

**Factors Influencing Farmers' Support for the Minnesota Buffer Law: A Cross-County Case Study of Rice and Dakota Counties**

Sarah Goldman, Jenna Greene, and Leland Swift

Senior Comprehensive Exercise

Advised by Kimberly Smith and Mary Savina  
Environmental Studies  
Carleton College  
March 10, 2017

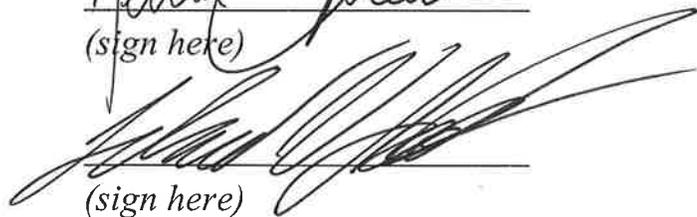
We hereby give permission for the Carleton Environmental Studies program to use and reproduce this paper for educational purposes, citing us as the author. (The authors do not forego copyright protection.)



(sign here)



(sign here)



(sign here)

# Table of Contents

<b>Acknowledgements</b>	1
<b>Abstract</b>	1
<b>Introduction</b>	2
<b>Context and Scope</b>	3
History of Buffer Legislation	3
Scope of Buffer Implementation	5
<b>Literature Review</b>	6
Attitudes	6
Local Situational Variables	8
Interaction	10
<b>Methodology</b>	12
Study Area	12
Qualitative Analysis and General Approach	13
Review of Primary Sources	13
Interviews	14
<b>Results</b>	15
Demographics	15
Attitudes	16
Conservation Values	16
Land Stewardship Values	17
Economic Values	18
Political Values	19
Local Situational Variables	20
Economic Factors	20
Government Education and Outreach	23
Interactions	25
Corporate Interests	25
Takings/Land Grab	26
Urban Versus Rural Identity	27
Experience-Based Social Change	28
<b>Discussion</b>	29
<b>Conclusion</b>	32

## Acknowledgements

We would like to thank everyone who helped us with this project. Our advisors Kim Smith and Mary Savina have been invaluable. Their insights into the direction of our study, local considerations, and feedback on our findings have been immensely helpful for the success of this project. We would also like to thank Danya Leebaw for her help with our primary source research, Tun Myint for helping us to refine the scope of our research, Paula Lackie for her advice about interview transcription, coding, and qualitative research, and Carol Trosset for her thoughtful edits of our survey and interview questions. We would like to thank Aaron Swoboda for his help with formulating our research question and data collection process. Our study would not have been possible without the graciousness of local farmers to share their thoughts so openly with us during our interviews, and for that we are incredibly thankful. We also want to thank local government officials and other stakeholders for their willingness to be interviewed. We would like to extend a special thank you to David Legvold for his patience, support, and advice as we began our interview process. Finally, we would like to thank our friends, families, and our ENTS cohort for their support throughout the process.

## Abstract

Vegetative buffers are a Best Management Practice that have been well studied as a regulatory tool for agricultural nonpoint source pollution control. In 2015, the Minnesota State Legislature passed the Minnesota Buffer Law mandating buffer establishment on all public waterways and ditches. This study investigates farmers' support for the Minnesota Buffer Law in Rice and Dakota Counties. Our study examines farmers' support for environmental practices through legally mandated regulation, an area of study that scholars have not addressed in the literature on Best Management Practice adoption. We collected data from interviews with farmers and various stakeholders to address the question: do local situational variables and farmers' personal attitudes influence support for the Minnesota Buffer Law in Rice and Dakota Counties? We found that the interplay between farmers' personal values and local situational variables is an important category in our results. We propose a cyclical framework in which the relationship between attitudes and policy is reciprocal and a change in policy may affect attitudes through learning about details of a policy by experiencing it, or through a change in social norms and framing.

## Introduction

Agriculture is a major nonpoint source of phosphorus and nitrogen to aquatic ecosystems (Carpenter et al., 1998). Nutrients, such as phosphorus and nitrogen, that enter waterways from agricultural runoff are linked to environmental issues such as toxic algal blooms, eutrophication, and loss of biodiversity (Carpenter et al., 1998). Polluted water also degrades waterways for recreational, municipal, and commercial uses (Westra, 1999).

Water pollution as a result of agricultural runoff is a significant environmental concern in Minnesota, with a report from the Minnesota Pollution Control Agency finding that 73% of nitrate pollution and 26.4% of phosphorus pollution in Minnesota waterways comes from cropland (Westra, 1999; MPCA, 2013; MPCA 2004). A five-year assessment by the Minnesota Pollution Control Agency found that 50% of Lakes and Streams in Southern Minnesota qualified as impaired and do not meet water quality standards for recreation or fishing set by the state aquatic recreation standard (Kennedy and Marcotty, 2015). Although agricultural runoff negatively impacts ecosystems, drinking water, and aquatic recreation, it is difficult to regulate directly because it is a nonpoint pollution source. This makes pollution harder to monitor, and therefore makes it harder to implement a targeted, enforceable pollution-control policy (Segerson, 1988).

Vegetative buffers are a Best Management Practice (BMP) that have been well-studied as a regulatory tool for nonpoint source pollution control by reducing agricultural sediment runoff, sedimentation, and nutrient leaching (Dillaha, 1989; Carpenter et al., 1998; Osborne and Kovacic, 1993; Lovell and Sullivan, 2006; Gilliam, 1994; Dutcher et al., 2004; EWG; Valdivia and Poulos, 2008; Sullivan et al., 2004). Vegetative buffers are strips of land along bodies of water consisting of plants and grasses that slow agricultural sediment runoff and nutrient leaching through a filtration mechanism (Lovell and Sullivan, 2006). They are an effective conservation measure for reducing water pollution and have recently been incorporated into public policy in Minnesota.

The Riparian Protection and Water Quality Practices Law (which we will refer to as the Minnesota Buffer Law) was signed into law by Governor Dayton in June 2015 and was amended by the Legislature on April 25, 2016. This law mandates the establishment of an average 50-foot vegetative buffer (30 feet minimum width) along all public waterways, and 16.5 feet along all public drainage ditches in the state. Dakota County, a county in southeastern Minnesota, has already installed buffers in compliance with this regulation on 96% of its public waterways, while compliance in Rice County, a geographically adjacent county, is only 69% (Van Berkel, 2015; Gerhardt, 2016). As these two counties prepare to implement the law, the difference in compliance between the two offers insight into statewide compliance with the Buffer Law, as

Dakota County represents an exceptional example of compliance while Rice County has compliance levels similar to other counties throughout the state.

This case study of Rice and Dakota Counties uses applied qualitative methods to examine farmers' support for the Minnesota Buffer Law. Since farmers are the actors expected to implement buffers, their support is what will ultimately determine compliance. This is significant, because a high level of compliance is necessary to achieve the water quality goals of vegetative buffering. This study will examine the role of two factors - farmers' personal values and local situational variables under which farmers operate - in informing farmers' support for the law. The research question that guides our work is: Do farmers' attitudes and local situational variables in Rice and Dakota counties influence farmers' support for the Minnesota Buffer Law?

Our project will be further guided by the following questions:

- What are the differences between farmers' personal attitudes in Rice and Dakota County, and how do these differences influence support for the law in Rice and Dakota counties?
- What are the differences between local situational variables in Rice and Dakota County, and how do these differences influence support for the law by farmers in each county?
- Does the intersection of personal values and local situational variables influence support for the Buffer Law?

This study has broader implications for environmental policy, namely by examining the individual effects of farmers' personal values and local situational variables, as well as the interplay between these two mechanisms that inform support. By understanding the views of farmers and the differences in local situational variables in Rice and Dakota counties, our study may help to inform policymakers about the complexities of agricultural conservation policy.

## Context and Scope

### **History of Buffer Legislation**

Although the first policy requiring statewide 50-foot buffers on public waterways, the Minnesota Buffer Law is not the first policy or program encouraging landowners to implement vegetative buffers as a conservation practice. The Clean Water Act of 1948 allowed states to implement buffer requirements to regulate water quality. At the state level, in response to degraded water quality, the Minnesota state Legislature enacted the Shoreland Management Act in 1969 which laid the foundation for future shoreland regulation including buffer mandates (Protecting Our Lakes and Rivers, 2008). In 1977, an Amendment to the Clean Water Act federally mandated that a 16-foot buffer be left uncultivated around ditches on public lands. At the state level, an advisory committee released a set of rules, guidelines, and recommended standards for local shoreland ordinances in 1989. Over 250 of the local shoreland ordinances in Minnesota include buffer

provisions (Protecting Our Lakes and Rivers, 2008). Most importantly to our study, Dakota County enacted a Shoreland Ordinance in 2011 establishing a buffer mandate. A timeline of Federal regulation, Minnesota buffer policies and local Dakota County policies is below.

While previous legislation in Minnesota incentivized the establishment of buffer zones through the Buffer and Soil Loss Statutes and the national Clean Water Act, the Minnesota Buffer Law legally mandates buffer requirements and clarifies the enforcement protocol (Minnesota Pollution Control Agency). The Minnesota Buffer Law requires vegetative buffers composed of perennial, non-invasive plants and grasses that average 50 feet (with a minimum of 30 feet) to be planted and maintained along public waters and a minimum of 16.5 feet along public ditches. The law stipulates financial penalties, specifies enforcement responsibilities, and maps affected areas. In July of 2016, the Department of Natural Resources released an inventory of the public waters affected by the policy. This inventory has been used as a tool to inform farmers of land affected by the Minnesota Buffer Law.

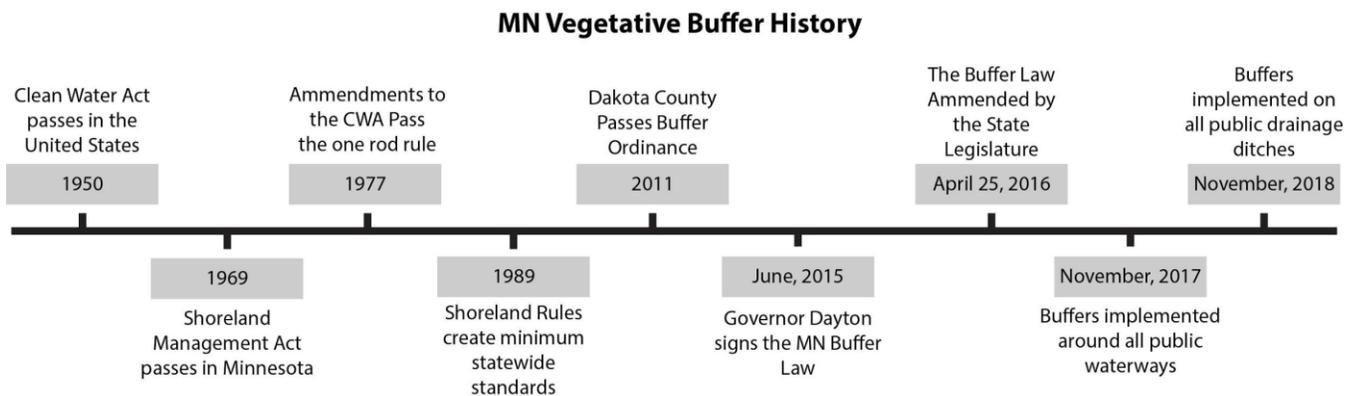


Figure 1. A timeline depicting buffer legislation relevant to our study from the Federal level to County buffer initiatives.

## **Scope of Buffer Implementation**

The Minnesota Buffer Law enforcement protocol was developed by the Board of Soil and Water Conservation Resources (BWSR) in Minnesota. The Department of Natural Resources in Minnesota has also been instrumental in the implementation of the Buffer Law through their development of a map identifying which lands require buffers utilizing the Public Water Inventory. The deadline for establishing the buffers is November of 2017 (November 2018 for public ditches), situating our study just before the deadline for implementation (Minnesota Board of Soil and Water Resources). In Minnesota, today, approximately sixty percent of land that requires buffers under the new law is in compliance (Environmental Working Group). Our study seeks to understand support for the Minnesota Buffer Law during this time period in between passage and mandatory implementation of the law, which could make our results useful to policymakers as they seek to increase support.

