Community Capacity Assessment in the Cannon River Watershed

Project Report by
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A Final Report prepared for the

Cannon River Watershed Partnership

by

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Table of Contents
Acknowledgements........................................................................................................................................ i
Executive Summary...................................................................................................................................... iii
Background ................................................................................................................................................... 8
Study Design and Methods ........................................................................................................................... 8
Study Findings ............................................................................................................................................... 9
Participant Profile ..................................................................................................................................... 9
Conservation Practice Decision Making Framework ...................................................................................... 11
  Farm management.................................................................................................................................. 13
  Conservation practice appraisal............................................................................................................... 20
External forces ........................................................................................................................................... 34
Drivers and Constraints to Engagement in Conservation Initiatives ............................................................ 41
Participant Interest in Leadership Role in Conservation Groups................................................................ 46
Recommendations for Increasing Farmer Engagement in Conservation Initiatives .................................. 46
Perspectives on Commercial Biomass Production....................................................................................... 51
Discussion and Recommendations ............................................................................................................. 53
  Strategies to Promote Conservation Practice Adoption among Farmers................................................ 54
References .................................................................................................................................................. 56
Appendices.................................................................................................................................................. 57
  Appendix A: Interview Recruitment Script ............................................................................................. 58
  Appendix B: Interview Consent Form .................................................................................................... 62
  Appendix C: Interview Guide .................................................................................................................. 65
  Appendix D: Interviewee Background Information Form ....................................................................... 70

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Executive Summary
This report describes a social science assessment of conservation practices conducted in the Cannon River watershed. The study was conducted by the Department of Forest Resources, University of Minnesota in collaboration with the Cannon River Watershed Partnership (CRWP). The overarching goal of the study was to provide a social science-based approach to understanding and promoting conservation practices in the Cannon River watershed. This study provides a comprehensive decision making framework that identifies drivers and constraints associated with voluntary conservation practice adoption among agricultural producers in the Cannon River watershed. Data were gathered through in-depth interviews with eighteen farmers and landowners in the Cannon River watershed. A brief synopsis of study findings are highlighted below.

Study Findings

Participant Profile
Eighteen participants including landowners and agricultural producers were interviewed in the study watershed.

Conservation Practice Decision Making Framework
Analysis of the interview data revealed a complex decision making framework consisting of two spheres of decision making that drive conservation practice adoption: farm management and conservation practice appraisal. In addition, a set of systemic factors that influence farmers in their decision making about their farm and conservation practices emerged.

Sphere of Decision Making: Farm Management
The decision making process related to farm management was anchored in four domains. These domains have multiple dimensions and descriptors. A brief synopsis of farm management domains are highlighted below:

1. Farming values and identity
Data analysis revealed five primary farming values or guiding principles that influence their farm decision making and conservation action. These values are central to what it means to be a farmer for study participants and include:

   - Independence
   - Stewardship
   - Community
   - Mastery
   - Way of life
2. **Farming goals**
Participants describe a unique set of farming goals that influence their decision making and conservation action. Five dimensions of farming goals emerged:

- Profitability
- Conservation
- Quality of life
- Family legacy
- Satisfaction

3. **Social norms of farm management**
Data analysis revealed that participants’ decision making about their farm is also influenced by social norms of farm management. Three descriptors of social norms emerged:

- Farming image
- Competition in farming
- Agricultural expert advice

4. **Uncertainty and risk**
The uncertainty and risk associated with farming was an important decision making consideration for many participants. Two descriptors around uncertainty and risk emerged:

- Capital investment
- Market uncertainty

**Sphere of Decision Making: Conservation Practice Appraisal**
The conservation practice appraisal process was anchored in five domains. These domains have multiple dimensions and descriptors. A brief synopsis of appraisal domains is highlighted below.

1. **Practice outcomes**
Participants evaluated the outcomes of conservation practices when making decisions about adoption. Five primary dimensions of practice outcomes emerged:

- Environmental outcomes
- Economic outcomes
- Social outcomes
- Aesthetic benefits
- On-farm benefits

2. **Perceived ability**
Several participants discussed the resources needed for practice implementation. Five descriptors around participants’ perceived ability emerged:

- Time
- Knowledge
- Equipment
• Control
• Uncertainty

3. **Landscape and operation suitability**
Participants identified suitability of conservation practices with the landscape and their current operation as important decision making considerations. Two descriptors around suitability emerged:
  • Practice suitability with landscape
  • Practice suitability with current farm operation

4. **Practice efficacy**
The effectiveness of practice in addressing water resource or soil health issues were important for some participants.

5. **Personal norm**
Personal or moral norms are a driver of conservation practices. Four dimensions of personal norm were identified:
  • Awareness
  • Sense of responsibility
  • Concern
  • Social norm

6. **Relationship and communication**
Participants’ past relationship and engagement with government officials and communication of issues influence their decision making about conservation practices. Two descriptors related to this domain emerged:
  • Relationship and engagement
  • Communication of issues

**External forces**
Apart from the two spheres of decision making, analysis of the interview data revealed two primary domains of external forces that shape the context within which participants made decisions about farming and conservation action. A brief synopsis of these domains, along with the related dimensions and descriptors is provided below.

1. **Systemic factors**
Three dimensions of systemic factors that shape participants’ decision making emerged:
  • Economic system
  • Agricultural system
  • Governance system
2. **External pressures**

   Besides systemic factors, analysis of the interview data revealed two dimensions of external pressures that shape participants’ decision making about their farm and their conservation action:
   - Public influence
   - Climate and weather

**Drivers and constraints to engagement in conservation initiatives**

Several themes emerged in participants’ discussion of what motivates and constrains their engagement in discussions about water resources and soil health. Primary dimensions included:
   - Issue framing
   - Perceived ability
   - Awareness
   - Motivation
   - Trust and fairness
   - Outreach
   - Time constraints
   - Focus on individual action

**Participant interest in leadership role in conservation groups**

Only a few of the participants were interested in taking a leadership role. One participant was interested in a “short term leadership role,” while the other participant would be willing to take a leadership role if “people are actually willing to listen and learn.” Another participant was interested but only if “it was a group of our local sustainable farmers.”

Participants were not willing to take leadership roles in a local soil health group for the following reasons:
   - Lack of leadership skills
   - Lack of time
   - Issue representation
   - Lack of empowerment

**Recommendations for increasing farmer engagement in conservation initiatives**

Participants offered three general strategies to increase farmer engagement in conservation initiatives:
   - Tailor communication strategies to farmers
   - Build relationships with farmers
   - Address time and resource constraints

**Perspectives on commercial biomass production**

Participants were asked to offer their insights on commercial biomass production. Participants offered varying perspectives along six dimensions:

Six domains of participant perspectives emerged:
   - Economic drivers and outcomes
Discussion and Recommendations

This study provides much needed insights on farmer decision making and documents a decision making framework that identifies drivers and constraints associated with voluntary conservation practice adoption among agricultural producers in the Cannon River watershed. Key conclusions are highlighted below:

1. Farmer decision making is a community-based process
2. Evaluation and awareness of conservation practice outcomes are primary drivers of conservation practice adoption
3. Systemic factors shape the context in which farmers make decisions about conservation practices
4. Multiple constraints to farmer engagement in conservation initiatives exist

Strategies to promote conservation practice adoption among farmers

A multi-strategy approach is recommended in conservation programming that builds awareness of local water resource and soil health problems, promotes conservation as a social norm, builds trust, encourages farmers to be more engaged in conservation initiatives and addresses economic constraints to the adoption of conservation practices. The recommendations provided here are grounded in the analysis of interview data and recommendations made by study participants.

1. Build awareness of local water resource and soil health problems, and provide technical assistance
2. Promote conservation as a social norm and share success stories
3. Build trust
4. Address economic constraints and reduce risk and uncertainty
Background
This report describes a social science assessment of conservation practices conducted in the Cannon River watershed. The study was conducted by the Department of Forest Resources, University of Minnesota in collaboration with the Cannon River Watershed Partnership (CRWP). The overarching goal of the study was to provide a social science-based approach to understanding and promoting conservation practices in the Cannon River watershed. This study provides a comprehensive decision making framework that identifies drivers and constraints associated with voluntary conservation practice adoption among agricultural producers in the Cannon River watershed. The project is designed to address three primary research questions:

1. What are the drivers and constraints of conservation practice adoption among agricultural producers?
2. What factors influence agricultural producers’ engagement in local conservation initiatives?
3. 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?

While much is known about the biophysical aspects of managing water resources, the psychological, social and institutional factors that influence voluntary conservation practice adoption at individual landowner and broader watershed community scales are not as well understood. Water resource professionals continue to struggle to influence conservation behavior among landowners and agricultural producers. Solving problems of non-point source pollution requires individual (e.g., conservation practice adoption) as well as collective action (e.g., civic engagement). This study provides a framework to understand the factors that drive and constrain voluntary practice adoption as well as civic engagement in conservation initiatives among agricultural producers.

Understanding agricultural producers’ motivations for and constraints to conservation practice adoption and engagement in conservation programs will help resource managers develop programs that speak to the needs and capacities within the agricultural community. This report also highlights strategies for tailored communication and outreach to enhance farmer engagement in water resource and soil health programs.

Study Design and Methods
The project used a qualitative approach to study design, data collection and data analysis. Data were gathered through in-depth, semi-structured interviews with farmers and landowners in the Cannon River watershed. Fifteen interviews with 18 participants were conducted. A list of potential project participants was generated through consultation with CRWP staff, internet searches and a “snowball” sampling technique in which participants were asked to recommend other farmers/landowners in the area. Participants were contacted via phone or email using a recruitment script (Appendix A). A $50
reimbursement was offered to participants for their time. Forty-three individuals were contacted in total. Despite repeated attempts, nineteen participants were unable to be reached for interviews. Another six individuals declined an interview. The interviews were conducted between January and March of 2015.

Interviews were conducted in participants’ homes, place of work or public establishments (e.g., local coffee shop) and lasted forty-five minutes to one and a half hours. Before each interview, participants were asked to read and sign an informed consent form (Appendix B). The interviewer emphasized that participation in the project was voluntary, confidential and identities of individual participants would not be tied to interview data in any publications. The interviewer also answered any questions the participants had before beginning the interview.

An interview guide (Appendix C) was developed in collaboration with CRWP staff and inquired about participants’ perspectives on farming, water resources, soil health, agricultural conservation practices and local conservation initiatives. After the interview, participants completed a background information form (Appendix D) that asked about individual socio-demographic information and farm and property 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 qualitative analysis techniques (Charmaz, 2014; Corbin & Strauss, 2008). Data were analyzed using QSR Nvivo 10.0 data analysis software. Domains, dimensions and descriptors reported in the next section are grounded in interview data. In the first round of analysis, individual meaning units (i.e., discrete ideas, descriptions, evaluations) within the interview transcripts were assigned labels or codes. In the second round of analysis, related codes were organized into dimensions and domains. This process was used to sort, synthesize and organize interview data into a hierarchy of themes. A structural taxonomy of themes was generated: domains represent the broadest category of meaning and the highest level of convergence, dimensions represent more focused subcategories of meaning with moderate divergence, and descriptors represent more detailed characteristics or examples and the highest level of divergence (Charmaz, 2014).

**Study Findings**

**Participant Profile**
Participants were asked to complete a background information form including socio-demographic and farm or land information. Thirteen participants were males and five were females. The median age of interviewees was 53. Participants have lived in their community for 35 years (median) and have been farming for 20 years (median). All participants reported completing at least high school with eight reporting having a bachelor’s degree or higher. Three participants reported making more than $100,000 in total household income in 2014 (Table 1).
Participants owned a median of 65 acres with operations ranging from 11 to 790 acres. Five participants reported that more than 50% of their income was dependent on their land. Land ownership characteristics varied with nine participants reporting that they own and manage their own land. In addition, five participants rented farmland from another party, while two rented land to another party. One participant also owned some woodland. Farms have been in participants’ families for 28 years (median) and current operations were approximately 1 mile from participants’ homes (median) (Table 2).

Participants were asked if they use practices on their land that reduce the impacts of farming on water resources. Participants reported using practices including nutrient management, cropping decision and implementation of structures specifically designed to improve water quality and soil health. Nutrient management practices included efficiency of nutrient use through nutrient analysis and application rates. Cropping decisions included planting cover crops, various conservation tillage practices and land retirement. Structural implementation included practices such as buffers and waterways specifically designed to address water resource issues.

