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National Pollutant Discharge Elimination System for CAFO Regulation in Michigan and Illinois

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Abstract

Concentrated Animal Feeding Operations (CAFOs) are large-scale farms that cause significant environmental degradation and contamination through the discharge of their waste. National Pollutant Discharge Elimination System, or NPDES, permits are one way that states set their own standards for CAFOs; the permits regulate the wastewater and manure discharged by CAFOs. The level of stringency for these NPDES permits varies by state. This paper analyzes typical case studies of the NPDES permitting process in two different states, Michigan and Illinois, and the agencies each state employs for its CAFO regulations. It finds that the NPDES permitting process in Michigan and Illinois are similar in structure, however Michigan's permits themselves implement stricter environmental protections and take a longer timeline to be approved. With its stricter standards, Michigan's regulatory agency has faced stronger pushback from farmers while Illinois's looser regulations have lended themselves to a collaborative relationship with the state's Farm Bureau. These findings have implications in the way regulations can influence the relationship between regulatory agencies and their respective industries.

Introduction

Concentrated Animal Feeding Operations, known as CAFOs, present a severe and harmful environmental impact on their local communities, water systems, and air quality. These operations raise animals in high-density, confined settings and discharge animal waste into waterways (Hribar, 2010). CAFOs contribute to a variety of environmental issues; one of the most significant of which is the disposal of manure. Since these operations are large by definition they produce overwhelming amounts of waste each year, often significantly more than major U.S. cities (Hribar, 2010). This manure gets utilized or stored in different forms including as fertilizers or in waste ponds, but it often leaches into nearby waterways and groundwater, contaminating water quality and spreading harmful pathogens. It can also spread excess nutrients into larger bodies of water, causing eutrophication and dead zones. Given these environmental concerns, it is necessary to provide stringent regulations of these facilities to ensure that there are environmental protections for surrounding communities.

CAFOs are regulated under the federal Clean Water Act by the National Pollutant Discharge Elimination System program as a point source of pollution ("CAFO regulations", 2017). Under this law, point sources of pollution require a National Pollutant Discharge Elimination System (NPDES) permit in order to discharge pollutants into water sources within the United States ("NPDES Permit Basics", 2020). Therefore, all CAFOs must attain an NPDES permit, which places limits on what can be discharged and sets requirements for monitoring and public health. These permits are authorized on a state-by-state basis ("NPDES Permit Basics", 2020). States have established their own regulations for CAFOs beyond the Clean Water Act, but each of these policies differ drastically and provide varying levels of control over the operations (Peterka, 2013).

This paper examines CAFO policies in Michigan and Illinois as case studies that represent common characteristics, patterns, and purposes of state regulations. In conjunction with this, it will explore the actors involved in applying for and managing NPDES permits within the two states. Conducting this case study demonstrates a broad, typical example of how states regulate CAFOs through their own NPDES permitting systems.

Literature Review

There has been a limited amount of research conducted that compares CAFO policies among states. Much of the literature regarding CAFO policies focuses on one part of the policymaking process, analyzes stakeholders in the policymaking process, or are case studies about CAFOs in the broader realm of environmental policy issues. This leaves a gap for further research that analyzes the specifics of state CAFO policies and how states manage NPDES permits. Before moving into that research, it is important to understand the background literature surrounding the issue.

Designing state CAFO policies is heavily influenced by public comments, industry stakeholders, and advocacy groups. Public comments, whether they come from individuals or experts, are an important part of the policymaking process. Previous research has found that private citizens often provide a greater number of comments on legislation over industry or advocacy groups during the rulemaking process, but industry comments are more technical and helpful to lawmakers (Crow et al., 2016). This paper also found that meetings with industry stakeholders prior to drafting rules are common, and that these meetings have a strong influence on policy making (Crow et al., 2016).