Farmers in Minnesota are in a period of transition, as farmers have to put specific management practices mandated by the state government into practice. The county-level Soil and Water Conservation Districts (SWCDs) oversee implementing the Buffer Law mandates being specified through Board of Water and Soil Resources (BWSR). In a testimony before the Natural Resources and Environment Committee of the Minnesota Legislature, Tom Gile, Buffer and Soil Loss Coordinator at BWSR, asserted that local SWCDs were given greater authority for implementation of the law because they have good relationship with landowners, and they were “local faces farmers could trust” (Gile, 2017). In addition, the law was intended to be written in relatively simple language so that farmers without technical engineering skills could put the buffers in place, with SWCD officials there to provide assistance (Gile, 2017). The Minnesota Board of Soil and Water Resources has stated their commitment to helping implement principal tenets in the Buffer Law including the following provisions (see Appendix A).

The Minnesota Buffer Law provides funding for programs that can be used to reimburse farmers for implementing buffers. Landowners may use federal Farm Bill resources, such as enrolling their land in the Conservation Reserve Program (CRP) or the Environmental Quality Incentives Program (Minnesota Board of Soil and Water Resources). State resources include programs such as the Reinvest in Minnesota (RIM) easement program, Conservation Cost - Share, and the Minnesota Agricultural Water Quality Certification Program. Funds for these programs come from federal appropriations through the USDA, as well as the Minnesota state-level Clean Water Funds and Outdoor Heritage Funds created through the Legacy Bill (Board of Soil and Water Resources). These programs at both the Federal and state level provide significant resources for farmers to implement buffers.

Our study is situated in an interesting period of regulatory implementation as the BWSR is set to release their final implementation guidelines through the Draft Model County Ordinance and Watershed District Rule. In addition, regulations related to the Alternative Practice Options of the law, which allow farmers to implement alternative practices that yield similar conservation outcomes, has yet to be fully defined. BWSR is currently in consultation with the United States Department of Agriculture, Soil and Water Conservation District boards, the Minnesota Corn and Soybean growers, as well as the University of Minnesota, defining the scope of these alternative practices. In addition, the legislature has yet to authorize the \$10 million dollar budgetary allocations that would allow Soil and Water Conservation Districts to assume greater regulatory responsibility for Buffer Law enforcement and implementation (Board of Soil and Water Resources).

## Literature Review

Many studies have examined the factors that influence farmers' support and subsequent adoption of BMPs. These studies have found that both attitudinal factors and local situational variables can explain differential adoption of BMPs. Although our study focuses on a government mandated conservation practice, rather than a voluntarily BMP, the literature on BMP adoption focuses on farmers' attitudes and local situational variables. Our study seeks to understand whether individual farmers' support for the Minnesota Buffer Law is influenced by these factors, therefore grounding our study in the literature on BMP adoption.

### **Attitudes**

The attitudinal variables identified in the literature as being most important in determining farmers' willingness to adopt BMPs are conservation value, land stewardship values, economic values, and political values.

### *Conservation Values*

Studies of voluntary BMP adoption suggest that farmers with pro-environmental attitudes are more likely to consider BMPs as having significant environmental benefits, and are more likely to implement these practices (Quinn and Burbach, 2010). In a study of farmers' motivations and risk perceptions surrounding conservation practices, researchers found that conservation motivations were one of the most statistically significant factors influencing farmers' decision to implement BMPs (Greiner et al., 2009). Additionally, farmers' awareness of their own role in contributing to environmental problems and belief in the efficacy of the relevant conservation practice have been found to be significant positive factors in the adoption of BMPs (Ahnström et al., 2009). Finally, scholars suggest that farmers' land-use decisions are influenced by their belief in the intrinsic value of the land (Ryan et al., 2003). Farmers' environmental attitudes and their beliefs about conservation are an important factor influencing farmers' support for BMPs.

### *Land Stewardship Values*

Another related but distinct category of attitudinal factors affecting support for the Buffer Law is land stewardship. This is different from conservation values because it focuses more specifically on how a farmer perceives themselves in relation to the land they farm, rather than their perceptions of environmental issues. A study by Ryan et al. found that attachment to the land is a more important factor in determining understanding and willingness to implement BMPs than other factors such as economic compensation (Ryan et al., 2008). According to Nassauer and Westmacott, many farmers see themselves as stewards of the land who keep “wild nature” in check, therefore influencing the likelihood of acceptance and adoption of BMPs. These findings indicate that farmers are motivated to make management decisions based on their perception of their role as stewards of the land. In addition, scholars study the impact of intergenerational land transfer as a factor in voluntary BMP adoption. Parker and Moore find that farm succession has significant influence on land tenure and Rosman finds that contextual factors and social networks may have a significant impact on adoption of BMPs (Rosman, 2015; Parker et al., 2008). Overall, the literature finds that those farmers who think of themselves as stewards of the land or who place importance on intergenerational land transfer are more likely to implement conservation practices.

Another subcategory of land stewardship that is studied in the literature involves farmers’ perceptions of themselves as independent. Scholars analyze the impact of farmers’ independent nature on land stewardship and find that the “virtue of independence” that many farmers express may hinder their support for collective actions, such as conservation efforts (Emery, 2014). This notion of farmers as inherently independent has been found to interact with other land stewardship factors to determine adoption of BMPs. For example, a more independent farmer who sees himself as a steward of the land may be more inclined to implement conservation measures because they think it is their duty as an independent steward of the land, or conversely, they may be less inclined to implement the practice if they perceive that someone is telling them what to do. Farmers independent attitudes may influence their support for and willingness to adopt BMPs.

### *Economic Values*

The third attitudinal category that has been well-studied as a factor influencing BMP acceptance and implementation is farmers’ economic values. Adoption of BMPs often results in costs to landowners. In the case of planting riparian buffers, costs include taking the land out of production, establishing the buffer, maintaining it, and the opportunity cost associated with the time spent by the farmer planting buffers (Lowell, 2006). Depending on how motivated a farmer is by profit, these costs might influence their acceptance of and decision to implement the new policies outlined in the Buffer Law. Another study by Lowell et al. found that many farmers feel pressured to make decisions based on short-term profitability rather than long-term sustainability due to economic competition in the agriculture industry (Lowell, 2006). The way that a farmer

thinks about their farm operation as a business and if they perceive conservation measures as economic losses has been shown in the literature to be an important determinant of BMP adoption.

### *Political Values*

The last attitudinal category that appears in the literature, and we believe could be a significant factor in this case study, is political values. In a study of farmers' willingness to implement BMPs, belief in the fairness of the distribution of financial incentives was a significant factor impacting farmers' support for, and likelihood of adopting, BMPs (Kalcic et al., 2015). This speaks to farmers' understanding of the government's role in land use decision making. Beliefs about the role of the government in land use decisions have been identified in studies as an explanatory factor in farmers' support for BMPs (Leviston et al., 2011). More specifically, the literature suggests farmers who feel that they have control over their land or view the government as a partner rather than an entity taking their land are more likely to implement a BMP (Leviston et al., 2011). The way farmers perceive the role of the government might impact their support for a BMP.

### **Local Situational Variables**

Although the literature has found that farmers' attitudes are important factors in determining compliance, existing local situational variables are also significant explanatory variables. In a study by Reimer et al., the researchers call for future studies about the impact of local situational variables on farmers' decision-making in implementing BMPs (Reimer et al., 2011). They suggest that local situational variables may "interact with farmer values and attitudes towards conservation to ultimately influence behavior" (Reimer et al., 2011). In a study by Ahnström et al., the authors identify a "context box" as a collection of factors that are not individual attitudes that might influence farmers' implementation of a BMP (Ahnström et al., 2009). This "context box" might contain education, economic factors, details of the policy, and political entities involved in the practice or policy (Ahnström et al., 2009). Reimer et al. define certain variables within the "context box" as local situational variables such as the structure of government entities in charge of implementation, economic stresses, and education about the policy (Reimer et al., 2011). Our analysis of local situational variables includes economic factors, the structure of local government entities (in this case, the Soil and Water Conservation Districts), and government outreach and education since these factors have been observed to significantly influence farmers' support for regulations.

The manner in which the government informs, educates and engages the public on BMP adoption as a part of the political process is an important factor in determining farmers support for these policies. In a study of factors affecting the adoption of riparian buffers, Valdivia and Poulos finds that previous knowledge of conservation practices through government-sponsored educational programs is the most significant factor in determining farmers' support and subsequent adoption

of these policies (Valdivia and Poulos, 2009). Another study of Midwestern River Corridors verifies the importance of education and constituent engagement as part of political regulation and identified ways in which the government can most effectively educate stakeholders about conservation practices (Ryan et al., 1998). Thus, government education and outreach are identified as important aspects of BMP adoption.

Overall, we expect that attitudes and local situational variables influence farmers' support for the Minnesota Buffer Law. Although much of the literature we draw on focuses on voluntary BMP adoption, and the BMP in our study is not a voluntary practice, but rather has a political authority mandating compliance. We believe that variation in attitudes and local situational variables between farmers in Rice and Dakota counties explains the difference in compliance between the two counties.

We expect that farmers who recognize the importance of implementing conservation measures and their role in environmental problems will be more supportive of the Buffer Law. Similarly, we believe that farmers with a stronger value in land stewardship might interpret the new regulation as a positive land management decision and be more supportive of the policy. We expect that farmers who are less motivated by profit or who seek long-term rather than short-term economic gains will be more supportive of the policy. The last attitude that we think might influence support for the law is political values, and we believe that farmers who view the government as having a role in land use decision making will be more supportive of the policy. Further, we believe that local situational variables such as economic factors, structure of local government entities and involvement in the political process (based on government educational support) influence farmers' support for the policy. A simple model of this proposed framework of understanding is below.

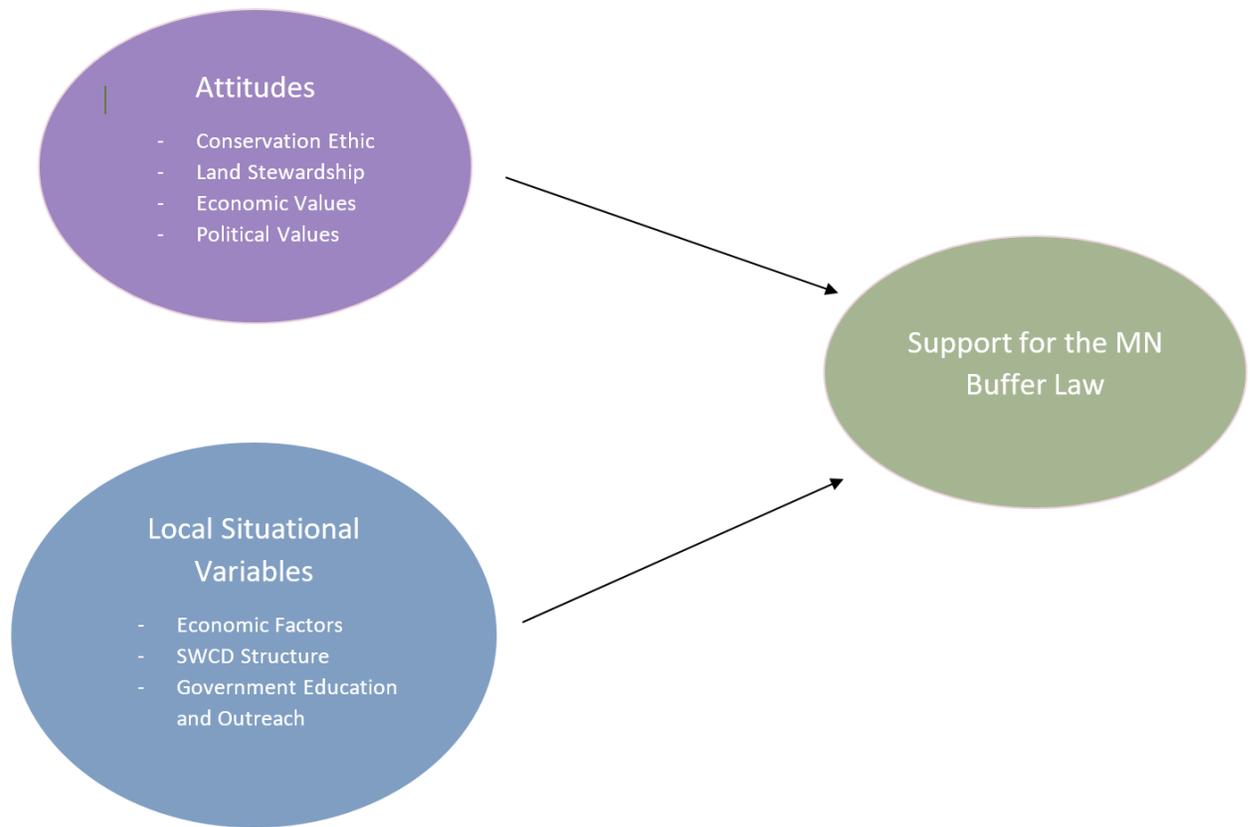


Figure 2: This framework proposes that attitudes and local situational variables influence farmers' support of the Minnesota Buffer Law.

