

An Assessment of Agricultural Conservation Practices and Minnesota FarmWise in the Cannon River Watershed



Project Report by
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An Interim Report prepared for the
Freshwater Society

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EXECUTIVE SUMMARY

The report describes the assessment of agricultural conservation practices and Minnesota FarmWise in the Cannon River Watershed, Minnesota. The study was conducted by the Department of Forest Resources, University of Minnesota in collaboration with the Freshwater Society. The overarching goals of this project were to examine the capacity of agricultural communities to engage in sustainable watershed management and to develop a comprehensive decision framework that identifies drivers and constrain associated with voluntary agricultural conservation practices in Minnesota. Specifically, this study examines the impacts of Minnesota FarmWise, a water conservation civic engagement program, on individual decisions to adopt voluntary conservation practices and broader community engagement in watershed management in two Minnesota watersheds. Data were gathered through in-depth interviews with ten farmers and farmland owners in the Little Cannon and Belle Creek subwatersheds of the Cannon River watershed. A brief synopsis of study findings are highlighted below.

Study Findings

Participant Profile

Ten participants were interviewed in the two study subwatersheds. A diverse group of interview participants were recruited for participation in this study.

Perceptions of Water Resources

Water Resource Problems

Most participants acknowledged having concerns about water resources. Seven areas of water resource concern emerged in their discussions:

- Erosion and sedimentation
- Groundwater pollution
- Nutrient loading
- Water quantity
- Chemicals
- Flooding
- Invasive species

Pollution Sources

In their descriptions of water resource concerns, participants identified a variety of pollution sources including:

- Agriculture
- Lawn care practices
- Urban development
- Sewage treatment

Responsibility

Participants assigned responsibility for solving water resource problems to wide-ranging groups including:

- Everybody
- Farmers
- Landowners
- Resource users
- Resource agencies
- Businesses
- Urban residents

Agricultural Conservation Practice Decision Making

Drivers of and Constraints to Conservation Practice Adoption

Several themes emerged in participants' discussion of what motivates and constrains their decisions to adopt conservation practices. Primary themes included:

- Environmental outcomes
- Economic outcomes
- Stewardship ethic
- Awareness of problem and sense of responsibility
- Competition in farming
- Social influences
- Landscape and operational suitability
- Ease of adoption
- Familiarity with practice
- Practice efficacy
- Time to implement practices
- Conservation program and policy

Information Sources

Farmers obtain information about farming and conservation practices from a wide range of sources. In these discussions seven primary sources of information emerged:

- Other farmers
- Agricultural specialists
- Financial advisors
- Conservation agency staff
- Extension and education staff
- Media sources
- Other specialists

Perspectives on Minnesota FarmWise

Participation in FarmWise

Participants find two things appealing about the FarmWise program: that the program is farmer based and is about sharing information. One farmer said, “It starts with the landowners, it’s not someone trying to tell you or someone else how to do something. It would almost be a peer pressure kind of a motive. But, no you can definitely get ideas from other people that you wouldn’t have thought of yourself; there is no harm in that.”

Reasons for non-participation in FarmWise included

- Lack of knowledge about the program
- Time constraints
- Conflict

Recommendations for Increasing Farmer Participation in Minnesota FarmWise

Participants offered three general strategies for increasing farmer participation and engagement in the FarmWise program.

- Address time constraints
- Improve facilitation
- Tailor communication strategies to farmers

Discussion and Recommendations

Analysis of the range of responses to multiple interview questions revealed three predominating worldviews on water resource conservation and the role of farmers in solving water resource problems.

1. “Get bigger, better or quit”
2. “We try to do the best we can”
3. “It is the right thing to do”

Strategies for increasing conservation practice adoption among farmers

A multiple-strategy approach is recommended in conservation programming that supports conservation leadership, builds awareness of water resource problems, promotes a sense of personal responsibility for water resource and addresses economic constraints to the adoption of conservation practices. The recommendations provided here are tailored to the three worldviews on water resource conservation.

1. *Support conservation leadership, recognize leaders and feature success stories*
2. *Build awareness of water resource problems and promote sense of civic responsibility*
3. *Address economic constraints and reduce risk and uncertainty*

STUDY BACKGROUND

The overarching goals of this project were to examine the capacity of agricultural producers to engage in sustainable watershed management and to develop a comprehensive decision framework that identifies drivers and constraints associated with voluntary agricultural conservation practices in Minnesota. Specifically, this study assessed the impacts of Minnesota FarmWise, a water conservation civic engagement program, on individual decisions to adopt voluntary conservation practices and broader community engagement in watershed management in two Minnesota watersheds. The study was conducted by the Department of Forest Resources, University of Minnesota in collaboration with the Freshwater Society.

The project is designed to address four primary research questions:

- 1) How do members of the agricultural community perceive the FarmWise program?
- 2) What factors drive and constrain individual decisions to adopt conservation practices?
- 3) How does FarmWise affect community engagement and decisions to adopt conservation practices?
- 4) How can policy-makers, resource professionals and other local actors design and promote water resource conservation programs that are ecologically and socially relevant and responsive to the needs within the agricultural community?

In the *first phase* of the study, data were gathered through ten in-depth interviews with farmers, farmland owners and one citizen FarmWise participant in the Rice Creek watershed area. This report highlights findings from the *second phase* of the study conducted through in-depth interviews with farmers and farmland owners in the Little Cannon and Belle Creek subwatersheds of the Cannon River watershed.

This project offers a much needed science-based and participatory approach to understanding and promoting conservation practices in the agricultural community. Despite advances in biophysical science, technology and engineering, water resource managers continue to struggle with fundamental questions associated with the *implementation* of water resource management programs. Foremost among these questions is how to influence human behavior. In particular, resource professionals need a more accurate and holistic understanding of the psychological, social, and institutional factors that drive and constrain voluntary adoption at individual landowner and broader watershed community scales. Previous research has revealed four levels of community capacity that are central to a community's ability to act collectively: individual, relational, organizational and programmatic capacities (Davenport & Seekamp, 2013; Foster-Fishman, Berkowitz, Lounsbury, Jacobson, & Allen, 2001). Recent reviews and studies conducted by the Principal Investigator in Minnesota and Illinois further support and provide detail to these dimensions in the context of land and water resource management (Davenport & Pradhananga, 2012; Davenport & Olson, 2012; Pradhananga & Davenport, 2013; Slemper et al., 2012). Extension agents, educators, resource professionals and program managers will benefit from more

sophisticated, science-based tools to monitor program effectiveness and enable them to better design programs that speak directly to the needs and capacities within the agricultural community.

This report also provides an evaluation of Minnesota FarmWise, an agricultural conservation program, from the perspective of farmers and landowners in the Little Cannon and Belle Creek subwatersheds of the Cannon River watershed in southeastern Minnesota. Minnesota FarmWise was developed by the Freshwater Society and the National Park Service, Mississippi National River and Recreation Area in 2011. The Freshwater Society describes the FarmWise program as “a community-based initiative that invites farmers to work together to reduce non-point sources of pollution through voluntary adoption of conservation practices.”

STUDY DESIGN AND METHODS

This study used a qualitative research approach for study design, data collection and data analysis. Qualitative research is well-suited for gathering rich and detailed information on complex issues and is grounded in participants’ experiences, values, beliefs and attitudes. Interviewing is a particular effective method for discussing issues associated with conservation practice adoption in-depth (Davenport & Olson, 2012).

Data were gathered through in-depth interviews with farmers and farmland owners in the Little Cannon and Belle Creek subwatersheds of the Cannon River watershed. Ten interviews in total were conducted. Participants were recruited through consultation with CRWP staff. A \$50 reimbursement was offered to participants for their time. Individuals were contacted via telephone using a recruitment script (Appendix A). Twenty-three individuals were contacted in total. Despite repeated attempts, ten participants were unable to be reached for interviews. Another three individuals declined an interview.

