



Riparian Buffers

Riparian vegetated buffers are crucial to the protection of our water resources in Vermont and New Hampshire. These strips of grass, shrubs, and/or trees along the banks of rivers and streams filter polluted runoff and provide a transition zone between water and human activity. Buffers are also complex ecosystems that provide habitat and improve the stream communities they shelter.

Natural riparian buffers have been lost in many places over the years. Restoring them will be an important step forward for water quality, riverbank stability, wildlife, and aesthetics in the Connecticut River Valley. Landowners, town road agents, local governments, farmers, and conservation organizations can all help restore and protect the riparian buffers that in turn restore and protect the quality of our streams.

HOW BUFFERS GO TO WORK

Sediment Filter

Riparian buffers help catch and *filter* out sediment and debris from surface runoff. Depending upon the width and complexity of the buffer, 50–100% of the sediments and the nutrients attached to them can settle out and be absorbed as buffer plants slow sediment-laden runoff waters. Wider, forested buffers are even more effective than narrow, grassy buffers.

**For water
quality**

Pollution Filter, Transformer, and Sink

The riparian buffer traps pollutants that could otherwise wash into surface and groundwater. Phosphorus and nitrogen from fertilizer and animal waste can become pollutants if more is applied to the land than plants can use. Because excess phosphorus bonds to soil particles, 80–85% can be captured when sediment is *filtered* out of surface water runoff by passing through the buffer. Chemical and biological activity in the soil, particularly of streamside forests, can capture and *transform* nitrogen and other pollutants into less harmful forms. These forests also act as a *sink* when nutrients and excess water are taken up by root systems and stored in the biomass of trees.

Stream Flow Regulator

By slowing the velocity of runoff, the riparian buffer allows water to infiltrate the soil and recharge the groundwater supply. Groundwater will reach a stream or river at a much slower rate, and over a longer period of time, than if it had entered the river as surface runoff. This helps control flooding and maintain stream flow during the driest time of the year.

Bank Stabilizer

Riparian buffer vegetation helps to stabilize streambanks and reduce erosion. Roots hold bank soil together, and stems protect banks by deflecting the cutting action of waves, ice, boat wakes, and storm runoff.

**For bank
stability**

Bed Stabilizer

Riparian buffers can also reduce the amount of streambed scour by absorbing surface water runoff and slowing water velocity. When plant cover is removed, more surface water reaches the stream, causing the water to crest higher during storms or snowmelt. Stronger flow can scour streambeds, and can disturb aquatic life.

Wildlife Habitat

The distinctive habitat offered by riparian buffers is home to a multitude of plant and animal species, including those rarely found outside this narrow band of buffer influenced by the river. Continuous stretches of riparian buffer also serve as wildlife travel corridors.

For fish and wildlife

Aquatic Habitat

Forested riparian buffers benefit aquatic habitat by improving the quality of nearby waters through shading, filtering, and moderating stream flow. Shade in summer maintains cooler, more even temperatures, especially on small streams. Cooler water holds more oxygen and reduces stress on fish and other aquatic creatures. A few degrees difference in temperature can have a major effect on their survival. Woody debris feeds the aquatic food web. It also can create stepped pools, providing cover for fish and their food supply while reducing erosion by slowing flow.

Recreation and Aesthetics

Forested buffers are especially valuable in providing a green screen along waterways, blocking views of nearby development, and allowing privacy for riverfront landowners. Buffers can also provide such recreational opportunities as hiking trails and camping.

And more

THE BETTER BUFFER

For every buffer there is a reason. Whether it is pollution filtration, erosion control, wildlife habitat, or visual screening, the size and vegetation of the buffer should match the land use and topography of the site.

Buffer Width

A wider buffer is generally more effective than a narrow one. While it is nearly impossible to set a width that applies to all streambanks and that will do all of the jobs a buffer can do, it is simple to say that the wider a buffer is, the better it will perform, and a narrow buffer is better than no buffer at all. The capacity of a buffer to capture pollutants partly depends upon how far surface runoff must travel across it before reaching the stream. The continuity of a buffer is as important as its width, especially for wildlife.

Topography

A buffer is more important for water quality in areas that collect runoff and deliver it to streams, and less critical on land that tips away from the water. Steeper slopes call for a wider riparian buffer below them to allow more opportunity for the buffer to capture pollutants from faster moving runoff. This is also true at the downstream end of the flood chute, or the path a river takes across a meander at high water.

Hydrology and Soil

The ability of the soil to remove pollutants and nutrients from surface and ground water also depends upon the type of soil, its depth, and relation to the water table. On a wetter soil, a wider buffer is needed to get the same effect.