### **Interaction**

After beginning our data collection, we found that the factors influencing farmers' support for the Minnesota Buffer Law were more complex than our original model suggested. We found ourselves drawing on other bodies of literature besides those on voluntary BMP adoption or local situational variables in order to understand the complex relationships between factors influencing farmers' support for the law. To better understand our findings, we drew on the theory of framing and experience-based social change.

### *Framing*

Framing refers to the process by which individuals and groups identify, interpret, and express political beliefs (Taylor, 2000). This creates a scheme of interpretation that guides the presentation of ideological meanings to would-be supporters. Daviter further supports this claim in his work on political frame manipulation, in which he pioneers the notion that framing is a strategy to gain support for a political movement (Daviter, 2007). Thus, framing is neither an attitude held by farmers nor a local situational variable. Since framing influences both farmers' attitudes about the policy and their perception of the local situational variables under which it was created, we believe that a discussion of framing is necessary to better understand the complex interactions between farmers' attitudes, local situational variables, and, ultimately, support for the Buffer Law.

Two different types of framing are most relevant to our study: identity framing and injustice framing (Taylor, 2000). Identity framing is a way of grouping the values and attitudes for those of a perceived identity, while injustice framing attempts to frame policy and the structures that implement and enforce them as unfair or unpractical, attempting to change the attitudes of others.

A recent study about the framing of conservation practices by farmers in Australia found that framing environmental regulations that limit land use as a governmental taking decreases farmers' willingness to comply with mandated environmental legislation (O'Connor, 2010). Framing serves as a useful framework for analyzing the interaction between farmers' attitudes and local situational variables in the context of the Minnesota Buffer Law.

### *Experience-Based Social Change*

Because Dakota County passed a local buffer ordinance before the passage of the state Buffer Law, we examine the literature for a connection between exposure to a law and support for that law, particularly in the realm of environmental and agricultural policy. Studies show that norm formation, education about a policy, and exposure to a policy contribute to farmers' support for that policy. Valdivia and Poulos find that exposure to high-quality education about a BMP significantly increases farmers' support for it (2008). This information might cause norms to form in a community. Stern uses this theory to lay out a Value-Belief-Norms (VBN) model of social change, which he finds to be especially important for environmental causes. In this model, the formation of norms is based on values in the community, and these norms then influence support for a BMP or policy (Stern, 2000). Another study finds that a farmer's support for a law is dependent on their local networks of other farmers and government networks (Baumgart-Getz et al., 2012). Overall, we hypothesize that exposure to a policy or BMP, whether through a local ordinance, education, or community norm formation, influences farmers' support for the Minnesota Buffer Law.

## Methodology

Our study seeks to understand the factors that influence farmers' support for the Minnesota Buffer Law, which involves an examination of their personal values, local situational variables, and an analysis of the interaction between these two factors. We use a three-pronged methodological approach to understand this research question. First, we conducted a brief historical review of the Minnesota Buffer Law to understand the stakeholders involved in its creation and passage, contextualize the law in the history of agricultural and mandated conservation policies in Minnesota (locally and statewide), and gain an understanding of how the law has been framed and discussed. Second, we interviewed key stakeholders at the county and state level who have been involved with the Minnesota Buffer Law. Third, we interviewed farmers in Dakota and Rice counties to understand their opinions of the law and how those opinions are influenced by their attitudes and local situational variables. Interviewing farmers and governmental and non-governmental organization (NGO) officials allowed us to understand the factors influencing perceptions of the law on a personal and institutional level.

### Study Area

Our study area consists of Rice and Dakota counties in Minnesota. These two counties are interesting due to their generalizability to other counties in Minnesota, as well as the differences between the two counties. Additionally, a Minnesota Pollution Control Agency study on nitrates in surface water found that the highest levels in the state are in Southern Minnesota, where these counties are located (MPCA, 2013). However, despite facing similar water quality concerns the two counties have prioritized buffers differently in their local ordinances.

The two counties in our study are similar in their number of agricultural jobs, land covered by water, and corn and soybean acreage. Dakota and Rice County have a relatively similar number of farming jobs (1387 and 1494, respectively) (Dakota County Agricultural Profile, Rice County Agricultural Profile). Dakota County is bordered by the Mississippi and Minnesota rivers, with 4.2% of its area covered by water, and Rice County has a similar 3.9% of its area covered by water bodies (United States Census Bureau, 2013). Dakota County has 156,114 acres in corn and soybean production while Rice County has 158,295 acres in corn and soybean production, only a 1.5% difference (EWG Database).

Dakota and Rice County differ in their size and history with buffer statutes. Dakota County is the third most populous county in Minnesota and part of the Twin Cities metropolitan area (United States Census Bureau, 2013). Rice County is the 13th largest county in Minnesota and is considered to be rural (United States Census Bureau, ERS). Although the two counties have similar acreage of farmland, the amount of agricultural land decreased by 70,000 acres in Dakota County between 1954 and 2007 (Dakota County Land Conservation).

Dakota County has made great strides in adopting BMPs to improve water quality and mitigate other environmental harms through local policy. In 2006, Dakota County began a program encouraging landowners to adopt 150-foot buffers along the Vermillion River Watershed. In 2012, Dakota County passed a local Shoreland and Floodplain Management ordinance, which we will refer to in the rest of this study as the Dakota County buffer ordinance. Under this ordinance, Dakota County began its *Shoreholders* program, in which landowners are paid (with funding by a federal grant) to implement buffers (Shoreholders FAQ, 2015). Dakota County has over 96% of its land (although the actual number is disputed in reports between 95-99%) in compliance with the Minnesota Buffer Law (Van Berkel, 2015). Rice County has implemented the Community Partners Conservation Subgrant Program, a county-level program that provides access to funds to decrease storm water runoff and improve lakes and streams in Rice County, but has passed no local statute requiring buffer establishment. The Conservation Reserve Program, a federal program promoting BMPs in agriculture, had 543 recipients of payments in Rice County in 2014, while Dakota County had 159 (Environmental Working Group). The two counties differ in their utilization of buffers as a conservation practice and preferred conservation programs.

### **Qualitative Analysis and General Approach**

Our methodology is grounded in environmental policy literature that relies on qualitative analysis, particularly interviews (Dutcher et al., 2008; Qiu et al., 2014; Kalcic et al., 2015; Ahnström et al., 2009; Moss 2004). A qualitative approach most appropriately fits our research question for numerous reasons. This approach lets us examine the data deductively, allowing us to understand the interaction of patterns, categories, and themes between farmers and stakeholders involved in the law obtained by our interview data (Pope, 2000). Since our study focuses on legislatively mandated practices that have not been fully implemented yet is necessary that we perform a qualitative study in order to understand underlying patterns and themes before attempting to quantify the explanatory power of different factors. Qualitative methodology allows us to understand the context and controversy surrounding the Minnesota Buffer Law through in-depth interviews with local farmers and stakeholders.

### **Review of Primary Sources**

In order to understand the context of the Minnesota Buffer Law, we conducted a brief historical review including an examination of the timeline of the creation and passage of the law, key stakeholders involved, and general controversy surrounding the law. To do this, we examined local news articles, county meeting minutes, and material distributed by state and county government offices about the law. Additionally, we briefly reviewed the history of clean water laws in Minnesota to understand how this law fits into the context of Minnesota's environmental policy history. This historical review of primary literature allowed us to contextualize our research question and findings.

## Interviews

In-depth interviewing is a common approach to understanding farmers' attitudes and the context of an environmental BMP () and is considered a valid, informative way to answer a research question (Dutcher et al., 2008; Qiu et al., 2014; Kalcic et al., 2015; Ahnström et al., 2009; Moss 2004; Heyink and Tymstra, 1993). This approach allows for a qualitative analysis in which different perspectives and attitudes about the passing of the Buffer Law, its implications, and attitudes about compliance can be understood. We carried out 19 in-depth interviews with stakeholders in our study area: ten with farmers and nine with governmental and NGO actors. We interviewed seven farmers from Rice County, and only three farmers in Dakota County. However, given time constraints, we believe we interviewed a sample representing the diversity of opinions in each county. We were able to conduct interviews until we no longer heard new information, a concept called saturation that is used often in interview-based qualitative studies (Guest et al., 2006).

Interviews with farmers allow us to understand how personal attitudes might explain general support for the law. Our interviews with county and state-level governmental officials and NGO employees are used in conjunction with the primary literature review to understand how the governmental officials and other non-farmer stakeholders understand the goals of the law, how they frame and explain it to farmers, and how the local government structures may affect farmers' interpretation of the law.

We used a two-step approach to find interviewees. First, we searched local news outlets to see if certain names were brought up many times in relation to the law, with the expectation that those people or organizations were more likely to be receptive to an interview. From those initial contacts, we used a snowball sampling method in which our study sample grew based on referrals, a common approach to qualitative studies (Biernacki and Waldorf, 1981). This method of data collection is not a random sample, but rather a purposefully selected set of participants.

We based our interview structure on a study of landowner perceptions of riparian buffers by Dutcher et al., utilizing semi-structured interviews in which a set of written protocol questions served as a way to keep the discussion relevant to the topic. The interview protocol allowed our interviews to remain focused, while also providing the potential to explore unanticipated areas of interest. The interview protocol, including separate questions for farmers and policymakers, is included in Appendix B.

Our interviews generally lasted between 30 and 45 minutes. The majority of our interviews took place in person, with at least two of the researchers and one interviewee present. On three occasions, farmers requested that they be interviewed in groups with other farmers so three of our interviews were done in group settings. Five of the stakeholders requested phone interviews. In addition to the interviews, we asked each farmer to complete a short demographic survey. This

demographic survey is not analyzed separately, but rather used as supplementary data for our analysis of the interviews (see results). These results allow us to contextualize the participants' responses. The demographic survey for farmers is included in Appendix C. Each interviewee was assigned a participant code and all names of farmers (or other identifying information) were omitted to maintain privacy and anonymity. Governmental and NGO stakeholders did not have their organization's name omitted, and elected officials did not have their names omitted.

The interviews were audio-recorded and transcribed. Once the interviews were transcribed, we followed procedures of qualitative research analysis described by Creswell in his book on research design (Creswell, 2009). As a first step, each group member read all interview transcripts to understand the themes brought up in the interview. We organized responses from each interview into two categories, common sentiments summarizing similar ideas from multiple interviews and nuanced viewpoints that advanced our understanding of the issue. Two researchers coded each interview to reduce potential interviewer bias (Heyink and Tymstra, 1993). Once the coding process was completed, we generated a description of common themes from the interview. Finally, we established analytical categories to further categorize our themes. This process allowed us to interpret the themes that emerged from the interview data to generate hypotheses about which factors most significantly influence farmers' support for the law. Our analytical categories are generally divided into attitudinal categories and local situational variables, with framing and previous policy experience representing the interaction between attitudes and local situational variables.

