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A new conservation education delivery system

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Abstract

The Conservation Agriculture Project (CAP) of the North Dakota Natural Resources Trust (Trust) has demonstrated a new concept for delivering conservation education that improves farm economics while enhancing environmental health, restoring landscape functions and providing societal benefits. The 5-year project, initiated by the Trust in 2000, incorporated Resource Analysis Teams to assist four farmers and farm families serving as a demonstration in developing and implementing holistic farm plans. Resource Analysis Team members were agricultural, environmental, conservation and economic professionals. Resource Analysis Teams met with each demonstration farm family twice each year in a non-threatening setting, usually around the family's kitchen table. The integration of diverse knowledge bases resulted in an educational roundtable with all participants being educators and students at the same time. As round-table participants became familiar with the intricacies of each particular farm and with each other, adversarial relationships dissolved and team members worked together to move the farms toward sustainability—economic, environmental and social. This approach differs from most federal conservation programs to date, which have approached on-farm conservation in a piecemeal manner, only protecting a parcel of land or a critical problem area. For those programs, responsibility for searching out and implementing conservation practices has fallen primarily on the farmer, who also has had to assume associated risks. The Conservation Agriculture Project has demonstrated that the Resource Analysis Team approach yields positive results for the environment, wildlife, farm families and society while enhancing information delivery and improving communication and acceptance among diverse groups with varying agendas. Most importantly, it has demonstrated the need and positive impacts of delivering conservation education directly to farmers and ranchers, who manage 43% of the land nationwide.

Key words: conservation, Conservation Agriculture Project (CAP), environmental education, resource teams, sustainable farms, whole farm planning

Introduction

Two divergent views have emerged on how to protect the nation's natural resources. The first approach attempts to protect them through governmental regulation. The second entails bringing farmers together with local agricultural, environmental and conservation experts to improve the natural resource base on individual farms.

The regulatory approach—whether rules are administered by the Environmental Protection Agency, the US Fish and Wildlife Service or state health department—has a tendency to raise animosity among farmers toward the responsible agency. Farmers often become indignant at the imposition and feel regulations are illogical, inflexible rules that are difficult to implement in real life. In this system, farmers receive conservation education from a variety of agencies and organizations, but they must seek out recommendations and often receive conflicting information.

To demonstrate the alternative, the North Dakota Natural Resources Trust (Trust) initiated Conservation Agriculture Project (CAP) in 2000. The mission of CAP was to demonstrate how a holistic team approach to farm planning, which includes economic, environmental and social considerations, enhances profitability while conserving natural resources for wildlife and society. CAP blended agricultural, environmental and conservation interests by simultaneously addressing the needs of farmers; local, state and national governments; and nonprofit conservation groups.

A Trust Advisory Board selected four farms in North Dakota's Drift Prairie Region to participate. Each farm

family was assigned a seven-member Resource Analysis Team of agricultural, economic and conservation professionals. The Resource Analysis Team members met twice a year around the family's kitchen table to focus on creating an individualized, realistic and implementable plan that would produce desired results. This integration of diverse knowledge bases resulted in an educational roundtable with all participants being educators and students at the same time.

CAP has been a successful on-the-ground demonstration of how the use of Resource Analysis Teams provides a more effective method for addressing environmental, agricultural and economic concerns. It further demonstrates the need and positive impacts of delivering conservation education directly to farmers and ranchers, who manage 43% of the land nationwide.

This paper will describe the CAP model, discuss its results as described in exit interviews with the Resource Analysis Team members and demonstration farmers, and propose the adoption of this model through policy targeted toward beginning farmers.

The Need for a New Conservation Education Delivery System

There is increasing concern that current agricultural practices are negatively affecting human health and the environment. When contaminants from fertilizer, pesticides and soil erosion enter the air and water, they become detrimental to the health of farm families, surrounding community members and wildlife. These concerns are driving demand for a more sustainable form of agriculture. To achieve real results to that end, farmers and ranchers must have access to the education and information they need to shift their operations from more conventional management techniques and processes.