Interviews were conducted in participants’ homes or workplace and lasted one to two hours. Before each interview, participants were asked to read and sign an informed consent form (Appendix B). Participation was voluntary and identities of individual participants remain confidential and are not linked to interview data in any publications. Interview questioning was semi-structured, meaning an interview guide (Appendix C) was followed with predetermined open-ended questions. However, interviewees had the freedom to respond to questions from their own points of view. The interviewer also had the freedom to ask probing questions for further clarity or explanation. After the interview, participants completed a background information form (Appendix D) that inquired about individual socio-demographic information and land and farm characteristics.

Interviews were audio-recorded and transcribed verbatim using Olympus DSS Player Standard Transcription Module Version 1.0.2.0. Interview transcripts were analyzed using standard thematic qualitative analysis techniques (Charmaz, 2006; Corbin & Strauss, 2008) for identifying themes, patterns and relationships within the data. Qualitative data were coded and organized using QSR NVivo 10.0. A range of themes including convergent and divergent themes were identified and are reported in the study findings below.

STUDY FINDINGS

Participant Profile

Participants were asked to complete a background information form including socio-demographic and farm or land information. Eight participants were males and two were females. The median age of interviewees was 55. Participants have lived in their community for 54 years (median) and have been farming for 36 years (median). All participants reported completing high school with six reporting having a bachelor's degree or higher. Three participants reported making more than \$100,000 in total household income in 2013 (Table 1).

Participants owned a median of 335 acres with operations ranging from 52 acres to 2800 acres. Nine participants reported that more than 50% of their income was dependent on their land. Land ownership characteristics varied with all participants reporting that they own and manage their own land. In addition, seven participants rented farmland from another party, while three rented land to another party. Farms have been in participants' families for 86 years (median) and on average, current operations were approximately 1 mile from participants' homes. However, it should be noted that eight of the ten participants reported that their farmland is 0 miles from their home, suggesting that they live on the farm (Table 2).

Participants were asked if they use practices on their land that reduce the impacts of farming on water resources. The question was open-ended to include all practices that participants themselves regard as reducing impacts on water. Participants listed 21 different practices they considered to be conservation practices (Table 3). Practices include nutrient management, cropping decision and implementation of structures specifically designed to improve water quality. Nutrient management practices included efficiency of nutrient use through nutrient analysis and application rates. Cropping decisions included planting native grasses, tillage regiments, crop rotation, and land retirement. Structural implementation included practices such as buffers and waterways specifically designed to address water resource issues. Installing drainage tile was also considered by some participants as a conservation practice. As one participant explained, "Tile makes all of the application of what you're doing a little better. You can get it drained and do your work. You don't have ducks moving in, that's not a long term place for them to live, it's not good; I hate to see wildlife misdirected."

None of the ten participants had participated in the Minnesota FarmWise program. Further, only two reported having heard of the Minnesota FarmWise program.

Table 1. Participants' socio-demographic characteristics

Socio-demographic characteristics		N	Percent
Gender	Male	8	80
	Female	2	20
Age (n=10)	Median	55	-
	Minimum	43	-
	Maximum	70	-
Years lived in community (n=10)	Median	54	-
	Minimum	18	-
	Maximum	69	-
Years farming (n=10)	Median	36	-
	Minimum	20	-
	Maximum	45	-
Formal education	Did not finish high school	0	0
	Completed high school	0	0
	Some college but no degree	1	10
	Associate or vocational degree	3	30
	College bachelor's degree	4	40
	Some college graduate work	1	10
	Completed graduate degree (MS or PhD)	1	10
Household income	Under \$10,000	0	0
	\$10,000 - \$24,999	0	0
	\$25,000 - \$34,999	0	0
	\$35,000 - \$49,999	1	10
	\$50,000 - \$74,999	5	50
	\$75,000 - \$99,999	1	10
	\$100,000 - \$149,999	0	0
	\$150,000 or more	3	30

Table 2. Participants' property characteristics

Property characteristics		N	Percent
Acres owned (n=10)	Median	335	-
	Minimum	52	-
	Maximum	2800	-
Percent income dependent on farming	0%	0	0
	1-25%	0	0
	26-50%	1	10
	More than 50%	9	90
Ownership arrangement	I own and manage my own farmland	10	-
	I rent my farmland <u>to</u> another party	3	-
	I rent farmland <u>from</u> another party	7	-
Years farm has been in the family (n=10)	Median	86	-
	Minimum	40	-
	Maximum	150	-
Distance farm is from home (miles) (n=10)	Median	0	-
	Mean	1.2	-
	Minimum	0	-
	Maximum	10	-

Table 3. Participants' reported conservation practices

Conservation Type	Conservation Practice
Nutrient management	<ul style="list-style-type: none"> • Nutrient analysis of manure before application • Managing use of fertilizers
Cropping decisions	<ul style="list-style-type: none"> • Crop rotation • Planting native grasses • Conservation tillage • No till • Minimum till • Mulch tillage • Grass waterways • Chisel plow • Conservation Reserve Program (CRP) • Reinvest in Minnesota (EQIP) • Conservation Stewardship Program (CSP) • Not plowing up to the creek or into waterways • Leaving residue on land
Structural implementation	<ul style="list-style-type: none"> • Buffer strips • Dams • Terraces • Waterways • Pond restoration • Tiling

Perceptions of Water Resources

Water Resource Problems

Participants were asked if they were concerned about water resources in the area, and if so, what concerns they had. Most participants acknowledged having concerns about water resources. Seven areas of concern emerged in their discussions:

- Erosion and sedimentation
- Groundwater pollution
- Nutrient loading
- Water quantity
- Chemicals
- Flooding
- Invasive species

Erosion and sedimentation were primary concerns. One farmer expressed his concern regarding soil erosion: “Most of us try not to let our soil go down river, because it doesn’t help us out a bit. And I’m up

at the upper end of both of 'em, both the Little Canon and the Belle Creek. This soil is one that erodes very easily, and it's not that we have steep slopes here, we have long slopes."

Groundwater pollution was also a primary concern for many participants. One participant expressed concern about leaching into groundwater: "We got that limestone, that is the other problem too with the leaching in the groundwater and we got that limestone surface around here which is pretty vulnerable." Others expressed concerns about iron, mud and other chemicals in groundwater.

Participants expressed concern over *nutrients* including fertilizers used in agriculture and in lawns: "The nutrients don't do any good if they end up in the water because we need them to grow the crops, not to pollute the streams and the lakes." *Water quantity* was also a concern for participants. One participant expressed concerns about water quantity in wells: "We've got a shallow well here and when it's dry in the summer, it goes dry. I have to haul water from my well at home."

Participants also expressed concerns about *chemical* runoff into surface water: "I think people need to be aware of their chemical uses, I hate seeing them down in Bell Creek in the valley there." *Flooding* was another concern for participants. One participant explained: "Mainly my main concern is flooding. Anything we can do to slow that down...you're never going to stop it I guess but maybe you could lessen the burden, holding back some of the water in places and releasing it slower." Participants were also concerned about *invasive species*. One participant explained the negative impact of invasive species and how it results in further erosion:

So what happens is you get these Box Elder trees growing and then...what's that other one? It's like a brush that grows...buckthorn, that's terrible. And it isn't real heavy around here yet but I've been up around Hastings and some places where I've been in the woods and they are really bad. It just takes over everything. But around here the Box Elder trees are terrible, they start growing around...it used to be pasture, there used to be a nice pasture in between the two fields and it's a valley, and there used to be a pasture...at one time it used to be all grass and now it is just Box Elder trees. See and when they grow, they start taking over, they shade out everything so much, you don't have any grass underneath it and then you get erosion. It's just dirt and mud. It's terrible.

