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Muddied waters: exploring Iowa's water policy and practices

Jorgen D. Rose
University of Northern Iowa

MUDDIED WATERS:

EXPLORING IOWA'S WATER POLICY AND PRACTICES

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Jorgen D. Rose

University of Northern Iowa

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Abstract

Clean, usable fresh water is a precious and valuable resource, but it is one that we often mistreat and misuse. Surface water in particular is extremely vulnerable to human actions and influences; nowhere is this more apparent than in agricultural states like Iowa, where nonpoint-source pollution (runoff) has a dramatic effect on our rivers, lakes, and streams. However, despite this continuing decline in the quality of Iowa's water, there exists very little public policy aimed at dealing with the problems of nutrient contamination and other forms of nonpoint-source pollution. Furthermore, what policy does exist is either ineffective or insufficient. The goal of this research was to attempt to discern *why* this gap in Iowa's public policy exists. By examining current and historical factors associated with policymaking in Iowa, it became possible to gain a detailed understanding of why such a lack of effective and sufficient policy exists. Operating on the assumption that in order to fix a problem it is first necessary to accurately comprehend what is wrong, this research identified two broad "primary culprits" behind the lack of effective policy in Iowa: economics and culture. And although much research has been done into various facets of this topic before, a holistic, wide-angle view of the problem both proved most appropriate for accurately assessing the problem and more effective in providing for policy implications that might have otherwise been missed.

Introduction

Water is *the* most important resource on the planet. Throughout history clean, drinkable freshwater has been a cause for strife and conflict, which should illustrate its value. Usable water is also a finite resource, although we often fail to think about it as such. It is possible to overuse water, or to use water poorly. As can be seen through numerous extreme examples of pollution and misuse, it is also possible to ruin water through contamination. Often this contamination is

what is termed point-source pollution: specific types of pollution originating from specific sources. Other times, however, the pollution is nonpoint-source, i.e. not originating from a single source; agricultural run-off is the prime example of this sort of pollution. These two types of pollution are drastically different, but they have one defining feature in common: they can adversely affect the quality of our water, especially surface water.

Surface water is especially vulnerable to human actions because that is the water that we deal directly with: lakes, rivers, ponds, streams, etc. Also adding to the vulnerability of surface water is its tendency to concentrate; a little bit of pollution upstream might result in a much higher concentration of pollution downstream. And as with any vulnerable and finite resources, the issue of managing and protecting that resource effectively and efficiently becomes important. This is the idea of conservation, and although there are multiple understandings of what exactly conservation entails, there is one method of conservation that is almost universally sought after: public policy.

Public policy is the primary way that our society uses to order itself and our individual actions. Public policy is used to regulate numerous and myriad aspects of our daily lives, from the speed limits of our roads to the building codes that dictate construction. In a perfect world, public policy could be used to effectively manage, reduce, and eventually eradicate both point- and nonpoint-source pollution. The problem, however, is that Iowa lacks sufficient and effective public policy concerning environmental issues, especially in regards to agricultural nonpoint-source pollution, namely nutrient contamination. The goal of this research was to attempt to discern *why* this gap in Iowa's public policy exists. By examining current and historical factors associated with policymaking in Iowa, it became possible to gain a detailed understanding of why such a lack of effective and sufficient policy exists. Operating on the assumption that in

order to fix a problem it is first necessary to accurately comprehend what is wrong, this research identified two "primary culprits" behind the lack of effective policy in Iowa: economics and culture. And although much research has been done into various facets of this topic before, a holistic, wide-angle view of the problem both proved most appropriate for accurately assessing the problem and more effective in providing for policy implications that might have otherwise been missed.

Background and Context

Before diving into the details of this research, it is first necessary to establish some background and context for the discussion that will take place. There are four main topics that require further detail: agriculture, pollution, current policy, and the problem that this thesis seeks to address. The "agricultural" section provides a short historical background of the development of modern agriculture in the Midwest over the last century; the "pollution" section illustrates the shifts and trends in the types and quantities of pollution over time; the "current policy" section details the existing body of current policy; and the "problem" section seeks to more firmly establish the existing situation that is the core premise for the purpose behind this research.

Agriculture

The last century has seen massive changes in how agriculture both looks and works in this country. Given the sheer scale of these changes, it is highly probable that the shifting face of farming has had an impact on water quality standards across the country. The existing literature breaks the last century of American Midwest farming into several distinct time periods, characterized by both the similarities within these time periods and the differences between

them. Overall, however, there are several trends that characterize the shifts in American farming. First is the movement towards larger, fewer, and more specialized farm; farms generally moved from family owned and operated subsistence farms to larger, incorporated specialty farms.[1]Second is the mechanization of farming over time. Farms moved from cheap, unreliable laborers to expensive, complex machinery. With this commercialization of farming and the increase in technology, the skills that farmers needed to be successful also diversified. Farmers now required complex managerial skills, and they became machinists and mechanics by necessity.[2]

Many things drove the shift to our current model of industrial agriculture. As farmers required more and more skills to be successful, agricultural educational programs also became more and more popular. Land prices skyrocketed, and the advances and use of new technologies and machinery led to larger farms that were managed and worked more efficiently and with greater success.[3] This use of new machinery meant that row crops, in general more profitable but also more expensive, became a prime economic investment. While making better economic sense, the introduction of these mass row crops into the Midwestern agricultural cycle has had repercussions that are not yet fully understood, and will be discussed later in the thesis in detail.

Technology also allowed farmers to directly control the amount of water that was reaching their fields. Through spray and ditch irrigation, flood plain drainage, tiling, and other techniques and technologies, water control and the effects thereof began to play a more and more important and prevalent role in agriculture in general, but in Midwest farming in particular.

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[1] Dennis S. Nordin and Roy V. Scott, *From Prairie Farmer to Entrepreneur: The Transformation of Midwestern Agriculture* (Bloomington, IN: Indiana University Press, 2005), 30.
[2] Ibid, 32-33.