According to North Dakota agricultural statistics for 2002, 89% of the state's landscape is in agricultural use[1]. Nationwide, 972 million acres are farmed, or about 43% of the total landscape[2,3]. Because agriculture engages such a large portion of the land in the state and across the nation, it is critical for conservation education and application of that knowledge to succeed.

When conventional farmers move toward sustainability they shift their risks from effective available inputs to ecological systems management of the landscape, i.e., organic agriculture. To make these changes farmers are forced to take on significant risks that differ significantly from those to which they are accustomed.

Organic farmers do not have the option of quick-fix solutions to pesticide risks used by conventional farmers[4]. The organic industry requires specialized farm equipment and smaller storage units to accommodate broader crop rotations. There is the potential for genetically modified organisms to contaminate crops through cross-pollination, making them unfit for sale through the organic market. Most farmers cannot bear the entire risk and expense of good stewardship without an appropriate return for that investment. At the same time, no farmer wants to be the cause of degraded environmental quality. The availability of a good education program to make this transition is a must.

In the current system, farmers receive conservation education from a variety of agencies, including the Natural Resources Conservation Service (NRCS), Soil Conservation Districts (SCD), University Extension, the agricultural media and agribusiness. However, farmers must seek out recommendations and they often receive conflicting information.

The NRCS recognizes the need for technical expertise to support the district conservationist, who provides direct service and information to farmers. To address this, the NRCS has additional resource people available in its area (regional) offices, including soils classifiers, agronomists, engineers, wildlife biologists and program consultants. The inherent problem with this model is that only one person—the district conservationist, soil conservationist or technician—meets with the farmer. In most situations, it is a top-down system in which the agricultural or environmental professional is the authority and the farmer is considered the learner.

The Extension network has a similar structure, with a county agent backed by a university research team and a variety of Extension publications. This structure puts pressure on the professional to be the authority. In addition, it does not address farm issues as interconnected or from a whole-farm approach. Instead, these professionals address problems as isolated issues.

To have a significant impact on environmental health, restore landscape function and provide societal benefits, changes in conservation education programs should be directed toward farmers and ranchers[5]. The new conservation education model also should be designed to bring agricultural, environmental and conservation professionals together with farmers to focus on creating a whole-farm plan. This integration of diverse knowledge bases results in an educational roundtable with all participants being educators and students at the same time.

Conservation Agriculture

Central North Dakota wet cycle

In the late 1990s, North Dakota was in the midst of a 7-year wet cycle that was causing major flooding, planting and harvesting challenges and the spread of crop diseases related to wet conditions. The Drift Prairie Region of the Red River of the North Basin, located in central North Dakota, was particularly affected.

The Drift Prairie Region is characterized by low rolling hills and numerous prairie potholes, or small- to medium-sized depressed wetlands. These closed lakes, ponds and depressions, created by stagnant glacial ice, often are a

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source of aggravation to farmers, who frequently describe them as 'wasteland'. Environmentalists, however, attribute a number of important landscape functions, such as lowered erosion, improved water quality and improved flood management, to these wetlands.

Conservation programs and farmers' attitudes

Generally speaking, farmers and ranchers have many concerns and conflicting ideas regarding water storage and conservation practices. They struggle daily with issues related to farm income, soil salinization, wetland designations and regulations, drainage and private property rights. Many private landowners become indignant at the suggestion that they are not providing the best care for the landscapes under their management. Because of this, they harbor anti-wetland views and animosity toward agencies and environmental groups that sponsor conservation of natural resources such as air, water, soil and wildlife habitat. Others believe that wetland drainage has no impact on flooding or are apathetic about the need to store water.

Farmers face many barriers to implement conservation practices. Those willing to engage in conservation programs have found it increasingly difficult to initiate and maintain practices. Economics drive their land use, and programs often do not provide adequate compensation for taking marginal land out of production; the high cost of implementing specific conservation measures are often prohibitive. Farm commodity programs and federal crop insurance programs promote market-driven crop rotations of corn and soybeans. As a result, a farmer who chooses to implement a long-term diversified crop rotation or other conservation practice assumes all the risks.