## Results

### **Demographics**

We interviewed ten farmers, three from Dakota County, and seven from Rice County. All the farmers interviewed were males between the ages of 39 and 65, with the majority of farmers between 50 and 60 years old. Every farmer we interviewed has been farming for twenty or more years, and all have been farming for more than half of their lives. The farm operations run by our interviewees range from 185-4050 acres. All of the farmers interviewed grow both corn and soybeans. We decided to interview corn and soy farmers in order to maintain consistency within our study sample and because these types of farms are most prevalent in Minnesota. In addition, individual farmers also grow wheat, alfalfa and raised pigs. Eight of the ten farmers work on agricultural land made up of a combination of land they rent and land they own. Most of the farmland each farmer cultivates is rented land. Seven of the ten farmers have public waterways or drainage ditches running through their land, and of these seven, five were enrolled in conservation programs. One farmer who did not have public waterways or drainage ditches on his land is also enrolled in a conservation program. The programs that these farmers are enrolled in are the Reinvest in Minnesota – Farmland Trust Program, Environmental Quality Incentive Program

(EQUIP) support, the Department of Natural Resources sponsored conservation, and Conservation Reserve Program (three farmers are enrolled in this program). Due to the deductive nature of our study, it is important to understand demographic information and scope of the interviews we conducted with farmers.

## **Attitudes**

We focus on farmers' attitudes as an explanatory variable in our cross-county case study for support of the Minnesota Buffer Law. Within attitudes, our analysis revealed four major categories, all of which we expected to find based on the literature we reviewed about farmer adoption of BMPs. These analytical categories are conservation values, land stewardship values, economic values, and political values. Within each of these categories specific themes emerged.

### *Conservation Values*

Conservation values, especially in relation to water resources, emerged as an important category in our interviews. We expected to see farmers in support for the Buffer Law place a greater significance on the importance of water quality issues. We were surprised to find that every farmer and stakeholder in both counties, regardless of their level of support for the Minnesota Buffer Law, spoke about the importance of water quality issues and farmers' role in the problem. All the farmers we interviewed spoke to the importance of the law's goals to improve water quality. Farmers cited issues with the law's creation and implementation rather than disagreement with buffers as a valid and important conservation practice. For instance, one farmer said:

Yeah, I mean, you have to filter. The cleaner the water the better. This is about the earth, we can't screw it up, it's a one-shot deal... I'm ok with the concept of the Buffer Law, but I'm really disappointed in the thought process getting to it.

Farmers reported caring about water quality for a number of reasons. Many farmers discussed the buffer's filtration ability as being important for keeping nutrient runoff out of waterways. They also spoke about how runoff can cause water quality issues downstream. Additionally, multiple farmers discussed how their farming practices have caused the water to become "scummy and unswimmable," and contribute to unwanted algal blooms. Multiple farmers in both counties discussed wanting to limit runoff in order to improve drinking water quality. Several farmers were proud to have received water quality certifications and others shared stories about farmers' contributions to clean water after implementing buffers. One farmer in Dakota County said:

I have neighbors who have put in buffers and they really like them. They care for them and they say, look at that buffer! He is very proud of it and he protects it and he says "That's my water filter!"

Besides valuing water quality, many farmers in both counties discussed their view of farmers as conservationists who are constantly adapting as they better understand environmental problems. One farmer in Rice County said:

I think proactive is the word for it, we are adapting, that is the word for it. Are we perfect – no, not yet. But we are adapting to the times. We are doing our best, and conservation compliance is tough.

These statements suggests that farmers view themselves as conservationists who address environmental concerns broadly, whether they include water quality or not. Farmers also discussed that their conservation practices have improved over generations, as they learn more about best practices. We did not observe variance between farmers in Rice and Dakota County in these sentiments.

Previous studies suggest that acknowledging the role of agriculture in water quality issues is one of the most important factors determining farmers' willingness to implement BMPs. However, we found that nearly all the farmers we interviewed spoke about the importance of water quality conservation and their role in the issue. This was a surprising finding and demonstrates that conservation values do not account for varying support for the law among farmers in our study area.

### *Land Stewardship Values*

Land stewardship values emerged as a category in interviews with both farmers and other stakeholders. Scholars have defined land stewardship as a critical component in conservation BMP adoption, and we noticed the influence of land stewardship attitudes during interviews with farmers and stakeholders. Two key components of land stewardship that emerged in our study are transfer of land between generations and the importance of being an "independent farmer." We expected that farmers who placed significance on transfer of land between generations would be more supportive of the law. We also expected that Dakota County would have a larger proportion of these farmers than Rice County. Surprisingly, farmers in both Rice and Dakota generally expressed similar attitudes about land stewardship.

One prevalent theme that emerged from our research was intergenerational land transfer. Farmers in both counties expressed pride in inheriting property from their parents and discussed how their families taught them how to utilize conservation practices long before the Buffer Law was passed. As one farmer in Dakota County stated:

It's not just a property that you bought as an investment and you want to take everything out of it and then leave. My parents didn't think that way and my grandparents didn't think that way.

Farmers were also proud that they would be able to leave their farm to future generations. However, many farmers were concerned about future inheritance, especially in Rice County, as Buffer Law implementation provoked fear about the possibility of not being able to pass on land to future generations. As one farmer in Rice County states:

All I am doing is worrying about it for the next generation who it will be in trust.

We found that farmers in Rice County and Dakota County both articulated the importance of intergenerational land transfer as it related to the Minnesota Buffer Law, but it did not consistently influence support of the law.

Another interesting theme that emerged within the land stewardship category was the notion of being an “independent farmer.” The notion of “independent farmers” embodies the sentiment that farmers expressed that they “just don’t like to be told what to do.” Stakeholders in both counties discussed this perception and farmers in both counties shared these attitudes. Farmers in Dakota County were more open to suggestions through alternative conservation programs. A farmer in Dakota county articulated this sentiment by stating:

You ever get mad when your parents tell you ‘you will do this’? Did you like that? Sometimes it’s for your own good sometimes it isn’t... I am always a little bit like I don’t like being told what to do.

Both State Representative Bly and State Representative Rick Hansen, from Rice County and Dakota County respectively, also shared similar concerns with farmers’ independent nature. Representative Bly mentioned that farmers “don’t want to be regulated.” Not only could this “independent” attitude prompt negative reactions to the law, Representative Hansen asserted that this view could hinder the success of the Buffer Law’s implementation.

Farmers in Dakota County, however, are more receptive to government intervention on farms through alternative conservation programs such as the Conservation Reserve Program and the Farmland Trust Program. The same farmer who previously expressed concerns about the government telling him what to do liked the farmland trust program because he viewed this program as a suggestion rather than a demand. This farmer stated “I don’t like people telling me what to do, I like suggestions, or here is a way we can work with you.” Overall, land stewardship emerged as an important analytical category in our study that highlights the similarities between Rice and Dakota counties.

### *Economic Values*

Economic values constitute another category of attitudes that emerged as significant in our interviews. We expected that farmers who prioritized profit on their farm and saw the Minnesota Buffer Law as an economic burden would be less supportive of the law than those who thought that long-term sustainability and economic gains were more important than short-term profit maximization. Our results were consistent with these expectations. Farmers in Rice and Dakota counties showed different opinions about the economic costs and benefits of buffers. Although some farmers in Rice County acknowledged that good farming practices confer economic and

conservation benefits, almost all of the farmers in Rice County emphasized the economic losses caused by taking the land out of corn and soy production. One farmer from Rice County stated:

But the big issue is telling farmers they have to take their most profitable land out of production.

On the other hand, while one farmer in Dakota County described the regulation as a loss, the other farmers in the county argued that the regulation did not diminish profits. These farmers pointed to land enrollment programs such as the Conservation Reserve Program as well as alternative uses for buffers including growing hay and grazing livestock as methods of increasing income generated on buffered property instead of intensive corn and soy production. Additionally, these farmers tended to highlight the environmental benefits buffers confer to the public and expressed that the costs are relatively insignificant in comparison. For example, one farmer from Dakota County observed:

I think once you have the whole picture of what the financial rewards would be, and what the environmental rewards are, that it is a good thing.

The most common economic factor discussed by stakeholders and politicians was profit maximization. Multiple politicians argued that farmers motivated by profit maximization to grow cash crops like corn and soybeans are simultaneously one of the major causes of water quality degradation and one the groups least likely to implement buffers due to the loss of profits. Overall, we observed a significant difference in economic attitudes between farmers in Rice and Dakota counties, which could account for the difference in compliance between the two counties.

### *Political Values*

We expected the attitudinal variable about beliefs in government might be more important in relation to the Minnesota Buffer Law than in previous literature about voluntary BMPs. We thought that farmers who had an aversion to government intervention, strong partisan alliances, or a sense that government did not understand farming would be less supportive of the law than other farmers. This expectation was consistent with our results. Overall, our data suggest that Dakota County farmers generally think of the government as a partner in farming, whereas Rice County farmers think of the government as taking their land. Many Rice County farmers thought the law was poorly designed. None of the farmers we interviewed discussed partisan allegiance, although government stakeholders in both counties thought this was an important factor influencing farmers' level of support for the law.

In our data, we found three themes within farmers' beliefs about the government: farmers' perceptions about property rights, poor design of the law, and partisan allegiance. Four of the farmers we interviewed thought of the law as a "land grab," an interference in individuals' private property rights by the government. One farmer stated:

For a farmer to just give up land [...] it's a land rights issue.

Government officials and NGO organization staff stated that this was farmers' main concern about the law. Beliefs about property rights speak to how farmers view the government, and farmers in Rice County generally thought that the government was taking farmers' land. Dakota County farmers had different opinions, thinking more broadly of the government as a "partner [...] not as an enemy." In several local Rice County newspaper articles, the land rights issue was highlighted as the main problem farmers had with the law (Weyhe, 2016; Gerhardt 2016).

Additionally, farmers talked at length about how the politicians who created the law did not know anything about farming and that the law did not fit their needs. We categorized these sentiments generally as farmers viewing politicians as being out of touch with the needs of the farming community. Five farmers, none of whom were from Dakota County, thought of the law as "one size fits all," or not tailored to the specific needs of every farmer and the unique characteristics of every farm. Farmers did not think that the government was looking at the entire farming system when creating the law, but rather assuming that all fields were the same. One farmer stated that "not all fields are created equal."

Finally, the buffer mandate was signed into law by a democratic governor, and some of the farmers we interviewed discussed the importance of partisanship in determining support for the law. Interestingly, no farmers who opposed the law brought up partisan attitudes. However, farmers and stakeholders who supported the law stated that this was an important underlying attitude that influences support for the law. Therefore, allegiance to partisan alignment may be important to determining support for the law, even if farmers did not share these sentiments explicitly during data collection.

### **Local Situational Variables**

We examine local situational variables as another explanatory variable in our cross-county case study of support for the Minnesota Buffer Law. Three themes emerged most often in our study: Three themes emerged most often in our study: economic factors, SWCD leadership and structure, and government education and outreach.

#### *Economic Factors*

As expected, our results confirmed that economic factors are an important local situational variable that could explain differential support for the Minnesota Buffer Law. Economic factors, including the agricultural economy, the tax status of buffered property, and the differences in funding between the local SWCDs of Rice and Dakota counties were all brought up during interviews with farmers and stakeholders as significant in influencing farmers' support for and counties implementation of the Buffer Law.

For instance, none of the farmers we interviewed from Dakota County discussed the farming economy. In contrast, every farmer from Rice County that we interviewed mentioned the economic downturn in the agricultural sector and the farming economy as being an important consideration in implementing buffer. However, only one politician acknowledged the significance of the economic landscape when discussing the Buffer Law. This suggests that politicians and farmers might prioritize the landscape of the agricultural market differently.

