

Understanding the Functions of Riparian Buffer Areas

A riparian (forested) buffer zone is an area along a shoreline, wetland or stream where land disturbance is restricted or prohibited. The primary function of a riparian buffer is to physically protect and separate a stream, lake, or wetland from future disturbance or encroachment.

A riparian forest buffer of sufficient width can provide many benefits that help keep water clean. Trees, shrubs and grasses act as a filter by “capturing” nutrients, pesticides, pathogens, heavy metals, sediment, and other pollutants from stormwater runoff.

Non-Point Pollutants:

Nitrogen from fertilizers and pet waste is removed from agricultural runoff and urban lawns as it is caught by vegetation and absorbed into the soil.

Phosphorus from fertilizers is best removed through grass buffers, and dissolved phosphorus from runoff through absorption by clay particles.

Buffer areas slow the movement of *pathogens* (bacteria and viruses) and *toxins* (pesticides, toxic metals, PCBs) to surface waters catching contaminants so they can be buried in sediments or absorbed into clays or organic matter and transformed by soil microbes.

Many of the water quality functions in a riparian area happen underground. Soil microorganisms take up and convert nutrients and metabolize organic chemicals such as pesticides to energy sources for plants and, in the process transform chemicals to less toxic compounds.

Floodplains:

A buffer area along a stream reduces the force, height and volume of floodwaters by allowing them to spread out horizontally across the floodplain. Buffer zones increase the water-holding capacity of soil. The slowing and dispersal of runoff and floodwater by floodplain vegetation allows additional time for runoff to infiltrate and recharge groundwater aquifers.



Buffer zone soils and vegetation can also help to purify and cool the water as it filters down to the aquifer. Water that travels through the aquifer provides a continuous source of water as it discharges into streams. This filtered and cooled water is necessary to the survival of aquatic life living in our streams.

Property Loss/Bank Stabilization

The erosive force of storm flows can cause rivers to dig into and undermine steep stream banks, causing slope subsidence and subsequent damage to homes and yards. Vegetation on and above the stream bank provides friction against moving water, which slows it down so water is not delivered down stream too quickly. Vegetation also protects the surface of the soil from wind and water erosion, modifies stream water temperature, filters light and moderates humidity within the riparian area and the stream itself.

Wildlife:

The riparian buffer is necessary to maintain an equilibrium of life within the stream corridor. As long as a stream is allowed to freely interact with adjacent vegetated riparian areas, a diversity of plant and animal habitats necessary to a healthy ecosystem will be maintained. Streamside vegetation provides food and shelter for many species of wildlife habitat. Some species of wildlife rely on streamside habitat during the breeding season. Others depend on buffer strips as a source of habitat protection. Riparian buffers serve as a connection for migratory species to travel between two adjacent areas providing good wildlife habitat.

Groundwater and Public Water Supplies & Private Wells

Keeping riparian areas naturally vegetated will help maintain high infiltration rates, thereby replenishing the groundwater and recharging the aquifer which is key to the long-term sustainability of groundwater-based public water supplies and private wells. In the meantime, the naturally vegetated area's cleansing action will help ensure the purity of water entering the aquifer. However, if riparian lands within a well's zone of contribution are used in a fashion that enables pollutants to get into the groundwater, then there is a significant possibility that some of this polluted groundwater will enter and contaminate drinking water sources.

Streams, Rivers and Baseflow

Most of the annual flow of streams is attributable to rainwater falling onto and infiltrating the soil under vegetated areas. This continuous seepage of groundwater that keeps streams flowing is called "baseflow". The failure to maintain vegetative cover on riparian areas adjacent to streams is likely to result in a significant loss of groundwater recharge (baseflow) and increase the frequency, duration and severity of low flow conditions. A significant loss of groundwater recharge due to lack of vegetative cover may cause a reduction in baseflow that can be extremely stressful if not fatal to fish and other aquatic organisms. The stream will dry up.

Aesthetic Benefits:

Water in a landscape draws people because of its visibility, movement, reflections, color and its contrast to adjacent earth surfaces. Vegetation adds to an area's beauty; the large trees provide a great source of satisfaction and privacy. However, poor water quality can distract from the aesthetic appeal. Poor water quality can actually decrease property value.

Recreational Benefits:

Not only do stream corridors attract more users, there is a greater diversity of recreational activities occurring within these environments. Traditional activities, such as fishing and hunting are enjoyed by many, while others enjoy rafting, motor boating, hiking, biking, photography, and observing nature.

Human Activity in Riparian Zones

Alterations of riparian areas can lead to serious loss of stream habitat and water quality. Natural drainage is interrupted as riparian soils become compacted, sedimentation rates increase, and stream channels are altered. Removal of streamside vegetation, removing woody debris and boulders from streams, stream channelization, damming and dredging does have damaging effects on our waterways.