Many farmers also find it challenging, if not prohibitive, to deal with the bureaucracy inherent to implement multiple conservation programs. Past federal programs have approached on-farm conservation practices in a piecemeal fashion, only protecting a particular parcel of land or a critical problem area. Payments for conservation programs often compete with alternative programs. Federal programs are under-funded and farmers with less acreage cannot compete with larger farms for program enrollment. The programs farmers really like and use often are phased out and replaced with more prohibitive programs. The complex and ever-changing list of programs and requirements detracts from, rather than encourages, farmers' willingness to implement conservation practices.

Ultimately, all of these factors detract from adequate water storage and conservation, and point to the need for a new, more effective strategy.

Conservation agriculture takes shape

Farmers and community members came together in a series of meetings across North Dakota to address water issues related to the wet cycle of the 1990s. After listening to their concerns and frustrations with conservation programs and the overall agriculture climate, Roger Hollevoet, Devils Lake Wetland Management District director, developed the concept for Conservation Agriculture[5].

Hollevoet believed farmers should abandon their non-productive, problem farmland areas. He coined what would eventually become the slogan for CAP: 'Farm the best; alternatives on the rest'. Hollevoet reasoned that, for farmers to maintain profitability, they needed to have access to a team of advisors. This team would help them better understand the various programs available, as well as provide technical guidance and assistance to develop management efficiencies for improving the economic health and viability of the farm. Hollevoet suggested that the team include economists, agronomists, soils experts and conservation planners to advise on soil management, erosion prevention, wetlands development, crop selection and management, herbicide and fertilizer management, program selection, alternative land uses and minimum/no-till practices[5]. In 1999, Hollevoet presented his concept to the Trust for funding and management of a demonstration project.

Whole-farm planning

Whole-farm planning is not a new concept. The Savory Center[6], the Henry A. Wallace Institute for Alternative Agriculture[7], the University of Wisconsin-Madison[8], and others have all developed and advanced various holistic planning concepts and processes.

In 1984, Allan Savory developed Holistic Resource Management™ (HRM), a decision framework for resource management. It is based on the premise that all energy is derived from the sun, and it flows through plants which, in turn, capture water and minerals to produce 'marketable energy products' such as grain, livestock, fruits, vegetables, etc. Through HRM, effective sustainable management and goal setting focus on how to produce those marketable energy products efficiently on a sub-ecosystem basis, where the sub-ecosystem includes the farm and the people who live there. The Savory Center, a not-for-profit organization, offers tools, strategies, training, learning materials and a mentoring support network to help farmers and ranchers 'improve the quality of life and their bottom line (minimum economic need) while restoring the environment that sustains us all'[6]. This systems-based concept for 'agroenvironmental management' made sense to many professionals.

The Henry A. Wallace Institute for Alternative Agriculture helped define the whole-farm planning concept as an initial step to potentially influence national farm policy[7]. The Institute convened a roundtable of industry, government, sustainable agriculture and environmental interests to sort out definitions, goal-setting and implementation strategies for whole-farm planning. In response to the question, 'What are the features necessary for ensuring that whole-farm planning is an effective policy tool?' only two features appeared in the top five lists for each discipline.

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Table 1. Characteristics of demonstration farms.

Landscape diversity
Farm diversity including livestock, crops, grassland and diversity in water resources
Landowner has a positive attitude and commitment to program objectives and is credible
Represent North Dakota farms with the primary income source being farming
Represent a diversity of watersheds with preferences placed on farms in specific locations within the watersheds
Farm has the potential to demonstrate conservation and wetland management
Best area for demonstration with easy accessibility for farm tours
Possibility for partnerships or cooperating with other programs or projects

First, whole-farm planning 'must be a voluntary option' and, secondly, plans 'must work at the ground level'[7].

