The Way Things Work:

How effective watershed projects are organized and what we can do to improve public and private sector watershed programs

Report to the Natural Resources Conservation Service, USDA

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Finally, the author is deeply grateful to NRCS for its support and funding, without which none of this work could have been accomplished. The profound hope of this report is that it helps the dedicated people in NRCS and all their partners in the agriculture community be more effective and successful in meeting the challenges of improving water quality and sustaining the viability of the nation's farms.

Any opinions, findings, conclusions, or recommendations expressed in this report are those of the author and do not necessarily reflect the views of NRCS, those interviewed or those who have reviewed the report. NRCS is an equal opportunity employer.

EXECUTIVE SUMMARY

The purpose of this assessment was to identify and articulate the key organizational factors that are present in successful watershed projects – how successful projects are designed, coordinated, and implemented, the ways in which project partners interact with each other and with the farmers the project intends to serve and support. The underlying premise of this assessment is that a watershed project is an effort to help change the behavior (farming practices) of a large, diffuse group of people. Doing that successfully requires organizational skills in managing change and those skills are just as critical as the technical skills necessary to physically implement new farming practices. By identifying the factors that have been instrumental in projects across the country, this report provides an opportunity to gain important insights that can be valuable in strengthening watershed scale programs and projects.

It is important to note at the beginning of this report that other studies have assessed the effectiveness of watershed projects; most notably, Evaluation of the Experimental Rural Clean Water Program (1993) and How to Build Better Agricultural Programs to Protect Water Quality (2012). While different in scope from those earlier studies, this project draws on those studies in recognizing the importance of "key informant" interviews to understand the human dimensions of watershed projects and in appreciating the pivotal role that organizational factors can have on project success.

For the purposes of this report, the term 'organizational factors' refers to those elements of a watershed project that are non- technical – to how the projects are organized and managed and how the human element is integrated and factors into changing farm practices on a large scale. For example, while the actual detailed work of assembling and analyzing data to create a watershed plan is a technical activity, the *decision* and *strategy* of a project manager or sponsor in designing a watershed plan as the basis for an implementation project is an organizational factor. While technical and organizational factors are inter-connected in projects they involve distinct activities and different knowledge and skill sets to be applied effectively.

Methods

Projects were selected with input from NRCS state offices, facilitated by the Chief of Staff for the Regional Conservationists, and conservation leaders from non-profit and grower organizations in each NRCS region. Projects in the assessment selection process all address water quality resource concerns. The selection process was developed to account for watershed differences, and to include a varied set of projects that illustrated different water quality problems, farming systems and funding sources. The diversity among the watershed projects selected revealed the presence and efficacy of organizational factors in a number of different settings. The term "watershed' as used in this study is meant to identify the area in which a project was conducted (e.g., Root River in Minnesota) and is not meant to refer to any specific technical terminology (e.g., HUC8, HUC12). As a result, the eight watersheds in the assessment vary significantly in their size and complexity.

In the selection process, projects were deemed to be highly effective or "successful" in the view of key contacts in each region if: 1) the projects were well-organized and managed; and 2) they met the internal water quality and implementation goals identified by their leaders and

participants. Expert opinions of conservation leaders in the regions (state conservationists, federal and state agencies, farm leaders) were relied upon in discerning whether a project was 'well-organized and managed'. The specific objectives of the projects differed significantly from each other with some focused on conservation outcomes and others focused on rectifying particular water quality problems. However, all the projects clearly identified their objectives through deliberate planning and succeeded in achieving the results set out in the design of the project.

Information Collection Strategy

The methods for conducting the assessment were initially designed in an all-day meeting with an Advisory Team of professionals who have extensive experience in water quality projects, their design and assessment. The results of previous studies, the current state of watershed planning and water quality projects, the key issues in implementing conservation practices and the challenges in crafting viable recommendations for NRCS and its partners were discussed. The Advisory Team acknowledged that though this assessment would not reproduce methodological techniques of previous studies, it would offer valuable insights into the organization of watershed projects from the practitioners and supervisors responsible for their success.

Multiple sources of information (e.g., publications, website, presentations, legislation, personal correspondence) were collected from individual projects in order to provide information used in the assessment. A site visit, including key informant interviews, was then conducted. A key informant interview questionnaire was used at each watershed location (APPENDIX B), with a minimum of nine to a maximum of fourteen interviewees. Interviews were held with 24 NRCS staff, 13 conservation district staff, 5 university/extension affiliates, 14 state/county/tribal representatives, 14 farmers, and 19 representatives from private organizations for a total of 90 key informants. Information collected was used to produce state-specific project reports. Reports were provided to watershed project personnel for feedback. The secondary data and interviews were used to identify organizational factors in the projects selected, which came to be the basis of recommendations in the assessment.

The Watershed Project Reports

Eight watershed projects were selected for study, two in each of the NRCS regions:

Northeast – Tulpehocken Creek, Pennsylvania
Rock River, Vermont
Southeast – Shenandoah Valley, Virginia
Point Remove, Arkansas
Central – North Canadian River, Oklahoma
Root River, Minnesota
West – Whatcom County, Washington
Tillamook Bay, Oregon

The projects are very diverse in their geographical contexts, the farming systems under consideration, the type and level of organizational support, the length of time that they have been in existence, the funding sources, the extent of regulatory involvement, and the level of controversy in which the projects exist. Each of the watershed project reports begin by

describing the characteristics of the watershed and the background in which the project was carried out. The description of the project focuses on how the project was put together, how it operated, what working and organizational relationships were important, and what key or innovative features went into the project's results. Finally, observations are offered about notable aspects of the project that were pivotal to its success and that could be relevant and applicable to organizing other watershed program or projects. Because this study's task is to identify organizational factors the reports do not attempt to review the technical aspects of project activities or provide an overall evaluation of the project.

Synthesis

The most interesting and instructive aspect of these watershed projects is that though they are quite varied in their specific characteristics, such as geography and farming systems, they all share virtually the same organizational features. From this synthesis, it is apparent that several organizational factors identified in these watershed projects are important, if not critical, to effective watershed projects:

Watershed assessment – Successful projects are based on sound watershed plans or assessments that characterize the nature of the water quality problems, identify sources, prioritize critical areas, and identify mitigating conservation practices. While different formats for watershed conservation planning are available, the plan should be technically sound, designed to interface effectively with development of an implementation plan and developed in consultation with those who will have a part in the subsequent implementation effort.

Collaboratively developed implementation plan – Using the information from the watershed assessment, an implementation plan provides a deliberate structure for organizing, managing, and coordinating the outreach, education, technical assistance and other activities in the project. Creating the plan in a collaborative manner with project partners who will be involved in carrying out and supporting the project helps create and reinforce the partnerships that are integral to success. In addition, providing opportunities during the plan development to engage the farming communities and other stakeholders creates buy-in for the project.

Creation of a credible set of data – Whether it is extended monitoring effort or the establishment of a "Discovery Farm," having a credible data set has multiple benefits. Collecting data about the effects of existing farming practices and the outcomes of adoption of conservation practices on water quality or conducting a water quality monitoring program provides more than a way of setting benchmarks and evaluating progress. A well–designed data collection method that is credible to the agriculture community and the community at large creates an opportunity for greater recognition and awareness of water quality issues. Collecting and sharing data trusted by farmers reduces farmer resistance to adopting conservation practices and, to the extent that contending interests concede the validity of the information, reduces controversy and enables progress in solving water quality problems.

Capacity to coordinate and manage project activities – Given that effective watershed projects require coordination of multiple partners, planning and other key activities, adequate capacity and skill to organize and manage a project is essential. The necessary capacity includes having an anchor organization that serves as the hub for project administration; a project coordinator

who has primary responsibility for managing the project; and designated staffing by the funder or project-sponsoring organization to provide oversight and support for the project team and staff. The anchor organization and coordinator need to have adequate resources and time allocated to be able to realistically fulfill their responsibilities. In addition to resources, support and training in the specific organizational skills for managing a project increases the effectiveness of project coordinators.

One on one engagement with farmers and landowners – It turns out that there is no substitute for the direct interaction of a conservation professional with a farmer. This is particularly true as conservation practices have become more sophisticated and program requirements more complicated. While the more innovative farmers may be interested or motivated by articles, presentations or outside speakers, researchers such as Everett Rogers (2003) have noted that the majority of adopters of new practices get their information from and are motivated by a trusted, competent individual. Recognizing the demands of such labor intensive interactions, watershed projects have found ways to increase the number of people available through use of agribusiness staff, support from conservation district staffing and engagement of grower organizations.

Flexibility – The value of flexibility in the installation of conservation practices is that it responds to site specific conditions on a farm and encourages adoption of practices that might not otherwise have been installed. Just as important, the ability to adapt a practice to suit a farmer's particular needs demonstrates an appreciation of the challenges faced and a willingness to help the farmer solve an important problem on her or his farm.

Appropriate time frame – The process of watershed planning, creating a shared strategy for implementation, assembling credible data, and developing the trusted relationships necessary for successful wide-scale adoption of conservation practices for water quality improvements clearly extends over multiple years. The need for adequate time is particularly important in areas where water quality problems exist but much of the necessary capacity for successfully carrying out a watershed scale project is absent. If substantive wide scale change in farming practices over an entire region to improve water quality is the objective, adequate time is necessary to accomplish that goal.

The findings in this study very closely parallel the findings in the Rural Clean Water Program evaluation and in the NIFA-CEAP study, for instance, in emphasizing the value of one-on-one interaction and flexibility and the importance of watershed planning. It is no coincidence that many of the observations about the critical importance of effective organization and management identified in the 1993 and 2012 studies were again confirmed by this assessment. A common and important finding in all these studies is that, just as there are best management practices for implementing conservation in watershed projects, there are equally important best management practices for organizing and managing those projects.

Recommendations

The following recommendations are offered as concrete steps that NRCS and its partners can incorporate in their operations and programs. In making these recommendations it is not intended that NRCS assume sole responsibility to implement and wholly fund these recommendations.

That said, NRCS plays a pivotal leadership role as the funder of this assessment with direct influence on how people within the agency value and apply the lessons from this study.

- Develop a working model that incorporates organizational best management practices for organizing and managing watershed projects that would be actively applied in programs such as WQI, MRBI, and RCPP. The model would incorporate the factors identified in this assessment and would be used to guide program design, as well as the development of specific programs at the state level. The model could be developed in collaboration with private sector and other partners to be implemented by NRCS and/or its partners and would be a required element of all watershed projects.

- Adopt and support use of a watershed planning process that could be used in developing all projects. The planning process would necessarily include a watershed assessment and implementation plan that can be seamlessly incorporated into a watershed project work plan and readily implemented. Engagement of groups and practitioners in the watershed would be a critical component of the planning process. The planning process would be a required element of any watershed program. Possible sources of support for this work could be PL 566 or an initiative with EPA 319, private, or state support.

- Develop and implement a training program for project coordinators and leaders to create and ensure the necessary skills and human capacity to organize and manage watershed projects. Such a program would provide understanding of the importance of sound organizational skills, knowledge of how farmers make decisions to change their behavior and practices, and the ability to coordinate and manage complex partnerships. Once developed the program could be conducted at the state or local levels by project partners or sponsors.

- Establish a program for facilitating the collection and monitoring of on-farm data to inform and support watershed projects. The data would serve multiple purposes in establishing credible baselines, identifying sources of water quality problems, demonstrating and documenting water quality improvements from conservation practices. The program could be organized with land grant universities where appropriate, and supported with a combination of federal, state and private funds. A number of private sector organizations are carrying out monitoring efforts that could be harnessed to facilitate specific watershed efforts of this sort in conjunction with watershed projects.

- Work with partners to expand the supply of skilled people to provide technical assistance and support to farmers in adopting conservation practices and thereby ensure adequate human capacity to achieve conservation and water quality objectives. Good examples exist in current RCPP projects that, if replicated more widely, could increase the overall human capacity to engage farmers in EQIP through RCPP. Addressing this recommendation will require new and greater involvement of the private and non-federal sectors in making staffing available.

- Increase opportunities for appropriate flexibility in the implementation of conservation practices by facilitating and explicitly providing flexibility protocols for adaptation of

practices and payment schedules as part of a watershed project. This would provide consistency and encourage innovation at the field level when circumstances warrant it, especially when widespread adoption is a primary objective.

- Establish longer terms than the typical two or three years for projects so that the substantial watershed results so often intended can actually be achieved. Watershed projects could be organized and supported in successive phases. Each phase would have a specific term of funding with support for continuing to the next phase contingent on successfully completing the previous phase and funding could come from different source for each phase. In this way, a 5- 10 year project term could be provided without making an irrevocable long term commitment of funds.

- Establish a leadership position in the NRCS national office to oversee and coordinate watershed scale efforts within HQ, among the states and with partner organizations. This position would add needed consistency and support for watershed efforts, especially for geographic initiatives and state programs, and reinforce the value of applying deliberate attention to the way watershed projects are organized and managed.

Taken together, these recommendations provide a blueprint for making watershed efforts as effective as they are expected and need to be in meeting water quality and agricultural challenges. There is ample evidence over multiple studies that these are critical elements of success and that they readily produce results when implemented. The ability to regularly and consistently implement highly effective watershed projects that serve the needs of farmers and the environment is an achievable goal. The task is to incorporate changes into programs and policies that capitalize on this understanding and ensure the necessary return on the sizable public and private investments in watershed scale efforts.