Additionally, farmers in both Rice and Dakota counties brought up taxation of buffered property as an important economic consideration. Some farmers thought that farmland requiring buffers under the new law should be exempt from real estate and property taxes because farmers cannot maximize profit on that land when they cannot use it for corn and soy production. Farmers from both counties described the potential economic and ecological benefits of buffers, however some farmers in Rice County were frustrated that they were not reimbursed for the use of their property in creating these benefits. Specifically, one farmer from Rice County said:

There are a lot of landowners who unless they get a tax break or something like that, or a CRP payment, it is hard for them, not because they aren't environmentally friendly, because they are, but they pay taxes on a piece of land.

We found that politicians recognized these losses, especially at the local levels. However, politicians often discussed subsidies and other pre-existing land reimbursement programs as remedies to these losses.

Although the agricultural economy and property taxes on buffered land affect farmers in Rice and Dakota County similarly, the major differences between the funding of the local Soil and Water Conservation Districts offer another explanation for the differences in compliance between the two counties. In the 2016 fiscal year, Dakota County Soil and Water raised nearly \$1,460 million dollars in revenue and spent \$480,000 on various projects (Dakota County SWCD Comprehensive Plan, 2016). Rice County raised almost \$470,000 in revenue and spent \$50,000 on buffer implementation expenses (Rice County SWCD Budget 2016). Overall, Dakota County has nearly three times the budget of Rice County and has far greater economic power to support buffer implementation and acquire staff resources. Dakota County SWCD employs over twice as many full-time staff members than Rice County and spends almost three times as much money on staff payroll expenditures and benefits (Rice and Dakota SWCD Budgets). Dakota County has far more economic power to implement and enforce buffer regulations than Rice County. However, despite such economic resources, only 12% of farmers in Dakota County sought funding from the local SWCD to assist with implementation or reimbursing costs associated with buffer installation. This indicates that although economic factors are an important issue influencing farmers' support for the legislation, economic differences between the local SWCDs cannot fully explain the difference in compliance between the two counties.

Another factor that might explain the difference in compliance between Rice and Dakota County are economic differences between the times when the counties began implementing buffer regulation. Several farmers in Rice County mentioned in interviews that the Conservation Reserve Program is nearly at maximum enrollment, meaning farmers implementing buffers in Rice County do not have the same opportunities for reimbursing their buffers as farmers in Dakota County who did not face such limits when implementing the buffer ordinance in 2011. According to the Minnstar Bank “the maximum number of CRP acres enrolled at any one time at a national level has been reduced in each of the last two Farm Bills, with the 2014 Farm Bill setting the maximum acres in the CRP program at 24 million,” making it more difficult for farmers across the county to be accepted into the program (Thiesse, 2016). Reaching maximum levels of acreage enrollment for the CRP demonstrates that local situational variables, including economic options available to farmers, might cause the different rate of compliance with the Minnesota Buffer Law between Rice and Dakota counties.

#### *Soil and Water Conservation District Leadership and Structure*

We hypothesized that within local situational variables, local governmental structures and leadership are important determinants of farmers’ support for the Minnesota Buffer Law, which we found to be true in our interviews. One NGO staff member summarized this point clearly:

Every county is (...) unique in terms of the landscape, landowners, attitudes, and land use practices. There is a great deal of variability. And the county boards and other local governments have a lot of authority and ability to make a difference in what happens within their communities.

Through our interviews and review of primary sources, we divide this analytical category into three themes: the history of agricultural regulations (specifically buffers) in each county, local leadership, and alternative practices offered within the Minnesota Buffer Law.

Prior to the passage of the Minnesota Buffer Law, over 90% of land that would be affected by the law in Dakota County was already in compliance (Gile, 2017). This is because in 2011, Dakota County amended their buffer ordinance so that it mandated a 150-foot buffer, while Rice County had no such ordinance. This local ordinance likely accounts for much of the differences in the percentage of buffered streams between the two counties since the passage of the Minnesota Buffer Law. When asked about the differences in compliance with the Buffer Law between Rice and Dakota County, many farmers and stakeholders discussed the difference in the history of the counties in terms of buffer statutes and local support for conservation policies.

Another aspect of SWCD structure that was brought up by farmers and stakeholders was the importance of local leaders. State Representative Hansen expressed his belief that local leadership is one of the primary differences between counties in Minnesota with regards to buffer implementation. This sentiment was echoed by Mike Slavik, a County Commissioner from a rural

region of Dakota County. Slavik recalled that there was a county manager for 25 years (from a natural sciences background) who advocated for vegetative buffers, and because of his influence, people supported the local buffer statute in Dakota County.

Besides history with buffer policy and local leadership, an important aspect of SWCD structure is the flexibility and alternatives offered within the Minnesota Buffer Law. Under the law, the SWCDs have the authority to approve alternative BMPs if farmers propose an alternative conservation practice to vegetative buffers. This area of the law has not been communicated particularly well to farmers, in part because the acceptable alternatives guidelines that the SWCDs will follow have not yet been negotiated within the legislature. We found that farmers who understood the available alternative options were generally more supportive of the law. Education by the SWCDs about these alternative practices has been more extensive in Dakota County than in Rice County. This flexibility and availability of alternatives was brought up many times in our interviews, with a staff member from Dakota County SWCD stating:

Our overriding goal is [to] build in the flexibility so that we can meet the purpose and intent of the law but also [make it] work for landowners as much as possible.

In summary, we found that the structure and leadership of SWCDs influence how farmers think about the Minnesota Buffer Law, based on influential local leaders, history of buffer regulations, and the support they receive locally in implementing buffers and alternative practices.

#### *Government Education and Outreach*

The way that politicians and local government educated and conducted outreach to farmers about Buffer Laws (both the Dakota County Ordinance and Minnesota Buffer Law) was a theme that emerged through our interviews. At the time of this study, 84% of SWCDs have provided landowners assistance with maps and parcel review (Gile, 2017). In addition, 74% of SWCDs have sent mailings related to the Buffer Law (Gile, 2017). This indicates that SWCDs as a whole have been attempting to engage with farmers to discuss the new policy. Based on our review of the literature, we expected that Rice and Dakota counties used different methods of educating farmers about the law and that this difference might account for the varied support and compliance between farmers in these counties. However, the two counties held multiple meetings to answer questions about the Buffer Law. Despite holding a similar number meetings, farmers in Rice County expressed confusion about the law more often than Dakota County farmers, which was consistent with our expectations. The two ideas interviewers brought up most often regarding government education and outreach were that the law was “rushed through” the state legislature and general confusion about how the law would be implemented.

Many farmers in Rice County expressed concern that the Buffer Law was rushed through the state legislature and thought that its quick passage would lead to challenges in implementing the law. A Rice County farmer stated that:

People were really upset because it was given to them when they weren't ready to handle it. If the governor would have thought this thing through and worked out a more proactive campaign, and had all his ducks in his row... and if they had had a plan set up with BWSR ahead of time to be proactive about it instead of people having to be reactive [it would have been better]. That's the big mistake with all of this.

Farmers in Dakota County, however, did not voice concern that the Buffer Law had been rushed through the legislature. This difference in perception of the speed at which buffer legislation passed through the state legislature was also expressed in the testimonies of other stakeholders. Representative Hansen asserted that:

There was a great deal of groundwork related to buffers and looking at the scientific validity of buffers, looking at the existing law, clarifying the existing law for where does the buffer start and stop, and then providing some funding for implementation.

Stakeholders from Dakota County thought that the Minnesota Buffer Law was the result of a long legislative process, but farmers in Dakota County did not share this opinion.

Another theme that emerged in our data was confusion resulting from education about the Minnesota Buffer Law. Many farmers in Dakota County thought that education about the Buffer Law and Dakota County buffer ordinance was clear, and stated that they understood where to seek information if they had questions about the law. One farmer even stated that:

There's quite a bit that I don't know, but there's people that do know it that will share it with me, and if you want to contact any support people, [...] there's so many sources of information out there that I can't imagine people could claim that they don't have the answer. The information is out there.

However, despite such statements, farmers in Rice County were initially more confused about the law. More than one farmer in Rice county cited "miscommunication" as a problem in Buffer Law development and enforcement. However, these farmers also spoke about coming to understand the law over time after seeking out resources. Other stakeholders also mentioned that there have been a lot of public forums to educate farmers about the law, but some farmers were more interested in attending the meetings to voice opposition to the law than to learn about implementation options. A representative from the Cannon River Watershed Partnership (CRWP) stated:

And I was just like "Please come to the forum! This is a great place where you can voice your opinion" and they would be like "Screw you!" and hang-up.

Despite outreach efforts in both counties, confusion about the law still exists, especially in Rice County.

## **Interactions**

We found that the interaction between farmers' values and local situational variables emerged as an important category in our data. The ways in which framing and experience-based social changes seemed to affect farmers' support for the law complicate the simple model that we proposed in our literature review.

### *Pheasants Forever*

In almost every interview, individuals discussed the importance of an organization called Pheasants Forever. Pheasants Forever is a group that promotes restoration and establishment of pheasant and quail habitat through lobbying and public awareness campaigns. Mark Dayton's first public announcement of the Minnesota Buffer Law occurred at the Pheasants Forever conference in December of 2015. The law was then framed by news outlets, agricultural lobbyists, and interest groups as a habitat restoration and pheasant conservation policy, rather than a water quality policy. Almost every farmer and stakeholder we interviewed brought up the Pheasants Forever conference and expressed confusion about the original goals of the law. Therefore, framing the law as being aligned with Pheasants Forever instead of with water quality goals was effective at influencing farmers' support for the law. Presenting the law in association with this organization raised concerns for farmers. First, farmers did not feel it was their responsibility to restore and conserve habitat for species. Framing the law as a pheasant habitat policy pitted habitat conservation efforts against agricultural interests. Second, when Governor Dayton presented the law with Pheasants Forever, it was presented that buffered land would be open access. This appealed to hunters, as it increased hunting land, but farmers were concerned about trespassing. Although Governor Dayton has since highlighted water quality improvement as the key goal of the Buffer Law, several farmers still mentioned open access hunting rights as a major concern with the law. This provides a clear example of framing, in which a particular aspect of a political issue is emphasized to influence attitudes and frame support for the law. In this case, framing the goals of the Buffer Law in terms of habitat preservation instead of water quality improvement may have diminished farmers' support for the regulation.

### *Corporate Interests*

Lobbying and interest groups also played an important role in facilitating understanding and framing the Minnesota Buffer Law for farmers. Specifically, the Farm Bureau, Minnesota Soybean Growers, and Minnesota Corn Growers helped create what Taylor et al. would call a "scheme of interpretation" for the Minnesota Buffer Law (2000). These groups utilized principal points that farmers could organize around based on ideological beliefs. Farmers sometimes based their perception of the law on analysis by these interest groups. One farmer states "I heard it on the news. And then Minnesota Soybean got active with it right away, trying to figure it out," insinuating that this farmer's interpretation of the law was based on the Bureau's analysis. Thus, interest groups were able to achieve one of the core tenets of identity framing, communicating about the Minnesota Buffer Law in a way that is easily understood by farmers.

One of the main arguments presented against the Minnesota Buffer Law by the Minnesota Soybean Growers association was that “it appears most agency folks have forgotten; every field is not the same.” (Minnesota Soybean Growers) This sentiment was expressed by farmers who asserted that the law was a “one-size-fits-all policy.” The Minnesota Farm Bureau made a similar assertion that “farmers care about water quality but disagree that application of a mandated single conservation practice will achieve problem solving for all areas of the state” (Minnesota Farm Bureau). This cohesive analysis, supported by multiple farm interest groups, also strengthened the resistance to the law, as farmers who relied on different lobbying groups to represent their farming interests were able to rally around the same argument.

