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The Pennsylvania Nutrient Management Act: Pennsylvania Helps to Save the Bay through Nonpoint Source Pollution Management

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1995]

THE PENNSYLVANIA NUTRIENT MANAGEMENT ACT:
PENNSYLVANIA HELPS TO "SAVE THE BAY"
THROUGH NONPOINT SOURCE
POLLUTION MANAGEMENT

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I. INTRODUCTION

In 1993, Pennsylvania began to satisfy a decade-old commitment to the Chesapeake Bay area by enacting the Nutrient Management Act ("NMA").¹ NMA is Pennsylvania's contribution to fulfilling the Chesapeake Bay Agreement of 1983.² Under the Chesapeake Bay agreement, Maryland, Virginia, Pennsylvania, the District of Columbia, the United States Environmental Protection Agency ("EPA") Administrator, and the Chesapeake Bay Commission agreed to take steps to save the Chesapeake Bay area by reducing the Bay's nonpoint source pollutant content.³ Pennsylvania is the first state in the Chesapeake Bay watershed and one of the first states in the nation to adopt mandatory nutrient management controls on farm pollution.⁴ NMA will reduce the amount of nonpoint

1. Nutrient Management Act ("NMA"), Act No. 1993-6, 1993 Pa. Legis. Serv. 1993-6 (codified at 3 PA. CONS. STAT. ANN. §§ 1701-18 (1993)).

2. See Chesapeake Bay Agreement of 1983, Dec. 9, 1983, (quoted in CHESAPEAKE EXECUTIVE COUNCIL, FIRST ANNUAL PROGRESS REPORT UNDER THE CHESAPEAKE BAY AGREEMENT, 1 (1985)).

3. *Id.*

4. Timothy Wheeler, *Pa. Legislature Passes Bill to Curb Farm Pollution*, THE SUN (Baltimore, Md.), May 6, 1993, at 1A (noting that "[t]he action puts pressure on

source pollution⁵ that flows into the Bay from Pennsylvania's watersheds by controlling the handling and disposal of manure and fertilizers in Pennsylvania.⁶ NMA will not do so, however, without imposing complex restrictions on certain agricultural interests.⁷

The flow of Pennsylvania's nonpoint source pollutants into the Chesapeake Bay comes primarily from the Susquehanna River, the source of fifty percent of the fresh water that flows into the Chesapeake Bay.⁸ Unfortunately, the Susquehanna River is also responsible for more than half of the nitrogen and phosphorous that flow into the Bay each year.⁹ Nitrogen and phosphorous are the primary types of pollutants involved in nonpoint source pollution.¹⁰ These pollutants, which often have their origins in farm fertilizer runoff, have greatly contributed to the damage suffered by the Chesapeake Bay.¹¹

Concerns about water quality, such as those relating to the Chesapeake Bay, are causing a shift in attention from point source pollution to nonpoint source pollution.¹² The problems with point source pollution, which is water pollution that can be traced to a specific source such as the end of a pipe, have been considerably alleviated by government controls.¹³ Now, nonpoint source pollution, which essentially encompasses all other types of water pollution, is drawing attention as a significant cause of environmental problems, especially in Pennsylvania.¹⁴ In fact, the Department of Environmental Resources ("DER") has allocated \$3,478,933 in

Maryland and Virginia, since both states have a greater stake in the bay's health than Pennsylvania, yet rely mainly on voluntary efforts by farmers"); see also Governor Robert P. Casey, *Pennsylvania Moves to Aid the Bay*, THE SUN (Baltimore, Md.), June 7, 1993 ("[W]hile we enjoy the benefits of this resource, we also recognize that we must be its steward.").

5. For a discussion of the nonpoint source pollution problems, see *infra* notes 16-50 and accompanying text.

6. Tom Troy, *Hearings Focus on Nutrient Pollution*, UPI, Oct. 19, 1989, available in LEXIS, Nexis Library, UPI File.

7. For a discussion of NMA, see *infra* notes 85-116 and accompanying text.

8. Troy, *supra* note 6.

9. *Id.* The Susquehanna River brings over 3,000,000 tons of phosphorous and 121,000,000 pounds of nitrogen into the Bay each year. *Id.*

10. William Eichbaum, *The Chesapeake Bay: Major Research Program Leads to Innovative Implementation*, 14 *Envtl. L. Rep.* (Envtl. L. Inst.) 10,237 (1984).