In agricultural areas, riparian areas are often converted to crop and grazing lands. Removal of the riparian area compacts and erodes riparian soils, and interferes with wildlife habitat in the area. Stream water quality is impaired as stream temperatures increase and fertilizer/manure is deposited or washed into streams, introducing organic matter, nutrients, and pathogenic organisms.

In urban areas, streams are degraded as they are diverted through stormwater systems, riparian vegetation is removed and the watershed becomes covered by roads, parking lots, and buildings.

Changes in the vegetative cover in the watershed can cause changes in the amount and timing of water flows in stream channels. Where stormwater once soaked into the ground, it now must flow over hard surfaces, picking up sediments, oils, grease, chemicals, metals and other pollutants and discharging them directly into storm drains that drain unfiltered into streams.

Increases in the frequency, velocity, and magnitude of flood events cause damage to streams and riparian plants and animals and cause stream channels to erode their banks.

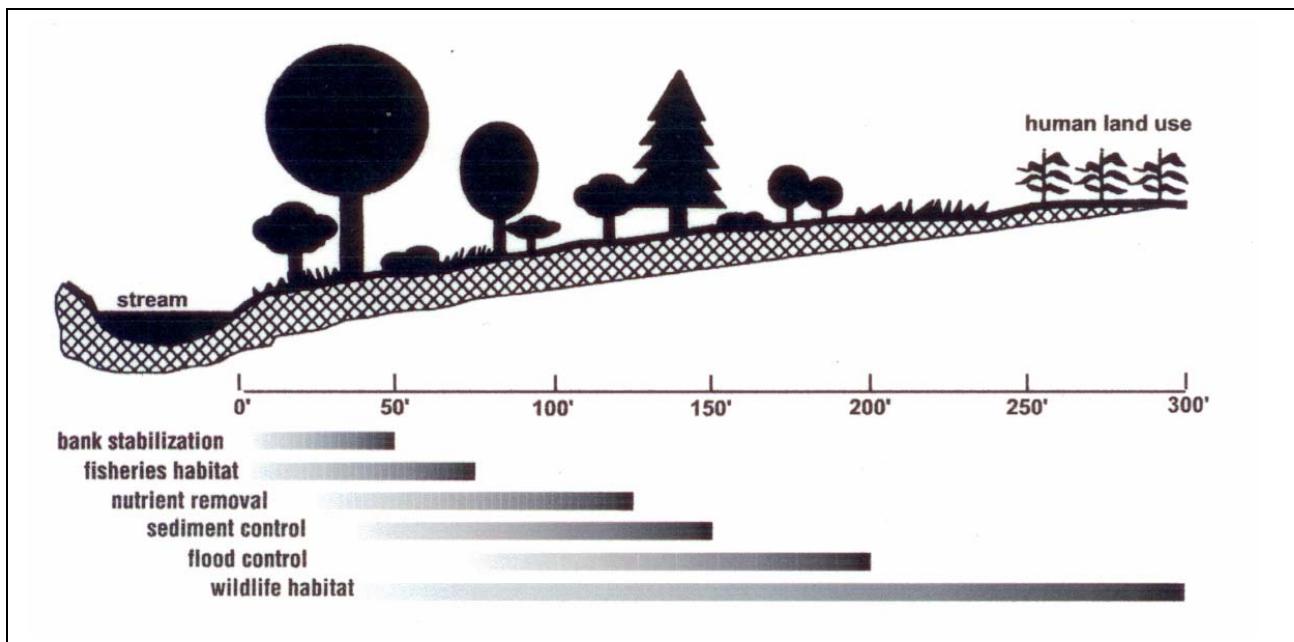
Increases in sediment entering the stream also result in changes in the stream, including a widening and shallowing of the streambed, a loss of aquatic habitat and a decrease in the streambed "roughness" as pools become filled and the streambank is covered with fine soils. Streams also tend to be warmer in urban areas, due to warmer inputs into the stream and the loss of streamside vegetation.

A large portion of the water in our County's rivers is contributed by the smaller tributaries. If riparian areas along these brooks and streams are altered in a manner (removal of forest cover or placement of buildings) that impairs their ability to detain and absorb floodwater and stormwater, the cumulative impact of streams discharging flood and storm flows into rivers at a greater volume and velocity will result in worsening flooding and storm damage to existing structures and main stem river communities downstream. Furthermore, a development is likely to have a relatively greater negative impact on flooding conditions in an adjacent small stream than the same project along a larger river. The impervious cover of one large parking lot can overwhelm a small stream.

Sizing the Riparian Buffer Zone

For riparian forest buffers to achieve specific purposes, they must be properly located and sized, (width, length, area) in relation to the stream or waterbody. The right buffer width for a given purpose actually may vary from stream to stream based on stream size and other factors.

The chart below will show how to size a buffer zone to achieve varying purposes.