The University of Wisconsin-Madison (UWM) adapted HRM concepts to a workshop module for training Extension educators, agency conservationists and nonprofit organization staffs. UWM's goal was to immerse professionals in the whole-farm planning concept and train them in the use of related processes to accomplish more effective planning with farmers and ranchers. The module's elements are compiled in a participant's workbook, 'Whole-farm Planning: an Overview Workshop,' and a facilitator's guide by the same name[8].

Technical team precedents

Hollevoet's proposal to the Trust board specifically recommended the use of technical teams to assist farmers with whole-farm planning. Two examples of the use of technical teams in the Upper Midwest already existed: the North Dakota Dairy Diagnostic Program and a monitoring program initiated by the Land Stewardship Project in Minnesota. Both suggested an initial basis for the structure of Hollevoet's team concept.

The North Dakota Dairy Diagnostic Program resulted from a 1997 North Dakota Department of Agriculture dairy summit. The summit focused on value-added animal agriculture for livestock producers, economic developers and financial lenders from across the state. Producers and representatives of service and support industries—power utilities, processors, regulatory agencies and individuals in public service, including the Extension Service—participated. The effort led to the Dairy Diagnostic Program, which was created by the North Dakota Legislature in 1999 through House Bill No. 1021.

The program's technical teams include a records specialist, a dairy nutritionist, a representative of a creamery and the county Extension agent. The program has one state coordinator. Participating dairy farmers define issues and set goals; technical teams survey the farms and propose solutions. Participants pay a fee based on the number of years they are enrolled and the number of cows they own[9].

The second program, initiated by the Land Stewardship Project in 1993, was a biological, financial and social monitoring project. Collaborators included researchers from the Minnesota Institute for Sustainable Agriculture, farmers from the Sustainable Farming Association of Minnesota and other agencies and individuals. In all, 24 monitoring project team members contributed expertise in soil science, plant pathology, wildlife ecology, hydrogeology, farm management, water quality, rural sociology, animal production (beef and dairy), crop production, agricultural economics, stream ecology, plant biology, on-farm research, management intensive grazing and HRM[10].

After documenting the farmers' management style and practices, the team supplemented them with new technologies and tools for making observations and recording progress. The team's methods, technologies and tools were compiled in the *Monitoring tool box*, which guides farmers to a future with a balance between the three elements of sustainability: economic, environmental and social[10].

Conservation Agriculture Methodology

The Trust's CAP Advisory Board selected four demonstration farms from 26 applicants. To qualify, a farmer was required to be engaged in a conventional management style. Advisory Board members also ensured that selected farms represented real North Dakota farms (Table 1).

After selecting the demonstration farms, the Advisory Board created a Resource Analysis Team for each farm family. Each six-member team included an Adult Farm Management (AFM) instructor, an agronomist, a soil scientist, a district conservationist, a wildlife biologist and a quality-of-life specialist. Selection of team members was based first on the resource people the demonstration farmers had worked with prior to the project. The project coordinator then selected additional professionals to fill any disciplinary gaps. When county-level personnel were unavailable, the project coordinator recruited regional personnel. This was the case for the farm management instructor, soil scientists and wildlife biologists. Some team members served on two Resource Analysis Teams. Each team included a local NRCS staff member.

CAP personnel collected and documented a range of information for each farm, including a farm description, all field maps, field rotations for the previous 4 years, a National Wetland Inventory, soils maps, and infrared vegetation images. The NRCS evaluated each demonstration farm for a Natural Resource Inventory and developed a Whole-Farm Conservation Plan.

Figure 1. Shown in front row are Deborah and Darrell Odegaard, Egeland, ND and members of their Resource Analysis Team (back row left to right) Terry Lykken, Rick Lee, Richard Mertens, Mark Fisher, and Jay Olson. Not shown is Gayle Gette, quality-of-life specialist.

Prior to a Resource Analysis Team meeting, the farmer and the project coordinator determined which issues needed to be addressed and the coordinator developed an agenda for the 2-h meeting. The project coordinator also forwarded documents to team members to inform them of specific issues to be covered prior to the meeting.

