Simulation of Wetland Nitrogen Removal at the Watershed Scale using AnnAGNPS

Yongping. Yuan, Jay Christensen, Ronald Bingner, Michael Jackson, and Martin

Locke

The authors are **Yongping Yuan,** Research Hydrologist, **Jay Christensen**, Wetland Ecologist, **Michael Jackson**, Cartographic Technician, US EPA- Office of Research and Development, NERL-ESD-Landscape Ecology Branch, Las Vegas, Nevada; **Ronald Bingner,** Agricultural Engineer, and **Martin Locke,** soil Scientist, Water Quality and Ecology Research Unit, USDA-ARS-NSL, Oxford, MS.

Abstract: The Future Midwest Landscape (FML) project is part of the U.S. Environmental Protection Agency's new Ecosystem Services Research Program, undertaken to examine the variety of ways in which landscapes that include crop lands, conservation areas, wetlands, lakes and streams affect human well-being. The goal of the FML project is to quantify current and future landscape services across the region and examine changes expected to occur as a result of two alternative drivers of future change: the growing demand for biofuels, and hypothetical increases in incentives for the use of agricultural conservation practices. Reducing nutrient loadings from agricultural fields is important for water quality improvement and wetlands have been shown to reduce loadings to receiving waters. The overall objective of this study is to assess wetland nitrogen removal at a watershed scale. To achieve the overall objective of this study, USDA Annualized Agricultural Non-Point Source Pollution (AnnAGNPS) model was enhanced to simulate wetland nitrogen removal efficiency. Then, the model was applied to an agricultural watershed, which is located in the Upper Mississippi River Basin in Iowa. In this study, nitrogen loadings from the watershed were simulated based on current landuse and projected future landuse conditions reflecting increased biofuel production. Wetland nitrogen removal was then assessed based on the simulated loadings and a range of wetland performance coefficients. The impact of size and location of wetlands on nitrogen removal was also assessed.

Keywords: Future Midwest Landscape study; AnnAGNPS watershed modeling; conservation practices assessment; wetland nitrogen removal; and Ecosystem services.