Pollution Sources

In their descriptions of water resource concerns, participants identified a variety of pollution sources:

- Agriculture
- Lawn care practices
- Urban development
- Sewage treatment

Several participants identified *agriculture* as a source of pollutants. One farmer interviewed described how runoff from agricultural land impacts water resources: "It's my understanding that all this crop land when the rain comes it washes away whereas if that was grass it would pull the water from rushing off and bringing so much of the farm chemicals into the streams and so forth." Another participant emphasized tiling as a source of pollutants. The participant explained: "if we tilled the hillside up here, boy that neighbor would have problems that he didn't have before, no doubt about it." While farmers acknowledged *agriculture* as a source of pollution, several participants pointed to the impact of lawn care practices on water resources. One participant spoke about the runoff of fertilizers from lawns: "I think a lot of the fertilizer that ends up in the river comes from the city, because it's been a direct source from off the lawn and into the sewer system, piped right to the river." Another participant described in detail the impact of lawn care practices and lakeshore management on water resources:

Just check the lawns, a farm lawn, they kind of keep it low enough so the cattle can still find it, but they don't shave it down so short.... [Urban residents] do that right by a lake; there's nothing to hold the water. It's like rolling down an asphalt highway. It's like boom. And what else do they typically do? They'll put some kind of fertilizer on. They ain't got a clue of what they're doing; they ain't got a clue how many tons per acre they're putting. "Well, we are only putting on a couple of bags," but that couple of bags would probably cover twice as many square feet as you put it on. And how many lakes in Minnesota? Is there 10,000 lakes? There's a million people right there in Minnesota. There's exceptions, but so many of them: "Well yeah, it's the weekend, we better weed and feed." And, that's all you see on TV. They put so much effort and so much material into that, and too much of it goes down to the lake and then, well geeze, you got a house on the lake. Well, now what? They got a boat. Well, you're not going to dock that boat in weeds. So the weeds come out and there goes that natural filter right down the edge of the lake and most lakes are built up. There's not room for too many more to get out there, that's all sucked up already. So I wonder what happens. Who gets the credit for all of their potential sins as far as runoff and things and what can they do different outside of not apply or leave the grass in places long, what else can they do?

Participants also attributed pollution to *urban development*. One participant identified lakeshore development and argued that "this country 75 years ago made an error; they shouldn't have let anyone build within half a mile of any size lake, anywhere." Participants also identified *sewage treatment* as another source of pollution related to urban development. One participant expressed concern about sewage from development near rivers: "It is a big problem, what are you going to do with sewage, you know, all these towns that are have grown pretty good, live along the rivers and they always got their sewer plants on the lower ends of the towns and you don't go swimming down there."

Responsibility

Participants were asked who they think should be responsible for solving water resource problems in the area. Participants assigned responsibility to wide-ranging groups including:

- Everybody
- Farmers
- Landowners
- Resource users
- Resource agencies
- Businesses
- Urban residents

Several participants suggested that it is *everybody's* responsibility to solve water resource problems. One participant emphasized that "everybody just needs to be a little more aware of what they're doing." Another participant noted that it is *landowner* responsibility: "I still believe it's the landowner's land, the water falls on it, so that is their asset or their liability. Once they give that up, they still have a responsibility, so they should be engaged in that." Several participants acknowledged that it is *farmers'* responsibility to solve water resource problems. When asked about farmers' role in water resource protection and restoration, one participant stressed that it is farmers' responsibility to identify and address problems. Another participant spoke about how farmers can help solve water resource problems by using conservation practices: "Yeah, you got to watch the streams. You got to try and not farm right up to the stream bank, get a buffer strip maybe or plant alfalfa along the river maybe. And, then maybe some conservation tillage when it works." Other participants argued that it is not just farmers' responsibility to protect water resources. One participant explained:

Well, farmers shouldn't get blamed for it...but this lake is full of contaminants...what is it, phosphorus, that makes the algae grow like wildfire? There is some that comes off from the ag fields, but when you think, farmers and their intent, this is what, their farm, be it livestock or grain, that's what fed their families for years and that's what they want to pass on. They're pretty concerned with all their issues, most of them are... What can we do, how can we do this better, as well as more efficiently and preserve things better? That's in the forefront of their thoughts, continually.

Some participants assigned responsibility to solve water resource problems to other *resource users* (e.g., people who hunt and fish). Yet others suggested that *resource agencies* such as Minnesota Department of Natural Resources and Minnesota Pollution Control Agency should be responsible for solving water resource problems. Participants also noted that *businesses* and *urban residents* should also take the responsibility to solve water resource problem. One participant explained how everybody has an impact on water resources and thus everybody should shoulder the responsibility to solve water resource problems:

I think everybody, just because a person lives in town, doesn't mean that they shouldn't be cautious of what they do, because they could do just as much damage if they change the oil in the car and pour it down in the storm sewer. Well, that is a direct outlet right to the creek. Another example is all the salt they put on the roads in MN. Where does all that go? That goes right down there. So, I think it is up to everybody, I would not say just because we farm and the

water runs off our land into the creek, that we are doing more or less compared to a person in town who over applies fertilizer on their lawn, and that runs off into the storm sewer and that runs directly flows into the [streams] ...So, I think it's everybody.

Agricultural Conservation Practice Decision Making

Participants were asked a series of questions about their motivations for adopting conservation practices and important considerations when making decisions about conservation. They were also asked directly if they would be more likely to adopt conservation practices if they knew they had downstream benefits, they received financial assistance, if they had evidence practices would not reduce yield, if most farmers they knew used the practice and if they could talk to other farmers about the practice. Participants were also asked who they consult when making decisions on the farm and what are their most trusted sources of information about conservation practices.

Drivers of and Constraints to Conservation Practice Adoption

Several themes emerged in participants' discussion of what motivates and constrains their decisions to adopt conservation practices. Primary themes included:

- Environmental outcomes
- Economic outcomes
- Environmental stewardship
- Awareness of problem and sense of responsibility
- Competition in farming
- Landscape and operational suitability
- Social influences
- Ease of adoption/use of practice
- Familiarity with practice
- Practice efficacy
- Time to implement practices
- Conservation program and policy

Environmental outcomes such as erosion control, water quality and wildlife benefits associated with the practice were primary motivations for the adoption of various conservation practices among participants. Speaking about rotating crops with hay, one participant explained: "It would be better for the erosion. It would be a better return that way and rotation is always better. The more you can get in, in the rotation, the better off it is." Another participant would be more likely to consider using conservation practices "If it could help clean the water a little bit more." One participant spoke about multiple benefits of using buffer strips: "Having that buffer strip around it, it works well, it gives pheasants a place to run and it keeps the pollution out of those ditches, from filling up so fast." Potential negative impacts of conservation practices on farm land were important constraints to the adoption of conservation practices. One participant mentioned that leaving residue on the ground creates other

problems like “more bugs.” Another participant noted that excess water resulting from no-till practices creates problems in his farm.

Economic outcomes such as payments for conservation practice adoption, impact of conservation practice on yield, financial and market uncertainties, labor requirements and cost of adoption and use were important considerations for participants in their decision making. Financial uncertainties around the risks of conservation practice adoption were an important consideration for several participants. For one participant, the key consideration when making decisions about conservation practices is the question, “is the benefit of a [conservation practice] going to save me dirt or save me money?” One participant explained the importance of assessing risk in making decisions about conservation practices:

You talk to other guys that are using it and just say okay, so when [does the practice make it] worse or when does it work. ...That is what I need to know. And I have to justify that risk. Is that risk worth taking to go to that, or do you stay in your comfort zone and say, this is what I know that works. And I think that is part of the reason that people haven't adopted

Market uncertainties such as variability and fluctuations in crop pricing and understanding the market were key considerations. One participant explained how variability in pricing constrains conservation decision making: “If you’re struggling to make it, you’re not going to stick your neck out too far. You want to do a good job without putting yourself at risk.”