Resource Analysis Teams met twice each year in the farmers' homes with the exception of one farmer who felt his home was too small. His team met in the local Extension office conference room (Fig. 1). The project coordinator facilitated meetings, which began with an update from the farmer on his activities. Team members then addressed the topics they had been asked to prepare for the meeting.

In the spring, teams discussed soil samples taken the previous fall and planned for the upcoming cropping season. They also discussed the Adult Farm Management Analysis completed each spring, the results of the on-farm demonstrations from the previous year and any follow-up or new demonstrations being planned. In the fall, teams reviewed the successes and failures of the year and discussed what changes could be implemented the next season. They also reviewed avian surveys which tracked biological changes and were taken from mid-June to mid-July. Also in the fall, the quality-of-life specialist gave reports to the team. The reports were based on the results of exercises from the *Monitoring tool box*[10] designed to help families articulate their goals and values for the farm and their lives. This concept was new to an agricultural setting.

Major issues addressed by each Resource Analysis Team differed by farm (Table 2). In all cases, the demonstration farmer made final decisions regarding any actions taken on his farm.

Table 2. Major issues addressed by the Resource Analysis Teams.

Farm management analysis
Crop rotations and cover crops
Wetlands and saline soils, foxtail barley issues
Water drainage
Irrigation potential for dry edible beans
Improving soil quality and nutrient management
No-till/reduced-till practices
Long-range plan for transition of farm ownership/management
Iron chlorosis in soybeans
Biological control of soybean aphid infestation
Avian, invertebrate and plant surveys
Carbon sequestration monitoring
Bio-fuel potential
Pasture renovation and rotational grazing
Tourism income potential of birds and other wildlife
Quality of life exercises

Resource Analysis Team Results

CAP personnel gathered qualitative information through exit interviews with demonstration farmers and their Resource Analysis Team members to evaluate the effectiveness of the Resource Analysis Team concept. Although the data are not quantitative, these first-hand accounts will be valuable to agricultural education planners.

Exit interviews with demonstration farmers

CAP personnel asked each demonstration farmer to evaluate the value of his Resource Analysis Team, the return on his investment, and whether teams should be available to all farmers.

Each of the demonstration farmers agreed to participate in the program with apprehension. Initially, two issues motivated them to participate: the prospect of assistance in treating wet-saline areas and the project's incentive payments for set-aside acres. However, as the project progressed, farmers found the required AFM program interesting and beneficial. AFM is an educational program that provides group and individualized instruction for agricultural producers and their families to improve their marketing, risk management and business analysis. AFM also offers assistance in tax planning, year-end report preparation and a full-enterprise analysis at the end of the year. Farmers said AFM helped them to see the economic changes on their farms and to understand the positive economic impacts of the environmentally sound practices they were implementing.

Initially, the farmers were surprised that resource professionals were willing to take time just to talk about their farms. As the project progressed, trust developed and the farmers appreciated having such direct access to a range

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of expertise to inform their decisions. The Resource Analysis Teams gently pushed the farmers toward protection of the environment by helping them envision the real application and potential of their ideas. One of the demonstration farmers described his experience as follows:

> I knew all of the people [who were members of my team], but when you bring them together for 3 h and you talk about issues and solutions, I kind of appreciated that. It isn't something I would have done on my own, nor would those team members spend as much time on an individual basis . . . I have seen lots of benefits to that [the team approach].

The broad knowledge base of the resource professionals resulted in a variety of perspectives and lively debates. The farmers became especially interested when professionals challenged each other over particular approaches to specific issues. These discussions helped the farmers consider many different management options by providing in-depth explorations of the possibilities.

Members of one demonstration family found the quality-of-life exercises especially beneficial and believe the exercises are important and central to a successful whole-farm plan. The process helped them raise important questions about their lives on the farm and, as a result, they realized the importance of a vacation away from the farm.

