Regulating Farm Nutrient Runoff: Maryland's Experience with the Water Quality Improvement Act

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ABSTRACT

Federal and state programs designed to address nonpoint agricultural nutrient pollution rely almost exclusively on voluntary programs and financial incentives to encourage farmers to adopt nutrient management plans and other best management practices. In 1998, after highly publicized fish kills highlighted shortcomings in the voluntary approach, Maryland adopted the nation’s strictest and most comprehensive nutrient management regulations. Seven years later, a majority of farmers are not in compliance with the law. This thesis examines the Maryland Department of Agriculture’s implementation of the Water Quality Improvement Act. I find the department has continued to adhere to a voluntary approach to nutrient management. As a result, farmer practices are largely unchanged and the efficacy of a mandatory approach remains untested.

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Chapter One: Introduction

More than 25 years after the Clean Water Act was adopted, states report 39% of assessed river and stream miles, 46% of lake acres, and 51% of assessed estuarine square miles do not meet water quality standards (Environmental Protection Agency [EPA] 2000). Despite these gloomy figures considerable progress has been made in addressing industrial, municipal sewage treatment, and other “point sources” of pollution. The primary remaining threats to water quality are the impairments caused by “nonpoint sources” such as agricultural and urban runoff (EPA 2000). Nationally, agriculture is the number one source of water quality impairments in rivers and lakes and the third leading source of impairments to estuaries (EPA 1996).

One of the chief problems associated with agricultural runoff is that it often contains high levels of nutrients, particularly nitrogen and phosphorus from manure and fertilizers. Nitrogen and phosphorous are essential for the growth of living organisms, but excess nutrients damage aquatic ecosystems. One result of nutrient enrichment of waterways is massive algae blooms that threaten aquatic life because their decomposition reduces dissolved oxygen levels in the water. In turn, this creates “dead zones” where dissolved oxygen levels are not sufficient to support healthy ecosystems. In addition, algae blooms damage sea grass, which is critical habitat by for aquatic life, by blocking the sunlight that is necessary for its growth.

Perhaps nowhere has agricultural nutrient pollution been a bigger concern than in the Chesapeake Bay region where a highly publicized multi-state effort to restore water quality has been a work-in-progress for more than two decades. In the summer of 2003 a “dead zone” in the Bay covered approximately 40% of the main stem of the bay and
stretched into many of its tributaries (Chesapeake Bay Foundation [CBF] 2004). Excess nutrients are the leading cause of water quality impairments in the Chesapeake Bay and agriculture is the largest source of nutrient pollution in Chesapeake Bay. Farms comprise 25% of the land in the Chesapeake Bay watershed, but scientists estimate that agricultural sources contribute 42% of the total nitrogen inputs and 49% of total phosphorus inputs to the bay (CBF 2004). They project that in order to remove the Chesapeake Bay from the impaired waters list by 2010, nitrogen flows must be reduced to 39% of current levels and phosphorus must be cut by 33% (CBF 2004).

Despite the significant effort and attention devoted to this issue, the Chesapeake Bay experience mirrors the national trend, in that little progress has been made in reducing farm nutrient pollution. Scientists estimate that between 1985 and 2000 agriculture's proportion of the overall contribution of nutrients to the bay remained nearly constant. During that same period, point source contributions of nitrogen fell from 25% to 20%; phosphorus contributions declined from 32% to 20% of the total load (Simpson 2003).

For regulators, agricultural pollution poses unique challenges. The diversity and sheer number of farm operations complicates the process of developing solutions and monitoring impacts. The Chesapeake Bay watershed contains more than twenty thousand farms, and farm impacts are highly variable depending on their particular characteristics. For example, farmers who use organic and inorganic fertilizers have different environmental impacts that may require different solutions. Animal operations that produce liquid manure face different challenges and constraints than those that produce dry manure. Manure impacts can be more or less of a concern depending on the amount
of land available for its use. Moreover, the application of identical nutrients can have highly variable impacts depending on soils, slopes, proximity to water resources and a myriad of other farm characteristics.

These difficulties, however, do not fully explain why so little progress has been made during the past 25 years, especially given the attention and resources that have been devoted to the problem. To understand why so little progress has been made, we must look beyond the technical challenges of controlling nonpoint sources, and consider the political context in which this difficult project must be accomplished. This thesis examines Maryland’s effort to encourage its farmers to institute nutrient management plans. Maryland has 12,000 farmers and 2.15 million acres of agricultural land. All but 7% of Maryland’s land is contained within the Chesapeake Bay watershed and a substantial portion of the Chesapeake Bay shoreline lies within its borders. As a result, much attention has naturally been focused on the State of Maryland’s efforts to address farm nutrient runoff.

In the United States, historically and to date, the vast majority of initiatives to encourage adoption of nutrient management plans (NMPs) have relied on voluntary programs and financial incentives. In 1998, after more than fifteen years of encouraging farmers to adopt NMPs under a voluntary and incentive-based model, Maryland broke with the voluntary model and adopted the nation’s strictest and most comprehensive nutrient management regulations. The Water Quality Improvement Act of 1998 requires all but Maryland’s smallest farms to adopt nutrient management plans for nitrogen and phosphorus and establishes fines for non-compliance.
Today, fully seven years after Maryland first adopted mandatory nutrient management regulations, the state has largely failed to implement the Water Quality Improvement Act (WQIA). One third of farmers have yet to file a NMP, a majority failed to comply with the act’s most recent deadline; and no farmer has ever been cited for failure to comply with the WQIA. Moreover, Maryland has yet to institute any system to monitor implementation of NMPs. As a result, just as under the voluntary system, we have no knowledge about the extent to which farmers are complying with their NMPs. In effect, Maryland continues to operate under a system of voluntary compliance with the regulations.

I argue that a compromise in the initial legislation, which placed oversight of the WQIA solely in the hands of the Maryland Department of Agriculture, has been the key impediment to implementing the Water Quality Improvement Act. The initial version of the act submitted by the governor gave significant oversight and enforcement responsibilities to the Maryland Department of the Environment (MDE). But agricultural interests were bitterly opposed to any involvement on the part of the MDE, and the final bill gave authority to the MDA. As has been the position taken by agriculture departments generally, MDA officials long championed the voluntary approach. Indeed, MDA leadership was vocal in its opposition to mandatory regulation. As recently as 2003, the Maryland Secretary of Agriculture testified in favor of a bill to suspend enforcement of the WQIA calling it “just about as anti-agriculture as you could be” (Huslin 2003a). This thesis shows that MDA actions have stymied environmental progress by 1) resisting implementation of enforcement mechanisms, and 2) selecting NMP requirements that prioritize farmer concerns over environmental objectives.
Further, MDA compliance reports have created a false sense of progress by equating the mere act of filing an NMP with compliance, and creating the misimpression that farmer compliance with the requirement to file NMPs shows a steady upward trend.

Given the MDA’s outspoken opposition to mandatory regulation, a less-than-committed approach to enforcement is not a surprising result. Political scientists who study the behavior of bureaucracies predict such an outcome. The MDA’s primary mission is to “promote the economic well-being of farmers, food and fiber processors and businesses engaged in agricultural related operations” (MDA 2005a). The department provides product promotion, technical assistance and educational services to the agricultural industry. Its top appointees are typically drawn from the farm community. The department does have regulatory responsibilities, including pesticide management and the WQIA; the MDA also emphasizes its responsibility for consumer protection (MDA 2005a). Nevertheless, representing agricultural interests is the MDA’s primary focus. In short, the MDA is what political scientist James Q. Wilson (1989) terms a “client agency.” Client agencies interact primarily with a dominant interest group that favors its goals. In client agencies, most or all of the benefits of agency programs go to a single industry. According to Wilson, “a client agency will have to struggle mightily to avoid having its work influenced by the single, organized group with which it must deal on a daily basis. Many do not succeed, some do not even try” (1989 79).

Organizational culture affects agency performance of assigned tasks in a variety of ways. Organizational culture is a “persistent patterned way of thinking about the central tasks of and human relationships within an organization” (Wilson 1989, 91). Wilson argues that culture is passed on through generations and “changes slowly, if at
According to Wilson, tasks that conflict with dominant agency culture will not be done well or with commitment. Finally, Wilson suggests that agency executives will resist taking on tasks that run counter to the dominant culture of department. Notably, in this case, Maryland Secretary of Agriculture Lewis Riley was adamantly opposed to mandatory regulation, but equally adamant that any oversight be handled by the MDA – a position that underscores the commitment of the MDA to maintain control of regulation in order to protect farming interests.

Despite the commonsense expectation, and theoretical support for the notion that agricultural agencies will have difficulty enforcing regulations that run counter to the expressed interests of the agricultural community, observers cite two important advantages to MDA oversight. The first relates to the inherent complexity of regulating nonpoint sources. The MDA, with its extensive agricultural expertise and familiarity with local farm operations and sectors, has a critical knowledge base needed to make and enforce sensible regulations. Second, given strong farmer opposition to regulation, their cooperation is more likely to be gained working with the MDA, where there is a history of goodwill and an expectation of fair treatment, than with an environmental enforcement agency that farmers actively disdain and distrust.

Maryland is not unique in placing enforcement in the hands of its agriculture department. Indeed, it is the norm for states to place administration of environmental programs targeted to agriculture under the administration of agriculture rather than environmental enforcement departments (McElfish 1997; NASDA Research Foundation 2005). In Maryland this decision was the result of legislative compromise with farmer
interests. I will show, however, that MDA agricultural expertise and relationships with the farm community have not served the goals of the WQIA.

Others argue the comprehensive nature of the act, as well as the inherent difficulty of regulating nonpoint sources, rather than the role played by the MDA, are the major stumbling blocks to implementation of the law. I will show that although the comprehensiveness of the act slowed implementation efforts, particularly in the early years, it is not the fundamental cause of shortcomings in enforcement. Finally, I will show that the enforcement challenges posed by farmer resistance and the inherent characteristics of nonpoint sources cannot explain failures of implementation, as they have yet to be taken up.