It is common for CAFO policies to receive public comments before they are enacted, whether they be supportive or against the proposed policy. Many factors drive public support for regulations related to CAFOs and their opinions on the importance of government regulations in this sector. Guo et al. (2021) tested this in Ohio by analyzing individuals' opinions on farmer autonomy, accountability of farmers, and support for fines on excessive agricultural runoff from farms in conjunction with their political ideology and environmental worldview. They found that an individual's environmental worldview, but not necessarily their political ideology, is an important element that drives support for regulations of agricultural runoff. This perspective influences people's thoughts on farmer autonomy and external accountability, which are also key factors in determining public support for these regulations (Guo et al., 2021).

In addition to playing a role before regulations go into place, the public also influences CAFOs and their processes after regulations take effect. Given the large amounts of pollution and waste generated by the operations, public health issues are a common concern of citizens. Previous research has found trends in how states respond to public health concerns arising from CAFOs (Fry et al., 2014). In general, state agencies have not taken strong actions to prevent or respond to these public health concerns, often due to the narrow scope of regulations for CAFOs, lack of knowledge within the agencies about how to address the concerns, and lack of resources to deal with the issues (Fry et al., 2014). These trends indicate that CAFO regulations are often not stringent enough to address public health issues that arise from them.

When regulations and rules for CAFOs are stricter, however, there is evidence that this influences their practices. In Minnesota, an additional siting restriction was implemented in 2000 which mandated that CAFOs must be located a farther distance from bodies of water than prior regulations mandated. A study of this new restriction found that CAFOs in Minnesota permitted

after 2000 had a larger distance from bodies of water than those permitted prior, and concluded that distance between CAFOs and surface water increased after the new siting restriction was put in place (Brands, 2014). These findings indicate that policy change can influence CAFOs to help reduce water contamination and mitigate their harmful environmental impacts.

There are further ways for states to improve their agricultural practices. Research has been conducted in this area in order to understand the best management practices in the agricultural sector. The major findings of this research include the need for practical implications of their work through policy regulations such as subsidies and taxes, and the important role that agricultural and public health stakeholders play in creating policy guidelines that have demonstrable effects (Domingues Martinho, 2019). Using this insight can help policymakers develop better policies to regulate CAFOs to a safe and feasible extent.

Given the many different stakeholders and management practices involved in CAFO policies, these regulations have been found to vary among states in many ways. Using a model based on policy scope and stringency, Koski (2007) found that there are large discrepancies between different state regulations of CAFOs with many different factors to consider, such as how to mitigate water pollution, how many provisions are included in a state's CAFO code, and whether or not to classify them as a point source of pollution. This research categorized state CAFO policies in order to understand how broader environmental policies differ among states. Koski (2007) demonstrated that there are significant differences among state CAFO policies, but did not analyze the common trends of these policies, as this paper seeks to do.

Previous research conducted about CAFO policies analyzes the policymaking process and the actors involved in it (Crow et al., 2016), public opinion on policies (Guo et al., 2021), the impact of state regulations on the operations (Domingues Martinho, 2019; Brands, 2014; Fry et

al., 2014), and differences between state policies (Koski, 2007). This leaves a gap in the literature that does not explain the typical process of applying for and managing NPDES permits, nor what these permits entail. This paper fills in that gap, looking specifically at Michigan and Illinois, in order to answer the question: what are common characteristics and purposes of state CAFO policies and who is involved in managing these regulations?

Methods

The main approach to answer this question is to analyze a case study of two typical states that approve and manage NPDES permits: Michigan and Illinois. After conducting background research into the NPDES permitting process in all of the Great Lakes Basin states, it is apparent that both Michigan and Illinois are representative examples with common NPDES permits and CAFO regulations through these permits. NPDES permits are an important aspect in regulating CAFOs at the state level, and looking into typical examples of the specifics of these permits is helpful in understanding how states manage CAFOs and the waste they produce (Seawright & Gerring, 2008).

This paper analyzes a number of factors that influence CAFOs and state CAFO policy. These include the CAFOs present in each state, the influence that the agricultural sector has on the state economies, and the amount of land used for animal agriculture in each state. These factors are depicted in Figure 1 (USDA, 2017).