Next Steps

Capturing the benefits of the recommendations for increasing the effectiveness of watershed programs could best be accomplished by establishing a small team to develop the methodology, guidelines and a plan of work for incorporating the organizational key factors/best management practices (BMPs) into NRCS watershed programs and projects. The team would include NRCS and partner participants who were well versed in organizing and managing watershed efforts and would be able to access additional public and private expertise. In order to be of maximum usefulness to NRCS, the team would be given a relatively short period of time in which to accomplish its initial work (six months). The team would be charged with these basic tasks:

- Create guidance for RFP's, proposal evaluation and project work plan development that integrate organizational BMPs into NRCS watershed programs.
- Identify training, education and support needs for program managers, project coordinators, project leaders and cooperators to implement the new model for watershed efforts.
- Identify tools, resources needs and resources that can be applied to watershed efforts to implement the methodology.
- Establish protocols and support for a pilot effort to implement the revised methods in a particular NRCS watershed program, e.g., RCPP, WQI. The pilot would be used to

validate the methodology so that it could be adapted and applied across the board to increase the effectiveness of watershed programs.

While the time frame is ambitious, there is much that is already available that can be incorporated into this effort. Effective overall organizational strategies are currently being used, for example, in Oklahoma. Training programs are being developed and carried out in several states such as Iowa and Wisconsin. Several different processes for watershed assessment and planning are being used by NRCS and other agencies as well as private organizations. In addition, it is likely that this effort could be done collaboratively with other federal and state agencies as well as private organizations. In fact, a number of organizations are addressing the same situation and set of issues in Iowa's Nutrient Reduction Strategy, the Chesapeake Bay, and Delaware River Basin among others. Given that the knowledge is available to advance watershed work and the needs are recognized in multiple regions, taking these steps would provide invaluable leadership in achieving greater conservation and water quality benefits.

Conclusion

The last decade of conservation has been marked by a dramatic increase in the financial assistance available to support resource conservation along with advances in technology for conservation practices. At the same time, there has been increased demand for the implementation of conservation practices and programs to produce significant changes to the water quality problems that exist in watersheds all over the country. As a result, watershed projects are being initiated by federal and states agencies and private funders on the assumption that projects on that scale will improve water quality. The pressure to achieve results that are meaningful to agriculture and the environment will only increase and the ability to retain voluntary conservation as a viable option will depend on achieving those substantive results.

This study was initiated to determine what in addition to financial incentives and a sound technical basis for conservation measures are critical dimensions of watershed scale projects. The reality is that the adoption of a new practice by a farmer is a behavior change that is almost always made in the context of a personal interaction. A watershed project, while recognizing the fundamental importance of the interaction between farmer and technician, also needs to be cognizant of landscape, farming systems and the community of people. Once the scale of intended conservation adoption is at the watershed level it becomes a series of interactions that is, in fact, an organizational problem that requires its own deliberate structure, process, resources and skills. In that way, a watershed project is an organizational challenge to change multiple behaviors in a social context based on a solid technical foundation with the support of financial incentives to assist in those behavior changes. From this perspective, deliberate attention to the organizational factors is so obviously critical to success that it warrants significant attention and resources.

"Happy families are all alike; every unhappy family is unhappy in its own way."
Leo Tolstoy, *Anna Karenina*

Introduction

The purpose of this assessment was to identify and articulate the key organizational factors that are present in successful watershed projects – how successful projects are designed, coordinated, and implemented, the ways in which project partners interact with each other and with the farmers the project intends to serve and support. The underlying premise of this assessment is that a watershed project is an effort to help change the behavior (farming practices) of a large, diffuse group of people. Doing that successfully requires organizational skills in managing change and those skills are just as critical as the technical skills necessary to physically implement new farming practice(s). The extensive inquiry upon which this report is based confirms the validity of this premise. The evidence from this assessment indicates that where organizational processes are planned for and supported in the project design and implementation, a project is able to make substantive progress increasing the adoption of conservation practices to improve water quality.

It is important to note at the beginning of this report that other studies have assessed the effectiveness of watershed projects; most notably, Evaluation of the Experimental Rural Clean Water Program (1993) and How to Build Better Agricultural Programs to Protect Water Quality (2012). Both of those studies took a comprehensive look at a wider range of factors than this assessment and applied more technical depth to the analysis framework. Both studies describe the factors that affect performance in watershed projects and demonstrate that conclusions could be drawn from extensive qualitative investigation. Of particular interest is the fact that both studies drew similar conclusions and made comparable recommendations about ways to improve the effectiveness of watershed projects. While different in scope from those earlier studies, this project draws on those studies in recognizing the importance of "key informant" interviews to understand the human dimensions of watershed projects and in appreciating the pivotal role that organizational factors can have on project success.

For the purposes of this report, the term 'organizational factors' refers to those elements of a watershed project that are non- technical –to how the projects are organized and managed and how the human element is integrated and factors into changing farm practices on a large scale. For example, while the actual detailed work of assembling and analyzing data to create a watershed plan is a technical activity, the *decision* and *strategy* of a project manager or sponsor in designing a watershed plan as the basis for an implementation project is an organizational factor. Similarly, the processes of structuring a project to include a watershed plan, to engage partners and farmers in the subsequent development of an implementation plan, or the creation of a one-on-one outreach program are all organizational functions in which sound technical activities are enabled or embedded. While technical and organizational factors are inter-connected in projects, they involve distinct activities and different knowledge and skill sets to be applied effectively.

A central observation of this assessment is that regardless of how different the circumstances and situations, successful projects have the same basic organizational factors in place and those factors are critical to meeting their objectives. Incorporating those factors into watershed projects

demonstrably increases their effectiveness. Conversely, other studies have shown that, where those factors are not present, projects are considerably less successful. This report describes, based on extensive field assessment, what those factors are and brings into focus how important organizational factors are to creating and implementing successful watershed projects. With that awareness, the report is able to provide a set of recommendations on how to incorporate those factors into programs designed to support watershed scale projects.

Methods

Selecting the watersheds

The initial decision to select two watersheds in each of the four NRCS regions was made in consultation with NRCS Regional Conservationists. The intention was to look at a representative range of geographies and issues so that this assessment could be relevant to situations across the country. A decision was also made to focus on individual projects at the watershed or sub-watershed level rather than to focus on basin-wide initiatives so that the inquiry could gather in-depth information and could be conducted within budgetary constraints. The term ‘‘watershed’ as used in this study is meant to identify the area in which a project was conducted (e.g., Root River in Minnesota) and is not meant to refer to any specific technical terminology (e.g., HUC8, HUC12). As a result, the eight watersheds in the assessment vary significantly in their size and complexity.

Projects were selected with input from NRCS state offices, facilitated by the Chief of Staff for the Regional Conservationists, and conservation leaders from non-profit and grower organizations in each NRCS region. Projects in the assessment selection process all address water quality resource concerns. The selection process was developed to account for watershed differences and to include a varied set of projects that illustrated different water quality problems, farming systems and funding sources. The diversity among the watershed projects selected revealed the presence and efficacy of organizational factors in a number of different settings.

In the selection process, projects were deemed to be highly effective or “successful” in the view of key contacts in each region if: 1) the projects were well-organized and managed; and 2) they met the internal water quality and implementation goals identified by their leaders and participants. The expert opinion of conservation leaders in the regions (state conservationists, federal and state agencies, and farm leaders) was relied upon in discerning whether a project was ‘well-organized and managed’. The specific objectives of the projects differed significantly from each other with some focused on conservation outcomes and others focused on rectifying particular water quality problems. However, all the projects clearly identified their objectives through deliberate planning and succeeded in achieving the results set out in the project design.

Information Collection Strategy

The methods for conducting the assessment were initially designed in an all-day meeting with an Advisory Team of professionals who have extensive experience in water quality projects, their design and assessment. The results of previous studies, the current state of watershed planning and water quality projects, the key issues in implementing conservation practices and the challenges in crafting viable recommendations for NRCS and its partners were discussed. The Advisory Team acknowledged that though this assessment would not reproduce methodological

techniques of previous studies, it would offer valuable insights into the organization of watershed projects from the practitioners and supervisors responsible for their success.

Multiple sources of information (e.g., publications, website, presentations, legislation, personal correspondence) were collected from individual projects in order to provide information used in the assessment. A site visit, including key informant interviews, was then conducted. A key informant interview questionnaire was used at each watershed location (APPENDIX B), with a minimum of nine to a maximum of fourteen interviewees. Interviews were held with 24 NRCS staff, 13 conservation district staff, 5 university/extension affiliates, 14 state/county/tribal representatives, 14 farmers, and 19 representatives from private organizations for a total of 90 key informants. Information collected was used to produce state-specific project reports. Reports were provided to watershed project personnel for feedback. The secondary data and interviews were used to identify organizational factors in the projects selected, which came to be the basis of recommendations in the assessment.

The majority of interviews were conducted in person during project site visits from late June through early September, 2015. Scheduling difficulties, especially during the growing season, necessitated that a handful of interviews took place over the phone. The primary author developed a set of questions to guide the interviews to ensure key topics were discussed. However, the interviews followed an unstructured approach to allow for follow-up questions and expansion on related themes. This approach provided an opportunity to learn a great deal about the context in which the projects took place, to gain insights about the working relationships that made the projects effective, and to understand the thinking that went into key informants' participation. Equally important as the interviews was the time spent on the ground talking to farmers and seeing the landscape first hand – visiting farm operations, looking at installed practices, seeing restoration efforts. Those opportunities provided a real world context for the assessment and an appreciation for the scope, challenges and results of the projects.

As site visits were completed, initial drafts of each state section of the assessment were provided to one or more key individuals from the watershed project to ensure that the information was accurate and complete. Once all of the state sections and related sources were assembled and edited, analysis and framing was conducted by the primary author. Subsequently, a draft assessment was circulated to the Advisory Team for review and comment. (It is important to note that while those who were interviewed and the Advisory Team members provided invaluable information, insights and advice for this project and report, the content, conclusions, and recommendations are solely the responsibility of the authors.)

Challenges

One of the challenges of this project was that the idea of an assessment focused solely on learning what factors are essential in organizing successful projects had few, if any, analogues. Studies that focus on technical aspects of projects or that seek to evaluate results are much more common. In addition, with some notable exceptions, the process of organizing projects is not necessarily a deliberate or conscious process. Some of the project leaders were innately skilled at working with people so that the skills they applied were not necessarily obvious to them. Also, specific training is far more common in mastering the technical aptitude necessary for sound

conservation work, while training in project design, organization and management are virtually non-existent.

As a result, the interviews were conducted in such a way that the specific features of project organization and management could come out in the course of the discussion even if they were not as explicitly deliberate as the technical features of conservation practices that were implemented. This was particularly true in discussions with farmer participants who may not have been involved in the design of a project but whose experiences were shaped by the way the project was managed. As a consequence, those persons interviewed were guided to talk about the experience of working on the project to uncover relevant organizational factors without being directly asked about those factors. The open-ended nature of the interviews made note-taking challenging in many circumstances; thus, when needed, additional staff members were brought in to help document the discussion.

Even though the amount of time spent in the state site visits was significant, the numerous people, places and relevant history made such visits very demanding. The projects all had multiple people and organizations involved and typically covered multiple years. In addition, the regulatory contexts in some of the states added a layer of complexity that was important to the projects. There were also multiple cropping systems, unique geographies, and systems of conservation practices that were the substantive basis for the projects. Those challenges were managed by gathering information and resources over the phone and through email before the site visits and by vetting the initial drafts with project leaders to ensure that the information was accurate. As mentioned previously, assistance from the project leaders in reviewing the initial state section drafts was invaluable.

The substance of this report is presented in three sections: *The Watershed Project Reports* for each of the eight watershed projects that were studied along with selected references; *The Synthesis* that describes the common themes and key lessons derived from the projects; and *The Recommendations* that identifies specific action that NRCS, its partners and other organizations can take to increase the effectiveness of the watershed projects they support. The remainder of the report includes *Acknowledgements, General Resources* and additional attachments.

The Watershed Project Reports
Eight watershed projects were selected for study, two in each of the NRCS regions:

Northeast – Tulpehocken Creek, Pennsylvania
Rock River, Vermont
Southeast – Shenandoah Valley, Virginia
Point Remove, Arkansas
Central – North Canadian River, Oklahoma
Root River, Minnesota
West – Whatcom County, Washington
Tillamook Bay, Oregon

The projects are very diverse in their geographical context, the farming systems under consideration, the type and level of organizational support, the length of time that they have been in existence, the funding sources, the extent of regulatory involvement, and the level of controversy in which the projects exist. Most of the projects focused on specific watersheds and/or stream systems with two exceptions. The Adaptive Livestock Fencing project is focused in a highly agricultural region of the Shenandoah Valley and Chesapeake Bay region. Whatcom County in Washington State is focused on an intensified area of farming area that borders Puget Sound. The organizations that serve as the hubs for these project vary substantially from a Resource Conservation and Development Council (VA), a National Estuary Partnership (OR), and a Conservation District (WA) to partnerships of state government, NRCS and private organizations in the other states. The funding sources vary considerably as well from Environmental Protection Agency (EPA) programs (OK, OR), PL 566 (AR, PA- pre 2002 Farm Bill), state funding (WA, OK, MN) to the NRCS Mississippi River Basin Initiative (AR, MN), NRCS Water Quality Initiative (WQI), and private funders (PA, WA). In several cases the projects received funds from multiple sources. Regulatory drivers such as existing or pending EPA Total Maximum Daily Load (TMDL) limitations or shellfish bacterial contamination limits are key factors in some areas (MN,VT, WA, OR, OK) and in some areas political and social controversy has characterized water quality issues (VA, MN, WA, VT) in which the project must operate.

