HANDBOOK FOR CONSERVATION DISTRICTS ON

Environmental Markets

JANUARY 2018

National Association of Conservation Districts

American Farmland Trust
SAVING THE LAND THAT SUSTAINS US

CONTENTS

COVER IMAGES TOP: NRCS PHOTO/LYNN BETTS: BOTTOM FAR LEFT AND CENTER: NRCS PHOTO; BOTTOM FAR RIGHT: NRCS PHOTO/PRESTON KERES

Executive Summary

In 2008, the National Association of Conservation Districts (NACD) concluded that market-based engagement opportunities for conservation districts could be important additions to existing district strategies and initiatives and help highlight and assign economic value to the ecological services that well-managed farmland provides (NACD 2008). Conservation districts continue to help develop these market frameworks and are actively recruiting farmers to participate in these markets as credit generators. In some cases, districts also help producers design, place and implement best management practices to generate credits for sale, while in others; they confirm the baseline status of farms and/or verify and monitor practices to validate those credits.

The conservation delivery system of the future points to a strong need to increase partnering.

NACD 2015

To further advance understanding of these environmental markets, NACD and American Farmland Trust (AFT) joined forces to review and draw lessons from current district involvement in a particular ecosystem service market: water quality trading (WQT). In September 2015, the USDA Natural Resources Conservation Service (NRCS) awarded a two-year Conservation Innovation Grant to NACD and AFT (titled *Enlisting Conservation Districts to Accelerate Participation in Environmental Markets*) to engage and empower conservation districts to participate in environmental markets by developing this booklet and widely disseminating its findings.

The level of district involvement in emerging markets varies considerably. The core competencies of conservation districts have helped them take on review, outreach, technical support and/or administrative roles in these markets. Review-based roles include site screening, initial project review and on-going project review. Technical support-based roles include calculating credits and providing technical assistance to farmers. Outreach-based roles include educating the public through newsletters, social media, websites and meetings, and engaging with farmers to help them decide whether to participate. Administrative activities include developing a water quality trading program and verifying and/or certifying credits.

The NACD-AFT case studies captured in this booklet show that districts derive benefits from their involvement in environmental markets, particularly when that involvement helps to strengthen dialogue among other districts and partnering organizations. The conservation districts that participated in the case studies also advised other districts:

1. Against pursuing markets as a revenue generator, seeing them more as a partnership to provide local benefits to multiple stakeholders; and
2. To view any trading income to farmers as a supplemental source of revenue to help demonstrate that "conservation pays."

Some of the districts profiled in the case studies indicated they were most comfortable in roles that included direct contact with producers (i.e. implementing projects and monitoring and verifying them). Several others also cautioned that WQT could be a "time sink" for districts not equipped to handle an influx of paperwork.

In addition to the case studies, this booklet provides a checklist and guidance for conservation districts interested in water quality trading and other environmental markets. These tools are meant to help districts develop a business plan for such programs.

The case studies and the checklist/guidance are included as appendices in this booklet and are also available as stand-alone documents on the AFT and NACD web sites.

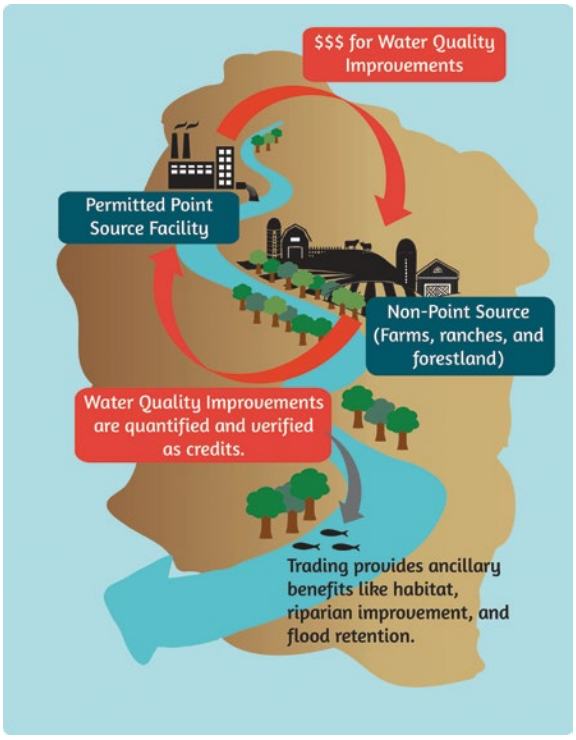
Introduction

USDA PHOTO BY PRESTON KERES

Spurred on by governments, businesses and communities alike, global demand for greater investment in environmental markets (also called ecosystem service markets) has grown significantly over the last decade (Forest Trends Ecosystem Marketplace 2015). In its latest analysis, Ecosystem Markets mapped more than 2,300 markets nationwide (Figure 1). These include: (1) Markets for biodiversity (government-mediated biodiversity payments); (2) Wetlands compensatory mitigation, species/habitat compensatory mitigation and voluntary biodiversity offsets (e.g. pollinator habitat credits); (3) Carbon markets (funds for reducing emissions from deforestation and forest degradation (REDD+)); (4) Forest carbon offset markets (both compliance and voluntary); and (5) Water markets (public watershed service subsidies, bilateral agreements, collective action funds, water quality trading and voluntary compensation).

In 2008, the National Association of Conservation Districts (NACD) concluded that emerging market-based engagement opportunities for conservation districts could be important additions to existing district strategies and initiatives while highlighting and assigning economic value to the ecological services that well-managed farmland provides in a district (NACD 2008). Water quality trading (WQT) markets seemed particularly promising. WQT is a flexible approach that allows regulated point sources of pollution, like municipal wastewater treatment plants and utilities, the choice of installing onsite technology or practices or working with other sources offsite to generate equal or greater pollutant reductions.[1]

1. A comprehensive guidebook of how to build WQT programs is available online at www.usda.gov/oce/environmental_markets/files/BuildingaWQTProgram-NNWQT.pdf



NACD pointed out that for decades, conservation districts had helped to develop market frameworks, including WQT programs. District staff have provided outreach to recruit farmers; helped design, place and implement best management practices (BMPs) to generate credits for sale; and confirmed the baseline status of farms and/or were verifying and monitoring practices to validate credits.

In the spring of 2015, NACD and AFT joined forces to review district involvement in WQT and other ecosystem service markets and draw lessons from them. In September 2015, the USDA Natural Resources Conservation Service (NRCS) awarded a two-year Conservation Innovation Grant to NACD and AFT (titled *Enlisting Conservation Districts to Accelerate Participation in Environmental Markets*).

Team members from NACD and AFT engaged in many activities to inform this report. Key facts and guidance about trading were gleaned from research, previous reports and practical experiences in earlier trading programs. Team members reached out to WQT partners in nine markets, sometimes involving multiple districts, with questionnaires and follow-up interviews. While the primary focus was on conservation district experiences, team members also interviewed other WQT project partners, such as water utilities and project administrators, to further develop the case studies. Team members also participated in regional and national meetings to present case study findings and solicit feedback. The final report reflects the input received from participants in these settings. These gatherings included two NACD annual meetings, two Soil and Water Conservation

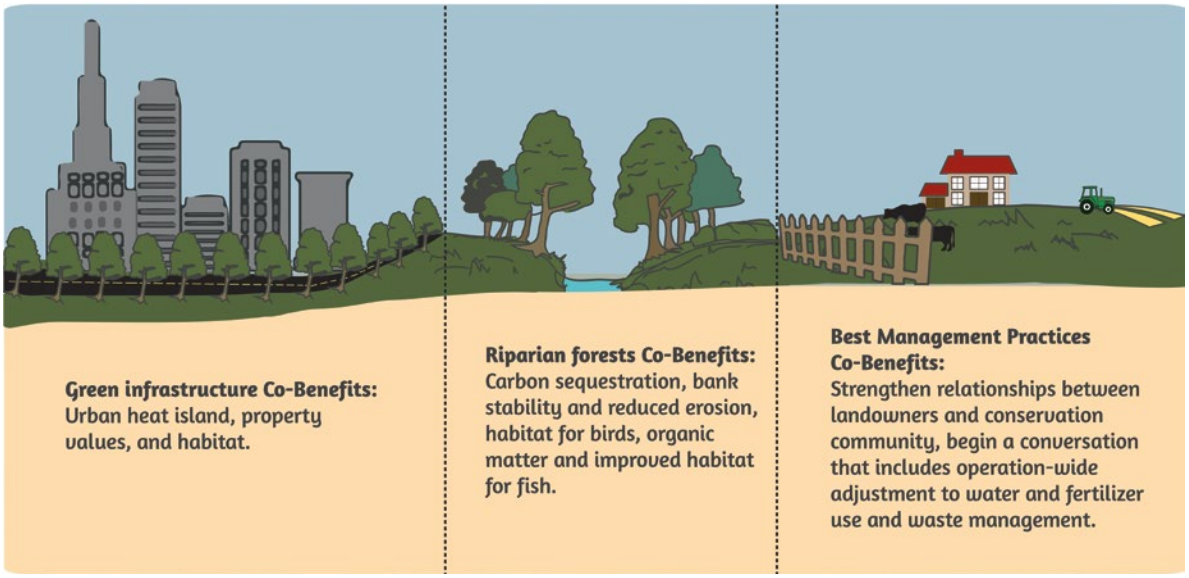
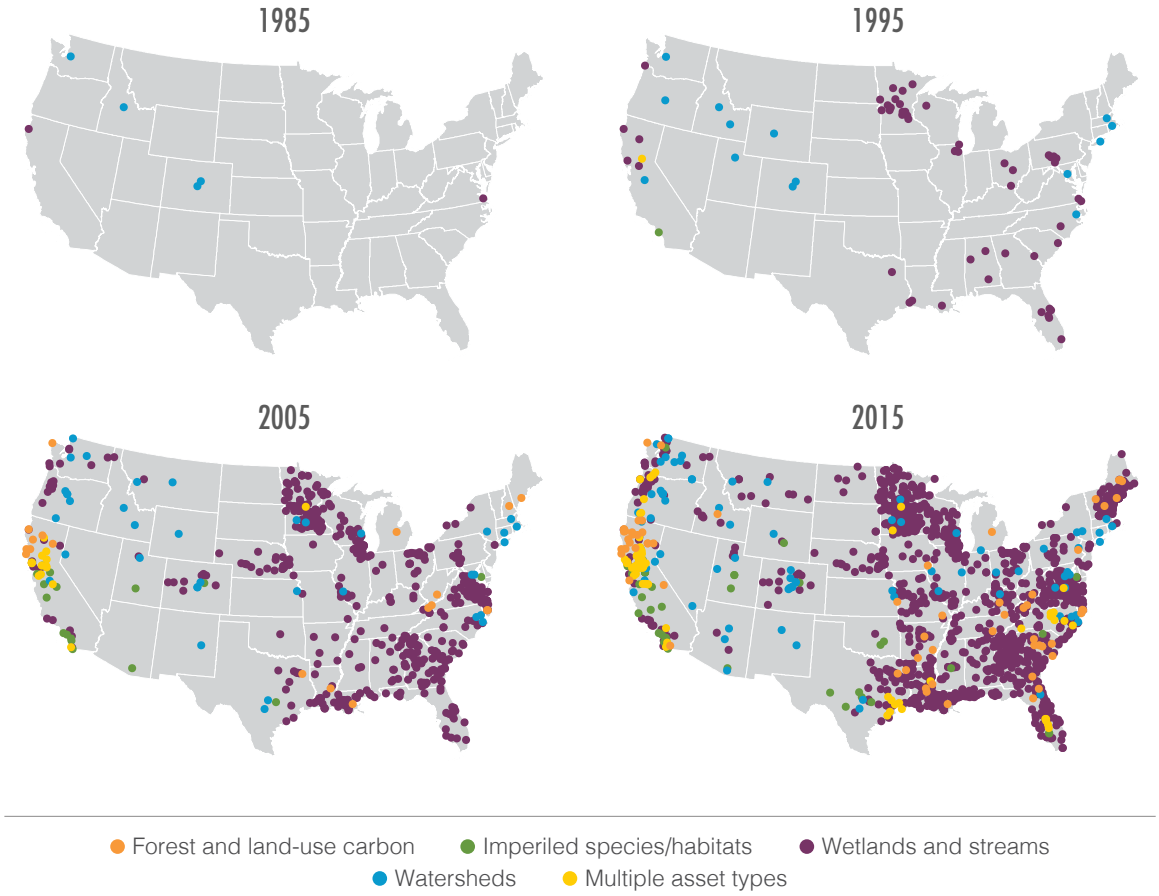


Figure 1: Growth in Ecosystem Markets Initiatives in the United States, 1985–2015
(Bennett et al. 2016)



Society annual meetings and the National Network for Water Quality Trading[2] Spring 2017 National Dialogue.

These activities were captured in this report. Its various pieces are designed to engage and empower conservation districts to participate in environmental markets. The report covers the experiences of multiple conservation districts in nine separate markets. Districts can use it as a guide to make informed decisions about whether and/or how to participate in environmental markets.

While the primary focus was on conservation district experiences, team members also interviewed other WQT project partners, such as water utilities and project administrators, to further develop the case studies.

2. The National Network was formed in 2012 to establish a dialogue on how water quality trading can best contribute to clean water goals. National Network participants come from diverse backgrounds, representing utility, agriculture, environmental, regulatory and practitioner communities. The 2017 dialogue focused specifically on conservation district roles in water quality trading.

While the focus here is primarily on WQT, the lessons documented in the following nine case studies are applicable to other environmental markets and certainty/stewardship programs. Districts will, and in some cases already do, take on the same roles in these emerging programs as they do in the case studies cited here.

Background

Markets and Conservation Districts

Conservation districts are often perfectly positioned to play a role in emerging WQT markets. The United States has nearly 3,000 conservation districts funded by a variety of sources including county and state dollars, fees for service and grants or partnership agreements with the federal government or other conservation organizations.

