

# Riparian Forest Buffers

## FORESTS ON THE WATER'S EDGE

**American waterways** have provided transportation, recreation and livelihood for many people over the centuries. Years of intense agriculture, new development and roads sprawling across watersheds have resulted in severe losses of forest cover. The importance of the land-water connection bridged by riparian forests has been realized. The productivity of streams and rivers has declined in step with the forest losses. State forestry and agriculture departments are joining forces to reforest riparian zones.

**Riparian buffers** are natural vegetative filters that are located between upland landscapes and waterways. All riparian buffers are associated with a suite of benefits. However, the biological processes of tree growth, and the physical structure of trees make forest buffers one of the best management practices for water quality.

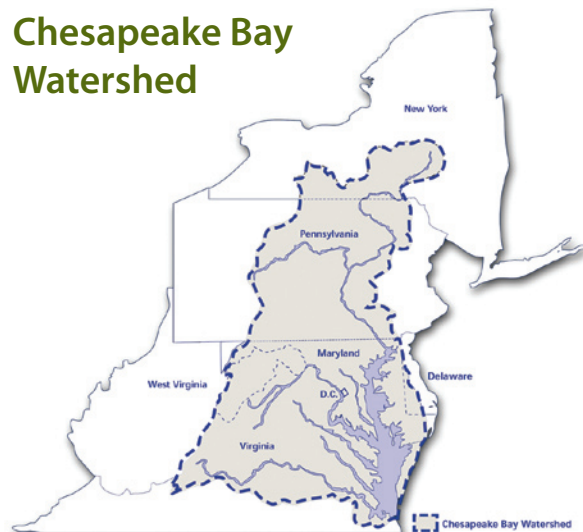


Photo: Courtesy of VDOP

### Benefits of Riparian Forest Buffers

- Stabilize and Protect Stream Channels
- Provide Wildlife and Aquatic Habitat
- Capture and Filter Surface Runoff
- Intercept and Process Air Pollutants
- Contribute Organic Carbon to Stream Ecosystems
- Reduce Sediment Loads from Adjacent Land Uses
- Present Opportunities for Recreation (walking, jogging, riding, fishing, hunting)

### Chesapeake Bay Watershed



The Chesapeake Bay is North America's largest and most biologically diverse estuary, home to more than 3,600 species of plants, fish and animals.

The 64,000-square-mile Bay watershed has the highest land to water ratio of any estuary in the world.

16 million people live in the watershed, with another million expected. The way people live and use the land greatly influences Bay water quality.

### Why Forest Buffers?

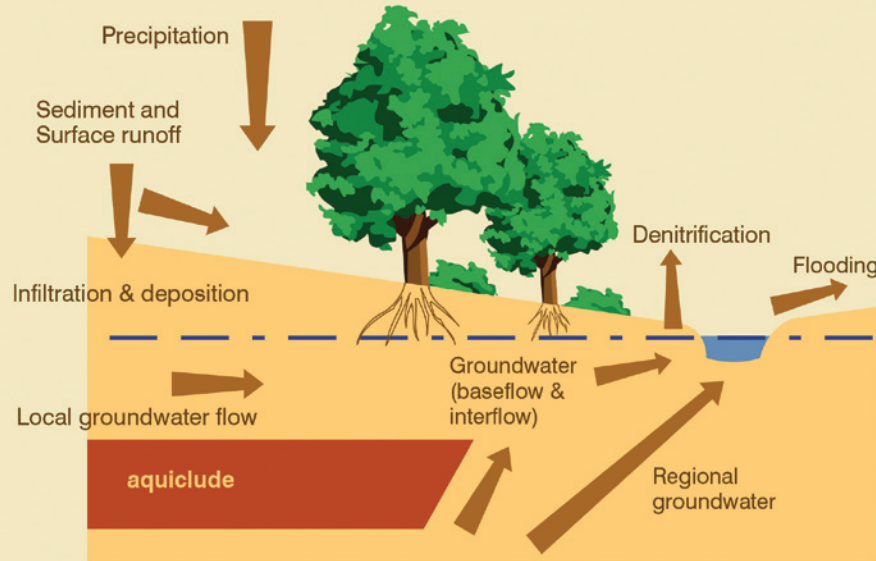
If you live, work or play in the Chesapeake Bay watershed, this publication will help you learn more about forest buffers for the Bay's health. It will help you to understand why forest buffers are an important resource for Bay water quality. Discover what forest buffers do for quality of life in Chesapeake Bay communities. Find out what your Bay state is doing to restore and protect riparian forest buffers. Become aware of actions you can take to promote the value of forest resources and water quality for your watershed and for the Chesapeake Bay.