State	**Michigan**	**Illinois**
Number of CAFOs	272	42
Total land in farms (acres)	9,764,090	27,006,288
Total farm-related income	$316,717,000	$879,724,000

Figure 1: CAFOs, farmland, and farm income in Michigan and Illinois

Although there is more farmland and farm-related income in Illinois, there are more CAFOs in Michigan. Illinois farms are more concentrated on crops and agriculture rather than livestock.

First, this paper examines the general NPDES permits in both Michigan and Illinois to provide an understanding of the function of these permits and the process of obtaining one. NPDES permits are the main regulatory document on CAFOs and their waste disposal; they hold a great deal of importance in what CAFOs can and cannot do in their facilities. These permits also have a significant weight on the environmental impact that CAFOs will have on the surrounding land and water in their area, so it is important to comprehend the specifics of what they require from the facilities they regulate. The process of applying and being approved for an NPDES permit is similar in each state; this case study provides insight into the procedures CAFOs must follow in order to obtain one and legally run their operations. Data regarding these permits will be obtained through the websites of the agency in each state with jurisdiction over CAFOs and NPDES permits. They have information about the permitting and application process, as well as a copy of the general NPDES permit granted to many of the CAFOs in their state.

Another framework that this paper considers is the actors involved in the NPDES permitting process in Michigan and Illinois. These actors include the CAFOs themselves, public individuals that provide comments in the permitting process, and the regulatory agency that has jurisdiction over CAFOs in each state. Data regarding these actors will be taken from numerous sources. These sources include ArcGIS, an online geographic information system with data on CAFOs in Michigan, as well as a report by the Sierra Club on CAFOs in Michigan, and data from the Illinois EPA disclosing CAFOs in its state. Public comments can be found on the

regulatory agency websites and in newspaper articles. Information about the regulatory agencies in each state will be obtained through their websites.

These actors are important for numerous different reasons. First, CAFOs are the entities being regulated and have utmost importance in filing for an NPDES permit and being regulated by it. As mentioned by previous literature on the subject, public comments are common and impactful in the policymaking process, just as they are in approving and administering NPDES permits. Finally, the agency that regulates CAFOs and authorizes NPDES permits is a key actor for state CAFO policies, as they are the body that provides and manages these regulations. In Michigan the Department of Environment, Great Lakes, and Energy has jurisdiction over CAFOs and approving NPDES permits; in Illinois this responsibility lies with the Illinois Environmental Protection Agency. These agencies represent typical departments that manage CAFOs in their respective states.

Results and Analysis

NPDES Permits

In Michigan, all facilities that qualify as Concentrated Animal Feeding Operations must acquire an NPDES permit in order to discharge wastewater into surface waters of the state. In essence, this means that all CAFOs are required to apply and be approved for an NPDES permit in order to get rid of their waste (EGLE, 2021b). Michigan's system for applying for and managing these permits is an online site called MiWaters, which is where all applicants and permit holders must go in order to see their permit and get information and updates on its status (EGLE, 2021a).

The process of applying for an NPDES permit in Michigan begins at least 180 days before the applicant intends to use their permit. This application includes a number of details and specifics for Michigan's Department of Environment, Great Lakes, and Energy (EGLE) to consider (*National Pollutant,* n.d.). The following list encompasses the requirements necessary in Michigan's NPDES permit application:

1. A thorough description of wastewater and facility
2. A water flow diagram
3. A map of the facility and discharge location
4. A list of adjacent property owners
5. Appropriate signatures
6. New or increased discharge locations must include a) an Antidegradation Demonstration or b) an Antidegradation Exemption
7. A Comprehensive Nutrient Management Plan for CAFOs

The Antidegradation Demonstration must be justification for the facility's proposed discharge and a demonstration that it will comply with the regulations on its discharge. It must also explain why its proposed discharge is necessary; this can either identify social or economic benefits that would come from the permit and its approval. In contrast, the Antidegradation Exemption is submitted for a temporary or responsive discharge, such as one conducted to protect human health or the environment (*National Pollutant,* n.d.). CAFOs applying for an NPDES permit are required to submit a Comprehensive Nutrient Management Plan that outlines the limitations of the CAFOs discharge and the implementation of the plan to minimize runoff and overflow (Alexander, 2020). Once the application has been submitted, the Department of Environment,

Great Lakes, and Energy has 180 days to develop a permit for the facility that respects all state and federal guidelines.

