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FOR SUSTAINABLE AGRICULTURE

Taking the next step – Building a platform for performance-based stewardship payments

Abstract: Policy makers need a way to measure environmental results of farming practices, and incorporate those outcomes into farm policy. Modeling tools can help, but are not yet adequate to serve as performance-based policy guidelines. Roundtables can help diverse groups of people explore a new concept like performance-based policies.

Question & Answer

Q: What did this project tell farmers about stewardship farming on a given landscape?

A:

1. More grass equates to less contamination by nitrogen and soil on the run. The modeling was done in the driftless area of southeastern Minnesota with supporting funds that applies directly to northeastern Iowa, and is of interest to others in Iowa.
2. Environmental goals can be reasonably addressed by even the most conventional of farmers who nevertheless hold the stewardship of habitat, water, and soil as important.
3. The consequences of farm management escape the farm gate – and an attentive public is both concerned with and willing to pay for improved habitat, cleaner water, and less soil erosion.
4. The tremendous efforts of a single farmer can be undermined by a neighbor; stewardship, then, starts with one farmer but must engage many within a watershed.
5. The problems and measurements will be at the watershed level, but the solutions must be at the farm or field level.
6. Some people feel that federal farm policy should be obliged to reward – or at least to not discourage – individual environmental enhancement based on outcomes and practices. Policies at almost every level have so far failed to do more than encourage bad actors to keep being bad.

Background

Current farm policy payments discourage farmers from breaking out of the mold of conventional agriculture. These same conventional farming systems have been found to contribute to environmental problems such as the hypoxia zone in the Gulf of Mexico, soil loss, water contamination, stream bank erosion, and habitat degradation.

Federal farm policy is beginning to reflect the public's willingness to pay for environmental improvements, but there has been no way as yet to legislate a bridge between practices and outcomes on the farm. This project attempted to further the design and testing of verifiable, on-farm outcomes and to generate serious exchanges about their legitimate role in federal farm policy.

Project objectives were to:

1. Quantify the links between policy incentives/disincentives, environmental benefits, and agricultural land use through analyses in the Logan Creek sub-watershed of the Whitewater River Watershed in southern Minnesota.
2. Exchange information with the Rathbun Lake Watershed Alliance in southern Iowa on multiple benefits and performance-based concepts. *NOTE: At the recommendation of an Iowa partner, the focus was successfully turned to the Nishnabotna Watershed in southwest Iowa.*

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\$18,101 for year two

3. Further the larger goals of policies that seek significant water quality improvements from changes in agricultural practices, through the use of policy briefings about agriculture and clean water in the driftless region of southeastern Minnesota, northeast Iowa, and bordering areas of Wisconsin.

Approach and methods

The Soil and Water Assessment Test (SWAT) was applied to data collected from the Logan Creek sub-watershed in southeast Minnesota. Simulations were made to evaluate the impacts of five rates of fertilizer applications on nitrate losses. A land conversion from crops to pasture also was measured. Contrary to indications prior to starting the project, the available data sets were poor and/or incomplete, and results should be viewed accordingly.

SWAT also was applied to farm-scale sustainability. That is, composite “virtual” farms (dairy, beef, and cash grain) were designed by watershed constituents and applied to the land base of a real township in the watershed. Running the model for 10 years allowed predictions of the impact of a host of practices on sedimentation and N contamination.

The economic analysis component of the project involved a simplified economic model that conceptualizes what it costs to practice conservation farming and the strength of conservation incentives such as the Conservation Security Program (CSP) or Environmental Quality Incentives Program (EQIP) to induce land use changes. Researchers sought an optimum amount of conservation effort that generates profits to farmers while maximizing net benefits to society. The study utilized a previously conducted willingness to pay survey.

