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Farmers as producers of clean water: Getting incentive payments right

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Abstract Text:

This presentation will describe development of prices and a payment schedule in order to conduct a field experiment involving performance-based economic incentives for non-point source pollution control. The purpose of this research project is to investigate how to increase economic efficiency and farmer acceptability of water quality protection in the context of agriculture-related nonpoint source pollution on a 3,000 hectare watershed in eastern West Virginia, USA. By paying farmers to produce clean water, water quality best management practices are converted from a threat to farm income to a potential income opportunity.

Economic incentives designed to reduce nonpoint source pollution should: increase with improving water quality, be detached from changing environmental conditions beyond farmer control, and be large enough to induce farmers to abate pollution without overpayment. In addition, projections of total payments are needed with enough precision to allow for development of a budget before any research project begins. Addressing these considerations is difficult especially given limited stream flow information and highly variable water quality conditions. In this research, economic incentives were created with a payment formula where the total payment is the product of water quantity, a price per unit of water, and a quality adjustment factor. To estimate water quantity, we developed simple watershed models using information from rainfall stations and a nearby USGS gauge station. To derive a schedule of prices, we developed an economic optimization model that sets the opportunity cost incurred by devoting agricultural land to BMPs against higher payments for improved water quality. The quality adjustment factor consists of a ratio of nitrate-N loading in control watershed over that in the experimental watershed. We applied these models using information from a long term water quality monitoring project to generate payment estimates for the experimental watershed. We were able to test these estimates with a simulation based on nine months of additional data. We conclude by comparing this preliminary work to actual data from the first ten months of the project.

Impact Statement:

By providing both economic and social motivations, this project has brought farmers together within a single watershed to work as a group towards addressing solutions to nitrate-N pollution. These solutions are still being formulated, but involve identification of priority areas within the watershed along with increased soil and manure testing to improve efficiency of poultry litter use as a fertilizer.