The permit that is developed will include either water quality effluent limitations or treatment technology effluent limitations, whichever is the more stringent. Water quality effluent limitations are defined by EGLE as "a value determined by selecting the most stringent of the effluent limits calculated using all applicable water quality criteria (e.g., aquatic life, human health, and wildlife) for a specific point source to a specific receiving water for a given pollutant" (*National Pollutant,* n.d.). These water quality limitations and calculations include measurements of bacteria, dissolved oxygen, pH, phosphorus, and temperature of the surface water and discharge location. Treatment technology effluent limitations are defined as "a permit limit for a pollutant that is based on the capability of a treatment method to achieve a minimum level of performance", based on federal standards for the discharge categories (*National Pollutant,* n.d.).

The draft permit developed by EGLE is then sent to the applicant, who has between two and three weeks to review the permit. After this period, the permit is opened up for a public commenting period for thirty days. During this time interested parties can make comments on the permit and request public hearings or meetings to discuss it. After public commenting, EGLE considers the concerns brought up by the public, evaluates and adjusts the permit, and makes the final decision to either approve or deny the permit. Finally, within sixty days of this decision any party can petition for a contested case hearing about the permit outcome. If the permit is approved, it can last up to five years (*National Pollutant,* n.d.) Figure 2 provides a visual demonstration of the timeline of the NPDE permit process in Michigan.

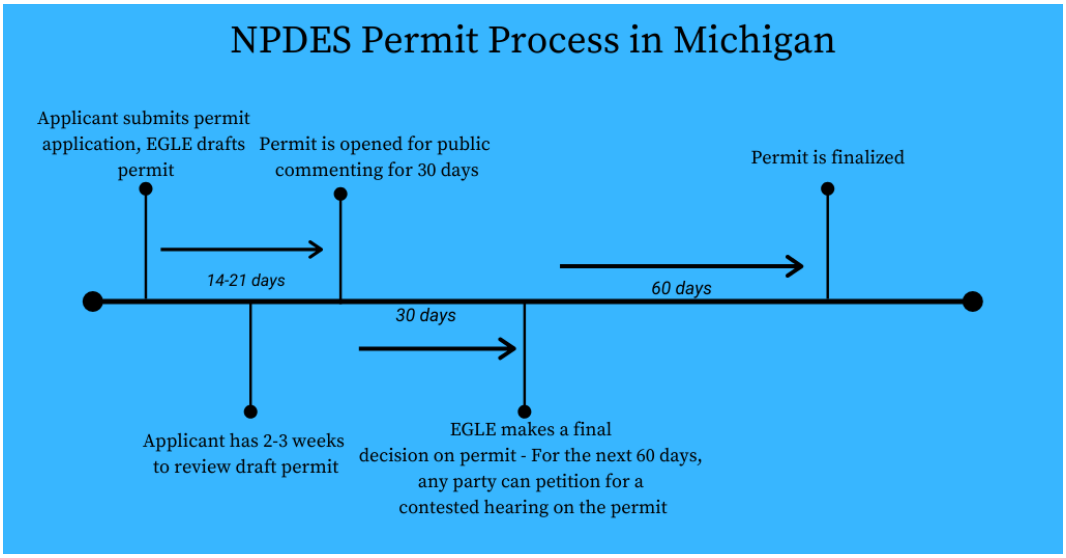

Figure 2: Timeline of the NPDES permitting process in Michigan

In Illinois, there are similarities and differences in the NPDES permitting process and the content of these permits. Like in Michigan, all CAFOs must apply and be approved for these permits in order to discharge wastewaters. The discharger must submit a permit application to be reviewed by the Illinois Environmental Protection Agency (EPA), who will determine if the facility falls under the general NPDES permit. If they do, a thirty-day Public Notice period begins for public comments to be made about the permit and facility at question. If they do not, an individual permit will be developed in coordination with the applicant. After the thirty day public comment period, the EPA can issue coverage to the facility under the general NPDES permit (Illinois EPA, 2021a). Figure 3 below illustrates the NPDES permit timeline in Illinois.