In chapter two, I outline Maryland’s historical commitment to voluntary nutrient management and explain how an outbreak of toxic *pfiesteria* linked to farm runoff resulted in the adoption of mandatory regulations. I will show that farmer opposition to the act led to the key compromises that have since hobbled its implementation. Chapter three details implementation of the act from 1998 to the present. I describe how the MDA has taken up its implementation and enforcement responsibilities in light of ongoing farmer opposition to the act. Chapter four analyzes shortcomings in Maryland’s effort to implement the act. In particular, I highlight the MDA’s reluctance to enforce the law and establish requirements that are protective of water quality. I show that the failure to implement the WQIA is not related to its complexity or to the inherent difficulties in regulating nonpoint sources. Rather, the critical problems stem from the fundamental conflict between the MDA’s mission and the requirements of the act.
In the remainder of this chapter, I will outline my research methods and offer a brief profile of the Maryland agricultural industry.

Methods

In this case study of Maryland’s adoption of mandatory nutrient management regulations I set out to investigate two questions. 1) Have mandatory regulations succeeded in increasing farmer implementation of nutrient management plans? 2) What factors explain the success or failure of the regulations? I chose to focus on the Maryland experience because farm nutrient pollution is of critical concern in the Chesapeake Bay region, and because Maryland’s regulations are commonly regarded as the nation’s strictest and most comprehensive.

My analysis is based on primary and secondary source materials, as well as semi-structured interviews with individuals familiar with Maryland’s efforts regarding farm nutrient management. I developed the historical account of this case through review of the extensive public accounts, drawn from both primary and secondary sources, including newspaper articles, newsletters and policy reports from farm and environmental organizations, journal articles and books. Other primary sources included the relevant regulations as well as documentation from the Maryland Department of Agriculture. I also examined scientific reports on nutrient management in Maryland. My review of the literature on the behavior of bureaucracies provided the framework for my analysis. Finally, I conducted in-depth interviews with farmers, scientists, environmentalists, public officials, University of Maryland Cooperative Extension staffers, and state employees from the Maryland Departments of Agriculture, and Natural Resources.
Profile of Maryland Agriculture

Of the 12,000 farms in Maryland, 5,000 have annual sales of less than $2,500 (United States Department of Agriculture [USDA] 2002). These 5,000 farms account for only .2% of total agricultural products sold (USDA 2002). The Water Quality Improvement Act of 1998 applies to the remaining 7,000 farms that have annual sales greater than $2,500. Although Maryland is a highly urbanized state, 33% of the state’s total acreage is devoted to farming (Economic Research Service [ERS] 2005). On-farm employment accounts for only .6 of total state jobs, but farm-related jobs (including processing, marketing, and wholesale and retail trade) account for 11.5% of state jobs, and 17.2% of jobs in rural Maryland (ERS 2005).

In 2002, the market value of all agricultural products sold was $1.2 billion (USDA 2002). In 2003, the top five farm commodities accounted for nearly 80% of total farm receipts (ERS 2005). They were:

- Broilers (poultry) 33.7%
- Greenhouse/nursery 22.2%
- Dairy Products 11.1%
- Corn 6.0%
- Soybeans 5.9%

The poultry industry, and the grain growers that supply chicken feed, are centered in rural Maryland on the Eastern Shore (Gardner 2002). In 2002, of the 293 million broiler chickens produced by Maryland farmers, 98% were grown in the nine counties that make up the Eastern Shore (ERS 2005). Moreover, five counties on the Eastern Shore produce 85% of the broilers in the state (ERS 2005). As a result of this concentration, and the links to grain growers, the poultry industry is critical to the economy of the Eastern Shore.
Chapter Two: Fish kills spur adoption of mandatory regulations

This chapter details Maryland’s historical commitment to voluntary nutrient management planning and the transition to mandatory regulation. I recount how agricultural interests and the Maryland Department of Agriculture advocated for voluntary nutrient management from the early 1980s through 1997. During this period they successfully harnessed their economic and political clout to fend off calls for mandatory regulation. I describe how the “pfiesteria crisis” in 1997 dramatically changed the political landscape for farmers because massive fish kills were linked to farm runoff. This highlighted the failures of voluntary nutrient management and prompted the formation of new political alliances that successfully countered agricultural interests and won government support for mandatory regulation in 1998. Finally, I show that farm interests still retained sufficient legislative support to win compromises in the new law that have significantly hampered its implementation.

Voluntary nutrient management planning

For more than two decades, policymakers have recognized that agricultural nutrient runoff is a chief contributor to water quality problems in Chesapeake Bay. In 1980, representatives from Maryland, Delaware, and Pennsylvania founded the Chesapeake Bay Commission, a multi-state coordinating committee, in order to provide advice to state legislatures and Congress concerning bay restoration efforts. One year later their first report identified agriculture as the primary source of nitrogen in the bay. In 1983, the results of a seven-year Environmental Protection Agency (EPA) study of the bay confirmed the conclusions of the Chesapeake Bay Commission. The EPA report
identified nutrient enrichment as the primary cause of water quality decline and singled out agriculture as the leading source of nutrients. Numerous reports and studies in subsequent years have reinforced these initial findings; reducing agricultural nutrient inputs remains a primary focus of the ongoing multimillion-dollar federal and state effort to restore water quality in Chesapeake Bay and its tributaries.

One commonly employed tool for minimizing farm nutrient impacts on surface and groundwater resources is the nutrient management plan. Nutrient management plans require farmers to analyze the nutrient content of their soils and manure through lab testing, limit nutrient application to amounts required for realistic yield goals, and adopt best management practices (BMPs) to prevent nutrients from reaching surface or groundwater. Each plan must be tailored to the individual farm to take into account numerous factors including soil type, slopes, proximity to surface and groundwater, crop rotations, potential yields, type of fertilizer utilized, and method of application. NMPs provide nutrient application guidance, rather than a precise prescription, as nutrient needs will vary considerably depending on rainfall and other local conditions.

Historically, NMPs were developed for the purpose of maximizing economic returns from nutrients. Today economic goals remain embedded in NMPs; nutrient recommendations are crafted to avoid any risk of yield reduction. The adaptation of NMPs to encompass environmental goals rests on the theory that applying no more nutrients than are needed for plant growth should limit nutrient levels in surface water runoff and groundwater infiltration. In addition to establishing crop nutrient requirements, NMPs recommend fertilizer application and control methods to inhibit their transport to waterways. Given that NMPs prescribe nutrient use based on
agricultural yield rather than water quality goals, it is unrealistic to expect that even
universal implementation of NMPs would fully resolve the problems of nutrient pollution
generated by agriculture. Nevertheless, it is commonly accepted that conscientious
implementation of NMPs has proved to be a successful tool for reducing excess fertilizer
use and nutrient runoff to waterways.

Maryland has been encouraging the use of farm plans to address nutrient runoff
for more than twenty years.¹ In the early 1980s, spurred by Section 208 of the Clean
Water Act, which required states to develop strategies to address agricultural nutrient
pollution, Maryland developed voluntary goals for farms to institute management plans.
This effort, however, received little priority in terms of funding and attention and few
farm plans were developed as a result (Ernst 2003).

Gerald Winegrad, then a Delegate in Maryland, reports that in the early 1980s he
considered proposing mandatory regulations. In response to strong opposition from
agricultural interests, he instead proposed that Maryland develop a voluntary program to
provide up to 87.5% reimbursement of the cost of implementing farm plans or other best
management practices. According to Winegrad, Secretary of Agriculture Wayne Cawley
initially opposed even this voluntary initiative on the grounds that it would compete with
other MDA programs for funding (Winegrad 2005). Cawley later supported the proposal
when additional funding was provided (Winegrad 2005). Cawley’s opposition reflects
the view, echoed by later MDA leaders, that environmental protection programs pose a
conflict with department priorities.

¹In the 1980s, farm plans were called Soil Conservation and Water Quality plans. The focus on soil
conservation reflects an historic emphasis on farm planning to address soil erosion.
Maryland rejects calls for mandatory regulation

By 1986 the Chesapeake Bay Commission, in its annual report, was questioning whether voluntary efforts could bring about reductions in agricultural nutrient loadings (Ernst 2003). The need for nutrient reductions took on a higher profile in 1987, when the Governors of Maryland, Virginia, and Pennsylvania, the Mayor of the District of Columbia, and the Administrator of the EPA agreed to the goal of reducing nitrogen and phosphorous inputs to the bay to 40% of 1985 levels by the year 2000. That same year, Maryland’s Governor and Secretary of Agriculture announced ambitious goals that all farms would voluntarily develop farm plans within ten years and farms in sensitive areas would develop farm plans within five years.

By the early 1990s, however, skepticism about the efficacy of voluntary approaches and pressure for regulation was mounting. In 1990, a panel convened by the EPA to address nonpoint source pollution recommended that states add regulatory muscle to voluntary programs to reduce nutrient runoff in the bay (Ernst 2003). By 1993, despite Maryland’s high profile commitment to voluntary planning, only ten percent of Maryland farmland was covered by NMPs (Wheeler 1993a).

Gerald Winegrad, who by 1992 was a State Senator and Chairman of the Subcommittee on Chesapeake Bay and the Environment, grew frustrated with the failure of Maryland agriculture to follow through on the state’s Section 208 commitments and the lack of overall progress in addressing farm pollution (Winegrad 2005). He introduced legislation calling for mandatory nutrient planning in the 1992, 1993 and 1994 legislative sessions. In 1993, in an editorial highly critical of farmer efforts to control nutrients and state government oversight, the Baltimore Sun endorsed Winegrad’s bill (Editorial 1993).
Although Winegrad gained Senate support for weakened versions of his proposals, his bills never came to a vote in the House, as he could not win backing from the farm-dominated House Committee on Environmental Matters (Ernst 2003).

In the face of mounting pressure for mandatory regulation, agricultural interests remained committed to voluntary nutrient management planning. The Maryland Department of Agriculture (MDA) was active in the debate. Secretary of Agriculture, Robert L. Walker, opposed Winegrad’s bill saying: “We can’t afford a program that runs our farmers out of business” (quoted in Wheeler 1993a). In 1994, then Deputy Secretary of Agriculture Lewis Riley used positive results about farm environmental practices contained in a Maryland Farm Bureau (MFB) survey to lobby against Winegrad’s move to institute mandatory nutrient management planning (Wheeler 1994a).

Farmers also had the support of then-Governor Donald Schaefer. In 1993, a spokesman for Governor Schaefer criticized Winegrad’s bill saying, “this bill would make it a matter of coercion rather than cooperation” (quoted in Hill 1993). He argued that voluntary efforts and incentives were sufficient to achieve pollution reduction goals. A 1993 article in the Baltimore Sun highlighted the strong stance of farm interests and their political power in the struggle over the proper approach to nutrient management. The article quotes a former Maryland Department of the Environment employee saying, “The ag lobby is hellbent on preventing regulatory control” and “Maryland goes easy on farmers because of their political clout” (quoted in Wheeler 1993b).