# Forest Buffers Are Important to Watersheds

## Air Quality

Forests capture rainfall as well as pollutants in the air. They change chemical pollutants into carbon compounds useful to build more biomass. This is a means to sequester carbon. Individual forest trees release oxygen and other harmless gases into the air. This makes the air quality better for breathing. **Riparian forest buffers are the lungs of stream and river ecosystems.**

## Inputs and Outputs of Nutrients



## Water Quality

Forest buffers filter excess nutrients present in surface runoff from adjacent land uses. They intercept phosphorus-loaded sediment present in surface runoff. The roots of the trees in the buffer penetrate soils and reduce excess nitrogen from shallow groundwater. Leaves and small woody debris are an organic carbon source that drives the microbial denitrification process. This enhances nutrient reduction in streams and surrounding floodplains. **Riparian buffers are the kidneys of the stream and river ecosystems.**

## Habitat for Fish and Wildlife

**Riparian forest buffers** provide food, shelter, travel corridors and breeding space for wildlife on the land and in the water. The fruits, seeds, leaves, branches and trunks of trees provide forage and nesting for mammals and birds. The corridor along the stream/river and upland open spaces, occupied by forest buffers, is a corridor rich in biodiversity. Larger wildlife is dependent on these corridors for cover as they rest and travel from one breeding ground to another. This important connection of like habitats guards against weaker populations that result from in-breeding when there is no connection of populations living in stream and river ecosystems.

On the banks of the streams, dangling tree roots provide cover for fish, frogs, salamanders and reptiles. When all of the contributions that riparian forests make to the riparian ecosystem are considered, it is appropriate to symbolically say that **riparian forest buffers are the heart of stream and river ecosystems.**



Photo: Courtesy of VDOF

# Forest Buffer Losses

As development and changes in land-use occur, forested riparian areas are more critical in protecting water resources.



Photo: Courtesy of VDOF

**Stream quality** is reduced incrementally with riparian forest buffer losses. A Pennsylvania State University study estimated that Chesapeake Bay streams are 58 percent forested. For a healthy watershed, 70 percent of the shorelines and stream banks need to be forested. Select jurisdictions in the Chesapeake Bay watershed have experienced riparian forest losses in a range of 1.1– 5.2 percent. These losses occurred between 1994 and 2002. The variation in riparian forest buffer numbers is the result of the way land-use is planned and developed in the watershed.

## How Do We Manage Growth in Riparian Zones?

**Maryland** — Maryland's unique Forest Conservation Act (FCA) requires developers to mitigate forest losses with the rate of allowed clearing and required replacement depending on the land-use category. As an element of the FCA, riparian areas are priority areas for protection and mitigation, and may be transferred to public ownership as an easement. The Critical Area Law requires a minimum 100-foot buffer of natural vegetation on any stream or shoreline within 1,000 feet of the high tide line .

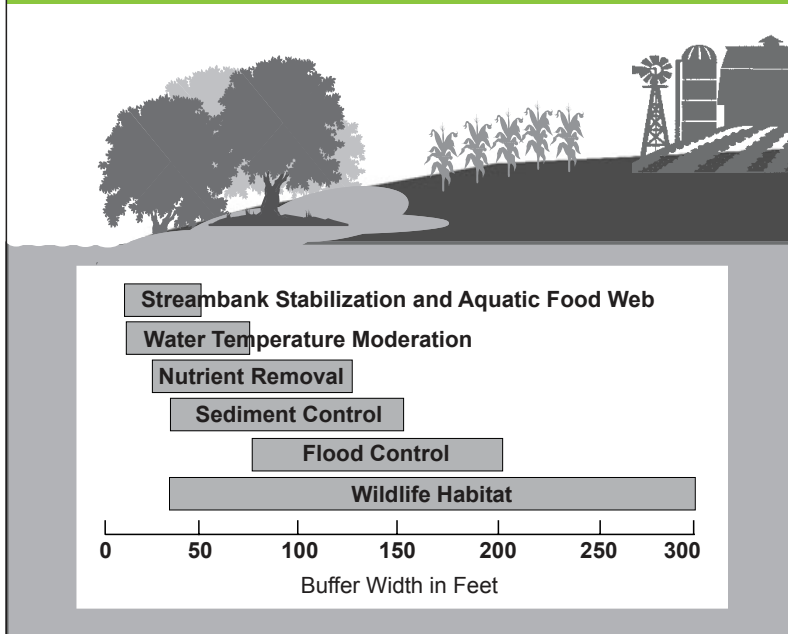
**Pennsylvania** — The stormwater best management practices (BMP) manual in Pennsylvania uses many different practices to mediate the impacts of the development process. The protection and restoration of riparian forest buffers is promoted as a BMP. Developers are encouraged and credited for leaving riparian forest buffers in place. In addition, forest owner's are encouraged to incorporate woodland management in their plans.

**Virginia** — The Chesapeake Bay Act and Regulations require that a 100-foot wide vegetated buffer be located adjacent to and landward of all tidal shores; tidal wetlands; non-tidal wetlands connected to tidal wetlands, or along water bodies with perennial flow. These features, including the 100-foot buffer, comprise the Resource Protection Area (RPA). The 2000 Virginia General Assembly enacted the Riparian Buffer Tax Credit. The amount of the credit is equal to 25 percent of the value of the timber retained up to \$17,500. The buffer must be at least 35 feet wide, no more than 300 feet wide and be intact for 15 years.