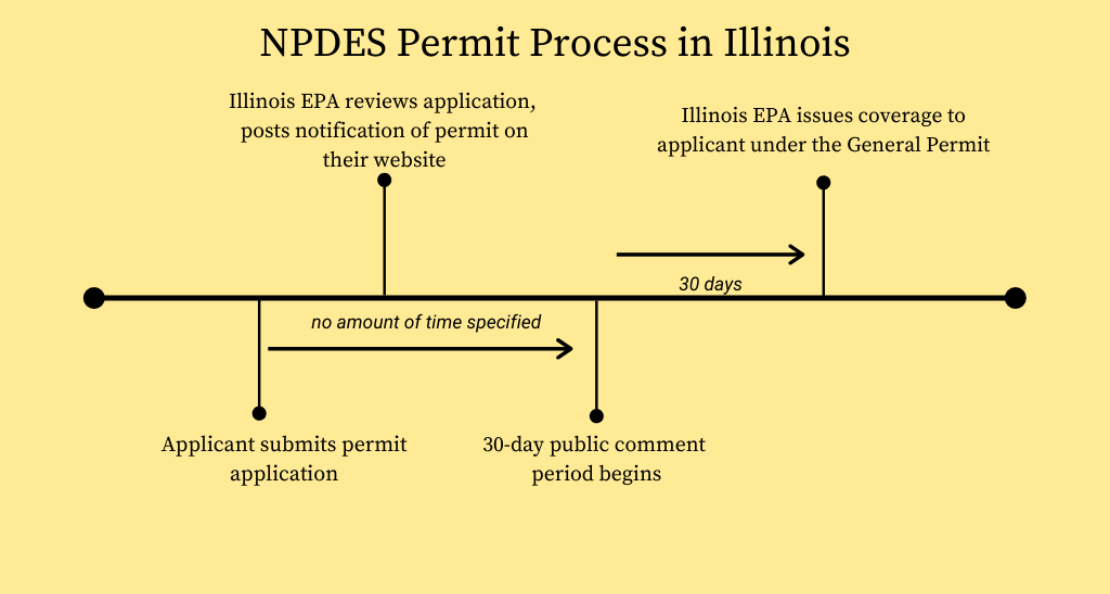

Figure 3: Timeline of the NPDES permitting process in Illinois

Additionally, facilities must submit a number of plans and information in their application in order to be approved. The following is a list of requirements for an Illinois NPDES permit application:

1. Submit a topographic map indicating the locations of the livestock waste management facilities
2. Demonstrate livestock waste land application areas
3. Develop a Nutrient Management Plan
4. Develop a Stormwater Management Plan
5. Develop a Spill Control and Prevention Plan

The Nutrient Management Plan must specify that the facility will not discharge waste into waters of the state and consider limitations on the land they can apply manure to at different times of year, the amount of phosphorus in the surrounding soil, slope of the land, and distance of stored and applied manure from a water supply (Keller, 2009).

The NPDES permitting process in Michigan and Illinois have many similarities. As two typical case studies for these types of permits, they demonstrate standard models for the way these permits are issued and managed. Both Michigan and Illinois require all facilities deemed Concentrated Animal Feeding Operations to obtain a permit, which is supported by federal requirements. Additionally, both Michigan and Illinois administer a 30-day public commenting period for outside parties to provide input on the NPDES permits. This period allows other parties to make arguments about the proposed permits and gives the public a chance to have their voice be heard in the matter. As demonstrated through previous research, these public comments are important and common in the policymaking process (Crow et al., 2016), but regulatory agencies often do not have the resources to address most of the concerns (Fry et al., 2014).