According to Winegrad, as he escorted Governor Schaefer to his State of the State speech in 1994, he pressed the Governor on the need to address agricultural pollution. Winegrad recounted that Schaefer pounded his fist on a marble State House column and
said “Gerry you’re absolutely right. But you know what dealing with agriculture is like. It’s like trying to move this column. You just can’t do it” (Fesperman and Wheeler 1997). Recently Winegrad recounted that story, noting that he continued to try to persuade members of Schaefer’s staff to gain Schaefer’s support. He noted, “I could never get his support. His Secretary of Agriculture and other agricultural interests would not buy off on it” (Winegrad 2005). Winegrad speculated that had Schaefer endorsed his bill “his Secretary of Agriculture would be mad at him, and all the farmers too would be mad. He just did not want to antagonize the farm community and the rural interests” (Winegrad 2005).

Nevertheless, in 1994 Governor Schaefer did express impatience with farmer progress. Although he declined to endorse Winegrad’s latest bill, Schaefer said the next Governor would have to consider mandatory regulation if farmers did not increase their participation in voluntary nutrient management planning (Wheeler 1994a). Despite Governor Schaefer’s reprimand, the MDA insisted that they would meet their goals for adopting voluntary plans without difficulty (Blankenship 1994a). In the summer of 1994, after Winegrad’s legislation was again defeated, the EPA publicly criticized Maryland’s latest announced target to have 60% of farmland covered by voluntary NMPs as part of a strategy to address pollutant runoff in bay tributaries. The EPA argued “farmers must be compelled to participate in what are now mostly voluntary conservation programs if the state hopes to clean up the bay’s rivers and streams” (Wheeler 1994c). State officials rejected the EPA criticism saying, “farmers will respond better to appeals for their cooperation than to government regulation” (Wheeler 1994c).
At the end of 1994, Gerald Winegrad retired from his State Senate seat and Parris Glendening replaced the term-limited Donald Schaefer as Governor of Maryland. Winegrad reports that he met with Glendening in late 1994 to discuss environmental issues. Winegrad pressed the need to regulate farm nutrient practices in order to meet Chesapeake Bay water quality goals. According to Winegrad, Glendening was focused on growth management issues and disinclined to take any action that would antagonize farming interests (Winegrad 2005). Indeed, during the next three years there were no legislative initiatives from the Governor or the General Assembly with regard to mandatory nutrient management regulation of agriculture.

Following the defeat of Winegrad’s last attempt at mandatory regulation in 1994, the Maryland Department of Agriculture continued its focus on encouraging voluntary implementation of NMPs. By 1997, the MDA claimed that farmers had instituted NMPs for 900,000 acres, or 40% of Maryland farmland. This was a considerable jump from the 10% level of 1993, but still far short of the goal to have 60% of acres covered for the tributary strategy, and further still from the 1987 goal to have 100% of farmland under voluntary farm plans by 1997 (Tapscott 1997). Nevertheless, it appeared that agricultural interests had prevailed in their vision of a voluntary approach to farm nutrient management.

*Pfiesteria* outbreak highlights failures of voluntary efforts

A *pfiesteria* outbreak in the summer of 1997, however, dramatically changed the political landscape with regard to mandatory nutrient management. In August 1997, massive fish kills in the Pocomoke River led the state to close miles of the river to public
access. Scientists believed the fish kills were caused by *pfiesteria*, a microorganism that lives in Chesapeake Bay. Public concern was heightened when watermen and environmental investigators showed signs of illness believed to be caused by contact with *pfiesteria*. The Pocomoke River is located on Maryland’s Eastern Shore in the heart of the Delmarva Peninsula chicken-farming region. In the Pocomoke River watershed, poultry outnumbers humans by 500 to 1; the annual chicken litter produced is equivalent to the sewage created by a city of one million people (Fesperman and Wheeler 1997). Increases in *pfiesteria*, and in its toxicity, have been associated with high levels of nutrients and the waters of the Pocomoke were known to be highly nutrient enriched. Within a week, attention turned to farming practices as a potential cause of the outbreak.

The *pfiesteria* outbreak called attention to weaknesses in the voluntary nutrient management regime. The MDA reported that 72% of the six hundred farmers in the Pocomoke region had nutrient management plans. This was a high rate of participation compared to the statewide figure of 40%. MDA officials had to acknowledge, however, that they had no way of knowing how many farmers had actually implemented their plans. Louise Lawrence from the Department of Agriculture said, “we don’t physically check to see if a farmer is following his plan. It’s sort of like a business plan. It’s pretty much up to the business how they use it” (quoted in Meyer 1997). The MDA’s lack of knowledge about actual farm practices was highlighted by their immediate move to commission a survey of the six hundred farmers in the watershed about their nutrient management procedures. Skeptics suggested that the survey would not reveal the extent of problematic practices, pointing out that farmer participation in the survey was also voluntary (Fesperman and Wheeler 1997). Newspaper accounts of farmers using nutrient
sheds to store equipment suggested that farmer implementation of NMPs might be lax.

The *Baltimore Sun* reported:

> Even [Secretary of Agriculture] Riley said that sometimes his manure sheds fill up, meaning some has to be stored outside more vulnerable to erosion and runoff. That’s better than what happened to his predecessor … who was cited in 1991 for not following ‘best management practices’ after chicken manure was spread on his fields (Fesperman and Wheeler 1997).

The crisis also highlighted the impacts of chicken farming, the number one industry on the Eastern Shore. At the time, nutrient management plans were based solely on nitrogen inputs to the soil. It had long been assumed that because phosphorus tends to bind to soil, it would not run off into local waters. Coincidentally, at this time, scientists were just starting to publicize research indicating when soils become saturated with phosphorus, runoff to local waters does occur (Simpson 2005). Chicken litter is rich in phosphorus and scientists suggested that farmers following nitrogen-oriented NMPs might be applying as much as ten times the phosphorus needed for crops (Simpson 2005). As I discuss in chapter four, high levels of phosphorus in soils, resulting from massive quantities of chicken litter relative to the farmland available for its use, arguably pose the greatest challenge to efforts to limit nutrient runoff to the bay.

**MDA performance criticized**

As the crisis continued in the ensuing months observers were highly critical of the MDA. *The Washington Post* quoted Gerald Winegrad saying: “The Maryland Department of Agriculture is exclusively a booster and promoter of Maryland agriculture. Depending on them to reduce nutrients is like putting a fox in charge of the henhouse”
In response, Riley, who had been raising chickens since 1959, and had been agriculture secretary since 1994, said he saw no conflict:

> I think my credibility as a farmer … and in this job is very well proven….I find my understanding of the industry is an asset in being able to work with the industry. Riley added, most poultry farmers have been responsible in storing and then using or selling the tons of composted chicken waste produced each year as fertilizer (quoted in Meyer 1997).

A Baltimore Sun article, however, highlighted the conflict between the MDA’s role as supporter of agricultural interests, and enforcer of environmental regulations, reporting that that the MDA,

> would be hard pressed to be very aggressive with farmers, since its most important role is helping them get the most out of their crops and their animals, and in being their advocate before the legislature. ‘It’s just very difficult to be heavy-handed with a community you’re trying to work with’ Riley said. But he is adamant that his agency and no other, such as the Department of Environment, keep watch over the farmer’s nutrient management, even if he never intends to be aggressive. ‘We just try to use some diplomacy’ he said. ‘We don’t want to end up utilizing all our funds and expertise in being manure cops’ (Fesperman and Wheeler 1997).

Riley’s comments revealed the low priority that environmental duties carried in the department. The same article also carried the anonymous allegations of an MDA employee that he had been directed by a supervisor to produce a report claiming that farmers were following their NMPs even though the farms hadn’t yet been surveyed.

Tom Horton, author of the weekly On the Bay column in the Baltimore Sun, took direct aim at the MDA and the University of Maryland, saying he didn’t blame individual farmers or researchers for the outbreak, but rather:

> I do blame the Maryland Department of Agriculture and the leadership of the University of Maryland College of Agriculture. They represent a culture that is incapable of carrying out the heavy environmental responsibilities they have fought to keep, separate from most state and federal water quality regulation (Horton 1997b).
Maryland adopts mandatory regulation

In response to the *pfiesteria* outbreak Governor Glendening appointed the Citizens Pfiesteria Action Commission, led by former Governor Harry Hughes, to recommend a response. The panel addressed a series of concerns, but by far the most contentious issue was whether they would endorse mandatory nutrient management regulation. On November 1, 1997, with agricultural interests dissenting, the panel recommended that farmers develop NMPs by 2000 and implement them by 2002. Although the word mandatory was not used in the panel report, the clear implication was that farmers would be required to implement NMPs.

Governor Glendening followed up on the panel recommendation and proposed mandatory nutrient management planning in his State of the State speech in January of 1988. His proposal required that:

- All but the smallest farms must develop NMPs by 2000 and implement them by 2002.
- NMPs must consider both nitrogen and phosphorus inputs to the soil.
- Two-person teams would handle enforcement, with one representative each from the Maryland Department of Environment and Agriculture.
- Farmers would be fined for non-compliance.
- The State would give subsidies to farmers for developing NMPs.

Environmentalists strongly supported the Glendening plan, but farmers were outraged. In February, hundreds of farmers traveled to Annapolis to testify at a hearing on the proposed legislation. Former Secretary of Agriculture Lewis Riley, who had resigned to care for his ailing wife on the day the *pfiesteria* commission issued its report,
joined them. He said: “The farm community stepped to the plate, accepted their responsibility, and they continue to do so. Penalties are not the direction we ought to go’” (quoted in Goodman 1998b). Even Henry Virts, who replaced Riley as Secretary of Agriculture, provided only lukewarm support for Glendening’s proposal saying, “I have an obligation to support the Governor” (quoted in Shelsby 1998b).

In taking up the Governor’s plan, the Senate added significant funding for nutrient management planners and extended the planning and implementation deadlines to 2002 and 2004, but otherwise passed the Glendening proposal intact. In the farm-friendly House, however, rural legislators proposed an alternative voluntary nutrient management bill. But, given strong public reaction to the _pfiesteria_ outbreak, delegates could not achieve majority support for a bill that lacked mandatory provisions. The House bill that ultimately passed was, nevertheless, significantly weaker than the Senate version. The deadline for developing nitrogen NMPs was 2003; a separate 2006 deadline was created for phosphorus NMPs. In addition, fines were much lower, enforcement responsibilities were assigned solely to the MDA, and all of the bills’ requirements were contingent on sufficient state funding to develop NMPs.

