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REGULATING FARMERS: LESSONS LEARNED FROM THE DELMARVA PENINSULA

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The experiences in three Chesapeake Bay states—Maryland, Delaware, and Virginia—which enacted mandatory nutrient management plan regulations in the late 1990s, provide important lessons for all six Bay states as they choose strategies to meet the new Bay water quality goals for nitrogen and phosphorus. A series of fish kills on the eastern shore of Chesapeake Bay in 1997 that drain the Delmarva Peninsula were linked to agricultural sources of nutrient pollution, specifically poultry manure. The fish kills were associated with *Pfiesteria piscicida*, a toxic microorganism which caused skin lesions on fish and health problems for fisherman and scientists studying the problem. Though the *Pfiesteria* diagnosis remains controversial to this day, the fish kills became a focusing event for the on-going and long-time plight of the Bay and prompted sufficient concern for all three states to augment their voluntary approaches to agricultural environmental management with new regulatory mechanisms.

All three states required farmers to obtain and follow field-specific nutrient management plans that “optimized crop yield by minimizing environmental losses of nutrients.” Plans prescribed the rate, form, timing and method of application of commercial fertilizer and manure sources of nitrogen and phosphorus. In addition, the states decided to officially lower their university recommendations for poultry manure application rates from a nitrogen-based rate to a phosphorus-based rate to address the build-up of excess soil phosphorus in cropland in poultry production areas.

This article provides highlights from research (Perez, 2010) examining the Maryland, Delaware, and Virginia initiatives based on interviews with 60 farmers and over 60 policy stakeholders in the three states and other data. It examines the results of these initiatives according to two compliance criteria, administrative compliance and adherence compliance. The former is concerned with whether farmers obtained the required plans and filed the required annual implementation reports. The latter is concerned with whether farmers are following the application rates in their plans and implementing nutrient management practices. In addition, the article explores how implementation issues related to the policy processes in each state affected the outcomes.

Different State Policymaking Processes

Maryland responded first to the fish kills. Its policymaking approach to regulating farmers was contentious. Under the leadership of a high-profile governor who was recognized as an environmental “policy entrepreneur,” Maryland debated the causes of the fish kills and the possible policy responses under national news coverage. The media spotlight exacerbated the belief by farmers and farm trade associations that they were wrongfully attacked for causing the fish kills. They reported feeling alienated from the policymaking process and believed they had less influence than the environmental stakeholders. Maryland chose a very aggressive implementation schedule requiring almost all farmers to have a plan within three years of the law despite a shortage of State-certified individuals to prepare the plans and not having finalized their new policy on phosphorus management or the computer model used to calculate the plan recommendations. Maryland also required the poultry integrator companies such as Tyson and Perdue to add an enzyme, *phytase*, to their chicken feed to lower the phosphorus content of the poultry manure and to pay for 50% of the cost-share to transport excess manure off of farms.

In contrast, Virginia's business-oriented governor took a “go slow” approach, preferring to see if the fish kills would occur near the Western Shore of the Bay closer to the Virginia mainland, and to conduct their own medical analysis of the humans affected by the event. Despite leadership from a member of the state General Assembly who argued that a comprehensive regulatory response was warranted given that poor Bay water quality continued to cause harm to his seafood industry constituents, the Virginia General Assembly disagreed that regulating all farmers was necessary. Instead, Virginia chose to regulate only poultry growers—as the largest dairy and beef industries were already regulated. Crop and grazing lands were untouched. But because most poultry growers did not grow crops, Virginia provided very little cost-share to help farmers obtain a nutrient management plan nor did they establish a manure transport program as most of the manure was already moving from poultry farms to crop-only farms. In the end,

environmental stakeholders in the state complained that the agricultural industry had the upper hand in the policy-making process. This resulted in a law that in effect, required very few farmers to make behavior changes that would result in significant nutrient reductions.

Because Delaware has no Bay frontage, the State waited to see how Maryland and Virginia would respond to the fish kills. Delaware's governor reached out to leaders in the agricultural community and asked them to discuss options for policy responses. They concluded that a comprehensive regulatory response was necessary by the state legislature but that a quasi-governmental commission comprised mainly of farmers be created to write, implement, and enforce the regulations. Thus, Delaware was highly inclusive of farmers and their farm trade association representatives in the policymaking process, to the point where they were seen by some as dominating the process. Delaware's policy deliberations largely occurred outside the media glare and behind closed doors. Delaware chose a very slow implementation schedule allowing farmers to come in voluntarily to obtain a plan within three years after the law or be called to comply in groups of 20% of the farming population over five years after the initial voluntary period. Though virtually all farmers were regulated, similar to Maryland, Delaware opted for a simpler and more straightforward phosphorus policy—a 3-year crop removal rate—which does not require field-specific measurements like Maryland's Phosphorus Site Index approach. Delaware provided farmers with cost-share funds to hire certified private sector planners if they chose to do so and established a publically funded manure transport program.