These interest groups also suggested that the government was out of touch with farmers through statements such as “the governor is apparently unaware of the many things farmers are doing to protect water quality- we need to let him know.” (Minnesota Farm Bureau) In this particular case, the Farm Bureau portrays the government as an entity that does not understand the plight of farmers. This frame not only invalidates the buffer mandate, but also is founded on decades of mistrust between “liberal, urban elite” and “rural conservatives” who are distrustful of government regulation on private property. By utilizing this “rhetorical idiom,” that imbues claims with moral meaning and significance, lobby groups are able to convince farmers that this law is unjust (Taylor, 2000). As one farmer in Rice County claimed, the Buffer Law is ultimately a “problem with property rights and government telling us ‘ok you have to do this.’” The influence of interest groups in framing farmers’ perception of the Minnesota Buffer Law thus cannot be ignored.

### *Takings/Land Grab*

Framing the Buffer Law as a “takings” is particularly interesting as many scholars have discussed this specific injustice frame. The takings frame stems from the Property Rights Movement of the 1990s which is rooted in the Lockean ideology that private property is a natural right (Yandle, 1995). The takings frame suggests that property rights include not just ownership, but also a collection of other rights including using private land for economic profit. Therefore, any regulation that limits the use of land is a takings because it violates a property owners’ rights to manage their property, by restricting certain types of land use decisions. The Property Rights Movement asserts that any regulation that restricts landowners’ property interests without fair compensation is an unjust “takings” (O’Connor, 2010).

In the case of Minnesota Buffer Law, farmers in Rice County argue that the regulation is a land grab because it takes away their rights to the land without just compensation. Farmers who frame the law as a takings tend to emphasize the economic costs of implementing the law without compensation or real estate tax breaks. Several farmers and politicians in support for the law, however, also understand the “takings” or “land grab” frame. Although they acknowledge that the

law limits farmers' ability to produce corn and soybeans, politicians assert that farmers can still make profit on buffered land. Additionally, substantial government aid and funds are available to compensate farmers. Farmers in Rice County with less experience with buffer regulation were more influenced by the takings frame than farmers in Dakota County. This suggests that farmers with previous experience with regulation are less influenced by political framing of those policies.

### *Urban Versus Rural Identity*

Another important way framing impacts this case study is through urban versus rural identity framing, which influences the way farmers and politicians elected by urban populations support the Buffer Law. A common view expressed by farmers interviewed in Rice County is that farmers are seen as the "bad guy" and the cause of water quality degradation. Farmers tended to universally support water quality conservation, and several farmers told us that they consider themselves conservationists. One farmer said:

The bottom-line is that we are all environmentally friendly because we have to create the water [quality]. We are doing our best, and conservation compliance is tough. I think we are getting very little attention to what we as producers have done already. I am trying to be very conscientious, proactive.

This suggests that farmers feel their water quality conservation efforts are underappreciated by other citizens. In fact, multiple farmers mentioned the public benefits urban populations receive from buffering waterways in rural lands and complain that cities do not pull their weight in water quality conservation. Farmers pointed to runoff pollution from unbuffered lawns, road salts, and other pollutants from urban sources as contributing to pollution problems

Further, many farmers discussed the notion that politicians did not know what was best for them, did not consider the realities of farming in Minnesota, and, interestingly, that urban policymakers could not understand what it was like to live and work in rural Minnesota. One Rice County farmer spoke at length to this sentiment, stating:

[Governor Dayton] doesn't get outside the city much. He's the governor. [St. Paul] is where you need a buffer. So he looked at that, and he expected that that's how every field is. Well, it's not.

We found that overall, politicians and stakeholders representing urban taxpayers were less likely to discuss farmers' existing conservation efforts than their significant contribution to water quality degradation. In our interviews, stakeholders expressed that urban citizens already pay too much in taxes that support the farming economy, and that cities should not have to pay for regulations aimed at improving water quality when they perceive agriculture to be the cause of water quality degradation in the first place. Urban versus rural identity framing in our case study highlights the disconnect between farmers, citizens residing in urban areas, and politicians writing

regulations. It also shows how framing can complicate both the local situational variables under which the regulation is created and farmers' attitudes and reactions to the Minnesota Buffer Law.

### *Experience-Based Social Change*

One theme that emerged in our interviews that did not fit within our two categories of attitudinal and local situational variables related to farmers' previous experience with buffer mandates. The importance of experience-based social change surprised us, as it added complexity to our original model (see figure 2). As we have previously discussed, Dakota County implemented a local buffer ordinance four years before the passage of the Minnesota Buffer Law, while Rice County did not have any such policy. Although this history could explain why Dakota County has a higher rate of compliance with the Minnesota Buffer Law than Rice County (because buffers were already mandated in Dakota County) our data suggests a more complicated relationship between established policy and support for current policy.

Through our interviews, we found that Dakota County farmers were generally more supportive of the law than Rice County farmers. Dakota County farmers often discussed their support for the Minnesota Buffer Law in relation to the local law they had already been exposed to. Dakota County farmers suggested that once farmers who had not experienced a mandate for buffers in the past got used to buffer policies, they would grow to accept them. One Dakota County farmer stated:

I think that [after a few years] it will be the same thing. Once people get these buffer strips seeded in, get it figured out, it will just become the way it works. Five to ten years will go by and we won't talk about it anymore.

A representative from the Cannon River Watershed Partnership spoke at length about how support for practices such as vegetative buffer implementation is, in part, a product of a changing social norms. This theory of change fits into the value-beliefs-norm (VBN) model of social change, developed by Paul Stern, which has been studied in relation to environmental movements (Stern, 2000). The importance of social norms was expressed by one farmer from Dakota County who shared an experience in which they persuaded a neighbor to implement buffers, saying:

I think his hearing it from a neighbor was much better than hearing it from an enforcement agency.

These sentiments from Dakota County support the theory that the relationship between farmer attitudes and policy go both ways; farmer attitudes affect local situational variables that then create local policies, but also, once a policy is enacted, it may influence farmer attitudes. Farmers' attitudes, local situational variables, and local policies are all interconnected in a

circular process. For instance, when a policy is enacted, it changes farmers' attitudes and political institutions, which then influences future policy actions.

We also found support for this theory beyond Dakota County's experience with its buffer ordinance through interviews with Rice County farmers. Three farmers from Rice County made comments about becoming more supportive of the law as they learned more about it and as more people around them implemented buffers. Farmers said they were "less afraid and opposed to it," "settled down a bit," and "were less excited from it" after learning more about the intricacies of the law and talking with local leaders. These data support our theory that experiencing a policy, both in the case of the buffer ordinance in Dakota County, and as time goes on with the Minnesota Buffer Law in Rice County, influences farmers' attitudes about the policy.

## Discussion

We discovered that unlike the literature on the adoption of BMPs would suggest, farmers in our study universally discussed water quality issues as an important concern, even those who showed less support for the Minnesota Buffer Law. In addition, farmers in both counties had similarly strong land stewardship values. As we expected, economic values influenced farmers' support for the Buffer Law especially for farmers in Rice County who had yet to implement the law. We identify intergenerational land transfer, property rights issues, and the perception that politicians are out of touch with local realities as key attitudinal subcategories with particular influence on farmers' support for this law.

Additionally, we extended our analysis of farmers' attitudes by studying the differences between local situational variables in Rice and Dakota counties that influence farmers' support for the Minnesota Buffer Law. We found that the economic landscape, including the strength of the agricultural economy and the tax status of buffered property to be important considerations for farmers, especially in Rice County. We also identify the ability to enroll in the CRP and funding differences between Dakota and Rice County SWCDs as potential explanatory factors for the difference in compliance between the two counties. In our examination of local SWCDs we identified local leadership and the communication about the options for alternative conservation practices when implementing buffer laws as important factors to both Rice and Dakota County farmers. We also suggest that the Dakota County Shoreland Ordinance contributed to more buffer installations in Dakota County. We found that government education and outreach was significantly different between Rice and Dakota counties. Farmers in Rice County were more likely to be confused about the goals of the law and articulate that the law was "rushed through" the state legislature than their counterparts in Dakota County. These findings about the local situational variables that influence farmers support for the Buffer Law

complement our analysis of farmers' attitudes by accounting for the differences in local realities between Rice and Dakota counties.

Finally, our study suggests that framing and previous experience with practical results of policy represent a significant interaction between farmers' attitudes and local situational variables. A study by Valdivia and Poulos studying farmers' attitudes and BMP compliance found that having previous experience with a policy influences farmers' attitudes about the policy (Valdivia and Poulos, 2008). Our research enhances this idea by pairing it with the VBN model of social change. Therefore, we suggest that the relationship between attitudes and policy is reciprocal. A farmer's attitudes may be influenced by previous experience with a policy, or through a change in social norms. Based on our findings, we hypothesize that the relationship between farmers' attitudes, local situational variables, framing, and experience are cyclical. In this way, a policy may get stuck in a loop between attitudes, local situational variables, and framing. Our data suggests that Rice County might be in this framing cycle, which is why support for and compliance with the Minnesota Buffer Law is lower in this county. On the other hand, if a policy can get out of this cycle of framing and be enforced, attitudes can change in a way that will further the goals of a policy. We believe Dakota County is in this portion of the cycle, especially due to its local buffer ordinance. A graphic of these cycles is below.

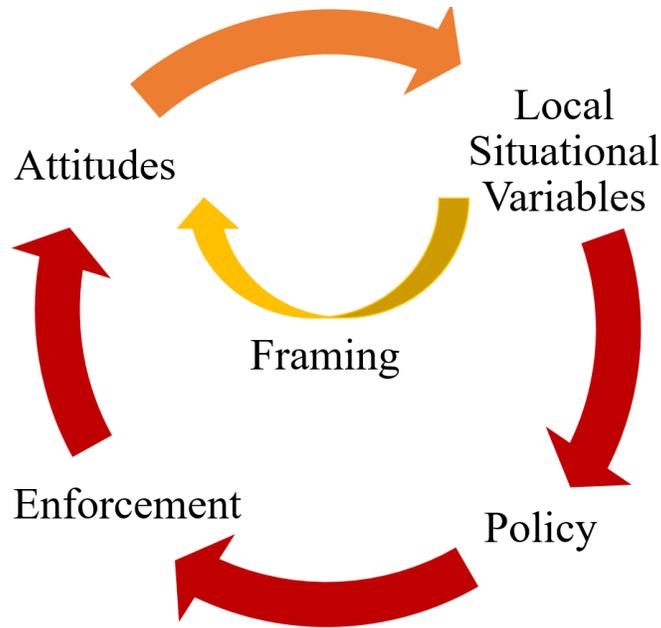


Figure 3. Proposed Model. The red/orange cycle demonstrates that the relationship between farmers’ attitudes, local situational variables, and experience is cyclical. A change in policy influences subsequent changes in farmers’ attitudes after experiencing the enforcement of that policy. These changes in attitudes influence local situational variables, and the cycle continues through an iterative process. The orange/yellow cycle demonstrates that policy may get stuck in a loop between attitudes, local situational variables, and framing.

Overall, farmers in Dakota County were more supportive of the Minnesota Buffer Law than farmers in Rice County. The relative importance of framing in Rice County versus experience in Dakota County as indicators of support for the Minnesota Buffer Law suggests that farmers’ support for BMPs mandated by law may change over time. In Rice County, many of the sentiments and slogans expressed by larger farm organizations and conservative ideology seemed to resonate with farmers; these frames of reference significantly impacted farmers’ support for the law and were repeated frequently during interviews. This was not the case in Dakota County. Since Dakota County mandated buffer installment on agricultural land since 2011 when the Shoreland Ordinance was passed, farmers’ experiences implementing buffer conservation measures seems to have appeased concerns that were expressed in Rice County. On an individual basis, we saw this transformation occur. As Rice County farmers learned more about the law, they became more receptive of it. Thus, it seems that framing carries the most weight amongst farmers who have less exposure and understanding of mandated conservation Best Management Practices. However, exposure over time, whether through discussions with government officials, or by observing a neighbor’s farming practices, can change support for conservation practices mandated by law and override negative frames of reference.