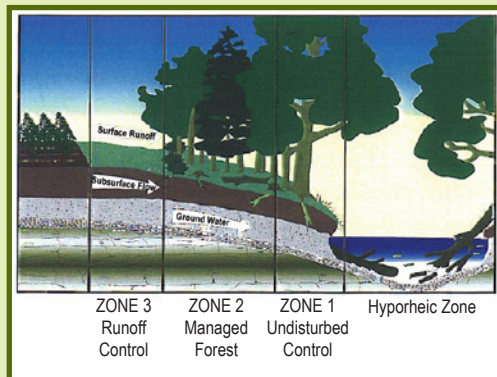
**Good policies and ordinances by government promote conservation.**

# Quality Riparian Forest Buffers

## Recommended Minimum Buffer Widths to Achieve Specific Objectives



## Three-Zone Buffer System for multiple benefits and diversity. (Welsch 1991)



## Tree Species Common to Riparian Areas

**Sweetgum** — A large tree with corky gray bark and winged twigs. Leaves are palmate and, along with the twigs, have a spicy aroma. Seed is contained in a spiny ball.

**Sycamore** — Large tree, fast growth, mottled bark, small air-dispersed seed.

**Red Maple** — Medium tree, red flower and red fall color, winged seed, good cavity tree for small mammals and bird habitat.

**Green Ash** — Medium tree, fast growing, good timber wood, compound leaves 7-10 per stem, slender winged seed.

**Box Elder** — Small to medium tree, grows well at water's edge, winged seeds, compound leaves, 3-7 leaflets per stem.

**Willow Oak** — Large tree, has small leaves whorled on the stem, produces very small acorn.

**Pin Oak** — Medium tree, lobed leaves, produces striped acorn with saucer shaped cup.

**Black Willow** — Small tree, rarely 50 feet tall, long narrow leaves, catkin with multiple downy seeds for airborne dispersal, found along stream banks.

**River Birch** — Medium tree, drooping branches, cone-like fruit with multiple small winged seeds, tan bark peels off in sturdy sheets.

**Bald Cypress** — Large tree, needled deciduous leaves, produces cones, found in swamps and water's edge, produces knees at base.

**Black Walnut** — Large tree, leaves are compound with 15-23 leaflets per stem, produces large edible nut in a thick casing, valuable wood.

**American Hornbeam** — Small tree, found in floodplains, small simple leaves, drooping branches, seed is in foliage-like catkin.

# Riparian Forest Restoration

**The Chesapeake Bay Program state and federal partners** have been working across state boundaries, in a holistic effort to re-establish trees along the shorelines of rivers and streams in the Bay watershed. Forest buffer goals have been developed, strengthened and expanded. Restoration efforts will continue until 70 percent of Bay shorelines and stream banks are forested. This is a critical number established by scientists, to support healthy watersheds. To implement this goal, federal-state programs have provided financial incentives to agricultural landowners to establish forest buffers on their property. Publications have been developed to aid restoration efforts, one example is "Riparian Forest Buffer Design and Maintenance," from Maryland Department of Natural Resources.



Photo: Courtesy of Al Todd, USFS







## Bay Signatory State Efforts

**Maryland** — Maryland Stream ReLeaf is a statewide initiative to coordinate efforts of a wide variety of state, local, federal and non-profit groups in expanding, and maintaining streamside and shoreline forests. Issues addressed by Maryland Stream ReLeaf include: tracking, restoration, conservation and outreach. Stream ReLeaf has a middle school curriculum available to teachers. State and federal partnerships utilize cost-share programs to establish forest buffers on streams in agricultural areas.

**Pennsylvania** — Growing Greener, Pennsylvania Act 45, reenacted in 2005, provides grants for watershed cleanup, open space preservation and other environmental actions, including planting riparian forest buffers. Growing Greener funds provided nearly \$20 million in cost-share funds to further incentivize CREP enrollment in the Commonwealth. Partnerships among the state and federal agencies and non-profit groups administering cost-share and volunteer programs have helped the effort to establish riparian forest buffers and protect open space in the Commonwealth.

**Virginia** — Local governments in Virginia have helped preserve or restore 625,000 acres of riparian buffers by implementing the Bay Act. Since 1993, floodplain areas of Difficult Run watershed in Fairfax County have been enhanced by the planting of tree seedlings through the cooperation of Virginia Department of Forestry, Fairfax Releaf and Fairfax County Park Authority. Other efforts by state and federal partners and non-profit organizations have established forest buffers in the Rappahannock watershed and other major river basins of Virginia.

# What You Can Do For Forest Buffers

-  Restore forests along streams and shorelines.
-  Join and support a local watershed association.
-  Plant native species in riparian zones.
-  Encourage sound land-use planning in your community.
-  Protect and conserve stream corridors and their forests.
-  Collect native riparian species seed for state forestry nurseries.

Resources: [www.dnr.state.md.us](http://www.dnr.state.md.us) <http://www.dof.virginia.gov> <http://www.dep.state.pa.us>  
[http://dnrweb.dnr.state.md.us/download//forests/rfb\\_design&maintenance.pdf](http://dnrweb.dnr.state.md.us/download//forests/rfb_design&maintenance.pdf)



Photo: Courtesy of VDOF

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**Chesapeake Bay Program**  
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