Table 1. Participants’ socio-demographic characteristics

<table>
<thead>
<tr>
<th>Socio-demographic characteristics</th>
<th>N</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Gender</td>
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<tr>
<td>Male</td>
<td>13</td>
<td>72</td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>Age (n = 11)</td>
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<td></td>
</tr>
<tr>
<td>Median</td>
<td>53</td>
<td>-</td>
</tr>
<tr>
<td>Minimum</td>
<td>30</td>
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</tr>
<tr>
<td>Maximum</td>
<td>74</td>
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</tr>
<tr>
<td>Years lived in community (n = 11)</td>
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</tr>
<tr>
<td>Median</td>
<td>35</td>
<td>-</td>
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<tr>
<td>Minimum</td>
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<td>-</td>
</tr>
<tr>
<td>Maximum</td>
<td>63</td>
<td>-</td>
</tr>
<tr>
<td>Years farming (n = 11)</td>
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</tr>
<tr>
<td>Median</td>
<td>20</td>
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<td>Minimum</td>
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<td>-</td>
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<tr>
<td>Maximum</td>
<td>45</td>
<td>-</td>
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<td>Formal education</td>
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<tr>
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<td>0</td>
</tr>
<tr>
<td>Completed high school</td>
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<td>9</td>
</tr>
<tr>
<td>Some college but no degree</td>
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<td>18</td>
</tr>
<tr>
<td>Associate or vocational degree</td>
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<td>0</td>
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<td>College bachelor’s degree</td>
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<tr>
<td>Some graduate work</td>
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<td>0</td>
</tr>
<tr>
<td>Completed graduate degree (MS or PhD)</td>
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<tr>
<td>Household income</td>
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<td>Under $10,000</td>
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<td>$10,000 - $24,999</td>
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<td>$50,000 - $74,999</td>
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<td>6</td>
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<td>$100,000 - $149,999</td>
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<td>11</td>
</tr>
<tr>
<td>$150,000 or more</td>
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<td>22</td>
</tr>
</tbody>
</table>
### Table 2. Participants’ property characteristics

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<thead>
<tr>
<th>Property characteristics</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres owned (n = 10)</td>
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<td></td>
</tr>
<tr>
<td>Median</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>790</td>
<td></td>
</tr>
<tr>
<td>Percent income dependent on farming</td>
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<td></td>
</tr>
<tr>
<td>0%</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>1-25%</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>26-50%</td>
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<td>9</td>
</tr>
<tr>
<td>More than 50%</td>
<td>5</td>
<td>46</td>
</tr>
<tr>
<td>Ownership arrangement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I own and manage my own farmland</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>I rent my farmland to another party</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>I rent farmland from another party</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Other (own woods)</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Years farm has been in the family (n = 11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Distance farm is from home (miles) (n = 11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

**Conservation Practice Decision Making Framework**

Participants were asked a series of questions about decision making on their farm and their motivations for adopting conservation practices. They were also asked directly if they would be more likely to adopt practices if they knew they had downstream benefits, if they received financial assistance to implement the practices, if they had evidence that the practices would not reduce yield, if most farmers they knew had also adopted the practice, if they could talk to other farmers about how to make the practices work on their farm and if there were policies or regulations around the implementation of the practice.

Analysis of the interview data revealed a complex decision making framework consisting of two spheres of decision making that drives conservation practice adoption: *farm management* and *conservation practice appraisal*. In addition, a set of *systemic factors* that shape farmer decision making about their farm and conservation practices emerged (Figure 1). Each sphere of decision making was anchored in several domains. These domains have multiple elements (i.e., dimensions) and details (i.e., descriptors). The spheres of decision making along with primary domains, dimensions and descriptors are highlighted below.
Figure 1. Framework of conservation decision making
Farm management
Participants were asked a series of questions to explore their perspectives on farming including what they like and dislike about farming, what worries or concerns them about farming, how they evaluate the success of their farm and what their most important consideration are when making decisions about their farm. Qualitative analysis of this data revealed four domains of farm management that shapes participants’ decision making and conservation action (Table 3):

- Farming values and identity
- Farming goals
- Social norms of farm management
- Uncertainty and risk

Farming values
Data analysis revealed five primary farming values or guiding principles that influence their farm decision making and conservation action. These values are central to what it means to be a farmer for study participants and include: independence, stewardship, community, mastery and way of life.

Independence emerged as a key value among farmers interviewed in this study. When asked what they like about farming, one participant said succinctly, “you’re your own boss most of the time”. Another participant expressed a similar farming value: “I like the freedom to make my own choices”. Stewardship emerged as another important value among several participants. Being a “good steward of the land” and “caring for the land” were values expressed by some participants. For other participants, passing the land to future generations was important:

I think the biggest thing is... conservation is... you do it because you want to keep the soil just as good as, or in better condition for the next generation. Because I would make more money if I just plowed everything straight up, right through everything. It makes more time... more efficient. But I know that’s not right. So, a person has to think about the next generation, I think.

Community connections were also a critical value for some participants. “Providing a service to the community” was important to one participant. Another participant emphasized the farm’s impact on the community:

You can tell that you’re making an impact on the community, because we have some direct connections to people who buy our food, through the [food coop] and our farmer’s markets and it’s really gratifying to provide them with what... If it didn’t come from around here it would come from California and cost more.

Another participant spoke about the connection of the farm with the broader community:

Just having people be part of the community, in a very tangible way, by coming out and coming to pot lucks and seeing each other too. It actually forms a sense of community around the farm,
even without us. One of my favorite things is we do [an event] as part of our CSA and that’s included with their share. And it’s cherry tomatoes, green beans, peas, flowers, herbs, things like that. And just looking out each week and seeing people out there with their kids picking flowers and talking to each other, meeting each other, is one of my favorite things. Because it feels like we’ve kind of helped create this community, but it’s not about us. Or it’s much beyond us, because it’s about other people and then their relationship with the farm itself. You know, we don’t have to be there. They’re out there just enjoying being on a piece of land and away from the rest of their lives and being with each other. I think that’s really special.

Mastery was an important farming value among several participants. One participant expressed satisfaction in doing work with “concrete results”. Another participant enjoyed seeing the tangible results of farming, “It was nice to be able to come and do work that was tangible. You could see what you were accomplishing.”

Some participants viewed farming as a way of life. When asked what farming means to them, one participant replied simply, “I guess what it means to me is it’s a way of life.” Another participant described farming as a way of life in the family: “I guess it means a way of life. When I grew up, my dad was a farmer and my wife’s parents are farmers.”

Farming goals
Participants describe a unique set of farming goals that influence their decision making and conservation action. Five dimensions of farming goals emerged: profitability, conservation, quality of life, family legacy and satisfaction. Several participants identified profitability as a key criterion to evaluate the success of their farm. When asked how they evaluate the success of their farm, one participant put it simply, “Did we make money? The financial side is, we can evaluate the finances, did we make money or didn’t we and how much did we make.” Another participant described long term profitability in terms of growth of the business over time:

Well I think it has to be successful, financially. And because it’s really a very young business and we bought the farm and we built the buildings and we bought the business we’ve made a lot of investment. So, we’re not actually like seeing profit, but we’re seeing growth. And so I evaluate the health of the business on its growth over time and whether we’re producing products that are in demand and meeting customer’s needs.

Participants also evaluate profitability of their farm based on annual yield. Several participants mentioned that they evaluate the success of their farm based on “crop yields” and whether or not they had a “good crop”. Another key aspect of farm profitability was efficient use of equipment and fertilizers. As one participant explained, “Being efficient with equipment costs and input costs and fertilizer costs and trying to know what the best way, because not everybody does it the same.” Conservation emerged as another important farming goal. Soil health featured as an important goal for many participants. Preventing erosion and maintaining organic matter and nutrient levels in soil were important goals for participants. One participant mentioned how their long term success depends on
soil health, “Organic matter and fertility improving. You know long term, that’s really the foundation of our long term success.” Another participant emphasized the importance of soil health in their farm decision making:

Ultimately most decisions, if you follow them back far enough, start with what’s good for our soil health, for the next 7 to 10 years. So all the decisions kind of, seemingly, hard to say that deciding whether we grow plants in the greenhouse can come from that, but all of those decisions really do get traced back to the health of the soil.

The impacts of nutrient runoff on water quality, carbon emissions from farms and presence of wildlife were also important decision making considerations for participants.

Another key goal for participants was their own and their community’s quality of life. Several participants mentioned that they consider “people health”, providing “healthy food” and “quality of life” as important decision making considerations. Leaving a family legacy was an important goal for some participants. Passing on the “farm work ethic” to children was important for one participant. The participant explained:

I want to have the family experience, like we talked before, with raising our kids... We were just a mile away so during spring, summer, and fall we walked out to the farm every day, the kids would come with, and I loved that they experienced all that.

Several participants identified the satisfaction and enjoyment of “being outdoors” and working with family members as things they like about being a farmer. One participant explained, “I can be outside. I don’t have to be in a cubicle or an office doing anything. Being outside with the plants and the cattle and everything, that’s fun. I like that.” Another participant described the satisfaction of watching crops grow, “Put the seeds in the ground and watching it grow and taking care of the ground and the crops that grow from it.”

Social norms of farm management
Data analysis revealed that participants’ decision making about their farm is also influenced by social norms of farm management. Three descriptors around social norms of farm management emerged: farming image, agricultural expert advice and competition for growth. One participant described the negative farming image portrayed in the media, “A lot of things get blown up in the media that... a lot of it is maybe not completely factual, I guess, in regards to farming. But if people don’t understand it, they’re going to believe what the media says.” Another participant voiced concern about the misperception of farming as a result of the “disconnect” between farmers and urban residents:

The misperception ... there’s such a disconnect between people who farm for a living and the people that live in the city. Whereas maybe 15, 20 years ago, most of the people who lived in the city maybe grew up on a farm. But now it’s becoming... at least it’s somewhat of an understanding, but now it’s becoming less and less. The people in the city are getting more
removed from the farm...have less understanding of how it works and what some of the challenges are.

Participants highly valued the input of agricultural experts including agronomists, bankers, fertilizer and seed dealers, SWCD, local coops and other farmers. One participant reported relying on an agronomist when making decisions on the farm:

We have a private crop consultant that we use, our private agronomist that we use to help us make daily decisions, so we’ll take soil samples of all our ground and decide what we need to put in it for nutrients, for yields and things like that. So we use a private consultant to give us advice on different decisions.

Some participants identified informal network of farmers as a key source of information. One participant explained, “It’s mostly just an informal group of colleagues and friends who...this is who we’re getting together with and having dinners with and hanging out with and so we end up talking through a lot of these things, because a lot of us are a similar age and got into farming at a similar time.”

Other participants emphasized the competition in farming resulting from the need to remain profitable. One participant described the competition among farmers as more people get involved in farming:

We’ve had some recent good times in agriculture, so then there’s probably more people involved that want to do it for a living too. So that means there’s more people competing for a finite amount of acres out here to farm. There’s more people competing for kind of the same number of opportunities I guess.

**Uncertainty and risk**

Financial uncertainty and risk influenced participants in their decision making and conservation action. Uncertainty and risks associated with high capital investment needed to farm, market uncertainty and risk of low financial return were cited as major challenges in farming. One participant expressed concern about the high capital investment needed to get started in farming, “the financial cost...to buy our farm and get started. We borrowed from my family and her family and young farmer loan and the capital investment is very, very large. Maybe not always worth it.” Other participants spoke about high labor and land costs as a challenge to farming, “All the land is already in production. So, if you want to grow your operation, you have to take it away from somebody or purchase it. And the land costs to buy it are expensive.”