11. *Id.*

12. See, e.g., *infra* notes 54-69 and accompanying text.

13. C.F. MASON, *BIOLOGY OF FRESHWATER POLLUTION*, 95-98 (2d ed. 1991).

14. See 3 PA. CONS. STAT. ANN. §§ 1701-1708. For a further discussion, see also *infra* notes 80-86 and accompanying text.

grants to reduce nonpoint source pollution in Pennsylvania waterways.¹⁵

The nonpoint source pollution problem has reached critical proportions due to the failure of past nonpoint source pollution control efforts.¹⁶ The current nonpoint source pollution levels raise serious environmental and public health concerns.¹⁷ In particular, bodies of water like the Chesapeake Bay are experiencing severe damage from nonpoint source pollution.¹⁸ Due to the extent of the damage, efforts to protect and rejuvenate bodies of water from the effects of nonpoint source pollution deserve attention. The measures necessary to accomplish these goals are neither simple to establish and enforce, nor without negative consequences, but they are necessary if such irreplaceable natural resources as the Chesapeake Bay are to be saved.

With these concerns in mind, this Comment examines the nonpoint source pollution problem in general and the Chesapeake Bay crisis in particular. Next, the origins of NMA are explored and the terms of NMA are examined in detail. Finally, the effects of NMA on agriculture, government and the economy are weighed and possible alternatives are suggested.

15. *DER Announces \$3,478,933 in Nonpoint Source Grants*, PR NEWSWIRE, Aug. 16, 1994. Environmental Resources Secretary Arthur A. Davis stated, "These grants will help us take another step forward in improving the quality of Pennsylvania's waterways. Many of these projects will help reduce acid mine drainage, restore aquatic life, reduce nutrient runoff and increase public awareness about water quality issues." *Id.* The projects funded by these grants include: Piney-Alloway Creeks Watershed Video (video to increase public awareness about watersheds and quality improvement); an Agriculture Program (ten nutrient management technicians will be hired to develop, review and assist with NMA compliance); Tri-Regional Conference on Nonpoint Source Pollution (state and federal environmental officials will meet to discuss changes to the federal Clean Water Act and how they will effect Pennsylvania nonpoint source program); Statewide Nitrogen Worksheet, Resource List, Nonpoint Source Workshops (used to design "personal nitrogen worksheet" to raise public awareness and a nonpoint source pollution education program for local government officials, utilities, educators and the general public). *Id.*

16. Daniel R. Mandelker, *Controlling Nonpoint Source Water Pollution: Can It Be Done?*, 65 *CHI-KENT L. REV.* 479, 479 (1989).

17. For a discussion of the nonpoint source pollution problem, see *infra* notes 23-32 and accompanying text.

18. For a discussion of the environmental and health concerns resulting from nonpoint source pollution, see *infra* notes 23-30 and accompanying text.

II. THE NONPOINT SOURCE POLLUTION PROBLEM

Before nonpoint source pollution can be controlled, it must be identified and defined. The Clean Water Act ("CWA")¹⁹ defines point source pollution, but fails to define nonpoint source pollution.²⁰ A nonpoint source of pollution has generally been defined as "a source that creates pollution through surface water runoff . . . normally associated with rainfall."²¹ The most common nonpoint source pollutants, therefore, are those nutrients easily carried by water, such as nitrogen and phosphorous.²²

Nitrogen, phosphorus and other nonpoint source pollutants cause a variety of water problems including diminished sunlight, reduced dissolved oxygen content, changes in heat radiation, and the retention of organic materials, sediment and other substances that blanket the bottoms of the bodies of water.²³ They are also responsible for algal nuisances called "algal blooms."²⁴ These algal blooms result from the increase in algae-promoting nutrients in the

19. Federal Water Pollution Control Act (Clean Water Act) ("CWA") §§ 101-607, 33 U.S.C. §§ 1251-1387 (1988).

20. A point source is defined in § 1362(14) of CWA. 33 U.S.C. § 1362(14) (1988). This section does not define nonpoint source pollution. *See id.*