Buffer Purpose	Recommended Size of Buffer in Feet
Stabilize eroding banks	35' to 50'
Filter sediment and attached contaminants from runoff	
Gentle slopes	35' to 50'
Steep slopes	150'
Filter dissolved nutrients and pesticides	100' to 150'
Protect fisheries	At least 100'
Protect wildlife habitat	300'
Protect against flood damage	At least 200'
Grow valuable products	300' +

Rewards of Riparian Buffers

Economic Services

- Protect citizens against property loss through flood damage and erosion
- Recharge aquifers
- Protect quality of public drinking water supplies
- Support the recreation and tourism industry
- Support sustainable yields of timber

Social services

- Protect clean surface water for public recreation
- Protect prime agricultural soils from permanent loss through development
- Provide natural fences, visual screens, and noise control
- Improve air quality
- Provide outdoor laboratories for teaching and research
- Offer places for camping, nature study, hunting and fishing
- Recycle nutrients
- Trap heavy metals and toxins
- Store excess sediments
- Trap excess carbon dioxide

Biological services

- Support predators of rodent and insect pests
- Protect fish and wildlife habitat
- Provide corridor for movement of wildlife

Protecting Buffer Zones and Stream Health

- Let the buffer develop naturally; never mow to the edge of a stream or lake;
- Plant appropriate native vegetation and cuttings in the buffer zone;
- Do not dump anything in a stream, including grass clippings and other yard waste. Try home composting instead;
- Keep the water body clean by removing trash;
- Leave natural woody debris in a stream. It provides habitat and food for aquatic communities;
- Use pesticides and fertilizers sparingly in your yard and not at all in the buffer;
- Keep septic systems in good working order to prevent contaminated runoff; and
- Don't change the course of a stream or try to use rocks or other materials to stop stream bank erosion yourself. You can do more harm than good.

Is Mitigation for Destroyed Riparian Areas the Answer?

Even though some regulations require compensatory mitigation when buffer zones are destroyed, it is not sufficient to restore the ecological services and biodiversity of a natural forested area. Impacts of human activities on buffers, forests, wetlands and other natural areas greatly affects the benefits they provide such as mitigating floods, droughts, the erosive forces of wind and rain, and the siltation of our waterways.

Land use change destroys the ecosystem and causes loss in the biodiversity of natural habitats. Organisms take many years to adjust to their habitat. Destruction of that habitat cannot be mitigated with the expectation that organisms will “just” survive. Many species will be and have been lost due to land use changes. When species are lost, the ecosystem is greatly affected.

Bottom Line: The welfare of humans is dependent on the survival of biodiversity in our streams and rivers. Are we willing to sacrifice our welfare?

References:

Issues in Ecology, Number 2, Spring, 1997. Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems

Riparian Area Information and Fact Sheets, Riverways Program, Department of Fish & Game, Boston, Massachusetts, 1997.

*Georgia Department of Community Affairs, Office of Environmental Management
(www.dca.state.ga.us/environmental)*

Jefferson County's Buffer Strip Requirements - Section 505.170 Subsection B Paragraph 3-5

Jefferson County has established requirements for buffer strips in the Code of Ordinances that became effective February 8, 2011. Those requirements are quoted below.

“Land disturbance or development shall not occur along watercourses within fifty (50) feet from the top of the bank on first and second order streams and 100 feet from the top of bank on third and higher order streams, wetlands and sink holes except as provided for in Subsection (D). “

“Buffer strips are divided into two zones, the *streamside zone* and the *outer zone*. The *streamside zone* is the area within twenty-five feet from the top of the bank on first and second order streams and fifty feet from the top of the bank on third and higher order streams, wetlands and sinkholes. The *outer zone* is the area outside of the *streamside zone* within fifty feet from the top of bank on first and second order streams and one hundred feet from the top of the bank on third and higher order streams, wetlands and sinkholes.”

Streamside Zone: Bank vegetation along practically all streams plays a crucial role in reducing soil erosion and land loss as well as providing shade and woody debris (for food and shelter) that is necessary to stream water quality and to the health of plants and animals.

Outer Zone: The extra width the outer zone provides helps to reduce excess amounts of sediment, organic material, nutrients, chemicals and pesticides in surface runoff.

Jefferson County regulations continue to say: “The natural conditions of a buffer strip should not be altered, except as allowed by this Chapter. The following activities are prohibited in a buffer strip, except with County approval granted in Subsection C7 or D:

- a. Any land disturbance activity, such as clearing, grading, stripping, filling or dumping.
- b. Mowing.
- c. Storage or operation of motorized vehicles, except for maintenance or emergencies.
- d. Septic tanks or drain fields.
- e. Structures and other impervious surfaces or cover.
- f. Stormwater retention or detention facilities.
- g. Housing, grazing or other maintenance of livestock.
- h. Riding of horses, except on existing trails.”

For more information, please contact the Stormwater Management Office at:
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