Annual yield was one of the ways participants evaluate success of their farming operation. Consequently, impact on yield was an important factor for participants in their conservation practice decision making. When asked about important decision making considerations around the adoption of conservation practice, one participant put it simply: “Increase yield.” Another participant explained further: “If I’m going to switch our farm over to a strip till, if I’m going to switch everything over there, yield is going to be one of them, because that is our main driver.” However, participants also acknowledged that conservation practices improve yield in the long run: “Anytime you leave a lot of trash on the field it takes longer for the soil to warm up in the spring so you are compromising some yield by doing it but in the long run, down the road I think it will save you.” Further, evidence that conservation practices do not reduce yield was also a motivator for participants.

Financial assistance programs such as cost-share, cost-reimbursements and other payment programs were drivers of conservation practice adoption. One participant explained:

Sometimes a little nudge helps. A lot of the terraces, there was cost reimbursement between 50, 75, 80 percent depending on their funds, sometimes it had been more. Well, you got to get on the list and wait two or three more years before the money becomes available. So that's a lot like the farm...it's in the plans, but it's hard to grab sometimes.

Costs associated with adoption and use was another economic consideration for participants. One participant highlighted investment in equipment to adopt conservation practices: “I would have to

invest in a lot of equipment. You have to have bigger sized bailers, and they get very expensive.”

Environmental stewardship emerged as another driver of conservation practice adoption. When making decisions about conservation practices, participants consider if the practice is “going to benefit the land in the long term.” For other participants, long term impacts of current practices were important. One participant voiced concerns about long term impacts on land: “Well, I think the long term is important and farmers today are probably wearing out the land and maybe a concern in the long run.” For other participants, passing land to future generation was an important consideration:

Well, [what] farmers are doing, I think, because of the history and what they want to do with their property when they're done, is send it to the next generation, that hopefully tills the dirt. ...They don't want to sell it to their buddy in town that's going to develop it into houses. Most farmers that's not on their radar; they want their children, the next generation, to take it over when they're done and they want to do, you know, the same thing for them, provide for their families.

Several participants also held strong water resource protection beliefs. A participant mentioned that water resources are “an important part of the community.” Other participants noted that it is important to monitor and protect water resources. One participant stressed that Minnesota should be the leader in water resource protection:

We are the land of 10,000 lakes. We ought to be the land of 11,000 different answers for water too. There is no reason we can't figure it out. I mean we've got to set the standard for the rest of the country and how to do it, because if we can figure out how to do it with our water that we have and how we are making use of it and conserving it, quality wise and everything, then the areas that are more populated with less water, the mistakes we make or things that are really good here...and again, one size doesn't fit all, but the concept: we ought to be able to take that and make it adaptable to some watersheds.

Awareness of problem and sense of responsibility also emerged as an important factor in farmer decision making. While the awareness of the problem of “deep gullies going into deep woods” motivated a participant to adopt conservation practices, another participant believed that water resources were “going the right direction.” Several participants emphasized that “everybody realizes the importance of quality water, and so they'll try to protect it as much as they can.” Participants also expressed that it is not just farmer responsibility to solve water resource problems. A participant said, “Sometimes in a way I think maybe farmers get blamed for a little bit more than they should, because there's probably some other areas that need to be addressed.” While acknowledging that farmers have a role to play in solving water resource problems, a participant stressed that water resource problems are caused by other pollution sources: “But, I don't think it's totally on the farmers either. I think a lot of the fertilizer that ends up in the river comes from the city, because it's been a direct source from off the lawn and into the sewer system, piped right to the river.”

Competition in farming driven by the need to get bigger and corporate influence on farming was a constraint to conservation practice adoption. One participant described how economics is driving farmers towards bigger operations: “The economics force you to kind of make up your mind, saying well either get bigger, better or quit. It’s kind of the three options. Its like, do I get bigger? Getting better, well it’ll require even more investment, and I couldn’t justify the return on my investment so you get out.” Another participant acknowledged, “I do wish it didn’t have to be quite so big to be profitable, because that stuff now where you’d used to have strip cropping and stuff, had helped a little bit with erosion control or stuff like that.” Several participants identified corporate farming as another factor driving competition in farming. One participant said: “Corporate farming...everything is pushed that way now with the government. Everything is bigger, bigger, bigger.” Another participant expressed concerns about corporate subsidies: “If they could stop the subsidies that go to the bigger farms, that would truly change things. And then it would stay more family farms, I think that would probably be the biggest thing.” One participant tied the corporate influence on farming to land stewardship: “Well, it’s unfortunate that it’s going to the big operators all the time, I mean, I know they hire people but then it doesn’t give as many people the chance to own land and be their own stewards.”

Landscape and operation suitability emerged as another factor that influenced participants’ conservation decision making. Several participants noted that conservation practices (e.g., no till) were either not suitable to the landscape or to their current operations. Several participants mentioned that the “ground does not get warm enough” and that “heavy clay soil we have here just does not lend itself well to no till.” Lack of equipment and lack of ways to incorporate practices with current operations (e.g., lack of ways to apply manure with strip till) were also identified as constraints.

Several participants identified *social influences* as a driver of their conservation practice adoption. Participants were influenced by their family’s conservation ethic in their decision making. Several participants were also more likely to adopt conservation practices if they knew of or could talk to other farmers who had adopted the practice. One participant explained: “If somebody’s tried something and said it works good then... It always helps if someone tried it first, learn from their mistakes and then you can usually do a little better job.”

Participants identified *ease of adoption* of practice including the equipment needed and the inconvenience caused by switching to a new practice as important decision making considerations. *Lack of familiarity* with programs such as EQIP and RIM were also constraints to farmer participation in those programs. Another factor in farmer decision making around conservation practices is *practice efficacy*, (i.e., whether or not the practice works). *Time to implement practices* such as terracing was another decision making consideration for participants. Participants also identified constraints related to conservation policy and programs. One participant emphasized the complexity and lack of flexibility in government programs as a constraint. Another participant explained the problem with “one size fits all” policy approach:

I guess my opinion is that this watershed needs to be broken down into smaller areas that have more in common...because what somebody over on the east side is doing, their practices, you

won't be able to get them to work this way and different soils, different growing degree units. I mean you might not think of it that way, but when you start looking at growing degree units and soil temperatures and soil... This ground is different than this ground and you can't use them...and that is part of the problem with state policy or U.S. policy, is you can't have one size fits all when it comes to agricultural production.