Each of the watershed project reports begin by describing the characteristics of the watershed and the background in which the project was carried out. The description of the project focuses on how the project was put together, how it operated, what working and organizational relationships were important, and what key or innovative features went into the project's results. Finally, observations are offered about notable aspects of the project that were pivotal to its success and that could be relevant and applicable to organizing other watershed program or projects. Because this study's task is to identify organizational factors, the reports do not attempt review the technical aspects of project activities or provide an overall evaluation of the project.

ARKANSAS

Point Remove Watershed Project: From water quantity and wetlands restoration to water quality by creating strong community engagement

Background

Water quality and water quantity are tightly linked with more than 46% of Arkansas' harvested cropland under irrigation according to the 2012 Ag Census (USDA, 2012). Water is of particular importance to the state's rice industry, which accounts for roughly 50% of the nation's rice production (USDA/NASS Crop Production Summary, 2014) as well as the significant corn and soybeans acreage in the state. The Point Remove watershed work provides a unique intersection of efforts to increase availability to irrigation water, create wildlife habitat, and implement conservation activities to protect water quality. It also demonstrates several key factors that are important to developing successful watershed scale efforts.

The Point Remove watershed is located in the Arkansas River Basin about 30 miles north and west of Little Rock. The watershed includes parts of Conway, Pope, Van Buren and Yell counties. The geography in the watershed ranges from broad fields of crop production – corn and soybeans and some wheat near the river – to more rolling country side, where there are a large number of poultry houses as well as and livestock operations that incorporate hay, pasture and corn for silage. Interestingly, the area also includes a pecan orchard.

The beginnings of work in the Point Remove watershed go as far back as the late 1950s when local organizations around that stretch of the Arkansas River sought to implement measures for flood prevention and watershed protection. In 1995, a Watershed Plan Environmental Assessment for the Point Remove Wetlands Reclamation and Irrigation District (PRWID) was completed. This plan paved the way for the use of PL-566 funds to develop a source of surface water for irrigation in the watershed. The watershed at that time included more than 100 farms and more than 20,000 acres of cropland. Work on the project was begun in 2000 and completed in 2006 to deliver water to farms and create more than a thousand acres of wetlands and wildlife habitat in the Ed Gordon/Point Remove Wildlife Management Area. The wetlands restoration project was made possible through further collaboration with Arkansas Game and Fish Commission, Ducks Unlimited and other state and federal partners Overall the construction cost for the entire project was $12.5 million for which the support of Senator Lincoln and the Arkansas delegation was critical.

In addition to the results on the ground, the Point Remove project also created strong working relationships among the PRWID, Pope and Conway County Conservation Districts, NRCS, and local farmers. These relationships made it possible to apply successfully for Mississippi River Basin Initiative (MRBI) funding in 2010 and build on the work that had been accomplished in the region.

Project description and key features

The influx of MRBI support was made possible in no small part by the experience, organizational competency and strategic connections that PRWID provided as the project's administrative hub. In addition, the leadership of PRWID Board members and their connections within and outside of their community were very important in bringing people together, securing

support and setting priorities. With recognition that water quality issues were a key challenge for the watershed, PRWID Board members, along with NRCS, convened a series of meetings prior to the MRBI proposal to hear farmers' needs and concerns. Subsequently, the organizations developed an implementation plan that met the needs of the watershed and its farmers. Key to that effort was the dedicated engagement of state and local NRCS staff who were instrumental in providing expertise and support to pull the proposal together. The project focused over $7 million of financial assistance in the watershed. As a USDA/NRCS bulletin described, " To improve the health of the Mississippi River Basin, including water quality, water quantity and wildlife habitat, NRCS and its partners help producers in selected watersheds in the Mississippi River Basin voluntarily implement conservation practices and systems that avoid, control and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity." The intent of the Point Remove effort was to increase adoption of practices that improved water quality including conservation crop rotations, cover crops, prescribed grazing, and nutrient management planning.

The project was able to provide flexibility in locating the poultry litter sheds on the farms near where the litter was to be spread. Ordinarily support for construction of litter sheds was provided only on the poultry production facility. In this case, allowing for the construction of sheds in other locations made it possible for more farmers to use litter on their fields as a nutrient source and reduced possible environmental problems associated with other on-farm litter storage options. As is usually the case, the flexibility was very welcome and led to a number of the sheds being erected to store litter until it was ready to be spread on the fields. Introducing flexibility to adapt to farmer needs and circumstances in the beginning of the project encouraged the adoption of other conservation practices later in the project.

The influx of MRBI resources for Point Remove, while welcome, also created a large increase in the need for technical assistance that NRCS state office was able to meet by allocating additional resources to the area. As a result, over the life of the project, conservation practices were implemented on more than 63,400 acres including conservation crop rotation, pasture management and grazing practices, waste utilization, residue and tillage management, cover crops and deep tillage, and nutrient management planning.

Concomitant to understanding conservation and water quality in the Point Remove watershed is the location of two Discovery Farms (http://discoveryfarms.uark.edu/) in the area one in the western part of the watershed near Atkins and the other further east near Morrilton. These Discovery Farms provide farmers the ability to observe, from field monitoring data, the results of new practices and the impacts of practices on off-site movement of nutrients. In short, the watershed was able to make significant progress in conservation adoption with the MRBI resources due to good planning, engagement of partners and the farm community in the implementation effort, appropriate flexibility and concentrated focusing of resources.

Observations

The Point Remove watershed work has been accomplished in a coordinated and integrated way with the conservation efforts building on the organization and working relationships developed through the irrigation project. Water was the common thread in both projects and their

intersection helped create a coordinated approach to water quantity, quality and wetland restoration.

Leadership within the agricultural community and from the PRWID was critical in selecting Point Remove and in carrying out the conservation work, as was the ability of the private sector and NRCS to coordinate efforts throughout each of the project phases. While it is common to take for granted such cooperation from NRCS, limited resources and expanded workloads can constrain the ability of NRCS to devote significant time to working with a specific watershed project. The work in Point Remove was an example of where NRCS was able to invest staff time from the state and county offices that provided support and energy to the project.

The existence of the PL 566 watershed plan served as a sound foundation for conservation work in the region and as a catalyst for engaging the collaborative efforts of the partners who would subsequently undertake the MRBI effort. .

The meetings and engagement of the farm community in the development of the implementation plan was critical to ensuring the relevance and effectiveness of the subsequent MRBI work.

Flexibility in the litter shed practice helped achieve conservation outcomes that otherwise would not have taken place and served to create a strong sense of commitment to solving farmers' problems, which furthered the adoption of additional conservation practices.

Discovery Farms were pivotal in providing information about the impacts of farm practices and effects of conservation measures that were the basis of farmer interest in adopting new practices.

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MINNESOTA

Root River Field to Stream Partnership: Water quality monitoring and on farm assessments to involve farmers in conservation

Background

The Root River flows through parts of six counties in southeastern Minnesota to its confluence with the Mississippi River near Hokah, MN. The entire watershed covers over a million acres with a wide variety of landscapes from the Western Corn Belt Plains in the west to the karst geology of the Driftless Region in the east where there are a number of cold water trout streams. More than 40% of the watershed is in agricultural land, roughly 38% in grassland and 6% in forests. There are also 2,000 feedlots in the area, the vast majority of which have 300 or fewer animals.

Water quality concerns in the area stem from non-point source nutrients – nitrogen and phosphorus – and bacterial pollution. As agriculture has intensified and more land has been devoted to crop production rather than hay and pasture acreage, nitrogen, sediment and phosphorus are the primary pollutants of concern and involve the intersection of surface and groundwater via fractured bedrock areas with karst geology.

There have been a number of efforts in the public sector to address water quality issues in Minnesota. Monitoring efforts at several different levels have been carried out by state, county and private organizations. A TMDL for the Root River that covers 80 impairments is being developed by the Pollution Control Agency (PCA) and is expected to be completed by the end of 2015, as is the Water Restoration and Protection Strategy, also being developed by PCA. The Minnesota Department of Agriculture (MDA) has assembled a set of priority or 'sentinel' watersheds in the state, including the Root River, to monitor changes in water quality as conservation practices are implemented. MDA has also recently completed a revision of its Nitrogen Fertilizer Management Plan with the help of an advisory committee that included representatives from the agriculture community, in order to reflect current farming practices in the protection of groundwater. In the Root River and other watersheds, counties have developed their own county watershed management plans that have engaged the agricultural community and municipalities in charting 10 year plans for water quality. As a state that borders the Mississippi River, Minnesota has also been engaged in the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force.

The increased public attention and regulatory attention focused on water quality in Minnesota has spurred actions from the agriculture community. The Minnesota Agriculture Water Resource Center (MAWRC) was established in 2008 to help crop and livestock producers in addressing water quality issues and has been active in convening and informing farmers. Through those meetings, MAWRC also helps to inform those outside the agricultural community about farming and conservation practices. In 2010, Discovery Farms Minnesota was established, as a farmer led effort, "to gather field scale water quality information from different types of farming systems, in landscapes all across Minnesota. The mission of the Discovery Farms program is to gather water quality information under real-world conditions. The goal is to provide practical, credible, site-specific information to enable better farm management" (http://www.discoveryfarmsmn.org). In 2012, MDA established the Minnesota Agricultural Water Quality Certainty Program, designed

as a voluntary program for farmers to take leadership in conservation practices that protect water quality.

While there are a number of proactive initiatives to address agriculture's contribution to water quality in Minnesota, the tasks of determining the sources of water quality problems and the solution to those problems, are also contentious, as they are in most other areas. In the context of the Root River watershed, the Root River Field to Stream Partnership was established to provide the foundation of shared knowledge about agriculture, its impact on water quality, and the ways in which effective conservation efforts could be undertaken.

Project Description and Key Features

The Root River Field to Stream project (http://rootriverfieldtostream.org/) was first initiated in 2009 by MDA as a partnership between the Nature Conservancy, MAWRC, the Fillmore and Mower Soil and Water Conservation Districts and with initial funding support from Monsanto. The work of the partnership was envisioned as a two phase effort. The first phase (2010-2015) is intended to document existing practices and measure the range of sediment and nutrient losses at various field and sub-watershed scales. The second phase (2016-2020) is to work with farmers to build on existing conservation practices and evaluate their long term effectiveness. Ongoing funding for the work has been provided by MDA.

The project work is focused in three different areas that represent the varied landscapes in the region. The South Branch sub-watershed is located in the headwaters at the western origin of the river and covers almost 2,800 acres (94% cropped) in flat terrain with poorly drained soils that require tile drainage. The 16 farm operations, with field size of about 130 acres, raise primarily corn and soybeans. The Crystal Creek sub watershed is located on roughly 3,800 acres (78% cropped) of rolling hills with karst geology and spring fed streams. The 26 farms in the area have an average field size of 25 acres, growing corn, soybeans and alfalfa. The Bridge Creek sub-watershed covers 4,700 acres (64% cropped) and includes largely forested steep hillsides and bluffs where the river meets the Mississippi. There are 12 farm operations in the area, with an average field size of 16 acres raising beans, corn and alfalfa. Monitoring has been carried out by the project since 2010 to determine the range of nutrient and sediment losses in the region, the effectiveness of practices at the field and small watershed levels, and the longer term trends and intersections between practices and water quality. The project is conducting both edge of field and in-stream monitoring. Detailed documentation of field practices was completed initially in 2011. The data collection for the project is being done collaboratively across the relevant disciplines to include evaluation of bioavailable phosphorus, basal stalk nitrate testing, delineation of springsheds using sinkhole dye tracing, digital terrain analysis assessment of critical source areas, stream channel characteristics, and sediment fingerprinting.

The coordination of the work has been done through a full time MDA staffer on the ground in the watershed while the administrative work has been coordinated by the Fillmore Soil and Water Conservation District. Having full-time staff dedicated to the project over several years has ensured that the extensive monitoring program is well managed, that the results are disseminated and that the work of partners is coordinated. This presence has also made possible a consistent education effort to explain the monitoring results and the impacts of farm practices on water quality, as well as the conservation options that farmers have for their operations. As a

result of this staff presence, the necessary coordination has been provided for Phase 1 and the ground work has been done for Phase 2 to be successful.

Due to the strong support from the District boards, the work has had an additionally strong local presence that has lent credibility to the effort. Regular meetings have been held with a small advisory group of farmers in each of the sub-watersheds and educational meetings have been held regularly so that farmers have been apprised of the ongoing monitoring results. In addition, farmers participating in the monitoring have sent letters to their neighbors encouraging them to be involved in further conservation efforts. Project staff has also engaged agriculture retailers to inform them about project results because the vast majority of the nutrient management decisions made by farmers are made in consultation with field representatives from those companies.