Both the _Baltimore Sun_ and _The Washington Post_ editorialized in favor of mandatory regulations (Editorial 1998e; Editorial 1998c). The _Sun_, however, endorsed the House bill as an appropriate compromise. _The Washington Post_ similarly suggested that the Glendening proposal was overly harsh and that compromise was necessary. Their support of the House version reflected sympathy for farmer claims that the Senate implementation deadlines were untenable. Conference committee deliberations continued into the last days of the legislative session as the participants debated
implementation deadlines and whether the Maryland Department of the Environment should have role in oversight of the law (Dresser 1998i). Senate representatives complained that the active participation of farm lobbyists was a barrier to reaching agreement (Dresser 1998i). Under pressure from Governor Glendening, who threatened to bring the Maryland General Assembly back into session if an acceptable bill was not passed, the conferees did forge an agreement in the final days of the legislative session. The compromise legislation passed the House and Senate by nearly unanimous votes and was signed into law by Governor Glendening. Their agreement, the Water Quality Improvement Act of 1998, was touted as the most comprehensive in the nation because it: 1) applied to all but the smallest farm in the state, and 2) added a new requirement that NMPs address phosphorus as well as nitrogen.

Enactment of the WQIA constituted a striking policy reverse. For more than a decade, the MDA and agricultural interests successfully turned aside calls for nutrient management regulation despite the fact that farmers never came close to reaching voluntary targets. Yet eight short months after the first fish kills were reported, Maryland passed the most comprehensive nutrient management regulations in the country over the strenuous opposition of farm interests. This dramatic turn of events is understandable when one considers the political dynamics produced by the pfiesteria crisis. The pfiesteria outbreak enabled the formation of a new coalition capable of taking on agricultural interests. Suddenly farmers were up against not just their usual foes in the environmentalists, but also watermen and the tourism industry both of which suffered significant economic losses due to public fears about the outbreak.
Moreover, the *pfiesteria* crisis opened up what political scientist John Kingdon calls a “window of opportunity” (1995). Political analysts noted at the time that the WQIA gave Governor Glendening a strong environmental platform for his upcoming reelection bid and protected him politically in the case of another *pfiesteria* outbreak. The fact that 1998 was an election year likely affected members of the General Assembly as well. It was assumed at the time that further *pfiesteria* outbreaks the following summer were likely, if not inevitable. With keen voter interest in protecting the bay, and less than 8 percent of Maryland’s population located on the Eastern Shore, most members of the legislature did not want to risk being in the position of campaigning for office in the midst of a *pfiesteria* outbreak and having to explain why they voted against the WQIA (Nakashima and Goodman 1998). Advocates who had previously been unable to overcome farmer opposition took advantage of heightened public concern, and the election year timing, to advance nutrient management regulation as the solution to the *pfiesteria* outbreak.

**Compromise undermines the WQIA**

With all the attention generated by Maryland’s policy reverse, and the groundbreaking aspects of the law, less notice was given to the compromises forged in the final days of the legislative session. Terry Moe, in *The Politics of Bureaucratic Structure*, points out “legislative victory of any consequence almost always means compromise. This means that opposing groups will have a direct say in how the agency and its mandate are constructed” (1989 275). Indeed farm interests won compromises in
the design of the law, and its oversight, in return for their endorsement of the final version.

The key compromises included a delay in the implementation of nitrogen and phosphorus NMPs until 2002 and 2005 respectively (see Figure 1 below) and, most important, delegation of exclusive responsibility for implementation of the act to the MDA. Farm lobbyists were intent on keeping enforcement out of the hands of the Maryland Department of the Environment, which they viewed as ‘environmental police’; they successfully held firm in their demand for MDA oversight of the WQIA. Observers today identify the nearly universal application of the law as another provision designed to hobble implementation of the act. They claim the Maryland Farm Bureau advocated for broad application (offering the requirement that all farms grossing $2,500 annually and/or owning at least 8,000 pounds of livestock be subject to the act) with the intent of making the law difficult to administer (personal interviews 2005).

Figure 1: WQIA Deadlines

<table>
<thead>
<tr>
<th>Date</th>
<th>Nutrient Source</th>
<th>Nutrient</th>
<th>Action required</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/31/01</td>
<td>Chemical fertilizers</td>
<td>Nitrogen and Phosphorus</td>
<td>Report plan</td>
</tr>
<tr>
<td>12/31/02</td>
<td>Chemical fertilizers</td>
<td>Nitrogen and Phosphorus</td>
<td>Comply with plan</td>
</tr>
<tr>
<td>12/31/01</td>
<td>Sludge/animal manure</td>
<td>Nitrogen</td>
<td>Report plan</td>
</tr>
<tr>
<td>12/31/02</td>
<td>Sludge/animal manure</td>
<td>Nitrogen</td>
<td>Comply with plan</td>
</tr>
<tr>
<td>7/1/04</td>
<td>Sludge/animal manure</td>
<td>Nitrogen and Phosphorus</td>
<td>Report plan</td>
</tr>
<tr>
<td>7/1/05</td>
<td>Sludge/animal manure</td>
<td>Nitrogen and Phosphorus</td>
<td>Comply with plan</td>
</tr>
</tbody>
</table>

The remarks of the various interests at the time the WQIA was enacted reflect the reality of these political compromises. Governor Glendening naturally championed the bill, calling it a “win-win”. He said: “Everyone concedes we got 80 to 85 percent of what we needed” (quoted in Dresser 1998j). While some environmentalists praised the new
law, others expressed disappointment, particularly with the delay in implementation deadlines, saying that no change in water quality would occur any time soon. They expressed concern that the MDA would be reluctant to enforce the law. Farmers, while still adamantly opposed to mandatory regulation, expressed satisfaction about the delayed implementation dates and relief that the MDA would be responsible for enforcement of the bill. A lobbyist for Perdue Farms said “We knew something had to be done….We consider it a victory” (quoted in Goodman 1998e).

As the next chapter shows, compromises won by farm interests have indeed hampered implementation of the WQIA. The broad application of the act particularly affected its early implementation. The delayed deadlines not only postponed the possibility of water quality improvements, they also gave farm interests the opportunity to regroup politically. Most critically, the MDA, in keeping with their strong opposition to the law, and in the face of strong farmer resistance to its implementation, resisted taking up its enforcement duties.
Chapter Three: Implementing the WQIA

In this chapter I trace the implementation of the WQIA from 1998 to the present. I show that far from being a settled issue, mandatory regulation continues to be the source of ongoing controversy and debate. I detail how intense farmer opposition to the act created tension between farmers and MDA officials obligated to develop enforcement regulations. I show that while the MDA-sponsored regulations antagonized farmers, the MDA also developed strategies that supported farm interests by 1) declining to enforce the regulations, 2) minimizing the severity of nutrient runoff problems, and 3) continuing to support initiatives to weaken the WQIA’s requirements. Further, I describe how delay in the implementation deadlines improved the fortunes of farm interests as they helped elect a new governor more sympathetic to their concerns. Finally, I show that despite recent revisions to the act designed to meet farmer objections, farmer compliance remains low. In fact, it has not changed significantly since the days of voluntary nutrient management planning.

Developing the regulations

In 1998 the MDA began developing the regulations for the WQIA. The new law assigned the Nutrient Management Advisory Committee (NMAC) a role in advising the MDA on the development of the regulations. The committee members were appointed by the MDA; farm interests dominated, although appointees included a broad range of participants including legislators, academics, farmers, and representatives of the agricultural industry and environmental groups. In early 1999, highlighting the beginning of a contentious process of developing the regulations, The Washington Post
reported that the NMAC was recommending, among a number of modifications to the act, a one-year grace period for farmers unable to comply due to uncontrollable circumstances. According to the Post “farm advocates welcomed the idea as a way of coping with the need to draft runoff plans that increase their costs. Critics called it ‘crazy’ and the wrong way to help farmers” (Year’s Grace 1999). The Baltimore Sun endorsed some of the NMAC proposed changes to the act, but opposed what they described as “recommendations to eliminate enforcement penalties” (Editorial 1999).

In the summer of 1999, and again in the spring of 2000, the MDA scheduled a series of public hearings to receive comment on the proposed regulations. Farmers turned out for the hearings in large numbers. They expressed bitter resentment of the way in which the WQIA was introduced and passed. They criticized what they considered to be a rush to judgment based on limited scientific evidence about the cause of the pfiesteria outbreak. Farmers argued they were subject to unwarranted scrutiny not directed toward other nutrient contributors including point sources and residential homeowners. From their perspective, Maryland farmers were leading the nation in voluntary implementation of NMPs and didn’t receive due credit for their efforts. Farmers argued they deserved the opportunity to address phosphorus issues that, through no fault of their own, had never been raised before. The comments of one farmer highlighted the intensity of their reaction. “I just wanna say that I think this whole program is a direct slap in every farmer’s face in the state of Maryland…and it’s just gettin’ shoved all down…[our] throats, and I think it’s a dirty shame that we have to be in here listenin’ to this” (quoted in Paolisso and Maloney 2000).
Some of the most vehement criticism was directed towards two aspects of the regulations proposed by the MDA. The first was the “right-of entry” clause that required farmers to sign a form allowing MDA personnel to inspect their property. Farmers argued that the clause was an invasion of their privacy and a violation of private property rights. The second was the act’s paperwork requirements that required farmers to file lengthy reports including updates on any deviations from their NMPs as they occurred during the farm season.

A newspaper account of a meeting between farmers and Secretary Virts reflected the tensions between MDA leadership and their farm constituency resulting from the new law, as well as MDA resistance to the enforcement role (Haddad 2000). Virts joked that he might be thrown out of the meeting, but he defended the regulations saying “research continues to support what the new regulations require: a reduction in nutrient runoff” (quoted in Haddad 2000). At the same time he downplayed MDA enforcement responsibilities, saying “our goal here is not so much to enforce [the WQIA], but as a cooperative partner in success. Our goal is clean water and profitable agriculture” (quoted in Haddad 2000).

