

Understanding the Science Behind Riparian Forest Buffers: An Overview

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Introduction

The Commonwealth of Virginia has over 50,000 miles of streams, 248 publicly owned lakes, and almost 2,500 miles of coastal estuary. These waters play an important role in industry, transportation, and agriculture and provide Virginia's citizens with a place to relax and enjoy the out-of-doors (Figure 1). They are a source of fresh drinking water and home to many of the state's plants and animals.



Fig. 1. Virginia's streams are an important natural resource.

Unfortunately, human activities within and around the state's waterways have often led to a loss of water quality and the destruction of habitat for fish and wildlife. As a result, 48 percent of Virginia's streams, 6 percent of Virginia's lakes, and 71 percent of Virginia's estuaries are now considered threatened or impaired by some form of pollution. Over the past two decades, scientists at Virginia Tech, around the United States, and in other parts of the world have begun to recognize the important role that riparian areas play in maintaining healthy surface waters.

The *riparian area* is that area of land located immediately adjacent to streams, lakes, or other surface waters (Figure 2). Some would describe it as the floodplain. The boundary of the riparian area and the adjoining uplands is gradual and not always well defined. However, riparian areas differ from the uplands with their high levels of soil moisture, frequent flooding, and the unique assemblage of plant and animal communities. Through the interaction of their soils, hydrology, and biotic communities, riparian forests maintain many important physical, biological, and ecological functions and important social benefits.



Fig. 2. The riparian area is that area of land located adjacent to streams, lakes, or other surface waters.

(photo courtesy of U.S. Forest Service)

Riparian Ecosystem:

"A complex assemblage of plants and other organisms in an environment adjacent to and near flowing water. Without definitive boundaries, it may include streambanks, floodplains, and wetlands as well as sub-irrigated sites forming a transitional zone between upland and aquatic. Mainly linear in shape and extent, they are characterized by laterally flowing water that rises and falls at least once within a growing season".

(Lowrance, Leonard, and Sheridan 1985)

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Water Quality

One of the most important functions of riparian forests is to protect water quality by reducing the amount of sediment, nutrients and other pollutants that enter streams, lakes, and other surface waters (Figure 3). Improved water quality mainly occurs as contaminants are buried in sediments, taken up by riparian vegetation, adsorbed onto clay and organic particles, immobilized, or denitrified by soil microorganisms.



Fig. 3. One of the most important functions of riparian areas is to protect water quality.

Riparian forests also provide important physical protection for the stream. Plants protect the soil surface from wind and water erosion, stabilize streambanks, and modify temperature, light, and humidity within the riparian area and the stream itself. Riparian vegetation slows the force of stormwater runoff and allows time for water to infiltrate the soil and for sediments to be captured. Within the soil, plants create small zones of aeration where oxygen diffuses from their roots, providing important places for microbial metabolism.

Living Resources

Rich soils, regular inputs of nutrients, and water availability contribute to the high productivity and diversity of vegetation within the riparian area. The diversity and productivity of the riparian plant



Fig.4. Riparian forests provide habitat for many animals. (photo courtesy Thomas G. Barnes, University of Kentucky Extension Wildlife Specialist)

community and its proximity to water are especially attractive for many species of wildlife (Figure 4). Some animals are permanent residents, while others visit the area to feed or find water. Because of their linear shape, riparian forests can also provide protected travel corridors for wildlife to travel from one area to another.

Riparian forests are also critical components of the aquatic community. In headwater streams, riparian forests provide nearly all of the food for the aquatic community by dropping leaves, branches, insects, and other materials into the stream. Forests also contribute the most critical component of a stream's physical structure—large woody debris. Woody debris provides cover for aquatic species and creates areas for rest and reproduction. In addition to providing food and habitat for the aquatic community, riparian forests are important for the role they play in moderating stream temperatures and influencing water chemistry.

Social and Community Benefits

Riparian forests provide many important benefits to humans. Their pleasing combination of land, water, vegetation, and wildlife draw us as places to relax and observe nature (Figure 5).

These areas are attractive for many recreational pursuits, like swimming, boating, fishing, hunting, hiking, and nature observation. Riparian forests can also provide important benefits to communities as they function to moderate the impacts of flood waters, improve water quality, and reduce sedimentation in streams and reservoirs.

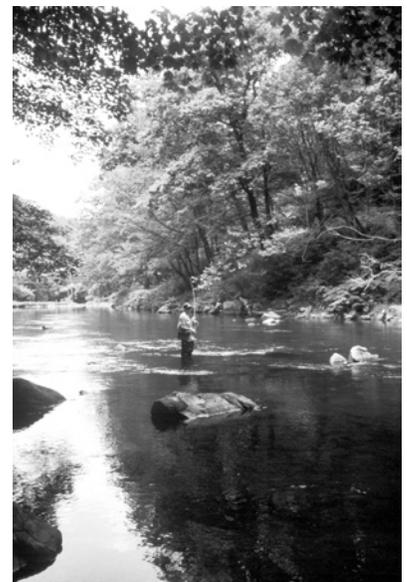


Fig. 5. Streams provide a place to relax and enjoy the out-of-doors.

Virginia's Riparian Buffer Implementation Plan

In October 1996, members of the Chesapeake Bay Executive Council, including the governor of Virginia, recognized the role that riparian forests play in benefiting stream water quality and living resources and adopted what is known as the Riparian Forest

Buffer Initiative. In doing so, council members agreed to work to preserve, protect, and enhance existing forested buffers and to plant an additional 2,010 miles of streamside buffers in the Chesapeake Bay Watershed by 2010. Virginia's commitment to this goal is to restore 610 miles of riparian forest buffer.

In 1998, the Commonwealth of Virginia expanded the effort statewide by adopting the Virginia Riparian Buffer Implementation Plan. The goal of the plan is to continue to restore the quality of Virginia's streams and lakes by ensuring that all streams and shorelines in the commonwealth are protected by a riparian buffer. To meet this objective, the agencies of the commonwealth have agreed to work with individuals and communities in their efforts to restore streamside lands. They are increasing their efforts to provide education, technical assistance, and funding to Virginia's landowners.

Riparian Forest Buffer

"A permanent area of trees, usually accompanied by shrubs and other vegetation, that is adjacent to a body of water and is managed to maintain the integrity of the stream channels and shorelines; to reduce the impact of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals; and to supply food, cover, and thermal protection to fish and other wildlife"

(Virginia Riparian Forest Buffer Panel 1998)

Join the Effort

If you are the owner of riparian lands, or live in a community that borders a stream, you can join in the effort to restore Virginia's streamside forests. The best place to start is to contact your county forester, local Soil and Water Conservation District, wildlife biologist, or Virginia Cooperative Extension office. Let them know that you have riparian lands that you wish to restore, or that you would like to volunteer to help restore community areas. You can also fill out the attached "Count Me In" sign-up sheet and return it to the Virginia Department of Forestry.

Bibliography

Lowrance, R., R. Leonard, and J. Sheridan. 1985. Managing riparian ecosystems to control nonpoint pollution. *Journal of Soil and Water Conservation* 40:87-91.

Virginia Riparian Forest Buffer Panel. 1998. Riparian buffer implementation plan. Commonwealth of Virginia Riparian Forest Buffer Panel. Virginia Department of Forestry, Charlottesville, Va. 58 pages.

For more information

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