[3] Ibid, 28

Pollution

Another way to approach this subject is to examine the idea of pollution itself. Pollution is a broad term, and it is one not clearly defined. In this context, however, there are two primary types of pollution: point source and non-point source. And while at first glance all pollution might seem similar, point-source and nonpoint-source pollution are about as different as can be. Both are threats, and both have severe consequences for the environment, but both the methods of pollution and the way that the pollution interacts with the environment varies considerably between various point-sources and nonpoint-sources.[4]

Point-source pollution is what might be considered standard, regular pollution. It is perhaps the first thing that comes to mind when considering the idea of water pollution. For instance, a point source of pollution might be a factory dumping chemicals into a lake or a sewage drain emptying into a river. Both of these are identifiable, quantifiable, and specific.[5] In other words, the pollution originates at a single *point*. Other types of point source pollution include, but are not limited to, wastewater treatment facilities, landfills, and underground storage tanks

In contrast with point sources, non-point sources are broad-spectrum, diffuse sources that are hard to identify and even harder to identify than point sources.[6] Some examples of non-point source pollution include, but are not limited to, agricultural pesticide and herbicide run-off, debris and chemical wash from city streets, and nutrient saturation. These sources are all around us, and they are extremely difficult to measure and regulate.[7] It is also hard to predict the long-

[4] Adam Markham, *A Brief History of Pollution* (New York: St. Martin's Press, 1994), 54-58
[5] Louise I. Gerdes (ed), *Pollution*. (Detroit: Greenhaven Press, 2006)
[6] Ibid.
[7] Markham, *A Brief History of Pollution,* 25

term effects of this kind of pollution, as the United States is currently discovering. Overall in the last century this type of pollution has become a larger and larger concern as agriculture increases in size and scale and as point sources are slowly regulated, controlled, or even destroyed.[8]

Policy

There are two major categories of exiting policy where environmental regulation is concerned: federal policy and local policy. In terms of federal policy, perhaps the most important policy concerning water quality is the federal Clean Water Act (CWA), which is administered by the Environmental Protection Agency (EPA). The CWA has some overarching broad goals, including making waters safe for fish and wildlife as well as people. And while the CWA has served as a main policy instrument for the last forty years, it has failed in some respects.[9] For starters, the CWA is primarily focused on point-source pollution. This is a noble goal, but while bad enough in its own right, point-source pollution is *relatively* easy to monitor, control, regulate, and restrict. Because prevention is so important when dealing with pollution, this ability to identify and punish specific entities for specific amounts of pollution is invaluable, and it is not an advantage shared by non-point sources.[10] Here is where the CWA begins to fall short.

The CWA is relatively weak concerning nonpoint-source pollution for a number of reasons. First, and perhaps foremost, nonpoint-sources are extremely difficult to measure and regulate, especially by national policy.[11] This occurs because while nonpoint-sources share certain traits, the details of each case are absolutely vital to solving the pollution problem. This

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[8] Ibid.
[9] Asit K. Biswas, Cecilia Tortajada, Benedito Braga, Diego J. Rodriguez , eds, *Water Quality Management in the Americas* (The Netherlands: Springer-Verlag Berlin Heidelberg, 2006), 27-29.
[10] Ibid.
[11] Markham, *A Brief History of Pollution*, 25

means that any attempt by the federal government to solve nonpoint-source pollution using the cheapest, most mass-produced policies it can come by are not going to be effective.[12] States and local institution thus play a necessary and vital role in solving nonpoint-source pollution, but these states and local institutions often suffer from conflicting (mostly economic) interests.[13] Solving nonpoint-source pollution is expensive, both in terms of repairing the damage that the pollution has cause and in terms of the economic damage done to certain sectors (mainly farming) as a side effect of regulating these non-point sources.

There are other reasons why policy often falls short when attempting to deal with nonpoint-source pollution. As mentioned previously, it is very difficult to measure nonpoint-source pollution, and if it cannot be measure then individual actors and interests cannot be fined and/or regulated accordingly.[14] It is also difficult because some nonpoint-source pollution (e.g. nutrient saturation) is not strictly poisonous by definition. Furthermore, there are long periods of variability involved when dealing with nonpoint-source pollution. Natural weather and climate cycles can mean that pollution will lie dormant for long stretches of time before becoming a problem, and it also means that such pollution can remain a threat for much longer than otherwise anticipated.[15] All this culminates in the fact that legislating a solution to non-point source pollution was, is, and will continue to be extremely difficult.

The CWA is the main federal policy dealing with water quality, but the focus of this research is on state water policy. While the federal government sets water quality standards (through the CWA), it has thus far been willing to let the states determine how best to implement those standards. Iowa has a long history of water quality policy, some of which predates the

[12] Biswas, *Water Quality Management in the Americas,* 30
[13] Ibid.
[14] Ibid.
[15] Ibid.

CWA. For decades Iowa has pursued comprehensive water policy, efforts that culminated in the 1978 State Water Plan. Intended to be succeeded by a 1980 State Water Plan, the 1978 plan is the last truly comprehensive state policy regarding water. More current efforts include the recent Nutrient Reduction Strategy, which is the first policy to be aimed solely at nonpoint-source pollution. So far, however, the Nutrient Reduction Strategy has remained largely theoretical, with very little implementable effects or funding. The result is that while Iowa faces a huge problem of agricultural nonpoint-source pollution, there is extremely little policy dealing with the issue.

The Problem

Located in the heart of the Corn Belt, in what is one of the most important growing areas of the entire world, Iowa is most often (rightly) classified as an agricultural state. And while the Hawkeye State's economy is now more varied than ever, agriculture and farming still greatly affect the day to day lives of millions of Iowans. Drive for an hour through any part of Iowa and one invariably comes face to face with Iowa's massive agricultural industry firsthand; with over 90% of Iowa's total acreage, well over thirty million acres, classified by the USDA as farmland, it is literally impossible to ignore the importance of Iowa's agricultural industry.[16] And while the day to day operations of Iowa's farms may not directly affect the average Iowan's life, the necessary repercussions of such a massive agricultural industry impact the lives of millions of people, both in Iowa and beyond, and the do so in ways that are not strictly beneficial. This has led to a variety of concerns and worries that all arise from one underlying truth: lots of farmland

[16] Iowa State University Extension and Outreach, "Crop and Land Use: Statewide Data," *Iastate.edu* (2013), retrieved from http://www.extension.iastate.edu/soils/crop-and-land-use-statewide-data.

equals lots of subsurface drainage tiling, fertilizer, pesticides, herbicides, and other byproducts. Industrial agriculture changes the very nature of the land, and not necessarily for the better.

It is not necessarily the case that Iowa's industrial farming model is damaging in and of itself. Unfortunately, the side effects of the current model are difficult to comprehend fully; this is due at least in part to the fact that those side effects may not manifest themselves until years or even decades later. Looking to the past, we can see cases in which certain practices of massive, industrial farming have had repercussions far beyond what one would expect; the sad story of dichloro-diphenyl-trichloroethane (DDT) is a prime example of such an unanticipated cause-and-effect relationship.[17] However, despite the long-term nature of some of these damaging effects, it is possible to identify vulnerabilities, areas of concern that are at great risk, both now and in the future. Iowa's waterways are one example of such a concern.