Districts are closely tied to their communities and are governed by boards of elected local representatives or supervisors who value land stewardship, soil health and water quality. The districts' role is to increase voluntary conservation practices among farmers, ranchers and other landowners and managers. They work closely with NRCS to help deliver its conservation cost-share programs to landowners within their boundaries and/or counties (e.g. Conservation Stewardship Program (CSP) and Environmental Quality Incentives Program (EQIP)). Since conservation district staff are responsible for erosion and sediment control in their county, they often have the technical and managerial capacity to take on some of the roles in markets including outreach, recruitment, help with the design, placement and implementation of BMPs, confirmation of baseline status of farms and verification and monitoring of practices to validate credits.

Equally important, most farmers respect and trust the district staff in their counties. The many roles that conservation districts play in markets are featured below in the *Overview of District Involvement in WQT Markets* and *Possible Roles for Districts in Markets* and *The Case Studies* in Appendix I.

The Future for WQT Markets

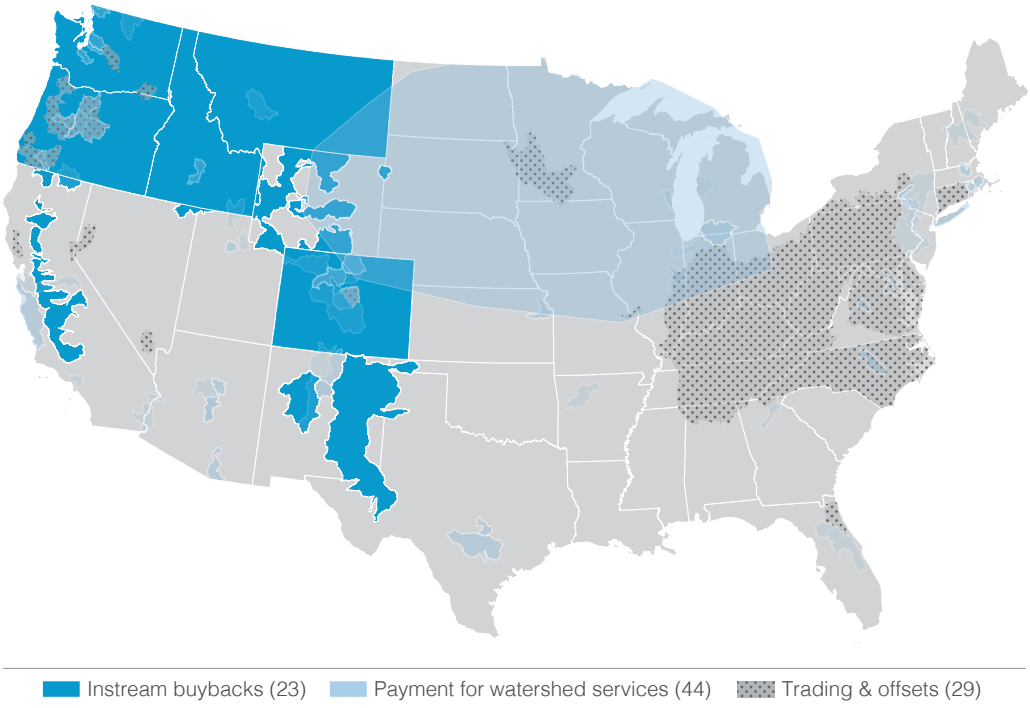
The early WQT markets were driven by the possibility that numeric limits on nutrients were looming (Mehan 2015). However, outside the Chesapeake Bay, Great Lakes, Long Island Sound, Florida, North Carolina and a few watersheds subject to an applicable Total Maximum Daily Load (TMDL), numeric limits remain on the drawing board so there is little pressure on point sources to concern themselves with nutrients.

Of the more than 16,500 municipal or publicly owned treatment works in the United States, only four percent have numeric limits for nitrogen and about 10 percent have numeric limits for phosphorus. Although rigorous and enforceable numeric nutrient water quality criteria would create considerable demand for WQT, the current trend favors fewer regulations. At the same time, the aging infrastructure, increasing pressure on rate payers and the ecological threats of impairments by nutrients and other pollutants make this issue hard to duck.

WQT is an attractive, least-cost solution that can provide multiple environmental benefits that go beyond cost savings and cleaner water (Mehan 2015). The current geographic distribution of WQT markets and policies is shown in Figure 2 (below).

Figure 2. Water Quality Trading Markets and Policies in the U.S.[3]

(Bennett et al. 2016)



3. State-level policy support for WQT can include regulatory drivers that accept water quality credits as a compliance option, enabling policies that specifically enable or establish WQT mechanisms or non-binding regulatory guidance (Bennet et al. 2016).

Potential Market Opportunities to Address Storm Water

Market-based approaches to address storm water are also beginning to emerge. In 2014, six percent of utilities responding to a national survey indicated they offered some type of storm water credits trading/banking program (Black and Veatch 2014).

Storm water managers are increasingly looking to green storm water infrastructure (GSI) and are considering non-traditional approaches and innovative financing mechanisms to expand GSI to manage urban runoff at a landscape scale (NNWQT 2016). Storm water crediting programs exist in Virginia (Virginia Stormwater Management Program, Stephenson et al. 2016), Washington D.C., and Chattanooga, Tennessee (NNWQT 2016). An existing trading program in California's Laguna de Santa Rosa watershed may expand its scope to include storm water permits. If these programs are harbingers of things to come, storm water crediting programs will become more common.

Conservation districts are often perfectly positioned to play a role in emerging WQT markets. The United States has nearly 3,000 conservation districts funded by a variety of sources including county and state dollars, fees for service and grants or partnership agreements with the federal government or other conservation organizations.

Overview of District Involvement in WQT Markets

The level of district involvement in emerging markets varies considerably. This section comprehensively covers how districts have been involved in WQT programs across the country and describes the role they played. A selection of these examples is covered further in Appendix I: Case Studies. Taken together, they paint a picture of how and why districts undertake various activities associated with water quality programs and the lessons learned from their participation.

Voicing Concerns to Shape a Market

One of the early examples is the Southern Minnesota Beet Sugar Cooperative (SMBSC) Water Quality Trading pilot project (1999), when the Renville County SWCD expressed its concern about the heavy reliance on spring cover crops to generate credits. The district felt cover crops would be difficult to establish in cold and wet springs and that the potential for inaccuracies in the credit estimation methods would be magnified due to the lack of diversity in credit types purchased (Kalahar 2003). The SMBSC created a trust fund of $300,000 to implement projects and contracted with its member-growers to grow spring cover crops on about 36,000 acres upstream but also authorized additional BMPs, including cattle exclusion from streams, buffer strips, constructed wetlands, set-asides and alternative water conveyance (Stuart 2008).

Building a Positive Relationship Between Farmers and Nearby Cities

The Barron County Land Conservation Department in Wisconsin worked with the city of Cumberland and developed a small program focused on flexibility and cost-effectiveness (the Red Cedar River program). The district established contracts between farmers and the city of Cumberland, advertised trading alongside other cost-share programs, absorbed the administrative costs of the trading program and brokered trades with farmers while Cumberland funded the BMPs. Farmers could receive funding more quickly through trading since cost-share agreements took more time to implement than trading contracts (Breetz et al. 2005; Stuart 2008). They established a clear, per-acre price for no-till and conservation tillage. The program is no longer operating.

Playing Key Roles

The Miami Conservancy District (MCD) started a WQT pilot in 2005 in the Great Miami River watershed in southwest Ohio. In this large watershed, 14 conservation districts play the key roles of outreach, recruitment, aggregation, verification and monitoring (Hippensteel Hall and Hall 2015). (See Appendix I: Case Studies.) When funds are available, MCD announces a Request for Proposals that includes a deadline for when bids must be submitted. The districts recruit eligible farmers to submit bids. Farmers submit bids that include the pounds of nitrogen (N) and phosphorus (P) that the practices they install are predicted to reduce, and the amount of money they are willing to take to reduce each pound. Once projects are chosen for funding, MCD contracts with the districts to implement the projects, and they enter into a project agreement with the farmer who commits to being responsible for the operation and maintenance of the management practice. The agreement between the farmer and the district is wholly incorporated into the agreement between MCD and the district. Once a bid is accepted and a project is approved, the district verifies the project installation and conducts and documents annual inspections for multi-year projects to make sure the project is functioning as designed. In 2013, the Trading Program stakeholders began to explore the transfer of the management functions from MCD to a joint board of the 14 conservation districts. The Great Miami River Watershed Joint Board hired an administrator in April 2013 to build the capacity to take over those functions.

Helping Drive Innovative Solutions

In 2001, as a permit condition for the Illinois-American Water Company, the Illinois EPA approved an agreement between Illinois-American and the Great Rivers Land Trust to prevent nonpoint source sediment discharge into the Mississippi River through a combination of land acquisition and BMPs (Stuart 2008). A coalition including the local water utility, the Illinois EPA, the Illinois Pollution Control Board, the Great Rivers Land Trust and local conservation districts developed an innovative solution to clean muddy waters. The plan allowed the new treatment plant to continue returning silt back into the river but redirected $4 million of the $7 million that would have been used for a dewatering facility to fund a program to reduce erosion in the nearby Piasa Creek tributary. The 10-year plan was designed to reduce sediment erosion by 6,700 tons per year in the Piasa watershed (twice the discharge of the new treatment plant). The Great Rivers Land Trust worked through the local districts in Madison, Jersey and Macoupin counties to identify cooperating landowners and to estimate sediment reductions achieved through BMPs. Landowners

were responsible for maintenance of the sediment control structures, and the program paid for the conservation practices working through the districts (Stuart 2008).

Seizing Opportunities to Add Staff

The Alpine Cheese trading project started in January 2007 with The Ohio State University acting as a facilitator/mediator for the Alpine Cheese production facility so it could cost-effectively expand its production and treatment facilities without exceeding phosphorus discharge limits (see Appendix I: Case Studies). The Ohio State University brought in the Holmes County Soil and Water Conservation District to serve as the broker because the district had a high level of trust in the watershed; previous experience leading a team of farmers in the South Fork; excellent relationships with USDA NRCS; a local desire to expand their program to include other permit holders; and a need to create local-level budget funding (Moore et al. 2008; Moore 2012; Mariola 2009). Conveniently, the county commissioners who governed the district also had oversight over the wastewater treatment plants. As a result of its involvement, the district was able to hire an additional staff person. A second trading program, the Walnut Creek project, emerged within the Alpine Trading area as part of a NPDES permit when the Holmes County wastewater treatment plant (WWTP) was cited by the Ohio Environmental Protection Agency (OEPA) for violations on its permit. It followed a similar model.

> In the nation's first interstate WQT project, districts in targeted counties in Ohio, Indiana and Kentucky have been recruiting farmers and installing BMPs to generate credits since 2013.

Bringing Multiple Districts Together for Cross-County Trades

The success of the Alpine Cheese and Walnut Creek WQT efforts led to the formation of a 21-county Muskingum River Watershed Joint Board of SWCDs in June 2010. This group has a WQT program pending with the Ohio Environmental Protection Agency and convened a public meeting in January 2015 in accordance with Ohio EPA WQT trading rules to hear comments regarding their WQT management plan application. The districts are sub-brokers responsible for brokering between farmers and point sources when trades are within their counties; when cross-county trades occur, a Technical Advisory Committee ranks the intra- and inter-county bids.

Expanding into Other Environmental Markets

In the Northwest, the Willamette Partnership in Oregon has developed a set of protocols, tools and resources to value ecosystem services such as water quality, wetlands, salmon habitat, upland prairie habitat and water temperature benefits, and they are expanding their program to several other states in the West and Northwest (NACD 2013). The protocols, known as the Ecosystem Credit Accounting System, were developed in partnership with several public and private entities, including the Oregon Association of Conservation Districts. They have been applied to generate water quality credits on private lands in Oregon's Rogue, Columbia and McKenzie river basins.

The Tualatin SWCD (see Appendix I: Case Studies), in Washington County, Oregon, was instrumental in helping design an enhanced Conservation Reserve Enhancement Program (CREP)

approach that combines state and federal incentives with credit payments from the regional water resource management utility (Clean Water Services) for producers who install riparian buffers on perennial streams. The district links Clean Water Services and landowners, arranges tree plantings and pays landowners and contractors. The district was able to modify CREP to provide landowners with better economic incentives to make the program more impactful.

The Stearns County SWCD in Minnesota has played an active role in creating a market for environmental services as a founding partner in the Conservation Marketplace Midwest (CMM) (Majanen et al. 2011) (See Appendix I: Case Studies). As part of CMM, the Stearns County SWCD certifies local agriculture and conservation practices using experts (e.g. district staff, crop consultants, etc.) to locate and assist farmers to produce credits for the various CMM markets.

Participating in Interstate Trading

In the nation's first interstate WQT project, districts in targeted counties in Ohio, Indiana and Kentucky have been recruiting farmers and installing BMPs to generate credits since 2013 (AFT 2012) (See Appendix I: Case Studies). The Electric Power Research Institute (EPRI) launched this effort in 2007. The districts verify the baseline status of the farm, execute contracts with the farmers, help install the BMPs and verify the successful installation of the credits. Verification and monitoring are done by state agencies. The districts are paid by their state agencies which, in turn, are paid by EPRI to provide credits. Both the state agencies and the districts have the option of collecting 10 percent overhead on the funds they receive. EPRI sells the resulting credits to buyers as water quality stewardship credits. The project is currently analyzing district costs and may adjust indirect charges accordingly.

Using Market Opportunities to Help Producers on Wait Lists for Federal Cost-Share Funds

Districts involved in the EPRI inter-state trading effort also used the funding opportunity to reach out to farmers who were on their cost-share funding wait-lists. USDA NRCS EQIP funds tend to be oversubscribed in many watersheds. Although WQT narrowly focuses on offsetting nutrient loading to impaired surface waters, and EQIP broadly focuses on reducing the impact of farming across a range of resource concerns, unfunded EQIP applications may provide candidates for WQT programs (Breetz and Fisher-Vanden 2007).

In 2016, The Great Lakes Commission partnered with its member states of Indiana, Michigan and Ohio, and the Canadian province of Ontario, to examine the potential market for WQT across state and provincial boundaries within the Western Lake Erie Basin. The Erie P market project is funded by a USDA NRCS Conservation Innovation Grant and will develop guidelines for inter-state and province trading and test the system through several pilot trades.

Possible Roles for Districts in Markets

As illustrated in our case studies, there are many possible roles that conservation districts can play in markets. The following list with its qualifiers is drawn partly from information gathered by the National Network for Water Quality Trading (NNWQT 2015). The core competencies of conservation districts may help them take on review, outreach, technical support and/or administrative roles in these markets.