Education was a significant component that manifested itself in the form of papers, field events, watershed meetings, legislative briefings, and presentations to a wide variety of audiences. (Field days were held with Practical Farmers of Iowa.) Forty diverse specialists and practitioners in soil and water conservation participated in a “Dialogue on Performance-based Conservation Policies for Agriculture” in Ames in November 2005. The roundtable was a facilitated discussion to explore nuances of the topic and spur people’s thinking.

Results and discussion

This project attempted to further the design and testing of universal and verifiable on-farm outcomes and to generate serious dialogue about their legitimate role in federal farm policy. Leopold Center funds were substantially leveraged to facilitate extensive research in the Minnesota part of the Driftless Region. The researchers also held key education components in Iowa, Minnesota, and Washington, D.C. that made use of the information.

Watershed-scale research:

Assurances to the contrary prior to the research, data crucial to an accurate application of the SWAT model were only partially available. Results, therefore, should be viewed as an indication of the general trend without honing in too closely on the actual values. Both N and soil loss were predicted as a result of varying N fertilizer rates and crop land conversion to pasture. Nitrate losses were sensitive to changes in N fertilizer application rates, but not proportionately so. For example, an 11 percent reduction in N losses was predicted when 43 percent less N fertilizer was applied. When 20 percent of row crops were converted by the model to pasture, predictions suggested a 6 percent reduction in sediment loss.

For the farm-scale research:

In all scenarios where the field set was changed to all grass, N dropped 75 to 80 percent and sediments levels declined 88 to 95 percent. For all scenarios in which the status quo was changed to 30 percent crop residue and the intermittent stream became a grassy waterway, sediment levels dropped 6 to 18 percent.

This effort to model virtual farms underscored the hypothesis that more grass equates to less contamination by sediment and nitrogen. It also illustrated that environmental goals are within the range of even the most conventional of farming norms.

For the economic components of the project:

A Minnesota university resource economist concluded that based on the Minnesota numbers, there is a 4:1 benefit/cost ratio to conservation farming. He suggested that conservation efforts could increase up to ten-fold in order to meet the demand for environmental improvements that Minnesotans expressed willingness to support. This information was gathered in such a way as to be broadly applicable beyond Minnesota.



Field day -- September 2005

Vic, Cindy, and Eric Madsen hosted a field day focused on the Conservation Security Program and related issues on their farm in the Nishnabotna watershed in southwest Iowa. The event was organized by the PFI and several partners, and included a locally-sourced meal, field tour, and presentations ranging from politics to poultry.



Coordinated Conservation Planning tool:
Project partners were interested in practical tools that reasonably connect federal payments with beneficial environmental outcomes. One difficulty is the disparity between the long-term nature of biological systems and the real-time payment needs of farmers. The Coordinated Conservation Planning (CCP) analysis tool is one Geographic Information System-based tool that might provide a link between predicted environmental outcomes and timely payment incentives. The tool was applied to a series of “what if?” scenarios in Logan Creek to learn how grassland and woodland birds might thrive in a selected landscape. Converting most of the cropped (corn and soybean) land to pasture/hay land improved 90 percent of the low-ranked acreage for a group of 12 desirable grassland bird species. This tool could be used in Iowa or elsewhere.

Iowa Round Table:

A white paper on the topic was prepared and submitted to invited guests before the roundtable. A briefing sheet on the white paper and an “Afterward” were prepared to summarize the key points. The success of federal and state agricultural conservation programs is currently measured by indicators such as acres enrolled and allocated funds, while water contamination and erosion from non-point source pollution continue in the Mississippi River Basin. A stronger incentive to generate and protect real environmental gains on working farmland could be to link payments to actual or predicted outcomes. The paper and Afterward build on the Conservation Security Program (CSP) and other current options to address these and other components behind performance-based policies for agricultural conservation. Additional discussion focused on fundamental principles, barriers, testable policies, measurement tools, and recommendations to provide a viable path forward.

Conclusions

Significant findings by the project researchers:

- The SWAT model proved difficult to use in the driftless area due to insufficient data about the location of springs and estimates of base flow for streams. As a result, the model predicted only about half of the losses of sediment in the streams.
- Nitrate losses were sensitive to application rate.