Clean, safe, drinkable, usable water is vital to the continued survival and prosperity of every Iowan and water is of especially vital import to the agricultural industry itself. Thus, because water is such a universal concern, and because agricultural is such a prevalent industry throughout Iowa, one would assume that there are policies in place to ensure that agricultural practices make proper and safe use of Iowa's waterways. After all, why would Iowans ignore the relationship between two huge, inescapable aspects of their lives? When one examines Iowa's water policy, however, it quickly becomes apparent that there is a gap in the current legislation. According to David Osterburg, director of the Iowa Policy Project, Iowa's water policy has long been deficient.[18] In addition to simply lacking regulations in many areas, Osterburg points out that funding for clean water initiatives within Iowa has been decreasing, culminating in the fact

[17] Environmental Protection Agency, "DDT—A Brief History and Status" *EPA.gov* (2012), retrieved from http://www.epa.gov/pesticides/factsheets/chemicals/ddt-brief-history-status.htm.
[18] David, Osterburg "Talk is Cheap," *Policy Points: The Blog of the Iowa Policy Project* (2012) retrieved from http://iowapolicypoints.org/2012/11/20/talk-is-cheap/.

that the latest resolution does not even contain a stipulation as to where the funding for the program is to come from. In an era where policy is becoming a primary avenue of environmental change, it is truly disheartening to realize that Iowa is missing such policies, and herein lays the ultimate problem *and* the ultimate question of this thesis.

The problem in this situation is complex and many-pronged, but as mentioned it has its ultimate roots in the fact that Iowa lacks any sort of efficient and effective regulatory policy concerning water quality and agricultural run-off control. On a superficial level, this results in conflicts between Iowa's government and regulatory agencies such as the EPA, for Iowa's policy continues to fail to meet particular standards set forth in federal laws such as the Clean Water Act (CWA).[19] However, the problem is much deeper, and much more extensive, than a simple tussle between a state and federal government. Not least among these additional implications is the fact that agricultural run-off is polluting Iowa's waterways on a fairly regular basis, contaminating water supplies that the entire state relies on.[20] Furthermore, such contaminated waters do not stay in Iowa, and the environmental implications of such pollution have yet to be understood fully; it is safe to say, however, that the effects of such unregulated run-off cannot be good. Iowa's lack of sufficient policy may not be the only cause of these dangerous phenomena, but it is certainly a large part of the problem, and it is one that needs to be addressed.

Methods

[19] Karl, Brooks, "Letter from EPA Region 7 Karl Brooks, Jan. 09, 2013," (2013), retrieved from http://www.epa.gov/Region7/water/pdf/comment_letter_iowa_nutrient_reduction_strategy.pdf.
[20] Michelle, Hesterberg "6.2 Million Pounds of Toxic Chemicals Dumped into Iowa's Waterways," Iowa Environmental Council (2013), retrieved from http://www.environmentiowa.org/news/iae/62-million-pounds-toxic-chemicals-dumped-iowa%E2%80%99s-waterways.

Seeking to identify primary historical and cultural factors behind Iowa's current lack of effective policy by taking an extended, holistic view, this thesis is almost entirely qualitative in nature. Specific aspects of this issue have been examined in-depth previously, often using a variety of quantitative methodologies, but narrow examinations of specific aspects of a single problem often fall short in terms of generating usable and accessible implications. Narrow examinations also often necessarily discount important aspects of any problem. Thus, this thesis serves to gather and synthesize the existing literature into a single document through what amounts to a meta-analysis. Primary historical sources, such as newspapers and other era-contemporary documents, were also consulted, and qualitative interviews were conducted with a variety of farmers across Iowa.

A broad reading of the literature, both secondary and primary, immediately provided two relatively distinct categories of factors behind Iowa's lack of effective policy: culture and economics. And although there is certainly overlap between these two categories, they proved distinct enough to allow for separate investigations and discussions. Ultimately, both of these categories were explored in order to answer the following research question:

> *What are the current and historical factors that have resulted in Iowa's lack of sufficient and/or effective policy concerning agricultural nonpoint-source pollution?*

Primary Culprits: Economics and Culture

The research quickly revealed two "primary culprits" responsible for Iowa's lack of effective water policy: economics and culture. And although these two categories overlap to a significant degree, they were also disparate enough to warrant their own individual discussions. Economics was, of course, an expected driver behind Iowa's lack of policy. However, while

economics is without a doubt important, it was the underlying cultural drivers of those economic trends that proved both more interesting and more informative. In order to understand the cultural aspects driving Iowa's lack of water policy, however, it is first necessary to understand the economic factors.

As already mentioned, economics is one of the primary factors preventing the development and implementation of effective water policy in Iowa. For starts, policy of any kind can be extremely expensive. Policy aimed at affecting a change usually operates on one of two principles: incentive vs. punishment.[21] Both of these methods of policy implementation carry their own costs, both economically and politically. Incentives for voluntary conservation efforts usually take the form of monetary payments or exemptions, both of which cost the state money in some way or another but carry less political cost. In a time of economic difficulty, however, such incentive programs may draw criticisms of their costs. Punishment usually shifts economic burden to the farm-holder, although there is still a cost associated with activities such as enforcement and regulation. Punishment-oriented policy, however, is usually very politically unpopular and can be difficult to establish.

With either incentive-based or punishment-based policy, there is often the cost of regulation and implementation. Any policy will require full-time staff to implement or regulate that policy. Incentive programs require staff to administer funds and determine who should receive said funds, while punishment-based programs require regulators and enforcement mechanisms to ensure that individuals are complying with the appropriate regulations. In any situation, funding must be appropriated for both the program itself and the implementation of that program; the latter step is often overlooked, resulting in an ineffective policy. Ineffective

[21] Jack Riessen, "Water Planning: Law and Government," Iowa Department of Natural Resources (2008), retrieved from http://www.iowadnr.gov/Portals/idnr/uploads/water/Law_and_Govt2.pdf.

policies themselves increase the cost of policy; inefficiency leads to cost, and nothing is more inefficient than a half-formed or half-implemented policy. Even more concerning than this lack of effective implementation, however, is the element of contrariness that is inherent in much of the existing policy.

Take, for instance, the Clean Water Act, a federal law which seeks to impose certain quality standards nation-wide. The CWA sets the standards, and then the states are left to their own devices in terms of meeting those requirements. But while the states are seeking to implement policies that either require or incentivize conservation efforts, other federal policies are incentivizing the exact opposite. Federal subsidy programs encourage farmers to plant as much as possible, and often that encouragement outweighs any counter encouragement or regulation that conservation-oriented policies can bring to bear. Thus, tax payers end up paying for two policy programs that work both directly and indirectly against each other, increasing the costs of policy and decreasing public's interest in pursuing conservation and water policy.