21. Mandelker, *supra* note 16, at 480.

22. MASON, *supra* note 13, at 95-98. In contrast to nonpoint source pollution, a point source is a "discernable, confined and discrete" conveyor of pollution, such as a pipe, ditch, channel, tunnel or conduit. EPA NONPOINT SOURCE GUIDANCE 3 (1987). Whereas point source pollution tends to be of an industrial nature and the source itself is fairly easy to locate, nonpoint source pollution tends to result from agricultural, silvicultural or urban runoff and the source itself is much more difficult to specifically identify. *Id.* Silvicultural nonpoint sources are forestry sources. Mandelker, *supra* note 16, at 481. "[Nonpoint source] pollution results in the human-made or human-induced alteration of the chemical, physical, biological, and radiological integrity of water." WILLIAM H. RODGERS, JR., 2 ENVTL. L. § 4.10 (1986).

23. George A. Gould, *Agriculture, Nonpoint Source Pollution, and Federal Law*, 23 U.C. DAVIS L. REV. 461, 466 (1990). The sediment that blankets the waterways' bottoms endangers bottom-dwelling organisms and smothers fish eggs which are laid on the bottom. *Id.* Furthermore, all underwater organisms which rely on oxygen are detrimentally affected because the decaying organic material in the sediment filters out sunlight. *Id.* Dissolved oxygen is "the primary parameter indicating the water's suitability for fish life." *Id.* The reduced sunlight starves the photosynthetic organisms, thus reducing the number of these organisms available to "form the base of the food chain." *Id.*

24. OFFICE OF WATER, U.S. ENVIRONMENTAL PROTECTION AGENCY, SAVING BAYS AND ESTUARIES I2-I3 (Sept. 1990) [hereinafter SAVING BAYS AND ESTUARIES]; MASON, *supra* note 13, at 96. Excess amounts of nitrogen and phosphorous cause eutrophism. SAVING BAYS AND ESTUARIES, *supra*, I2-I3; MASON, *supra* note 13, at 96. Eutrophic water is cloudy water caused by excess amounts of algae. MASON, *supra* note 13, at 96. The excess amounts of algae result from an overabundance of inorganic plant nutrients which encourage the growth of plant life in the water. *Id.*

water which causes an excess amount of algae.²⁵ In turn, these algal blooms cause pollution problems for the water's inhabitants when the algae dies.²⁶

The Chesapeake Bay is not the sole victim of nonpoint source pollution. According to EPA, the damage caused by agricultural runoff that contains the same algae-promoting nutrients is the most prevalent form of nonpoint source pollution.²⁷ Runoff may endanger human health because it pollutes groundwater,²⁸ the primary source of drinking water for much of the United States.²⁹ Other

25. MASON, *supra* note 13, at 96.

26. *Id.* In turn, the dead and decomposing algae creates an organic screen that reduces dissolved oxygen levels and suffocates fish and plant life. Troy, *supra* note 6; see also Gould, *supra* note 23, at 466. Fish are also affected by eutropism, which is encouraged by agricultural nonpoint source water pollution. Troy, *supra* note 6. The fish population dwindles and the waters develop an offensive smell and taste as a result of eutrophism which occurs when the water's dissolved oxygen is depleted by decaying algae and underwater plants. *Id.*

27. *The Clean Water Act Amendments of 1987*, 18 Env't Rep. (BNA) No. 19, at 40 (Sept. 4, 1987) [hereinafter *BNA Special Report*]. With regard to agricultural nonpoint sources, "[t]he popular perception is that most agricultural runoff enters surface waters after flowing across farm fields." John H. Davidson, *Commentary: Using Special Water Districts to Control Nonpoint Sources of Water Pollution*, 65 CHI.-KENT L. REV. 503, 505 (1989). Although this perception reflects the most common scenario, "a major share of all runoff from farm fields enters surface waters only after having been collected by organized water management organizations, typically irrigation, drainage or conservatory districts." *Id.* For a discussion of the use of water districts to control nonpoint source pollution, see *id.* at 515-18.