Although this account went on to suggest that farmers were beginning to accept the new law, in fact farmer opposition remained strong. The Baltimore Sun, noting farmer opposition, once again editorialized against weakening the mandatory aspects of the act, saying: “farmers continue to chafe at the imposition of mandatory nutrient management plans, but it is the only way to assure effective and equitable implementation of this vital plan to clean up the bay” (Editorial 2000). On May 31, 2000 regulations for the WQIA were adopted. Even before the first regulations took effect, the
General Assembly, in the 2000 session, considered sixteen changes to the WQIA proposed by the NMAC. The legislature adopted seven of the proposals, none of which were controversial; they did not take up NMAC proposals to delay implementation or otherwise weaken the act. The final regulations reflecting minor revisions to the act approved by the General Assembly, but with the right-of-entry language, paperwork requirements and compliance deadlines all intact, took effect in April 2001.

**Compliance rates low at first deadline**

In December 2001, the WQIA was back in the news as the deadline for farmers to file nitrogen NMPs arrived. Only 20% of farmers filed the required plans, while 44% filed delay forms and 36% did not respond at all. Farmers who filed delay forms were in compliance with the law; the delay forms certified that they had attempted to hire a nutrient planner at least sixty days before the deadline, but that the planner was not able to complete their plan before the deadline. The *Baltimore Sun*, reporting on the low farmer response rate noted “the legislation has been very controversial within the farm community, with at least some farmers insisting that they will go to jail before they will have a nutrient management plan” (Shelsby 2002a).

For the most part, however, the missed deadline spurred criticism of the state for failing to provide funding to address a backlog of farmer requests for nutrient planning support. A spokesperson for the University of Maryland Cooperative Extension said they had a backlog of more than 1,000 farm requests and that their capacity to respond was limited by lack of money (Shelsby 2001). *Baltimore Sun* columnist Tom Horton offered: “It’s clear that the execution of what was a well-intended law to hold farmers accountable
is a mess. Promised state funding to help farmers meet the accountability standards has fallen millions of dollars short” (Horton 2001). Finally, the *Baltimore Sun* editorialized in favor of extending the implementation deadlines due to the backlog (Editorial 2001).

In the 2002 legislative session, state officials made several proposals to address the low response rate. Governor Glendening proposed a 500 percent increase in funding (from $216,000 to 1.3 million annually) to subsidize farmer costs for the development of NMPs. Delegates introduced three pieces of legislation in the House. One bill, initiated by the Maryland Farm Bureau (MFB), would have delayed the December 31, 2002 NMP implementation deadline by two years. Another would have doubled the minimum threshold for the annual gross income of farmers subject to the act from $2,500 to $5,000. Finally, Delegate Hubbard, reflecting criticism of MDA performance, introduced legislation to transfer oversight of the act to the Maryland Department of the Environment. The MDA opposed the bill with the comment: “This proposal runs counter to the original legislative intent which was to have nutrient management programs reside with MDA, an agency with the experience and technical knowledge necessary to effectively work with the agricultural community to implement this complex program” (MDA 2002a). Further the MDA touted their accomplishments under the act including:

- 65% or 1.1 million acres are covered by a nutrient management plan or will be this year
- 1200 applications for nutrient management cost share have been processed
- $1.2 million for nutrient management plan cost share has been approved
- 94 training sessions were held, providing nutrient application vouchers to 3700 farmers
- 100,000 tons of poultry litter is approved for transport for environmental utilization in other locations
274 nutrient management consultants from the private sector are licensed to provide nutrient management services to farmers (over 900 individuals have been certified).

141 farmers are certified under the current certification program for professional and MDA is developing a certification program targeted to farmers so they can write their own plans (MDA 2002a).

Hubbard’s bill received only his own vote in the House Environmental Matters Committee. The other two House initiatives failed as well. Increased funding for the development of NMPs was, however, approved. Although the MDA did not endorse the MFB proposal to delay enforcement of the act, it did hold off on initiating any enforcement, to see if the General Assembly would adopt their proposed change (Shelsby 2002b). After legislators failed to act, the MDA sent warning letters to 5,400 farmers setting a new July 31, 2002 deadline to fulfill their obligation to file NMPs. Thereafter, however, the MDA took no further action to enforce the act’s deadlines.

Farmers gain support from new governor

In the summer of 2002 the WQIA was an issue in the race for governor. Because Maryland law limits the governor to two consecutive terms, Governor Glendening was not a candidate for re-election. In a campaign visit with farmers the Republican candidate for governor, Robert Ehrlich, claimed that farmers had been demonized by Glendening’s administration. Ehrlich pledged, if elected, to hold a summit with farmers to revisit the WQIA. Further he offered, “farmers are stewards of the land. The fact that these rules don’t work isn’t their fault, and they shouldn’t have to pay the price” (quoted in Connelly 2002).

In November 2002, Ehrlich was elected with strong backing from farmers and voters on the Eastern Shore. The Maryland Farm Bureau, which ended 83 years of
neutrality and formed a political action committee (PAC) after the WQIA passed, announced that 87 percent of the candidates backed by their PAC, including the governor, won their races. On election night, Lieutenant Governor-elect Michael Steele proclaimed, “farmers and watermen no longer have to fear for the livelihoods of their businesses” (quoted in Weber 2002). Farmers expressed optimism that with the new administration they would have a voice in policy decisions that affected them. Ehrlich’s nominee for Secretary of Agriculture was Lewis Riley, the outspoken opponent of mandatory nutrient management regulations, who had served as Agriculture Secretary under Governor Glendening until he resigned in 1997.

Maryland revisits the WQIA

At the end of 2002, the MDA announced greatly improved farmer compliance figures, saying that 83% of agricultural land was in compliance with the act (MDA 2002b). By that time, farmers had filed plans for 45% of the land covered by the WQIA; delay forms still accounted for 38% of the land. No response was received for the remaining 17% of land. The MDA compliance report did not mention the 2002 deadline that required farmers to start implementing their plans. The following spring the General Assembly once again considered a bill to suspend enforcement of the WQIA and extend the deadlines. Agriculture Secretary Riley testified in favor of the bill saying that farmers hadn’t complied with the act due to confusion over paperwork and the potential for invasion of their privacy because of right-of-entry provisions for MDA inspectors. He urged elimination of penalties and of inspector’s right-of-entry to farms. Referring to the Glendening administration and the WQIA, he said: “Their bill was just about as anti-
agriculture as you could be.” Riley continued: “We need to find a way to reach compliance in a way that’s more comfortable to the farming community. Let’s give them an opportunity to sit down and express their views and let the department of agriculture work with them” (quoted in Huslin 2003a). Theresa Pierno, Maryland Director for the Chesapeake Bay Foundation, opposed the bill saying “by removing fines and eliminating site visits you’re already making it a voluntary program. We should be moving forward with these plans, not backwards” (quoted in Huslin 2003a). The bill passed in the House, but failed to move out of committee in the Senate.

In the summer of 2003, Governor Ehrlich made good on his pledge to hold a summit to revisit the WQIA. As a preface to the summit, the MDA and the University of Maryland sponsored a conference on the ‘state of the science’ for nutrient management. Royden Powell, assistant Secretary of Agriculture said “we want to go into the policy discussion with the latest research and bring everyone to the same place” (quoted in Libit 2003a). The research, however, sparked controversy. The Washington Post commented, “as a sign of the state’s changing approach, much of the research presented…came from agriculture and soil scientists rather than environmental agencies studying the bay” (Huslin 2003c). University researchers suggested that “fewer farms than previously thought appear to be in danger of letting major amounts of phosphorus run off into the bay” and that the Eastern Shore has enough cropland to accept all of the poultry litter produced there (Libit 2003a). Theresa Pierno, from the Chesapeake Bay Foundation objected to the omission of research she said shows nutrient runoff from Eastern Shore farms poses a more significant risk to the bay (Libit 2003a). She said, “if this is the basis they’re going to use to make decisions on the future of nutrient management then I’m
very worried. There seems to be at least one side of this that’s missing” (quoted in Libit 2003a).

At the summit itself, nearly 300 people, primarily farmers, but also environmentalists and researchers gathered to review the WQIA and make suggestions for change. The Farm Bureau recommended abolishing the right-of-entry requirement, reducing record keeping requirements, and the “streamlining” of state resources by getting rid of record keeping and review at the state level (Weber 2003). They advocated return to a voluntary and incentive-based approach. Secretary Riley expressed support for the farmers’ proposals saying, “It’s a unique business, and each farmer has his own approach to it. You create too much regulations and it takes away their ability to compete” (quoted in Huslin 2003c). While environmentalists did not support a rollback in the mandatory provisions of the law, they conceded that the regulations were overly bureaucratic and should be streamlined.

The Baltimore Sun followed the summit with an editorial praising the positive and productive tone of the day. The Sun described the WQIA as “rigid and hastily imposed” and commented that while there should be no going back to voluntary regulation, the farmers made many good suggestions for improvements in the law (Editorial 2003c). On the other hand, Baltimore Sun columnist Tom Horton wrote a scathing critique of the MDA for what he termed their “attempt to paper over the seriousness of the farm runoff problem” (Horton 2003). Horton, took the MDA to task for using EPA modeling data known to overestimate progress in reducing agricultural nutrient loadings in the bay saying, “the numbers are bogus, wildly over-optimistic – and MDA, as does every agency involved in the bay cleanup, knows it” (Horton 2003).
WQIA revised

Following the summit, the MDA announced their proposed changes to the WQIA. Key recommendations addressed farmer concerns about paperwork obligations and the "right of entry" language. The required reporting of changes to NMPs (due at the beginning of the season and as they happen during the season) was replaced with an abbreviated update summarizing fertilizer use due each March 1st. The requirement to provide permission for MDA right-of-entry to farm property was scrapped, although the act still gives MDA personnel the right to visit farms for the purpose of assuring compliance. Mandatory compliance requirements were left intact. Theresa Pierno, representing the Chesapeake Bay Foundation, reacted favorably saying the changes might bring more farmers into the program. Pierno said, "I think it's going to make it more difficult for someone who does not have a plan to justify why he doesn't" (quoted in Amon 2003).

Farmers, on the other hand, appeared disappointed that they hadn't gained further concessions. Expressing the view of farmers who hoped the reporting requirement would be eliminated altogether, one farmer said "we feel quite strongly that what a farmer does on his farm is more important to the environment than a piece of paper" (quoted in Amon 2003). MDA officials, speaking to a Farm Bureau convention audience, made clear to farmers that more dramatic changes were simply not politically feasible, as they would never gain majority support in the General Assembly (Libit 2003d). Farm Bureau members agreed to endorse the changes only after two days of debate at their convention.

