Project Background

The Stroud Riparian Reforestation Project was initiated in 1991 as a demonstration of the 3-zone Riparian Forest Buffer System developed by the U.S. Forest Service. Previous research had shown trees nearest the stream protect habitat by controlling water temperature, providing leaf litter as a food supply for aquatic organisms, and stabilizing stream banks.

Other research showed that a somewhat wider zone of streamside forest can filter out agrochemicals and eroded soil that would otherwise reach the stream. The Forest Service's 3-zone buffer concept integrated this research into a strategy for reforesting streams in agricultural areas to protect water quality while maintaining agricultural productivity.

The Natural Land Trust's Stroud Preserve, near West Chester, PA, provided an ideal site for implementing the first example of the 3-zone system and collecting the long term data necessary to evaluate its effectiveness.

Project goals

- Demonstrate the use of the 3-zone Riparian Forest Buffer System developed by the U.S. Forest Service.
- Demonstrate the ability of streamside—or riparian—reforestation to improve water quality
- Assess the time needed to achieve full benefit of restoration
- Establish guidelines for riparian buffer planting, maintenance and management
- Transfer lesson learned to the general public, land-use professionals and the research community.

More information

www.stroudcenter.org/research/StroudPreserve/index.htm

The 3-zone Riparian Forest Buffer System

Zone 1— protects stream habitat. Undisturbed mature forest extending at least 15 feet from the streambank. At the Stroud Preserve, this was in place prior to 1992.

Zone 2—filters nutrients and sediments. At least 60 ft of forest that can be managed for timber production.

Zone 3—disperses concentrated runoff. At least 20 feet of non-forested buffer contoured to spread overland flow into sheet flow before it enters Zone 2. At the Stroud Preserve, a level-lip spreader was constructed in this zone.

The level-lip spreader

Overland flow during storms often runs off crop and pasture lands as concentrated flow in grass waterways. A forested buffer, although capable of filtering sediments from overland flow, is vulnerable to erosion from this concentrated flow. A level spreader intercepts the concentrated flow and spreads it out so that it flows evenly as thin sheet flow into the forest.

At the Stroud Preserve, a level spreader was constructed in 1994. The berm, or level-lip, over which the water flows lies at the original contour. The hillslope above the contour was excavated to provide a narrow, extended basin that diverts and distributes the water so that it flows uniformly over the level "lip" or contour.

The Reforestation…

Zone 2 was planted in 1992 with seedlings of red oak, white ash, tulip poplar, sugar maple, black walnut, trembling aspen, sycamore, and river birch.

Tree growth was initially delayed by drought and deer-damage. Beginning in 1998 more aggressive measures were instituted to assure vigorous forest development. These included annual herbicide (glyphosate) treatment of each tree, gradual replacement of plastic tree shelters with wire mesh tree enclosures, and replanting critical gaps with larger balled and burlapped trees. Since 1999 the trees have grown rapidly and the total basal area has increased more than tenfold.

1992

1999

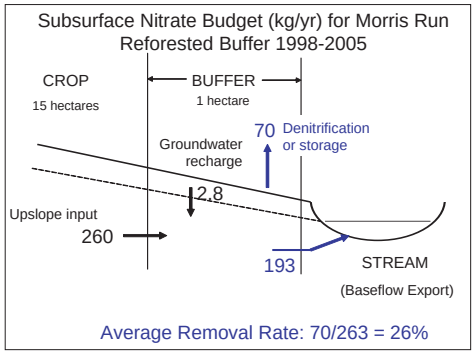
2005

What the project is monitoring

The project monitors water quality (primarily nitrogen, phosphorus, and suspended sediments) in the streams and in overland flow during storms. Nitrogen and phosphorus are also measured in the groundwater at varying distances from the stream.

What the project has shown

- the riparian buffer removes an average of 27% of nitrate and 52% of the sediment that would otherwise reach the stream
- the level-lip spreader minimizes erosion within the reforested area by dispersing concentrated surface runoff from the cropland into sheet flow as it enters the reforested area
- successful establishment of the riparian forest buffer required control of non-woody vegetation and protection of trees from deer damage
- plastic tree shelters followed by 5-foot wire-mesh cages around individual trees have proved the most effective means to protect saplings from deer damage



Project Support

Since 1997, the project has been a US-EPA National Monitoring Program Project,funded by the Pennsylvania Department of Environmental Protection and the US EPA through Section 319(h) of the federal Clean Water Act. Other support has come from: USDA Forest Service, Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry, Chesapeake Bay Program, Pennsylvania State Bureau of Forestry, USDA Natural Resource Conservation Service, Stroud Foundation, Pennswood No.2 Research Endowment, and the Stroud Endowment for Environmental Research.

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Protecting Water Quality and Stream Habitat…

The Stroud Preserve Reforested Riparian Buffer

A U.S.-EPA National Monitoring Program Project