The fluctuation and volatility in market prices was identified as a challenge by several participants, “The limits are the markets. We have to sell our crops so, if the price is high, we do well, if the price is low, we don’t.” For organic farmers, market availability was a key challenge, “We didn’t have a connected market for...not that they wouldn’t have been saleable, if we had a different market base, but for our customers, it was hard to sell them.”
For some participants, particularly organic farmers, the low rate of financial return despite the amount of work required in farming was a challenge:

This kind of farming is a lot of hours of work for not much money. It’s wonderful, but we’re about to put a little bit into retirement for the first time ever. We don’t really have that financial security. So definitely if either people were willing to pay more for organic or sustainably grown produce, because the whole culture of how we value food changed, because there wasn’t this really cheap alternative, that would really help.
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<thead>
<tr>
<th>Domains</th>
<th>Dimensions</th>
<th>Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming values</td>
<td>Farming values</td>
<td><strong>Independence</strong>&lt;br&gt;• Autonomy and freedom in making farming decisions</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Stewardship</strong>&lt;br&gt;• “Doing what is right” and “being a good steward of the land”&lt;br&gt;• Desire to pass land on to the next generation&lt;br&gt;• Finding a sustainable way of life</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Community</strong>&lt;br&gt;• Making an impact on the community&lt;br&gt;• Providing service to community</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Mastery</strong>&lt;br&gt;• Farming has concrete and tangible results&lt;br&gt;• Rewarding to watch crops and livestock grow</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Way of life</strong>&lt;br&gt;• Farming as a “way of life”</td>
</tr>
<tr>
<td>Farming goals</td>
<td>Profitability</td>
<td><strong>Making a profit</strong>&lt;br&gt;• Short term and long term profitability from farm</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Yield</strong>&lt;br&gt;• Improving yield</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Efficiency</strong>&lt;br&gt;• Efficient use of equipment and fertilizers</td>
</tr>
<tr>
<td>Conservation</td>
<td></td>
<td><strong>Soil health</strong>&lt;br&gt;• Improvement in soil health and erosion control as a measure of farm success</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Water quality</strong>&lt;br&gt;• Consider farm impacts on water quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Other</strong>&lt;br&gt;Presence of wildlife, reduction in carbon emission and ecosystem resilience as measures of success</td>
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<td>Domains</td>
<td>Dimensions</td>
<td>Descriptors</td>
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</tr>
<tr>
<td>Farming goals</td>
<td>Quality of life</td>
<td><strong>Human health</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Providing healthy food</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Quality of life</strong></td>
</tr>
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<td></td>
<td></td>
<td>• Quality of life for self and others</td>
</tr>
<tr>
<td>Family legacy</td>
<td></td>
<td><strong>Family legacy</strong></td>
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<tr>
<td></td>
<td></td>
<td>• Passing on farm work ethic to children</td>
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<tr>
<td>Satisfaction</td>
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<td></td>
<td></td>
<td>• Enjoyment of being outside, working with family and watching crops grow</td>
</tr>
<tr>
<td>Social norms of farm management</td>
<td>Social norms of farm management</td>
<td><strong>Farming image</strong></td>
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<td></td>
<td></td>
<td>• Negative image of farmers portrayed by the media</td>
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<td></td>
<td></td>
<td>• Disconnect between farmers and urban residents</td>
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<tr>
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<td></td>
<td><strong>Competition in farming</strong></td>
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<tr>
<td></td>
<td></td>
<td>• Need to increase yield to remain profitable</td>
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<td></td>
<td></td>
<td>• Competition for finite amount of land</td>
</tr>
<tr>
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<td></td>
<td><strong>Agricultural expert advice</strong></td>
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<tr>
<td></td>
<td></td>
<td>• Advice from individuals and groups including agronomists, bankers, fertilizer and seed dealers, SWCD, local coops and other farmers</td>
</tr>
<tr>
<td>Uncertainty and risk</td>
<td>Uncertainty and risk</td>
<td><strong>Capital investment</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Large capital investment needed to start farming</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Financial challenges for young people to get into farming</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High labor and land costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Market uncertainty</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fluctuation in market prices for crops</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Affordability of sustainable food</td>
</tr>
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<td></td>
<td></td>
<td>• Lack of connected markets to sell organic products</td>
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<td><strong>Financial return</strong></td>
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<td>• Low returns from organic farming</td>
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Conservation practice appraisal
Participants were asked a series of questions about their motivations for conservation practice adoption and the most important considerations when making decisions about conservation practices on their farm. Six broad domains of conservation practice appraisal emerged (Table 4):

- Practice outcomes
- Perceived ability
- Landscape and operation suitability
- Practice efficacy
- Personal norm
- Relationship and communication

Practice outcomes
Participants evaluated the outcomes of conservation practices when making decisions about adoption. Five primary dimensions of practice outcomes emerged from the analysis of interview data:

- environmental outcomes,
- economic outcomes,
- social outcomes,
- aesthetic benefits
- on-farm benefits.

Environmental outcomes
Several participants identified water quality, soil health and wildlife habitat as important environmental outcomes of conservation practices. Downstream benefits to water quality including reduced runoff and sedimentation were important practice outcomes identified by participants. One participant emphasized the downstream benefits to water quality:

Cleaner water and less soil in the water. The whole deadzone, we’re just at the top of the deadzone. Everything we do, moves that way. So that’s what would convince me. I mean, in this particular farm, it’s not like we’re saving that water for some kind of trout habitat or anything... Those days have passed us by here in Minnesota, in this part of Minnesota anyway.

Erosion control was also an important outcome for most participants. Speaking about the benefits of using cover crops, one participant said, “Just the idea of having something on your field in case you get a big rain.” Another participant described the benefits of cover crops and no till:

In the right soils, cover crops are great. You have the grasses up, like I said, or whatever your cover crop is, up. And then we actually no till right into that cover crop. So we’ll plant right into it and then we’ll kill the cover crop later, once the crop is starting to come up. So that’s kind of nice. So it just really keeps the ground covered all the time and really keeps from water and wind erosion. So that’s huge.

Wildlife habitat was another important outcome of conservation practices for participants. One participant said, “I’m not an avid hunter, but I do appreciate woodlands, grasslands, I’m a passive observer of wildlife and habitat. So, those are important.” Another participant explained how providing
habitat for beneficial insects provides important pest control benefits to the farm:

We’re really excited to have those [pollinator plan], both to prevent flow and to prevent erosion and provide habitat for beneficial insects, which are really key for organic management of insects. Pests, vegetable insect pests. Having plenty of good pollinating insects, because they tend to predators of a lot of our pest insects.

The reduced use of fertilizers when using strip till was an important outcome for one participant. When asked about what motivated the participant to use strip till, the participant explained, “Just the idea of being more conservative with our fertilizer use and the rented ground, nobody likes to put excess fertilizer on the ground they might not have in the future.”

Economic outcomes
Participants identified five economic outcomes that were either drivers of or constraints to conservation practice adoption: impact on yield, adoption and maintenance costs, financial benefit from practice, payments for adoption and efficiency.

The impact of conservation practices on yield was clearly an important consideration for most participants. Several participants noted that they would be more likely to adopt or maintain conservation practices if they had evidence that the practices do not reduce yield. For some participants, a primary concern with conservation practices such as buffers was that land would be taken out of production. One participant explained, “A lot of it comes down to the money. That cost to put these practices in, if you’re going to put a buffer in, you’re taking out that land out of production.” Other participants have seen better yields with the use of various conservation tillage practices. One participant described how no till has resulted in better yield, “It’s so dry, by no tilling, you’re conserving moisture and we always ran out of moisture, midway through the season. So I guess the water efficiency or water usage gave us that yield.”

Adoption and maintenance costs of conservation practices were an important decision making consideration for most participants. When asked about the most important decision making consideration about conservation practices, one participant replied succinctly, “Can I do this in my budget?” The investment required to purchase new equipment for conservation tillage was an important factor for some participants. One participant spoke about the initial expense of tillage equipment, “It’s really expensive. I would say that pretty much everyone we’ve talked to... Oh, I would love to buy that, it’s just too expensive. And we just chose to buy it, instead of buying another tractor and doing a different system.” Several participants mentioned the high costs of seeds as a constraint to the adoption of cover crops. Another participant noted that the maintenance cost of cover crops was high too, “And then more upkeep, because it takes a while for them to germinate. We’ve got to mow it, which is a cost there.” Some participants noted that the ability to harvest and sell hay off of land in conservation would be an added benefit.
Several participants noted that conservation tillage practices save time, fuel and money. One farmer spoke about fuel savings of conservation tillage, “It takes less fuel or it’s quicker, doing the tillage. I mean it’s not like moldboard plowing where it takes a lot of fuel.”

Most participants reported that they would be likely to adopt or maintain conservation practices if they had financial assistance to implement the practices. Programs that subsidize the cost of implementation or that provide financial assistance such as cost-share were identified as motivators by some participants. One participant explained why cover crops are financially worthwhile, “The big one right now is the programs that help subsidize it and the want to have a cover on the field when crops come off early. That might me more of a want, than a reason that’s making it worthwhile on a money perspective.” When asked about the motivation to enroll in the Conservation Reserve Program (CRP), one participant responded, “Yeah actually, they paid to set it aside. So that was an incentive.” However, one participant noted that the payments from conservation programs compared to corn production were low, “There are some FSA program, I don’t know one specifically that will help you put in a buffer, but it typically doesn’t pay what a typical corn crop would pay.”

Social outcomes
The primary social outcome that some participants tied to conservation practices was human health. For some participants, human health and providing “healthy food” were primary decision making considerations.

Aesthetic benefits
The aesthetic benefits of conservation practices were important for some participants. When asked about important decision making considerations, one participant replied, “Is this going to look natural/beautiful when I get done?” The participant was clearly excited about the aesthetics of prairie restoration:

Oh man, you should see it! This last summer in late July, I had them put a lot of extra forbs in it [prairie]. So, in July, a lot of these things are coming into bloom all at the same time. Oh, my God! Oh, you’ve got the White Daisy Flea Being, that’s a pretty common wild flower that we’ve seen quite a bit. We’ve got the Yellow Coneflower, the Yellow Brown Eyed Susan and you have a Lavender Bergamot and they all come up about the same time or at least, for about a week or two, they’re all up at the same time and I got cars coming down the hill going really slow. It looks like a wildflower garden except it’s acres of it.

On-farm benefits
Several participants identified nutrients, water and organic matter retention as an important outcome of conservation practices. One participant described the multiple on-farm benefits of cover crops:

We just had always learned about them working at other farms as a key way to build... maintain and build soil health in an organic system. So, both for preventing erosion over the winter and whenever our crop wasn’t being grown on the land. And also for building organic matter and biological life and soil fertility. They’re just... they’re just an incredible tool, for the amount of
nitrogen they add and other nutrients that they can help cycle and make plant available. So in the absence of... choosing not to use synthetic fertilizers, they’re a really important fertility tool.

Participants also noted other on-farm benefits such as weed control, prevention of chemical drift from other farms and reduced hay loss.

Perceived ability
Several participants discussed the resources needed for practice implementation. Five primary descriptors that relate to the participants’ perceived ability to adopt or maintain conservation practices emerged: *time, knowledge, equipment, control* and *uncertainty*.

Several participants mentioned time savings as a driver of conservation practice adoption. Participants said that using conservation tillage was “quicker” and “saves trips across the field”. Other participants however noted that some practices require more time, “You got to go around it [waterways]. You don’t have to plant around it, but you have to lift the digger up and you have to spray around them. Yeah, so they’re good, but you have to go around them. It takes more time.”

Knowledge and technical expertise required to use conservation practices emerged as a key factor in farmer decision making about conservation practices. For example, one participant noted that strip till takes “good timing and good management”. Another participant explained the complexities of cover crops, “It’s really complex, because it’s different depending on the crop and the exact timing and what combination of things you want to do and what uses you want them for, when you want them to... Whether or not you want them to winter kill or come back in the spring.” The participant further added, “It’s definitely takes a lot of learning and we’re still learning a lot about it.”

Lack of equipment was a constraint to conservation practice adoption for some participants. Speaking about the challenges associated with using strip till, one participant explained, “I think for us right now we don’t have... we haven’t had the best equipment for doing it. It involves different tillage tools for tilling just a strip then it does to till a whole field, like we normally do. So, we have some equipment for it that’s not perfect.”

Other factors such as the ease of using the practice and uncertainty over future management also emerged as a constraint to practice adoption. One participant described uncertainty as a constraint to practice adoption:

I think what stops me is that I don’t know, whoever buys this property, I could put all this love, care, and money into it and my biggest fear is that someone is going to come along and they’re just going to want to put a big pole barn and put some horses out and run their snowmobiles and I think what a waste.
**Landscape and operation suitability**

Participants identified suitability of conservation practices with the landscape and their current operation as important decision making considerations. Participants suggested that practices such as cover crops may not be suitable with area topography, soil type and temperature. For example, one participant, speaking about cover crops said, “We’re too far north to make it work in a corn-soybean rotation in our area.” Another participant explained that the ground temperature is too cold for cover crops, “The ground temperature is too cold in this area where it doesn’t always justify putting a cover crop on. Where a lot of places down South have warmer weather and can utilize cover crops better.” Similarly, another participant described the challenges of using cover crops on heavier soil in the area:

> Certain soil types are better than others for cover crops. So it seems like lighter soils are better. If you’d use a cover crop on a heavier soil, it’d be more difficult to plant that farm the next year, because it wouldn’t heat up as much, so we’d have a harder time getting the crop planted and being able to get in that field in the spring. So there are some challenges there on that side. Just being able to get the spring sun on darker ground. Just kind of heats the soils and if you have a blanket of grass, we’re not going to be able to heat it as easily, so you’d have to plant quite a bit later if you did cover crop.

