

6-14-1999

## Riparian buffer systems -- the basics

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### Recommended Citation

Isenhardt, Thomas M. and Tidman, Michael J., "Riparian buffer systems -- the basics" (1999). *Integrated Crop Management News*. 2204.  
<http://lib.dr.iastate.edu/cropnews/2204>

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# Riparian buffer systems -- the basics

## **Abstract**

If you have a stream running through your farm, you may be interested in learning about a conservation technique that has gained the respect of many Iowa landowners and conservation professionals. It is called a riparian buffer system and involves planting trees, shrubs, and native grasses along streams to prevent sediment and chemicals from entering creeks and rivers.

## **Keywords**

Forestry, Agronomy

## **Disciplines**

Agricultural Science | Agriculture | Agronomy and Crop Sciences | Forest Management



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If you have a stream running through your farm, you may be interested in learning about a conservation technique that has gained the respect of many Iowa landowners and conservation professionals. It is called a riparian buffer system and involves planting trees, shrubs, and native grasses along streams to prevent sediment and chemicals from entering creeks and rivers.

The name comes from the scientific reference to the floodplain adjacent to creeks and streams--known as riparian areas. Because riparian areas are the areas that handle the greatest overland flow of sediments, managing riparian areas well goes a long way toward controlling the presence of sediment as well as nitrate, atrazine, and other farm chemicals in rivers.

The Agroecology Issue Team of the "Leopold Center" for Sustainable Agriculture has studied the impact of a riparian buffer system at the Bear Creek Riparian Buffer National Research and Demonstration Area in northern Story County. Since 1990, a team of scientists has been measuring the impact of trees, shrubs, and grasses on water quality. In one study using the buffer system, nitrate levels were reduced from 13 parts per million (ppm) in the cropped area of the field to less than 1 ppm in the tree-zone of the buffer. Atrazine levels showed a similar reduction--from more than 12 parts per billion (ppb) to less than 1 ppb.

Stopping erosion is the key. Estimates place Iowa's soil erosion rates at 6 to 7 tons per acre per year on cropland with some areas running up to 25 tons. The erosion is the result of change in the land. Around 90 percent of most midwestern watersheds are cultivated. In the past 50 to 75 years, many of Iowa's natural riparian areas also were cleared for agriculture (each year approximately 82 percent of Iowa's farmland is managed as cropland).

Establishing trees, shrubs, and grasses helps replace the natural system that once protected most Iowa streams, creeks, and rivers. Each kind of vegetation offers a specific benefit, working together as a "living filter." And using hardy, native plants (such as switchgrass) can stop eroded soil from entering streams.

As runoff flows over land, the tall, dense stems of native grass slows it down, allowing waterborne soil particles to drop into the buffer zone rather than getting to the stream. The root systems of some grasses may penetrate up to 6 feet, providing deep pores for water to soak into rather than running off. The "sponge" effect also helps lessen the severity of floods and recharge groundwater. And the mass of roots deep beneath the soil's surface provides an abundance of organic matter. This organic matter provides an ideal environment for microbes that break down the chemicals through natural processes.

Shrubs have woody stems that obstruct runoff flowing into the stream and help slow floodwaters. Slowing down the flow of water allows sediments to settle out, cleaning the water.

Trees near the stream's edge offer similar soil and stream-bank protection. Their dense root mass stabilizes stream banks. (Slumping is a major contributor to sediment in streams, creeks, and rivers.) The deep roots of shrubs and trees also take up nutrients before they reach the stream.

There are other proven benefits to establishing a riparian buffer system. Planting a streamside buffer can dramatically improve wildlife habitat. In one study, more than 30 species of birds were found in the Bear Creek buffer zone compared with eight species in a neighboring, nonbuffered stretch of stream.

There are also the benefits of the Conservation Reserve Program (CRP). Landowners who install riparian buffer systems on their land may be eligible for cost-share and annual rental payments from the federal government for up to 15 years. (Signing up for the CRP restricts income from a riparian buffer system--check with your district conservationist for more information.) In the long-term, trees in the buffer can provide landowners with valuable biomass, timber, and nut crops.

Finally, it is important to consider adding a constructed wetland component to your riparian buffer system to intercept tile outlets. Tile lines carry drainage directly from the farm field, and "filtering" that drainage before it reaches the stream is a proven technique for reducing nitrogen loading in surface waters. The design for the wetland component is flexible and a riparian buffer system is a conservation technique that can provide incredible long-term benefits at a very low cost.

This article originally appeared on pages 96-97 of the IC-482(14) -- June 14, 1999 issue.

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