Table 4. Drivers to and constraints of conservation practice adoption

Domains	Dimensions	Descriptors
Environmental outcomes	Erosion control	<ul style="list-style-type: none"> • Erosion control • Erosion damage to land for future generations • Benefits in fixing erosion

		problems
	Water quality and wildlife benefits	<ul style="list-style-type: none"> • Downstream benefits to water quality • Downstream benefits to wildlife
	Negative impacts on farm	<ul style="list-style-type: none"> • Practice has negative impacts such as excess water on farms and more insects
Economic outcomes	Payments for adoption	<ul style="list-style-type: none"> • Financial assistance programs such as cost sharing, cost reimbursements and other payment programs
	Impact on yield	<ul style="list-style-type: none"> • General yield considerations • Evidence that practices does not reduce yield • Knowledge that practice helps with yield
	Land not suitable for farming	<ul style="list-style-type: none"> • Land enrollment is CRP because land is not suitable for farming
	Labor requirements	<ul style="list-style-type: none"> • Labor required to farm the land
	Financial uncertainty	<ul style="list-style-type: none"> • Assessment of financial risk • Low return on investment
	Market uncertainty	<ul style="list-style-type: none"> • Variability in pricing for crops • Challenges in understanding the market
	Lack of market	<ul style="list-style-type: none"> • Lack of market in the area for hay
	Cost of adoption and use	<ul style="list-style-type: none"> • Investment needed to purchase new equipment • Other costs associated with adoption and use

Domains	Dimensions	• Descriptors
Environmental stewardship	Stewardship ethic	<ul style="list-style-type: none"> • “It is the right thing to do” • Ethical considerations • Long term benefits to and impacts on the land • Desire to pass on farm to the next generation • Long term environmental perspective
	Water resource protection	<ul style="list-style-type: none"> • Water resources are an important part of the community • Water resource monitoring • Protect water resources for future generations • Set an example for the rest of the country in water resource protection
Awareness of problem and sense of responsibility	Awareness of problem	<ul style="list-style-type: none"> • Water resources have improved • Awareness that something needed to be done
	Sense of responsibility	<ul style="list-style-type: none"> • “We try to do the best we can” • Farmers not to blame for water resource problem • Not just farmer responsibility to protect water resources • Other pollution sources such as lawn care practices and sewage treatment cause problems
Competition in farming	Need to get bigger	<ul style="list-style-type: none"> • “Get bigger, better or quit” • Competition with other farmers who also want to get bigger • Need to have a big operation to be profitable
	Corporate influence on farming	<ul style="list-style-type: none"> • Corporate subsidies hurting family farms • Corporate farming reduces farmers’ opportunities to become land stewards

Domains	Dimensions	• Descriptors
Landscape and operational suitability	Not suitable with landscape	• Soil too warm for no till
	Suitability with current practices	• Lack of equipment suitable to current practices
Social influences	Social influences	<ul style="list-style-type: none"> • Conservation ethic fueled by family • Influenced by seeing other farmers adopt practice • Influenced by talking to farmers who have tried the practice
Ease of adoption/use of practice	Ease of adoption/use of practice	• Inconvenience associated with practice adoption and use
Lack of familiarity	Lack of familiarity	• Lack of familiarity with program
Practice efficacy	Practice efficacy	• Does the practice work?
Time to implement practices	Lack of time	• Times it takes to implement a practice
Conservation program and policy	Policy approach	<ul style="list-style-type: none"> • Management at national level instead of local management • One size fits all policy approach
	Program complexity	• Complexity and lack of flexibility in government programs

Information Sources

Participants were asked who they consult when making decisions about the farm and what their most trusted sources of information about conservation practices are. Farmers obtained information about farming and conservation practices from a wide range of sources. In these discussions seven primary sources of information emerged:

- Other farmers
- Agricultural specialists
- Financial advisors
- Conservation agency staff
- Extension and education staff
- Media sources
- Other specialists

A farmer interviewed said he consulted with *other farmers, extension and education staff, other specialists* and also get information from media sources: “Local farmers, neighbors, friends. You read a

lot in the farm magazines, they'll get their sources through the extension office or the University. A lot of it is consultants, you know if it is a nutritionist, who says this will work better than that, so it's a lot of the consultants that we work with day by day." Another participant noted consulting with *agricultural specialists* and *conservation agency staff*: "We work with an agronomist, work with soil conservation office." Participants also mentioned that they work with *financial advisors* such as bankers and marketing advisors.

Perspectives on Minnesota FarmWise

Participants were asked whether or not they had participated in the Minnesota FarmWise Program. None of the farmers interviewed had participated in the program. Only two of the ten participants had heard of the program. All participants were read a short description of the program and were asked if for their perspectives on the program. Participants were also asked what kept them from participating in the FarmWise program. All participants also were asked what they might suggest to Minnesota FarmWise leaders to increase farmer participation in the program.

Participation in FarmWise

Participants find two things appealing about the FarmWise program: that the program is farmer based and is about sharing information. One farmer said, "It starts with the landowners, it's not someone trying to tell you or someone else how to do something. It would almost be a peer pressure kind of a motive. But, no you can definitely get ideas from other people that you wouldn't have thought of yourself, there is no harm in that."

Reasons for non-participation in FarmWise included

- Lack of knowledge about the program
- Time constraints
- Conflict

Lack of knowledge about the program was a constraint on involvement. Eight out of the ten participants interviewed had never heard of the FarmWise program. One participant noted: "Sometimes you just don't hear about them until afterwards or something." *Time constraints* and meeting location was a concern for some participants. One participant explained:

I don't know how often they would want to meet. Let's say one consideration would be not when they are planting or harvesting, not in the spring, not in the fall. If you could do it in the winter or the summer, that would be the only thing, when and where. Nobody wants to drive, you have a local area, so it's in the middle of the territory or something

Conflict and disagreement during meetings was a constraint for other participants. One participant explained how too much disagreement can affect group dynamic during meetings:

I think that's the biggest problem right now is there's just way too much disagreement just for the sake of being a pain in the ass. Some people dig their boots in, and it's just like you know, prodding them along. Well, if you keep prodding them too far, they're just going to turn around. If you've ever moved cattle, you can crowd cattle along pretty good, but if you start getting them boxed in and boxed in and boxed in, what's the first thing they're going to do? They're going to find an exit strategy, and whatever will help them achieve that exit strategy, they'll use.

Recommendations for Increasing Farmer Participation in Minnesota FarmWise

Participants offered three general strategies for increasing farmer participation and engagement in the FarmWise program.

- Address time constraints
- Improve facilitation
- Tailor communication strategies to farmers

Several participants recommended that program leaders *address time constraints* by finding a convenient time and location for farmers to meet. One participant suggested meeting in the winter, instead of summer. Another participant suggested that program leaders “should go to their house and stop in.” Participants suggested that the program hire a facilitator and find things that farmers can agree on. One participant emphasized the importance of a facilitator: “A facilitator or a mediator is probably mandatory, because if you get two people arguing about that or the group just decides, we are going to talk about football instead, keep them between the lines there.” Another participant added: “That facilitator needs to be, instead of driving a wedge, they’re making a funnel to bring it down to what people can...both if you got people both kind of nodding their heads at the end of it, that’s a good sign.” Participants also emphasized the importance of meeting organization and group size. A participant said, “Well a lot of times you go to meetings and people are long-winded and nothing’s accomplished and it’s a waste of time; so they have to be well organized.” Another participant spoke about the importance of finding the right group size for discussions: “I don’t know what the perfect size would be, but I think if it was too small, you’re wasting your time because you are not dealing with enough people to help impact and at the same time. If it is too large, then it seems like you lose control of everything too. And I don’t know if that’s a dozen people or under twenty.” Participants also suggested involving local township officials in program discussions.

Participants suggested a variety of strategies to *tailor communication strategies to farmers*. Participants suggested that the program needs to “get the word out” and needs “good advertising.” Other participants emphasized the importance of finding program benefit to farmers. One farmer said, “They’ve got to find some benefit to...and it’s got to prove good for them to want to go at it”. Another participant stressed that it is important to not threaten farmer’s independence:

They’ve always got it in the back of their mind, if I sign up for this is this going to come back to haunt me, are they going to be checking me more? Farmers are kind of independent, they don’t

really like to be watched, most of the time they don't need to be. But there's maybe a few that it wouldn't hurt but yeah it's the independence thing that they kind of like to protect.

A participant added: "Farmers don't like to feel threatened. Make it seem like its just informational and you're not committing to anything, and if you don't do it you're not going to get in trouble."

