



USDA-CSREES 2005 National Water Quality Conference

Temporal Change in Filter Strip Performance

Abstract: Vegetative filter strips are installed at crop field margins for the purpose of removing pollutants from field runoff before they enter streams. We have limited capability to predict how well these filter strips will work, particularly over the long term. We can expect major changes in soil structure and surface roughness after conversion from annual tillage to permanent vegetation. It is not clear how long it takes for these changes to become fully expressed.

Objectives:

Our objectives are to determine (i) if, and by how much, the effectiveness of filter strips changes over time since establishment, (ii) if temporal change in effectiveness depends on vegetative composition, and (iii) partition any such change among fundamental process of infiltration, deposition, and dilution.

Methods:

We are capitalizing on a plot study, originally established in 1995 and conducted for three years, by revisiting these plots at 9 and 10 years after establishment using the same protocols (see Schmitt et al., 1999, J. Environ. Qual. 28:1479). Treatment plots contain either grass or forest vegetation. Control plots, for which we expect little or no change over this time frame, contain annually-tilled row crop or 30+ year old grass. Anticipated products will include research information (publication and presentations) that can feed directly into modeling.

Partnerships:

The USDA Forest Service and the University of Nebraska are key partners. The USDA-FS provides overall coordination and conduct of the experiment. The university owns the land on which the study site occurs, conducts the runoff chemistry portion of the project, and utilizes the site and research products for education and extension activities.

Resources:

This research site is part of the University of Nebraska's Integrated Farm (~7,000 acres) research and demonstration network which is used to enhance education and extension activities that are frequently conducted at the farm.

Integration of Research, Teaching, and Extension:

Study site establishment and initial phases of data collection were enabled by a grant from the US-EPA and Nebraska Department of Environmental Quality, with substantial matching and in-kind contributions from the University of Nebraska and USDA Forest Service. The current grant has leveraged additional in-kind contributions from the USDA Forest Service.

Results:

Results indicate that there is rapid and substantial improvement in pollutant trapping by filter strips over the first three years. Performance changed from a level similar to the cropped condition toward that of 30+ year-old grass. After ten

years, there remains little difference in performance between the new filters and the old grass. Plots having grass vegetation performed similarly to those having forest (trees, shrubs, grass) vegetation. These results support the need for including a temporal variable, but not a vegetation variable, in existing filter strip prediction models.

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