All of the farmers appreciated the Resource Analysis Team concept and said the process was worthwhile. One described the benefits this way:

> The whole Resource Team is learning in this process. My county agent is listening to the seed guy or soils guy and they are going back and forth. [This discussion] is really good and the whole group is learning more every meeting.

In addition, they all agreed the Resource Analysis Team concept should be offered in some format, funded either by state government or as part of the next Farm Bill.

Exit interviews with Resource Analysis Team members

In exit interviews with Resource Analysis Team members, CAP personnel focused on the following themes: expectations, positives, negatives, impacts on cooperators, impacts on the farm enterprises and impacts on the team members' professional capacities. Of the 20 Resource Analysis Team members, 17 completed an exit interview. With regard to expectations, two team members stated they were initially hesitant to get involved because they believed that little if anything would be accomplished. Others thought the resource would be a value to the producers and wanted to see how farmers would react. They felt that, if the process worked, it would be a great opportunity to meld farming and conservation.

Among the positive aspects of the experience, team members complimented the farmers for allowing the process to happen. They saw the farmers develop a spirit of cooperation and begin to rely upon their team's direction. As for the professionals, they appreciated being able to apply routine knowledge to a specific farm and follow the impact from year to year. The project also gave them an opportunity to get to know other agency professionals. Throughout the meetings, team members offered a variety of perspectives and the interchange of ideas was very respectful. They felt Resource Analysis Teams were able to offer more complete answers to farmers' questions. They described the quality-of-life exercises as putting the emphasis on the total picture, not just the planting and harvesting. One team member summarized the positives this way:

> Having six people with different professional backgrounds sit down with a producer and discuss various concerns that a producer might have and ways to help meet . . . objectives for the farm [is a positive]. I think just the interchange of ideas between people was a real plus. I know I learned some things even though I've been out in the field here for many years. I learned things I'd never been aware of before by listening to people with different backgrounds. It made me more cognizant of the fact that there's more to most things than I had a perception that there was [when] looking at it from my background.

Time was the most frequently mentioned negetative aspect of the Resource Analysis Team concept. Travel to and from the meeting and the meeting itself consumed half a day of work two times per year. For most professionals, the agency they work for covered this expense, but for those who were part of an independent business, the time and travel counted against their bottom line. Another negative cited was the fact that the project ended, and Resource Analysis Team support is no longer available to the participating farmers. Some team members felt that a six-member team was too large. While one team member described the quality-of-life exercises as an important aspect of the total farm management, others questioned their value. One team member said he found it difficult to work as a member of a team.

The farm management professionals were disappointed that they had to speak in generalities due to the confidentiality of financial information, while the soil scientist, agronomist and wildlife biologist could speak in specific numbers, e.g., pounds of nitrogen, number of pure live seed, or numbers of blue-winged teal.

One team member felt the whole-farm planning process had fallen short of the ideal outline for whole-farm planning. In reviewing the project, it is clear that funding was a limiting factor. As a result, the farm plans were progressive plans measured against NRCS Conservation Plans to protect the natural resources. However, it is also clear that this multidisciplinary and multifaceted Resource

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Analysis Team approach to education changed farmers management to benefit landscape resources in a relatively short period of time.

Resource Analysis Team members agreed that, overall, implementation of the concept was very successful. They described the impact on the farmers as generating positive income, which absolutely affected the bottom line in a positive way and significantly impacted the farm families.

Team members also believed the interaction among a variety of professionals helped farmers to think about issues from different perspectives. As trust developed, farmers responded by being open to changes and showing a willingness to try new things, which made team members feel valued. At the same time, team members felt farmers were not overwhelmed and were able to represent their own perspectives proficiently. Team members said they also observed a change in farmers' attitudes toward conservation as the project progressed. An example of this is the fact that one demonstration farmer has agreed to serve on his county Soil Conservation District Board. In addition, team members felt that the exposure of the family to the biological aspects of the farm was a plus.