Administrative Compliance

Farmers in Maryland and Delaware reacted very differently to their state's regulations. While all Maryland farmers were required to develop a nutrient management plan by the first deadline in 2001, only 30% did so. In contrast, only 20% of Delaware farmers were *required* to obtain a plan by the state's first deadline in 2003, but over 40% of the eligible acres did so. Thus, while most Maryland farmers were "digging in their heels" according to many interviewed policy stakeholders and farmers, Delaware farmers were coming in early.

By 2008, however, the story changed. After years of sending warning letters and levying small fines to farmers who had not obtained a nutrient management plan, Maryland was able to gain virtually total compliance with farmers obtaining a plan and filing short, two-page Annual Implementation Reports. In contrast only 70% of the eligible acres required to come into compliance in Delaware had done so in the fifth and final year of implementation of the Delaware law. In addition, less than 40% of the expected Annual Reports have been submitted. In both instances, the Delaware Commission has made little effort to compel noncompliant farmers into compliance and only a "handful" of fines were levied. Thus, Delaware's seemingly more farmer-friendly approach did not achieve the same level of compliance over the longer term as Maryland's stricter approach.

Virginia's administrative compliance story is uneventful as virtually all poultry growers were in compliance by the law's 2001 deadline. Part of the ease of gaining near complete compliance was the fact that most growers didn't need to have a nutrient management plan written for them as they were not growing crops but only needed a manure transfer plan indicating which crop farmer was receiving his/her poultry manure.

In addition to the differences in administrative compliance statistics between states which can be attributed to the different state policy making styles and regulatory choices, there were also differences in farmer attitudes about their plans and their state regulations. The majority of regulated Maryland and Virginia farmers interviewed were critical of required nutrient management plans, believing they were too strict and that they would reduce yields. In contrast, the majority of Delaware farmers reported the opposite feelings; that they would be satisfied if they followed their plan; that their recommendations were not too conservative and the regulations were not too strict. It is uncertain whether farmers in Delaware have plans that are significantly different from farmers in Maryland and Virginia which may account for the different views on the plans by each group of farmers.

One factor behind some farmers' objections to their state nutrient management laws and the mandatory plans was that they did not believe they were over applying nutrients. Most farmers disagreed with the restrictive "Sufficiency" approach to nutrient application philosophy espoused by Extension scientists and preferred the "Maintenance" approach espoused by the private crop consultants and fertilizer dealers. In addition, many farmers did not believe in the new science that said phosphorus was soluble under certain conditions and could cause environmental harm even if soil erosion was controlled. The resulting phosphorus-based nutrient management plans were very unpopular, in that they restricted manure applications to the point where farmers have to purchase commercial nitrogen. In addition, farmers objected to the amount of "paperwork" that goes into preparing a nutrient management plan: obtaining soil survey maps, collecting soil tests, manure tests, keeping records of crop yield for every field for five years, and keeping records of the rate, form, timing, and method of application for each crop in each field. Many farmers indicated that it was too tiresome to manage each field differently and preferred to lump management of several fields together despite the different field characteristics. And, perhaps most importantly, farmers objected to the first step in a plan aiming to "optimize yields" which is to set a realistic yield goal for each field based on an average of the best three out of five years of yields, as they preferred to fertilize at levels needed to "maximize yields."

Adherence Compliance

Despite objections to the requirement for a nutrient management plan, many farmers across all three states indicated they have improved various aspects of their nutrient management behavior since the regulations were enacted. Among the most important improvements reported by farmers are: a) reduced purchases of commercial phosphorus fertilizer, b) reduced nitrogen concentrations in their purchased fertilizer mixes, c) reduced poultry manure application rates, and d) increased use of soil nutrient and manure nutrient testing. Even the Virginia crop farmers who use poultry manure but are not required to implement a nutrient management plan said that they have “a greater awareness of nutrient management” because of the laws applied to their poultry grower neighbors.

However, many basic nutrient management practices that have been encouraged for decades by each state's University Extension Service and federal Conservation Districts are still not being used by a majority of the farmers. These include: a) not taking residual nitrogen credits for previous legume crops or applied manure; b) not implementing a riparian set-back from ditches or streams when driving manure spreaders—resulting in manure deposition into waterbodies; c) disposing of manure during winter months when no crops can absorb the nutrients, making them subject to significant environmental losses; and d) not calibrating manure spreaders at least annually.

In addition, most farmers disagreed with the scientific consensus that “agriculture is the largest source of nitrogen and phosphorus loads to the Chesapeake Bay.” Previous research has found that farmers have to believe that a problem exists before they accept that best management practices are justified and are willing to take action (Ribaud and Horan, 1999).

Each state experienced difficulty during on-farm inspections in detecting adherence with the nutrient management plans and resorted to using mathematical calculations based on fertilizer receipts and manure transport counts to determine compliance. Virginia committed to inspect all regulated poultry growers, and on average they accomplished a 90% inspection rate and about an 80% compliance rate. Both Maryland and Delaware set a 10% inspection goal and both fell short, Maryland inspected about 8% of regulated farms per year and Delaware inspected only two percent. Delaware found that about 80% of the inspected farms were in compliance while Maryland found that only about 65% were. The majority of the noncompliance was attributed to having an outdated plan which indicated that a third of the inspected farmers were not valuing their plan sufficiently to update it.