Some participants identified “the feasibility of the practice in the context of my whole farm operation” as an important decision making consideration. Another participant expressed a similar view, “can we fit it in to our existing systems or adjust our systems to make it work well? That’s kind of always a question with farming stuff.” Participants were less likely to adopt practices if they do not fit into current farm operations. For example, one participant explained the challenges of no till, “If you did a whole farm no till, but, that just wouldn’t work because we have manure. So we got to put the manure on, we have to dig that under, so it mixes with the soil. It’s just not feasible for us to do it. Not applicable.” For one participant, conflict between the timing of planting cover crops and harvest season was a constraint:

> I think there’s going to be real challenges in this area because of our short growing season. I think the first opportunities would be for producer that grow canning crops or maybe seed corn or chop corn off for silage, where they’re getting that crop off in September or maybe even earlier. Those fields would be prime areas for at least trying cover crops. For my operation, I don’t have any acres that I... generally the earliest we’re harvesting is right at the very end of September. So then, in other words, if I’m going to make a cover crop work, I’m going to probably have to see it in a standing corn sometime, maybe in late July or August and that increases my cost.

The participant continued:

> It’s easier to, obviously, seed a crop into a field that doesn’t have a standing crop in it. But, the issue here, if you’re going to try to seed something after harvest, in this part of Minnesota, most of that is going to be seeded at the end of October and then it’s going to be so late that you’re going to get little benefit out of it. So if you’re going to do a cover crop, you’re going to need to
get it seeded, probably anywhere from late July into probably at the latest, late September and then if you’re going to try and do that in a standing crop then it takes specialized equipment to do that, obviously.

**Practice efficacy**
Some participants identified practice efficacy or the effectiveness of conservation practices as a key decision making consideration. Participants mentioned that they are more likely to use practices when they see the expected outcomes of those practices. For example, one participant described how practice efficacy impacts decision making:

> If I see the outcome being positive and there’s a correlation directly to what I’m doing to my land and how it affects the end result-the water leaving my farm. It would have a major impact on my decision making process.

Effectiveness of the practice in controlling soil erosion, runoff and flood damage was important to participants. One participant explained the efficacy of waterways in controlling floods:

> The flood… the peaks in the water flow on my farm are still there, but they seem to be better controlled or managed with these waterways. I’m not losing as much time on my land. So like I say, if I’m cutting hay, if my whole farm is underwater for 24 hours that… the saturation of that land is there for a longer period of time. With my waterways, the land is draining quicker. Not as quickly as if I were to tile at all, but it is drying out quicker.

**Personal norm**
Personal norm is a driver of conservation behavior if an individual is aware of, concerned about and feels responsible for the consequences of water resource or soil health problems. In addition, the expectations and actions of others (i.e., social norm) also activate personal norms. Personal moral obligation was closely related to a conservation ethic. One participant characterized conservation as “Wanting to do what’s right and be conservative.” Qualitative analysis of the interview data revealed four primary dimensions of personal norm: awareness, sense of responsibility, concern and social norm.

**Awareness**
Awareness of on and off-farm problems such as runoff and erosion motivated several participants to use conservation practices. For one participant, seeing soil erosion on the farm was a driver:

> When you see that your land doesn’t look right. Like I mentioned, if all the sudden you see a gulley through your land or on a windy day in the spring, you know, we get real windy days, and all the sudden you see your dirt blowing in the air. You know, if you see that happening… Nobody wants... No farmer wants to see their land not look good or their land blowing in the wind and stuff like that. So if you start seeing that erosion happen you, there by… either by rainfall or by wind, you’ve got to figure out how to make it better the following year or how to make it better.
Awareness of consequences of using conservation practices was a driver for some participants. For one participant “knowing that some kind of perennial sod based, sod developing plant material was the only way that I was going to stabilize the runoff” was a driver. Another participant emphasized awareness of consequences as an important motivator, “I think what helps people along that way... and say, and here are the consequences of what happens if we don’t. So I think that has to be a part of the educational process, is to say, and if we keep doing this, this is what’s going to happen, versus, if we try and do this other thing, this is what might happen.”

**Sense of responsibility**

Participants acknowledged that it was farmer and landowner responsibility to protect soil and water resources. One participant explained, “Well, obviously farmers are the actors in the play. They’re the ones that actually have the resources under their control. They own the land, they operate the farm on whatever way they see fit. So the farmers ultimately have the final responsibility.” Other participants suggested that farmers can protect soil and water resources by “leaving buffers along waterways and rivers, minimal tillage where they can” and by following practices “to minimize the use of fertilizers and soil erosion.” Other participants noted that farmers are “making improvements all the time.”

Participants also recognized that farmers need support to implement practices:

> I think there should also be some financial help, to help farmers implement practices like riparian buffer zones. You know, cause farmers are running a business and it can be hard to absorb a cost like that, even if it is the right thing to do. And the finishing question, who should be responsible? I feel like, as farmers, we should definitely care about the environment that feeds us all and we have a responsibility to take care of it.

Several participants believed that it was community and government responsibility to protect soil and water resources. One participant suggested that water resource protection is a joint responsibility of landowners and the broader community, “Well, I think the land owner is partly responsible and then the community is partly responsible. They want to be able to use those resources for fishing or as habitat for wildlife that they hunt or fish. I don’t know, I guess a combination of the two.” Other participants believed that the responsibility extended beyond the farming community to towns and homeowners, “There’s the towns and the private home owners that contribute to it also. It’s not just the farming community. Everybody is responsible for it.” One participant suggested that citizens have an important role in bringing about change, “regular citizens who can do something about it and make a noise about it and local government can change things.” Participants also emphasized the role of government in incentivizing conservation:

> I think the government has a responsibility to conventional farmers to incentivize conservation in a different way, because it’s hard to do things if you’re not getting paid for them. I understand that. And there are some government programs, but you know, they go up and down as far as getting cut and what the funding is for, the funding’s there, but if the price of corn is better, people are, you know, we’ve watched people take out their land that’s in conservation programs just to get a few more acres of corn. So I think the government, right... actually...
responsibility both to incentivize that, but also just to educate, because I worry... I mean certainly some conventional farmers are well aware of what their practices are doing, but I doubt all of them are, because I think some of them would make a change if they did know.

Concern
Several participants expressed concern about soil health and water resource problems including soil erosion, streambank erosion, nutrient and sediment runoff, flooding, extreme storms, groundwater quantity and groundwater contamination. Participants were also concerned about pollutants such as coliforms, nutrients, fertilizers, suspended solids and pharmaceuticals. One participant expressed concern about water quality and water management:

The algae blooms are significant in pretty much, all summer long now. Whereas when I first moved here, I don’t recall the water being green all the time. So algae blooms are a function of excess nutrients in the system. I can only imagine that the amount of phosphorous in particular is relatively high in the system. So, I would give our water quality about a... if I were to give it a grade, I would probably give it about a C-, in terms of water quality. In terms of water management, I would give it about a D. I don’t think we manage water runoff very well in this watershed at all.

Another participant discussed lack of concern as a constraint:

I don’t see a lot of people doing a whole lot with the creek at all. Right now they’re just trying to keep their head above water, financially with the economic problems that we’ve had since 2008. If they didn’t have the economic problems, I’m not sure if they would do anything anyway. I have very little confidence in people in that regard.

Social norm
Participants were more likely to adopt conservation practices if they knew that other farmers had adopted the practice and if they could talk to others about conservation practices. Participants were influenced by other farmers and neighbors in their conservation decision making. Some participants adopted conservation practices such as conservation tillage and cover crops because “some neighbors had it [strip till]” and because they “had always learned about them [cover crops] working at other farms as a key way to build... maintain and build soil health in an organic system.” The perception that a practice was “a pretty accepted practice among sustainable farmers” was also influential in conservation practice adoption. For other participants, their conservation and stewardship ethic was fueled by their family:

I would have to say that, the first teacher I had in terms of any kind of environmental stewardship, was my father, who was born in 1925 and grew up in the depression. So, in the ‘70s, he was recycling, my father was not an environmentalist, he was a conservative Republican, but there was something about growing up in the depression... and I fear when we lose this generation... that made you aware that you could get by with so much less. And you didn’t waste anything and it was a crime, it was a sin, to the Lutherans and the North Dakota
Pro...it was a sin to waste something. And so, he really was recycling things, way before it was popular to recycle, because you just did that and you reused everything and you conserved everything and you saved everything, because you never knew when you were going to need it. And so that was really my original introduction to the whole idea.

Relationship and communication
Participants’ past relationship and engagement with government officials and communication of issues influence their decision making about conservation practices. Two dimensions of relationship and communication emerged: relationship and engagement, and communication of issues.

Relationship and engagement with government officials and others was cited by several participants as a motivator for conservation practice adoption. One participant spoke about the positive effects of establishing relationships with government officials:

I think there are positive benefits to working with the government and it’s important to have a relationship with the government in the form of people who possess technical expertise. And they try to be personable and helpful, so I think there is the human dimension of good relationships. Because that’s really the face of the government.

Another participant identified outreach from county staff as a reason for enrollment in government programs such as the Conservation Stewardship Program (CSP). However, the participant also identified lack of resources as a constraint to engagement:

I had a contact person in the Dakota County offices that was good at coming out and saying, ‘Have you considered doing this?’ But that was when resources were available and employees had time to go out and visit with farmers. Now we’re in the mode of cutting back and scaling this down and conservation is getting less and less. There’s less dialogue in the country because of reduced staff.

Some participants cited the lack of conversation and dialogue around conservation as a constraint:

There’s a lot of people helping farms look at their balance sheet, because so many farms have loans. And that’s a requirement. You participate with a loan officer, they’re going to talk to you all about return on investment and a whole bunch of stuff that doesn’t relate at all to conservation. They’re never going to mention the word cover crop in a meeting about whether that farm’s profitable and can pay their bills. Whether farmers like it or not, they have those conversations about money and don’t have those conversations about their farm as a living organism. Some would probably think that was weird.