Major agricultural nonpoint sources of pollution are: non-irrigated crop production, irrigated crop production, specialty crop production, such as truck farming and orchards, pasture land, range land, all types of feedlots, aquaculture and animal holding or management areas. U.S. ENVIRONMENTAL PROTECTION AGENCY, GUIDELINES FOR THE PREPARATION OF THE 1988 STATE WATER QUALITY ASSESSMENT (305(B) REPORT) 19 (1987).

28. PA LEGISLATIVE JOURNAL - HOUSE, 177th Gen. Ass., at 481 (Sen. Armstrong) (Feb. 2, 1993). EPA guidance emphasizes that "[n]on-point source pollution impacts virtually all types of water resources, and therefore, ideally should be an integral part of any overall water cleanup strategy." *BNA Special Report, supra* note 27, at 41.

29. Gould, *supra* note 23, at 464. Sixty-eight percent of the states and territories depend on groundwater for their principal source of drinking water. *Id.* A principal source of drinking water is defined as one from which the state receives fifty percent or greater of its drinking water. *Id.* Groundwater also accounts for "fifty-seven percent of water used for livestock, forty percent of water used for irrigation and twenty-five percent of water used by self-supplied industrial enterprises." *Id.* at 465. Groundwater's use has been increasing by almost four percent per annum, which is twice the increase in use of surface water. *Id.* The most recognized health problem caused by polluted groundwater affects very young children. Methemoglobinemia, more commonly known as "blue baby" syndrome, is a potentially fatal illness caused by nitrates in infants' drinking water which prevents the infant's blood from carrying sufficient oxygen. *Id.* These high levels of nitrates have also been linked to increased cancer levels and additional disorders in people of all ages. *Id.* at 467.

problems include an increased potential for flooding because of sediment deposited on riverbottoms.³⁰

Agricultural runoff, and the extent of the damage it causes, illustrates the incompatibility of farming interests and environmental interests.³¹ For example, the presence of nutrients and pesticides in runoff is direct evidence of inefficient farming practices because excess fertilizers applied to plants are not absorbed.³² Thus, the nutrients and pesticides in runoff not only pollute the waters downstream, but also cost farmers money in the form of wasted fertilizer.³³

Runoff merely transports the harmful nutrients into the Bay; the sources of these nutrients, however, are very difficult to identify and connect with a locality's pollution problem.³⁴ In general, nutrients enter agricultural runoff from two "sources": erosion and the excessive presence of nutrients.³⁵ Erosion caused by farming activi-

Increases in the occurrence of cancer have also been correlated with the increased presence of pesticides in ground water. *Id.* Pesticides have been identified with and suspected of causing various kinds of cancer. *Id.* Additional research is still needed to identify the chronic effects of long-term exposure to nitrates and pesticides in ground water. *Id.* at 467-68. In addition, little is scientifically known about "synergistic effects from pesticide and fertilizer combinations." *Id.* at 468.

30. Gould, *supra* note 23, at 466. The potential flooding problems are caused by the fact that sediment disposition decreases the storage and flow capacities of rivers, lakes, reservoirs and canals. *Id.*

31. *Id.* at 468.

32. *See id.* at 469.

33. *Cf. id.* at 487. Professor Gould offered the example that "half the nitrogen applied to fields does not reach the plants but enters the streams and ground-water," which demonstrates the high levels of waste that are adversely affecting farm efficiency and water quality. *Id.* at 468. Another problem affecting agricultural efficiency is dissolved salt from irrigation return flows, which "reduce crop yields, requiring the substitution of less valuable salt-resistant crops, and require the application of more water at more frequent intervals." *Id.* Dissolved salts and other minerals also increase water's hardness, which in turn increases water treatment expenses and reduces the useful lives of appliances, such as washing machines and dishwashers, and industrial equipment. *Id.*

34. MASON, *supra* note 13, at 97-98. Past water pollution control efforts focused on point source pollution because the source of the pollution is easier to locate and control. Mandelker, *supra* note 16, at 480-81. "The Senate Environment and Public Works Committee report on the Clean Water Act amendments highlighted the growing concern over non-point source pollution. 'During the course of the Clean Water Act reauthorization process,' the report said, 'it became clear that non-point source pollution could no longer be ignored.'" *BNA Special Report*, *supra* note 27, at 40.