Review-based Roles

Districts can take on several different roles but, as noted below, need to carefully consider whether there could be conflicts of interest.

SITE SCREENING AND INITIAL PROJECT REVIEW (e.g. Washington County, OR; Lower Fox River, WI; Great Miami, OH; Holmes County, OH; Lycoming County, PA)

Project review and verification can include review of site and stewardship documentation (administrative review); review of a site's credit calculation amount (technical review); and confirmation of proper standards implementation and/or performance of credit-generating actions. This can also be split, e.g. with the conservation district doing initial project review and the state agency doing certification (Ohio River Basin WQT project). Districts may need some type of formal

assignment of tasks from the relevant agency and/or trading program administrator. The district's role should be stated clearly in the permit, trading plan or private contract. It is also critical that the entity conducting the reviews is seen as independent and credible. In taking on these roles, districts need to establish a clear process to identify, avoid and/or mitigate any conflicts of interest. For example, a strong technical advisory committee can provide guidance and support for district staff and/or verifiers. In all cases, a clear dispute resolution clause needs to be part of a market framework in case verifiers and buyers or sellers cannot agree on credit estimates.

ONGOING PROJECT REVIEW (e.g. Holmes County, OH)

Ongoing project review is needed to ensure project is maintained properly throughout its life. Again, districts conducting reviews must be seen as independent and credible so there must be a clear process to identify, avoid and/or mitigate any conflicts of interest. Preferably, this should be backed up by a formal assignment of tasks to the district from the relevant agency.

Technical Support-based Roles

CALCULATING CREDITS (e.g. Lycoming County, PA)

Districts can utilize credit calculators to help identify and prioritize conservation activities and BMP placement with the landowner and facilitate the conservation planning process in addition to performing the credit calculation for the agreed-upon BMP. Although credit calculation may need days of specialized training and require retaining skilled staff over time, for a district it helps change focus from simply implementing more conservation practices to using and targeting practices to reduce as many pounds of N and P run-off as possible (a pay-for-performance approach).

The core competencies of conservation districts may help them take on review, outreach, technical support and/or administrative roles in these markets.

PROVING TECHNICAL ASSISTANCE TO FARMERS (e.g. CMM)

Since environmental markets can be complicated, sellers (farmers) may need help to successfully enter a market. If they have an opportunity to access several markets in order to sell the full value of conservation practices that can provide multiple environmental services, districts can help them do that. Farmers may also need help to find synergies between state and federal cost-share opportunities and private funding from participation in markets as well as help in filling out forms and possibly in finding buyers.

Outreach-based Roles

PUBLIC EDUCATION

Gaining public support for and acceptance of a WQT market is critical. All the different aspects of gaining public acceptance for a trading program are contingent on building trust between the parties involved. This requires transparency and public discourse. The level of public trust in district staff tends to be high, and most districts are experienced in holding and facilitating public meetings. Districts can also further identify community needs by holding community and stakeholder

meetings. Districts can serve to communicate information about the trading program to their cooperators through newsletters, websites, social media and other vehicles. However, public education is often a time-consuming process.

FARMER ENGAGEMENT

Districts are ideally suited to help educate and recruit farmers to participate in a market. This can involve workshops, one-on-one visits, helping a market draft a Request for Proposals and making sure the RFP is widely distributed, and helping a market develop outreach materials that are appropriate for this critical audience. Districts can also help farmers decide between federal and state cost-share program funding opportunities and market-based funding opportunities and look for synergies between the various programs. It should be noted that the private buyers participating in markets may provide a more acceptable source of funds for those farmers who are reluctant to participate in federal cost-share programs.

Administrative Activities

WQT PROGRAM DEVELOPER (e.g. Big Sioux, South Dakota)

WQT program developers are the individuals or collectives responsible for trading program design. Sometimes the state water quality agency takes on this role. In other cases, a collective of representatives from state and federal regulatory agencies, agriculture groups, point sources, environmental advocates and other interested stakeholders fill this role. This is a time-consuming process, so districts rarely take a lead but may participate as part of a group. Regardless of how the program design emerges, it still needs to go through a public process and be formally incorporated into a National Pollutant Discharge Elimination System (NPDES) permit. Program development needs adequate funding and can be a time-consuming process. However, participation in a collective enables districts to "ground truth" framework options based on their experiences with farmers. Districts can help shape the framework to better fit their own expectations for possible roles. Districts can also help markets complete high-quality watershed assessments to identify the most strategic needs and opportunities for environmental improvements. Most districts will be in an ideal position to make sure a market is in accordance with local planning and community needs. Note that in the absence of a high-quality watershed assessment, trading can sometimes go forward but must include a reasonable margin of safety. Districts can also help identify the synergies between existing conservation cost-share programs and services and potential markets. The National Network guidance document (NNWQT 2015) offers a time-saving template built on the lessons learned by previous trading programs.

PROJECT VERIFICATION AND/OR CERTIFICATION

Project verification and/or certification guarantees the amount and quality of services anticipated to be provided. This includes making sure that the design of a BMP meets high quality standards, is fully implemented to meet to those standards and its effectiveness will be maintained. Again, the certification entity needs to be seen as independent and credible, and districts will need a clear process in place to identify, avoid or mitigate any conflicts of interest. In addition, certifiers must have the scientific and technical credentials to evaluate the site and the supplier and be able to assess the supplier's

performance potential against their baseline. Ideally, they should be accredited, trained and included in ongoing updates to trading program rules and tools. Annual reporting and all documentation from the credit verification process should be readily available for agency and public review.

Deciding Whether and How to Participate

The districts that chose to get involved in market development made the decision based on what their key conservation issues were and whether their involvement would help address those issues. They carefully considered their resources and any outside factors that could affect their ability to participate. They were realistic about their resources and capabilities. They also kept their customers front and center—knowing what producers might need to participate and how they could make the opportunity more accessible and convenient for them. Making these critical decisions—and other considerations—can help districts reap the benefits and avoid the pitfalls to market involvement. As an easy primer, we recommend that districts revisit a decade-old, easy-to-use workbook for marketing conservation services that is available online through NRCS (NACD, NASCA and NRCS 1994).[4]

Benefits for Districts

Early in the Ohio River Basin WQT project, AFT queried conservation district staff about their perceptions and their potential role (Fox 2010). For example, the district staff in the Ohio River Basin felt the benefits from participating in WQT were additional funding (both for technical services

4. "Marketing for Conservation Success," www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1045542.doc

and implementation); an increase in the importance of conservation districts in the community; the potential to expand their trusted relationships with producers; and more funding for conservation practices. WQT programs could provide a more efficient process, simpler forms and greater flexibility to producers than the incentive programs they are currently offered, although this is not always the case. AFT has also found that district staff who participate in markets learn quickly that markets are not about conservation practices per se, but about the reduction of nutrient runoff in lbs/acre. This "pay for performance" approach can have an important impact on the mindset of district staff, reminding them why the type of conservation practice and its placement are so important.

> The districts that chose to get involved in market development made the decision based on what their key conservation issues were and whether their involvement would help address those issues.

The case study examples (Appendix I) cite the benefits of having an alternative funding mechanism to incentivize worthy conservation practices. While it is desirable that trading revenues cover the entire cost of implementing a BMP for the farmer, in many cases they do not or even come close. The revenues received do represent an additional "reward" for conservation work that can add up to a significant amount over years of participation. Also, the farmer may believe there are other environmental or agronomic benefits which make the investment worthwhile. An overriding sentiment was for districts to pursue markets, not as a revenue generator for the district, but more as a "partnership" to provide local benefits to multiple stakeholders.

The case studies also confirm that project implementation fits with what districts already do. Verifying fits partially, but at least one district expressed a concern that if a project is found to be sub-par, it could put the verifying district in an uncomfortable pseudo-enforcement role. Managing credit tracking and accounting could be a good fit because it puts the district in a coordination role that fits with its role in the community, but it also could be an administrative burden. Some of the case studies also cite the benefit of forming new relationships between cities and rural landowners. One case study recommended focusing on community-based WQT programs at the Hydrologic Unit Code(HUC) 8 level (about 700 square miles) or county level, including minor NPDES permit holders while focusing trading on areas of most impact (headwaters and critical source areas).

Barriers for Districts

Potential negatives for conservation district offices include not enough staff or staff time; possible conflicts with other funding sources (sometimes outside funding just provides a county or state with an excuse not to fund their district office); misperceptions (districts cannot risk being perceived as "working for" large wastewater treatment plants or utility companies or EPA); and the inability to recognize projects with a high crediting potential to avoid wasting time with low quality projects (Fox 2010). Regarding an oversight function in the market (as monitors and verifiers), district staff said if they were involved up front in the development of the WQT market, they would expect to be involved in verification. They could bring producers back into compliance before they go into default. The district staff felt the credited BMPs had to have integrity (e.g. conform to NRCS practice standards) and these would be important issues to get right. They also felt that noncompliance

roles were critical (e.g. conflict resolution, revoking credits) but that the districts needed to be the impartial third party verifiers, not the enforcers.

Our case study examples (Appendix I) caution that markets are not a silver bullet. Districts need to engage agency partners early and often, and key stakeholders need to be involved. The case studies advise against pursuing markets as a revenue generator when they should be viewed as a partnership to provide local benefits to multiple stakeholders. Trading income that farmers receive as a supplemental source of revenue help to demonstrate that "conservation pays." They also warn that it is easy to underestimate the time involved in setting up a program and, in the end, the process may be too cumbersome for the district or too complicated for the producer. The case studies cautioned that a program may not be operational for enough time to justify an increase in manpower.

Applying Lessons to Certainty/Stewardship Programs and Supply Chain Sustainability Efforts

JAMES SCHWABEL/ALAMY

Certainty Programs

Certainty programs are voluntary programs that have been created at the state- or multi-state level to provide landowners and producers with some degree of regulatory certainty in exchange for adopting best management practices (BMPs) in their operations (Berry 2012; Berry 2014). They provide confidentiality to participants, set agreed-to BMPs and require verification to prove that farmers have implemented the required BMPs (Hays 2016). Some state programs do not address regulatory certainty but seek to recognize stewardship accomplishments of producers.

Like markets, these programs are designed to accomplish a conservation outcome (e.g. protect habitat for certain species or protect water quality). They also rely on scientifically sound practices and systems to achieve verifiable water quality or habitat gains. Most programs are locally led with conservation districts playing a significant role in prioritizing resource concerns and administering and/or providing technical assistance to participants (Berry 2012). States with certainty/stewardship programs include Kentucky, Louisiana, Michigan, Minnesota, Mississippi, New York, Texas, Utah and Virginia. New programs are under development in Arkansas, Delaware, Maryland, Massachusetts, Oregon, Wisconsin and Vermont (Hays 2016). USDA's Working Lands for Wildlife Program has also harnessed this type of approach in partnership with the U.S. Fish and Wildlife

Service to provide certainty to landowners and producers who implement conservation practices that benefit target species and priority landscapes.

The development of certainty programs can include the following elements: 1) establish certainty requirements (e.g. conservation BMP systems for improving water quality); 2) develop comprehensive farm specific conservation plans with approved conservation systems to meet certainty requirements. These need to meet local needs and conditions and may include performance standards to achieve certification; 3) deliver education (this includes trained technical assistance (e.g. Certified Conservation Planner) and initial and on-going farmer education (i.e. LA Master Farmer Program); 4) verify maintenance of implemented BMPs; 5) incorporate adaptive management for continuous improvement (this also helps maintain certification as production system change); and 6) establish re-certification timeframe for participants (Berry 2012). Like environmental markets, certainty programs need to set high standards and develop consensus on standards from state and federal agencies and stakeholders. They also need to be inclusive and transparent; do extensive outreach and education to producers about the program and its benefits; involve producers from the beginning in both the design and execution; obtain legislative approval or endorsement; account for all BMPs in place regardless of how they are funded; recognize the power of "stewardship" in the marketplace and seek ways to simplify their processes.

Supply Chain Sustainability Programs

Programs continue to emerge across food supply chains to document—and perhaps ultimately reward—producers who continually improve natural resource stewardship. By 2013, most food companies already had a sustainability profile and many were starting to focus on the sustainability of the raw materials they use (Hamilton and Reaves 2014). Unilever established metrics-bound commitments, and Walmart, McDonalds, General Mills and Annie's followed suit. Unilever now intends to sustainably source 100 percent of its agricultural materials by 2020 and requires all of its suppliers to use its Sustainable Agriculture Code (which features 11 social, economic and environmental factors). Because of their size and market impact, Unilever is driving transformational change within the industry. By 2020, experts predict that all food companies in the U.S., Europe and many other parts of the world will have made public commitments to source food that is sustainably produced (Hamilton and Reaves 2014). Conservation districts may find new roles, responsibilities and resources in this emerging area—starting with good conservation planning and possibly leading to technical assistance for best

Most programs are locally led with conservation districts playing a significant role in prioritizing resource concerns and administering and/or providing technical assistance to participants.

management practices along with monitoring and verification of farm stewardship (NACD 2016). Like environmental markets, these programs rely on scientifically sound practices and systems; require extensive outreach and education to producers about the program and its benefits; should involve producers from the beginning in both the design and execution; recognize the power of "stewardship" in the marketplace; and need to seek ways to simplify their processes.

On-going efforts in the U.S. to develop systems for measuring sustainable performance throughout supply chains include the Stewardship Index for Specialty Crops (SISC) and Field to Market (F2M). SICS is focused on developing metrics for specialty crops (fruits, vegetables and nuts). Several conservation districts have been involved in developing the guidelines, which were developed by a broad partnership across the entire supply chain. Currently, districts are working with a number of groups and farmers to test the guidelines in the leafy green sector of Central California. Field to Market is focused on "commodity crops" and has set a goal of engaging 20 percent of productive acres of U.S. commodity crop production (50 million acres) in its Supply Chain Sustainability Program by 2020. Local conservation districts are involved in a number of pilot projects to help growers validate and refine metrics and develop consistent methodologies and approaches (Hamilton and Reeves 2014).