The cost of policy itself is only compounded by the fact that there is a perception of conservation as being unattainably expensive. Agricultural production in Iowa, and in the United States as a whole, is a billion dollar business, and this has been the case for some time. For instance, in 1979 agricultural exports alone were valued at approximately $21 billion USD,[22] which amounts to almost $70 billion USD when adjusted for inflation. Beyond pure economic impact, however, is the image that a powerful U.S. agricultural industry projects to the rest of the world. Agricultural exports have long played a huge role in U.S. trade policy,[23] and the idea of a strong agricultural community built on the backs of hard-working farmers is central to our

[22] Joseph C. Campbell and Earl O. Heady, "Potential Economic and Environmental Impacts of Alternative Sediment Control Policies," *Center for Agricultural and Rural Development* Report 87 (1979).
[23] Ibid.

national self-image. Thus, even while the percentage of the U.S. population participating in agriculture is relatively low, it is perhaps easy to appreciate the influence that the agricultural industry has on our politics. Farming is a big business, both domestically and internationally. This means that while individual farmers may wield relatively little political power, the organizations that represent their interests are immensely powerful, especially at a state and local level and especially in the places where conservation policy is perhaps most important: the agricultural states.

For those states defined as "agricultural states," including Iowa, farming plays a large or even dominant role in the local economies. This role is not limited to agriculture itself, either. Industrialized agriculture requires large amounts of heavy manufacturing and the production of equipment and machinery; these additional industries that are associated with agriculture in the United States only increase the scope of agricultural sector's economic reach. With so many people dependent upon the continued economic success of agriculture, very few policy makers are willing to pursue policies that could even be perceived as economically damaging. In short, the same economic factors that limit an individual farmer's participation in conservation efforts also limit the participation of policy makers and of society as a whole.

As the goals of industrialized agriculture have changed over the last seventy years, so too have the economic impacts. As already discussed, agriculture is a huge and growing industry, with greater and greater production propped up by federal subsidies that work to insulate farmers from the effects of the free market. Farmers are urged, both explicitly and implicitly, to produce more and more in order to simply remain financially solvent. The business of agriculture often amounts to little more than a zero-sum game, inherently containing vast degrees of uncertainty

that prey on a farmer's every decision.[24] This sort of climate results in a deep suspicion of any practice that could negatively affect business finances, either through increased operating costs or decreased profits.[25] What's more, it is far easier to calculate and comprehend the costs of any given conservation initiative then it is to calculate and comprehend the costs of *not* undertaking that same conservation effort.[26] In other words, farmers more easily appreciate the cost of action as opposed to the cost of inaction. In the context of an industrialized and corporatized agricultural sector, these issues of profit maximization/risk minimization and cost comprehension can make conservation efforts extremely unattractive to farmers, policy makers, and even to society as a whole. This issue of *perception*, or more accurately *misperception*, is one of the primary drivers for Iowa's lack of effective policy.

Often there are two types of costs associated with soil, nutrient, and water conservation efforts: upfront cost of an initial amount of capital and a loss of profit over a given time frame. Any given action may fall into one or both of these categories. However, each type of cost may serve as a different sort of disincentive for policy makers and farmers considering various conservation efforts.

Take for example the process of terracing. Designed and proven to help reduce soil erosion on slopes, terracing is one of the simplest ways to reduce soil loss and nutrient pollution. For decades terracing has been a so-called "poster child" for conservation practices in Iowa; that said, it has never truly been widely accepted or practiced.[27] This is due in large part to the

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[24] Ibid.
[25] Arden C. Pope III, Shashanka Bhide, and Earl O. Heady, "The Economics of Soil and Water Conservation Practices in Iowa," *Center for Agricultural and Rural Development* Report 109, SWCP Series II (1983).
[26] John Ikerd, "Who Pays the Cost of Water Pollution and Depletion?" Presentation at the Friends of the Central Sands Water Reality Conference, Wautoma, WI (2009), Retrieved from http://web.missouri.edu/~ikerdj/papers/Wisconsin%20-%20Water%20Pollution%20Depletion.htm.
[27] Pope et al, "The Economics of Soil and Water"

upfront capital required to initially create terraces and to the fact that building a terrace necessarily removes a certain amount of farmland from production. If widespread terracing was implemented across the state, the annualized cost would peak at just over $50 million USD, although that cost would in reality be spread across the lifetimes of the terraces.[28] In a business where profits are often minimal, many farmers may simply lack the capital to undertake such conservation projects. In other words, they simply do not have the initial funds necessary to construct terraces on their land. Furthermore, even if a farmer *does* have the necessary initial capital, he or she may choose not to invest in projects like terracing. For farmers who are constantly concerned with high operating costs and low profits, the additional cost of conservation is a risk that, from a purely financial (and superficial) standpoint, seems like a foolish investment.

Other conservation efforts provide similar financial disincentives. Conservation tillage and land set-aside, which are perhaps two of the most effective methods of soil and nutrient conservation, are also the most expensive for farmers to undertake, with an annualized cost of nearly $100 million USD.[29] To put land into set-aside, and to a lesser extent to utilize conservation tillage practices, is quite literally money out of a farmer's pocket. This financial disincentive, combined with the omnipresent uncertainty (or at least the perception of uncertainty) inherent to the agricultural industry, might lead farmers to assume that they simply cannot afford to undertake such conservation efforts.

Overall, a conservation program aimed at implementing terracing, conservation tillage, land set-aside, contouring, and nutrient management strategies would cost well over $300 million

[28] Silvia Secchi et al, "The Cost of Clean Water: Assessing Agricultural Pollution Reduction at the watershed Scale," Center for Agriculture and Rural Development (2005), retrieved from http://www.card.iastate.edu/environment/items/idnr_assess.pdf.
[29] Ibid.

USD and would achieve, at best, a 60% reduction in phosphorous pollution and *possibly* a 20% reduction in nitrogen pollution.[30] Other solutions are even more expensive. For example, the creation of wetlands at strategic drainage points could significantly lower nitrogen and phosphorous contamination. However, these wetlands are extremely expensive, with the first-years costs of a single wetland project ranging anywhere from $50,000 USD to almost $300,000 USD for engineering, construction, and easement.[31] What's more, the comprehensive long-term impact of wetlands is still relatively uncertain, making it even less appealing to farmers.

For most farmers, the long-term financial solvency of their farms and livelihoods prevents them from investing in conservation efforts. The irony, however, is that those same conservation efforts are necessary for the very long-term stability and viability that farmers are seeking.[32] Nonetheless, this general distrust of anything that appears to threaten the status quo generates intense opposition to conservation efforts; this is especially true, as will be explained later, when those conservation efforts are driven by public policy.