Participants suggested that the way issues are communicated is a constraint to conservation practice adoption. One participant stressed that issues have to be tied to future generations instead of using fear to motivate people:
Fear doesn’t motivate people for very long and it doesn’t create change, I believe, for very long. But I don’t think that, that actually gets people to change. If it can scare them and it can get them to change for a little bit, but it doesn’t actually get them to change for very long. But a vision of what can be, that does. And so I think, for me, there has to be that appeal to, this is worth working for and this is something that’s worth creating and that can motivate people. And especially when it’s tied to, it’s not about my life, it’s about my children and it’s about my potential grandchildren and so on.
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<tr>
<th>Domains</th>
<th>Dimensions</th>
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<tbody>
<tr>
<td>Practice outcomes</td>
<td>Environmental outcomes</td>
<td><strong>Water quality</strong>&lt;br&gt;• Water quality benefits downstream; reduced sedimentation; prevent runoff of chemicals and nutrients</td>
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<td><strong>Soil health</strong>&lt;br&gt;• Erosion control; prevent erosion after major storms; organic matter for soil</td>
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<td><strong>Wildlife habitat</strong>&lt;br&gt;• Habitat for insects and wildlife</td>
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<td><strong>Fertilizer use</strong>&lt;br&gt;• Reducing use of fertilizers</td>
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<tr>
<td>Economic outcomes</td>
<td>Impact on yield</td>
<td><strong>Impact on yield</strong>&lt;br&gt;• General yield considerations&lt;br&gt;• Evidence that practice does not reduce yield&lt;br&gt;• Practice takes land out of production</td>
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<td><strong>Adoption and maintenance costs</strong>&lt;br&gt;• Investment for new equipment&lt;br&gt;• Other maintenance costs</td>
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<td><strong>Financial benefit from practice</strong>&lt;br&gt;• Inability to harvest hay or grasses from land in conservation</td>
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<td><strong>Payments for adoption</strong>&lt;br&gt;• Financial assistance programs such as cost share&lt;br&gt;• Compensation for land enrolled in conservation program&lt;br&gt;• Low payments compared to crop production</td>
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<td><strong>Efficiency</strong>&lt;br&gt;• Cost savings from reduced fuel and fertilizer use</td>
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<tr>
<td>Social outcomes</td>
<td>Human health</td>
<td><strong>Human health</strong>&lt;br&gt;• Human health benefits of using practice</td>
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<tr>
<td>Practice outcomes</td>
<td>Aesthetic benefits</td>
<td><strong>Aesthetics of practice</strong></td>
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<td></td>
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<td>• Beauty and natural look of the land</td>
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<td>On-farm benefits</td>
<td>Nutrients, water and organic matter retention</td>
<td>• Practice retains nutrients and organic matter that help build soil fertility</td>
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<td>• Practice retains water on the farm</td>
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<td>Other benefits</td>
<td>• Weed control, prevention of chemical drift from other farms</td>
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<td></td>
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<td>• Reduces hay loss and provides feed for cattle</td>
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<td>Perceived ability</td>
<td>Perceived ability</td>
<td><strong>Time</strong></td>
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<td></td>
<td>• Time to implement and manage practice</td>
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<td>• Time savings from practice</td>
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<td>Knowledge</td>
<td><strong>Knowledge</strong></td>
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<td>• Practice requires technical expertise and good management to implement and maintain</td>
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<td>Equipment</td>
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<td>• Lack of equipment to adopt and maintain practice</td>
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<td>Control</td>
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<td>• Perceived ease or difficulty of using practice</td>
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<td>Uncertainty</td>
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<td>Landscape and operation suitability</td>
<td>Landscape suitability</td>
<td><strong>Practice suitability with landscape</strong></td>
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<td>• Practice does not work with topography, soil type and area temperature</td>
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<td>Operational suitability</td>
<td><strong>Practice suitability with current farm operation</strong></td>
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<td>• Practice suitability with current farm operation</td>
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<tr>
<td>Practice efficacy</td>
<td>Practice efficacy</td>
<td><strong>Practice efficacy</strong>&lt;br&gt;• Evidence that the practice is effective at preventing runoff and controlling erosion</td>
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<td>Personal norm</td>
<td>Awareness</td>
<td><strong>Awareness of problem</strong>&lt;br&gt;• Awareness that something needed to be done to address problems such as excessive runoff and soil erosion&lt;br&gt;<strong>Awareness of consequences</strong>&lt;br&gt;• Awareness of consequences of adopting or not adopting practice&lt;br&gt;• Knowing that practices can control erosion and runoff</td>
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<tr>
<td>Sense of responsibility</td>
<td>Farmer responsibility</td>
<td><strong>Farmer responsibility</strong>&lt;br&gt;• Farmer responsibility to protect soil and water by adopting conservation practices&lt;br&gt;• Farmers need help implementing practices&lt;br&gt;<strong>Community responsibility</strong>&lt;br&gt;• Community (e.g., landowners, private homeowners) and government responsibility to protect soil and water</td>
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<tr>
<td>Concern</td>
<td>Concern</td>
<td><strong>Concern</strong>&lt;br&gt;• Lack of concern about water resources</td>
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<td>Social norm</td>
<td>Social norm</td>
<td><strong>Social norm</strong>&lt;br&gt;• Influenced by seeing other farmers adopt practice&lt;br&gt;• Influenced by talking to other farmers who have tried the practice&lt;br&gt;• Conservation ethic fueled by family&lt;br&gt;• Seeing conservation as an accepted practice among other farmers</td>
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<td>Relationship and communication</td>
<td>Relationship and engagement</td>
<td><strong>Engagement in conservation</strong></td>
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<td>• Engagement with county staff about conservation</td>
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<td>• Lack of conversation about conservation among community groups and farmers</td>
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<td><strong>Relationship with government</strong></td>
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<td>• Good relationships with government officials driving conservation practice</td>
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<td>adoption</td>
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<td></td>
<td>Communication of issues</td>
<td><strong>Fear as motivation</strong></td>
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<td></td>
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<td>• Using fear to motivate people does not create change</td>
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**External forces**

Apart from the two spheres of decision making, analysis of the interview data revealed two primary domains of external forces that shape the context within which participants made decisions about farming and conservation action (Table 5):

1. Systemic factors
2. External pressures

**Systemic factors**

Three dimensions of systemic factors that shape participants’ decision making emerged: *economic system, agricultural system* and *governance system*.

**Economic system**

Two primary descriptors related to the economic system emerged as constraints to farmer decision making: *profit driven economy* and *corporate influence* on farming. Participants stressed that the *profit driven economy* drives farmer decision making towards increasing profits and yield. For example, one participant inquired, “Farms keep getting bigger, don’t they? Why? The profit is less. So you’ve got to farm more ground.” Participants also suggested that economics drives farmers to “raise what pays the best.” The participant argued, “But, that’s not always the best. It’s best for the farmers. Is it best for the people?”

Another participant described how economics dictates decisions around soil and food:

> I’m not saying capitalism is wrong. I’m just saying that what happens now is that the banks control the farmers, see, and here we go. What is dictating there? It’s all the economics, and usually that’s ok. But, not always, when it comes to soil. See soil, is a long term thing. Food is a long term thing. But what I think, in this country, we treat it like a short term, I think worldwide we treat it like a short term thing.

Several participants also identified *corporate influence* in farming as a factor that shapes farmer decision making. Some participants expressed concern about corporate influence on research and argued that “almost all of our research is done now, with corporate money. And it has... the results benefit the corporations.”

Another participant described how, in the current economic system, farmers are “beholden” to banks and big agriculture:

> I think it’s different when you’re trying to make a living off the land. I think that we tend to get, you know, if I have to make money doing this. We don’t have to make money on this piece of property. We may at some point, think about it as, can it provide food for a family, but we’re not trying to make an income, except nominally, if we did something like raise bees to make honey or something. So I think, when you don’t have to do that, you’re allowed a little more latitude
than things like, boy I need to get more and more money per acre, I need to get more and more yield per acre, I need to pay off all these incredible loans I have and then get into the whole way you... you sort of become beholden to the banks and big agriculture for maintaining that.

**Agricultural system**

Along with the economic system, aspects of the agricultural system emerged as factors that shape farmer decision making. Five primary descriptors related to the agricultural system emerged: *monoculture system, farm bill, farm insurance programs, lack of government incentives and emerging technologies*. One participant described the agricultural system as a “fundamentally flawed system” and emphasized the negative environmental impacts of *monoculture system* of farming:

Part of my understanding of this comes from that research and the notion that the monoculture, annual grain crop system of farming is not sustainable. It requires too much throughput and energy and it just can’t keep going. And part of the problem with that is loss of topsoil through tilling practices and tilling up to the edge of fields and the runoff and the high input of petroleum based fertilizers and then the runoff that, that produces. And the pressure on farmers to increase yields, to make everything more efficient with bigger and bigger farms and farms that are now, you know, thousands of acres. But then, the need to use every square foot of that. So, you tile more of the land so you don’t get water standing on it and so the water, instead of percolating through, runs off, and the runoff is faster higher and stronger and that increases erosion in the rivers and then we look at the result of that when we get these... We had 2 hundred year floods in one year. It just can’t absorb it... it’s all running off, it’s running into the rivers, it’s creating this problem with erosion.

Participants noted that the *farm bill* does not provide incentives for farmers to reduce chemical use. One participant said, “We need to adapt the farm bill to people that want to change. If you want to get away from chemicals and do that stuff, we need to have something in the farm bill for that. We ain’t there yet.”

Some participants suggested that *farm insurance programs* are incentivizing type of agriculture that is “unhealthy” for soil and people. One participant discussed the effects of farm insurance programs:

It’s incentivizing a type of agriculture that is really unhealthy for both the soil and the people and I think that’s what is really frustrating, is that it seems so unhealthy in both ways. Because we’re mostly growing corn and soybeans that are being made into really unhealthy food and it’s just destroying the soil to put so many chemicals in it. So I think big conventional ag is very unfairly rewarded by the government. So I wish that either the playing field would be leveled somehow. It’s not like we need a bunch of government handouts, but, you know that that wasn’t incentivized.

Other participants spoke about the *lack of government incentives* for organic farming, “If there were more government incentives, either for us as farmers or for consumers to buy that [organic] kind of
food. Yeah I think that’s really the biggest. I feel like market demand is there and it’s high. People are really excited about this kind of food, so it’s not, that hasn’t been our issue.”

Participants also expressed concerns about emerging technologies such as Genetically Modified Organisms (GMO) and new pesticides. One participant expressed concern about the use of GMOs, “We release them to be used out into the public long before we understand the implications of what will happen.” Another participant questioned the over-reliance on technology to solve problems in a “fundamentally flawed system”:

That the kind of energy we put in to developing an acre of food, we can’t keep doing for hundreds of years. I mean at some point, we’re going to run out of the resource that it takes, we’re living in this golden era of fossil fuel that didn’t exist 150 and 200 years ago and is probably not going to exist in the same way in another 200 years, so we need to start developing the long term strategies that recognize that. Of course, one of the responses to what I’m saying is, well technology is going to get us out of this, hydrogen, or whatever, and it’s like... I mean I’m a religious person and I find that sort of magical thinking to be like, I don’t even get it. So, for me there has to sort of be this realistic notion that, when you keep pouring this much energy into a particular thing, this pot of energy will at some point diminish, what are you going to have?

**Governance system**

Participants also highlighted three themes around the governance system that shape their decision making: policy and governance, trust in information and fairness in policy development and implementation.

Several participants described government influence on farming and conservation through regulations and permitting as an aspect that shapes their decisions. Some participants suggested that policies or regulations around practice implementation are needed. One participant supported the buffer law, “I think the buffer strip law. I think, was it Dayton that proposed no farming within 50 feet of any tributary? That just makes tons of sense, I think. And I really hope that, that can get implemented.” However, participants also cautioned against too much government influence, “Some government control is ok, but sometimes it can be... you have people deciding what you’re going to do.” One participant voiced concern about the segmentation of issues by resource instead of a holistic approach, “One of the problems we have is we’re so segmented, in terms of what people are able to look at. So it’s like, I can look at trees or I can look at flowers, and I can look at soil, and I can look at rivers, but everybody has got something different.”

Participants also identified short term thinking as a key factor that influences farmer decision making:

I think one of the shifts we’ve undergone, is our horizon for what constitutes the future has gotten shorter and shorter. So I think increasingly as a culture, we look only at... I mean, corporations look a quarter ahead and farmers, I think at one point thought about it
generationally. What will my children inherit, what will be here for them. And now I think farmers are forced to look in more... it’s just an annual thing. It’s like, next year can I get by, next year can I make enough money, next year can I pay off those loans. And so we get more and more short sighted in terms of how those decisions are made, because the pressures, and I don’t want to be paranoid about it, but the pressure is to try and keep us focused on just what is next, instead of the bigger picture, mount more and more.

Another participant described the flaw in problem definition around food security and farming:

That’s the fundamental flaw. How do you develop a system that ultimately is sustainable over a long period of time. And I don’t think there’s going to be this magical sort of, I found the key, it’s like the perpetual motion machine, it doesn’t exist. But, you look at farming in the 1800s and you look at farming now and granted, yields are way up. But we’re wasting boat loads of food and we’re sold this notion that what we need is more food to feed people, not that we need efficient distribution system to feed people. So we’re sold on this notion is that the problem is that we don’t create enough food. I don’t think that’s the problem, the problem is how we distribute the food and the problem is an economic one.

Trust and fairness were important elements of participants’ decision making framework. Participants reported that information about farming and conservation practices would have to be science-based and from credible, trustworthy sources. For one participant, obtaining science based information is important to farm decision making, “We’re trying to do things science based, what makes sense with science, does this make sense or does that make sense? So that’s decisions as far as growing the crop.” Another participant mentioned that scientific information about conservation practices is needed to inform people, “I want some scientific data to say, this is really going to be helpful or that it’s really not helpful.”

One participant emphasized the importance of trustworthy sources of information:

What’s hard to sort out sometimes is just, my feeling is typically, you get this side, you get this side, the truth is somewhere in the middle. That’s hard to come by. So again, just having that source of trustworthy information is really important. Which, unfortunately, I would say, as much as I want to trust academic circles, the way academic circles interact with business these days makes it a little harder to sort that out.

Several participants spoke about the inconsistencies in implementing and enforcing soil erosion and buffer regulations. One participant explained:

Different counties have different soil erosion regulations. So if a farmer has a field and the county road ditch gets full of eroded soil, some counties have strong erosion ordnances and others, you know, they just come in and take the soil away and put it someplace. So it’s very disheartening to see that kind of thing going on.
The lack of farmer representation in policy development was also an issue for participants. One participant spoke about the lack of farmer representation in Congress, “There isn’t enough representation in the Congress to making rules, ‘cause as producers... farm producers, we’re only 2 percent of the world and so a lot of time it’s hard for people who are making the laws to understand what we’re going through, because they’re so far reserved.” Others expressed concern that I guess “people that don’t know anything about farming are trying to get some laws through.”

External pressures
Besides systemic factors, analysis of the interview data revealed three dimensions of external pressures that shape participants’ decision making about their farm and their conservation action: public influence and climate and weather.

Public influence
Participants emphasized the importance of public influence in their decision making about farming and conservation practices. Participants highlighted three primary descriptors around public support for conservation: political support, public pressure and lack of vision.