However, reductions in nitrate losses were not proportional to reductions in N fertilizer application rates.

- Predicted annual sediment losses in the Logan Creek watershed were about 1.99 ton/ha under prevailing conditions. Conversion of 20 percent of the row crop land to pasture resulted in a reduction of 6 percent in sediment losses. However, the researchers believe this may be an underestimate due to problems with data availability.
- The overwhelming economic result was that if willingness to pay among Minnesotans is even close to the average of \$201 per household per year found by the contingent valuation results, the net benefit to the public is in the vicinity of \$300 million per year, or a benefit/cost ratio of \$400 million/\$93 million which is in excess of 4 to 1 for installation of practices such as those studied.
- CCP data similarly found that conversion of 20 percent of row crop land to grass produced a 90 percent improvement in predicted occurrence of grassland bird species.
- Single farm analysis is cumbersome; an alternative approach is to credit the practices of an individual farmer based on predicted outcomes at the watershed level.
- Recurring themes regarding performance-based policies from papers and the roundtable include the lack of and need for performance goals at every level, the need to monitor for outcomes, determining how to change or support existing policy that pays for practices, and developing fair ways address to “bad actors syndrome” at a watershed level.
- After a day of discussion, there was some movement along the gradient to where all but three participants thought they could “live with the decision” or were “interested,” in the idea that performance based measurements should form the basis for federal farm policy

Impact of results

Through the larger efforts of the Multiple Benefits of Agriculture Initiative, the concept of multiple benefits is now part of the Midwestern policy lexicon and the ongoing debate on cellulosic energy production.

The need to consider how to pay for performance, instead of practices, also is beginning to percolate. For example, the Washington, D.C.-based Natural Resources Defense Council is advocating performance-based measures

November 2005 Roundtable in Ames (below)

- a. The group at the table - 40 people from diverse areas of sustainable agriculture met to sort out some of the conundrums behind the question of federal dollars paying (or not) for on-farm performance along with sound land management practices.
- b. Iowa farmer Greg Koether made his mark on a continuum of support for performance-based agriculture policies.
- c. Some of the participants at the Ames roundtable gathered around an over-sized question concerning support for federal dollars paying (or not) for on-farm performance along with sound land management practices. Participants voted at the beginning and again at the end of the day-long event, and overall showed some progress toward greater support for such policies.



related to biofuel production. More research is needed, and the Cooperative State Research Education and Extension Service (CSREES) acknowledged that priority within its managed ecosystems program area. Policies are being developed to explicitly foster multiple benefits from agriculture.

Education and outreach

Some examples of project outreach included:

- A dialogue on performance-based policies for agriculture was hosted by the North Central Regional Center for Rural Development and three partners to encourage further thinking with 40 key regional conservation operatives.
- A field day held at the Nishnabotna Watershed in southwest Iowa in September 2005 focused on the Conservation Security Program (CSP) from production, habitat, and policy points of view. A watershed exchange with the directors and members of the Whitewater River Watershed was held in conjunction with this field day. Results from multiple benefits studies were included.
- A successful watershed meeting at the Whitewater River Watershed in October 2005 addressed the research, policy, habitat, and project goals related to performance-based policies. A white paper was written on outcome-

based policies including the relevancy and role of the CSP. It has been available on web-sites.

- Two briefings on performance-based policies for agricultural conservation were later held under Land Stewardship Project leadership for U.S. Senate and House legislative aides and another for Cooperative State Research and Extension program leaders.
- Presentations describing the project results were made at meetings in Minneapolis, St. Paul, Wabasha and Bloomington, Minnesota; Washington, D.C.; Portland, Oregon; and Oakland, California.

Leveraged funds

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Photos courtesy of the Land Stewardship Project (Caroline van Schaik and Brian DeVore)

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