CEAP RELEVANT RESEARCH WATERSHED STUDY

Name of Project	Location (State, River, HUC)
Effects of Agricultural Conservation Practices on Nitrate Losses from Croplands of the Choptank River Basin	Choptank River, Maryland

Principal Investigator (Name, contact info)	Website
Thomas R. Fisher, Horn Point Laboratory University of Maryland (410) 221-8432 fisher@hpl.umces.edu	http://www.hpl.umces.edu/gis_group/ CRIS project progress report

Purpose of Project (Goals and Objectives)

This project examines the background rates of denitrification in mixed land use watersheds in order to enable the estimation of the minimum application rates of conservation practices required for statistically detectable reductions in stream nitrate delivered to coastal and estuarine waters.

Description of Project (Landscape, Models, Practices)

This research will estimate rates of denitrification in groundwater by measuring ratios of the dissolved gases N2, O2, and argon under conditions expected to exhibit varying levels of denitrification, particularly in hydric soils. Knowing background rates of denitrification will enable the estimation of the minimum application rates of conservation practices required for statistically detectable reductions in stream nitrate. Currently, 25-75% of the nitrate in groundwater is removed in wet areas (wetlands, hydric soils, stream buffers), and in this project we will measure the conditions under which these regions remove nitrate. This information will enable the evaluation of the effects of agricultural conservation practices against the large and variable, natural background of biological removal within the landscape. This in turn will permit local recommendations for minimum application rates of agricultural conservation practices required to achieve water quality goals in regions dominated by agricultural land use such as the Choptank River basin.

Agricultural conservation practices designed to reduce losses of N, particularly nitrate, have been found to be effective at the field scale. However, only limited success has been achieved in reducing N losses from cropland in larger, mixed-land use watersheds. We will establish relationships between excess N2 and the isotopic composition of nitrate (15N and 18O) in groundwater before it enters streams. Preliminary measurements of N2/Ar and the 15N and 18O of nitrate in groundwater and streams of the Choptank River basin show evidence of denitrification, and more extensive measurements will be used to reveal nitrate sinks within the landscape.

This project is funded through the Cooperative State Research, Education, and Extension Service (CSREES) of USDA, National Research Initiative Competitive Grants Program on Water and Watersheds.