Summary and Recommendations

PHOTO COURTESY OF USDA NRCS

Most districts involved in environmental markets have felt they derived benefits from their involvement, particularly since the markets had initiated and strengthened dialogue and partnerships with others in their districts. By and large, however, they advise against pursuing markets as a revenue generator, seeing them more as a partnership to provide local benefits to multiple stakeholders. They view any trading income to farmers as a supplemental source of revenue to help demonstrate that "conservation pays." They seem to be most comfortable in roles that included direct contact with producers (i.e. implementing projects and monitoring and verifying them). However, although WQT might mean less paperwork for farmers, it could increase the paperwork for district staff.

Districts can also apply the lessons learned from trading to the partnership opportunities offered by emerging state certainty and supply chain sustainability programs. These emerging opportunities, approached in an informed manner, can help broaden partnerships to reach out to new customers to deliver local conservation solutions.

With this in mind, we offer the following recommendations:

- Use the accompanying checklist and guidance for conservation districts and partners offered in Appendix III. Research your interests and needs first and then identify which programs will meet those needs and interests.

- Take it slow and fully understand the opportunity before full implementation. Figure out what the benefit is for the district, for the farmers and whether you trust the market opportunity and administrators. Make sure funding is adequate for start-up and will last for at least three to five years.
- Do not underestimate the amount of time involved with setting up a program or trading. It may be easier to focus on smaller watersheds and work with minor NPDES permit holders to address areas of most impact (headwaters and critical source areas).
- Setting up a framework and involving key stakeholders in this process can be critical. Advisory groups are a must.
- The level of understanding among stakeholders is usually very low, so education/outreach is critical. Make sure there is sufficient outreach to potential participants and stakeholders. Setting up an advisory group composed of local leaders who can help promote water quality and eco-services trading can help speed implementation.
- Engage agency partners early and often in the process of developing recommendations, but be more selective in how much you ask agricultural producers to be involved. Choose key update/decision points to engage the producers so that they don't feel like you're taking too much of their time.
- Acting as a verifier could put a conservation district in an uncomfortable pseudo-enforcement role. Start verification even before work is done.
- Managing credit tracking and accounting could be a good fit because it puts the conservation district in a coordination role, but it could also be an administrative burden.

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APPENDICES

APPENDIX I: CASE STUDIES

CASE STUDY:
Laguna Water Quality Trading Project, California

Sonoma County Resource Conservation District Valerie Minton, Program Director

Details

The Laguna WQT project was the first market of its kind in California. The program was distinctive because it incorporated a zero-discharge permit and the ability to bank credits. It was also one of the first wastewater credit trading programs in California. The initial credits were used following heavy rainfall in recent years. Under a 2012 USDA Natural Resources Conservation Service (NRCS) Conservation Innovation Grant, the wastewater treatment plant in Santa Rosa was given opportunity to meet compliance goals with water quality offset credits. Santa Rosa is the largest metropolitan area on California's north coast. The Sonoma[5] and Gold Ridge Resource Conservation Districts, in collaboration with consultants, partners and local agricultural landowners/managers, undertook a three-year process to develop recommendations for water quality credit trading in the Laguna de Santa Rosa Watershed (a small watershed draining about 254 square miles). This is the largest freshwater wetlands complex on the northern California coast and the Laguna is the largest tributary of the Russian River. About one quarter of the watershed's area has been designated "important farmland" by the California Department of Conservation. The resulting recommendations form a framework whereby point source dischargers (e.g., wastewater treatment plants or municipal stormwater systems) can meet pollution reduction needs by paying for quantifiable nonpoint source reductions voluntarily implemented elsewhere in the watershed (e.g. manure management projects or erosion control).

The first phase of the project has been completed, but as of this report's publishing, the California Environmental Protection Agency North Coast Regional Water Quality Control Board had proposed a new WQT project. According to a scoping document:

"North Coast Regional Water Quality Control Board (Regional Water Board) staff proposes to develop a new water quality trading (WQT) framework for the Laguna de Santa Rosa watershed, and to bring the framework to the Regional Water Board for approval by resolution in August 2017…"

"The new WQT framework proposed by staff is designed to achieve the following goals: 1) expand the use of WQT beyond the City of Santa Rosa to include the Town of Windsor; 2) test a set of new program elements that can be expanded to greater scale once the TMDLs are adopted; and

5. The Sotoyome and Southern Sonoma RC&Ds were reorganized into the Sonoma RCD in July 2013. The Sonoma RCD covers 919,000 acres or over 85 percent of Sonoma County.

3) promote restoration actions that will improve the Laguna's ability to assimilate the pollutants of concern."

The project scoping/development period extends through May 2017 with a public draft release for public comment scheduled for mid-June through mid-July. A regional board hearing is tentatively set for December 13, 2017.

Advice

Don't expect WQT to be a "silver bullet" that will fund all kinds of projects. We've found that it's only cost-effective if the water quality issues can be easily and directly linked to a waterway (vs. for example an erosion feature that discharges away from a water body and then flows over land before it gets to the water body). Be open with participating landowners and upfront that the process may be complicated in terms of landowner agreements, verification and monitoring, potentially needing to do prevailing wage construction, etc.

Engage agency partners early and often in the process of developing recommendations, but be more selective in how much you ask ag producers to be involved. We structured our three-year Conservation Innovation Grant project to have producer meetings as frequently as agency/non-profit meetings, but it quickly became apparent that they weren't interested in the same level of detail and weren't engaged enough to show up that frequently. Choose key update/decision points to engage the producers so that they don't feel like you're taking too much of their time.

Setting up a framework and involving key stakeholders in this process can be critical. We did a couple of projects on the ground to meet water quality offset credits. Realizing how hard it was to generate credits, we have taken steps to develop a formalized market.

Setting up a framework and involving key stakeholders in this process can be critical. We did a couple of projects on the ground to meet water quality offset credits. Realizing how hard it was to generate credits, we have taken steps to develop a formalized market. The recommendations that came out of our projects are for what we see as a better, more functional system to generate water quality credits in the watershed. We involved the staff from the regulatory body, the Regional Water Board, throughout the project so they got to hear what everyone else was saying. They are now recommending the adoption of our framework for a credit program. However, there may still be opposition from environmental activists who oppose trading.

We established two advisory groups. The Project Advisory Committee was mainly agencies and non-profits that met roughly quarterly and had some web conferences in between. The Stakeholder Advisory Committee was mainly agricultural producers and commodity groups that met roughly quarterly, but skipped some meetings toward the end. Both were advisory bodies, not decision-making. We tried to follow all recommendations, but in some cases the group couldn't agree, and the Project Team (RCD and consultants) needed to make a decision. The learning curve for the advisory groups and our board members was huge. We got to a good level of understanding by the end of the discussions but because of the nature of the market (demand comes in fits and starts), it will be hard to keep people aware of it and remembering the details.

District Roles

We think the most comfortable roles for districts will be implementing credit projects, perhaps verifying credit projects, and perhaps managing the credit tracking and accounting. We (Sonoma) decided there was a bigger role for us than just verification. We kept open the possibility of an RCD playing the role of administrator. Concerning technical assistance and verification by the same entity, we had discussions with a variety of people involved in development of the framework, and there weren't any concerns about (both) administering and technical assistance.

The verification process should start even before the work is done. You should be in touch during the process and be very clear that "This is what we're going to be looking for. Do this." Consultants would be capable of being verifiers.

Implementing projects fits with what the RCD is already doing. Verifying fits partially, but there is a concern that, if a project is found to be sub-par, it could put the verifying RCD in an uncomfortable pseudo-enforcement role. Managing credit tracking and accounting could be a good fit because it puts the RCD in a coordination role that fits with the RCD's role in the community, but it also could be an administrative burden.

We don't think districts would rely on WQT as the core of their business. We see it as an alternate funding mechanism to do the kind of conservation practices that are worthy. Ideally, markets are another way for us to fund that important work.

Did the Program Provide Additional Revenue to the District?

The point-source discharger paid the RCD for development and implementation of projects, and the CIG paid for the RCD's expenses to lead the three-year stakeholder process. After that, we passed it along to Regional Water Board staff. The market needs demand for credits, and the city of Santa Rosa, our main credit buyer in the short term, has met their demand. They are interested in banking for the future, but they are really interested in getting a bunch of credits for a good price. Right now they don't need them. There's no demand anywhere nearby. More significant demand will not likely occur until the current buyer's credits start to term out, or until other point sources have similar permit compliance options.

We're excited that we've been part of a CIG and are looking for opportunities to be involved again. We remain in contact with city of Santa Rosa to help them develop more projects. For more information, see our recommendations on our web site. Also, visit our FAQs and Framework on the web. http://www.lagunawaterquality.org/

Current Status of Market

The project completed three trades:

1. Sediment reduction on unpaved roads in a privately-owned nature preserve: Sediment was going into streams and had nutrients bound to it. From the trading perspective, they could quantify reductions in phosphorus (P) with resulting improvements in water quality and fisheries. This property is a nature preserve, privately owned.
2. Organic dairy: Improved livestock crossing to avoid contact with surface water; reconfigured pasture and installed changes in fencing to keep a heavy use area away from the stream; and installed a concrete area to handle solids from manure ponds. The district provided technical assistance and worked with an engineer and consultant. They didn't put a lot of emphasis on making sure they met NRCS standards, but in general were consistent with the standards.
3. Legacy dairy site that is no longer a dairy: The city paid to remove big manure ponds that were a threat to water quality.

The Regional Water Board staff is crafting updates to the Regional Board's offset policy to mirror and build upon the recommendations that came out of the stakeholder process.

Other Comments

We used expert consultants and read lots of articles and materials from other programs. When we were almost done with our project, a couple new resources became available—the National Network protocols and the Joint Regional recommendations. I would definitely rely more on those if they had been around earlier.

The Sonoma RCD is now working on carbon farming and sequestration regionally. We use the term "carbon farming" intentionally. There is a tight coalition of five districts around the Bay area—Marin, Napa, Sonoma and Mendocino (which has two districts) counties. Other RCDs are interfacing with on a broader level. There will be quite a few in coastal California picking up the idea and running with it. We (the coalition) pieced together seed money to put together template materials on carbon farming and are hoping others will get to use it. We are working on a template for carbon farming for vineyards. Five years ago, we weren't working nearly this closely with our neighbors. Now we are.

Carbon farming consists of traditional conservation practices just explained and described in a different way. When you address water quality and other conservation goals, conservation practices are so interconnected with other things (such as carbon sequestration) that it is a challenge to stay on-point with the message. But it is important for landowners to get recognition for doing all of these other things for the land. It's an interesting challenge, developing materials and processes. When we're working with landowners on a management plan, we try to link all of the ecosystem services together and consider what is already in place and how it can be enhanced. A carbon market would be one facet. I'm not convinced it will generate credits on vineyards. You can increase soil carbon, but I'm not sure it would be enough to sell, although it would be enough to improve soil health. On rangeland, we see larger opportunities since these lands might have more capacity to sequester carbon. We struggled for a while and called it soil health but now we're calling it carbon farming because people are excited about that. Some are imagining we can use it for marketing, depending on who the buyers are. We're finding that a lot of people want to do the right thing.

CASE STUDY:
Washington County, Oregon

Tualatin River Shade and Temperature Ecosystem Services Trading Credit Program Lacey Townsend, Executive Director, Tualatin Soil and Water Conservation District

Details

The 83-mile-long Tualatin River is a tributary of the Willamette River that drains a fertile farming region (Tualatin Valley) to the southwest and west of Portland in the northwest corner of the Willamette Valley. The primary function of the program is to plant trees along the river corridor to increase shade, thereby controlling temperature along the river corridor. The program is distinctive in that the district works with Clean Water Services (a regional water utility), which receives shade credits for shade creation. The Tualatin Soil and Water Conservation District works directly with private landowners in rural Washington County on a voluntary basis. Landowners can sign up for assistance through the Enhanced Conservation Reserve Enhancement Program (ECREP), which combines funding from the federal CREP program, Oregon Watershed Enhancement Board (OWEB) and Clean Water Services to cover all project costs. The program features 10- to 15-year easements and options to re-enroll.

The district provides all the technical assistance and planning and hires contractors. The program began in 2004. At the time, federal programs were not popular in the watershed due to low reimbursement levels and skepticism about easement granting. The Tualatin SWCD engaged in outreach to establish trust with the farmers and learn more about the amount of funding needed. As a result, the utility augments the federal programs to encourage greater participation. The SWCD also partners with Clean Water Services to offer the Vegetated Buffer Areas for Conservation Program (VEGBAC), which is funded entirely with local dollars. VEGBAC enrollment options include stewardship agreements tied to the deed and filed through the county for 15, 20 or 30 years. Stewardship agreements are essentially modified conservation easements that provide long-term stability for the project investment. There is also a 10-year VEGBAC option with a small per-acre cost share component for the landowner. Clean Water Services provides funding to the district for materials.

Tualatin SWCD also does similar stream enhancement projects through the NRCS EQIP program.

Advice

"It takes a lot of effort to build the partnerships. It is an adjustment for some people who haven't worked with federal programs, both for the landowners and the districts. There is

a learning curve. There is reporting on our part, a ranking system for projects, and then Clean Water Services reviews and determines what projects to fund. Clean Water Services provides us a dollar amount per acre we enroll, with 30 percent going to staff and operations. We have a program manager who oversees two project managers, a technician and an outreach and enrollment specialist. We are at capacity with over 75 projects, and 700 acres under management.

The program features 10- to 15-year easements and options to re-enroll. The district provides all the technical assistance and planning and hires contractors. There are no out-of-pocket expenses for landowners.

"When planning these programs we had an advisory group that included our district board chair, along with federal partners, Clean Water Services, the district and landowners. They worked for 2 1/2 years on (developing) the ECREP program. We still meet annually with a Steering Committee of all the partners, including the district, Clean Water Services, Farm Service Agency (FSA), NRCS and Oregon Department of Forestry, which provides technical review of project plans.

"The level of understanding of markets among stakeholders was nonexistent at the beginning of the planning process. Among our board members, the level of understanding was moderate and not all of them knew all the details. The newer Board members now have a basic understanding. We usually put new board members on the Contract Committee so they have to review new projects, or on the budget committee so they have understanding of how a project works."

District Roles

"We basically do all of the on-the-ground work for the program except for the credit action piece. We are the only contact for the landowners. They come to see us to enroll in ECREP or VEGBAC. It was a big piece for us to be the face of the program, because of the trust issue."