The applications for NPDES permits in both states also require similar content to be disclosed: maps of the facility and discharge plan, demonstration of intent for the discharge, and justification of the applicant's plans for the discharge waste. However, this justification of the waste comes in different forms in Michigan and Illinois; in Michigan it is demonstrated through the Antidegradation Demonstration or Exemption and the Nutrient Management Plan, while in Illinois it is demonstrated in the Nutrient Management Plan, Stormwater Management Plan, and Spill Control and Prevention Plan. The recommendations and implementation of the Nutrient Management Plan are important factors that structures and regulates the discharge coming from CAFOs. The content of these plans is, to some degree, left up to the discretion of the facility and the state regulatory agency, however federal limitations do provide a standard basis for them.

There are some differences between NPDES permits in Michigan and Illinois as well. On its website Illinois places more emphasis on general NPDES permits that encompass many facilities' operations, while Michigan focuses on individual permits that are developed on a

site-by-site basis. Michigan's website also outlines more specific regulations for water quality and treatment technology effluent limitations, while Illinois demonstrates the basis for these through its general permit, a pdf of which is available to view on its website. Although their method of putting forward these restrictions is different, both Michigan and Illinois demonstrate the limitations their NPDES permits impose on CAFOs.

The process of applying for and acquiring a permit is also different in Michigan than in Illinois. Michigan's process is lengthier and has more steps; first the applicant applies, then waits for their permit to be developed, reviews their draft permit once it is ready, confirms it and opens it up to public comment, then EGLE adjusts the permit as necessary and makes the final decision whether or not to approve it. In Illinois, on the other hand, the application is submitted, then the Illinois EPA reviews it to determine coverage by the general permit, then the public commenting period begins, and after this period the permit can be issued. The processes have similar steps and conclusions, but Michigan outlines a more specific, methodical approach to the NPDES permitting process.

Actors and Agencies Involved

NPDES permits in Michigan are regulated by the Department of Environment, Great Lakes, and Energy, commonly known as EGLE. This department was established in 2019 under Governor Gretchen Whitmer to unite the Office of Great Lakes, the Department of Environmental Quality, and the Michigan Agency for Energy under one entity. This change revamped the department and helped establish a more holistic and responsive handling of environmental issues in Michigan. EGLE focuses on environmental justice efforts through its Environmental Justice Public Advocate and Response Team; it has also created other new divisions such as the Office of the Clean Water Public Advocate and the Office of Climate and

Energy (Gardner, 2019). These new positions and teams allow for the department to have a broader reach on more environmental issues across the spectrum.

The newly established EGLE was tasked in 2020 with creating an updated general NPDES permit. When EGLE came out with their new general permit, there was major pushback from farmers in the state. EGLE was focused on implementing stricter environmental standards for CAFOs, which angered farmers since it created more restrictions for their facilities (Graham, 2020). Laura Campbell, the manager of Michigan Farm Bureau's Ag Ecology Department, was quoted in Michigan Farm News saying "'Unfortunately, the final permit is still considered overly burdensome, increasing farm costs and threatening their economic viability'" (Rudat, 2020). EGLE defended their permit, saying "'We made changes because of what we've seen in the field to better protect the water quality for the citizens of the state'" (Graham, 2020). Environmental groups supported the new regulations and argued that they were necessary protections to improve public health and reduce pollution (House, 2020). Although there was controversy over the new, stricter standards, previous research in Minnesota has demonstrated that more stringent regulations do make a difference in the environmental impact of CAFOs (Brands, 2014). This signifies the chance for better environmental protections in Michigan.

This pushback from farmers demonstrates a tenuous relationship between Michigan farmers and the department that regulates them. As EGLE pushes for stricter environmental standards, farmers push in the opposite direction against them. As seen through previous research, industry stakeholders have a strong voice in the policymaking process (Crow et al., 2016). The pushback from farmers occurred after the general permit was released, and therefore not during the policymaking process itself, however it does demonstrate an example of important industry stakeholders speaking out against policies that affect them.

The Illinois Environmental Protection Agency (EPA) was created in 1970 as a state agency "dedicated to cleaning up and protecting our outdoor environment" (Illinois EPA, 2021b). It has remained the primary department that handles environmental issues, regulations, permits, compliance, and enforcement in Illinois.