A key feature of the projects has been one-on-one farm evaluations conducted by a former SWCD staffer who conducted field walkovers for 97% of the farmers in the sub watersheds. These on-farm assessments by a technically competent and trusted person have focused on a field by field assessment of the operation with the farmer, helping identify solutions to key runoff problem areas on the farm. As a result of these labor intensive assessments an inventory has been compiled of the necessary practices and the willingness of farmers to add additional conservation practiced to their agricultural operations. To date, 85% of the farmers interviewed signed a letter of intent to fix their high priority areas if competitive cost-share funds were made available.

As the project prepares to begin the implementation phase, the collection of field data, the on farm visits, and the team building with the local organizations and commodity organizations like MAWRC has created credibility for the effort and reduced reticence in the farming community about watershed improvements. Recent allocations of Mississippi River Basin Initiative (MRBI) funds by NRCS (roughly $2.3million over four years) are expected to provide a basis of support for the implementation of the conservation practices that have been identified.

Observations

The commitment by MDA of full-time staff has been invaluable to the project so far and to prospects for adoption of conservation practices in Phase 2. The combination of skilled and continuing MDA staff presence and the availability of the conservation district as an anchor organization have provided consistency and strong management to the extended and complex monitoring program.

The collection of real world data on farming practices and water quality, the cooperation of multiple partners in dissemination of that information, and the engagement of farmers in the reviewing and understanding the results has built credibility for the implementation phase.

Having the staff to do farm-by-farm assessments with all the farmers in the region has provided multiple significant benefits: engagement of farmers in problem-solving on their farms, the building of trust, and development of an inventory that can serve as solid foundation for implementation efforts.

The local engagement and buy-in that have made the first phase possible are critical to any further work. In combination with the data collection and individual outreach, the project has raised the level of dialogue in the watershed about what needs to be done and how problems can be solved. As a result of all that work, the watershed is particularly well-positioned for effective use and application of MRBI and other funds to support conservation efforts.

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OKLAHOMA
North Canadian River Watershed Project: A coordinated state program to support priority watersheds with EPA 319 funding

Background
The Central North Canadian River runs from Canton Lake south and east to Lake Overholser just to the west of Oklahoma City. The majority of the land is agricultural with 38% wheat and 35% pasture on a primarily wheat/ cattle rotation. Cattle graze the winter wheat until early spring when a decision can be made to raise the wheat to maturity as a grain crop, or to graze it out. Over the past four years, the weather has swung from extended severe drought to more than ample rains at times during the year.

The North Canadian feeds into the public water supplies for Oklahoma City with research indicating a substantial contribution of sediment and nutrient from non-point sources. Modeling of the watershed further indicated that cropland and riparian pasture were contributing the largest amounts of bacteria, sediment, and nutrients. Conventional tillage, removal of vegetation in riparian areas, and uncontrolled livestock access to streams are key factors of the impairments in the watershed.

In dealing with water quality problems, the Oklahoma Conservation Commission (OCC) has a well-developed, deliberate process for identifying, prioritizing, designing, organizing and supporting water quality projects. The OCC develops watershed plans using the EPA 319 nine step planning format for the problematic watersheds in the state, engaging local people and organizations in the development of each watershed. The OCC then establishes a prioritized list of those watersheds and works with the local partners to create and submit proposals for 319 funding to carry out the watershed improvements. Each submission and project follows an established work plan format that includes objectives on project management, implementation, education, monitoring and evaluation. There is a project coordinator for each project who is a Level II NRCS Certified Conservation Plan Writer who organizes the efforts of partners on the ground and develops and implements conservation plans in partnership with landowners. Additionally, the OCC has dedicated staff that support and oversee each project.

Funding for the projects comes from state funds and EPA's 319 program and the necessary technical support for on the ground practices comes from NRCS programs. NRCS trains project coordinators in conservation planning and the plan writers are reviewed annually to maintain that certification. NRCS also provides technical support on engineering practices. While NRCS practices are certainly adopted in the target watersheds through EQIP, having a 319 program means that EQIP can focus in other geographic areas.

Project Description and Key Features
Project development started in 2004 when conservation districts in the watershed (Central North Canadian, Blaine, East Canadian County, and eventually Dewey) requested assistance from OCC. A watershed plan was developed in 2008 and a local Watershed Advisory Group was formed to organize and oversee the project, identify conservation practices and set cost share rates. Project partners also included Oklahoma NRCS and Oklahoma State University (OSU) Cooperative Extension. OCC hired a local project coordinator and educational coordinator to

conduct outreach, overseeing project activities and contacting landowners. As part of the education program, OCC established a 290 acre demonstration farm to demonstrate all of the conservation practices offered through the program. In addition, OSU Extension initiated further demonstrations at the farm to conduct studies on no-till, cover crops and forage mixes.

The priority practices were selected to meet the water quality challenges in the region – livestock management such as cross-fencing, riparian area protection, heavy use areas, watering facilities and rotational grazing – as well as erosion control through conversion to no-till, cover crops, and nutrient management. To facilitate no-till conversion, the project purchased and made available three no-till planters for use by farmer participants through the conservation districts.

Implementation results were documented through use of a GIS based BMP tracking tool. The project also used and assessed the value of sensor based technologies and grid sampling to improve the efficiency of fertilizer applications and thereby also reduce the potential for nutrient movement off-site. Water quality monitoring was carried out using sampling sites that had been established and used by OCC since 2007. In addition, the project developed and demonstrated training and data collection programs for district employees to collect environmental information by which the districts could earn additional funding.

The project resulted in 160 on-farm projects that included implementation of 20,976 acres in no-till conversion, 85,077 linear feet of riparian area fencing installed, 1,345 acres of cropland planted to grass, 586 acres of riparian area protected, 26,810 linear feet of cross fencing installed to facilitate grazing, and 11,008 acres enrolled for nutrient management. It also provided funding for replacement of 17 substandard septic systems in the rural areas.

There are a number of specific features of the way OCC approaches its program that make individual projects in that program particularly effective:

- OCC manages the watersheds in the state as a portfolio of challenges and opportunities and uses a consistent and deliberate format in the way it designs and manages projects.
- Each project is characterized by a clear work plan with project management as a specific objective for which staff is allocated and support and oversight are provided. Each project has an OCC supervisor and a project director.
- State support combined with EPA 319 program funding allows flexibility for the state to set priorities for practices and establish watershed specific rates for financial assistance payments.
- OCC has created a combination of strong working relationships at the state level and quite effective organizations at the local level with the Watershed Advisory groups, which provide a means for local participation and project buy-in.
- Each project is based on a substantial watershed plan that informs project development, allowing the implementation plan to reflect the needs and opportunities in the watershed.
- Through its ongoing monitoring work, OCC is able to use this water quality data to assess progress and show results, encouraging continued efforts. OCC also uses its Blue Thumb program to engage schools and communities in collecting water quality data that increases understanding and support for water quality endeavors.

Observations

Oklahoma has uniquely recognized that effective partnerships are labor intensive, dedicated project management is critical, and engagement among local partners in a systematic and deliberate fashion from the outset of planning and implementing a project is essential.

Recognizing the need for project management and community engagement, OCC has a well-designed program that invests in key staff to oversee the projects and uses a replicable model for project success. Having project overseers on OCC staff provides the ability to learn and share knowledge and skills across projects. The OCC monitoring program assesses the effectiveness of conservation work, provides the basis for priority setting, and influences the design and operation of watershed projects. As a result, the OCC process is in a position to learn, gain efficiencies, and create successful projects on a regular basis.

The Watershed Advisory Group is a critical part of each project conducted by the OCC and provides far more than just local input. They allowed the North Canadian River project and all other OCC projects to start "where farmers are," and to build trust in what the project aims to accomplish. By encouraging local initiative and leadership, OCC projects are able to be targeted and effective in working with farmers to implement conversation practices.

The success of the OCC in delisting streams has demonstrated the value of watershed planning, priority setting, local engagement, and a commitment to effective organization and management of a growing portfolio of successful watershed projects. These factors have created a coherent program that is more than a set of individual projects.

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OREGON

Tillamook Bay Watershed Initiative: A community approach to monitoring and water quality with support from the National Estuaries Program

Background

Tillamook County is located along the Northwest coast of Oregon. The County contains three major watersheds: the Nehalem, Tillamook Bay, and Nestucca. The Tillamook Bay Watershed is unique in that it has 5 significant rivers that flow into Tillamook Bay**.** Its eastern boundary is defined by the ridge of Oregon's Coastal Range, which impedes many ocean storms from crossing into the valley, resulting in an average of 90 inches of rain per year. This creates a wet, rainforest-like environment and regular concerns about flooding in the coastal lowlands.

The 1,125 square miles of land in the county is comprised largely of hilly forests and a valley dominated by 30,000 acres of farm land. The predominant agricultural activity in the region is its 90 dairy farms, ranging in size from 3 to 3,000 cows, with the average operation having around 250. Almost every dairy is part of the Tillamook County Creamery Association, the coop that provides the Tillamook Cheese Factory with its milk. Typically, the dairies' agricultural land is primarily used to grow grass but in recent years has also started including corn for silage and is rotated in the winter with a cover crop of pasture grass. There are an additional 150 hobby farmers raising horses, sheep, beef cattle and chickens.

Water quality has been a long-standing concern in the area. The high annual precipitation and the presence of livestock operations and other human sources create risks of runoff into the surrounding surface water that leads to high bacteria, nutrient and sediment. The regular flooding in the area complicates the protection of water quality and can have dramatic impacts. For example, one of the galvanizing events in the county was a devastating flood in the winter of 1996 that resulted from 14 inches of rain in 48 hours on top of melting snow in the higher elevations in combination with high tides. Waters crested at more than 17 feet over flood stage with tens of millions of dollars of damage and the loss of hundreds of dairy cows.

While historically water quantity has not been a concern for the community, this year's drought may raise cause for concern in the coming years as the local population continues to grow and dairies become more abundant, both of which put a strain on the amount of water available in the region. Increased irrigation usage in agricultural production could result in tapping into the surface water that is currently used for municipal and recreational purposes. Drawing from surface water could potentially threaten fish and other wildlife that depend on these waterways and could increase salt intrusion.

Project Description

Tillamook Bay was designated in 1992 as a National Estuary, which led the Tillamook Estuary Partnership (TEP) to develop a Comprehensive Conservation Management Plan (CCMP) in 1999. The CCMP set the stage for all of the subsequent actions in the Bay by using a collaborative process that included farmers, NRCS, Oregon State University, state agencies and the conservation district to develop the plan. The water quality chapter of the CCMP plan was focused on reductions of bacteria, sediment, and water temperature in the watershed. It also indicated that dissolved oxygen levels in the lower reaches of rivers and sloughs are not sufficient to support aquatic life such as the listed Coastal Coho Salmon. It included goals for

stream monitoring, voluntary conservation practices and conservation plans, fish habitat restoration and riparian buffers.

The collaboration that TEP fostered in developing the CCMP continued in implementing the plan. An Advisory Group was created with the key parties in the region positioned to guide conservation and restoration efforts. In addition, several local Watershed Councils were established in the county by the State of Oregon Watershed Enhancement Board to share and focus resources, primarily to address Coho salmon needs including water quality. TEP's work was supported and continues to be supported by CWA Section 320 funds that are provided through the Environmental Protection Agency. This allows TEP to provide staffing, project coordination, support and leadership for work in the Bay, and to continue to serve as a focal point and convener.

From the beginning, the project conducted systematic monitoring of streams to identify the levels of bacteria in stream segments and document the extent of the problem. This data served to inform stakeholders and the public, to help prioritize work in the region, and to measure progress in reducing bacterial counts in the streams and estuary. The systematic collection of monitoring data created a credible means for identifying accurately the source of pollution, This reduced controversy between farm and non-farming groups and helped create a shared sense of the problem and its solution.

The initial CCMP was augmented in 2001 when the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) and the Tillamook Soil and Water Conservation District (SWCD) published a Watershed Plan/Environmental Assessment for the Lower Tillamook Bay watershed. The 2001 document identified agricultural practices and restoration activities that needed to be implemented to address water quality issues. Implementation funds from EPA's Section 319 program, managed through DEQ, were made available for conservation and restoration efforts and were used in combination with NRCS EQIP funds. As the work in Tillamook evolved NRCS has implemented a long range planning process at the county level that has enabled strategic, multi-year allocation of technical and financial assistance in coordination with local partners.

Technical assistance and outreach were coordinated between the Conservation District and NRCS staff as well as a private consultant who worked closely with county and NRCS staff on restoration projects. Having people on the ground who were familiar and trusted by farmers and landowners and their ability to collaborate in helping farmers adopt new practices has been particularly valuable. In addition, the Tillamook County Creamery Association took the initiative to address waste water treatment on their member facilities and establish a stewardship fund. The fund provides $50,000 annually to pay for coop member farmers fencing around surface water.