35. Commercial fertilizers, manure, herbicides and pesticides are the primary sources of agricultural pollutants that contribute to nonpoint source pollution. Timothy J. Linden & Mark P. Gergen, *Interagency Disputes Over Dry Fields or Clean Water: A Case Study of the Conflict Between Agricultural Drainage Programs and the Chesapeake Bay Cleanup*, 4 VA. J. NAT. RESOURCES L. 219, 221 (1985). Since the mid-1960s, farm pesticide use has tripled and farm nitrogen fertilizer use has quadrupled, as a result of farmers trying to ensure peak crop production. Christine Ol-

ties such as unnecessarily deep plowing tends to release phosphorus.³⁶ Nitrogen in runoff, on the other hand, is generally the result of excess concentrations of animal waste and fertilizer.³⁷ The release of excess nitrogen from soil is facilitated by its electric charge, which is opposite to that of the soil.³⁸ When water passes over soil, it picks up nutrients from both sources and it enters the waterways through runoff; the sources are distinguishable based upon the triggers that release the nutrients from the soil.

In erosive nonpoint source pollution, the farming techniques used precipitate nutrient release by failing to appropriately direct the flow of water to reduce runoff.³⁹ Water that flows over farmland picks up nutrients and other materials⁴⁰ and carries them into nearby waterways.⁴¹ Erosive nonpoint source pollution can generally be addressed through the use of agricultural Best Management Practices ("BMPs"), such as tilling techniques.⁴² Nonpoint source pollution resulting from excessive use of nutrients can be addressed

senius, *Soil Erosion, Agrichemicals and Water Quality: A Need for a New Conservation Ethic*, binder (1988). It is estimated that 3.5 million to 21 million pounds of pesticides reach groundwater or surface water annually, prior to degradation. *Id.* Nonpoint source pollution from agricultural sources is deemed a moderate or severe environmental problem in thirty-six states; groundwater contamination resulting from agricultural nutrients has occurred in thirty-one states, and pesticide groundwater contamination has occurred in thirty-seven states. *Id.* Unfortunately, the quest for increasingly quick and efficient harvesting has caused farmland to be treated more extensively with these major pollution contributors, while basic soil conservation and labor intensive techniques fall by the wayside. Majorie A. Hutter, *The Chesapeake Bay: Saving a National Resource Through Multi-state Cooperation*, 4 VA. J. NAT. RESOURCES L. 185, 191 (1985). Specifically, in the Chesapeake Bay area, "the amount of agricultural land . . . has decreased over the last three decades, agriculture has had an increasingly adverse effect on the Bay because of major changes in the manner of cultivation," i.e. increased use of fertilizer and other agricultural pollutants. *Id.* at 190-91.

36. MASON, *supra* note 13, at 98.

37. *Id.*

38. *Id.* This removal process is evidenced by the fluctuation of nitrate levels in rivers. *Id.* The nitrate levels parallel the plant growing seasons. During growth seasons, like summer, less nitrogen ends up in rivers because the plants absorb it through transpiration before it can be leached out of the soil and carried into the rivers. *Id.* Furthermore, as a result of increased evaporation that occurs in the summer, there tends to be less water in the soil to facilitate the removal of nitrates through runoff. *Id.* During the seasons of harvest or while fields lay fallow, nitrate levels in rivers rise in accord with the decreased plant absorption. Furthermore, decreased evaporation rates contribute more water to form runoff and carry the nitrates to the rivers. *Id.*

39. See generally MASON, *supra* note 13, at 98-99.

40. *Id.*; BNA *Special Report*, *supra* note 27, at 40. Other materials include: sediment, nitrogen, phosphorus, pesticides and bacteria. MASON, *supra* note 13, at 98-99.