Any economic argument against conservation efforts and conservation policy necessarily relies on an underlying understanding of the economics involved. For many farmers and policy makers this relationship is fairly straightforward: building a terrace requires capital, and a terrace ultimately removes farmland from production, thereby decreasing the amount of farmable land and decreasing profits. However, part of the problem is due to the fact that farmers and policy makers make economic decisions without a true understanding of the processes involved; what

[30] Ibid.
[31] Will Hoyer, "Agricultural Drainage and Wetlands: Can they Coexist?" Iowa Policy Project (2011), retrieved from http://www.iowapolicyproject.org/2011docs/110622-wetlands.pdf.
[32] David R. Krog et all, "Effects of Livestock enterprises on the Economics of Soil and water Conservation Practices in Iowa," *Center for Agricultural and Rural Development* Report 112, SWCP Series V (1983).

appears to be a straightforward economic relationship between conservation efforts and financial cost is not nearly as simple as it appears.

The majority of the problem arises for a single reason: it is difficult in general to evaluate the long-term consequences of our actions, especially when those consequences do not specifically pertain to us directly. [33] To put it plainly, we do not fully comprehend or appreciate the costs, economic or otherwise, of *not* undertaking conservation efforts. A true cost-benefit analysis of any given situation must include the costs of and benefits of both *taking* a certain action and of *not taking* a certain action, and many times farmers and policy makers simply discount one half of this complicated process.[34] They fail on two fronts: they fail to account for the possible costs of *not* undertaking conservation efforts, and they fail to account for the benefits that those conservation efforts might provide over the long-term.

One possible cause for this failure of comprehension is the fact that the long-term economic costs of nonpoint-source pollution and soil erosion are difficult to measure, especially in relation to specific phenomena. It is difficult to calculate and quantify the total cost (i.e. damage) of nonpoint-source pollution for a variety of reasons, not the least of which is the fact that the pollution originates from a variety of sources over an uncertain period of time.[35] In general, however, there are two main categories of costs that can be associated with nonpoint-source pollution: agricultural costs and societal costs. Both of these costs are important and both can be severe, but in general farmers do not incorporate societal OR agricultural costs into their short- and long-term planning.[36] It is similarly difficult for policy makers to defend policies

[33] Lois Wright Morton and Chih Yuan Weng, "Getting to Better Water Quality Outcomes: The Promise and Challenge of the Citizen Effect," *Agricultural Human Values* 26 (2009): 83-94.
[34] Pope et al, "The Economics of Soil and Water"
[35] Ikerd, "Who Pays the Cost"
[36] Pope et al, "The Economics of Soil and Water"

based on societal costs due to the often-times abstract nature of those costs. However, several agricultural and societal costs *can* be identified and measured to some extent.

The agricultural costs and benefits of nonpoint-source pollution and nonpoint-source pollution control are, in general, easier to measure than the societal costs. Much of these costs have to do with the nature of nonpoint-source pollution itself. For instance, in Iowa much of the nonpoint-source pollution is often comprised of what is termed "nutrient contamination," mainly nitrogen and phosphorous.[37] This contamination is due to the fact that nitrogen and phosphorous are both vital to the high-yield row crop production of corn and soybeans, which combined make up the vast, vast majority of Iowa agricultural production. As a result, farmers apply nitrogen and phosphorous directly to their fields, oftentimes at higher concentrations than necessary.[38] In fact, some research has suggested that simple and cheap soil tests can help reduce nutrient application because farmers often discover that the soil already has a sufficient level of nitrogen and phosphorous.[39] In addition, farmers usually apply fertilizer in the late fall after crops have been harvested and the early spring before anything has been planted. The lack of any root systems in the ground greatly increases the risk of soil erosion and nutrient runoff.[40]

Another practice that greatly affects soil erosion and nutrient contamination is a staple of the Iowa agricultural landscape: subsurface drainage tiling. As discussed previously, subsurface drainage tiling can be found all over Iowa and much of the Midwest. Designed to funnel excess water away from row crops, subsurface drainage tiling necessarily increases the amount of soil erosion taking place over any given parcel of land.[41] Due to the direct application of nitrogen and

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[37] Andrea Heffernan, Teresa Galluzzo, Will Hoyer, "Sollution to Pollution: It Starts on the Farm," *Iowa Policy Project* (2010), retrieved from http://www.iowapolicyproject.org/2010docs/100927-nutrients.pdf.
[38] Ibid.
[39] Ibid.
[40] Ibid.
[41] Ibid.

phosphorous, this increased sediment load is also rich in nutrients. The end result is that farmers end up purchasing and applying nutrient fertilizer that simply gets washed away into the local watershed, amounting to wasted resources both in terms of time and money.

In addition to the short-term cost of loss adding excess and transitory nutrients to their fields, farmers should also be concerned with the long-term viability of their farms. As discussed, tiling and other row cropping practices also create a large risk for soil loss. Iowa has some of the best farm soil in the world, but that soil is still a nonrenewable resource, at least on a human timescale. However, we often fail to treat the soil as such, resulting in chronic degradation that will eventually threaten the viability of the agricultural sector. The result is that while farmers and policy makers are hesitant to implement conservation efforts that they deem economically expensive, what both sides often fail to understand is that in the extreme long-term undertaking certain conservation efforts may actually be more economically beneficial than *not* undertaking those same efforts.

Overall, accurate cost/benefit analysis and comprehension is extremely important. In short, there is much public resistance to conservation policy because it is assumed that such conservation efforts are expensive. Oftentimes this is true, but it must also be noted that farmers and policy makers often fail to take a wider view of the full costs and benefits of *not* undertaking such conservation efforts. And although there are perhaps more fundamental reasons for Iowa's lack of effective and sufficient water policy (as will be discussed later), this is perhaps the area in which it is easiest to affect a change. Education on the long-term economics of the situation could make a significant difference in terms of farmer attitudes towards conservation efforts and conservation policies. Likewise it is clear that any policy that seeks to address nonpoint-source

pollution or any similar conservation issue must consider in detail the economic situation and reasoning of its target audience, in this case namely the farmers themselves.

Perhaps even more difficult to measure than the agricultural costs and benefits of water conservation efforts are the societal costs and benefits of taking or not taking certain actions. For example, there are always commercial concerns when considering water contamination; if nothing else, the recreational value of the water is necessarily reduced due to any sort of contamination.[42] As with anything, this commercial devaluation is most apparent in an extreme example: the hypoxic "dead zone" in the Gulf of Mexico. A failure to undertake a given conservation effort could increase this commercial devaluation, ultimately creating a cost of *not* acting that could possibly offset the economic cost of undertaking the conservation effort. Similarly, undertaking such a conservation effort could actually result in increased commercial value to waterways; this could be considered a benefit of undertaking a given conservation effort. Similar to the agricultural costs and benefits, farmers and policy makers often fail to take both the costs and benefits of acting and not acting into consideration. Unlike the agricultural costs and benefits, however, the societal costs and benefits can extend beyond what could normally be considered "economics." Furthermore, it can be extremely difficult to measure these costs, many of which are extremely long-term, and it can be even more difficult to tie them to one specific type of pollution or pollution event.[43]

An example of this phenomenon is human health risk. It is easy to imagine a situation in which a certain contaminant results in adverse health effects among a given population. In such a situation the health costs of that contamination are fairly easy and straightforward to measure. In the case of nonpoint-source pollution, however, there is no specific contaminant that can be

[42] Ikerd, "Who Pays the Cost"
[43] Ibid.

explicitly tied to any given health effect.[44] The result is that the health costs of nonpoint-source pollution are extremely difficult to measure, especially in the case of tying certain health costs to certain types of nonpoint-source pollution. This variety of pollution sources and effects is one of the primary drivers behind the general lack of understanding of the true costs and benefits of conservation; in order to be able to conduct a true cost/benefit analysis, farmers and policy makers must be able to understand the true costs of nonpoint-source pollution itself. In other words, the costs of *not* undertaking conservation efforts must be understood in order for the benefits of those conservation efforts to be truly apparent.