Resource Analysis Team members commented on CAP's impacts on demonstration farm enterprises by mentioning how the project generated real dollars. CAP gave the farmers economically viable options that allowed them to manage the land differently, including investment in minimum/no-till drills. This resulted in a substantial change in tillage practices, which had profound effects on the soil quality of fields. This, in turn, resulted in greater protection of the environment.

When asked if serving on a Resource Analysis Team had impacted their professional capacity, three team members indicated it did not while another said the adversarial relationship between wildlife/conservation organizations and farmers had eased. Another said:

> I was a skeptic coming into the project. We've had a long history of having an adversial relationship between the wildlife organizations and conservation organizations here in the Devils Lake area with all of our water problems. From my own perspective, it has helped my own attitude toward programs [like Conservation Agriculture].

Three team members said their exposure to other agencies' staff and programs has provided information they will share with other farmers with whom they work. While one team member, a field consultant, was skeptical of the soundness of collaborative recommendations, others said the project strengthened their belief in collaboration, and that the experience broadened their views and understanding of farmers and their families. The interaction helped them think beyond research plots to develop an appreciation for a larger operation and its cropping system. One member said he now has a better understanding of why farmers do not adopt diverse rotations and implement conservation practices. Another said he gained confidence in the value of his professional product (soil surveys).

Resource Analysis Team members overwhelmingly believed the concept should be available to other farmers. They agree this effort showed the economic loss of farming marginal ground and the positive effect of finding alternative uses for it. However, team members believed producers need a substantial reward or benefit to encourage them to hold up their management strategy for public scrutiny. They also agreed that the primary obstacles to this concept would be funding the teams and accomodating for the time constraints. As a group, they were unsure of how such a broadened team effort should be structured, and said available funding likely would dictate the final structure.

All but one of the team members said that they would be willing to serve again. He is a self-employed businessman and serving on the team took time away from his business.

Potential Obstacles to Resource Analysis Team Implementation

There are many potential obstacles to applying the Resource Analysis Team concept on a county, state, regional or national scale. They include funding, time, scheduling, the ability to recruit cooperative and knowledgeable team members, the ability to engage farmers who want to learn, and the availability of a skilled coordinator/facilitator.

Generally speaking, funding for this new farmer conservation education model needs to be addressed through public policy at the state and federal levels. The Farm Bill is one possible funding opportunity. However, states also need to be proactive in adopting and funding this type of conservation education program. Once the funding for the resource analysis teams and coordinators is secure then other programs funded by federal, state and private non-profits can be engaged to support the educational activities suggested by the resource analysis team members. Three examples of programs that were used by CAP were Agricultural Products Utilization Commission (APUC)[11], Sustainable Agriculture Research and Education (SARE)[12] AFM as described earlier.

On-farm demonstrations are an essential part of any program because they allow farmers to test different management techniques, and there are many small grant opportunities. In North Dakota, for example, producers can apply for farm diversification grants from the APUC[11]. CAP also accessed SARE grants, which are available nationwide. SARE provides farmers small grants for testing innovations that lead to more sustainable farming practices[12]. The AFM is available in several states in the upper midwest. It is funded by the ND Department for Career and Technical Education and the remainder of expenses are paid by the farmers and ranchers enrolled.

With regard to recruiting Resource Analysis Team members, the real issues are money and time. CAP demonstrated that the Resource Analysis Team concept

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Table 3. Resource analysis team and coordinator's time approximations per farm family.

Resources per farm family per year	Time
Six Resource Analysis Team members × 2 h per meeting × 2 h travel time × 2 meetings per year + 12 h total preparation time Additional cost: mileage to meetings	60 h
Farm family time	10 h
AFM program cost: $500/year enrollment cost	25 h
Coordinator: enrollment, schedule, facilitate	48 h

would require a total of approximately 60 h of team time per farm family to engage six technical professionals for two meetings per year (Table 3). In the case of CAP, team members' time was donated, with independent business owners reinbursed for some mileage.