A key accomplishment has been the establishment of riparian buffers along 300 miles of streams. Many dairies have installed larger manure storage tanks than they previously had and there are currently three anaerobic digesters in the county. Nutrient management plans, livestock exclusion, and other conservation practices have been adopted as part of overall restoration efforts. In addition, more than $6 million, including funds from U.S. Fish and Wildlife Service, have been spent in the Kilchis, Tillamook and Wilson river watersheds alone.

Monitoring has also progressed as TEP, EPA, and Oregon State University have collaborated to implement two studies; one a genetic marker study and the other a 3-year farmer specific study to determine how farm management could be modified to improve water quality. Results from TEP's Volunteer Water Quality Monitoring Program has shown that the bacteria levels dropped significantly in the Wilson, Tillamook and Kilchis rivers since 2001 – the Wilson River has been meeting recreational standards for bacteria since 2005 and the Kilchis has met these standards since 2009.

Observations

The decision to conduct monitoring in a cooperative and transparent way from the beginning has been pivotal in establishing a common understanding about water quality issues, reducing distrust and providing a foundation for conservation efforts. Farmers who have been leery about some of the restoration efforts have still been very positive about the monitoring and the implementation of conservation practices.

Having the flexibility that 319 funds offer for implementation of conservation practices has complemented the resources from NRCS programs, increased the extent of conservation adoption and provided resources for maintenance of practices.

The Tillamook Estuaries Partnership and the long term support for it has provided consistent management, leadership and coordination of the overall effort that has been critical to success.

The willingness of the coop to support and be involved in the conservation work provides credibility for the efforts within the agriculture community as well as valuable resources for farmers.

That the effort was approached as a collaborative venture from the beginning has been instrumental to the improvements in water quality. Because of that, the program is now perceived as a part of the fabric of the community and has been successful in creating the buy in and support necessary for achieving those improvements.

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PENNSYLVANIA

Tulpehocken Creek Watershed Initiative: Coordinated watershed work initiated with PL 566 funding

Background

The Tulpehocken Creek Watershed covers 140,000 acres that include approximately 82,500 acres of cropland and about 370 farmers owning an average farm of around 100 acres. The farming is a mix of cash grain operations, dairy, beef and poultry houses. The farm community includes Amish and Mennonite farmers who are more prevalent in the Lebanon County portion of the watershed.

The Tulpehocken Creek starts in Lebanon County and runs into Berks County, through Blue Marsh Lake and then into the Schuylkill River near Reading, PA, which is part of the Delaware River Basin. The Blue Marsh Lake is managed by the U.S. Army Corps of Engineers and its primary function is flood control. The Western Berks Water Authority has an intake below the dam that serves as a source of drinking water for over 100,000 County residents, while the impoundment provides recreation opportunities for the surrounding community. Frequent algae blooms within the lake persuaded a variety of agencies to begin discussions about water quality due to excess nutrients and those discussions were the catalyst for the Tulpehocken Creek Watershed Initiative. Along with the routine Army Corps testing, water quality issues were initially brought to light by Albright College professors who had begun studying water quality in the watershed through an EPA 319 Clean Lakes Study. In addition to agricultural sources, sewage treatment facilities in Bernville, individual septic systems and other urban sources were noted as contributors to nutrient pollution. The multiple uses of water in the Lake and the level of impairments created a significant level of concern and a general sense that action needed to be taken.

The Initiative began in 1998 with funding through the NRCS PL-566 program that was secured by a Congressional appropriations earmark from the area's Representative, Tim Holden. The "Tulpehocken Creek Watershed Plan and Environmental Assessment" was developed as part of the PL 566 funding that laid out plans for waste management systems, erosion and runoff control, nutrient management, livestock exclusion, wetland restoration and aquatic habitat practices. The initial Federal funding target for the project was $5.97 million of PL-566 funds and a $2.95 million local match for a total investment of $8.92 million to be allocated over 10 years for technical and financial assistance. The funds were aimed at improving water quality, increasing soil productivity and health, improved wildlife habitat and increased regional economic benefits. This influx into the watershed was significant and unique; though funds had been allocated to Chesapeake Bay watershed for conservation efforts, this was the first time that such an intensive focus of resources had occurred in the Delaware River Basin.

Project description and key features

The project brought together over 27 agency partners and over 75 individuals who evaluated the needs of the watershed and developed the "Tulpehocken Creek Watershed Protection Plan and Environmental Assessment," which outlined project measures and associated costs and benefits. Two county agencies, the Berks and Lebanon Conservation Districts agreed to act as sponsors to the program along with the Berks County Conservancy which provided a non-profit entity to work on behalf of the riparian easement portion of the plan. The three locally led agencies

already had well established working relationships with each other and with Natural Resources Conservation Service (NRCS). They also had close ties with the Pennsylvania Game Commission, Pheasants Forever, and Trout Unlimited whose efforts and communication with their existing landowner contacts were integral to getting the project off the ground.

The boards of each of the organizations involved were very supportive of the project and their staff's involvement due to the unique opportunity and the importance of the Lake in their communities. As a result, there was a consistent core group who were always involved in managing the project with one member of the team serving as Coordinator. The continuity led to ongoing stability in implementing the project, providing outreach and working with farmers.

The project started out by conducting individual outreach to all of the farmers in the watershed, which took two years. By meeting with farmers one-on-one – "doing their homework" as project staff described it – the project partners were able to establish target areas where conservation practices would be most beneficial, devise a specific ranking system for assistance in the Tulpehocken Initiative and develop a customized cost share payment schedule for the practices that were most important to farmers and to achieving conservation results. Some specific outreach was carried out by the program through meetings and detailed instructional brochures on how farmers could access the technical and financial assistance. However, the primary farmer outreach mechanism was the targeted one-on-one contact via the ongoing work of the Conservation Districts, NRCS and private partners with farmers and landowners in the watershed. The focus of farmer interactions was not particularly on the environmental angle but rather on getting the farmer to identify what was most important on his or her farm.

The project focused on practice implementation rather than specific water quality monitoring results to document progress. Monthly check-ins among the partners and sponsors were held to coordinate outreach and implementation activities, to identify needs, manage issues and report on progress. The support of the NRCS state office was particularly important in administering the project. The project also assembled an annual meeting of participants to discuss and review activities and results.

Implementation of the project was coordinated with existing conservation efforts and supported by the availability of significant, at that point in time (pre 2002 Farm Bill), funding, provided a new and unique platform for working with farmers. In the first 4 years of the project (1998 – 2001) 52 contracts with farmers infused over 2.2 million dollars into the watershed for a wide variety of Best Management Practices. Over the next 4 years (2002 – 2006) as the "earmark" method in appropriations by Congress started to diminish, funding for another 26 contracts for over $900,000 was secured. Due to the strong cohesive working group that organized and managed the project, when the USDA looked to assign some of the American Recovery Reinvestment Act (ARRA) funds in 2008, they used the existing model of the Tully Project to allocate another $900,000 to 20 contracts with farming operations.

The project goals included the improvement of aquatic habitat, which provided a public component in what may have been seen as primarily a "farmer" program. Two of the habitat projects were installed in waterways that flowed through public parks. This allowed for an educational opportunity beyond any one community and promoted the connection between water

quality, aquatic habitat and best management practices to both the farming community and the public.

Observations

The working relationships among individual and organizations were already largely in place and served as the foundation of the project. Dedicated leadership emerged to organize the project, coordinate partners, and manage project activities. Relying on existing structures and relations was bolstered with strong support from the NRCS state office. The good working relationships between NRCS and the Berks Conservation District, given that the majority of farmers were in Berks, were particularly important to project implementation.

Direct outreach to farmers at the beginning of the project established a baseline of information, helped identify priorities and was used to shape the project. The project was able to identify and respond to the local concerns and circumstances by coming up with their own ranking and payment schedule. Thus, there was a perception in the community of local control of the project. The sense of local control by participating farmers facilitated participation in the program as did the simple set of administrative procedures adopted by the project to facilitate enrollment and provide compensation to farmers.

The flexibility of the program to respond to local conditions allowed work to get done in an expedited way when farmers identified needs in their operation. The working relationships among NRCS, Conservation District staff and farmers were based on their willingness to adapt to farmers, evidenced in field interviews.

Watershed planning that engaged the project partners was an important initial element of the project. The plan developed through PL-566 that initiated the project included deliberate engagement with stakeholders in the watershed. In addition, Berks County Conservancy and the Pennsylvania Department of Conservation and Natural Resources developed the 1995 Tulpehocken Creek Rivers Conservation Plan in 1995. That plan laid out management options that complemented the PL-566 project and strengthened the ability of the private partners to engage in the project.

Implementation of this project started before the creation of the major conservation programs such as EQIP in the 2002 Farm Bill that are now a cornerstone of current conservation efforts. This example was chosen, in part, because it sheds light on the basic factors that lead to successful watershed scale efforts even prior to major federal programs. The same elements occur in this project as in other larger, more recent projects:

The working relationships among individual and organizations were already largely in place before the project was undertaken and served as the foundation of the project. Dedicated leadership emerged to organize the project, coordinate partners, and manage project activities. These leaders relied on existing structures and relations which were bolstered by strong support from the NRCS state office.

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VERMONT
Rock River Watershed: Combining state and federal efforts in Lake Champlain

Background
The Rock River Watershed is a 36,000 acre watershed within the Missisquoi Bay Basin. It is one of the most intensive agricultural areas in Vermont. Water from the Rock River watershed drains from Vermont north into Canada and then turns south, back into Vermont into the Missisquoi Bay. The Missisquoi Bay Basin is a 460,000 acre drainage area in northern Franklin and Orleans counties of Vermont. It is dominated by forestland, agricultural land, and small rural towns. The predominant agriculture in the area is dairy farming with grass and corn for silage grown to support the dairy production. Missisquoi Bay, which is warm and shallow, is the most eutrophic area in Lake Champlain due to blue-green algae blooms. Water quality in the Lake has been a longstanding problem with agriculture as a source of water quality problems at the center of much of the controversy.

Water quality issues have prompted several actions at the federal and state level. The implementation of the Clean Water Act has required development of Maximum Daily Loads (TMDLs) for Lake Champlain and for the waters that feed the Lake. Because phosphorus is impairing water quality in many parts of Lake Champlain, a phosphorus TMDL was prepared for the Lake in 2002. In 2011, the EPA, in response to litigation, disapproved the TMDL based on two concerns: the TMDL did not provide sufficient assurance that phosphorus reductions from polluted runoff would be achieved, and there was not an adequate margin of safety to account for uncertainty in the original analysis, particularly for four segments of the Lake, including Missisquoi Bay. EPA has recently released for comment a revised draft TMDL that includes phosphorus loading targets for the Basin. The goal for agricultural activities in the Rock River Watershed in Franklin County was particularly stringent (83% reduction in phosphorus).

The proposed TMDL comes on the heels of significant actions at the state level over the past year as the Vermont legislature passed Act 64, aimed at improving water quality in the state. The Act mandates the Vermont Agency of Agriculture, Food and Markets (VAAFM) to establish a set of required agricultural practices to protect water quality that included requirements for small farm certification, nutrient storage, soil health, buffer zones, livestock exclusion, nutrient management and tile drainage. The Act sets up a Clean Water Fund to be funded with a 0.2 percent surcharge on the property transfer tax, which will raise $5.3 million in FY2016. The Clean Water Fund is also set up in such a way to allow for additional federal and private funding, including a generous donation of $5 million from Keurig Green Mountain. Among other provisions are a mandate to update watershed basin plans and to require training for farm operators in prevention of discharges to water, land application of manure and nutrient management planning.

The state and federal regulatory developments reflect the severity of the situation in Lake Champlain and the growing sense that significant steps need to be taken. At the same time, as is true in other parts of the country, there is concern from the agriculture community about the justification, the burdens, and costs that farmers will be expected to bear to implement these measures. The situation is creating new demands for technical and financial assistance and will create a more contentious environment for NRCS and its partners in continuing the conservation efforts that are underway in the Rock River watershed.

Project description and key features

One of the building blocks for conservation efforts in the Missisquoi and Rock River was the Critical Source Area Study, commissioned by the International Joint Commission and conducted under a grant from the Lake Champlain Basin Program. The main objective of the project was to locate and characterize the hotspots at risk for phosphorus loss, defined as Critical Source Areas in the Vermont landscape of the Missisquoi Bay Basin for the purpose of targeting improved management practices to the highest priority source areas and thereby improving the efficiency of phosphorus reduction efforts. The Final Report, published in 2012, documented the extensive series of workshops used to engage technical expertise and public meetings that provided outreach to the general public.

Work to increase adoption of conservation practices in Rock River and the Missisquoi began to intensify in 2012 as a combination of funding from the America's Great Outdoors and National Water Quality Initiatives that brought an additional $1million of EQIP financial assistance through NRCS for the Rock River and Missisquoi Bay. As part of the delivery of that assistance a Memorandum of Understanding (MOU) was signed among the key partners: Vermont NRCS, VAAFM, Vermont Association of Conservation Districts, (VACD), USDA Farm Service Agency, University of Vermont Cooperative Extension, U.S. Fish and Wildlife Service, Lake Champlain Basin Program (LCBP), Vermont Agency of Natural Resources, Department of Environmental Conservation (VTDEC) and the Poultney Mettowee Natural Resources Conservation District. The MOU documented and committed the existing partnerships to focus collaboration on working with farmers and landowners on water quality issues.