One participant mentioned the lack of “political will” to “begin enforcing buffer laws”, while another participant cited lack of lobbying for organic farmers as a constraint. Participants also spoke about the need for public pressure on farmers and a demand for better food:

That’s where I think you people are going to push the farmers to this. But if you guys demand better food, it’s going to happen. And farmers will adapt. Farmers are very innovative now. Could they feed their livestock differently? Sure they could. Sure. It would be hard. Could they raise different crops? Sure. Could they cultivate it and raise it? You bet.

For another participant, lack of a vision of “what can be” was a constraint, “What we often lack in this [environmental] movement is the vision of what can be, what we often focus on is the horrid things that will happen if we don’t. “

Climate and weather
Weather was another challenging factor for participants in their decision making, both around farming and conservation practices. Uncertainty associated with weather affects farm profitability because “yields are a lot of times tied to weather.” Another participant spoke about erosion resulting from extreme storm events, “the other thing is the weather we’ve had has been very challenging for. We’ve had some really large storm events that have made it very challenging and unfortunately, maybe added more erosion than we’d like to see.”

Another participant was concerned about the impacts on climate change on farming, “as climate change impacts us, we’re finding that the window of good planting weather gets shorter and shorter. Because if you have as significant rain event, which we do get now, you have to wait for things to dry up and that shortens the time that’s available.”
Table 5. External forces that influence farmer decision making

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<th>Domains</th>
<th>Dimensions</th>
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<tbody>
<tr>
<td>Systemic factors</td>
<td>Economic system</td>
<td><strong>Profit driven economy</strong></td>
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<td></td>
<td></td>
<td>• Economic system drives farmers to farm crops that pay best</td>
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<td>• Economics leads farmers to farm more land</td>
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<td>Corporate influence</td>
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<td>• Farmers are “beholden” to big banks because they have to make more money</td>
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<td>• Corporate money in research benefits corporations</td>
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<td>Agricultural system</td>
<td>Agricultural system</td>
<td><strong>Monoculture system</strong></td>
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<td>• Monoculture system pressures farmers to increase yield and results in loss of topsoil and runoff</td>
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<td>Farm bill</td>
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<td>• Farm bill does not provide incentives for farmers to use less chemicals</td>
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<td>Farm insurance programs</td>
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<td>• Insurance programs incentivizing type of agriculture that is “unhealthy” for soil and people</td>
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<td>Lack of government incentives</td>
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<td><strong>Lack of government incentives</strong></td>
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<td>• Lack of government incentives for organic farmers or consumers</td>
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<td>Emerging technologies</td>
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<td>• Over-reliance on technology to solve problems</td>
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<td>• Release of genetically modified organisms (GMO) and pesticides before understanding implications</td>
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<td>Domains</td>
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| Systemic factors    | Governance system   | **Policy and governance**  
|                     |                     | • Government regulations and influence on farming and conservation  
|                     |                     | • Issues segmented by natural resource (e.g., soil, water)  
|                     |                     | • Short term thinking replacing long term approach to conservation  
|                     |                     | • Flaw in how problems are defined  
|                     |                     | **Trust in information**  
|                     |                     | • Providing information based on scientific data about conservation practices  
|                     |                     | • Government officials perceived as a source of technical expertise  
|                     |                     | • Lack of trustworthy sources of information  
|                     |                     | **Fairness in policy development and implementation**  
|                     |                     | • Inconsistencies in enforcing buffer and soil erosion rules across counties  
|                     |                     | • Lack of farmer representation in policy development  
| External pressures  | Public influence    | **Public pressure**  
|                     |                     | • Public pressure and demand for better food  
|                     |                     | **Political support**  
|                     |                     | • Lack of political support for organic farming  
|                     |                     | • Lack of will to enforce buffer laws  
|                     |                     | **Lack of vision**  
|                     |                     | • Environmental movement lacks vision  
| Climate and weather |                     | **Uncertainty due to weather**  
|                     |                     | • Effects of extreme storms and climate change on farming  

Drivers and Constraints to Engagement in Conservation Initiatives

Participants were asked a series of questions about the drivers of and constraints to their engagement in local conservation initiatives. This line of questioning revealed eight overarching dimensions that influence participants’ engagement in local conservation initiatives (Table 6):

- Issue framing
- Perceived ability
- Awareness
- Motivation
- Trust and fairness
- Outreach
- Time constraints
- Focus on individual action

Issue framing was a primary constraint to engagement in conservation initiatives among participants. Some participants did not perceive environmental issues as a “crisis situation”. One participant explained how the perception of environmental issues as a crisis situation can mobilize people:

As I said I’m worried about all these things for the future, but it doesn’t feel like a crisis situation right now. But, if there was some specific... there are tests that are water quality... You know, when it’s our farm, or just right around here, is just like so bad. So like a specific scenario, which I can imagine might come, I think we would really rally behind it. Right now, it’s just one of those sort of vague, ominous things, like climate change. That we feel like we can do... we try to do as much as possible on our farm to impact soil health and water quality, but there’s not one single thing that’s happened that we feel that people are organizing around or they’re turning out for.

Several participants reported that programs are not tailored to the issues and needs that people are concerned about. One participant stressed the need to connect environmental issues with human health:

Just making not sort of an abstract environmental issue, but like a human health issue. I think it’s really important to change it, because people might care about the environment, but they’ll often only go so far. But if it’s not just that it’s hurting the life in the Gulf of Mexico, it’s also bad for you to drink water with so many nitrates in it.

Several participants felt that organic farmers are not targeted and prioritized for engagement. One participant noted that communication from organizations is not targeted at organic farmers, “we get little newsletters or you know, from the FSA office or something. But, it’s not directed at all towards farms like ours [organic farms]. Yeah, so I think that if people just reached out to farms like ours, that would make a difference.”

Polarization of issues was another constraint to participants’ engagement in discussions about water
quality and soil health. One group explained how issues tend to be polarized by organizations:

Large groups tend to create mob mentalities and they tend to polarize very quickly to, you’re either in camp one or camp two. There seems to be a lot of tension between those two camps and the polarization seems to be driven by organizations, commodity organizations, conservation organizations. So they quickly polarize.

Another participant mentioned that conservation related groups set “unrealistic”, “superficial” goals that are “never going to be met.”

Stressing the need to frame environmental issues without threatening people’s values, one participant said:

It happens, it happens. People feel really threatened when you start talking about things that impact them directly. Things that affect how they go about doing their daily business. It becomes really tense and people get really threatened, feeling like someone is trying to tell them what to do. Even though they can agree or recognize that the outcome, the impact of a particular practice has an impact downstream, the fear of letting go and allowing more interaction is too overwhelming and it’s too... it’s easier to back away and trench yourself in a dogma, in a belief that you’re doing the best that you can. That you need to... your land needs to be profitable. And the way to be profitable is to maximize productivity and to maximize productivity is to remove the water from the landscape as quickly as possible. And anything outside of that idea is attempting to control how you make land... how you make money with your resource... with your land. And I don’t feel... I don’t know how to get past that.

Perceived ability emerged as another factor that influenced participants’ engagement in conservation initiatives. Professional expertise in organizing was a driver for one participant, “Well, for me the meetings and all that comes with that, can be traced back to my professional work as an organizer.” For other participants, the perception that they do not “have any input” for conservation groups was a constraint.

Motivation to learn about conservation practices was a driver of engagement for some participants. Participants were more willing to be engaged if they could learn about something applicable to their operation. One participant explained:

I can tell you one thing we would probably go to, if someone was to host this is, if there was a no till, strip till workshop right in our area. We would totally go to something like that. Where we could learn something very applicable to our operation. But just discussing water quality. I mean we kind of do that with our friends and we do it... It’s kind of just a part of our business, so it’s not really something we can take extra time for.
Participants were also motivated by social norms. One participant was influenced by previous farm owners, “The people I bought my farm from were very involved in watershed projects.” Lack of outreach from government organizations was a constraint for some participants. Discussing outreach activities, one participant said, “I’ve just never seen any activity like that coming from more government organizations, you know, local government.” For another participant, having to reach out to organizations instead of organizations reaching out to them was a constraint.

Trust and fairness emerged as another key domain of participant engagement in conservation initiatives. Trust in information was a constraint for many participants. Some participants believed that groups are not science based. One participant explained:

I don’t know if there’s a lot of groups out there that are science based. There’s a lot of special interest groups out there... I guess I don’t have any interest in being involved in special interest groups. Because they usually have their own interest, and like I said, it’s not fact based.

Some participants questioned the credibility of groups. One participant asked, “Does watershed council...an expert on conservation practices?”

Lack of farmer representation was a constraint for some participants. One participant expressed concern about the lack of farmer representation at meetings, “Because out of the 12 people that were there, there was 2 farmers and the rest were all people from the city and their version of clean water was like glacial snow that trickles into the... across the land and they didn’t even realize that a stream will naturally erode.”

Lack of awareness of meetings and discussions about soil health and water quality was a constraint for some participants. When asked what has kept them from getting involved in discussions, one participant responded, “I guess I wasn’t aware that they’re around. I don’t know if there have been meeting in Canon Falls someplace. I guess I just wasn’t aware.”

Time constraints and meeting location were important decision making considerations for participants. Lack of time to attend meetings and be engaged in discussions was cited as a constraint cited by few participants. Many participants were constrained by competing priorities such as work and children that took up most of their time. Meeting location also influenced participants’ engagement in conservation initiatives. For example, one participant said, “If it’s a discussion, I can handle that. If it’s not too far away, I can handle that.” Another participant suggested that food was a motivator for some farmers:

Well, probably as recently as 15 years ago, seed companies, chemical companies, equipment companies would put on a farmer meeting and you would go in and have a wonderful steak dinner. That was great motivation. So that kind of thing doesn’t happen now. I think the budget for that kind of thing has taken a real hit.
Focus on individual action also emerged as a constraint to engagement in conservation initiatives. Participants mentioned that they were not involved in community discussions about soil health and water quality because they are already implementing conservation practices on their land. For example, when asked about what has kept them from getting involved in discussions, one participant responded, “I’m implementing what they’re talking about, I suspect, in the discussions.” Another participant said, “We’re taking care of it on our own spot, I guess. We don’t run a lot of land, so we’re not worried about a wide area. It’s just one focused area.” Another participant believed that engaging with others diverts them from putting practices on own land, “You’re 62 years old, you’re not in the best physical condition, how much do you think you can do? You’re hiring people to do this for you, because you can’t do this yourself. So do what you can, don’t get diverted too much.”
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<thead>
<tr>
<th>Dimensions</th>
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<tr>
<td>Issue framing</td>
<td><strong>Tailored communication</strong></td>
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<td></td>
<td>• Programs not tailored to issues that people are concerned about</td>
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<td>• Communication not directed towards organic farmers</td>
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<td><strong>Perception of environmental issues</strong></td>
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<td>• Environmental issues not perceived as a “crisis situation”</td>
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<td><strong>Polarization</strong></td>
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<td>• Polarization of issues driven by organization and “special interest groups”</td>
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<td><strong>Goal-setting</strong></td>
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<td></td>
<td>• Unrealistic goals of conservation groups</td>
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<td>Perceived ability</td>
<td><strong>Expertise</strong></td>
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<td></td>
<td>• Professional background in organizing</td>
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<td></td>
<td>• Lack of input during meetings</td>
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<td>Awareness</td>
<td><strong>Lack of awareness</strong></td>
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<td></td>
<td>• Lack of awareness about meetings and discussions about water quality or soil health</td>
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<td>Trust and fairness</td>
<td><strong>Trust in information</strong></td>
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<td>• Local conservation groups not trusted because their information is not perceived to be science-based</td>
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<td><strong>Lack of farmer representation</strong></td>
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<td>• Lack of farmer representation at meetings</td>
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<td>Motivation</td>
<td><strong>Learning</strong></td>
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<td>• Desire to learn about practices</td>
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<td><strong>Social norm</strong></td>
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<td>• Past owners’ involvement in projects</td>
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<td>Time constraints</td>
<td><strong>Time and Location</strong></td>
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<td>• Lack of time</td>
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<td>• Time when meetings are held</td>
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<td>• Distance to meeting location</td>
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<td><strong>Competing priorities</strong></td>
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<td>• Conflict with other priorities like work and children</td>
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<td><strong>Food</strong></td>
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<td>• Providing food at meetings</td>
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<td>Outreach</td>
<td><strong>Outreach activities</strong></td>
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<td>• Lack of outreach activities from government organizations</td>
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<td>Focus on individual action</td>
<td><strong>Adoption of conservation practices on own land</strong></td>
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<td></td>
<td>• Perception that engaging with others diverts from putting practices on own land</td>
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Participant Interest in Leadership Role in Conservation Groups

Participants were asked about their interest in and motivations for or constraints to taking a leadership role in a local soil health group. Only three participants were interested in taking a leadership role. One participant was interested in a “short term leadership role”, while the other participant would be willing to take a leadership role if “people are actually willing to listen and learn”. Another participant was interested but only if “it was a group of our local sustainable farmers.”