In addition to the actual costs and benefits of undertaking certain actions, there can also be a detrimental influence on the development of policy due to a lack of understanding concerning who pays the various costs and who benefits. General public support is often in favor of an industrialized and production-focused agricultural sector as the economics of that sector often appear to benefit communities and states as a whole. However, when considering ALL of the costs and ALL of the benefits this may not be the case. For example, it is not uncommon for the majority of the costs of nonpoint-source pollution to fall upon the wider population rather than the agricultural producers.[45] The agricultural producers and the corporatized "agribusinesses" continue to profit in the short term from increased production, and so they continue to have a perceived disincentive to avoid conservation efforts that might curb nonpoint-source pollution. Meanwhile society as a whole continues to pay the costs of that pollution, relatively unaware that the agriculture-pollution-society relationship is ultimately a net cost. Ultimately policy makers and our society as a whole is extremely aware of the possible costs of increased conservation, such as increased food or fuel prices, but they are relatively unaware of

[44] Ibid.
[45] Ibid.

the costs of *not* undertaking conservation efforts or of the benefits of undertaking those conservation efforts. There is an economic and financial misperception that conservation is simply too expensive to pursue, or that policy in general is too expensive to be effective. The real question, then, is *why* this perception exists. And to answer that question it became necessary to look beyond the economics and into the underlying culture.

Culture is so powerful because it is omnipresent; we all live within one culture or another, whether we know it or not.[46] Culture influences us in ways that are difficult to measure and even more difficult to counter. Thus it should not be surprising that culture plays such an important role in the development and implementation of policy. There are several cultural factors that have influenced our failure to address nonpoint-source pollution through public policy. First and foremost is the fact that regulation is and always has been an extremely volatile subject in the United States, especially where land and property is concerned. Second is the fact that nonpoint-source pollution may not directly affect those doing the polluting, and without that direct contact with the effects of pollution there is relatively little public interest in solving the problem. Third is the fact that we are not good at comprehending the inherently complex and long-term relationships between nonpoint-source pollution, our actions, and the global effects of that pollution. When taken together, these three factors have significantly hindered the development of sufficient policy in Iowa.

As a nation, the United States has almost always been concerned with individual rights and the ability of the government to interfere with those rights. The first ten amendments to the U.S. Constitution, known collectively as the Bill of Rights, codify this idea that our individual

[46] Michal Sahlins, "Two or Three Things I Know About Culture," *The Journal of the Royal Anthropological Institute* 5.3 (1999): 399-421.

liberties need protecting from the government. When looking for examples of this phenomenon, nowhere is perhaps more viable for consideration than property and land ownership. Many of the existing ideas of private property ownership in the United States originate from John Locke's *Two Treatises on Government.*[47] In his *Treatises* Locke lays out a theory of property as a natural right derived from labor. Eventually Thomas Jefferson would borrow this idea of property as a right for both the U.S. Declaration of Independence and the U.S. Constitution, and overtime this idea has morphed into something that it was perhaps never intended to be. Locke's idea of property of a right was limited in that it was not an absolute right to do completely as one wished; while property for Locke conferred both the powers of exclusion and control, it also included provisions for adequate usage and wastage.[48] In our current system, however, this idea of property as a "natural right" has transformed into something else entirely: an absolute right to do with our land as we please without government interference. Add to this fact that the vast majority of the land in the U.S. is privately held, and regulating land via public policy becomes extremely difficult—especially when those individuals who are most directly affected by such regulations (e.g. farmers) have their very identities and livelihoods tied deeply to the land that they and their families have owned for generations.

Much of the problem arises from the fact that historically we have tended to view land solely as a private good.[49] In fact, private interests in land are explicitly protected from government interference by the 5th Amendment to the U.S. Constitution. It is partially this separation of the public and private spheres that creates such a difficulty when attempting to deal with ecological issues; we simply do not think about our private actions and our privately owned

[47] Grant, Elizabeth Michelle, "Private Property in America: Land Use and the Ethics of Owning Land" (M.A. thesis, University of North Texas, 2005), retrieved from http://www.cep.unt.edu/theses/grant.pdf.
[48] Ibid.
[49] Ibid.

land affecting the greater public and/or social good. This culminates in the fact that those qualities that make one a good private land owner do not necessarily lend themselves to an ecological conscience or "land ethic," both of which are rooted in long-term sustainability of the whole: the greater good.[50]

Why is this view of land ownership so detrimental to agricultural policy in Iowa? Because as mentioned previously, public policy is most effective when driven by the public interest and/or outcry. Public opinion is of the utmost importance, and when we hold inherent views of land ownership that disfavor regulation of any kind, public opinion for any sort of regulatory environmental policy necessarily suffers greatly. In general, land owners resent having any outside force, especially the government, tell them what to do with their land, and as a whole the public tends to sympathize with them when the government tries. Having spoken with several farmers, it is easy to recognize the fact that even the most conservatively minded land-owner may resent government regulation or intrusion into his land. As a result, any policy that seeks to regulate environmental issues must also seek to address this problem; in other words, it must seek to educate and inform in an attempt to develop the sort of "land ethic" or conscience that will generate greater public support.[51] We must move past the perception that private actions affect only the private sphere, and we must cease to view water quality issues as solely individual concerns.[52] Until we can do this, the resentment of regulation and of government that runs through our society will continue to adversely affect any policy that we attempt.

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[50] Ibid.

[51] Ibid.

[52] Comito, Jacqueline, Wolseth, Jon, and Morton, Lois Wright, "The State's Role in Water Quality: Soil and water conservation district commissioners and the agricultural status quo," *Human Organization* 72.1 (2013): 44-54.