41. MASON, *supra* note 13, at 98-99.

42. For a discussion of BMPs, see *infra* notes 147-57 and accompanying text.

by creating a land use plan tailored for the chemical character of that particular piece of land, considering the land's use.⁴³

Agricultural nonpoint source pollution has been deemed responsible for 64% of the nation's river pollution.⁴⁴ Nonpoint sources cause 65% to 75% of the pollution in the nation's bodies of waters.⁴⁵ Specifically, "[n]onpoint sources contribute 45% of the pollution to estuaries, 76% of the pollution to lakes, and 65% of the pollution to rivers."⁴⁶ Nonpoint source pollution from agriculture is of special concern for Pennsylvania because farming is the state's number one industry.⁴⁷

Despite the severity of this water pollution problem, the expense and difficulty of implementing nonpoint source controls has prevented the problem from being effectively addressed.⁴⁸ The expense borne by small farmers to control nonpoint source pollution is not easily passed on to their consumers.⁴⁹ Furthermore, local governments are not motivated to establish costly nonpoint source controls because their nonpoint source pollution often flows to other states downstream.⁵⁰

Nonpoint source pollution control is complicated by a number of factors. First, rainfall determines the level of nonpoint source pollution; therefore, the nonpoint source polluter does not have control over the pollutants' conveyance.⁵¹ Second, different nonpoint pollution sources, such as agricultural and urban sources, affect water pollution in varying degrees, making it virtually impossible to establish a uniform control strategy.⁵² Third, there is a "variable distribution of nonpoint sources throughout the United States."⁵³ For example, agricultural nonpoint sources are the primary problem in the cornbelt, while in the upper Great Lakes area, silvicultural and urban sources are the major concern.⁵⁴ These va-

43. For a discussion of nutrient management plans, see *infra* notes 158-60 and accompanying text.

44. Mandelker, *supra* note 16, at 481.

45. *Id.*

46. *Id.*

47. PA LEGISLATIVE JOURNAL HOUSE, 177th Gen. Ass., *supra* note 28, at 123 (Sen. Armstrong) (Feb. 2, 1993).

48. *Id.*

49. *Id.*

50. *Id.*

51. Mandelker, *supra* note 16, at 481. For example, unusually heavy rainfalls or melting snowfalls, which may have a significant effect on water pollution, are completely out of the farmers' control.

52. *Id.*

53. *Id.*

54. *Id.* at 482.

ried sources require source-specific solutions, because the pollution is originating in very different environments, i.e. forests, cities and farms. Fourth, the problem is pervasive. "Rain falls everywhere, and every use of land is a source of nonpoint pollution."⁵⁵ These four factors, coupled with the costs of implementation, make the control of nonpoint source pollution a challenging undertaking, especially in states that depend on agricultural activities, such as Pennsylvania. However difficult such controls may be, there may be no other way to address the problems which plague the Chesapeake Bay.

III. THE CHESAPEAKE BAY CRISIS

The Chesapeake Bay is a valuable natural resource for the United States.⁵⁶ Water flows to the Bay from several rivers in the area⁵⁷ and mixes with salt water, creating a productive estuary.⁵⁸ As an estuary, the Bay is home to thousands of species of plants and animals.⁵⁹ However, as a result of the pollutants carried into the Bay by the rivers, it is not as productive or healthy as it could be.⁶⁰ The pollution problems in the Bay are exacerbated by the unusual tidal patterns which prevent freshwater from freely flowing out of

55. Mandelker, *supra* note 16, at 482.

56. Hutter, *supra* note 35, at 187; Eichbaum, *supra* note 10, at 10,237.

57. Hutter, *supra* note 35, at 187. Ninety percent of the freshwater that flows into the Bay comes from the Susquehanna, Patuxent, Potomac, Rappahannock, York, James, Choptank Rivers and the rivers of the West Chesapeake Drainage Area. *Id.* (citing U.S. ENVIRONMENTAL PROTECTION AGENCY, CHESAPEAKE BAY PROGRAM: FINDINGS AND RECOMMENDATIONS 5 (1983) [hereinafter FINDINGS AND RECOMMENDATIONS]).

58. *Id.* Estuaries are nurseries and spawning routes for many types of aquatic life. SAVING BAYS AND ESTUARIES, *supra* note 24, at H1-1.