Participants were unwilling to take leadership roles in a local soil health group for the following reasons:

- Lack of leadership skills
- Lack of time
- Issue representation
- Lack of empowerment

Participants cited the lack of leadership skills and experience as a constraint to leadership. One participant said, “Leadership is hard… doesn’t always come naturally to us.” Another participant noted, “I don’t think I’ve lead anything in my life. I’ve not been president of any club, any organization, I don’t believe I’ve got the people skills to be a leader.”

Lack of time was a constraint for several participants. Participants explained that commitments with other groups, work and children take up most of their time. One participant explained, “I’ve got a lot of commitments with some other groups that take up a lot of my time.” Another participant said, “I wouldn’t mind being a little bit of a contributor, but I don’t have the time right now to be in charge or help promote something. But I’m a resource if you need a quick easy thing.”

Issue representation emerged as a constraint for some participants. Participants believed that are not the right representatives of farmer issues. One participant explained, “Now I have very strong opinions about the amount of water coming down to my farm, but I don’t believe I would be an effective leader or a facilitator to such a group. Because I just don’t think I am perceived as being the right spokesperson to the issue. I would participate, but I would not lead.” Another participant noted that large farmowners may be better representatives, “I do not feel like I properly represent the issue. I know many… I know several farmers who operate, manage, many thousand acres of land and I would be more inclined to follow, to participate in a discussion that were being led by those people.”

Recommendations for Increasing Farmer Engagement in Conservation Initiatives

Participants were asked what they would suggest conservation professionals do to increase farmer engagement in formal or informal groups that discuss water resource or soil health issues. Participants offered three general strategies (Table 7):

- Tailor communication strategies to farmers
- Build relationships with farmers
- Address time and resource constraints
Participants suggested a variety of ways to *tailor communication strategies to farmers*. Participants suggested that conservation professionals would have to “show people that there really is an issue” and also “have some suggestions on how we can improve it.” Participants also suggested that programs share information that farmers perceive as “useful”:

> I think sharing information that farmers perceive as actually useful. Really farmers are not into meeting just to meet and to talk about this or that. They’re usually meeting because someone told them that they’re going to improve or they’re going to be getting money. Those are the 2 reasons that get farmers to a table.

One participant suggested that “a field day” where “farmers come and see what they’ve done and projects, showing them how it works” would motivate farmers to be more engaged. Another participant suggested providing “packet of information about what are good practices, packet of information about bad practices, a list of resources that you could go to for more information for financial help.” A participant suggested a “welcome wagon” as a way to share information:

> What I want is a welcome wagon from the watershed partnership. You bought this property, we’re going to come over and we’re going to meet with you, because the property you have is important you have is important because, it’s on this river, this river is important because, blah. And everything we learned about that, we really initiated and so had we not had that desire to know more about that, you know, it’s just a river and who cares? I think that, that kind of outreach work, from them to the landowners and even the people who’ve been there forever. Who may have adopted practices that are just, like, so no longer... and I get that there’s this paranoia about, don’t be telling me what I can do with my land, but for every one of those people, there’s someone who is like, if I knew what the right thing to do was, I’d do it.

Other participants emphasized the need to provide more information about conservation programs. One participant suggested communicating the benefits of conservation programs, “Educating, slideshows, question and answer sessions about profitability and cost-share and probably... I guess it would be about the nuts and bolts. Nitty gritty of it all. And how it can benefit. The benefits it can have right in our own community and the altruistic benefits downstream.”

Participants also stressed that information should be “based on fact and not opinions and special interest groups.” Another participant suggested using Geographic Information System (GIS) mapping to tailor information to individual farms, “With all the GIS mapping and all that kind of stuff, it seems like it would be relatively easy to say, ‘And in this chunk of the river, this is what we really need to pay attention to and this stuff is happening and we need to make sure it’s not having an effect somewhere else.’ “

Participants suggested that programs need to “publicize” farmer meetings. Participants also stressed that communication would have to be tailored to farmer values:
If in like 3 months of owning that property, somebody from the watershed district had called up and said, ‘Would love to come out and talk to you about the property, not because I’m going to... not because I’m big brother trying to tell you what you can and can’t do, although I have a right to do that, but because I really want you to make sure that you understand the importance of the health of the river and what we can do to maintain it.’

Participants suggested that groups set “realistic” goals depending upon the target audience. One participant put it simply, “I would suggest they be realistic about the farmer’s intention to make money.” Another participant explained:

Be more realistic. Some of them want to go talk to the big farmers and have them implement these practices and I don’t... in a big operation, where someone might run 10,000 acres or more. They have lot more worries, less time on their hands. I don’t believe some of them people will ever implement it. I just think they should be more realistic about their target and if they want people to try it they should be more realistic with the incentives to get people to try it.

Another participant added, “Maybe try to narrow their base of people that are somewhat interested before they bother people that are not interested at all.”

Several participants suggested building relationships with farmers. Participants suggested that programs increase farmer representation in meetings. Participants suggested that conservation professionals connect with farmers through trusted sources such as farm groups, organic farmers’ organizations, National Resources Conservation Service (NRCS), Soil and Water Conservation District (SWCD) and other farmers. One participant highlighted the importance of existing groups in connecting with farmers:

An approach for them would be to work through some of these farm groups like the Minnesota Farm Bureau and places like that, because it seems like they have a lot of farmers... A lot of farmers are already talking to these guys and getting information from them all the time. So if somebody worked through that group. They could help pass information down and that’d be a credible source for the farmers.

Another participant added, “I do think farmers will listen to information that is presented by entities at which the farmer spends a lot of money. And that’s seed companies, chemical companies, equipment companies and to some degree, their local elevator.” Other participants suggested identifying community leaders or “advocates” that “the farm community already trust and knows.” Several participants suggested that “direct” and “one-on-one” contacts may be the best way to connect with farmers. Participants suggested a “personal letter or a phone call” to communicate with farmers. One participant suggested scheduling a one-on-one meeting with farmers “to try to identify challenges and opportunities on their particular piece of property.” However, participants also suggested that meeting in groups may “help connect some farmers”. Participants suggested bringing together multiple entities for collaborative meetings:
If that elevator and the John Deere dealer and Cannon River Watershed Partnership and Monsanto seed company. You know Monsanto, the company we love to hate. If those were to get together and do a collaborative meeting, I think you’d have a pretty good shot at getting information out there. But, in other states that I’ve visited and talked intensively with collaborative conservation groups. That doesn’t happen in Minnesota.

Participants also stressed the need to build trust by interacting with farmers. Participants suggested that conservation professionals “make themselves available to speak at various... maybe in conjunction with other groups or something.” Participants also believed that due to competition in farming, “third party” visits to farms may be best to avoid conflict. One participant explained:

We have multiple farmers that grew up next door to each other and we also have a little bit of competitiveness in us and to me I’d rather see, if there was a group of random people, just stopping into our farm and saying hi and how are you doing this and does this work, or maybe you ought to try this. I would actually rather have them from another county. So you avoid that whole conflict of where one next door neighbor is not going to the other next door neighbor to tell him you shouldn’t be doing this. It’s almost like they’re a third party. I think there should be some difference. Like I say, if you have a group of local of farmers going to one local farmer to visit with, it’s kind of awkward for famers, I think.

Lastly, one participant highlighted the importance of one-on-one interactions in building trust and relationships:

I’m a big believer on the one on one. I’m a big believer in building relationships and building trust amongst people. Even as different as they might be in terms of their philosophy or their practices. When you get to know someone, you get to understand the challenges and the complexities of their decision making process and you can still disagree, but you’re probably less apt to be... to sit in judgment of people. So how to do it on a macro level, or even a micro, even a watershed level and to do it effectively? Build trust, build relationship, build a common vision, common goal. You know, it’s just about getting to know people.

Several participants recommended that program leaders address time and resource constraints by finding a convenient time for farmers to meet. Participants suggested that summer or winter may be the best time to schedule farmer meetings. Participants also suggested that staff and funding are needed to address resource constraints.
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<tr>
<th>Dimensions</th>
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<tr>
<td>Tailor communication strategies to farmers</td>
<td><strong>Communicate importance of issues</strong>&lt;br&gt;• “Show people that there really is an issue”&lt;br&gt;• Suggest ways to address issues</td>
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<td></td>
<td><strong>Share “useful” information</strong>&lt;br&gt;• Share information that farmers perceive as useful</td>
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<td></td>
<td><strong>Provide science-based information</strong>&lt;br&gt;• Provide evidence that conservation practices work&lt;br&gt;• Provide information based on facts</td>
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<td></td>
<td><strong>Provide information about programs</strong>&lt;br&gt;• Provide information about conservation practices and programs&lt;br&gt;• Communicate benefits of conservation programs</td>
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<td></td>
<td><strong>Target audience</strong>&lt;br&gt;• Target programs at people who are already interested</td>
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<td></td>
<td><strong>Advertising</strong>&lt;br&gt;• Publicize farmer meetings</td>
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<td><strong>Tailor to farmer values</strong>&lt;br&gt;• Do not threaten farmers’ independence</td>
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<td></td>
<td><strong>Goal-setting</strong>&lt;br&gt;• Set realistic and specific goals</td>
</tr>
<tr>
<td>Build relationships</td>
<td><strong>Connect through trusted sources</strong>&lt;br&gt;• Connect with farmers through trusted sources such as farm groups, organic farmers’ organizations, National Resources Conservation Service (NRCS), Soil and Water Conservation District (SWCD) and other farmers</td>
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<td></td>
<td><strong>Build trust through interactions with farmers</strong>&lt;br&gt;• Visit group of farmers and be available to speak to farmers</td>
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<td><strong>Increase farmer representation</strong>&lt;br&gt;• Increase farmer representation in meetings</td>
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<td><strong>Identify community leaders</strong>&lt;br&gt;• Identify “advocates” who are already using practices and are willing to talk to others</td>
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<td><strong>One-on-one meetings</strong>&lt;br&gt;• Make individual and direct connections with farmers instead of broad media campaigns</td>
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<td><strong>Collaborative group meetings</strong>&lt;br&gt;• Bring together multiple entities</td>
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<td>Dimensions</td>
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| Address time and resource constraints | **Convenient time**  
|                                     | • Find convenient time (i.e., summer or winter) for farmer meetings          |
|                                     | **Resources**  
|                                     | • Resources such as funding, staff and food needed                           |

### Perspectives on Commercial Biomass Production

All participants were read a short definition of ‘commercial biomass production’ and asked about their perspectives on commercial biomass production. Participants were also asked if they think commercial biomass production has effects on crop production, the health of water resources, soil health, farmers and others in the agricultural community. Participants offered varying perspectives along six dimensions (Table 8):

- Economic drivers and outcomes
- Environmental outcomes
- Suitability with operations and farming mindset
- Lack of information
- Local and global impacts
- Scale and logistics

**Table 8. Participant perspectives on commercial biomass production**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Descriptors</th>
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| Economic drivers and outcomes             | **Profitability**  
|                                          | • Ability to generate profit from alternative crop                          |
|                                          | • Price of biomass needs to be high for farmer interest                      |
|                                          | **Job creation**  
|                                          | • Create jobs in construction, engineering, manufacturing and maintenance   |
|                                          | **Efficiency**  
|                                          | • Ethanol not efficient                                                      |
|                                          | • Maximizing production leads to problems of chemical use                    |
|                                          | **Market economy**  
|                                          | • Market demand for biomass will offer farmers a way to make money           |
|                                          | • Market driven agriculture will push farmers to certain crops               |
|                                          | **Market uncertainty**  
<p>|                                          | • Biomass production may cause fluctuations in corn prices                   |
|                                          | • Impacts on corn supply and demand                                          |</p>
<table>
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<th>Domains</th>
<th>Descriptors</th>
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<tr>
<td>Environmental outcomes</td>
<td><strong>Soil health</strong>&lt;br&gt;• Impacts on soil health when biomass (i.e., crop residue)&lt;br&gt;is removed&lt;br&gt;• Grasses as a source of biomass may help improve soil health</td>
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<td><strong>Landscape diversity</strong>&lt;br&gt;• Diverse landscapes with more perennial crops</td>
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<tr>
<td>Suitability with operations and farming mindset</td>
<td><strong>Suitability with current operations</strong>&lt;br&gt;• Requires change in farming practices&lt;br&gt;• Suitability with work load and equipment system&lt;br&gt;• Could benefit livestock operations</td>
</tr>
<tr>
<td>Lack of information</td>
<td><strong>Lack of information</strong>&lt;br&gt;• Need more information about biomass production</td>
</tr>
<tr>
<td>Local and global impacts</td>
<td><strong>Local and global impacts</strong>&lt;br&gt;• Impacts on local road traffic&lt;br&gt;• Impacts of ethanol and corn market on other countries</td>
</tr>
<tr>
<td>Scale and logistics</td>
<td><strong>Scale and logistics</strong>&lt;br&gt;• Slow process to get to commercial scale&lt;br&gt;• Logistical issues because of the volume of product required</td>
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Discussion and Recommendations

This study provides much needed insights on farmer decision making and documents a decision making framework that identifies drivers and constraints associated with voluntary conservation practice adoption among agricultural producers in the Cannon River watershed. This discussion summarizes key findings around the decision making framework and are grounded in the perspectives of the 18 individuals who participated in this study.