DISCUSSION AND RECOMMENDATIONS

Three worldviews on water resource conservation

Analysis of the range of responses to multiple interview questions revealed three predominating worldviews on water resource conservation and the role of farmers in solving water resource problems (Figure 1). The discussion below describes these worldviews and especially where they diverge. However, the worldviews themselves represent a spectrum of beliefs and norms rather than mutually exclusive categories. Moreover, the narratives represented here had some common characteristics. For example, all three worldviews reflect the notion that everybody is responsible for water resource protection.

1. "Get bigger, better or quit"

Several participants described current farming practices as being driven by economic competition which forces farmers to "get bigger, better or quit." This perspective was narrowly focused on a business model approach to farming. Farmers with this perspective were concerned primarily about corporate influences on farming and resulting impacts to family farms and land stewardship. Further, their farm management practices are driven almost solely by profit (e.g., change in farming from diversified to cash crops). Their farming and conservation decisions are based on a cost-benefit analysis anchored in economic outcomes (e.g., the impacts of farming and conservation practices on yield and profit). They stress that farmers are not solely or even predominantly responsible for water resource problems and that urban pollution sources such as lawn care practices and lakeshore management are primary sources of water resource impairments.

2. "We try to do the best we can"

This narrative reflects concern about water resource problems but also a limited awareness of problems and sense of personal responsibility. Farmers with this perspective acknowledge the importance of healthy water resources. They also believe that conservation actions have greatly improved water resources. This worldview is anchored in the faith that farmers are taking appropriate actions, given the economic constraints they face. Decision making is grounded in careful assessment of risk and uncertainty. Farmers with this perspective appear likely to adopt conservation practices if the practice has clear, low risk economic benefits or if programs provide financial assistance for practice adoption. Farm management decisions are also influenced by natural resource stewardship, especially related to soil conservation and erosion control. Like the previous worldview, participants with this worldview are

emphasized that farmers are not the only group responsible for protecting water resources; urban residents and other resource users should also be held accountable for water resource problems.

3. “It is the right thing to do”

Participants aligned with this perspective held a very obvious and strong environmental ethic and beliefs around the need for water resource protection. These participants expressed concerns about a variety of water resources impairments and the notion that society is taking water resources for granted. For instance, one participant asserted, “Water is something the whole world doesn’t have, so they should wake up and make use of what they do have in the proper channels, because one day they may not have it.” Another participant with this perspective acknowledged that although personal gain is a part of the farm management decision making process, environmental actions are guided by a moral ethic: “Well, a lot of times, whether it’s me or anybody, I think at some point you’re going to cross that thought process, what’s in it for me? And regardless, you still need to do it, because it is the right thing to do.” Decisions are guided by a conservation ethic and the potential environmental outcomes of practice adoption. They acknowledge that farmers are responsible for water resource problems and must take necessary action to solve these problems.

Strategies for increasing conservation practice adoption among farmers

A multiple-strategy approach is recommended in conservation programming that supports local conservation leadership, builds awareness of water resource problems, promotes a sense of personal responsibility for water resource and addresses economic constraints to the adoption of conservation practices. The recommendations provided here are tailored to the three worldviews on water resource conservation.

1. Support local conservation leadership, recognize leaders and feature success stories

This recommendation is focused on existing conservation leaders who hold the worldview “it is the right thing to do.” Study findings suggest that other farmers are a trusted source of information for participants. Further, social norms and influences have a significant effect on participants’ conservation behavior. Study findings reveal that the natural resource benefits of conservation practices, especially erosion control and downstream water quality benefits are primary motivators for conservation action. Further, farmers are more likely to adopt conservation practices if they have evidence the practice works, if they see others adopting the practice and if they can talk to other farmers who have adopted the practice. Thus, featuring success stories and providing a platform where farmers can share their knowledge and experience with conservation practices are likely to be a useful strategy. Leadership development training, financial support for leadership activities (e.g., reimbursement for time, mileage), and cost-share opportunities to enable leaders to test innovative practices (e.g., equipment trials) may be particularly promising programs.

2. Build awareness of water resource problems and promote sense of civic responsibility

This strategy likely would have the most impact on farmers with the worldview “we try to do the best we can.” While awareness of water resource problems was a motivator for some farmers, others believed that water resources in Minnesota have improved. For some farmers, a better understanding of the current state of local water resources and water resource impacts of land use practices is needed. Visual models and demonstrations of land use and water resources, and field days along with monitoring data may be most effective. Most participants interviewed said that it is everyone’s responsibility to solve water resource problems. In particular farmers with the worldview “we try to do the best we can” believed that farmers are unfairly blamed for water resource problems and that it is the responsibility of other groups such as urban residents and resource users to protect water. Programs should emphasize and promote a sense of civic responsibility for water resource protection. Strategies that bring farmers to the table along with agricultural specialists, conservation experts, local officials and other resource users in discussions about the roles and responsibilities for water resource protection could be especially useful in this regard. In discussions around the Minnesota FarmWise and other conservation programs, most farmers noted that they were not familiar with these programs. However, some farmers identified information sharing as a potential benefit of such programs. Thus, building awareness of conservation programs through tailored communication is an effective strategy.

3. Address economic constraints and reduce risk and uncertainty

Several study participants described that their decision making is based on evaluations of yield and profit, and that the current business model of “get bigger, better or quit” drives current farming and conservation practices. Farmers with this perspective are also concerned about financial uncertainty and risk associated with practice adoption. To address perceptions of risk and uncertainty, conservation programs should draw clear connections between the short-term and long-term economic benefits associated with environmental outcomes such as erosion control and water quality. Financial assistance programs such as cost-share and cost reimbursements also help reduce the risk associated with practice adoption. Program managers and resource professionals must also be able to answer question of primary concern to farmers. Questions might include “How much will the practice cost me today and in the future?” “How will the practice impact yield?” and “How difficult is the practice to implement and maintain?” Although resource managers may not have clear answers to this question, it is important that farmers are included in an open dialogue to address these concerns. Study findings also suggest that farmers are more likely to adopt conservation practices if the practice is suitable to the landscape and their current practices and if they see evidence that practices do not reduce yield. Resource managers should identify practices that are suitable to individual farms and their farming practices, and demonstrate that these practices do not reduce yield in the short-term or long-term.