At the end of 2003 the MDA reported, "the number of farms in compliance with the WQIA continues to increase steadily" (MDA 2004). According to the MDA, 70% of
Farmland was covered by NMPs and delay forms accounted for 15% of the land for an overall compliance rate of 85%. There was no response from farmers who owned 15% of the land (MDA 2004). The results at the end of 2004 were largely unchanged. Once again, MDA reports did not mention compliance with the requirement to implement NMPs.

The revised regulations went into effect on December 22, 2004. A spokesperson for Governor Ehrlich predicted, as a result of the changes, farmer compliance would grow from 75 to 100 percent (McCaffrey and Kinzie 2004). An MDA official echoed Ehrlich’s optimism that farmers would comply with the new March 2005 deadline established by the revised regulations. He expressed the belief that both the department’s ongoing education efforts and the summit process had improved farmers understanding and acceptance of the nutrient management regulations (Samadani 2005). On March 1, 2005, farmers who had previously filed a NMP were required to file an annual update to their plan. Farmers who had yet to comply with the act were required to file an initial NMP. Despite the optimism of Governor Ehrlich and the MDA, as of March 31, 2005, only 43% of farmers responded to the March 1 deadline. The MDA received updates from 63% of farmers who had previously filed a NMP. Only 9% of farmers who have yet to file an NMP responded to the deadline. This was a sharp decline from the 85% compliance rate reported just three months earlier in December 2004.

In the next chapter I will show that analysis of MDA compliance figures suggests the latest sharply reduced compliance rates likely reflect overly optimistic reporting for the period from 2001 to 2004, rather than a sudden drop in compliance on the part of farmers. Chapter four explores the MDA’s reluctance to enforce the WQIA, and its
adoption of NMP requirements that fail to address water quality concerns. I show that conflicts with MDA mission and priorities, rather than the complexity of the task or the challenges of nonpoint enforcement, explains Maryland’s failure to implement the act.
Chapter Four: Analyzing Maryland’s experience with the WQIA

In this chapter I analyze Maryland’s experience with mandatory regulations outlined in the last chapter. I argue: 1) the WQIA has largely failed because it has not resulted in significant advances in farmer implementation of NMPs, and 2) the root cause of this failure is the compromise provision that assigned enforcement to the MDA. Further, contrary to arguments made by some critics of the WQIA, I show that the fundamental difficulties in enforcing the law are not a result of its overly broad mandate, or the inherent challenges of regulating nonpoint sources. Rather, they are a direct result of the strategies developed by the MDA to support farmer interests. I detail how misleading reports of farmer compliance have served to give the public a false impression of progress. In addition, I show how the guidelines developed for phosphorus NMPs will allow phosphorus levels in the soil to continue to rise. Finally, I offer some suggestions for alternative strategies that may improve prospects for reducing farm nutrient runoff.

MDA Maintains a Voluntary Program

As the previous chapters have demonstrated, MDA leadership has, for more than two decades, been absolutely consistent in its support of a voluntary approach to farm nutrient management. Even after the WQIA was enacted, MDA Secretary Riley publicly supported efforts to postpone or abolish compliance deadlines and penalties during the 2003 legislative session and at the summit to revisit the WQIA in the summer of 2003. Regardless of the fact that the WQIA was enacted in direct response to the failures of Maryland’s voluntary nutrient management regime, the MDA has implemented the WQIA as though it were a voluntary nutrient management program. According to the
MDA, their implementation strategy for the WQIA employs three approaches: 1) education and outreach, 2) incentives, and 3) regulatory measures and enforcement (MDA 2005b).

In the spirit of a voluntary program, MDA effort and accomplishments with regard to education, outreach and incentives are substantial. In 2002, when the MDA defended their performance in response to Delegate Hubbard’s bill to transfer oversight of the WQIA to the Maryland Department of the Environment, they were able to point to significant achievements in addressing needs for certification, training, and financial assistance for farmers. MDA efforts to provide needed education, support and training have continued and expanded in recent years. Further, the department describes a “comprehensive communications effort—including newsletters, fact sheets, press releases and brochures” to advise farmers of the requirements of the act and encourage compliance (MDA 2002b, 46).

Again, as is consistent with a voluntary system, four years after the first compliance deadline, not a single enforcement action against farmers has been initiated by the MDA. The WQIA provides that farm operators who do not meet the deadline for developing a NMP are subject to a written warning for a first offense, and thereafter, a penalty of not more than $250 for second and subsequent offenses. Any farmer who hasn’t yet filed a NMP has been in violation of the act since December 31, 2001. To date no farmer has even been warned, let alone fined for failure to comply. Farmers who do not implement the requirements of a NMP are subject to a written warning and a $100 fine for second and subsequent violations. All farmers were required to implement their NMPs by December 31, 2002. To date, the MDA has yet to check on farmer
implementation of a single NMP. This decision not to investigate farmer implementation is all the more notable because the MDA does investigate NMP implementation of non-farm operators (golf courses, athletic fields, landscapers, etc.). In 2004, the MDA reviewed the records and fertilizer programs of 40 non-farm operators. The MDA rated their performance and reported results ranging from full to poor compliance (MDA 2004).

In 2001, when farmer compliance with the initial deadline was low, the MDA waited to see if the General Assembly would amend or repeal the law during the 2002 legislative session. When the General Assembly took no action, the MDA sent a letter reminding farm operators of their obligation to comply with the act. Fred Samadani, Administrator of the Nutrient Management Program for the MDA, described this period of time:

The law was approved with … limited time for farmers to understand the law and … the requirements and commitments. There was some resistance; sometimes it was very hard. When the first deadline came, 5,400 out of 9,000 operators had not responded to the deadline. We had to send a letter to them … we received a lot of negative responses and resistance, and also some farmers expressed fear of the laws and regulations. The department was in a situation that it found out it cannot penalize such a large majority immediately, because they were not prepared. Also the agriculture community, the farm bureau and other institutions, they were strongly resisting the program in their annual meetings and in the meetings that they had here with department representatives. They were criticizing the department and so on. After I sent the letter in June 2002 to operators and we got those reactions, the Secretary of Agriculture told us to halt on enforcement of regulations. Also, November 2002 was the election year -- they were discussing these issues and the administration changed. The new administration met with the agriculture community and promised to streamline the program and listen to them (Samadani 2005).

Samadani describes the period from mid-2002 to the end of 2004 when the revised regulations were adopted, as a “pause” in enforcement. He said, “this pause in enforcement of penalties did not stop the participation of farmers. We were working with
them with education and incentives to prepare them. By end of 2004 when the new regulations were enacted, we had a very good participation rate” (Samadani 2005).

Samadani’s reflections, and MDA actions since the WQIA was enacted, reflect behavior Wilson predicts for a client agency. It was the clear intent of the General Assembly to mandate the end of voluntary nutrient management and institute a mandatory system with accountability mechanisms found to be lacking in the voluntary regime. Yet the MDA, in line with its own preferences and those of Maryland farmers, has managed to maintain its commitment to a voluntary system that encourages farmer compliance through training, education, financial incentives, and moral suasion. MDA officials recently expressed support for the act and a willingness to enforce its provisions now that the revised regulations have taken effect (Canter 2005; Samadani 2005). A Baltimore Sun article referring to the fact that only 43% of farmers responded to the most recent deadline quoted Secretary Riley saying: "It is our intent to aggressively work with the ag community in achieving the goals of the law" (Associated Press 2005). Given the MDA’s history, however, there is reason to be skeptical that the MDA will change their enforcement approach.

Reports overstate farmer compliance

Despite the MDA’s decision to stick with voluntary measures to encourage farmer compliance with the WQIA, there has been little public demand for greater enforcement of the act. To some degree this may be due to recent public focus on the need to revise aspects of the WQIA that were generally regarded as problematic. It is more likely however, that the public has been lulled by regular MDA public statements and reports
that emphasize growth in farmer compliance and indicate farmer compliance rates have been above 80% since 2002 (see Figures 2 and 3).

Figure 2: Farm plans filed from 2001-2004

![Cumulative Number of Plans and Delay Forms Filed with MDA from December 2001 to September 2004](source: MDA)

Figure 3: Compliance as reported by the MDA

<table>
<thead>
<tr>
<th>MDA Reported Compliance Figures for Farm Acreage</th>
<th>Year</th>
<th>NMP</th>
<th>Delay Form</th>
<th>No Response</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>20%</td>
<td>44%</td>
<td>36%</td>
<td>64%</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>45%</td>
<td>38%</td>
<td>17%</td>
<td>83%</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>70%</td>
<td>15%</td>
<td>15%</td>
<td>85%</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>71%</td>
<td>13%</td>
<td>16%</td>
<td>84%</td>
<td></td>
</tr>
</tbody>
</table>

Source: MDA

MDA compliance figures are, however, misleading in a number of respects. First, the WQIA regulations provided that farmers who did not meet the original December 2001 filing deadline could file a delay form if they had attempted to hire a certified nutrient management planner in advance of the deadline. The regulations, however,
required farmers to file a NMP within one year in order to remain in compliance with the act. As a result, 38% of the farmers the MDA identified as in compliance in 2002 (and 15% and 13% listed as in compliance in 2003 and 2004 respectively) were in fact, no longer in compliance with the law.

Second, the WQIA required farmers to file regular updates reflecting their actual nutrient application activities. It was this paperwork requirement that farmers bitterly resisted and succeeded in modifying as of 2005. One farmer reported that an MDA official acknowledged to him that MDA compliance figures would include his farm in the compliance category despite the fact that he had not filed updates to his plan since meeting the original 2001 deadline (Anonymous farmer 2005). A closer reading of the reports, therefore, suggests that 71% of farmers have filed at least one NMP between 2001 and 2004. The MDA has reported more than 80% compliance with the act since 2002. In fact, considering that the delay forms were no longer valid, compliance could not have been better than 45% in 2002, and 70% and 71%, in 2003 and 2004 respectively. Given the strong farmer resistance to the paperwork requirements it is likely that compliance was substantially lower.

