The Role of Riparian Buffers in Watersheds and in your Local Landscape

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Center for Land Use Education and Research, CT Sea Grant and UConn Extension
provides research, tools, training, information, and assistance to community decision makers and other audiences in support of:

- better land use decisions
- healthier natural resources
- more resilient communities
A renewed focus on riparian areas

- Water Quality
- Resilience
- Biodiversity
- Recreation
- Economic development
Support for Protecting and Restoring Riparian Buffers

Webinars

Riparian Restoration Tools

Geospatial Analysis & Tools

Workshops
The Role of Riparian Buffers in Watersheds and in your Local Landscape

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What is a riparian corridor (buffer)?

• “Riparian” refers to the area by the banks of a river, stream, or other body of water.

• “Corridor” refers to a designated zone or strip of land of a specified width along the border of an area.

• So a “Riparian Corridor” is the natural vegetation and soil cover adjacent to a river, stream, or other body of water.
Riparian Zones and Context

- Riparian zones are the interface between land and water
- Includes the floodplain as well as the riparian buffers adjacent to the floodplains.

Riparian buffers rarely take into account riparian and aquatic ecosystem functions.
Riparian buffers – focus on water quality

• Buffers used in agriculture practices to protect water quality pre-1960’s

• Buffers used in forestry practices since at least the 1960’s
Scientists and regulators in Pennsylvania are working with farmers to plant trees along streams in an effort to reduce the amount of pollutants entering the water. Farmers are cultivating fruit trees and flowers in the riparian zone for additional income. This represents an agroforestry system that is a win-win for ecological outcomes and community livelihoods. 

Sarah Derouin, Stroud Water Research Center
Why should we care about creating, managing or restoring riparian buffers?
Riparian Buffer Ecological and Societal Functions

- Water Quality
- Biodiversity
- Protection and Safety
- Economic Opportunities
- Productive Soils
- Aesthetics and Visual Quality
- Outdoor Recreation
Water quality – especially important for headwater streams

Streambank stabilization/erosion control
Flood control

- Without buffers
- With buffers

Buffer should be width of appropriate floodplain

Flood storage in buffer
Biodiversity Buffer Functions

- Increase aquatic and terrestrial habitat areas
- Protect sensitive habitats
- Restore connectivity
- Increase access to resources for animals
- Provide shade to maintain water temperature
Riparian Buffers for aquatic species

• Provide woody debris for aquatic habitat structure
• Maintain in-stream microclimate
• Provide food for aquatic species
• Protect water quality
Adding woody debris to a pool for amphibians and turtles.

CT DEEP fact sheet on large woody debris

Woody debris very important for the larval stages of many insects.
Fisheries – water quality and water temperature
American Rivers’ report, *The Economic Value of Riparian Buffers*


The reported findings include:

- Riparian buffers have a positive economic value in terms of public and private benefits.
- The economic value of riparian buffers generally increases with width and length.
- Riparian buffers generate a price premium for residential property.
- The public is willing to pay for watershed restoration with riparian buffers.
Riparian Buffer Online Tool

Coastal Riparian Landscaping Guide for Long Island Sound

Riparian corridors are the segments of land along our rivers, streams and wetlands including the natural vegetation and soil cover. These areas can provide multiple benefits, particularly as the first line of defense against the impacts of surrounding land uses. Corridors slow runoff from precipitation, aid in flood control, and filter or trap pollutants. These areas can also provide habitat and corridors for wildlife as well as scenic value and privacy. Within coastal areas, vegetated corridors can also be of significance in reducing the impacts of waves and overwash on properties. Recently, several major storms have caused extensive damage along the coast of Long Island Sound in both Connecticut and New York from erosion, scouring and salt spray.

In order to capture the benefits of coastal riparian corridors, lessen the impacts from storm events while still allowing for view sheds and water access, we offer the following tool as a resource for those living on or near the waters and tributaries of Long Island Sound. Instead of having lawn and turfgrass exclusively between the home and water, we suggest plantings that can withstand this harsh environment and show how plantings can be placed to still provide view sheds and water access, while incorporating the ecological benefits of riparian plantings. This tool includes a series of fact sheets describing the functions and values of coastal riparian corridors, how to prepare an area for planting, and how to plant. We provide a listing of native plants and indicate their ability to withstand salt spray and inundation. Additionally, we provide a series of landscaping diagrams to get you started including both plan views and cross sections.
Cross Section: K
Salt spray: Occurs often (property adjacent to Long Island Sound)
Shoreline: Rocky/sandy shoreline with no seawall
Slope of property: 35% (Moderately steep)

During high tide events and storms, areas at lower elevations may be flooded for a short period of time. If this is the case, use Zone 1 plants that can tolerate poorly drained soils (PDST). If lower elevations do not flood, use Zones 1+2 upland plants. Depending on planting scheme, some Zone 3 plants may do well if protected from salt spray.
Whether coastal or inland – same ideas apply for water access and viewsheds

Plan view: A
Salt spray: Occurs rarely (only during major storm events)
Shoreline: Seawall present
Slope of property: Gentle slope

Plan view indicates how water access, views and lawn can be retained with a riparian buffer.

