide wildlife habitat. In North Carolina, natural riparian buffers are forested. The most stable and effective riparian buffers include a combination of native trees, shrubs, grasses and herbs that form a plant community adjacent to a stream or water body.



### How do riparian buffers work?

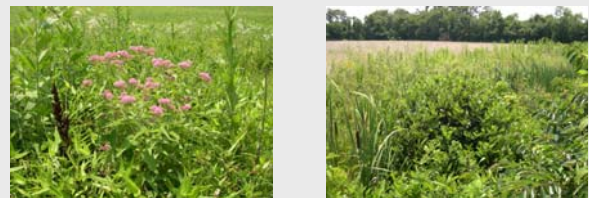
To understand how buffers work, it's important to understand how water moves. Surface water flows over the land and can carry sediment, nutrients, pesticides and fecal coliform bacteria into streams. Pollutants can affect an aquatic ecosystem in a number of ways. Excess nutrients (nitrogen and phosphorus) can cause algal blooms, fecal coliform bacteria can be an indicator of waste-borne disease and pesticides can kill or sicken fish and aquatic invertebrates. Buffer vegetation slows and filters runoff water above ground, causing sediment to settle out and be deposited in the buffer. If runoff water doesn't spread over a buffer, it cuts channels and flows directly to the stream, rendering the buffer ineffective for reducing sediment and sediment-attached pollutants.

Water also percolates through soil into the shallow ground water, which in many locations moves toward streams. Subsurface water often carries nitrate-nitrogen and sometimes pesticides. Nitrate that moves in the shallow ground water is diluted in the riparian area. Plants also use it, but more importantly, it is changed to nitrogen gas through denitrification. Nitrogen gas poses no harm to the environment.



### What are a riparian buffer's benefits?

- Buffers perform many environmentally, economically and socially significant functions. They maintain and improve water quality by protecting water resources from nonpoint pollutants such as sediment, nutrients and pesticides from both urban and agricultural activities.
- Buffers shade streams and regulate fluctuations in water temperatures, to help maintain fish habitat, especially for cold-water fish such as trout that can't tolerate high stream temperatures.
- Buffers can increase the amount and variety of game because they provide a wider range of habitat and food.
- Buffers reduce stream bank erosion, which helps keep valuable acreage from washing away.



### What is the best kind of riparian buffer?

Scientific debate continues on how to choose the best buffer. Researchers consider a buffer's design, effectiveness, width, management and associated vegetation. They also factor in site characteristics of the area to be buffered, such as hydrology, topography, geology, land use and value.

Wider buffers are better for water quality and wildlife, but buffers that are too wide could unnecessarily limit adjacent land use. Narrow buffers might not effectively reduce nonpoint source pollution.

Buffers work better when they contain a diverse mixture of plants, since different plants have different rooting structures. Root diversity is helpful because most within the top several inches of soil are fibrous, while others, such as taproots, penetrate the soil more deeply. These roots remove nutrients and stabilize stream banks.

An ideal mountain land buffer consists of a continuous forest along the stream or water body. However, for nonforested land, you could use a two-part buffer: a primary buffer consisting of a forested strip next to the stream or water resource, and a secondary working buffer between the nonforest land use and the forested buffer. This buffer can consist of grasses, shrubs, or additional forest, and would be available for nonintrusive uses such as haying, logging or taking cuttings for horticultural production.

Sediment, fecal coliform bacteria and nutrient levels all significantly increase when livestock are kept near a stream. The stream bank and buffer benefit greatly from removing or reducing livestock access in the stream bank buffer. For more information, call your local Cooperative Extension center.