The relationship between Illinois farmers and its EPA is different from that in Michigan; farmers and the Illinois EPA have demonstrated collaboration efforts and a mutual understanding between their vested interests. In 2020, the U.S. EPA Region 5 Administrator and the Illinois Farm Bureau signed a Memorandum of Understanding that binds the collaborative efforts of both parties in recognizing "agricultural environmental stewardship through improved communications and outreach" (Fortin, 2020). Illinois Farm Bureau President Rich Guebert Jr. spoke of their partnership with the EPA when he said "we look forward to expanding our collaborative activities toward our shared goal through this voluntary partnership" (Fortin, 2020). This language demonstrates a more positive relationship between the two groups, a different response than the attitudes expressed about EGLE by Michigan's farmers. Although the memorandum was signed with the U.S. EPA and not the Illinois EPA, it does demonstrate the type of relationship farmers have with the agencies that regulate them.

Another demonstration of Illinois farmers' positive relationship with their regulatory agency can be found on the Illinois Farm Bureau website. An article titled "Environmental Issues are Uncommon on Illinois Livestock Farms" highlights the efforts of Illinois farmers to meet environmental quality standards and improve the environmental performance of their farms. The article goes on to say that "Existing state laws and regulations, such as the [...] the Illinois Environmental Protection Agency's (IEPA) livestock rules, are working" (Illinois Farm Bureau,

2021). Again, this language is different from the strong pushback Michigan farmers exerted against EGLE.

Summary of Results and Analysis

This paper has found that the NPDES permitting process in Michigan and Illinois are similar in structure, however Michigan's permits themselves implement stricter environmental protections and take a longer timeline to be approved. Both permits require the permittee to address the environmental harm their CAFO causes through their Nutrient Management Plan, and provide regulations regarding discharge of wastewater. The farmers and agencies in each state differ from one another in their relationships and attitudes towards the permits. In Michigan, EGLE has implemented stricter standards in their NPDES permit, which angered farmers and sparked pushback from them against their regulatory department. On the other hand, Illinois farmers have demonstrated collaborative efforts with their regulatory agency, the Illinois EPA, and maintain a positive relationship with them.

Conclusion

Policy Implications

This research highlights a number of important factors with implications for policymakers. As this paper has demonstrated, the relationship between farmers and their regulatory agency is important to understand and can help inform productive policies that are beneficial for all parties involved. Michigan's more stringent policies have lended themselves to a tense relationship between EGLE and Michigan farmers, since farmers feel limited by the regulations. On the other hand, the Memorandum of Understanding between the Illinois Farm Bureau and the EPA represents a model for how industry stakeholders and regulatory bodies can

demonstrate a positive relationship. It is possible that this strong relationship is aided by the lack of strict regulations on Illinois CAFOs, which helps farmers and the Illinois EPA get along. These realistic policies facilitate a stronger willingness in farmers to follow the regulations. Finally, these implications are not restricted to CAFOs and the farming sector; they can be utilized for many industry stakeholder-agency relationships. These findings emphasize the importance of a strong network between regulatory bodies and the areas they regulate, and demonstrate that industries and agencies get along better in the face of less stringent regulations.

Limitations

There were significant limitations to the research conducted in this paper, some of which may lend themselves to further directions of investigation. This paper was completed over the course of one university semester, with the majority of the research being conducted during the span of one month. Given this limited time-frame, the research could only extend to two states and to one aspect of their CAFO policy. Additionally, the findings of this paper differ from other literature in the field. Previous research has analyzed the differences in state CAFO policies and explained the wide range of regulatory policies different states employ on CAFOs (Koski, 2007; Brands, 2014); this paper only looked into two states and one of the ways they regulate CAFOs: NPDES permits.

Given these limitations, it would be beneficial to expand this research more broadly and conduct similar research in all fifty U.S. states. This would help examine the NPDES permitting process for the entire nation and identify true patterns and trends among all states. Additionally, conducting research in each state would reveal the impact of relationships between farmers and their regulatory agency on state CAFOs and their regulations. This paper only analyzed policies and actors in one geographic region and watershed; conducting further research on a broad scale

would give better context of the NPDES permitting process and the way Michigan and Illinois fit in among other states' regulations.

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