

Riparian Buffers

Landowners who are fortunate enough to own property on the banks of a stream or lake (known as riparians) can have a tremendous influence on the health of the waterbody. Any of the variety of chemicals, fertilizers, detergents, household wastes, sediments, etc., that riparians use often end up in the adjacent water. Once these substances enter waterways they can cause a variety of problems ranging from fish kills to nuisance plant growth and algal blooms.

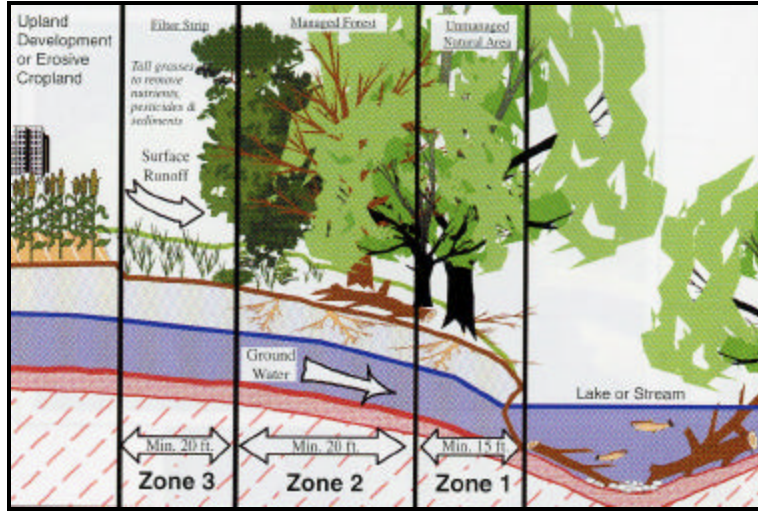


Figure 1: Riparian Buffer Zones Illustrated.

Perhaps the easiest method to prevent these substances from reaching the waterbody is to leave a strip of vegetation between the problem area and the water. These areas, known as buffer strips have long been recognized as critically important for maintaining water quality. Buffers perform many functions: they provide shade that reduces water temperature; filter sediments and other contaminants; reduce nutrient loads to lakes; stabilize stream banks with vegetation; provide riparian wildlife habitat; discourage geese congregation; maintain and protect fish habitats; form aquatic foodwebs; and provide a visually appealing greenbelt and recreational opportunities.

Buffer Basics

All buffers, as a minimum, must consist of two (2) management zones and must include a third if the buffer is intended to trap sediment, nutrients and pesticides leaving developed lands, croplands or sparsely vegetated or erosive areas.

Zone 1 is adjacent to the water (figure 1) and contains the trees and shrubs needed to provide shade, insect habitat, bank stability and large woody debris for instream habitat. The complex root structures of woody plants are highly desirable for holding soil in place (see woody debris, improve bank stability and to maintain a natural riparian ecology, no harvesting, livestock grazing or other resource extraction should be permitted within Zone 1.



Figure 2: A dramatic example of how woody vegetation will hold soil together, while the adjacent grass cover around this pond has allowed the banks to completely fail, thereby adding to the state's largest water quality pollutant of concern – soil erosion and sedimentation.

Zone 2 is inland of Zone 1 and contains trees and shrubs and other vegetation needed to filter runoff and provide uptake of nutrients and pollutants. Zone 2 combined with Zone 1 will provide a travel corridor and habitat for wildlife in addition to producing shelter, shade and large woody debris. Dominant vegetation should consist of existing or planted trees and shrubs suited to the site and purpose. Livestock should not be permitted in zone 2, but forest management and tree harvesting is permitted as long as the purpose of the zone is not compromised. Tree harvesting allows the landowner to maintain the land's productive value while providing water quality benefits at the same time.

Zone 3 is landward of Zone 2 and consists of a strip of tall grasses or herbaceous cover to spread and filter runoff which may be transporting sediment, nutrients and pesticides off urban land, cropland, or erosive or sparsely vegetated areas. The establishment of this zone is critical where the control of sediment, nutrient, pesticide or non-point source pollution is necessary, as is the case in urban and agricultural situations.

Minimum Buffer Widths

Where soil erosion, nutrient or pesticide pollution is a concern the riparian buffer must consist of Zones 1, 2 and 3. The combined width of these zones should be a minimum of 55 feet. Zone 1, which begins at the normal water line, or at the upper edge of the active channel must be at least 15 feet wide, measured horizontally on a line perpendicular to the watercourse. Zone 2 extends for a minimum of 20 feet upslope from Zone 1. Zone 2 is managed to function as a zone of nutrient uptake and pesticide and pollutant entrapment. Zone 3 must extend a minimum of 20 feet upslope from zone 2. On steeper slopes (>15%) the minimum width of Zone 3 must be 40 feet or more. The widths of each zone listed are the minimum necessary for the buffer to be effective. Increasing the width of any of the zones is strongly encouraged.

Buffers intended to provide wildlife habitat, maintain or restore water temperatures and provide large woody debris must be at least 100 feet wide. Zone 1 must be a minimum of 15 feet wide, and 2 a minimum of 85 feet wide. If Zone 3 is present, the width of Zone 2 can be reduced to 65 feet. Generally speaking, wider is usually better when designing buffers with wildlife in mind. Some wildlife species will benefit from relatively narrow buffers while other species may require very wide buffers to meet their needs. The newest USDA Natural Resources Conservation Service Conservation Standard for riparian buffers (391 MI) recommends a 600 foot buffer as the minimum habitat for some of Michigan's native, threatened species. A good rule of thumb to remember is that wide buffers will attract the greatest variety of wildlife.



Severely eroded stream bank. Observe the soil loss is more aggressive away from the unseen, stabilizing root mass of the bush.