Did the Program Provide Additional Revenue to the District?

"Yes. We have an intergovernmental agreement (IGA) with Clean Water Services that provides a set dollar amount per-acre enrolled. We use 30 percent for staff and operations and 70 percent for restoration contractors who implement treatments on the ground. All of the plants used on project sites come from local nurseries in the basin."

Current Status of Market

The market is ongoing.

Other Comments

"We developed outreach materials to help landowners understand how these programs work, and utilize those materials in targeted outreach efforts. There is also a USDA NRCS Regional Conservation Partnership Program project led by the Pinchot Institute that includes our county for forestry projects. They are looking at the carbon market."

CASE STUDY:
Big Sioux River Watershed Project, South Dakota

Moody County, South Dakota, Payment for Ecosystem Services Program
Jack Majeres, Chair, Moody County Conservation District
Barry Berg, District Watershed Coordinator

Details

As the Big Sioux River flows from Brookings to Sioux Falls, it winds through a region dotted with dozens of small livestock operations. Work to improve water quality on the Big Sioux River has been ongoing for about three decades. In 2006, the Moody District began working on the multi-year Central Big Sioux River Watershed Project in cooperation with the Brookings, Lake and Minnehaha Conservation Districts, the East Dakota Water Development District, and the city of Sioux Falls. In 2010, the district became the prime sponsor for that project to address the water quality concerns in the Big Sioux River basin between the Brookings/Hamlin County line and Brandon, South Dakota. In 2012, the Central Big Sioux Watershed Project joined with the Lower Big Sioux River Watershed Project, resulting in a combined coverage area from the Brookings/Hamlin County (South Dakota) line to the Big Sioux River's confluence with the Missouri River at Sioux City, Iowa. The cities of Brookings and Brandon were added to the list of cooperating members of the watershed project, and it was renamed the Big Sioux River Watershed Project.

Also in 2012, the Moody County conservation district was awarded a USDA NRCS Conservation Innovation Grant to develop a WQT program for the Central Big Sioux River Watershed project area. The goal was to facilitate implementation of BMPs for sediment and bacteria and then develop WQT programs in other parts of the Big Sioux River Basin and other river basins throughout the region. (The Central Big Sioux River program used the Payment for Ecosystem Services (PES) approach.)

The PES program protocols are designed to address multiple types of bacteria but can be modified to address other water impairments. The program allows a buyer to pay another entity to provide a new environmental benefit. Common uses of PES programs have included: 1) reduce nitrates in wellhead protection areas for drinking water supply; 2) reduce stream peak flows and/or increase the base flows; and 3) reduce water quality parameter loading upstream of river reaches flowing through the city. The primary practice used for payments was seasonal livestock exclusion from Skunk Creek, a tributary of the Missouri River.

Advice

"Our best advice is to research the interests and needs, then identify which programs will meet those interests and needs.

"We established a 13-member Technical Advisory Team composed of federal and state agencies, local units of government, and agriculture producers to review and advise on the protocols. The city of Sioux Falls was aware of the program before we started, but no other stakeholders were. Before the project began, there was little to no understanding among the Moody County Conservation District (MCCD) board members. Now, they are aware of the WQCT/PES programs and what they are designed to address."

District Roles

"Districts need to be that local conduit between the rural and urban stakeholders/constituents that we are delegated to serve. In our situation, the district is the watershed project sponsor, so it was incumbent upon the district to pursue a CIG to develop and test protocols."

Did the Program Provide Additional Revenue to the District?

No, the CIG funds were primarily used to reimburse RESPEC Engineering and Kieser & Associates (consultants) for their work in developing and testing the protocols and for public outreach.

Current Status of Market

Three landowners/livestock producers (one livestock feeding operation and two livestock grazing operations) in the Skunk Creek Watershed in southeast South Dakota agreed to test the protocols. The city of Sioux Falls was the "buyer" for the test program but is now waiting to see what the city's new Municipal Separate Storm Sewer System (MS4) Program permit requirements will be. EPA Region 8 staff is currently reviewing the MS4 permit update. The new MS4 permit requirements will determine what the storm water bacteria limits will be, and if the city will need to utilize a PES type program, pending EPA's approval of the test protocols.

Other Comments

"The MCCD contracted with RESPEC Engineering, Rapid City, South Dakota, and Kieser & Associates (K&A), Kalamazoo, Michigan. K&A has extensive experience in developing WQT programs, and RESPEC has extensive knowledge of the Big Sioux River Watershed and a good working relationship with the city of Sioux Falls. Through the combined efforts of RESPEC and K&A, our Big Sioux River Watershed Project coordinator, the three livestock producers that tested the protocols, and the city of Sioux Falls working with the MCCD board and staff, we were able to complete the project.

Districts need to be that local conduit between the rural and urban stakeholders/constituents that we are delegated to serve.

"We are not considering any other markets at this time, because there isn't a need for one in our Big Sioux River Watershed Project area."

CASE STUDY:
Conservation Marketplace Midwest

Dennis Fuchs, District Administrator, Stearns County SWCD, Minnesota

Details

The Conservation Marketplace Midwest (CMM) evolved from projects and partners dating back nearly 10 years. Originally, the Sauk River Watershed Ecosystems Service Market was formed and co-led in 2008 by the Sauk River Watershed District (SRWD), Stearns SWCD, American Farmland Trust and Kieser & Associates, LLC. Between 2008 and 2010, SRWD and Stearns SWCD partnered with additional organizations (the Minnesota River Board, the Minnesota State University Water Resources Board, the Greater Blue Earth River Basin Alliance and Rural Advantage), and that effort evolved into the Conservation Marketplace of Minnesota. The partners were mainly focused on initiating WQT and carbon trading (through the Chicago Climate Exchange—CCX). However, the Minnesota Pollution Control Agency shifted its WQT efforts to focus on trading between point sources, and CCX closed its doors to new GHG trades.

With the loss of WQT and GHG market potential and the loss of SRWD as a participating partner, the project renamed itself the Conservation Marketplace Midwest and became a nonprofit in 2013 to help meet water quality goals in watersheds across southern and central Minnesota (www.conservationmarketplacemidwest.org.) The CMM watershed service areas include the Sauk River watershed, the Lower/Middle Minnesota River watersheds and the Greater Blue Earth River watershed. The key objectives include: 1) advance conservation through innovative programs that value and award ecological uplift; 2) identify and partner with collaborators desiring a landscape that delivers more ecological value; 3) develop processes that are credible, have transparency and build program integrity; and 4) expand the knowledge base through education, research and outreach. The founding Board of Directors was drawn from the Minnesota River Board, the Water Resources Center, the Greater Blue Earth River Basin Alliance, Stearns County SWCD, Kieser & Associates, LLC, AFT and Rural Advantage.

CMM works to connect buyers and sellers of ecosystem services, also referred to as nature's benefits. CMM's local service providers—ag and conservation professionals, crop consultants, cooperating SWCD staff—are trained to provide a credible and quality experience for both the funding organization (buyer) and the land manager or farmer (seller) who is implementing the environmental BMPs. The CMM network provides a cost-effective, efficient implementation process and administration services to connect these buyers and sellers of ecosystem services. CMM's framework provides the contacts for shovel-ready implementation, necessary site-assessments, environmental credit valuation, record-keeping, and reporting for buyers and sellers.

CMM has been involved or is currently involved in several ecosystem service market efforts, including:

- Pollinator Habitat Project: With funding from the General Mills Foundation, CMM implemented a pilot project to increase the number of acres of high quality habitat and forage for pollinators. The project established 20 acres of pollinator habitat on approximately 10 two-acre sites across the state. What sets this project apart from other restoration efforts is the payment for ecological uplift, recognizing the pollinating services provided as a result of the planting. Participants are paid an annual credit payment of $75 for each half acre of habitat or $150/acre for the life of the contract.
- Drinking Water/Source Water Protection: Intensified land use and resource extraction, coupled with climate change, is challenging communities to provide a clean and affordable water supply. To address these concerns, CMM developed incentive-based tools to protect and restore drinking water quality. This voluntary approach rewards changes in land use management that are directly related to the protection of drinking water. CMM has successfully implemented nitrogen reduction programs for the city of Cold Spring and the city of St. Peter in Minnesota.
- Field Stewards: With assistance from a USDA-NRCS Conservation Innovation Grant, for the last few years CMM has been working with Environmental Initiative and GNP Company to develop a commodity-crop sustainable supply-chain certificate program. This market-based initiative connects food manufacturers who are interested in demonstrating environmental sustainability across their production process with farmers who operate their farms in a sustainable manner. In this program, farmers who reach a high level of environmental protection, certified by the Field Stewards program, are eligible to receive payment for the right to use those farms' supply-chain certificates in the food processor's sustainability program.

Advice

"Our best advice is to take it slow. It is important to fully understand the opportunity before full implementation. Another important aspect is the need for sufficient outreach to potential participants and stakeholders. Many people in our area are either unaware of these types of markets or view WQT as "pollution trading." There is more awareness now, but these issues still need to be addressed through a thorough outreach and education program.

"Another way to gain support for ecosystem markets and trading is to establish an advisory group. The advisory group in our area included a broad range of interests from agriculture to lakes to

communities. Identification of local leaders to help promote water quality and eco-services trading is valuable for quicker implementation."

District Roles

District staffs have filled multiple roles in the various efforts, including coordination and technical expertise in implementation of conservation practices, verification of practices and certification. Conservation districts are uniquely qualified to fill these various roles. Conservation District's have significant expertise in applying conservation practices. In addition, many times district staff spend significant time coordinating between the landowner and partners. This makes coordinating activities associated with ecosystem services a natural fit.

Did the Program Provide Additional Revenue to the District?

Yes, both grant funding and private industry funding that was available to implement the projects helped pay for district staff time.

Current Status of Market

The Field Stewards program is currently active and was first deployed on a pilot scale with a limited number of farmers in Stearns County, Minnesota. In 2015, the program grew to include 15 farmers and more than 1,700 certified corn and soybean acres. As part of the pilot process, GNP Company committed to buying $15,000 of certificates and was considering offsets for its Just Bare brand of chicken by purchasing 5,000 to 6,000 soybean acres that have reached or exceeded the required Water Quality Index for Agricultural Runoff (WQIag) 8.5 out of 10.00 threshold. However, GNP Company and the Just Bare brand have been sold twice since the start of pilot testing. Currently Pilgrims' Pride owns the Just Bare brand, and discussions are under way with the new owner. Additionally, the Fields Stewards program is being leveraged with the state's regulatory certainty program for producers, which is called the Minnesota Agricultural Water Quality Certification (MAWQC) program. MAWQC also uses the WQIag tool and has the same threshold, creating a ready-made pool of pre-approved certificates for Field Stewards. However, producer involvement in MAWQC is not a requirement of Field Stewards. CMM is also considering continuing its work with pollinators and investigating markets related to water storage and soil health.

District staffs have filled multiple roles in the various efforts, including coordination and technical expertise in implementation of conservation practices, verification of practices and certification.

CASE STUDY:
Lower Fox River Pilot P Trading, Wisconsin

Greg Baneck, County Conservationist, Outagamie County Land Conservation Department
Bill Hafs, Director of Environmental Programs, NEW Water
(Green Bay Metropolitan Sewerage District)

Details

The first modern water quality trade between a farmer and a wastewater treatment facility on the U.S. side of the Great Lakes Basin was signed in October 2016. The trade culminated in a multi-year project known as Fox P Trade.

Phosphorus is a major water quality concern in the Great Lakes, and the Fox River is a major source. The Lower Fox River basin is located in northeastern Wisconsin and encompasses Brown, Calumet, Outagamie and Winnebago counties. The lower Fox is subject to a Total Maximum Daily Load (TMDL), which has driven efforts to find cost-effective ways to reduce phosphorus loading. Nonpoint sources include runoff from barnyards, areas winter-spread with livestock manure, eroding agricultural lands and streambank erosion, cattle accessing the streams and other poor land use practices.

District Comments

"The Great Lakes Commission brokered the trade. They hired the Fox-Wolf Watershed Alliance as their contractor to coordinate with the point sources. The Commission also has staff in Ann Arbor. The Brown and Outagamie County Land Conservation Departments (LCDs are conservation districts in Wisconsin) provided technical assistance and direct contact with farmers. Districts gave GLC the numbers, and they did the accounting. They generated and created forms and stuff for us to use. We completed one trade with an agricultural producer. The point source buyer was NEW Water, the Green Bay Metropolitan Sewerage District. NEW Water was interested in permanent credits and less interested in credits that were short-term."

Advice

Do not underestimate the time involved with setting up a program or trading.

District Comments

"We had held out hope that conservation tillage in the priority watershed would help address our problems, but as the cost-share went away a lot of the plows came out. Now, we're pushing cover crops, but a lot of them are subsidized. My hope was once cost share went away, we could use trading to fund the cover crops, but it is going to take a while. You better have funding for staff. All our time was gratis. If a program can get up and running, it does have potential with the Silver Creek Pilot. Bill Hafs and NEW Water are dabbling in adaptive management, and one of my staff is funded by it. They are working on tying up their project with adaptive management and say they reserve the right

to claim the credits that are generated. At the end of the day, they need to meet their permit. They are considering expanding the pilot and are watching their water quality."

The Commission formed advisory groups. The primary group was a work group that staff from both conservation districts served on, along with the point sources, Appleton wastewater treatment and NEW Water and, periodically, the Department of Natural Resources, Jessica from Fox-Wolf and a representative from the Great Lakes Commission. And there was a broader group set up by the commission.

The commission was interested primarily with how the P trade would benefit NEW Water, its WPDES permit and the cost."

District Roles

The districts serve as aggregators, identifying opportunities for credits. They provide technical assistance for practice installation. They also serve as verifiers, assuring that the prescribed practices tied to credits are in place. In the case of this first trade, the Outagamie County LCD served those roles.

The LCD staff felt most comfortable in roles that include direct contact with producers. "For 30 to 40 years, we've been building relationships with our producers. My biggest concern was of others coming in and saying, "We're going to work with farmers." Give us the opportunity to work with them. It is just another cost-share program. The districts also participate in a multi-stakeholder work group set up by the GLC."