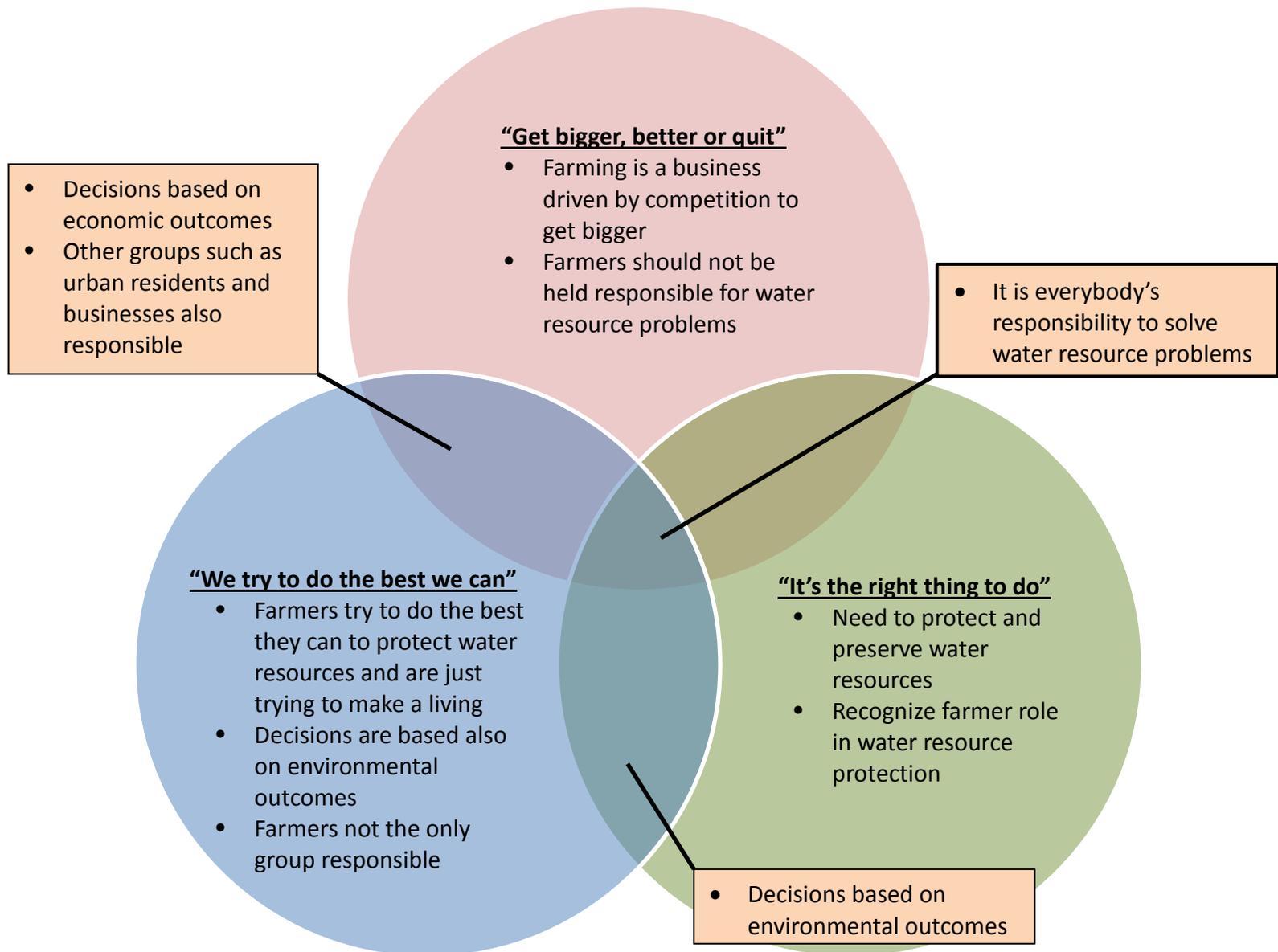


Figure 1. Three worldviews on water resource conservation

REFERENCES

- Charmaz, K. (2006). *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis*. SAGE.
- Corbin, J., & Strauss, A. (2008). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. SAGE.
- Davenport, M. A., & Olson, B. (2012). *Nitrogen use and determinants of best management practices: A study of Rush River and Elm Creek agricultural producers* (p. 87). St. Paul, MN: Department of Forest Resources, University of Minnesota.
- Davenport, M. A., & Seekamp, E. (2013). A Multilevel Community Capacity Model for Sustainable Watershed Management. *Society & Natural Resources*, 26(9), 1101–1111.
- Davenport, M., & Pradhananga, A. (2012). *Perspectives on Minnesota Water Resources: A Survey of Sand Creek and Vermillion River Watershed Landowners*. Department of Forest Resources, University of Minnesota. Retrieved from http://www.forestry.umn.edu/prod/groups/cfans/@pub/@cfans/@forestry/documents/asset/cfans_asset_379379.pdf
- Foster-Fishman, P. G., Berkowitz, S. L., Lounsbury, D. W., Jacobson, S., & Allen, N. A. (2001). Building collaborative capacity in community coalitions: A review and integrative framework. *American Journal of Community Psychology*, 29(2), 241–261.
- Pradhananga, A., & Davenport, M. (2013). *A community capacity assessment study in the Minnehaha Creek watershed, Minnesota* (p. 64). University of Minnesota. Retrieved from http://www.forestry.umn.edu/prod/groups/cfans/@pub/@cfans/@forestry/documents/asset/cfans_asset_442326.pdf
- Slemp, C., Davenport, M. A., Seekamp, E., Brehm, J. M., Schoonover, J. E., & Williard, K. W. (2012). “Growing too fast:” Local stakeholders speak out about growth and its consequences for community well-being in the urban–rural interface. *Landscape and Urban Planning*, 106(2), 139–148.

APPENDIX A: INTERVIEW RECRUITMENT SCRIPT

Farmer Decision Making and Conservation Practices

FarmWise Evaluation Project Phase II

Script for Initial Contact

“Hello, my name is _____. I am a graduate student conducting research on farmer decision making and agricultural conservation practices for Mae Davenport, Assistant Professor in the Department of Forest Resources at the University of Minnesota. This study involves farmers in the Cannon River Watershed. This research will provide decision-making support specific to farmers and their fields that aids in promoting agricultural conservation practices in an effective and economical way. I have been interviewing farmers to gather their insights about their farms and the decisions they make regarding conservation practices and was hoping you would be able to assist me by participating in the study and sharing your perspectives with me. We are offering a \$50 reimbursement for your participation. The interview takes about one and a half hours. Would you be willing to participate?”

If yes: “Thank you. I am available on _____ (days of week, times, have alternates ready) is there a time that would work best for you? [Set date, time, location (get directions)]. I would like to send you a confirmation email with date, time and location information. The email will include all of my contact information, in case you have any questions or concerns. Do you have an email address I can send the confirmation to?”

- a. **If yes,** take it down or confirm we have the correct email address for them. “Thank you. I look forward to meeting with you on ___(agreed upon date)___.”
- b. **If no,** “Is ___(phone # you contact them with)___ the best way for me to get a hold of you? In case you need to get a hold of me with questions or concerns, my phone number is _____.” I look forward to meeting with you on ___(agreed upon date)___.

If no: “Ok, thank you for your time. Good bye.”

If they seem unsure: “Just to be clear, participation is completely voluntary and if you decide to participate you can withdraw at any time. Your identity will remain confidential and we won’t include any information that would make it possible to identify you in the final report. We’re only talking to a limited number of key representatives, so capturing your perspective is important. Can I ask what your concerns about participating are?” [Try to address their concerns]

If they want to know why they are being asked to participate: “We’re interviewing a variety of farmers to try to get diverse perspectives and a range of experiences. I’ve talked to others in your community and your name came up as someone who is familiar with these issues. Since we are only able to conduct a limited number of interviews, capturing your perspective is important.”

If they want to know how the information will be used: “We are trying to better understand farmers’ perspectives on their farms, challenges they face, and decisions associated with conservation practices. We’ll be putting together a final report that describes how farmers view these issues to share with

community leaders, educators and resource professionals. Your information will be kept confidential and there will not be any identifying information in the report.”

If they want to know what the study is for: “This project is aimed at informing communication and outreach programs associated with agricultural conservation. Farmer input is critical to making these programs work for both water resource protection and for farmers.”

If they want to know who is supervising the research: “Mae Davenport is the supervisor for this study. She is an assistant professor in the Department of Forest Resources at the U of M. If you would like to contact her directly I can give you her phone number [612-624-2721] or email address [mdaven@umn.edu].”

If they ask about IRB: The research project has been approved by the IRB/Human Subjects Committee.

APPENDIX B: INTERVIEW CONSENT FORM

Farmer Decision Making and Conservation Practices Consent Form

You are invited to participate in a study of agricultural conservation practices in the Cannon River Watershed from the perspectives of local farmers. You were selected as a possible participant for an interview because you are a farmer in the Little Cannon or Belle Creek watersheds. We ask that you read this form and ask any questions you may have before agreeing to be in the study. This study is being conducted by: Mae Davenport, Associate Professor at Department of Forest Resources, University of Minnesota.