There have been several developments that have helped create the foundation for more intensive conservation and coordination. As of 2015, the National Water Quality Initiative (NWQI) has assisted in the adoption of more than 1,300 acres of cover crops, 6,335 feet of stream fencing, 1,178 acres of nutrient planning, 73 acres of reduced tillage and the establishment of 130 acres of conservation crop rotation. Following up on the MOU, staff has been hired to facilitate regular meetings of the key partners and to provide guidance for the establishment of local watershed teams in the Missisquoi River and St. Albans Watershed. In 2015, Vermont NRCS initiated a targeted watershed effort that will direct the majority of Vermont's EQIP funds to four priority watersheds. As part of this effort NRCS has completed a resources assessment and watershed plan of the Rock River Watershed that will be used by local teams to identify resource concerns and implement conservation practices at an accelerated rate.

As a part of that process and in order to meet its new mandates, the VAAFM is coordinating one-on-one farm visits with all the farmers in the region. Those visits are being carried out by the Agency staff that normally perform inspections on farms and are trained to identify areas of non-compliance. It is a first opportunity to walk around many farms and fields and identify the challenges that need to be addressed to be in compliance. The Agency is summarizing this data to develop a needs assessment that expands on the work NRCS has done. NRCS could only access information from GIS or their local contracts, which leaves a gap in farms that do not participate in programs. This farm by farm visit approach is allowing for a true assessment of farmstead practice needs and highlights field inventory challenges. The Agency is not using this information for enforcement purposes at this time, unless it is an egregious violation or if it is a permitted medium or large farm that has already been informed of the requirements. The highest

priority farms in need of assistance that are identified through these surveys will be offered technical assistance from one of the local organizations- the Vermont Association of Conservation Districts, the Farmer's Watershed Alliance, and Friends of Northern Lake Champlain. Because they have credibility and good relationships in the farm community, these organizations are able, through this program supported by VAAFM, to spend time with the farmers, assess the identified problems on their farms and help identify solutions and practices that the farmers can implement to address water quality concerns. They are working closely with farmers and in coordination with NRCS to help farmers navigate the options and programs available to them, with the goal of expanding the farmers who work with NRCS. This coordinated outreach and technical assistance is an extension of the existing working relationships that are intended to serve as the basis for intensified conservation adoption in the Rock River watershed.

Observations

The investment in watershed assessment, identification of critical source areas, and the inventory of resource conditions has contributed significantly to understanding the watershed and to identifying strategies to solve water quality problems. The assessments have been valuable in orienting the conservation work that has been done so far and are essential to achieving the ambitious conservation goals for future water quality improvements.

Reliance on local groups and staff in the Local Watershed Teams provides a valuable mechanism for the one-on-one contact that will be needed to enable farmers to adopt and sustain new practices. Having staff on hand to coordinate and support the work among the teams, as is currently the case, is essential to the success of the Team approach.

The MOU is an important step in signaling a commitment to collaboration. Just as important is dedicated staff from the cooperating agencies to organize and facilitate coordinated activities and ensure adequate follow-up among the partners. A key to the successful working relationships among the state and federal agencies has been the extraordinarily strong collaboration between VAAFM and VTDEC at the leadership and staff levels. In such a controversial issue as the Lake Champlain water quality, the coordination between those two agencies has been pivotal to making any progress and has facilitated the interaction with NRCS.

As further evidence of the efficacy of Vermont's approach, a Regional Conservation Partnership Program award of $16 million was made to the region. It was certainly made possible, at least in part, by the organizational structure that is in place, the basic assessment and planning that has been accomplished and the involvement of local partners on the ground to work directly with farmers.

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VIRGINIA

Adaptive Streambank Fencing Program: A flexible livestock exclusion program for water quality in the Shenandoah Valley initiated with private funds

Background: The Shenandoah Valley stretches from Harpers Ferry, WV to Roanoke, VA encompassing 200 miles of diverse agricultural area that includes corn, soybeans, dairy and beef cattle, poultry houses, some fruit production in the Northern end of the Valley and a small but growing fresh vegetable sector. Augusta and Rockingham counties are the centerpiece of the region in VA, and Rockingham includes a significant population of Mennonite farmers who tend to have diversified crop and livestock operations. That part of the valley is a rolling landscape with often steep hillsides in which dairy and beef cattle are raised.

The region is among the more intensive agricultural areas in the Chesapeake Bay region and, as a result, there has been significant attention to increasing the use of conservation practices to improve water quality. Agencies involved in this effort include the EPA Chesapeake Bay program, NRCS programs and a wide range of private funders including the Chesapeake Bay Funders Network (CBFN).

The CBFN is a funding collaborative effort dedicated to improving the capacity within communities to initiate and sustain change necessary to promote and protect the health of the Chesapeake Bay. CBFN also fosters opportunities for funders to pool resources and work together on shared interests in the Chesapeake Bay watershed. The CBFN Agricultural Initiative was aimed at maximizing the effectiveness of funder investments, aligning priorities, targeting specific geographic areas, and leveraging funding resources to foster the development of more economically-sustainable agricultural communities. Through the Initiative, CBFN intended to expand the number of programs designed to enable agricultural leaders and their communities to share, connect, and transfer the results of on-the-ground conservation projects by communicating lessons learned and creating working collaborations that extend beyond the life of specific projects.

CBFN's Agriculture Initiative (http://www.chesbayfunders.org/special-projects/agriculture) did not rely on a request for proposals or other general solicitation for watershed projects. Instead, CBFN staff conducted a series of interviews throughout the Chesapeake region to determine the best opportunities for progress in conservation. The interviews followed a specific format and were based on criteria designed to find the most impactful investment of CBFN resources. Once the initial project sites were identified, CBFN staff developed work plans collaboratively with each of the project management teams. Those plans served as management tools and the template for reporting that were used throughout the term of the projects.

The adaptive streambank fencing project was among the initial four projects funded by the CBFN Initiative. It was chosen due to the importance of the agricultural area and the sub watersheds in the area, the effectiveness of the Shenandoah Resource Conservation and Development Council (RC&D) as a central organization and the likelihood that the project partners could successfully undertake innovative work with the farming community. While the initial project was extended into two subsequent projects, with different organizations after funding for RC&D staffing was ended by Congress, this report focuses solely on the initial project.

Project description and key features

The Streambank Fencing Project began in 2007, managed by a team that included staff from the conservation districts, county NRCS offices, and the Virginia Tech Cooperative Extension. Organizationally, there were strong working relationships among NRCS and District staff and the RC&D. The RC&D provided a hub and administrative mechanism to work with the non-profit funders and administer grant funds. The RC&D, which was co-located with NRCS and the conservation district in Augusta County, also served as a facilitator and coordinator of the project, which proved crucial to project management. Technical assistance and outreach to farmers provided by NRCS and conservation district staff was important. However, just as important was the investment in support, coordination, and reinforcing and creating working relationships among partners and with farmers.

The project focus was a pilot effort to implement alternative livestock exclusion practices that fit the topography of the area, the needs of farmers and, additionally, the specific circumstances for a key group of farmers – Old Order and Mennonite. Recognizing the limitations that steep terrain and relatively small pastures presented for livestock exclusion in much of the area, the project team offered an alternative fencing program with narrower stream setbacks to reduce the number of livestock in streams and improve streambank stability. The project team coordinated the project decisions and activities using a work plan that they had developed with CBFN staff that includes four basic objectives:

- Develop flexible livestock exclusion pilot program.
- Implement pilot program with farmers and landowners in Rockingham and Augusta counties.
- Document and assess conservation benefits of adoption, economic cost/benefits to agriculture operations (benefits of fencing).
- Demonstrate and disseminate the project results (benefits of method) to farm community, state and federal agencies, and Chesapeake Bay stakeholders.

The project was unique in that it responded to a need and interest in the area for alternative practice for livestock exclusion – particularly in the hilly geography, where a 35 foot stream setback for fencing was not practicable. The reduced setback was adopted by the project as a pilot to see if having alternative options for fencing could actually increase the use of livestock exclusion, get cattle out of streams and improve stream banks. There was no specific setback required other than top of bank and setbacks ranged from 6 feet to over 100 feet. In addition to the specific results of the project in the targeted area, the project demonstrated that "adding another tool to the toolbox" of practices that farmers could use on their farms could indeed increase adoption of important conservation measures.

The project funding from private foundations provided a very useful combination of private resources to leverage and coordinate with federal and state dollars. The flexibility available with the private support allowed the project to engage farmers in more conservation activities than would have been accomplished with access only to government support.

The project did no blanket outreach – instead it depended on the direct contact from conservation district and NRCS staff who were able to offer farmers a range of options. Transactions with

farmers were designed to be simple and straightforward, to make it as easy as possible for farmers to participate. By enabling staff to help farmers solve problems, rather than simply deliver programs, the project created trust among the farmers and the relationships necessary to adopt practices.

A facet of this project that was particularly effective was its ability to engage Mennonite farmers, including Old Order Mennonite farmers. By offering private money as a source of financial assistance, the project was able to overcome reluctance to adopt practices supported by government programs. In some cases, the reimbursement to Mennonite farmers was provided through the Virginia State Dairymen's Association as that was a more acceptable source of support. Some Mennonite farmers were then willing to use financial support for the cost of the fencing materials and used their own labor to install the fences. In addition, project technical staff spent a great deal of time gaining the trust and confidence of the Mennonite bishops, whose influence was significant in their community. The ability to use private and public funds on farms provided the means to support multiple practices.

Just as important was the flexibility to install fences with narrower stream bank setbacks than the 35 feet typically required by NRCS specifications. This allowed farmers with small steep pastures to install fences in areas where a 35 foot setback was unrealistic from the farmer's production perspective. As a result, livestock were excluded from many miles of streams that were fenced. Without that flexibility provided to farmers and the ability to work with Mennonite farmers, those improvements would not have occurred.

As a result of the project, over 68,500 linear feet of fencing to exclude livestock with 18 landowners who also adopted stream crossings, watering systems, buffers and other practices, with support from CBFN and federal assistance. In addition, the participating farmers added additional conservation practices to their operations as a result of their initial involvement. As a result of the project's pilot efforts, both the Virginia Department of Conservation and Recreation and NRCS offices subsequently adopted options in their programs for reduced setbacks as an inducement to increase livestock exclusion.

Observations

The project development and organization was unique in that CBFN focused on finding the right places to invest and then provided ongoing support for work plan development. This kind of project development strategy ensured that there was a project coordinator to lead the effort, opportunities for training, technical consultation and connections to other projects funded by CBFN so that project managers could learn from each other. The value of the CBFN approach was that it developed a team consensus about the work and how to carry it out that provided a structure for the project to experiment, learn from mistakes, and quickly adapt to changes required. This approach provided guidance for the Streambank Fencing project and allowed adaptation to regional needs and circumstance. In doing so, the approach also enabled motivated and skilled people with strong working relationships to implement a new program and address the overarching need to get livestock out of streams

Flexibility allowed farmers to use their own discretion to adapt practices to their needs, thereby increasing the likelihood of adoption and maintenance of livestock exclusion from streams. The

relationships established with project staff provided a means for farmers to become more engaged in conservation, and added a tool to farmers' conservation toolkits who might not otherwise participate. It opened the door for farmers to participate and led to adoption of further practices.

It is extremely important to note that the relationships that were built and reinforced through the project continue to be the basis for successive conservation efforts in the Shenandoah Valley. Farmers viewed the program and staff as "working with them to help solve problems" and taking a "common sense approach." It is clear that those interactions have had long term impacts on the willingness to adopt conservation practices in the Valley.

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WASHINGTON

Whatcom Conservation District Clean Water Program: Improving water quality through increased conservation adoption in the midst of controversy

Background

Whatcom County is the furthest northwestern county in Washington State. It includes over 1,500 miles of surface water in the Nooksack and Sumas watersheds and a 95,650 acre aquifer, the Abbotsford-Sumas. Intermingled with these waters are over 115,000 acres of farm land, predominantly comprised of dairy farms with an increasing amount of land being used for berry production. The 110 dairy farms include roughly 50,000 acres of cropland used for corn and grass silage.

The area's soils vary from heavier peat to lighter, drier soils. Nutrient and bacterial contamination are among the important challenges to the surface water systems. In the drier soil areas, there is also potential for these nutrients to leach into the aquifer. The Lummi and Nooksack Tribes live in the watershed, many of whom make their living by farming the shellfish beds in Portage Bay. For those and other shellfish farmers, high bacteria counts can lead to closure of their beds by the State of Washington. Sharing a Northern border with Canada, Whatcom County is additionally challenged by the inability to regulate or address nutrient runoff and water contamination coming from Canadian sources. Other challenges the region faces include the frequent rotation of farmland between farmers that makes tracking of nutrient management difficult, outdated drainage infrastructure and the potential for frequent flooding during the wetter seasons.