In addition to this cultural predisposition towards distrust is the problem of distance, both geographical and temporal. It is perhaps common sense that we pay the most attention to those things that most affect us personally. Something that affects us directly is much more difficult to ignore and rationalize away than something that we do not necessarily have to confront on a regular basis; this is true for pollution as well. For example, point-source pollution often affects the immediate area in which the pollution occurs, prompting public concern and eventually action. Nonpoint-source pollution, however, does not usually have such an immediate and direct effect on the localities that are most responsible for the pollution.[53] This is especially true in Iowa, where many of the most severe effects of nutrient pollution occur hundreds, if not thousands, of miles downstream. Thus, because there is a lack of widespread concern or interest in nonpoint-source nutrient contamination, there is also a lack of public policy concerning the issue.

In addition to the geographical remoteness of the effects of nutrient contamination, there is also a temporal remoteness that must be considered. Oftentimes the effects of pollution can be relatively immediate; an oil-spill, for example, creates immediate and visible consequences that are readily apparent to all. With nonpoint-source nutrient contamination, however, this is not always the case. In fact, the effects of runoff pollution can lag behind the actual act of pollution by up to two years. This creates further problems in identifying the source of the pollution after so much time has passed, but it also dulls our awareness of the consequences of our actions. In the end, if we are not confronted with the immediate consequences of our actions, then we are not likely to mobilize at levels sufficient enough to solve the wider problem.

[53] Ikerd, "Who Pays?"

That is not to say that the problem is completely ignored at every level; discussions with farmers have revealed that while there is certainly some level of awareness about the problem, economic concerns and the other cultural barriers detailed here still impede public policy at a state level. Some farmers even seemed extremely aware of the problem of nonpoint-source pollution, but yet they seemed reluctant to undertake measures that would begin working to solve the problem. But while the economic concerns that go along with conservation could possibly be allayed through grant programs and similar funding, there is no guarantee that economic incentives will ever be enough to make conservation popular.[54] In fact, oftentimes the biggest sources of nutrient contamination are large, corporate farms that do not necessarily need economic incentives in the first place. Adding to the problem is the fact that farmers tend to reinforce with each other, convincing each other that their conservation methods are adequate.[55] Given all these factors, the issue of the urgency and immediacy, or rather the generally perceived lack thereof, creates a significant barrier; without education on and comprehension of the severity of the problem, it may prove difficult to ever legislate on this issue directly and with the widespread public support necessary for such policy to be truly effective.

Compounding the issues of resentment towards regulation and a lack of a direct, measurable effect is the fact that both the problem of nonpoint-source pollution and its solutions are necessarily complex. Ultimately, this is perhaps the most significant and prolific barrier to public policy concerning nutrient contamination. And while this idea overlaps with information discussed in the economics section of this research, the problem of complexity extends beyond the economic and financial realm. As mentioned, the complexity within this issue is two-fold: the complexity of the problem and the complexity of the solution. It is only by addressing both of

[54] Morton, "Getting to Better Water Quality"
[55] Ibid.

these complexities that true progress can be made in regards to public policy, but there are several barriers that prevent both understanding and action where nonpoint-source nutrient contamination is concerned.

The problems with nonpoint-source pollution are myriad, and most have been discussed in some detail already. From cost/benefit analysis to culpability determination, decisions surrounding are nutrient contamination are fraught with uncertainty.[56] What has not been discussed thus far, however, is the altogether separate complexity surrounding Iowa's lack of effective policy. Beyond the perhaps confusing science of nutrient contamination, and beyond the general lack of appreciation for the severity of the problem, is the fact that our current system is simply not well equipped to solve the problem. For while the nature of nonpoint-source pollution does indeed add a definite layer of difficulty to solving the problem, the existing system surrounding environmental policy and pollution control only adds to the problem. Beyond the

For instance, the current system of agriculture in the United States, and in an agricultural state like Iowa in particular, only works to propagate the conditions that ultimately result in the worst levels of nutrient contamination.[57] Farmers are encouraged by federal subsidy programs and state industry organizations to produce more and more, leading to the already discussed perception that economic viability and conservation cannot coexist. Over time, the agricultural industry has come to expect and even demand these subsidies and policies, and the political power that these various actors wield has made it difficult, if not impossible, for government to extricate itself from this process even if it wanted to. This is especially true at a state level, where certain agricultural business organizations and industry interest groups wield a startling amount

[56] Comito, "The State's Role in Water Quality"
[57] Riessen, "Water planning"

of influence. This sort of climate makes quick and immediate change all but impossible, and it severely limits the lengths to which politicians are willing to go in pursuit of effective public policy. In short, the current climate surrounding agricultural and environmental policy in general raises the political cost of policy to the point of unattainability.

Perhaps even more damaging to the pursuit of effective public policy is the fact that the existing public policy is complex, confusing, and often outright contradictory. The end result is that farmers and citizens do not really understand what they can or need to be doing in terms of pursuing conservation efforts.[58] The majority of this complexity and contradiction originates in the interactions between the federal, state, and local governments. In recent years, the federal government has begun to take more and more of an interest in environmental issues, starting in the seventies with the original passage of the Clean Water Act and the Clean Air Act.[59] However, for the most part the federal government has proven hesitant to act outright, often relying on the states to execute and enforce federal standards within their own borders. As can be expected, this generates tension between the states and the federal government, and raises a variety of constitutional efforts related to federalism. The end result, however, has been that states are often stuck with the cost and the blowback for federal policies that both focus on protecting the environment and maximizing yields—two philosophies that are not necessarily the most compatible.[60] Local governments, who are in Iowa responsible for enforcing the majority of the existing conservation policy and regulations, often get caught in between. Unable to affect policy themselves, these local governments are forced to wade through quagmire that is the battle between the state and federal governments in order to achieve some sort of consistency.

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[58] Comito, "The State's Role"
[59] Jack Riessen, "Comprehensive water planning in Iowa: Past efforts," Iowa Department of Natural Resources (2009), retrieved from http://www.iowadnr.gov/Portals/idnr/uploads/water/CompWaterPlan_Past.pdf.
[60] Riessen, "Water Planning"

Of course, policy is an unwieldy tool even in the best of times. In fact, it is not entirely clear if public policy could ever truly deal with the problem of nutrient contamination. For one, policy is difficult to write due to the sheer number of interests playing a role in its creation. Second, policy often seeks the simplest and cheapest solution, and a simple solution to the complex problem of nonpoint-source nutrient contamination simply does not exist.[61] Effective policy requires detail, not just a general identification of a problem. Implementation strategies *must* be considered, as does enforceability and prioritization; if these things are ignored, then even the best-intention policy can fail to achieve much of anything at all. The exiting political climate, however, does not lend itself to these sort of specificities. Political polarization and idealization has resulted in a social and political climate that simply cannot sustain the sort of bipartisanship necessary for effective policy to be survive. If there is one barrier to effective policy in Iowa, and in the nation as a whole, this polarization of the political climate is it.