## Conclusion

Our study was successful in generating hypotheses about the variables that influence farmers' support for the Minnesota Buffer Law, and contributes to the scholarly conversation about Best Management Practice adoption by analyzing support for regulatory environmental policies that affect farmers. Our findings complicate the simple model proposed by other scholars. Our results demonstrate not only are attitudes and local situational variables important in determining support for environmental regulation, but the interaction between attitudes and local situational variables is equally important. This emphasis on interaction is a novel element of the scholarly conversation about environmental regulation. In addition, by recognizing the dynamic nature of this interaction, our study posits new analytic categories, framing and prior experience with a law, that merit future research.

These findings could also be useful for policymakers as the Buffer Law continues to be challenged in the Minnesota State Legislature, and elected officials contemplate further environmental regulation on private agricultural lands. By emphasizing that support for environmental regulations and conservation practices is dynamic (that attitudes may change over time as a result of framing and experience), our results indicate that policy makers should assess the success of their legislation not on the support it initially receives, but by how support changes over time. It is also important that policymakers continue to work as closely as possible with agricultural constituents to educate farmers about new laws, as exposure to new regulation through government education may be able to override negative framing. In addition, politicians could frame policies in a way that emphasizes conservation and stewardship efforts in order to garner support for regulation, as these values were similar across counties. As we have seen from our data, the process of social change as a result of the passage of the Minnesota Buffer Law has already begun. Despite ongoing criticism of the Buffer Law, existing legislation such as the Dakota County Local Ordinance and the Minnesota Buffer Law are currently changing farmers' attitudes and local situational variables. As local SWCDs reorganize in order to implement the Buffer Law and farmers become more familiar with the law, farmers' attitudes about government environmental regulation may change, creating a more informed agricultural constituency that may be more receptive to government mandated conservation practices in the future.

We acknowledge several noteworthy limitations of our study. First, as a result of the qualitative nature of our study, we cannot prove direct causative conclusions about the Buffer Law in Rice and Dakota counties. This limitation, however, affects most qualitative studies. We believe that although our data do not allow us to draw definitive conclusions, the themes explored in our paper will be useful to policymakers and those interested in increasing farmers' adoption of conservation practices. Another limitation inherent to the design of our study has to do with our

method of finding interview subjects. We used a snowball sample to find our subjects, meaning that we were more likely to talk to farmers who already had strong opinions about the law.

Another significant limitation on our data collection was time. Because of the limited timeframe of our study, we could not talk to all relevant political actors and stakeholders, nor did we have much flexibility to interview farmers who were unable to be interviewed in the 6-week timespan in which we conducted interviews. Additionally, due to this time constraint, we were forced to limit the scope of our study to corn and soybean farmers in Rice and Dakota county. Although this gave us significant insight into a specific set of farmers in one geographic area, this makes the results of our study less generalizable. Finally, having a ten week time frame meant that we were only able to interview 19 people. Although ten of these interviews were with farmers, only three of the farmers we interviewed were from Dakota County.

Much of the research that we conducted led to further questions and hypotheses that would merit future research. One of the ideas that was particularly interesting was the 2011 Dakota County Buffer Ordinance. Because one of main conclusions of our study is that experience with buffer conservation practices influences subsequent support for buffer legislation, future studies could test this hypothesis by analyzing the history of this ordinance and farmers' receptiveness to it. In addition, we found that farmers generally did not dispute their role in contributing to water pollution, and they tended to express significant concern for degraded water bodies throughout the state. These results were unexpected based on the literature about BMP adoption. Future studies could explore the relative importance of conservation values versus other values in BMP adoption in southern Minnesota. Another area of study worth exploring is the theoretical model that we propose (see figure 3). Future research could test this model, especially in other counties in Minnesota that have high levels of compliance but may or may not have implemented a buffer ordinance. Finally, we believe that because the Buffer Law implementation is currently ongoing, and attitudes and norms about the law are also changing through exposure to the regulation. This might make undoing the conservation practices mandated by the law difficult to fully repeal. We are excited by the idea of testing the hypotheses generated by this study in the future.

## Works Cited:

- Ahnström, Johan, Jenny Höckert, Hanna Bergea, Charles Francis, Peter Skelton, and Lars Hallgren. 2009. "Farmers and Nature Conservation: What is Known about Attitudes, Context Factors and Actions Affecting Conservation?" *Agronomy & Horticulture --Faculty Publications*, paper 361. <http://digitalcommons.unl.edu/agronomyfacpub/361>.
- Baumgart-Getz, Adam, Linda Stalker Prokopy, and Kristin Floress. 2012. "Why Farmers Adopt Best Management Practice in the United States: A Meta-analysis of the Adoption Literature." *Journal of Environmental Management* 96(1): 17-25.
- Biernacki, P., and Dan Waldorf. 1981. "Snowball Sampling: Problems and Techniques of Chain Referral Sampling." *Sociological Methods and Research* 10(2): 141-163.
- Bruce Monson, Shawn Nelson, Kris Parson, Kelli, Nerrem. 2014. "Missouri River Basin Monitoring." *Minnesota Pollution Control Agency*.  
<https://www.pca.state.mn.us/sites/default/files/wq-ws3-10170204b.pdf>.
- Carpenter, Stephen R., Nina F. Caraco, David L. Correll, Robert W. Howarth, Andrew N. Sharpley, and Val H. Smith. "Nonpoint Pollution of Surface Waters with Phosphorus and Nitrogen." *Ecological Applications* 8(3): 559-68.
- Census of Agriculture. County Profile: Rice County and Dakota County. US Department of Agriculture, National Agricultural Statistics Survey. 2012.
- Creswell, John W. 2009. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks: Sage Publications.
- Dakota County Environmental Resources. 2015. "Shoreholders FAQ: Shoreland Restoration, Protection, and Enhancement." Accessed October 2, 2016.  
<https://www.co.dakota.mn.us/Environment/LandConservation/ShoreHolders/Documents/ShoreholdersFAQ.pdf>.
- Daviter, Falk. 2007. "Policy Framing in the European Union." *Journal of European Public Policy* 14(4): 654-66. doi: 10.1080/13501760701314474.
- Department of Natural Resources. 2008. "Protecting our Rivers and Lakes." *Department of Natural Resources*.
- Dillaha, T. A., R. B. Reneau, S. Mostaghimi, and D. Lee. 1989. "Vegetative Filter Strips for Agricultural Nonpoint Source Pollution Control." *Transactions of the American Society of Agricultural and Biological Engineers* 32(2): 513-19.
- Dutcher, Daniel D., James C. Finley, A.E. Luloff, and J. Johnson. 2004. "Landowner Perceptions of Protecting and Establishing Riparian Forests: A Qualitative Study Analysis." *Society and Natural Resources* 17: 329-42.
- Emery, Steven B. 2015. "Independence and Individualism: Conflated Values in Farmer Cooperation?" *Agriculture and Human Values* 32(1): 47-61.
- Environmental Working Group. 2014. "Broken Stream Banks." Accessed October 11, 2016.  
<http://www.ewg.org/research/broken-stream-banks>.
- Environmental Working Group Conservation Database. 2017. "EWG's Agriculture Conservation Database." Accessed March 9. <https://conservation.ewg.org>.

- Gerhardt, Nick. 2016. "Buffer Field Day Addresses Questions of Implementation." *Faribault Daily News*, Accessed January, 2017. [http://www.southernminn.com/faribault\\_daily\\_news/news/article\\_980c6701-50e5-56cc-a63f-27ca00802222.html](http://www.southernminn.com/faribault_daily_news/news/article_980c6701-50e5-56cc-a63f-27ca00802222.html).
- Gile, Tom. *Joint meeting of the Minnesota House Agriculture Policy, and the House Environment and Natural Resources Policy and Finance committees*, January 19, 2017.
- Gilliam, J. W. 1993. "Riparian Wetlands and Water Quality." *Journal of Environmental Quality* 23(5): 896-900. doi:10.2134/jeq1994.00472425002300050007x.
- Greiner, Romy, Louisa Patterson, and Owen Miller. 2009. "Motivations, Risk Perceptions and Adoption of Conservation Practices by Farmers." *Agricultural Systems* 99(2-3): 86-104. doi:10.1016/j.agsy.2008.10.003.
- Guest, Greg, Arwen Brunce, and Laura Johnson. 2006. "How Many Interviews Are Enough?: An Experiment with Data Saturation and Variability." *Field Methods* 59(18): 59-82. doi: 10.1177/1525822X05279903.
- Heyink, J.W., and TJ Tymstra. 1993. "The Function of Qualitative Research." *Social Indicators Research* 29(3): 291-305.
- Kalcic, Margaret M., Jane Frankenberger, Indrajeet Chaubey, Linda Prokopy, and Laura Bowling. 2015. "Adaptive Targeting: Engaging Farmers to Improve Targeting and Adoption of Agricultural Conservation Practices." *Journal of the American Water Resources Association* 51(4): 973-91. doi:10.1111/1752-1688.12336.
- Kennedy, Tony, and Josephine Marcotty. 2015. "Half of lakes and streams in southern Minnesota found too polluted for safe swimming, fishing." *Star Tribune*. <http://www.startribune.com/half-of-s-minn-waters-found-too-polluted-for-safe-swimming-fishing/301702651/>
- Lamba, Pamela, Glen Filson, and Bamidele Adekunle. 2009. "Factors Affecting the Adoption of Best Management Practices in Southern Ontario." *The Environmentalist* 29: 64-77.
- Leviston, Zoe, Jennifer Clare Price, and Lorraine Elizabeth Bates. 2011. "Key Influences on the Adoption of Improved Land Management Practice in Rural Australia: The Role of Attitudes, Values and Situation." *Rural Society* 20(2): 142-59.
- Lovell, Sarah Taylor, and William C. Sullivan. 2006. "Environmental Benefits of Conservation Buffers in the United States: Evidence, Promise, and Open Questions." *Agriculture, Ecosystems & Environment* 112(4): 249-60. doi:10.1016/j.agee.2005.08.002.
- Lubell, Mark, and Allan Fulton. 2008. "Local Policy Networks and Agricultural Watershed Management." *Journal of Public Administration Research and Theory* 18(4): 673-96. doi:10.1093/jopart/mum031.
- Minnesota Board of Soil and Water Resources. 2015. "Buffer Initiative Legislative Summary." Accessed February 22, 2017. [http://www.lccmr.leg.mn/calendar/2015/2015-09-16-mtg/attachments/item04-buffer\\_info.pdf](http://www.lccmr.leg.mn/calendar/2015/2015-09-16-mtg/attachments/item04-buffer_info.pdf).
- Minnesota Board of Soil and Water Resources. 2015. "Implementing the 2015 Buffer Legislation" Accessed February 22, 2017. <http://www.bwsr.state.mn.us/buffers/assets/buffer-fact-sheet.pdf>.