The defining events in the region have been the closures of shellfish beds in Puget Sound due to microbiological contamination. Widespread closures in 1996 led to the adoption of the Dairy Nutrient Management Act (DNMA) two years later. The DNMA requires all dairy farms to develop and implement a nutrient management plan, keep records on site, register with the Washington State Department of Agriculture (WSDA), and participate in an inspection and compliance program. These on-farm plans, which include the management of the production facility, manure storage and usage, and cropland nutrient management, must be approved by the Conservation District and implementation of the plans also needs to be certified by the District. The Whatcom Conservation District (WCD) led the effort to allow stakeholders to develop the initial shellfish closure response strategy. WCD also helped farmers to comply with DNMA and initiated a coordinated program that increased the use of conservation practices among dairy producers to reduce surface water contamination (described below).

In 2005, an MOU was signed that transferred responsibility for inspections from WSDA to the Washington State Department of Ecology (WSDE). Farmer compliance and levels of nutrients and bacteria counts went down following implementation of the DNMA. However, since 2007 subsequent monitoring has consistently tracked increases in bacteria counts in the Nooksack watershed. There are a number of factors that have been implicated in these increases. In 2004 and 2005, state budget cuts reduced the number of available inspectors for dairies by half; there were no inspectors for non-dairy operations. Impacts from the increasing numbers of raspberry, blueberry and other small berry operations and from small, non-commercial non-dairy livestock farms are not well-understood and conservation practice adoption on those operations has lagged

significantly behind that of dairy farms. As berry acreage has increased, there has been a substantial reduction of land that had historically been available for manure spreading. The inspections themselves also became inconsistent in their assessment of dairy operations. Human sources of bacterial contamination, (e.g., ineffective septic systems), are further sources of concern.

Recent events have resulted in further controversy and concern about water quality improvements in the region. In September 2014, the Lummi Nation halted shellfish harvest across 335 acres of Portage Bay due to public health concerns from high levels of fecal coliform. The State Department of Health formally closed a total of 496 acres of shellfish beds in March 2015. There is skepticism in the Lummi Nation about the effectiveness of both conservation practices adopted by dairies and the regulations in place to ensure compliance. DEC has initiated the development of new regulations for dairy farms that would require such operations to get water quality permits to continue operation. The tribe is considering legal action, along the lines of a lawsuit successfully filed in Yakima, to force further improvements. The position of the tribes has been strengthened by court rulings in recent years that have reaffirmed their senior water and fishing rights in the region. Controversy also intensified over buffer requirements proposed by the National Marine Fisheries Service that were questioned by farmers and the Natural Resources Conservation Service (NRCS).

Dairy farmers for their part, having complied with the DNMA, have felt that they are being unjustly singled out regardless of actual contribution to water pollution. While dairies have a role to play in protecting water quality, contributions from other sources is still in question and the nature of the increased bacteria levels are not fully understood. Dairy producers have combined with crop and berry farmers in the area to establish six Watershed Improvement Districts (WIDs) in Whatcom County using state irrigation district law. Those self-assessing, governmental organizations provide a collective mechanism to reach binding agreements with the Tribes that address water availability, water quality, riparian habitat and salmon issues in the county. While initial efforts have included some public education and there have been sometimes difficult interactions with tribal representatives, events this summer offer promise for the WIDs to be a valuable part of dealing with water quality.

Project description and key features

The Whatcom Conservation District first became engaged in October of 1997 as the closure of a commercial shellfish harvest area triggered the creation of a shellfish protection district and response strategy. The District stepped forward to lead the process in part because dairies were identified in the Sanitary Survey produced by the State Department of Health as the likely leading source of fecal coliform. In 1998, the Dairy Nutrient Management Act was passed along with the provision of significant funds from the Washington State Conservation Commission to address the issue from 1998 to 2003, when the shellfish beds were reopened.

The work started with District staff helping dairy farmers in the development and implementation of their Dairy Nutrient Management Plans. It was also the District's responsibility to approve and certify those plans. The District then collaborated with NRCS to help farmers access federal and state resources (Water Quality Implementation Funds) to support conservation practices. The District also obtained a 319 grant from EPA that was used to hire a

shellfish program coordinator and was provided funding to the Northwest Indian College to sample water. During that period, District staff worked with more than 250 farms to install BMPs on about 54,000 acres, including 400 miles of buffered watercourse and 2,100 acres of grass buffer strips, as well as targeted practices such as heavy use areas, dry stacks, manure storage and composting, anaerobic digesters, livestock exclusion, ditch management and pasture management. During that period more than $5.7 million in state and federal contributions were matched by at least another $1.4 million from producers.

Among the most successful projects has been the District's work with CREP that has protected streambanks, provided buffers, and planted trees to improve water quality and salmon habitat. Riparian buffers of native trees and shrubs have been established on 132 miles of stream in the county. The district has also implemented the Habitat Restoration Program, a three year effort funded by National Fish and Wildlife Foundation, that has constructed 36 fish habitat structures, removed 23 barriers to fish passage and funded 48 project applications that are improving stream environments and salmon habitat. These programs, in combination with dairy and small farm conservation assistance and educational programs, have enabled the District to serve as a central hub for the conservation and farming communities in the county.

As challenges have changed and increased in the County, the District has developed innovative approaches to nutrient management that are providing producers with new tools. WCD has received $1.6 million in outside grants to support various nutrient management programs. Some of these include the creation and implementation of a progressive Application Risk Management (ARM) system in Puget Sound watersheds supported by an EPA grant, a monthly informative Farm Speaker Series educational event, and delivery of an annual Dairy Producer Nutrient Management Training event. The District is also coordinating the establishment of Discovery Farms® Washington to help better understand the impact of on-farm practices on water quality, focusing on applied field level research, outreach and education.

Observations

The district serves a unique role as catalyst, convener, and anchor organization, providing far more than technical assistance. In doing so, the District staff, with strong support from its Board and the Washington State Conservation Commission, has managed to balance their responsibilities with the need to provide assistance, encouragement, and support to the agriculture community. Interviews with a number of dairy farmers indicated that trust and respect for staff has created strong working relationships with farmers.

The District has managed to retain credibility in contentious surroundings. That credibility is pivotal as solutions will need to be developed that balance the interests and meet the needs of tribes, municipalities and farmers to ensure the availability and quality of their water supplies. The District has equally open channels with the tribes and the Watershed Improvement Districts.

The ability to secure additional funding for projects (319, NFWF) has done more than simply add resources and capacity for the District. The support has enhanced the District's ability to find innovative solutions to ongoing problems, to develop new tools for farmers, and to increase monitoring efforts in the region.

The District is consistently exercising leadership in areas such as coordinating the Discovery Farms effort and helping to develop a comprehensive planning framework for conservation efforts in the county that can be the next steps in resolving the current water quality issues. To become more systematic in planning, implementing and adaptively managing conservation initiatives, the District is pioneering use of "Open Standards" methodologies and tools assembled by the Conservation Measures Partnership (See http://www.conservationmeasures.org/) to increase the effectiveness of and engagement in conservation planning efforts.

Collaboration, as is typically the case, has been essential to the district's work. High quality technical capabilities have enabled District's staff to work seamlessly with NRCS staff. Just as important, the District's willingness to spend time upfront with all of the partners on the ground has been fundamental to the functional collaboration that has led to effective conservation work with farmers.

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Synthesis

The most interesting and instructive aspect of these watershed projects is that, though they are quite varied in their specific characteristics, such as geography and farming systems, they all share virtually the same organizational features. Each of the projects had a watershed plan or assessment that was the underpinning for the implementation of conservation activities in the region. Different formats were used for those plans, ranging from the EPA 319 nine step plan or the planning process in the National Estuaries Program, to the planning required through PL-566. What mattered, as much as the plan, was the way that the plans and subsequent implementation plans were put together. The plans were designed to lead to subsequent implementation plans and were developed through a collaborative process. The process included all of the partners and organizations involved in the project and serious engagement of farmers and other stakeholders at every stage of plan development.

Not surprisingly, each of the projects was created as a partnership that included various combinations of staff from conservation districts, Cooperative Extension and universities, farm organizations, state and local government, NRCS, NGOs, and private companies. Participants in the projects described those partnerships as more than occasional interactions but as strong, working relationships. The partnership teams typically met throughout the term of the project to coordinate efforts and solve problems. Those working relationships, which were consistently noted in the interviews, were instrumental in implementation of the projects. Interviewees attributed successful support and collaborations with farmers to the strong partnerships within the project. Equally important was the presence of an anchor organization in each of the projects that served as the administrative hub for the watershed effort, and a project coordinator who took responsibility for the management of the project and the partnership.

One-on-one interactions with farmers and land owners were the primary mechanism for facilitating the adoption of conservation practices in the majority of the projects. The projects engaged not only conservation district, NRCS and Cooperative Extension staff in working with farmers; they also made use of farmer organizations, NGOs, private company staff to provide outreach and technical assistance to farmers. In every case, the need for that individual interaction was recognized as essential and resources were secured to ensure that adequate staffing was available. In every project, farmers and conservation staff regularly mentioned how important trust is in helping farmers adopt conservation practices. Everyone interviewed insisted that trust was built over time by demonstrating competence and working one-on-one with a farmer.

In several of the projects (e.g., Virginia, Arkansas, Pennsylvania), a component of the successful one-on-one interactions was the ability to provide flexibility for farmers to adapt practices to their specific farming operations. That flexibility was possible due to adaptations by state and county NRCS staff or the availability of money from non-Farm Bill program financial assistance such as state funds, EPA 319, or private sources. Flexibility in the installation of conservation practices increased the ability of the projects to get substantial conservation improvements. In cases where there were unique conditions on the farm that did not fit practice specifications, the flexibility allowed farmers to adapt practices that might not have been adopted at all, as in Oklahoma and Virginia. In those situations, the farmer perceived the person providing assistance as helping the farmer to solve a problem rather than delivering a program or practice. As farmers

were able to adapt practices to meet their individual circumstances they were more amenable to implementing those practices, more likely to sustain the practices because they had made them of their own volition, and more inclined to adopt additional practices as they were perceived as helping to solve problems.

In Oklahoma and Virginia, the projects were established, by the state and a private funder respectively, through a structured process for identifying, organizing and managing projects before they were funded. In both cases, a deliberate process was in place to identify the highest priority projects in a region. Once selected, the projects were designed using a specific work plan format. Resources for hiring an on-site coordinator were included in the funding arrangement and ongoing support from the funder was provided to support and assist the project team and coordinator in conducting the project. The ongoing support was provided by the funder that was dedicated for staff to deal with problems and help the projects to take advantage of the lessons learned in other watershed projects. The projects organized using that process in Oklahoma and Virginia were able to accomplish both their immediate objectives and increase their understanding and capacity to undertake continued conservation efforts.

The kinds of data collected during the projects and the ability for projects to share such data was an organizational feature important to successful watershed projects. Projects in this assessment focused data collection on the impacts of farming practices using water quality and edge of field monitoring, BMP performance assessment and other on-farm evaluation tools. Moreover, an emphasis was placed on sharing the results from adoption of conservation practices with those persons who could implement change at the farm and local level. In Minnesota, the project began with extensive on-farm monitoring that led to substantial farmer engagement. In Oregon, the monitoring process became a shared data set that informed farmers and their community on the nature and source of contamination. In Arkansas, Discovery Farms collected data and conducted research that enabled farmers to see what nutrients losses were occurring from their operations and provided them information on conservation practices that could be useful on their own farms. The Discovery Farm approach is also being implemented in Minnesota and Washington. Farmers in all these projects were given the opportunity to see first- hand from a credible source what effect their farming practices have and which measures can be used to mitigate problems.

Data collection, as described above, has an impact on the effectiveness of watershed projects to implement conservation practices and provides documented monitoring information for setting progress benchmarks within the target area. The practical and place-based approach to data collection serves as a pivotal learning opportunity that influences interest and willingness to adopt conservation measures. From a farmer’s perspective, on-farm and participatory data collection differed from external data monitoring or modeling that farmers often see as accusatory and inaccurate, which in turn creates resistance rather than willingness to adopt new practices. In the watershed projects where the data collection was perceived as a collaborative effort with agriculture and the broader community, the resulting information served as a shared reality that reduced controversy, directing energy and resources to solving water quality problems. Some of the value of this type of data collection can be seen in the ongoing efforts in Washington and Vermont. Data gathered from these projects is perceived as useful and credible by contending farm and non-farm interests. Having data collection methods to monitor conversation practice outcomes that farmers and other sectors of a community trust is critical to

engaging community members. By using trusted information to bring these interests to the table, they in turn bring the willingness and combined energies necessary to resolve water quality issues.

Finally, in the course of the site visits it was clear that the time frame over which work in these watersheds took place was significantly longer than the typical three year funding term for watershed projects. In many ways, those limited periods of funding amount to only a snapshot of what actually went into many these projects. In Pennsylvania and Virginia, the strong working relationships, without which the projects would not have succeeded, were built over a period of several years that greatly exceeded a particular funding cycle. The development of watershed plans and the engagement of farmers and stakeholders in Arkansas and Oklahoma took place over several years, in addition to the specific time spent implementing projects. The collection of farm-based monitoring data in Oregon and Minnesota has been a multi-year effort that was necessary for accuracy, completeness and credibility. The process of dealing with controversial regulatory issues, planning and building teams requires significant time and energy to create a sanctioned process that increases adoption of conservation practices, as has been seen in Vermont and Washington. Projects in this assessment were typically maintained over many years by securing multiple funding sources or long-term funding. Funding from multiple sources was typically combined to provide sufficient support for particular project phases, or a funding stream was available sequentially for longer than typical funding cycles. In either case, fiscal support for the project over multiple years was integral to organizing and accomplishing the projects' work.