What would you like to see in a tool that municipal officials, resource managers and property owners could use in riparian buffer design?
How big should a buffer be to provide water quality improvement and other services?
It depends.... on site conditions: location within the watershed, soil type and slope, hydrology AND what the function of the buffer is.
Riparian Corridor Widths for Specific Objectives

Bottom line: bigger is better

Small riparian corridors
(25 – 50 ft)

- Help to protect water quality
- Streambank stabilization
- Provide small scale travel routes
- May provide nesting/basking sites

Large riparian corridors
(> 50 ft)

- Provide habitat components to more species
- Help to reduce secondary inputs
- Increased water quality protection
- Flood control
- Provide large scale corridors
Climate Change and Riparian Ecosystems

- Air and surface water temperatures increasing
- Changes in the magnitude and seasonality of precipitation and run-off
- Shifts in reproductive phenology and plant and animal distribution
Why are riparian ecosystems important with regard to climate change?

Riparian Systems are naturally resilient to extreme weather events

Riverine habitats function as corridors for many plants and animals (causing distributional shifts in organisms)

Expanding thermal refugia - riparian areas absorb heat (water has high heat capacity) and protect riparian corridor organisms against extreme temperatures

Hydrologic Benefits (increased frequency of extreme precipitation events, and altered seasonal patterns of precipitation and runoff). Riparian vegetation increases infiltration; mitigates flood impacts
WHERE DO WE BEGIN?
From this....
To this....
Why using native plants is important

http://www.crjc.org/riparianbuffers.htm#intro
Trees

What can you plant in riparian buffers?

- Red maple
- Tulip tree
- Black gum
- Sweetgum
- Sycamore
- Silver maple
- Swamp white oak
Small Trees

Serviceberry species

Alternate-leaved dogwood
Shrubs

Common alder

Silky dogwood

Buttonbush

Swamp azalea
Herbaceous Plants

Jack in the pulpit

Swamp milkweed

White turtlehead
Strategies for enhancing visual preference of corridors

- Design the viewable part of the corridor to be visually pleasing while the interior can be designed to achieve the desired ecological functions.
- Use selective mowing to indicate stewardship without greatly reducing the ecological functions.
- Use bold planting patterns to indicate a designed landscape.

Enhance visual interest and diversity by increasing seasonal color and by varying plant heights, textures, and forms.
• Provide visual frames to contain and provide order around the corridor (such as a wooden fence).

• Provide simple habitat improvements such as nesting boxes and feeders.
Land use is the prime determinant of watershed health.

And we are in an urbanizing region.
A leap in land cover resolution (2020)

New **1m resolution** NOAA C-CAP land cover enables us to explore our landscape at a level of geographic detail that was previously impossible.
Our first thought:

RIPARIAN CORRIDORS!
A more detailed look at riparian corridors
Looking at the land use – watershed health connection at a finer scale.

4,364 basins, average size = 786 ac
The Combined Condition Index (CCI)

- CCI is a land cover-based metric that describes the probable health of a watershed
- CCI is based on the land cover of both the upland watershed and the riparian buffer
- CCI is correlated with long-term watershed health as indicated by the CT DEEP Macroinvertebrate Multi-metric Index (MMI)
- CCI is calculated for each of the >4,300 local basins in Connecticut
Comparing land cover makeup of two zones:

- **upland watershed**  
  (everything outside the buffer)

- **100’ riparian buffer**
CCI indicates the state of, and **suggested land use strategies** for, a local basin.
Local Watershed Assessment Tool

- [https://s.uconn.edu/wshedtool](https://s.uconn.edu/wshedtool)
- integrates a Story Map, Dashboard, and Scenario Builder
Coming up...

Webinars, workshops, & tools training

Online Tool Training

Watershed Protection Strategies
Watershed Protection Strategies

Land Conservation
Watershed Protection Strategies

Green Stormwater Infrastructure

Rain garden on UConn campus
Watershed Protection Strategies

Riparian protection through local land use regulations (zoning)
Watershed Protection Strategies

Riparian restoration