When recruiting Resource Analysis Team members, it is important that they be familiar with the individual farm, not only so they can make good recommendations, but also so there is an environment conducive to sharing opposing opinions about farm problems. Many agencies already offer professional assistance to farmers; when funds are available for projects, they allocate staff time or hire additional staff. To implement the Resource Analysis Team concept, they would have to allocate staff time.

Engaging a good coordinator/facilitator is essential because that person provides the links between the farmer, the Resource Analysis Team members and program providers. The coordinator/facilitator needs to have a strong agricultural background with excellent written and verbal skills. CAP required approximately 48 h per family per year for the project coordinator/facilitator to oversee program enrollment, schedule and facilitate meetings and follow through with on-farm demonstrations.

The nationwide Cooperative Extension programs comprise agricultural professionals trained to be effective facilitators, and most states have these professionals placed in each county. These Extension professionals could provide the needed facilitation for this project, if appropriate funding were provided for these activities.

Discussion

In 2000, in an area that has been in a wet cycle for 7 years, has had nine Presidential disaster declarations, and has experienced annual increases of wet-saline areas, CAP promised some relief.

The Resource Analysis Team educational model engaged a variety of people from agencies, nonprofits and businesses in working together for the benefit of farmers and the environment. The project broke down barriers between organizations, resulting in an atmosphere of real trust and communication. The varied perspectives from diverse professionals and farmers alike created multiple opportunities and choices for farmers, who might have a variety of skills but lack in one or two areas. By meeting on-farm, the Resource Analysis Teams came to the farmers and met in a somewhat neutral location where they were comfortable.

At the end of the project, the participating farmers all agreed the experience was beneficial. One farmer likened it to 'graduate school for farmers,' and one Resource Analysis Team member said CAP put a human face on regulations that guide environmental impacts. In exit interviews, both farmers and Resource Analysis Team members said this education model should be available to farmers and, at the very least, be available to a limited number of farmers. However, everyone involved in the project was concerned about its expense and the time constraints.

In addition to the educational and communication benefits of CAP, the project's incentive payments for the implementation of conservation practices allowed participating farmers to purchase tillage tools that will continue to impact their farm management. Farmers are finding that, when a no-till system reaches maturity, they can apply even less pesticide for weed control[13]. The ultimate results—less wind and water erosion and better soil quality—will continue to positively impact environmental quality for years to come.

Conclusion

CAP was a limited but highly successful demonstration of the Resource Analysis Team concept, which we believe could be the key to improve entire operations from a whole-farm perspective. Resource Analysis Teams successfully introduced concepts of sustainability and encouraged farmers to adopt more economically and environmentally sound practices, which benefit society as a whole.

Many technical resource professionals presently engage farmers and ranchers on the local level. In this demonstration, some resource specialists initially were reluctant to become involved with the project. However, as time passed these experts became active supporters, not only of the farmers, but also of the Resource Analysis Team concept. Most said the process was educational on a professional level. By participating, they gained a clearer understanding of farmers' perspectives and realities. We anticipate that other conservation professionals would also benefit from this experience. As a consequence, conservation programs would be more effectively designed and become more accessible to farmers. The agency representatives also

might assist in creating incentive payments that better reflect the true costs of restoring landscape functions and providing societal benefits.

There are numerous technical professionals in every state who are employed through federal, state and county agencies, agribusinesses, agricultural lending institutions and churches. All of these specialists will be potential team members once they understand the value of the concept and are compensated appropriately for their time and travel.

This new educational delivery model could be targeted to beginning farmers as a starting point for the proposed agricultural education reform. While three of the four CAP farmers plan to retire within 15 years, the program could be most beneficial for beginning farmers whose management practices are just starting to be shaped. In North Dakota, 80 beginning farmers requested loan assistance from the Bank of North Dakota in 2004–05. By tapping into this participant base, the farmers would be scattered throughout the state so that any one county would not be overburdened with the implementation of a new program.

This innovative education model will truly bring agricultural and environmental interests closer together, thus affecting real environmental protection by moving the farms in the direction of sustainability—economic, environmental and social.

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