Newly restored creek buffer with native vegetation.



Plant Materials Selection

Riparian buffers can be designed to produce different environmental benefits (water filtration, wildlife habitat, erosion control, etc.). Likewise, the plants used in the buffers can offer varying benefits. Because of this, it is strongly recommended that a wide variety of woody plant species be used in Zones 1 and 2 of the buffer. In Michigan there are hundreds of native trees and shrubs that potentially could be used in a riparian buffer planting. Non-native species should not be used, and should be eliminated prior to planting. It is strongly recommended that you consult with your local conservation district forester for assistance with interpreting the soils and other local conditions before selecting plants. Also, consider the following values when deciding what to plant:

Wildlife Food: Plants that produce palatable nuts, seeds, and berries should be included in the design if wildlife habitat is an objective. Trees like oaks, hickories, walnut, American beech, viburnums, cherries, and dogwoods are important to a wide variety of wildlife species. Additionally, some woody plants, such as aspen, white pine, and red maple provide desirable browse to deer and other species when they are small enough that animals can reach the young succulent twigs.

Wildlife Cover: Another important wildlife consideration is protection from harsh weather and predators, and nesting opportunities. Fast growing conifers, such as white pine or white spruce can provide good bedding areas and thermal protection in the winter. Long-lived trees such as beech, white oak, and sugar maple that often develop cavities as they mature, can ultimately provide great nesting sites for squirrels, wood ducks, and songbirds.

Large Debris: On naturalized riparian corridors, fallen limbs and dead trees can play a critical role in the health of the aquatic habitat. Many fish species are attracted to areas containing this woody debris. Also, a moderate amount of woody material can slow water movement, reducing streambank erosion potential. In some constructed drains, however, this may not be desirable.

Shade: Large trees with dense canopies growing adjacent to a stream are very important to water quality because they produce shade which can significantly cool the water. Trout and other cool water fish are much more likely to be found in stream corridors containing basswood, maples, oaks, and other dense-crowned trees.

Sprouting ability: Where fast moving flood waters or ice flows are likely, trees and shrubs planted close to the stream are likely to be damaged. In these areas, it may be wise to select trees that can easily sprout from stumps and cuttings. Willows, shrub dogwoods, highbush cranberry, and aspen are examples of species that can replace themselves easily if their tops are damaged or broken.

Aesthetics: Certainly, the appearance of a forested riparian buffer is important in most cases. While this is largely a matter of personal preference, some consideration should be given to trees and shrubs with attractive and/or fragrant flowers (nannyberry, redbud, tulip tree), bright fall foliage (sugar maple, red maple, sassafras), and interesting bark (beech, birch, sycamore).

Again, more importantly than any of the factors listed above, is the suitability of a species to the planting site. It is imperative that soil texture and drainage, existing shade, and site hydrology be considered in selecting your plants.

Additional guidelines on riparian buffers and species recommendations can be found at the following web site: <http://www.mi.nrcs.usda.gov>. On left sidebar click on Electronic Field Office Technical Guide (eFOTG). On the map under Access eFOTG click on Michigan, click on your county twice. On left sidebar, click Section IV, then A. Conservation Practices. Scroll about 2/3 down to Riparian Forest Buffer practice #391.

Additional Sources of Information

Further information on design and plant selection for riparian buffers can be obtained from the following resources:

Organizations

USDA Natural Resources Conservation Service & Conservation Districts:
Lenawee County: (517) 263-7400; Macomb, Oakland, St. Clair Counties: (810) 984-3001; Monroe County: (734) 241-7782; Washtenaw & Wayne Counties: (734) 761-6722.

Publications

Lakescaping for Wildlife and Water Quality. Carrol Henderson. 1999. Minnesota Department of Natural Resources, St. Paul, MN. Available from the Minnesota Bookstore at (651) 297-3000. An excellent reference for both stream and lake riparians.

Aquascaping, a Guide to Shoreline Landscaping, C.J. Dindorf. 1993. Hennepin Conservation District, Minnetonka, MN.

Stream Corridor Restoration: Principles, Processes and Practices, 1998. The Federal Interagency Stream Restoration Working Group. Washington D.C. Contains a wealth of information on riparian buffer function, design and planning, however it is not widely available. Check with local Natural Resources Conservation Service offices for availability.

Protecting Inland Lakes: A Watershed Management Guidebook, J.D. Warback, M.A. Wyckoff and K. Williams. 1990. Planning and Zoning Center, Inc. Lansing, MI. (517) 886-0555. Directed towards lake riparians, but has many applications to stream riparians. Available from Michigan Department of Environmental Quality.

Internet Sites

Southeast Michigan RC&D Council: <http://www.semircd.org> Contains information on streambank stabilization, using plant materials (soft engineering), including photos from demonstration projects completed in Lenawee, Macomb, St. Clair and Washtenaw Counties.

National Conservation Buffer Initiative-Natural Resources Conservation Service: <http://www.nhq.nrcs.usda.gov/CCS/Buffers.html>. Contains buffer design criteria & function; describes the NRCS's national buffer initiative.

Iowa State Agroforestry Research Team: <http://www.ag.iastate.edu/departments/forestry/Forestry.html>. The internal link to Extension Programs, Common Topics, contains many before and after pictures of severely eroded and overgrazed stream banks; includes buffer design criteria and re-vegetation techniques.

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Lake and Stream Corridor Owners' Guide for Riparian Buffer Establishment

Water Quality Improvement, Wildlife Habitat and Stream Bank Stabilization



Photo courtesy of USDA NRCS



Serving Lenawee, Macomb, Monroe, Oakland, St. Clair, Washtenaw & Wayne Counties

Visit our web site at: www.semircd.org

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