Vegetation

The purpose(s) of the buffer will influence the kind of vegetation to plant or encourage. In urban and residential areas, trees and shrubs do a better job at capturing pollutants from parking lots and lawn runoff and providing visual screening and wildlife habitat.

Between cropland and waterways, a buffer of shrubs and grasses can provide many of the benefits of a forested buffer without shading crops, and trees can be used on the north side of fields. Trees should not be planted where ice floes typically collect at high water.

Trees have several advantages over other plants in improving water quality and offering habitat. Trees are not easily smothered by sediment and have greater root mass to resist erosion. Above ground, they provide better cover for birds and other wildlife using waterways as migratory routes. Trees can especially benefit aquatic habitat on smaller streams. Native vegetation is preferable to non-native plants.

Figure 1. A riparian buffer on the Connecticut River or major tributary.



Land in active residential or agricultural use

Fertilizer and pesticides are carefully managed.

Buffer Edge

Surface runoff can filter into soil. Haying or controlled grazing can occur.

Riparian Buffer

Plants and leaf litter capture and store sediment, nutrients, and other pollutants. Selective forest management keeps riparian vegetation vigorous. Nearer the stream, the buffer should remain undisturbed.

On farmland, a buffer of shrubs and grasses can do much of the work of a forested buffer without shading crops. Exclude livestock, heavy equipment, and mowing here.

Riverbank

Dense shrubs and low plants hold soil, filter runoff, and protect the bank from scour by waves and ice.

On smaller tributaries, mature trees growing to the water's edge can improve aquatic habitat by shading and by creating pools when they fall into the stream.

Management

Where a buffer has been lost or reduced, plantings of rapidly growing grasses and shrubs can hold the soil and nutrients before trees are established. In a forested buffer, a no-cut zone should be maintained where trees should be removed on larger rivers only when they threaten to fall and dislodge bank soil. Stumps should be left intact. Beyond this area, an actively growing forest composed of a variety of species, especially hardwoods which will sprout from their stumps, is most effective in storing nutrients, and can be encouraged by careful selective management. Thick growth and accumulated plant litter in the buffer work to trap sediments and nutrients. The buffer should not be mowed or compacted by animals or large equipment. Fencing will be necessary to keep livestock out of the buffer and off the streambank.

WHAT YOU CAN DO FOR WATER QUALITY

- ◆ **Protect or increase** existing riparian vegetated buffers.
- ◆ **Enhance** grass and herbaceous buffers by planting shrubs and trees.
- ◆ **Re-establish** riparian buffers where they have been lost.
- ◆ **Include planting and protection** of buffers in all streambank restoration projects.
- ◆ **Keep livestock out** of riparian buffers and off stream banks.

WHERE TO GO FOR HELP

There are several sources of information and plant materials for landowners and communities who want to establish buffers. Cost-share programs for riparian buffers have greatly expanded in recent years, and include the Environmental Quality Incentives Program (EQIP), the Wildlife Habitat Incentives Program (WHIP), and non-point pollution control grants through state water quality agencies. Contact your county office of the USDA Natural Resources Conservation Service for more information on EQIP. The Connecticut River Coalition of Conservation Districts coordinates the WHIP program in the Valley, and can be reached through NRCS. The Cooperative Extension Service and state water quality agencies also provide plant lists and sources.

USDA Natural Resources Conservation Service

NH county offices:

Coos County: 788-4651

Grafton County: 747-2001

Sullivan County: 863-4297

Cheshire County: 352-3602

USDA Cooperative Extension Service

NH statewide: 862-1067

NH county offices:

Coos County: 788-4961

Grafton County: 787-6944

Sullivan County: 863-9200

Cheshire County: 352-4550

VT county offices:

Essex/Caledonia Counties: 748-3885

Orange/Windsor Counties: 295-1504

Windham County: 254-5323

VT county offices:

Essex/Caledonia Counties: 676-3900

Orange/Windsor Counties: 296-7630

Windham County: 257-7967

NH Dept. of Environmental Services, Surface Water Quality Bureau: 603-271-3503

VT Agency of Natural Resources, Water Quality office: 802-241-3770

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Part of the **Living with the River** series. May be reprinted without permission.

Prepared by the Connecticut River Joint Commissions with support from the Rivers and Trails Conservation Assistance Program of the National Park Service through the Connecticut River Valley Partnership Program, April 1996. Revised and reprinted with support from the New Hampshire Department of Environmental Services, November 1998.

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