Background Information

The purpose of this study is to better understand what influences farmers' decisions about conservation practices.

Procedures:

If you agree to be in this study, we would ask you to participate in an interview lasting approximately 90 minutes. The interview will be audio-recorded and transcribed.

Risks and Benefits of being in the Study

Risks associated with this study are minimal; responses are confidential and participants' names will not be linked to any information in any publications. There is no direct benefit to subjects who participate in this study. Indirect benefits of participation may include increased awareness of agricultural conservation programs. Study results will be made available to the public and all participants will have access to them.

Compensation:

\$50 reimbursement will be offered for participation in an interview.

Confidentiality:

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. Your responses to the interview questions will be audio-recorded, transcribed and kept for three years in a locked office. Afterward, these recordings will be destroyed. Only those directly involved with the project will have access to the audio recording or the interview notes.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions:

The researcher conducting this study is: Mae Davenport. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at address: 115 Green Hall 1530 Cleveland Ave. North, St. Paul, MN 55108-6112, phone: 612-624-2721, email: mdaven@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420

Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.
You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

"I agree _____ I disagree _____ to have my responses audio-recorded"

"I agree _____ I disagree _____ that Mae Davenport may quote me anonymously in her papers"

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

APPENDIX C: INTERVIEW GUIDE

CRWP Interview guide
University of Minnesota
March 10, 2014

First, I'd like to start with a few questions about your farm and farming in general.

1. **Tell me about your farm and what it means to you.**
 - a. What do you like about being a farmer?
2. **If you could change anything about farming today, what would you change?**
 - a. What worries or concerns you the most about farming today?

Next, I would like to learn more about the decision making process on your farm.

3. **What are the most important considerations for you when making decisions about your farm?**
 - a. When you make these decisions, do you consider the potential impacts of those decisions on local streams and lakes? Please explain.
4. **Do you consult with others when making decisions?**
 - a. If so, who do you talk to?
5. **How do you evaluate the success of your farm operation?**
 - a. What kinds of outcomes are you looking for in judging success?
 - b. What issues challenge or limit you in making your farm operation a greater success?
6. **Have you changed the way you farm in the past 5 years in attempt to make your farm more successful? If so, please describe what changes you have made.**

As you may know, there is increasing concern about water resources in the Cannon River watershed. In turn, the community is promoting conservation practices throughout the watershed. Farmers, in particular, have been encouraged to consider conservation practices intended to reduce the impacts farming has on water resources. I have a few questions for you about water resources in this general area [Interviewer points to a map of the CRW].

7. **What do water resources in the area mean to you?**
 - a. What is your connection to water resources?
8. **Are you concerned about water resources in the area? Please explain.**
 - a. [If yes] What concerns you the most?
9. **Who do you think should be responsible for solving any water resource problems in the area?**

- a. **What role should farmers play in water resource protection and restoration?**

The next set of questions inquires about your experiences with and opinions about agricultural conservation practices.

10. **First, a broad question: What does the term “conservation” mean to you, as a farmer?**
11. **Do you use practices on your farm that reduce the impacts your farm has on water resources? Please describe those practices for me. *[Write down practices, then for each practice ask the following]***

- a. What first motivated you to use this practice?
- b. What do you like about this practice?
- c. What don't you like about this practice?
- d. Is this practice doing what it was intended to do? How do you know? Please explain.

12. **Are there other conservation practices you have been considering? *[if yes, ask questions a-c for each, if no skip to 13]***

- a. What have you heard about this practice?
- b. What factors have kept you from adopting this practice?
- c. Would you adopt this practice if things were different? Please explain.

13. **Do you budget for implementing conservation practices each year?**

- a. *[If yes,]* Approximately what proportion of your budget would you say is devoted to conservation practices?

14. **Overall, what are the most important considerations for you when making decisions about conservation practices on your farm?**

15. **What would make you more likely to adopt or maintain conservation practices?**

16. Do you talk to others about conservation practices? Who do you talk to?

17. Who do you consider to be the most trusted source of information about conservation practices?

18. **Have you heard of the Watershed Councils program?**

- a. *[If yes,]* what have you heard about the program?

Next, I would like to read you a short description of the Watershed Councils program to get more insight from you on it. The Watershed Councils program was designed by the Cannon River Watershed Partnership to promote landowners coming together to discuss water quality issues and work toward

cleaner water solutions. The program is voluntary and built around the belief that conservation-minded landowners will share successful practices with others in the watershed. The program was developed to expand and strengthen locally-led support of conservation adoption.

19. Do you think the Watershed Councils program, as I just described it, is a good idea? Please explain.

20. Do you think this program could have effects on...

- a. The health of water resources in the area? Please explain.
- b. Farmers? Please explain.
- c. Others in the agricultural community? Please explain.

21. What would you like to see from the program?

22. On a scale of 1-5, one being “not at all likely” and five being “extremely likely” how likely are you to [*continue to*] participate in this program in the future? Please explain.

23. Program leaders would like to continue to get more participation from farmers in the program. What would you suggest they do to increase farmer participation in Watershed Councils?

24. What do you think would be the most effective ways to engage farmers about the program?

Finally, I have a few general questions for you about water resource conservation.

25. What do you think are the 3 biggest obstacles in the way of healthy water resources in the area?

26. What do you think are the 3 keys to success to achieve healthy water resources in the area?

27. Is there anything you would like to add about your farm, conservation practices or water resources in general that we haven't covered?

APPENDIX D: INTERVIEWEE BACKGROUND INFORMATION FORM

Please do not put your name on this worksheet.

To better document the types and range of farmers we talk to, we are asking participants to complete a short background information worksheet. This information will only be presented as a summary of study participant characteristics. All efforts will be made to maintain confidentiality and any information provided that may reveal your identity will be excluded from published documents. Your name will not be associated with the data collected and will not be referenced in any future publications.

1. How many years have you lived in your community? _____.
2. How many years have you been farming? _____.
3. Approximately, how many years has your farm been in your family? _____.
4. What type of crops do you grow? And, approximately what percent of your total crops is made up of each crop type?

Crop type	% of total crops
Total	100%

5. What crop rotation are you currently using?
6. How far is the distance from your home to your farmland (in miles)? _____.
7. Which of the following describes the ownership arrangement of the land you farm (circle all that apply and include an estimate of acres)?
 - a. I own and manage my own farmland. Approx. acres: _____
 - b. I rent my farmland to another party. Approx. acres: _____
 - c. I rent farmland from another party. Approx. acres: _____
 - d. Other (please specify): _____.

8. If you rent farmland, do you do so through (circle one):

- a. crop-share lease
- b. cash rental
- c. crop-share lease and cash rental
- d. I do not rent farmland

9. Are you involved in any farming-related organization/associations in your community (e.g., MN Corn Growers Association, MN Farmers Union, etc.)? Please specify:

10. What is your gender? Male Female

11. In what year were you born? _____.

12. What is the highest level of formal education you have completed?

- a. Did not finish high school
- b. Completed high school
- c. Some college but no degree
- d. Associate or vocational degree
- e. College bachelor's degree
- f. Some graduate work
- g. Completed graduate degree (MS or PhD)

13. What percent of your income is dependent on your land?

- a. 0%
- b. 1-25%
- c. 26-50%
- d. More than 50%

14. Which category best describes your **total household income from all sources** in 2012 before taxes?

- a. Under \$10,000
- b. \$10,000-\$24,999
- c. \$25,000-\$34,999
- d. \$35,000-\$49,999
- e. \$50,000-\$74,999
- f. \$75,000-\$99,999
- g. \$100,000-\$149,999
- h. \$150,000 or more