The 2004 revisions to the act established a new annual deadline for NMPs (March 1), revised reporting requirements, and removed the delay form option. As a result, the most recent MDA report on farmer compliance does not combine farmer response to the 2005 deadline with previous years. As of March 31, 2005, only 43% of farmers responded to the new March 1 reporting deadline. The much lower response to the latest deadline (see Figure 4) supports the notion that previous MDA reports overstated farmer compliance.
Finally, and perhaps most critically, when the MDA describes farmer compliance with the law, their figures refer to compliance only with the obligation to develop a NMP and file it with the state. As of December 31, 2002 all farmers were required to implement their NMPs, but as noted previously, the MDA has yet to investigate the degree to which farmers are complying with their plans. Although there is no data about the current degree of NMP implementation by farmers in Maryland, previous studies of farmer implementation rates provide cause for concern. In Pennsylvania an environmental group recently reviewed nutrient management plans for one county and reported 59% of farms were in violation of their own plans (Citizen’s for Pennsylvania’s Future 2004). An earlier Pennsylvania study, conducted by the United States Department of Agriculture, found only 22% of farms implemented 70% of their NMPs and 57% of farms implemented just 30% of their NMPs (Chesapeake Bay Program [CBP], 2004). In
Maryland, a statewide survey conducted in 1998 found farmers were following 40% to 70% of their NMP requirements (CBP 2004). A recent report authored by scientists associated with the Chesapeake Bay Program highlighted their concern with this issue. The paper said, “reported progress is usually based on plans written or structures designed, not on actual implementation. There is much concern that this results in the substantial overestimation of implementation” (CBP 2004, 8).

Despite the scientists’ concern, this issue has received little public notice. The MDA has succeeded in creating the impression that the vast majority of farmers have implemented the law. In fact, less than half of farmers complied with the most recent filing deadline. There is no way to know whether farmers are implementing their plans and reason to believe that implementation rates may be low. As to the MDA’s claims of progress, seven years after the WQIA was adopted and four years after the deadline to file a plan, current plans are in place for only 750,000 acres of farmland. This compares poorly with the 900,000 acres the MDA claimed was under nutrient management in 1997. It remains to be seen how the public will respond to the latest dismal compliance results. To date, however, MDA reporting has created a false sense of progress and thereby reduced public pressure for improved performance.

**Regional manure imbalance biggest threat to water quality**

At the outset I asserted that MDA oversight of the WQIA was problematic not just because of their unwillingness to enforce the law, but also because the MDA prioritizes farmer economic concerns over water quality goals. A case in point is the requirements adopted for phosphorus NMPs. The deadline for farmers who use organic
fertilizers to develop phosphorus NMPs did not take effect until July 2004. Proponents of the delay argued that time was needed to develop the standards for NMPs based on phosphorus, since previously NMPs were based solely on nitrogen. Moreover it was recognized that the challenges for farmers who use manure were considerably greater than those for farmers who use inorganic fertilizers. With inorganic fertilizers farmers can save money by reducing fertilizer use to the amount needed for optimum crop yield. Although farmers may fear that complying with NMPs will harm farm income by reducing yields, the immediate impact of following an NMP is likely to be reduced expenses for fertilizers.

For farmers who apply manure however, the cost of complying with a phosphorus-based NMP may be significant. Chicken litter, in particular, is known to have high phosphorus content. Farmers who apply chicken litter based on nitrogen needs, are likely applying many times more phosphorus than crops can absorb. If a soil test reveals that phosphorus levels are too high, farmers may have to replace a free source of fertilizer (manure) with purchased inorganic nitrogen. Moreover, farmers whose livestock produce more manure than their lands can accommodate face the challenge and expense of disposing of excess manure.

The increasing concentration of animal operations has resulted in regional manure imbalances precisely because farmers do not have enough land to safely accommodate all of the manure their livestock produces. A national study conducted by the National Resource Conservation Service (NRCS) highlighted the magnitude of the phosphorus manure imbalance on Maryland’s Eastern Shore (Kellogg et al., 2000). Based on 1997 figures, the NRCS estimated that all nine counties on the Eastern Shore produce an
excess of phosphorus manure. Three counties had an excess of 200,000-500,000 pounds, in five counties the excess was in the range of 500,000 to 2 millions pounds, and in one county the excess was more than 2 millions pounds. These figures did not take into account the possibility of transporting manure to nearby farmland; the NRCS separately calculated the ratio of phosphorus manure produced, to available crop and pastureland within each county. But even considering the possibility of transporting manure to all available farmland, four counties on the Eastern Shore had a ratio of manure to farmland greater than 1.0 (Kellogg et al., 2000). Another indication of the severity of the problem was provided by a scientist who estimated that some lands on the Eastern Shore are so saturated with phosphorus that it could be ten to fifty years before crops need any additional phosphorus (Wheeler 1997d).

There is general agreement that the manure imbalance in the Chesapeake watershed is the key challenge that must be addressed to reduce agricultural nutrient loading to the bay. Scientists, farmers, and policymakers are pursuing a variety of solutions including reducing phosphorus in animal feed, adding phytase to increase chicken uptake of phosphorus, and developing commercial uses for chicken litter. In 1998, the MDA developed a subsidized manure transport program to assist farmers in redistributing manure to crops that can use it. To fulfill the requirement of the WQIA, the MDA, as I discuss in the following section, has adopted regulations for phosphorus-based NMPs.

**Phosphorus standards minimize manure imbalances**

Ironically, while the nitrogen NMP standards are based on agronomic rather than
environmental goals, the claim for the phosphorus guidelines is that they are based on environmental rather than agronomic goals (Maryland Cooperative Extension 2003). That is, MDA phosphorus NMPs recommend phosphorus use based on estimated phosphorus transport potential rather than agronomic needs. Developing a phosphorus NMP is a two-step process. First, farmers must test their soils for phosphorus. The phosphorus fertility index value (FIV) defines optimum soil phosphorus levels to be between 50 and 100. Levels above 100 are considered to be excessive. Farmers whose soil FIV is above 150 (1.5 to 3 times the agronomic optimum) must utilize the Maryland Phosphorus Site Index (PSI) to determine whether a phosphorus NMP must be employed. Farmers with a soil FIV below 150 are not required to implement a phosphorus NMP. They are still subject to the requirements of a nitrogen NMP.

The PSI considers site transport characteristics including soil erosion and runoff class, leaching potential, distance from surface water, and priority of receiving water. The PSI also considers application rates and methods, and fertilizer characteristics. All of these characteristics are used to rate the potential for phosphorus transport. Transport potential is categorized as low, medium, high, or very high. If land is in the low category, farmers can continue to use nitrogen NMPs. With land in the medium category, farmers must use phosphorus NMPs for two out of three years. If lands are rated high, a phosphorus NMP must be used to determine phosphorus application rates. No phosphorus can be applied on lands in the very high category.

In a statewide sample of soil tests, (n=646) University of Maryland scientists found 45% of farms had FIV ratings higher than 150. In this sample, using the PSI, 69% of lands were rated low, 19% were medium, 8% were high and 4% were very high
(Maryland Cooperative Extension 2003). These data were included among the presentations at the conference sponsored by the MDA and the University of Maryland in the summer of 2003 as a prelude to the summit held to discuss revisions to the WQIA. It was after this conference that Theresa Pierno from the Chesapeake Bay Foundation indicated she was concerned that nutrient risks to the Chesapeake Bay were being downplayed. Thomas Simpson, Chesapeake Bay Program Coordinator for the University of Maryland recently expressed similar concerns. He argues that the Phosphorus Site Index was designed to minimize the number of farms that will have to make significant adjustments to their operations. He says:

The Phosphorus Site Index is supposed to estimate the relative risk of loss.... In Maryland it was designed to group certain amounts of fields into certain classes. So you don’t get a whole lot (rated) high or very high, because we couldn’t handle that. That’s not really science-based. It’s not really risk (assessment), it’s let’s distribute the fields to categories. We made a decision on breaking the categories down to get relative amounts in each category and I don’t have the data to say this is high risk or low risk relative to water quality....It is clearly a farmer friendly tool; it was designed that way (Simpson 2005).

Simpson expressed concern that the phosphorus standards will continue to allow significant accumulation of phosphorus in soils, particularly on the Eastern Shore:

Currently until you’re three times higher than the agronomic optimum you don’t even have to run a site index. And the site index is very slope sensitive. You get on the Eastern Shore where you don’t have slopes, it could allow you to go to 6-20 times above the agronomic optimum. My concern as a scientist: I know how qualitative the site index is; I know it doesn’t consider a number of things like temporary field drainage that could enhance phosphorus losses. If you don’t even run it until you’re 3 times above agronomic needs then we know for you to get into that high category, you’re many times above agronomic needs. We are still in a disposal mentality (Simpson 2005).

Finally, Simpson suggests the phosphorus guidelines may not serve the long-term interests of farmers, saying “I would stake my reputation on coming back in ten years,
and we will have to go back to those very farmers, and this is what really gets them mad, and say ‘guess what, you can’t keep putting down phosphorus’. For a large number of them ...the truth will be, their situation may be worse than it is today” (Simpson 2005).

Ken Staver, scientist at the Wye Research and Education Center on Maryland’s Eastern Shore, echoed Simpson’s remarks:

The phosphorus index is by far the least restrictive of the options that are available for managing phosphorus. You could say if you’re over what’s considered optimum for crop production, you may not put any more phosphorus. That would be simple and most restrictive. The next would be, you may not go any higher with your soil phosphorus if you’re above optimum, but you can go into replacement mode. Don’t put any more on than you pull off with your grain. The phosphorus index considers all these factors that affect phosphorus loss and says you can actually use phosphorus even if your phosphorus levels are well above what is the optimum economic level (Staver 2005).

Staver continued:

From a water quality standpoint I’m unhappy with the phosphorus index. I don’t really see it justifiable from a water quality standpoint to basically let people go higher than they already are, if they’re above the agronomic optimum already. If somebody is out of balance, even with the phosphorus index, sooner or later they’re going to hit the ceiling. So all it does is buy some time for people who have an imbalance (Staver 2005).

When asked about concerns that the phosphorus index continues to allow too much phosphorus to be applied to farmland. An MDA official defended the PSI, but tacitly acknowledged the need to consider interests other than water quality:

Where soil phosphorus levels may be high, the index looks at two factors: the potential for transport of nutrients, and loss due to management practices. If phosphorus has less potential to be transported into water with additional nutrient application, that is a little more acceptable if field characteristics allow phosphorus to stay in place a little bit better. Farmers do need places to apply manure, and crops still need some nutrients. High phosphorus levels are a concern, it is part of our concern, but in the bigger picture we need to make everything work together (Canter 2005).