"Our best fit was as the aggregator identifying opportunities for credits. Brokering? We opted out of that. That is what Jessica does on behalf of the Great Lakes Commission. But we rolled back in as the verifier of the credits. Trading is just another grant program, and if they (producers) get paid for installing practices, you have to be there (for verification). If we had a robust trading program, it would be a full-time position. I definitely think that's our role. We are that liaison between the point source and the producers. If we get paid to say you have to do something more, that's what they have to do. You are just trying to help them through the process. We implement the agricultural performance standards in my county. If we need to swing a hammer, we will. But 9.9 times out of 10, my staff tells a farmer he has to fix this, and we're going to work with you. It is not regulation. It is an opportunity for a producer to put in a practice and get paid for it."

Did the Program Provide Additional Revenue to the District?

"No. In fact, Outagamie County LCD did much of its work without reimbursement to help get the program off the ground. District staff calculated that for every $50 phosphorus credit, it would require a fee of $10 per credit. Credits are valued at about $50. You go much above that, and a point source has little incentive to think about trading."

Current Status of the Market

"The market is very young but it has potential—maybe. There are sellers, but not many buyers. With the frustration of the work involved in it, we probably won't push it that hard. We are working

with Heart of the Valley Sewerage System on some of their own land that they rent out. Challenges include the lack of staffing structure for wide-scale trading and the complexity of trading programs. Trading policies in Wisconsin make it difficult to get permanent credits in the TMDL watershed. Only phosphorus reduced above TMDL goals is eligible for permanent credits. Wastewater treatment facilities may not be as interested in short-term credits on conservation practices that are not permanent.

"NEW Water is now involved in an Adaptive Management program (nutrient offset program) pilot project where the goal is to improve the water quality in a selected watershed to meet the state water quality standards (.1mg/L P in rivers or .075mg/L P in streams). They are exploring the feasibility and legality of registering the P and Total Suspended Solid (TSS) credits in an Adaptive Management program so that they might be able to utilize those credits in the future."

Other Comments

NEW Water: "There are more sellers than buyers. The trading process in Wisconsin seems quite complicated, but with more trading it might become easier and more routine.

"For guidance documents, the program used state manuals and a 100-plus-page document the Great Lakes Commission put together. However, buyers want a broker to line up the entire trade with options and are not necessarily interested in guidance documents. They want the broker to take care of all the details and get them the best deal possible. They want permanent practices that offer substantial credits and want to be able to compare which conservation practice options offer the best price per pound of P. They also want a verifier who will monitor and ensure that the conservation practices are maintained to protect their permit.

> Trading is just another grant program, and if producers get paid for installing practices, you have to be there for verification.

"The program faces some major hurdles because of state policies and the complications and costs of trading programs. But the lessons learned may benefit other GLC programs, such as the Great Lakes Commission's Lake Erie P market project, which is exploring water quality trading as a nutrient reduction tool capable of crossing state and provincial boundaries in the Western Lake Erie Basin. Indiana, Michigan, Ohio and Ontario are participating in the project, along with other key partners."

Outagamie County: "Early on, the district thought trading would be the best option. Point sources are regulated and could accomplish more for a lot less. The state DNR muddied the water and made it a top-heavy process that takes an incredible amount of complexity. We would prefer coming up with an acceptable delivery rate based on some practices rather than trying to calculate everything. If you could generalize and say, 'Convert from conventional to no-till or strip-till and use a corresponding value from our charts,' it would make it simple.

"In addition, the state provided a discharge variance of $50 a pound to counties. The point sources pay $50 a pound above their P limit to the county for installing practices (65 percent goes to practices and 35 percent goes for staffing). This is pretty straight-forward, so I asked our Board to support it.

At end of the day, we are going to get more conservation on the ground for this P variance than with adaptive management. Early on, the point sources had three choices: upgrade their plant, trade for credits, or choose adaptive management and select a segment of stream upstream from them and work with those upstream. Then, out of the blue, this fourth option appeared and the point sources rallied together for this P variance to buy time as dischargers.

"The trading thing was a time sink. I was very disappointed in how cumbersome the process was made. Trade ratios and credit calculation on a per-field basis are very complicated for the producer. If this were to take off, it would almost certainly need dedicated staff to take it at the district level."

NEW Water: "From the perspective of the point source, several challenges still need to be addressed: 1) The staffing structure is not in place for wide-scale trading, and there are not enough brokers or conservation practice verifiers; 2) Trading policies in Wisconsin make it difficult to get permanent credits in our TMDL watersheds. Only the P reduced above TMDL goals is eligible for permanent credits. Wastewater treatment facilities may not be as interested in short-term credits on conservation practices that are not permanent; 3) Permit timeframes for wastewater treatment facilities and industry are all on different time schedules, which limits buyer potential. Buyers may not be interested in purchasing credits until it gets close to their Wisconsin Pollutant Discharge Elimination System (WPDES) permit renewal; and 4) It is unclear how municipal storm water could be involved in the trading process, and unclear what their permit timeframes require regarding P and Total Suspended Solids (TSS) credits."

CASE STUDY:
Great Miami Water Quality Trading, Ohio

Jeff Thomas, Director, Warren County SWCD
Ryan Smith, Senior Programs Specialist, Delta Institute
(formerly NRCS intern and District Technician in the Butler SWCD)

Details

The Great Miami River watershed is located in southwest Ohio and flows through all or part of 15 counties. It includes Dayton, Springfield, Sidney and Cincinnati and some of its suburbs. The eastern portion of the watershed is a mix of urban development and cultivated croplands, while the southern portion is dominated by pasture and hay lands with some cultivated crops and pockets of urban development and forest. In 2003, Miami Conservancy District staff began to talk to local, state and federal stakeholders about potentially using water quality trading to meet proposed nutrient criteria. Although MCD was willing to act as the market administrator to get the program off the ground, both MCD and the participants felt that the management functions should eventually be transferred to the county conservation districts.

In 2006, the MCD program became fully operational, and although nutrient criteria and TMDLs were still pending, five separate wastewater treatment plants (WWTPs) purchased credits in advance of regulatory requirements. The Water Conservation Subdistrict of the MCD administered the program and acted as a broker for the credits. Water quality credits were generated when farmers implement management practices to reduce the discharge of nutrients from farm fields. Each credit represents one pound of P or N. MCD, through the districts, offered an annual payment to farmers after a practice had been verified. The districts held the lump sum payment for the practice and used the interest generated from the lump sum payment to cover inspections fees. To participate in trading, public or private WWTPs needed a state-issued discharge permit that was modified to reflect their participation in the trading program and needed to help fund MCD's administrative and analytical costs for the trading program. MCD created an incentive for early participation by the WWTPs by offering non-expiring discounts on credits that would be required for regulatory compliance in the future (33 percent to 50 percent discount in regulatory credit requirements depending on attainment status of the water into which the WWTP discharges). Trading ratios depended on the water quality attainment status at the eligible buyer's discharge

point. An eligible buyer that discharged to impaired waters needed to acquire credits at a higher level than an eligible buyer that discharged to fully attaining waters. The EPA Region 5 Load Reduction Spreadsheet was used to estimate sediment and nutrient load reductions.

Advice

"Conservation district staff recommended other districts be open to the idea. Also, better education to districts is definitely needed regarding environmental markets. Although the program meant less paperwork for the farmers, there was increased paperwork for the district staff who had to calculate how much reduction could be achieved from a BMP (not required for CRP or EQIP). The districts handled the money and made it very easy for farmers with minimal paperwork."

District Roles

"MCD uses a reverse auction. When funds are available, it announces a Request for Proposals that includes a deadline when bids must be submitted. District staff recruit eligible producers to submit bids (amount of pounds they will reduce and amount of money they are willing to take to reduce each pound). They also propose the specific agricultural practices that can generate credits, and all nonpoint source reductions have to be generated upstream of a buyer's point discharge. A district representative sits on the Project Advisory Group, which makes recommendations for funding. Once a project is chosen for funding, MCD contracts with the districts for project implementation. The districts also verify project installation and conduct and document annual inspections for multi-year projects. Most of the agricultural BMPs implemented have been cover crops or grass waterways (planting grass in drainage ditches to absorb nutrients and maintain soil). When interviewed, the conservation districts felt that the role of reaching out to landowners and helping implement practices was the most appropriate one. They also felt the program could have been more effective if conservation district representatives had been involved from the beginning in helping set up the program and had been given more responsibility for the decision-making at the administrative level."

An eligible buyer that discharged to impaired waters needed to acquire credits at a higher level than an eligible buyer that discharged to fully attaining waters.

Did the Program Provide Additional Revenue to the District?

"The MCD WQT program allowed districts to decide on a case-by-case basis whether they wanted to add compensation for their technical services to a BMP proposal, and many did not. District staff tended to be more concerned with helping their local farmers get accepted than to charge the full costs of their assistance. For example, one staff person who was interviewed made the following comment, "Very little (revenue was provided to the District). That was the downfall of the reverse auction method. We had to throw in the costs to the district with the bid and the monies that would go to the landowner, and knowing the procedure, we knew we had to bid low for the project to be competitive so that lowered (or sometimes eliminated) the cost I put in to go back to the district because we wanted to do everything we could for the BMP to be accepted."

"The districts also performed site visits and inspections to verify BMPs were functioning and being maintained, but not all of the districts charged for time spent on monitoring activities. There were 15 eligible counties in the trading area. However, the districts in Auglaize, Champaign, Hamilton, Hardin and Greene counties did not submit any applications (mainly due to low award amounts relative to the considerable effort to formulate bid applications). Three of the districts (Darke, Preble and Shelby) were more successful in getting proposals accepted and funded. Some district offices chose not to recruit farmers into the program, either because they were overcommitted with the primary duties assisting federal conservation programs or because they became frustrated with the trading program after limited success in the early rounds of bidding.

For SWCDs that included costs, initial assistance costs averaged $878/project and monitoring costs averaged $233/project. The district cost assistance and monitoring represented approximately 3.9 percent and 1.0 percent (respectively) of the over $1.3 million total expenditures of the MCD through round six (in 2011). The total transaction costs of the initial assistance plus monitoring by the districts was estimated at five percent of the total program costs (although results at the county level varied from zero percent from counties not recovering costs up to 12 percent)."

Current Status of Market

"There is no public or private funding currently available to fund installation of practices. In 2013, the Trading Program stakeholders began to explore the transfer of the management functions from MDC to a Joint Board of 14 conservation districts. The GMR Watershed Joint Board hired an administrator in April 2013 to build the capacity to take over those functions. The conservation district in Warren County currently serves as the administrator/facilitator of the Joint Board. Tasks included revising the Operations Manual and securing approval for those revisions from the Ohio EPA. The new joint board also completed an updated MOU with the cooperating WWTPs in the Great Miami River watershed. In November 2013, Ohio EPA indicated that WQT would no longer be an option for wastewater treatment plants to achieve compliance with upcoming limits on nutrient discharges. This policy shift was in direct conflict with Ohio's final Nutrient Reduction Strategy, which was submitted to U.S EPA on June 28, 2013. However, a subsequent addendum in 2016 re-confirmed that when more facilities receive NPDES permits with compliance schedules for nutrient limits that are low enough to act as economic drivers, the use of trading as a compliance option is OK, as long as an approved trading plan is in place. Recently, the Joint Board partnered with the Electric Power Research Institute to install an agricultural water control structure in Logan County

to monitor the water quality results of this BMP and provide scientific evidence (as part of the Ohio River Basin WQT pilot program)."

Other Comments

"Some of the lessons learned included: the importance of stakeholder collaboration in the initial stages of program development (this phase was time-intensive with more than 100 meetings held from 2003–2005); minimal bureaucracy (incorporating existing state regulatory agencies and districts into the administrative process); using the districts (resulting in better producer buy-in and lower transaction costs); forming new relationships between cities and rural landowners; and ability to leverage additional funds and resources for general watershed management. Recommended program improvements include: adoption and application of discount factors for nutrient credits; independent, third-party oversight/inspection of agricultural BMPs; and improved credit tracking. Some of the benefits (aside from environmental outcomes) included much needed funding for districts (when they added administrative fees to the producer bids); additional funding to further implement BMPs; providing water quality data to state agencies; leveraging additional dollars to improve the watershed; and garnering support from environmental groups."

CASE STUDY:
Holmes County (Alpine WQT), Ohio

Michelle Wood, District Administrator, Holmes County SWCD
Joe Christner, Water Quality Technician, Holmes County SWCD

Details

Holmes County is in central Ohio, about 80 miles northeast of Columbus. The Alpine Nutrient Trading Program is unique. First, the Alpine Cheese production facility is a minor NPDES permit (less than one million gallons per day (MGD) design flow). Minor permits are common for small towns, and the cost per gallon for a facility upgrade is very expensive compared to major permits that have design flows over one million MGD. Secondly, the Alpine Nutrient Trading Plan was funded entirely by the Alpine Cheese Company. The company wanted to expand its operation but faced multi-million-dollar technology upgrades to bring the additional wastewater into compliance with OEPA regulations. As a lower-cost option, Holmes SWCD and Ohio State University partnered with Alpine to develop a trading program between Alpine and 25 dairy farmers in the area. The Holmes County SWCD acted as the broker for the plan because it was widely trusted with the community. Many of the farmers were Amish and did not typically participate in federally funded conservation programs. The SWCD asked influential farmers to host small community meetings to explain the program. They then asked the farmers to fill out self-assessment forms that indicated which conservation practices were needed. After determining how many credits a farm could generate and balancing that with the practice that the farmers preferred, they offered farmers up to $30/credit to install the practices and maintain them for five years. Ultimately, Alpine paid $800,000 over five years to implement farm conservation measures that included fencing cattle from the streams and managing manure. The OSU group acted as an impartial body to monitor the streams and determine changes.

Advice

Based on the success of the Alpine and Muskingum WQT programs, the following recommendations emerged: 1) WQT programs should focus on minor (rather than large-scale) NPDES permit holders; 2) Community-based WQT programs at the HUC8 level or county level provide benefits over larger-scaled programs; 3) Trading should focus on areas of most impact (headwaters and critical source areas); and 4) Locally based programs are more likely to have creative solutions to achieve water quality objectives.

District Roles

The Holmes County SWCD acted as the broker for the plan because it was widely trusted with the community.