Overall there are several cultural reasons for Iowa's lack of effective and sufficient policy regarding nutrient contamination. First are our attitudes towards land ownership and towards regulation in general. Going back hundreds of years and ingrained into our collective consciousness is the idea that government regulation is bad and that the freedom to do as one wishes is good. Second is the fact that we are not good at dealing with any issue that we can ignore or otherwise rationalize away, and nonpoint-source pollution falls into that category. Removed geographically and temporally from the effects of our actions, we simply lack the public support necessary for effective public policy. And last but not least is the fact that our current economic and political systems only encourage and proliferate all of the problems associated with our lack of policy, primary of which is our polarized political climate.

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[61] Ibid.

Discussion and Conclusion

The goal of this research was to identify factors and reasons, past and present, which have resulted in Iowa's lack of effective policy concerning agricultural nonpoint-source pollution. This was done through a variety of methods, including a detailed review of existing literature and broad samplings of primary source materials such as newspaper articles and interviews with local farmers. By holistically examining the current and historical climates surrounding Iowa's lack of policy, this research identified a number of factors that have or have had an influence on the sufficient development of such policy.

The first factor that this research identified was the economic primacy of agricultural and the accompanying misperception of cost without benefit. Because agriculture and its associated industries play such an important role in the economies of agricultural states like Iowa, industry organizations and lobbying groups wield a disproportionate amount of influence. As a result, lawmakers are hesitant to enact any policy that might damage or impose costs on farmers and the agricultural industry in general. This provides a significant barrier to policy, but it is even further compounded by the fact that we often over-calculate the costs of conservation and under-calculate the benefits. In other words, both lawmakers and the public suffer from a significant and drastic failure of strategic thinking, or the ability to accurately assess long-term situations and outcomes. Because the effects of the pollution itself and the effects of any actions we take concerning nonpoint-source pollution are so geographically and temporally distant, we have an extremely difficult time relating our actions to those distant outcomes.

This relates to perhaps one of the biggest issues this thesis uncovered: a general lack of public interest or concern. Because the effects of the problem of nonpoint-source pollution are

generally so temporally and geographically distant, the general public does not feel any particular sense of urgency to deal with the problem. This leads to political lethargy on behalf of lawmakers; public policy is often most effective when driven by public opinion, and without that motivator politicians are loathe to broach a generally unpopular topic such as environmental regulation.

Another barrier to policy is the fact that regulation via punishment is quite difficult to achieve. Part of this arises from the fact that there are conflicting policies concerning agriculture in the United States. Some policies, especially at the federal level, encourage farmers to plant as much crop as possible. These subsidies are in direct conflict with much of the conservation-oriented policy, and the result is that punishments imposed upon farmers for failing to meet environmental regulations will probably never outweigh the benefits they receive for shirking those regulations in the first place. Another problem is that farmers tend to reinforce with each other; in other words, farmers who talk to other farmers reassure themselves that the conservation efforts they are undertaking are sufficient—even in those efforts are truly *in*sufficient.

There is, of course, also the issue of a widespread and inherent distrust of government and regulation, especially among conservative-leaning farmers. We tend to view property as private, and we tend to adopt the view that our lands are ours to manage without interference from the outside, especially the government. This is a philosophy that reaches back hundreds of years to the founding of our nation, and it is a philosophy that is extremely difficult to address. This distrust of the government and of regulation in general means that the people, and therefore lawmakers, are extremely hesitant to pursue policies that rely on such regulation. Often seen as

"meddling," these policies are often unpopular and lack the necessary support to be truly effective.

Of course, all of these various factors are rendered moot by the fact that the current political climate precludes the passage of any truly effective policy. The "us vs. them" partisanship that currently rules U.S. politics at all levels of government makes it extremely difficult for controversial or significant legislation to be debated effectively and sufficiently. The result is the passage of incomplete legislation or even no legislation at all. Until the political environment changes to the point where policy can be created, discussed, and ultimately passed effectively and efficiently, policies concerning the actual environment enjoy little hope of ever coming to fruition.

So what does all this mean? First, there are several implications in this thesis for future research. One topic that may be of particular interest is the effect of socialization on farmers. In other words, how does educating farmers on the long-term and widespread consequences of their actions affect those actions? Another area of study that would be intriguing is the effect of community involvement on conservation; some of the research done for this study indicated that wider community involvement, rather than the involvement of a select few individuals, would be more effective in generating conservation efforts that were sustainable and effective. Research also needs to be done into the consolidation of existing policies, many of which overlap or are even contradictory, into a more cohesive body that can be easily understood by farmers and enforced by lawmakers.

As with any research project, this particular thesis had flaws and limitations. First is the fact that this study was extremely qualitative in nature, relying on interpretation and personal analysis for all of its major conclusions. While such interpretation is inherently suspect,

supporting and corroborating evidence from numerous secondary sources suggests that this research is on the right track. In addition, this research was necessarily broad. It covered a wide array of topics, but did so in a relatively shallow nature. Due to the breadth of the topics discussed it was ultimately unfeasible to go in-depth into any particular aspect, although this is a problem that could be addressed by future research.

Despite these limitations, it was possible to provide insight into several lessons concerning nonpoint-source pollution and policy. First is the issue of coherency; as mentioned at several points throughout this thesis, the conflicting and contradictory policies between and within the various levels of government (e.g. state and federal) are extremely damaging to any environmental conservation effort. In order to generate truly successful and effective policy, there must first be a reconciliation of these policies into a more unified, coherent platform. Second, and perhaps most important, is the issue of education. Farmers, lawmakers, and the public should be educated about the true costs and benefits of conservation; it is through education, not regulation, that truly effective policy will work. Similarly, farmers need to be made absolutely aware of what options are available to them and what is required of them. One farmer I spoke to stated clearly and unequivocally that there was no money available to him to pursue conservation. He stated multiple times that the costs fell on his shoulders, indicating that he was simply not aware of various opportunities available to him, such as cost-sharing programs. Likewise, each of the farmers I spoke to seemed to have a somewhat different interpretation of the conservation requirements that they had to abide by. Clearing up this confusion would be a huge step towards more effective and efficient conservation and policy.

Finally there is what I have termed “de-politicalization.” In today’s politically charged atmosphere, almost every issue becomes partisan in nature. The contrariness inherent in our

system prevents true dialogue and compromise. Water quality, however, is not a political problem, but a human problem. We must begin to think of it as a problem that *all* of us face, and we must acknowledge that we have no choice but to face it. Ignoring the problem is not going to make it go away, and so we must work to eliminate those excuses that let us rationalize away our actions and mitigate our responses. For while the problem of nonpoint-source pollution in Iowa is serious and growing, and while policy has heretofore been ineffective in dealing with the problem, there is still hope. Despite its limitations, policy is still a powerful tool for change in our society, and hopefully the lessons generated by this research can provide insight into how to create policy that truly works to protect the incredibly valuable resource of clean, usable water.

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