It is by now well recognized that as phosphorus stocks in soils increase,
phosphorus losses will tend to increase (Staver and Brinsfield 2001; CBP 2004). The MDA, however, has selected a nutrient management tool criticized by scientists as the least restrictive option, and one that will continue to allow significant build-up of phosphorus levels in the soil. Their choice minimizes the magnitude of changes in farming practice required to comply with NMPs. As a result, significant challenges, in particular the regional excess of manure, are downplayed rather than highlighted. This decision simply puts off to the future the need to confront difficult choices about farm practices and creates an illusion among farmers and the public that improvements in water quality can be achieved with minimal change in current practices. Moreover, the approach favored by the MDA risks compounding future problems for farmers as their soil phosphorus levels increase.

Notably, although prominent scientists expressed great reservation about the PSI as an appropriate NMP tool, they have not advocated immediate adoption of the agronomic optimum as a standard for phosphorus NMPs. This reflects their concern that farmers do not have the resources to adjust to drastic restrictions on their manure use. Many observers note that farmers tend to operate on slim profit margins and, because they do not control the prices they receive for crops, cannot pass costs on to the consumer. Although the MDA apparently hopes to protect farmers from economic hardship by minimizing excess manure levels, their actions serve to disguise the magnitude of the problem. As a result, water quality goals are deemphasized, and elected officials and the general public do not have to confront difficult issues about the economics of farming and how environmental improvements should be financed.
Conclusions

This analysis reveals that Maryland has largely failed to achieve the goals of the Water Quality Improvement Act. Although MDA reporting has created the public impression that Maryland farmers have made significant strides in implementing NMPs, a review of the record shows otherwise. Seven years after adoption of the act, and four years after the first deadline, farm plans cover fewer acres than under the voluntary system in 1997. Despite this dismal result there has been progress, albeit limited, in the past seven years. While only 43% of farmers are currently in compliance, MDA reports indicate that 70% of farmers have, on at least one occasion since 2001, filed a NMP. This suggests that although fully thirty percent of farmers have yet to develop a NMP, many farmers did at least take a first step toward addressing the problems of nutrient runoff.

Nevertheless, a much more important measure of progress is farmer implementation of NMPs. In this regard, the state has yet to undertake any oversight or review of farm plans to assess or encourage farmer implementation of NMPs. As a result, we simply have no information about farmer implementation. Surveys of farmer compliance with NMPs, however, suggest that implementation rates are low. Finally, in measuring success, we must consider whether the requirements of the NMPs will bring about desired improvements in water quality. I have shown that scientists express serious concern that the phosphorus NMP guidelines established by the MDA, even if fully implemented, will not achieve water quality goals.

As I argued at the outset, the key impediment to implementation of the act stems from the initial compromise with farm interests that placed oversight of the act solely in
the hands of the Department of Agriculture. The Maryland experience has borne out the predictions of political scientists that agency culture is stubbornly resistant to change, and that client agencies will have great difficulty resisting the influence of the groups they serve. The history shows that despite Maryland’s high profile adoption of mandatory regulations, the MDA has remained committed to a voluntary approach. No farmer has been fined, or even warned, for failure to file an NMP. While the MDA has investigated plan implementation of non-farm operators, it has yet to investigate farmer compliance with NMPs. The development of the phosphorus NMP guidelines illustrates MDA adherence to its primary mission of supporting the economic prospects of farmers in the face of conflict with water quality goals.

One of the original arguments for placing oversight in the hands of the MDA, was that only the MDA, with its close relationship with farmers, would be able to gain their cooperation. The evidence shows, however, that farmers have had greater influence on the behavior of the department than vice-versa. In response to farmer resistance in 2002, the MDA “paused” its enforcement of the law. Instead, the MDA focused on farmer education and outreach, and championed revisions to the WQIA designed to address farmer concerns. Based on the abysmal 43% farmer response to the most recent filing deadline, MDA strategies have not succeeded in gaining farmer cooperation. Another argument originally offered for MDA oversight was that their agricultural expertise and familiarity with local farm operations was critical to developing appropriate guidelines for NMPs. While MDA agricultural expertise has no doubt been valuable, I argue in the final section of this paper that there are alternative avenues to address the need for agricultural expertise.
Some observers argue that difficulties with implementation of the WQIA are more appropriately attributed to its broad mandate. It has been a significant challenge to implement a law that applies to more than 7,000 farms, and to develop guidelines for every sector of the agricultural industry. In 2001, the fact that thousands of farmers needed to engage a certified nutrient management planner did create a bottleneck that resulted in large numbers of farmers filing delay forms. That bottleneck was largely resolved in 2002, however, with improved funding from the state. The MDA has since certified adequate numbers of nutrient management planners to meet farmer demand. Delays are no longer an issue, as reflected by the fact that the 2004 revisions to the WQIA removed provisions for delay forms. This thesis makes clear that delayed enforcement and choices about NMP requirements do not stem from a lack of resources to cope with a too-large task, but rather from policy choices based on department goals and priorities.

Finally, some observers suggest, as a result of challenges inherent in regulating nonpoint sources, the WQIA is fundamentally unenforceable. They point out the impossibility of observing the daily actions of 7,000 farmers, and of ascertaining whether NMP documentation accurately reflects nutrients applications. Others support the assertion that “where people do not expect regulations to be implemented consistently over time they will choose to ‘game’ the system” (King 2004). Conversely, where government displays a clear commitment to enforcement, regulated entities are more likely to comply (King 2004). Since the MDA has yet to take up its enforcement responsibilities, we have no basis upon which to judge whether effective enforcement strategies can be developed for the WQIA. As previously noted, the little progress has
been made in the United States addressing agricultural nonpoint source pollution. Ongoing experimentation with various approaches is needed. Maryland's failure to pursue enforcement strategies represents a lost opportunity to learn whether a mandatory approach to nutrient management can be an effective tool to improve water quality.

In summary, it is unrealistic to expect an agency whose mission it is to support the economic interests of agriculture to effectively advocate for unwelcome regulation and the difficult changes in farm practices that are needed to reduce environmental impacts. In order to achieve the significant reductions in agricultural nonpoint source pollution required to meet the water quality goals for Chesapeake Bay and elsewhere policymakers should reconsider the placement of environmental enforcement responsibilities within agriculture departments. In the final section I consider alternative regulatory approaches and some of the larger challenges to addressing nutrient runoff from farms.

**Future Directions**

This thesis suggests that rather than asking agencies to take on duties antithetical to their fundamental mission, states should consider compatibility with established mission and culture when assigning new responsibilities. With this in mind, states should, as they do for other industries, assign oversight of laws designed for environmental protection to their environmental enforcement departments. In Maryland, the Department of the Environment (MDE) would no doubt have to develop agricultural expertise to effectively perform this function. There are, however, resources already available. The state funds a network of Maryland Cooperative Extension employees in every county that write nutrient management plans and provide educational assistance to
farmers. The MDE could focus on enforcement duties, while delegating the needed education and outreach work to extension staff. Based on the Maryland experience with the development of phosphorus NMP guidelines, I argue that the willingness and ability to critically evaluate nutrient management strategies based on water quality goals is more important than first-hand agricultural knowledge.

Critics claim that farmer hostility to the MDE would render their oversight unworkable especially given the challenges of assessing the compliance of nonpoint sources. The vehement farmer reaction to the MDA “right-of-entry” language indicates, however, that any enforcement agency will experience tensions with a regulated community. Moreover, while it remains to be discovered whether mandated nutrient management planning can effectively be enforced, I suggest that an agency committed to enforcement is more likely to develop regulations that will accomplish the task.

This thesis is focused primarily on how regulatory strategies have impacted farmer implementation of NMPs. I have argued strongly against the current practice of placing enforcement in departments of agriculture and suggested that placement of oversight in departments of environmental protection is necessary. Nonetheless, this change in and of itself, though crucial, will not be sufficient to achieve water quality goals. There are additional barriers to farmer implementation of NMPs that are not directly related to agency willingness or capacity to design and enforce effective regulations.

One such barrier is that many farmers remain deeply skeptical of the science that indicates farms are the number one source of nutrients in Chesapeake Bay (Paolisso 2000; personal interviews). One of the hoped-for benefits of nutrient management plans
is that they will educate farmers about nutrient transport pathways and the significant impacts of nutrient pollution. While most observers seem to agree that overall farmer understanding of the impacts of excess nutrients has increased, it is likely that the reported high turnover among low-paid nutrient management planners lessens their effectiveness as ambassadors for nutrient management planning. States should invest in stabilizing nutrient management planning staff, and emphasize the important one-on-one educational function of their role. With proper oversight, Maryland’s decision to allow farmers to be certified to write their own farm plans, may be another valuable way to increase knowledge of nutrient pollution within the farm community.

Another critical barrier that must be acknowledged is the economic challenges that confront farmers, particularly those with excess manure, when implementing nutrient management plans. As noted previously, scientists who were critical of the MDA phosphorus guidelines, were also reluctant to endorse requirements based on agronomic optimums. They were concerned that the regulations would be ruinous for farmers who operate on slim profit margins and are unable to control the price of their products. While the MDA decision concerning phosphorus guidelines for NMPs may be understandable in this context, an honest accounting of the magnitude of change required is an important precondition to a needed public debate about how the costs of producing food in an environmentally sensitive manner should be distributed.

Currently, Maryland subsidizes manure transport. In the short run, the state should consider significant expansion of this program. Given that the root cause of manure imbalances -- the concentration of animal operations -- is unlikely to be reversed, long-term solutions are necessary. Possibilities include adjustments to nutrient inputs in
animal feed, transition to nutrient efficient crop rotations, and the development of alternative commercial uses for manure. The economic viability of these and other options may improve once the true costs of current practices are calculated. Further, as the economic challenges facing agriculture are national in scope, action on the federal level is warranted. Current federal regulation of concentrated animal feeding operations (CAFOs) only applies to the largest operations. Expanded application of the CAFO regulations would at least protect Maryland farmers from competitive disadvantage with farmers in states with less rigorous requirements.

A final promising option is a current initiative, sponsored by some farm and environmental advocates, to redirect farm commodity subsidies toward reimbursement for improvements in the environmental performance of farms. As this thesis makes clear, while states must reassign regulatory authority to their departments of environmental protection, overarching barriers to achieving water quality goals must also be addressed.
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