1. Farmer decision making is a community-based process

Farmers interviewed revealed that they rely on various agricultural and business professionals or experts including agronomists, bankers, fertilizer and seed dealers and other farmers in their decision making on the farm. They also depend on multiple entities such as county SWCD, NRCS and other farmers in their conservation decision making. Some participants also reported that they listen to and depend on informal farmer networks when making decisions about conservation practices. Clearly, social influences are key drivers of farmer decision making. Thus, conservation programs should bring together these individuals and groups in discussions about water quality, soil health and conservation. Promoting information exchange among these stakeholders through formal, established organizations and through informal networks is likely to be a useful strategy. Identifying and supporting conservation knowledge and leadership among farmers, local resource conservation staff and agricultural and business professionals is likely to be a successful strategy. In addition, supporting informal knowledge networks and connecting informal farmer networks with conservation organizations can help promote information exchange. Finding common ground and proactively involving farmers as well as input dealers in community discussions about conservation may be useful strategies to help build local knowledge networks.

2. Evaluation and awareness of conservation practice outcomes are primary drivers of conservation practice adoption

Farmers interviewed suggested that awareness of water resource and soil health problems such as erosion and nutrient runoff motivate them to take action. In addition, the perceived outcomes of conservation practices were a primary driver of practice adoption among farmers interviewed. Farmers are likely to evaluate a practice based on the environmental and economic outcomes they expect and whether the outcomes are consistent with their goals. For example, farmers are likely to evaluate a practice positively if the outcome of the practice (e.g., erosion control) is consistent with their goal of conservation (e.g., improvement in soil health). When the practice outcome is perceived to interfere with their profitability goals, farmers are less likely to adopt the practice. Providing farmers with feedback about their conservation action can be an effective means of promoting voluntary adoption of conservation practices. Benchmarking, or providing farmers with feedback about their and their neighbors’ conservation actions may be a useful strategy to provide tailored feedback about practice outcomes, while promoting conservation as a community norm (De Snoo et al., 2013). Sharing information tailored to individual farms about the short-term and long-term impacts of conservation
practices on yield, soil health and water quality is likely to be a successful strategy.

3. Systemic factors shape the context in which farmers make decisions about conservation practices.

Findings revealed that systemic factors such as the economic system and agricultural system shape the context in which farmers make decisions about conservation practices. Farmers value stewardship of their land and consider conservation as an important farming goal. However, the profit-driven economy drives farmers towards farming decisions that are most profitable. Participants described that even as farmers identify themselves as “a land steward,” stewardship and conservation are “not always the most profitable way to go.” Farmers were also described as being “beholden” to big banks and big agriculture. Further, the economic and agricultural system also demand that farmers increase yield in order to maximize profits. As some participants mentioned, these goals are not always consistent with the goals of maintaining soil health and improving the health of water resources. Uncertainty associated with climate variability introduces more risks and financial uncertainties. Operating within this context, it is not always easy for farmers to balance profitability with stewardship and conservation.

4. Multiple constraints to farmer engagement in conservation initiatives exist.

The biggest constraints to farmer engagement in conservation initiatives appear to be lack of time, competing priorities and issue framing. Many participants cited lack of time and other priorities such as work and children as constraints to their active involvement in discussions about water quality and soil health. Finding a meeting time and location most convenient to farmers is a simple, yet effective strategy to encourage more farmer participation in conservation initiatives. Participants also expressed that conservation programs are not tailored to the issues that farmers are most concerned about. When farmers do participate, the lack of farmer representation and “tension” between different “camps” discourage farmers from engaging in a constructive dialogue about conservation.

Strategies to Promote Conservation Practice Adoption among Farmers

A multi-strategy approach is recommended in conservation programming that builds awareness of local water resource and soil health problems, promotes conservation as a social norm, builds trust and addresses economic constraints to the adoption of conservation practices. The recommendations provided here are grounded in the analysis of interview data and recommendations made by study participants.

1. Build awareness of local water resource and soil health problems, and provide technical assistance

When making decisions about conservation practices, farmers are motivated by “seeing” problems such as excessive runoff and erosion on their land. Practice efficacy or knowing that the practice is effective at solving problems also motivates farmers. Farmers also evaluate the outcomes of conservation practices
when making decisions about adoption. Farmers are more likely to adopt conservation practices, if they perceive that there is a problem, know how to address the problem and if they have evidence that conservation practices works. Further, participants reported the technical expertise required to implement and maintain practices such as cover crops as a constraint. Programs that emphasize local soil health and water resource issues, demonstrate the effectiveness of conservation practices and provide technical assistance to implement practices are likely to be successful.

2. **Promote conservation as a social norm and share success stories**

Social norms and influences have a significant effect on participants’ conservation behavior. Farmers are influenced in their decision making by agricultural professionals (e.g., agronomists, seed dealers) as well as conservation organizations (e.g., SWCD, NRCS). Farmers also depend on local, informal farmer networks in their decision making. Further, farmers are more likely to adopt conservation practices if they see other farmers adopting the practice and if they can talk to other farmers who have adopted the practice. Thus, featuring success stories from other farmers in the area is likely to be a successful strategy. Providing a platform where farmers, agricultural professionals and conservation organizations can discuss and share knowledge and experiences with conservation practices is likely to be an effective strategy.

3. **Build trust**

Lack of trust emerged as a constraint to both conservation practice adoption and farmer engagement in conservation initiatives. Trust can be built through repeated positive interactions with an individual or organization. Participants in our study believed that trust can be built through existing institutions and trusted and respected leaders in the farming community. Participants also suggested interpersonal relationships as the most effective strategy to build trust with farmers. Conservation professionals should develop and rely on partnerships with community leaders and institutions to connect with farmers. Building trust also requires that conservation professionals be sensitive to the needs and concerns of farmers. Farmers have a unique set of values and goals. Conservation professionals should consider farmer values and goals when communicating with farmers and developing conservation goals. It is also important that conservation programs share science-based information and increase farmer representation in dialogue around conservation practices. Trust will not be built easily or quickly. Conservation programs need consistency and continuity to build trust with farmers.

4. **Address economic constraints and reduce risk and uncertainty**

The decision making process for several participants is based on evaluations of yield and profitability. The profit-driven economic system and the pressures on farmers to increase yield and maximize profit drive farming and conservation decisions. Farmers are concerned about the risk and financial uncertainty associated with farming. The costs of implementing and maintaining conservation practices, and the impact of conservation practices on yield introduce more risk and uncertainty. Programs should draw clear connections between the short term and long term economic benefits of environmental outcomes like erosion control and improved soil health. Financial assistance programs such as cost-
share and reimbursement programs can provide an incentive for adoption by helping to reduce some of the risks associated with conservation practice adoption. Conservation professionals should also identify practices that are most suitable to farms and their current operations, and demonstrate that these practices do not reduce yield. Involving farmers in dialogue and discussions to address their concerns is also an important strategy.

References


Appendix A: Interview Recruitment Script
Community Capacity Assessment in the Cannon River Watershed
Phase II

Phone Script for Initial Contact

“Hello, my name is ______. I am a graduate student/research associate conducting research on farmer decision making and agricultural conservation practices for Mae Davenport, Associate 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 you 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.
Community Capacity Assessment in the Cannon River Watershed
Phase II

Email Script for Initial Contact

“Hello, my name is ______. I am a graduate student/research associate conducting research on farmer decision making and agricultural conservation practices for Mae Davenport, Associate 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?”

To let me know if you would be willing to participate, or if you have any questions about the project or the interview don’t hesitate to contact me at [email] or [phone] or the Research Supervisor, Mae Davenport at 612-624-2721 or mdaven@umn.edu.
Appendix B: Interview Consent Form
Community Capacity Assessment in the Cannon River Watershed  
Phase II  

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 participate in the study. This study is being conducted by: Mae Davenport, Associate Professor in the 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 and their engagement in water resource and soil health issues.

Procedures:  
If you agree to be in this study, we would ask you to participate in an interview lasting approximately 60 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 minimal immediate or direct benefit to subjects who participate in this study. Benefits of participation may include increased awareness of agricultural conservation programs or practices. 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. A participant database with your name and address will be stored in a password protected computer. We may also contact you in the future to follow up with you or to invite you to one of our outreach workshops. Only those directly involved with the project will have access to project files including audio recordings and 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
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 water resources and soil health? 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 and soil health 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 and soil health. I have a few questions for you about water resources and soil health in this general area [Interviewer points to a map of the CRW subwatershed].

7. How would you describe the condition of water resources in this area? Please explain.

8. Are you concerned about water resource or soil health issues 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 and soil health issues in the area?
   a. What role should farmers play?

**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 and/or soil health? Please describe those practices for me. [Write down practices, then for each practice ask the following]
   a. How long have you used this practice on your farm?
   b. To what extent do you use this practice on your farm (e.g., everywhere possible? In some areas only?) Please explain.
   c. What first motivated you to use this practice?
   d. What do you like about this practice?
   e. What don’t you like about this practice?
   f. Is this practice doing what it was intended to do? How do you know? Please explain.
   g. Do you plan to maintain this practice on your land over the next five years? 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] [Ask specifically about conservation tillage and cover crops if not already covered in Q11]
   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. Farmers and landowner have also been encouraged to adopt streamside buffers on their land. Buffers have also been in the news lately. What have you heard about this practice?
   a. What factors have kept you from adopting this practice?
   b. Would you adopt this practice if things were different?
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. Would you be more likely to adopt or maintain conservation practices if...
   a. You knew they had benefits downstream?
      i. Which benefits would be most important to you? (e.g., reduced flooding, cleaner water in streams and lakes, increased drinkability of well water, enhanced wildlife habitat)
   b. You had financial assistance to implement the practices?
   c. You had evidence that the practices would not reduce yield?
   d. Most farmers you knew had adopted the practices?
   e. You could talk to other farmers about how to make the practices work on your farm?
   f. There were policies or regulations around the implementation of the practice?

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?

Now I’d like to ask you about your perspectives on conservation initiatives in the area.

18. Conservation professionals in the area such as the Cannon River Watershed Partnership, Goodhue County Soil and Water Conservation District and Natural Resource Conservation Service have been increasing efforts to engage farmers in open discussions about water quality and soil health. Have you been involved in any of those conversations? Please explain.
   a. [If yes,] In what ways have you participated?
      i. What first motivated you to get involved?
      ii. Are you likely to continue to be involved in such discussions? Please explain.
   b. [If no,] What has kept you from getting involved?
      i. Would you be more involved in these discussions if things were different? What would motivate you to get involved? Please explain.
   c. Would you be willing to take a leadership role in a local soil health group? Why or why not?
19. Conservation professionals would like to continue to engage more farmers in such discussions. What would you suggest they do to increase farmer engagement in formal or informal groups that discuss water resource and soil health issues?

   a. How would they do this?
   b. What resources would they need to engage more farmers?

Next, I would like to get your perspectives on commercial biomass production. Biomass production is the conversion of agricultural biomass sources such as grains, crop residue (e.g., leaves, stocks) and grasses to produce animal feed or biofuels (e.g., ethanol). Usually plant material is processed chemically or mechanically in a processing facility.

20. Do you think commercial biomass production, as I just described it, is a good idea? Please explain.

21. Do you think it could have effects on...

   a. Crop production?
   b. The health of water resources in the area? Please explain.
   c. Soil health in your farm and in the area?
   d. Farmers? Please explain.
   e. Others in the agricultural community? Please explain.

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

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

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

24. Is there anything you would like to add about your farm, conservation practices, water resources or soil health in general that we haven’t covered?
Appendix D: Interviewee Background Information Form
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?

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<thead>
<tr>
<th>Crop type</th>
<th>% of total crops</th>
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<td>Total</td>
<td>100%</td>
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</tbody>
</table>

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 2014 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
   a. $150,000 or more