Performance-Based Management to Improve Water Quality

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In recent years water quality assessments and the science of water quality management have progressed much more rapidly than delivery of this information and implementation of strategies for performance-based water quality improvement.

Nonpoint source water quality improvements and solutions on the broad landscape need new approaches that lead to a majority of producers in a watershed community working to manage nonpoint source contaminants and jointly developing locally acceptable environmental stewardship goals.

The low-cost, high-return human resources of local knowledge and watershed resident leadership can provide cost-effective and sustainable solutions to managing agricultural nonpoint source issues. Watershed residents' voluntary efforts, neighbor-to-neighbor contacts, and leadership are major assets. Watershed resident participation is an effective way to inform the public, solicit its participation, build support for activities, and to present findings to the public.

The watershed size is crucial to project success. Residents must live within a distance that makes it feasible to work for a common cause, resulting in the development of a watershed community. There is a need to invite rural non-farm and small town neighbors who, similar to the farm population often have out-dated secondary waste treatment, use pesticides and fertilizer, and have soil erosion issues. Rural-urban finger pointing is not a productive use of the human resource.

At watershed meetings, residents as a group develop awareness, implement actions, measure outcomes, and evaluate results. At community meetings, extension, technical, and regulatory agency specialists invited to provide information should refrain from dominating the conversation. This encourages residents to share local knowledge and perspectives, permitting important insights from all participants. Usually after a few minutes of discussion the consensus of the group exceeds specialists' expectations. Most important, it reflects residents' own thinking and ideas for their project. Between-meeting discussions among residents usually result in refinement and enhancement of program or project planning.

In watershed programming, the first step is to identify all known science-based assessments and data about the watershed. Using science removes hearsay, encourages science-based solutions and sets the stage for measurable results. It also provides a focus for group discussion and identifies issues for residents to rally around.

Watershed residents don't want the finger of regulatory agencies pointed at them, their

neighbors, and their watershed and they understand the need for community involvement to deal with nonpoint issues. Environmental outcomes are evaluated during project implementation. Monitoring water quality and aquatic habitat changes guide watershed restoration and development of credible information.

A key piece of information is a watershed map of residents (plat map), not a stream map or map of a proposed lake. The question is, who is involved? Remarks at the first meeting always include "I didn't realize that farm was in this watershed" or "that farm drains to this stream" or "my rented land 8 miles away drains here, too".

There are usually restrictions and limits to public resources for improving water quality. This watershed implementation model allows watershed leaders to sharpen targeting and implementation of publicly-funded programs to secure the most environmental benefit from limited program resources through innovative ideas and management flexibility.

The incentive model goes beyond BMP practice recommendations to locally-managed rewards for improved environmental performance. The focus on performance is crucial as measured outcomes will provide an objective measure of improved environmental management that can be shared and supported by the watershed community. A recent example is the Hewitt Creek watershed council in Dubuque County that established a flat $400 per farm incentive to seed waterways. Fifteen cooperators seeded more than 12 miles of waterways at a cost of less than ten cents per foot of length. In contrast Conservation Reserve Program (CRP) waterways cost $4.74 per linear foot in the Maquoketa Headwaters watershed, where CRP land rental rates exceed going crop land rental rates in the community and include public incentive bonuses, specific seeding practices, and CRP multi-year land rental.

The Hewitt Creek sub-watershed council of the North Fork Maquoketa River basin in Northeast Iowa has experimented with bringing science-based indexes and flexible adaptive management alternatives together through a locally-managed incentive program that rewards cooperators for improved environmental performance.

Environmental indexes like the Iowa Phosphorus Index (P-index), NRCS Soil Conditioning Index (SCI), and Cornstalk Nitrate-Nitrogen test are indexes that can be measured at the field, farm, and watershed levels. The P-index is a model that evaluates potential phosphorus loading to water bodies based on landscape and management variables. The P-index is calculated for every field in the farm operation and a whole-farm P-index weighted by field size is determined for potential incentive payments. The Soil Conditioning Index is a product of the soil loss calculation needed for input into the P-index and predicts the trend in organic matter projected from current crop management and soil conservation practices. The end-of-season Cornstalk Nitrate test is a measure of nitrogen sufficiency/excess-which is used to evaluate field weighted performance of commercial and manure nitrogen management for the year.

All three of the performance measures are objective measures of the water quality impact of changing management rather than specific conservation practices and have measurable outcomes or results. The emphasis on environmental outcomes gives the program flexibility in the way a farmer can approach nonpoint source pollution control. The flexibility encourages participants to make changes which are innovative, cost-effective and within their financial and management

ability. The flexibility will induce farmers to use the least-costly solutions to achieve desired results.

Management alternatives that include reduced tillage, forages in rotation, cover crops, headland planting, buffers, terraces, no-till or contour planting alone or in combination can be employed to improve index and performance outcomes. Financial incentives determined by watershed residents, reflecting the severity of the water quality impairments, encourage producers to adopt environmental goals and continue refining practices because they have objective measures to evaluate their progress. Financial incentives enhance the process because many solutions with economic and environmental benefits in the long term require initial experimentation and capital investment.

A watershed incentive and management plan is a living document and should be revised on a regular basis to ensure that the goals, objectives and specific actions address the most pressing problems and serve as effective methods for restoring and maintaining water quality in the watershed. Due to the cost savings that accrue from refined management, watershed residents may adjust future incentive payments. Nonpoint source contamination often results from long term actions and will take a long time for measurable outcomes. The indexes offer an on-going measurement of progress toward environmental solutions and outcomes at the field, farm, and watershed level.

Special unique issues in a watershed can be addressed by identifying and providing incentives for education or practices, for example manure application calibration, nutrient analysis and updating manure management at the field and farm level.

Staff requirements to do indexes include major computer technician support to complete the P-index and resulting Soil Conditioning Index. Group facilitation expertise and information and education are other staff needs. These skilled staff may serve multiple sub-watershed groups of a larger watershed.

In agricultural watersheds cost-share for engineered soil conservation structures is an important but costly use of public funds that does not address landscape-based issues which require day-to-day, site specific management-such as nonpoint source nutrients from fertilizer and manure.

Performance-based nonpoint source programming develops watershed resident leadership, pride, added knowledge, and a sense of community, all contributing to sustainability of improved environmental performance. Sustainable environmental progress is a product of education including interpretation and understanding of performance indexes and evaluation of changes in the farming operation to most effectively improve environmental management. Informed and involved residents increase the likelihood of long-term success because ownership of the solutions extends to community members who must play a role in achieving them.

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