Finally, there is some concern about evasion of the law. During my interviews, about 15% of farmers in all three states happened to use the same three private crop consultants who are certified by the states to write nutrient management plans. These farmers and one of the crop consultants described several ways they are actively evading their state laws. For example, several farmers told me they are keeping “double books”—one nutrient management plan to show inspectors and one plan to use themselves. Other farmers said they were setting their crop yields higher than their average yields in order to justify higher nutrient application rates and several farmers said they knew they were applying higher manure rates than they should be. This anecdotal evidence for the ease of noncompliance with a mandatory plan underscores the herculean challenge before state policy makers. Given the nonpoint source nature of nutrient pollution, the challenge of detecting and attributing nutrient pollution to individual farm fields and farmers, the challenge of determining the validity of a plan, and the challenge of detecting adherence with a valid plan, the only way for governments to ensure with some certainty that farmers are following their plans is if farmers believe it is in their best economic interest to do so.

What does this mean for the Bay Total Maximum Daily Load (TMDL)?

As the EPA and the six Bay states grapple with how to accomplish the new TMDL cap on nutrient and sediment pollution to the Bay, which will likely involve even more intensive management and edge-of-field practices by the agricultural sector, several policy recommendations for the Bay States can be drawn from these experiences.

First, states should better understand the top reasons why some farmers do not follow university-standard nutrient management plans, including: a) poor acceptance of the links between agricultural activities and water quality problems, b) disagreement over the approach to setting yield goals: optimizing versus maximizing, c) disagreement over the Maintenance versus Sufficiency nutrient application philosophies, and d) poor acceptance of crop and soil nutrient science concepts—such as soil phosphorus concentrations and soluble phosphorus.

Given that the majority of farmers across all three states indicated that they were “interested in receiving more educational materials about nutrient management-related topics” and that they “believe that protecting the environment is part of what it means to be a farmer,” there is an opportunity to address perspectives that result in unintentional nutrient losses from agricultural production. A better understanding of their contribution to water quality problems in the Bay may make farmers more willing to be active collaborators in the Bay clean-up process.

In order to encourage adoption of nutrient management practices and to facilitate compliance, state university scientists and economists should collaborate with Soil Conservation District personnel, state regulatory agencies and other appropriate parties such as farmer peer-to-peer exchange networks to confirm whether the aforementioned problems are those hindering compliance with nutrient management plans or adopting good practices. Then, these stakeholders should develop unprecedented, specifically tailored education campaigns, including economic analysis that shows the savings and costs from adhering to university recommendations and other good practices. Policy stakeholders should consider coupling these tailored outreach campaigns with focused financial assistance to help improve farmer nutrient management behaviors.

Second, since over a decade has passed since the laws were enacted, it is time for states to evaluate if their approaches for gaining farmer compliance are effective. All three states should consider more frequent and effective farm inspections and significant fines to make noncompliance more costly than compliance.

Third, states should recognize that since the solutions to nonpoint source agricultural pollution largely involve behavioral changes rather than “end-of-pipe” technology solutions, states should focus on gaining buy-in from farmers for the new level of environmental management needed to achieve the new clean water goals. Note that such a collaborative process could be voluntary or regulatory in nature. However, states have to balance the goal of gaining buy-in from farmers and farm associations with the goal of achieving the new level of environmental management needed to meet the new clean-up goals.

Fourth, regardless of whether new regulatory options or new tailored outreach and voluntary programs are considered, states should opt for achieving changes that will have a major environmental impact, as was the case with requiring the addition of *phytase* to chicken diets. In addition, states should attempt to disaggregate the new Bay nutrient pollution reduction goals into smaller goals achievable at a watershed-scale for groups of farmers to accomplish and even at farm or field scales for individual farmers.

Fifth, if a regulatory approach is chosen, states should opt for easily monitored and verifiable practices to reduce the uncertainty of detecting compliance during on-farm inspections.

Sixth, financial assistance to implement regulations will likely be critically important to fully implement new rules. However, given the current budget crisis, states should prioritize cost-share funds for activities that are the most cost-effective.

Finally, whatever new policy approaches states engage in to meet the new clean water goals, states should establish realistic implementation schedules that reflect government and private sector capacity to deploy the new programs.

For More Information

Perez, M. (2010) .Does the policy-making process affect farmer compliance? A three-state case study of nutrient management regulations. Ph.D. dissertation. College Park, MD: University of Maryland. Available online: <http://gradworks.umi.com/34/09/3409721.html>

Ribaudo, M.O., and Horan, R.D. (1999). The role of education in non-point source pollution control policy. *Review of Agricultural Economics*, 31(2), 331-343.

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