- Minnesota Board of Water and Soil Resources. 2016. "Notice of Request for Comment on Proposed Policies and Draft Model County Ordinance and Watershed District Rule for the Implementation of the Minnesota Buffer Program." *Board of Water and Soil Resources*. Accessed February 22, 2017. [http://www.bwsr.state.mn.us/buffers/enforcement/Buffer\\_Request\\_for\\_Comments\\_12-12-16.pdf](http://www.bwsr.state.mn.us/buffers/enforcement/Buffer_Request_for_Comments_12-12-16.pdf).
- Minnesota Department of Agriculture. 2013. "Dakota County Agricultural Profile." Accessed February 8, 2017. <http://www.mda.state.mn.us/food/business/agmktg-research/~media/Files/food/business/countyprofiles/econrpt-dakota.ashx>.
- Minnesota Department of Agriculture. 2013. "Rice County Agricultural Profile." *Minnesota Department of Agriculture*. Accessed February 8, 2017. <http://www.mda.state.mn.us/food/business/agmktg-research/~media/Files/food/business/countyprofiles/econrpt-rice.pdf>.
- Minnesota Farm Bureau. 2015. "Action Needed! Tell the Governor about Conservation!" *Minnesota Farm Bureau*, April 24. <http://www.fbm.org/blog/2015/04/24/action-needed-tell-the-governor-about-conservation>.
- Minnesota Farm Bureau. 2016. "Minnesota's Buffer Legislation." Accessed February 22, 2017. <http://www.fbm.org/mn-water>.
- Minnesota Pollution Control Agency. 2007. "Detailed Assessment of Phosphorus Sources to Minnesota Watersheds." Accessed February 22, 2017. <https://www.pca.state.mn.us/water/detailed-assessments-phosphorus-sources-minnesota-watersheds>.
- Minnesota Pollution Control Agency. 2009. "Water Rulemaking." *Minnesota Pollution Control Agency*. November 20. <https://www.pca.state.mn.us/water/water-rulemaking>.
- Minnesota Pollution Control Agency. 2013. "Report on nitrogen in surface water." *Minnesota Pollution Control Agency*. Accessed February 20, 2017. <https://www.pca.state.mn.us/news/report-nitrogen-surface-water>.
- Minnesota Pollution Control Agency. 2016. "Water Rulemaking." *Minnesota Pollution Control Agency*. Accessed November 14, 2016. <https://www.pca.state.mn.us/water/water-rulemaking>.
- Minnesota Statutes 2016. "Minnesota Statutes." Accessed October 2, 2016. <https://www.revisor.mn.gov/statutes/?id=103F.48>.
- Moss, Timothy. 2004. "The Governance of Land Use in River Basins: Prospects for Overcoming Problems of Institutional Interplay with the {EU} Water Framework Directive." *Land Use Policy* 21 (1): 85–94. doi:<http://dx.doi.org/10.1016/j.landusepol.2003.10.001>.
- Nassauer, Joan Iverson, and Richard Westmacott. 1987. "Progressiveness among Farmers as a Factor in Heterogeneity of Farmed Landscapes." In *Landscape heterogeneity and disturbance*, 199-210. New York: Springer.
- O'Connor, Pamela. 2011. "The Changing Paradigm of Property and the Framing of Regulation as a 'Taking'." *Monash University Law Review*.
- Onsrud, Aaron, Dereck Richter, Joel Chirhart, Mike Koschak, Dave Christopherson, David Duffey,

- Osborne, Lewis L., and David A. Kovacic. 1993. "Riparian Vegetated Buffer Strips in Water-Quality Restoration and Stream Management." *Freshwater Biology* 32(2): 243-258.
- Parker, Jason Shaw, and Richard H. Moore. 2008. "Conservation Use and Quality of Life in a Rural Community: An Extension of Goldschmidt's Findings." *Southern Rural Sociology* 23(1): 235.
- Pope, Catherine, Sue Ziebland, and Nicholas Mays. 2000. "Analysing Qualitative Data." *The BMJ* 7227(320): 114-116.
- Qiu, Jiali, Zhenyao Shen, Lei Chen, Hui Xie, Chengchun Sun, and Qin Huang. 2014. "The Stakeholder Preference for Best Management Practices in the Three Gorges Reservoir Region." *Environmental Management* 54(5): 1163–74. doi:10.1007/s00267-014-0324-9.
- Quinn, Courtney E., and Mark E. Burbach. 2010. "A Test of Personal Characteristics That Influence Farmers' Pro-Environmental Behaviors." *Great Plains Research* 20(2): 193–204.
- Rosman, Hanna Teresa. 2015. "The Farmer and Farm Networks: an Examination of Conservation Adoption in the US Corn Belt."
- Ryan, Clare. 2008. "Managing Nonpoint Source Pollution in Western Washington: Landowner Learning Methods and Motivations." *Environmental Management* 43(6): 1122–30.
- Ryan, Robert L. 1998. "Local Perceptions and Values for a Midwestern River Corridor." *Landscape and Urban Planning* 42, (2–4): 225–37. doi:10.1016/S0169-2046(98)00089-9.
- Ryan, Robert L., Donna L. Erickson, and Raymond De Young. 2003. "Farmers' Motivations for Adopting Conservation Practices along Riparian Zones in a Mid-Western Agricultural Watershed." *Journal of Environmental Planning and Management* 46 (1): 19–37. doi:10.1080/713676702.
- Segerson, K. 1988. "Uncertainty and Incentives for Nonpoint Pollution Control." *Journal of Environmental Economics and Management* 15(1): 87-98.
- Smentek, Joe. 2015. "Soil health practices not a One-Size fits all." *MN Soybean Growers Research and Promotion Council Blog*, February 22, 2017. <https://mnsoybean.org/blog-msrpc/soil-health-practices-not-a-one-size-fits-all/>.
- Stern, Paul C. 2000. "New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior." *Journal of Social Issues* 56(3): 407-424.
- Sullivan, William, Anderson Olin, and Taylor Lovell Sarah. 2004. "Agricultural Buffers at the Rural-Urban Fringe: An Examination of Approval by Farmers, Residents, and Academics in the Midwestern United States." *Landscape and Urban Planning* 2–3: 299–313.
- Taylor, Dorceta E. 2000. "The Rise of the Environmental Justice Paradigm." *American Behavioral Scientist* 43(4): 508-80.
- Thiesse, Kent. 2016. "Farm Operators Consider CRP Enrollment." *MinnStar Bank Blog*, January 25. Accessed March 9, 2017. <https://www.minnstarbank.com/2016/01/25/farm-operators-consider-crp-enrollment/>.
- United States Census Bureau. 2016. "Quickfacts: Dakota County, Minnesota." *United States Census Bureau*. November 10. <http://www.census.gov/quickfacts/table/PST045215/27037,27131,00>.
- United States Census Bureau. 2016. "Quickfacts: Rice County, Minnesota." *United States Census Bureau*. November 10. <http://www.census.gov/quickfacts/table/PST045215/27131,00>.

- United States Department of Agriculture, Economic Research Service. 2013. "Metro, Non-Metro Metropolitan, and Nonmetro Noncore Counties, 2013." Accessed February 8, 2017. [https://www.ers.usda.gov/webdocs/charts/37405\\_micrononcorepng/micrononcore.png?v=4140](https://www.ers.usda.gov/webdocs/charts/37405_micrononcorepng/micrononcore.png?v=4140).
- Valdivia, Corinne, and Christine Poulos. 2008. "Factors Affecting Farm Operators' Interest in Incorporating Riparian Buffers and Forest Farming Practices in Northeast and Southeast Missouri." *Agroforestry Systems* 75(1): 61–71. doi:10.1007/s10457-008-9129-2.
- Van Benkel, Jessie. 2015. "Dakota County Provides Shoreline Buffer Lessons." *Star Tribune*, April 3. Accessed October, 2016. <http://www.startribune.com/dakota-county-provides-shoreline-buffer-lessons/298644521/>.
- Westra, John V. 1999. "Agricultural Phosphorus Nonpoint Source Pollution in the Minnesota River." *Annual Meeting of the American Agricultural Economics Association*.
- Weyhe, Philip. 2016. "Rice County Farmers Gather for Answers on New Buffer Law." *Northfield News*, September 15. Accessed October 23, 2016. [http://www.southernminn.com/northfield\\_news/news/article\\_9b214e0b-2acd-52f4-8f67-91075f56bbcd.html](http://www.southernminn.com/northfield_news/news/article_9b214e0b-2acd-52f4-8f67-91075f56bbcd.html).
- Yandle, Bruce. 1995. "Land Rights: The 1990's Property Rights Rebellion." *Lanham: Rowman & Littlefield Publishers*.

## **Appendix A:**

### **Principal tenets in the Buffer Law**

Requirements for landowners to establish and maintain buffers adjacent to public waters and public drainage ditches;

Requirements for soil and water conservation districts to identify other waters for inclusion in local water plans;

Exemption for certain land uses and areas from the riparian protection requirement;

Rules allowing landowners to meet the buffer requirements through other conservation practices that will protect water quality;

Requirements for soil and water conservation districts to assist landowners in complying with the riparian protection requirement;

Authorization of counties and watershed districts to elect to enforce the buffer requirements via, ordinance, rule, or administrative penalty order and BWS;

Providing for enforcement by BWSR when a county or watershed districts elect not to; and  
Provides for an appeal of an administrative penalty order to BWSR.

## **Appendix B: Interview Protocol**

The following questions will serve as a guideline for our interviews. Each interviewee will be asked these types of questions, although not all interviewees will be asked all of the questions. Each interview is expected to last between 30 and 90 minutes. Separate guiding questions are provided for farmers and other stakeholders.

Farmers:

### **General Questions (Context)**

- What do you see as the benefits and the costs of this policy?
- What is the relative importance of these costs and benefits to you?
- What do you see as the biggest barrier for you to implement this buffer law?
- Do you feel like you understand the content of the Minnesota Buffer Law? What, if any, unanswered questions do you still have about the law?
- Who first told you about the buffer law? Or, how did you first hear about it?

### **Financial Values**

- How do the costs of implementation compare with their benefits in the long term?
- Do you consider the implementation of the buffer policy economically risky?

### **Conservation Ethic**

- What conservation practices do you employ on your farm? Is your land enrolled in any conservation programs?
- Do you believe that riparian buffers are an effective conservation measure?
- How serious an issue are runoff pollution and river erosion? Do you believe your farming practices contribute to these problems?
- When considering conservation efforts, should human health goals or environmental health goals be prioritized?
- How do you value the land that you farm? Does it have value outside of profits? What are some of the ways you value your land besides profits?

### **Land Stewardship**

- As a farmer, what is your relationship with the land you farm?
- What is your role as the head of your farm? What responsibilities, if any, does this entail?
- Do you see yourself as a steward of the land you farm? What does this mean to you? Is this an important consideration in your decision to implement buffers?
- Does the land you farm have aesthetic value to you? How important a consideration is this in your decision to implement buffers?
- What does a healthy farm look like to you?

### **Political Process and Regulatory Structures**

- Did you know anything about riparian buffers before the law was passed?
- Do you feel like the government has given adequate resources to educate the public about buffers?
- Do you feel the government provided you with adequate educational support to implement this law?
- Do you feel like your opinions were taken into consideration in the creation of this law?
- Do you feel that implementation of the new buffer law is a government imposition on your preferred land management regime? Is this an important consideration in your willingness to implement the buffer law?

- Do you think the buffer law limits your use or limits the flexibility of the land your farm?
- Is control over the land you farm a central factor in your decision to implement the buffer law?
- Do you trust that the new buffer law supports your best interests?
- Do you trust that enforcement of the buffer law by the government is fair?
- Do you believe that the distribution of economic incentives by the government for the implementation of this law is fair?

Governmental Officials:

- What is your position?
- What involvement have you had with the MN buffer law?
- Were farmers' values considered during the creation of this law?
- What can you tell us about the political process surrounding the creation and implementation of the buffer law?
- What do you think are the biggest misconceptions about the Minnesota Buffer law? →
- What were some challenges in the creation and passage of this law?
- What do you believe are the goals of this law? Do you think this law will be effective in achieving these goals?
- Do you believe that people will comply with this law? Why or why not? What are the greatest challenges hindering buffer implementation?
- What do you see as some of the most important reasons for the difference in compliance between Rice and Dakota county?

Appendix C

Demographic Survey (For farmers)

Question 1

What is your sex?

Male

Female

Question 2

What is your age?

years old

Question 3

What County do you live in?

County

Question 4

How many years have you lived in Rice or Dakota County?

Years

Question 5

How many years have you been farming?

Years

Question 6

a. How many acres of land do you farm?

Acres

b. How many acres of land do you rent?

Acres

c. How many acres of land do you own?

Acres

Question 7

a. Do any public waterways or drainage ditches run through your land?

Y / N

b. Is any part of your land adjacent to public waterways land enrolled in the conservation reserve program or any other government conservation program?

Y / N

c. If yes (to part b), what program?

Question 8

What crops do you grow?