Did the Program Provide Additional Revenue to the District?

The original plan paid for an extra employee and administrative costs at the Holmes County SWCD and funded sampling and other research by OSU. Because Ohio EPA required extensive “voluntary

sampling" as part of the regulatory permit, the initial cost of the program—$800,000 over five years—was high. Sampling costs have since gone down to $318,000 for the second five-year permit cycle. Assuming sales of nitrogen, no voluntary monitoring and full administrative and staff cost recovery at the SWCD and OSU, the price per credit is in the $20 to $25 range. From the viewpoint of the factory, the plan cost about half as much as a full facility upgrade and also bought time for the partial facility upgrade to be gradually improved to come closer to the target reduction at a lower cost.

Current Status of Market

Alpine achieved its five-year reduction goal (5,500 lbs of P) in three years, and by year five the actual amount of P remediated was 7,133 lbs. The biological indicators located just downstream from the cheese factory outflow went from "partially impaired" to "full attainment" status by late 2010, and the plan NPDES permit was renewed in 2012. The partners are now executing a new agreement that will achieve load reductions similar to those in the past. The Alpine plan served as a model for the Holmes County-owned Walnut Creek wastewater treatment plant Water Quality Trading Plan, used as insurance in the event facility upgrades are insufficient to achieve the targeted P reductions required in their NPDES permit. The Walnut Creek WWTP is financed and managed through the county commissioners, so it made sense to save money on the WWTP upgrade and share those savings to finance the conservation district while returning tax savings to their citizens.

Other Comments

The popularity of the Alpine program combined with increased budget constraints from ODNR and local counties (which together fund the districts in Ohio) prompted the districts within the Muskingum River watershed to form the 21-county Muskingum River Watershed Joint Board of Soil and Water Conservation Districts and to seek approval from the Ohio Commission on Soil and Water. They met for the first time in June 2010. The Muskingum River Watershed Quality Trading Plan was completed in 2011 to implement nutrient trading within the six sub-basins of the Muskingum Watershed. The original Alpine trading model was incorporated into the Muskingum plan by keeping districts as sub-brokers responsible for brokering between farmers and point sources for inter-county trades. When cross-county trades occur, a Technical Advisory Committee ranks the intra- and inter-county bids. When ranking point source bids, a point system values county conservation targeted priorities, prior compliance history, stream attainment level, upstream land uses headwaters, economic and ecological significance and public health. In 2012, the Tuscarawas Nutrient Trading Plan was approved by OEPA and the other five watersheds that make up the Muskingum Basin were approved in 2014. Holmes SWCD was entrusted by members of the joint board to facilitate the writing of remaining plans with funds garnered from an Ohio Soil and Water Conservation Commission/ODNR-DSWR toolbox grant and matching funds from member SWCDs.

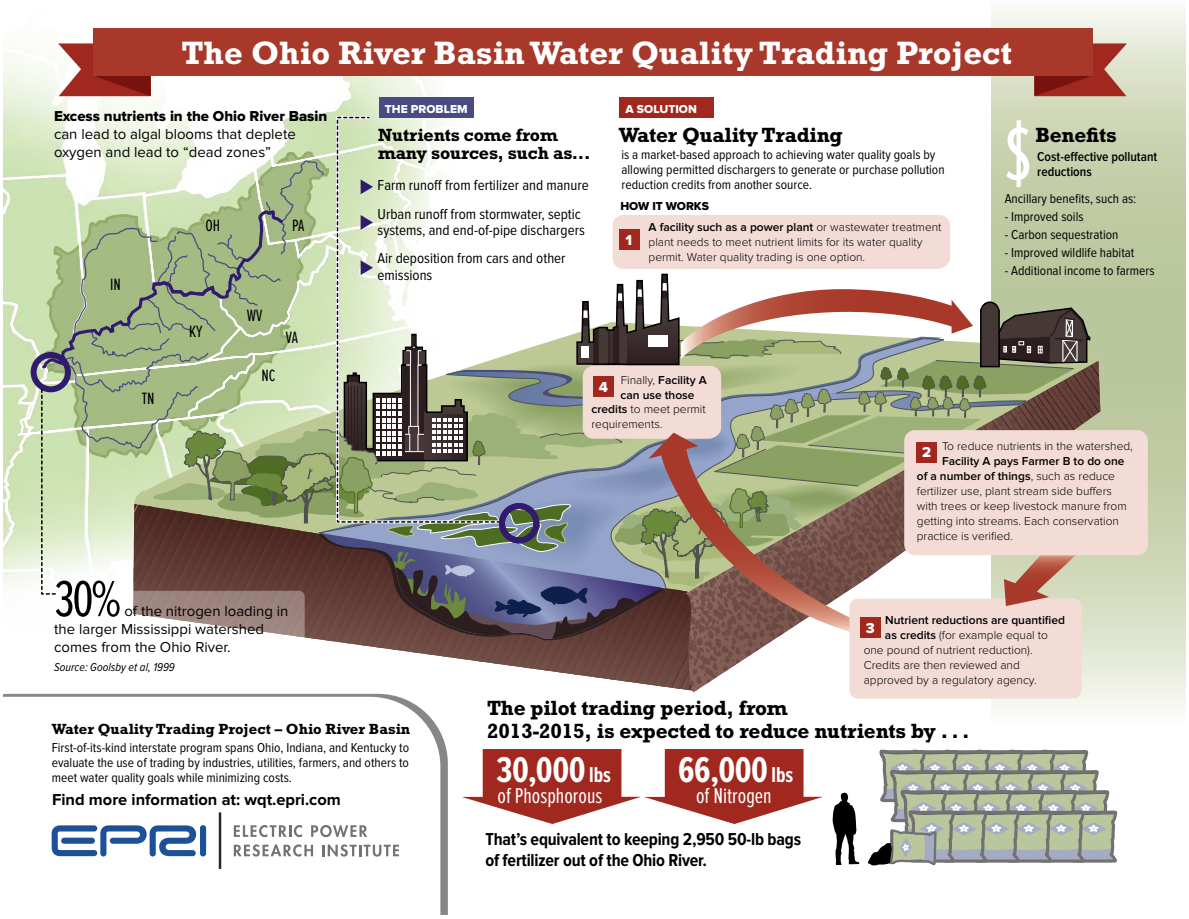
The biological indicators located just downstream from the cheese factory outflow went from "partially impaired" to "full attainment" status by late 2010.

CASE STUDY:
Ohio River Basin WQT Project, Ohio, Indiana and Kentucky

Pete Conkle, District Administrator, Columbiana County SWCD
Lloyd Schiltz, Administrator, Mason County SWCD
Tara Wesseler-Henry, District Support Specialist, ISDA

Details

Since 2007, the Electric Power Research Institute and its collaborators have worked toward delivering a framework for a fully functioning interstate water quality trading market in the Ohio River Basin. The relevant state agencies signed the agreed-upon trading plan in 2012, and pilot trades were made across state lines in three states (Indiana, Ohio and Kentucky). The ORB project uses a scientifically based credit equation methodology along with two models: the EPA Region 5 spreadsheet model for estimating nutrient reductions at edge-of-field and the Watershed Analysis Risk Management Framework (WARMF) model for estimating nutrient attenuation from the edge-of-field to the point of use. More information on the models is available at *wqt.epri.com*. While



the project is not selling compliance credits at this time, the research behind the market framework provides the scientific basis to support transactions occurring within hydrologic unit code 4 (HUC 4) watersheds (sub-regions averaging 16,800 square miles).

The ORB project requires farmers to follow USDA NRCS conservation practice standards that cover practice specifications, installation and maintenance. To verify that practices are in place and maintained, the SWCD staff complete a practice "installation" form after on-site inspection; the state agriculture agency completes a "verification" form based on on-site inspection; and the state permitting authority completes a "certification" form based on a desk review of all records. All projects are monitored annually. Management practices (like cover crops) are under a five-year contract, renewed annually, and structural practices are under a 10-year contract. As an additional hedge against performance risk, the project holds 10 percent of credits in a reserve pool and voluntarily retires an additional 10 percent of the credits to benefit the ecosystem. The project recently expanded to include many more counties in the three states and is now focused on incorporating forestry projects into the trading framework.

Advice

If districts have an opportunity to participate in environmental markets, they should invest staff time to determine if it is appropriate by considering the following:

- What is the benefit for the farmers that may be involved?
- What is the benefit for the district?
- Learn as much about the whole program/process as possible.
- Do you have trust in the market opportunity and administrators (partners)?
- Do you have the manpower to administer the required program components?
- Do you have farmers that are interested in participating, and what are the potential projects that could be implemented?
- Are you willing to take the farmer through the whole process from beginning to end since they are putting their trust in you?

District Roles

In the ORB market, the districts recruit the farmers, help them decide what practices to implement and sign contracts with them. The funding from EPRI goes through the state agencies to the districts to disperse to the farmers. When questioned about potential roles, the participating districts felt their best role was to be the first point of contact for the program and act as the technical resource for project implementation. They gave several reasons:

- The districts have been working with farmers for many years and know who to bring to the table and are experienced in working one-on-one with the farmers.
- District staff understands the resource concerns and farmer needs in the local area.
- Likewise, many farmers view the district staff as a trusted partner working on their behalf and trying to help them.
- They are experienced in providing technical services to farmers for implementation of projects.
- They have experience contracting with farmers to implement practices through other cost-share programs.

They felt it would likely be harder for the districts to fill other roles such as being a program administrator or aggregator because of:

- Staffing and manpower concerns, especially in a smaller office. Larger districts may be able to handle an expanded role, but many smaller districts do not have the manpower to handle any type of expanded role.
- Lack of enough revenue coming in to cover the costs of an expanded role. An economic analysis of the revenue that could come into the district would be helpful.
- Although districts could potentially share resources, there is not a lot of experience doing that, so they would have to investigate the logistics of sharing resources.
- Whether the program would be operational for an extended time frame. The districts would not want to increase manpower and then have the program go away after just two or three years.

The project recently expanded to include many more counties in the three states and is now focused on incorporating forestry projects into the trading framework.

Did the Program Provide Additional Revenue to the District?

The compensation was equal to 10 percent of the total funds distributed to the farmers to implement projects. For example, if farmers were paid $50,000 in a district to implement projects, the district received an additional $5,000 dollars as compensation for its role in helping farmers implement the project.

Current Status of Market

The ORB WQT program is still active. As of June 2015, the project had funded conservation practices on 32 farms, preventing the run-off of 98,314 pounds of total nitrogen and 28,699 pounds of total phosphorus into the Ohio River. The project estimated that the 14 districts directly contacted about 560 farmers (40/county) and distributed Requests for Proposals to many more. Credits were generated by both structural practices (e.g. heavy use protection areas, milk house waste treatment) and seasonal practices (e.g. cover crops, conversion to hay and agricultural drainage water). The seasonal practices covered 516.2 acres. The project sold 9,000 credits to power plants at $10/credit with roughly 100,000 credits remaining to be sold.

Between 2016-2019, the project team will finalize the market framework and secure the approval of the state governors, expand the number of counties and watersheds eligible for trading (through calibration of the WARMF model) to scale up implementation and complete two more cycles of pilot trades to incorporate forestry practices. This will include approximately 10 additional projects per state (30 projects total for approximately 120,000 pounds of total N and 40,000 pounds of total P). The team will also seek to increase buyer demand.

Other Comments

District staff also felt it would be helpful for a market program to include:

- An economic analysis that shows more clearly whether market transactions will cover the cost of administering the program. And, more importantly for the district, will the revenue coming into the district cover its costs for whatever role it fills in the program?
- A commitment from an environmental market program that funding would be available for three to five years.
- Examples for districts on the mechanics of sharing resources (technical and administrative).

CASE STUDY:
Lycoming County, Pennsylvania

Lycoming County Nutrient Credit Trading Program, Pennsylvania (Chesapeake Bay watershed)
Mark Davidson, District Manager, Lycoming County Conservation District
Megan Lehman, (formerly) Lycoming County Planning Department

Details

The Lycoming County Conservation District, in partnership with the County Planning Department, operates a nutrient credit trading program. Lycoming County is located about 130 miles northwest of Philadelphia and 165 miles east-northeast of Pittsburgh. It is the largest county in Pennsylvania in area. It is in the Chesapeake Bay watershed. The average farm is 134 acres, with slightly less than half of the farmland cultivated. Farms are mostly livestock operations along with corn and soybean production.

"The conservation district works with local farmers who are willing to participate in a trading program and install BMPs on their operations to reduce runoff of nitrogen and phosphorus. The district staff assesses the operation and develops a proposal using Pennsylvania Department of Environmental Protection (DEP) protocols to generate DEP-certified nutrient credits. Once these credits are certified, the district and planning staff work together to market and sell them to buyers. All sales are authorized under the state's nutrient trading program. The county program was originally created to assist local wastewater treatment plants within the county as they used credits as part of their regulatory compliance strategy. Now that all local plants have been upgraded to meet the new effluent limits on-site, the county markets all its credits externally. There are still treatment plants in the market for them, but not local plants. Originally, trading was meant to be local efforts for local benefits. We started with seven plants, and now we have six. Where we've been able to sell to buyers, we've done that with neighboring counties, and the rest of the credits have been marketed through the Pennsylvania Infrastructure Investment Authority (PennVEST).

"Farmers receive 75 percent of the total revenue from the program, and the county retains 25 percent to cover staff time and other costs. All sales are based on market-rate prices and all credit revenues are pooled together each year, so that participating farmers all receive a prorated share of the annual sales. The program began in 2008, and trading began in 2010. The value of credits has fluctuated over time, but is typically $3 per pound N. In 2016, it dropped quite a bit because there was a glut of credits. In 2014–15, there was also a dip. There were only a few phosphorus sales, and it is a lot of work to do the certification.

"The program has been criticized about the value of its credits. A lot of our credits were generated by existing practices. In the Chesapeake Bay Program, everything is centered around the Bay model.

Some of the controversy revolves around the baseline since we had to draw a point in time and say anything installed after this point will be considered. If we were applying in 2012 for a farm that did practices in 2009, we could do that. Our baseline was essentially defined as regulatory compliance. For us, compliance was having a conservation plan in place. In our part of the state, we don't have the agricultural intensity that is present in some other areas."