From this synthesis it is apparent that several organizational factors identified in these watershed projects are important, if not critical, to effective watershed projects:

Watershed assessment – Successful projects are based on sound watershed plans or assessments that characterize the nature of the water quality problems, identify sources, prioritize critical areas, and identify mitigating conservation practices. While different formats for watershed conservation planning are available, the plan should be technically sound, designed to interface effectively with development of an implementation plan and developed in consultation with those who will have a part in the subsequent implementation effort.

Collaboratively developed implementation plan – Using the information from the watershed assessment, an implementation plan provides a deliberate structure for organizing, managing, and coordinating the outreach, education, technical assistance and other activities in the project. Creating the plan in a collaborative manner with project partners who will be involved in carrying out and supporting the project helps create and reinforce the partnerships that are integral to success. In addition, providing opportunities during the plan development to engage the farming communities and other stakeholders creates buy-in for the project.

Creation of a credible set of data – Whether it is extended monitoring effort or the establishment of a "Discovery Farm," having a credible data set has multiple benefits. Collecting data about the effects of existing farming practices and the outcomes of adoption of conservation practices on water quality or conducting a water quality monitoring program provides more than a way of setting benchmarks and evaluating progress. A well–designed data collection method that is

credible to the agriculture community and the community at large creates an opportunity for greater recognition and awareness of water quality issues. Collecting and sharing data trusted by farmers reduces farmer resistance to adopting conservation practices and, to the extent that contending interests concede the validity of the information, reduces controversy and enables progress in solving water quality problems.

Capacity to coordinate and manage project activities – Given that effective watershed projects require coordination of multiple partners, planning and other key activities, adequate capacity and skill to organize and manage a project is essential. The necessary capacity includes having an anchor organization that serves as the hub for project administration; a project coordinator who has primary responsibility for managing the project; and designated staffing by the funder or project-sponsoring organization to provide oversight and support for the project team and staff. The anchor organization and coordinator need to have adequate resources and time allocated to be able to realistically fulfill their responsibilities. In addition to resources, support and training in the specific organizational skills for managing a project increases the effectiveness of project coordinators.

One on one engagement with farmers and landowners – It turns out that there is no substitute for the direct interaction of a conservation professional with a farmer. This is particularly true as conservation practices have become more sophisticated and program requirements more complicated. While the more innovative farmers may be interested or motivated by articles, presentations or outside speakers, researchers such as Everett Rogers (2003) have noted that the majority of adopters of new practices get their information from and are motivated by a trusted, competent individual. Recognizing the demands of such labor intensive interactions, watershed projects have found ways to increase the number of people available through use of agribusiness staff, support from conservation district staffing and engagement of grower organizations.

Flexibility – The value of flexibility in the installation of conservation practices is that it responds to site specific conditions on a farm and encourages adoption of practices that might not otherwise have been installed. Just as important, the ability to adapt a practice to suit a farmer's particular needs demonstrates an appreciation of the challenges faced and a willingness to help the farmer solve an important problem on her or his farm.

Appropriate time frame – The process of watershed planning, creating a shared strategy for implementation, assembling credible data, and developing the trusted relationships necessary for successful wide-scale adoption of conservation practices for water quality improvements clearly extends over multiple years. The need for adequate time is particularly important in areas where water quality problems exist but much of the necessary capacity for successfully carrying out a watershed scale project is absent. If substantive wide scale change in farming practices over an entire region to improve water quality is the objective, adequate time is necessary to accomplish that goal.

The findings in this study very closely parallel the findings in the Rural Clean Water Program evaluation and in the NIFA-CEAP study, for instance, in emphasizing the value of one-on-one interaction and flexibility and the importance of watershed planning. It is no coincidence that many of the observations about the critical importance of effective organization and management

identified in the 1993 and 2012 studies were again confirmed by this assessment. A common and important finding in all these studies is that, just as there are best management practices for implementing conservation in watershed projects, there are equally important best management practices for organizing and managing those projects.

Recommendations

Having identified the key organizational factors or "best management practices" that contribute to successful watershed projects, the following section offers recommendations that can be incorporated into future programs that support watershed scale efforts. In doing so, it is fair to point out that these factors are not discretionary elements that might or might not be included. For watershed scale projects to be successful, each of these issues must be adequately addressed to achieve the necessary, substantive results.

The following recommendations are offered as concrete steps that NRCS and its partners can incorporate in their operations and programs. In making these recommendations, it is not intended that NRCS assume sole responsibility of implementation or that it wholly fund these recommendations. In fact, the involvement of conservation districts, land-grant universities, state governments, foundations, private companies and organizations in implementing these recommendations would increase the extent and pace of improving watershed efforts. That said, NRCS plays a pivotal leadership role as the funder of this assessment with direct influence on how people within the agency value and apply the lessons from this study.

Recommendation – Develop a working model that incorporates organizational best management practices for organizing and managing watershed projects that would be actively applied in programs such as WQI, MRBI, and RCPP. The model would incorporate the factors identified in this assessment and would be used to guide program design, as well as the development of specific programs at the state level. The model could be developed in collaboration with private sector and other partners to be implemented by NRCS and/or its partners and would be a required element of all watershed projects.

Recommendation – Adopt and support use of a watershed planning process that could be used in developing all projects. The planning process would necessarily include a watershed assessment and implementation plan that can be seamlessly incorporated into a watershed project work plan and readily implemented. Engagement of groups and practitioners in the watershed would be a critical component of the planning process. The planning process would be a required element of any watershed program. Possible sources of support for this work could be PL 566 or an initiative with EPA 319, private, or state support.

Recommendation – Develop and implement a training program for project coordinators and leaders to create and ensure the necessary skills and human capacity to organize and manage watershed projects. Such a program would provide understanding of the importance of sound organizational skills, knowledge of how farmers make decisions to change their behavior and practices, and the ability to coordinate and manage complex partnerships. Once developed the program could be conducted at the state or local levels by project partners or sponsors.

Recommendation – Establish a program for facilitating the collection and monitoring of on-farm data to inform and support watershed projects. The data would serve multiple purposes in establishing credible baselines, identifying sources of water quality problems, demonstrating and documenting water quality improvements from conservation practices. The program could be organized with land grant universities where appropriate, and supported with a combination of federal, state and private funds. A number of private sector organizations are carrying out monitoring efforts that could be harnessed to facilitate specific watershed efforts of this sort in conjunction with watershed projects.

Recommendation – Work with partners to expand the supply of skilled people to provide technical assistance and support to farmers in adopting conservation practices and thereby ensure adequate human capacity to achieve conservation and water quality objectives. Good examples exist in current RCPP projects that, if replicated more widely, could increase the overall human capacity to engage farmers in EQIP through RCPP. Addressing this recommendation will require new and greater involvement of the private and non-federal sectors in making staffing available.

Recommendation – Increase opportunities for appropriate flexibility in the implementation of conservation practices by facilitating and explicitly providing flexibility protocols for adaptation of practices and payment schedules as part of a watershed project. This would provide consistency and encourage innovation at the field level when circumstances warrant it, especially when widespread adoption is a primary objective.

Recommendation – Establish longer terms than the typical two or three years for projects so that the substantial watershed results so often intended can actually be achieved. Watershed projects could be organized and supported in successive phases. Each phase would have a specific term of funding with support for continuing to the next phase contingent on successfully completing the previous phase and funding could come from different source for each phase. In this way, a 5- 10 year project term could be provided without making an irrevocable long term commitment of funds.

Recommendation – Establish a leadership position in the NRCS national office to oversee and coordinate watershed scale efforts within HQ, among the states and with partner organizations. This position would add needed consistency and support for watershed efforts, especially for geographic initiatives and state programs, and reinforce the value of applying deliberate attention to the way watershed projects are organized and managed.

Taken together, these recommendations provide a blueprint for making watershed efforts as effective as they are expected and need to be in meeting water quality and agricultural challenges. There is ample evidence over multiple studies that these are critical elements of success and that they readily produce results when implemented. The ability to regularly and consistently implement highly effective watershed projects that serve the needs of farmers and the environment is an achievable goal. The task is to incorporate changes into programs and policies that capitalize on this understanding and ensure the necessary return on the sizable public and private investments in watershed scale efforts.

Next Steps

Capturing the benefits of the recommendations for increasing the effectiveness of watershed programs could best be accomplished by establishing a small team to develop the methodology, guidelines and a plan of work for incorporating the organizational key factors/best management practices (BMPs) into NRCS watershed programs and projects. The team would include NRCS and partner participants who were well versed in organizing and managing watershed efforts and would be able to access additional public and private expertise. In order to be of maximum usefulness to NRCS, the team would be given a relatively short period of time in which to accomplish its initial work (six months). The team would be charged with these basic tasks:

- Create guidance for RFP's, proposal evaluation and project work plan development that integrate organizational BMPs into NRCS watershed programs.
- Identify training, education and support needs for program managers, project coordinators, project leaders and cooperators to implement the new model for watershed efforts.
- Identify tools, resources needs and resources that can be applied to watershed efforts to implement the methodology.
- Establish protocols and support for a pilot effort to implement the revised methods in a particular NRCS watershed program, e.g., RCPP, WQI. The pilot would be used to validate the methodology so that it could be adapted and applied across the board to increase the effectiveness of watershed programs.

While the time frame is ambitious, there is much that is already available that can be incorporated into this effort. Effective overall organizational strategies are currently being used, for example, in Oklahoma. Training programs are being developed and carried out in several states such as Iowa and Wisconsin. Several different processes for watershed assessment and planning are being used by NRCS and other agencies as well as private organizations. In addition, it is likely that this effort could be done collaboratively with other federal and state agencies as well as private organizations. In fact, a number of organizations are addressing the same situation and set of issues in Iowa's Nutrient Reduction Strategy, the Chesapeake Bay, and Delaware River Basin among others. Given that the knowledge is available to advance watershed work and the needs are recognized in multiple regions, taking these steps would provide invaluable leadership in achieving greater conservation and water quality benefits.

Conclusion

The last decade of conservation has been marked by a dramatic increase in the financial assistance available to support resource conservation along with advances in technology for conservation practices. At the same time, there has been increased demand for the implementation of conservation practices and programs to produce significant changes to the water quality problems that exist in watersheds all over the country. As a result, watershed projects are being initiated by federal and states agencies and private funders on the assumption that projects on that scale will improve water quality. The pressure to achieve results that are meaningful to agriculture and the environment will only increase and the ability to retain voluntary conservation as a viable option will depend on achieving those substantive results.

This study was initiated to determine what in addition to financial incentives and a sound technical basis for conservation measures are critical dimensions of watershed scale projects. The reality is that the adoption of a new practice by a farmer is a behavior change that is almost always made in the context of a personal interaction. A watershed project, while recognizing the fundamental importance of the interaction between farmer and technician, also needs to be cognizant of landscape, farming systems and the community of people. Once the scale of intended conservation adoption is at the watershed level it becomes a series of interactions that is, in fact, an organizational problem that requires its own deliberate structure, process, resources and skills. In that way, a watershed project is an organizational challenge to change multiple behaviors in a social context based on a solid technical foundation with the support of financial incentives to assist in those behavior changes. From this perspective, deliberate attention to the organizational factors is so obviously critical to success that it warrants significant attention and resources.

APPENDIX A

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APPENDIX B

INTERVIEW QUESTIONS & PROMPTS

Background

- What is unique about this area its people, agriculture?
- What was the reason, stimulus, trigger, rationale for the project?
- What was the motivation, problem, opportunity that was the reason for the project?
- Why did it happen?

What was the project, its purpose, goals, objectives?

How was the project organized?

- How did project come together?
- Who were the partners, how was it organized?
- How were partners coordinated?
- How was funding secured?
- What programs were used to fund it?
- Were there significant partner contributions partners
- What were the objectives of the project?
- Did you have a work plan?

How was the project managed?

- How were the operations of the project managed?
- Was there a "management team"? What did it do?
- Was there a full time coordinator? What was the coordinator's role?
- Who provided administrative support? How were those functions funded or supported?
- Did you use a work plan to guide project operations?
- If so, how was it used? How useful was it?
- What other means were used to coordinate project and partner efforts?

How did it operate, work with farmers?

- How did the project achieve its purpose?
- What were the underlying assumptions about how and why farmers adopt new practices?
- How did you go about working with farmers? Who contacted them?
- What did partner organizations do?
- Did you use surveys in the project?
- What outreach and/or education did you use in the project? What was its purpose? How did you evaluate its usefulness?

What did it accomplish? How could you tell?

- What was accomplished? What measures?
- What information/data was collected?
- How was it compiled and assessed?

- How can you tell the project worked?
- How did it change over time?
- How as project effectiveness assessed?
- What was the level of satisfaction with the project among partners, funders, organizers and participants? How was it assessed?

What are the observations, takeaways, lessons, caveats, recommendations?

- What was the biggest factor in the project's biggest success? shortcoming?
- What was its biggest asset? challenge?
- What would you do differently now?
- What would you never do again?
- What must you do to have a successful project?
- What must you avoid?