Advice

"I would recommend that any district interested in the trading markets pursue it, not as a revenue generator but more as a 'partnership' to provide local benefits to multiple stakeholders. Our participation was never based on a profit motive, and that's probably a wise choice. The trading income to the farmers can be a supplemental source of revenue to help demonstrate that 'conservation pays.' Trading can be one more reason some farmers may choose to implement conservation practices. While the trading revenues will never totally cover the cost of a BMP or likely even come close, it does represent an additional 'reward' for conservation work that can add up to a decent amount over years of participation. Some of our farmers use their annual income from the trading program as seed money to help fund additional conservation work on the farm.

"Lycoming County created a point source work group for wastewater treatment plant operators and a non-point-source work group for representation from the county's agriculture sector, MS4 permittees and conservation organizations. We also created an overarching Chesapeake Bay Advisory Committee with broad representation from all major county stakeholders, including elected officials. The county staff in both the district and planning department were knowledgeable and, in fact, served on multiple state advisory committees during the process of establishing the state's trading program, updating it over time, and creating an auction platform as a nutrient credit clearinghouse. Although the level of understanding varied among stakeholders, over time we established a good working level of knowledge among the various work group members. The farmers participating in the program generally don't get into the details of the program, but some are more aware. The wastewater treatment plant management staff and engineers on the point source work group generally have the highest level of understanding of these markets among the external partners. Our board does not have a high level of understanding of the trading program that we are involved with, but staff attempts to show the board that participation with the trading program is simply an opportunity to promote agricultural conservation, which is an outcome we strive for every day."

District Roles

"Primarily, we're a county department, so we have to be cognizant of the fact we're supporting our county board of commissioners as well as the board of directors for the district. We have a nominating organization based on stakeholders, and directors are selected based on those

nominations. We were well-positioned within the Chesapeake Bay Program related to good conservation work, so it is work we should have been doing anyway. Our county is not extremely agriculturally intensive, so our guys can spend some time with credits and reporting and such. It fulfills some of their daily duties/expectations. It helps fulfill the county mission as well. The most important role for us is to represent our local agricultural community in this effort. In addition to outreach, our role has consisted of credit certification and verification. We are the only organization in Lycoming County with the technical capacity to do the credit certification and verification.

"At the beginning of the program, the county used a consultant team for approximately two years to help get the program up and running, which included a much broader initiative than just the trading program. This level of consultant input would likely not be necessary now, but at the time we were the first ones to do it.

> The trading income to the farmers can be a supplemental source of revenue to help demonstrate that 'conservation pays.' Trading can be one more reason some farmers may choose to implement conservation practices.

"In our program, it just makes sense for us to certify and verify the agricultural credits and also to serve as the 'liaison' with our local agricultural community. Again, it's what we do every day. The district has existing relationships and was able to build off of those to gain participation in the trading program. It started with the 'best of the best' farms in terms of conservation: the ones we have worked with for years. It has now expanded to approximately 25 operations. Certification is good for five years or until there are new regulations. Verifications are completed on a yearly basis. Operations that generate the credits for the most part are animal operations.

In Pennsylvania, districts have an increasing role in agricultural regulation so our board was OK with us serving as the certifier/verifier of credits. Our Department of Environmental Protection is holding some purse strings. We are just confirming that what we said would be done is done. We have the ability to certify credits when completed. Most of our credits are really not risky in the overall scheme of things. Regulating and authoritative issues don't come into play at all for our technical people. DEP is tasked with inspecting 10 percent of all the farms in the watershed. Districts are expected to do 50 per fulltime position in the county.

Did the Program Provide Additional Revenue to the District?

"So far, the program has not provided adequate revenue to offset expenses. If success were measured in profit for the district, then we've failed so far. However, we are able to use existing staff so the program has not added any significant cost to our budget, only burden to our staff time. The county's share of the program income, 25 percent, is not returned to the district, but kept by the county. Some of the money was spent on Chesapeake Bay-related projects. Most has been held as a sort of 'insurance policy' against any potential failures of the credit-generating practices, or breach of contract. That way, if we sell credits and they are not available at the end of the year for any reason, we can purchase replacement credits to fulfill our sales contracts."

Current Status of Market

"Lycoming County's Nutrient Trading Program has been operational since 2010 and has brought $334,822 in credit sales to the county. At the beginning of 2016, the state changed the way credits are calculated, so most of our farmers are now receiving one-third of the credits they used to receive for the same practices. We are aggressively marketing our credits and have seen prices go up somewhat (although not enough to make up for the cut in supply). We are also reaching out to work with farmers from neighboring counties where their home districts are not participating in nutrient trading."

Other Comments

"The state changed the way credits are calculated to make the program defensible. The program always had to be defensible. The first few years, the state defined baseline as following our state laws. When the scientists looked at that, they said the ratios should change to address the TMDL.

The intent of one-third calculation was to be an interim measure. We said all along we were revising the program. The state's response to EPA and Chesapeake Bay and Bay issues can change by the week.

We are not considering other markets such as carbon trading at this time. We are always interested in interstate trading of our nutrient credits, and also in expanding the trading program to include sediment credits. We are most interested in, and strongly advocate for, the state of Pennsylvania to expand the trading program to include MS4 permittees. The MS4 permittees will be required to achieve quantifiable pollution reductions in the next permit cycle (beginning 2018). The most cost-effective way for many to achieve this will be through credit trading. Bringing new buyers into the program will also stimulate the supply-side to increase supply, meaning that there may be more investment over time in agricultural BMPs and technology. Storm water doesn't have high concentration of pollutants. If you are looking at storm water practices for all the stacking they generate, it's a different story. Lycoming County has a concerted effort to assist MS4 folks, including a position, which is why they're focused on that."

APPENDIX II: Checklist and Guidance for Conservation Districts and Partners

This checklist and accompanying guidance are intended to assist districts interested in water quality trading and other payment for ecosystem services programs.

Some initial questions before you proceed:

1. Has water quality been identified as a major resource concern by your district and its partners?
    - *What programs and activities are in place to address water quality issues?*
    - *Have these programs and activities led to measurable improvement in water quality?*
    - *What other programs and activities would help address water quality?*
2. Is your district in an impaired watershed(s)?
    - *If yes, what are the watershed's impairment issues?*
    - *Has a total daily maximum load (TMDL) been established for the watershed(s)?*
    - *Is there a plan to address impairment issues?*
    - *Is the plan successfully addressing the issues?*
    - *Is there more work to do before the impairment status can be removed?*
3. Is your district interested in pursuing a water quality trading or other ecosystem-services payments project?
    - *If there is interest, guidance on program development and implementation is provided in the Key Guidance and References section of* Building a Water Quality Trading Program: Options and Considerations.
    - *Also refer to Appendix I: Case Studies in this handbook for several examples of district activities in these areas.*

If you've answered yes to all three questions, the following questions may help you decide if market opportunities exist

1. In the watersheds where your district provides services, what are the Clean Water Act-permitted point-source entities, including water utilities, treatment facilities, industries or others that discharge or treat water?
    - *Has your district discussed possible cooperation on water quality issues with these entities?*
2. Which entities in your watershed are responsible for source-water protection for drinking water and other human needs?
    - *Has your district discussed possible cooperation on water quality issues with these entities?*

3. How are point sources addressing impairment issues, including TMDLs?
    - *Traditional infrastructure and treatment protocols?*
4. Are these measures sufficient to help the entities comply with their permits and other requirements?
5. Would a whole-watershed approach help these entities comply with permits and other requirements and reduce costs?
6. Do the point sources use tax revenues, user fees and other funding sources to address impacts on water quality outside jurisdictional boundaries?
    - *If so, do they provide funding for district programs that address resource issues such as water quality? If not, have you discussed the possibility with them?*
7. Have any of the point sources expressed an interest in trading or payment for ecosystem services trading programs to address their permitting, source-water protection or other water-quality issues?
    - *Are they familiar with guidance documents, including* Building a Water Quality Trading Program: Options and Considerations?
8. Has the district been involved in discussions with point sources and other stakeholders about possible trading or payment programs?
    - *If so, what is the status of these discussions?*
    - *If not, are there opportunities to have such discussions?*

If point sources aren't interested, it may be difficult to find potential buyers. But if they have expressed an interest in learning more:

1. What state agencies interact with the district and point sources in addressing resource concerns, such as water quality? You should touch base with them before you go any further.
    - *Are these agencies among those on your participation list?*
2. Which of these are regulatory agencies?
    - *Are they included on your list?*
3. Which oversee and support district activities and services?
    - *Are they included on your list?*
4. Which regulatory agencies interact with Clean Water Act-permitted point sources in watersheds where the district provides services?
    - *Are they included on your list?*

If you confirm that the key players are supportive, here are some more questions you may need to consider

1. What is the level of familiarity among district board members about trading or payments for ecosystem services programs?
    - *To increase the level of awareness, see* Building a Water Quality Trading Program: Options and Considerations.

2. What is the level of familiarity among district staff and close partners, such as local and state NRCS contacts, about trading or payments for ecosystem services?
    - *To increase the level of awareness, see* Building a Water Quality Trading Program: Options and Considerations.
3. What is the level of familiarity about trading or payments for ecosystem services programs among private landowners and cooperators in your district?
4. Is the district able to host an educational program to raise awareness about water quality trading/ ecosystem services payment programs?
    - *Are neighboring districts interested in co-hosting an educational program?*
    - *What stakeholders would be invited to participate?*
    - *Which experts would be asked to present information?*
5. What resources would your district be able to direct to development and implementation of a trading program?
    - *Staff time and expertise?*
    - *Board expertise?*
    - *Funding sources?*
    - *Experience with grant writing?*
    - *Meeting space and other physical resources?*
    - *Ability to take on contractual obligations?*
    - *Other?*

For districts with a mix of rural and urban

1. What percentage of landowners and cooperators in your district is classified as rural/agricultural?
2. What percentage is classified as urban?
3. Are they in shared watersheds?
4. Are there opportunities to address water quality concerns through rural-urban cooperation?

If you are still feeling positive at this point, consider:

1. Would your district consider leading or participating in stakeholder or technical committees to explore, develop and support programs such as water quality trading and payments for ecosystem services to solve mutual water quality concerns?
    - *See Appendix I, Case Studies, for examples of district activities in these areas, including stakeholder and technical advisory committees.*
2. Which individuals would represent your district as members or leaders of stakeholder or technical committees exploring water quality trading and ecosystem services trading programs?

3. Does the district have staff capacity to serve in either active or support roles on stakeholder or technical committees?
    - *Can your district share staff time with other districts for participation and leadership?*
4. Are neighboring districts able to participate?

If participation by neighboring districts is desirable and seems feasible, consider:

1. Does the district already cooperate with neighboring districts on projects, such as watershed and landscape-scale conservation efforts?
2. Is the district aware of state Joint Powers Agreement protocols that may help in the development of an operating board for a possible program?
    - *Is there already a structure for Joint Boards? See Appendix I, Case Studies: Lycoming Co, PAI.*
3. Do the districts find that they are able to enhance capacity to address conservation issues by sharing their resources and expertise and cooperating beyond their own boundaries?

Your opportunities are really looking good. Just a few final considerations

1. What other partners and stakeholders outside the district boundaries should be included on committees exploring program implementation? (These may include other local, state and federal government entities, businesses, communities, citizen groups, nongovernmental organizations, at-large community leaders and others.)
    - *Develop a list with contact information, then share it with trusted partners to identify who's missing from the list.*
2. Is the district aware of funding sources to support water-quality trading/ecosystem services payment programs? (These may include federal, state and local government grants and cost-share program, payments from point sources, foundation/nongovernmental grants and cost-sharing, and support from supply-chain entities interested in sustainability.)

APPENDIX III: Key Guidance and References

These key guidance documents and references can assist districts interested in water quality trading and other payment for ecosystem services programs.

Key National Guidance & References

Handbook on Environmental Markets for Conservation Districts. National Association of Conservation Districts and American Farmland Trust. September 2017.

Water Quality Trading Policy, Additional Tools and Information (website)
United States Environmental Protection Agency (2003)
www.epa.gov/npdes/water-quality-trading

Building a Water Quality Trading Program: Options and Considerations
National Network on Water Quality Trading (June 2015)
willamettepartnership.org/wp-content/uploads/2015/06/BuildingaWQTProgram-NNWQT.pdf

The Water Quality Trading Toolkit
Association of Clean Water Administrators and Willamette Partnership (August 2016)
willamettepartnership.org/wp-content/uploads/2016/09/WQT-Toolkit-Version-1.0-August-2016.pdf

Additional National Network on Water Quality Trading Products (website)
nnwqt.org/products

Additional Willamette Partnership Publications (website)
willamettepartnership.org/publications

Other Guidance & References

Pennvest (Pennsylvania Infrastructure Investment Authority) in Pennsylvania funds sewer, storm water and drinking water projects throughout the Commonwealth
www.pennvest.pa.gov/about-us/Pages/default.aspx

California EPA North Coast Regional Water Quality Control Board Nutrient Offset program, with project details for the Laguna de Santa Rosa WQT program.
www.waterboards.ca.gov/northcoast/water_issues/programs/nutrient_offset_program

Sonoma County (California) Resource Conservation District recommendations, FAQs and Trading Framework
www.lagunawaterquality.org

Conservation Marketplace Midwest
www.conservationmarketplacemidwest.org

Ohio River Basin Water Quality Trading Market
wqt.epri.com

Information Network for Salmon, Agriculture and Environmental Policy
donstuart.net

ACKNOWLEDGMENTS

The *Handbook for Conservation Districts on Environmental Markets* from the National Association of Conservation Districts (NADC) and American Farmland Trust (AFT) was made possible by funding assistance from the USDA Natural Resources Conservation Service as part of a two-year Conservation Innovation Grant (69-3A75-16-019: *Enlisting Conservation Districts to Accelerate Participation in Environmental Markets).* This handbook would not have been possible without the help of conservation district leaders and staff who shared knowledge and experiences gleaned from their pioneering work on environmental markets at the local, state and regional levels. NACD and AFT are also grateful for the thoughtful and thorough reviews provided by Ryan Smith, Delta Institute; James Klang, Kieser & Associates; Carrie Sanneman, Willamette Partnership; and Christopher Hartley, USDA Office of Environmental Markets.

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