59. Hutter, *supra* note 35, at 187. Over 2700 species of animals and plants live in the Bay's waters or along its shore. *Id.*

60. *Id.* ("No matter what word is applied, the diagnosis is clear — the Bay is very sick.") *Id.* at 185.

the Bay into the ocean.⁶¹ Thus, the concentration of pollutants is constantly increasing.⁶²

Not only has the Bay's ecological system been directly damaged by pollution, but it has been indirectly damaged as well — the pollution in the Bay greatly interferes with the Bay's natural abilities to recover from other ecological injuries.⁶³ Several other causes of damage to the Bay have been identified. For example, the major ports of the mid-Atlantic region are located on the Bay, producing much waste and pollution which flows into the Bay.⁶⁴ Populations along the Bay have been increasing, further taxing the environment in the area with increased waste water discharge and industrial sources of pollution.⁶⁵ Furthermore, the Bay has been overfished and overharvested for the past few centuries.⁶⁶ These changes have also resulted in a decrease in the amount of wetlands in the area, and a shift in the ecological balance of the area.⁶⁷

Between 1976 and 1983, EPA's Office of Chesapeake Bay Programs ("Chesapeake Bay Program") studied the condition of the Bay and found that the environmental quality of life in the Bay was

61. *Id.* Between 1976 and 1983, EPA's Office of Chesapeake Bay Programs ("OCBP") studied the water quality of the Bay and charted the noticeable trends. OCBP's research findings and recommendations are summarized in U.S. ENVIRONMENTAL PROTECTION AGENCY, CHESAPEAKE BAY PROGRAM: FINDINGS AND RECOMMENDATIONS (1983) and in four additional documents: U.S. ENVIRONMENTAL PROTECTION AGENCY, CHESAPEAKE BAY: A FRAMEWORK FOR ACTION (1983) (describes Bay's present condition, pollution sources, alternative control strategies and recommended actions); U.S. ENVIRONMENTAL PROTECTION AGENCY, CHESAPEAKE BAY: A PROFILE OF ENVIRONMENTAL CHANGE (1983) (describes Bay's 1983 condition); U.S. ENVIRONMENTAL PROTECTION AGENCY, CHESAPEAKE BAY PROGRAM TECHNICAL STUDIES: A SYNTHESIS (1982) (summarizes studies of specific problems); U.S. ENVIRONMENTAL PROTECTION AGENCY, CHESAPEAKE BAY: INTRODUCTION TO AN ECOSYSTEM (1982) (describes interactions among components of Bay's ecosystem). Furthermore, EPA has determined that "it is now known that contaminants entering the Bay are not readily flushed out into the ocean but, because of the unique circulation pattern in the Bay, they accumulate within the estuary." FINDINGS AND RECOMMENDATIONS, *supra* note 57.

62. *See generally* Hutter, *supra* note 35.

63. *Id.* at 187.

64. *Id.* at 188. Baltimore, Maryland and Hampton Roads, Virginia are located on the Bay. *Id.* In addition, the major metropolitan areas of Washington, D.C. and Richmond, Virginia are located on its tributaries. *Id.*

65. *Id.* at 190. The Chesapeake Bay area population grew by 4.2 million between 1950 and 1980. *Id.* (citing FINDINGS AND RECOMMENDATIONS, *supra* note 57).

66. FINDINGS AND RECOMMENDATIONS, *supra* note 57; *see also* Jeter M. Watson, *Point Source Water Quality Control in Virginia: Choices for the Chesapeake*, 4 VA. J. NAT. RESOURCES L. 263, 264 (1985) (number of bushels of oysters harvested in 1879 was more than five times that harvested in 1985).

67. Hutter, *supra* note 35, at 191.

deteriorating at an alarming rate.⁶⁸ The Chesapeake Bay Program findings included the following:

- The abundance of submerged aquatic vegetation has declined significantly since the 1960s;⁶⁹
- In many regions of the Bay, levels of nutrients far exceed beneficial levels;⁷⁰ and
- Freshwater spawning finfish landings have considerably decreased.⁷¹

Once these individual problems were identified and attempts were made to address them through point source pollution controls, officials realized that nonpoint source pollution would significantly hinder the rejuvenation of the Bay.⁷² In recognition of the problems in the Bay and the specific causes of its pollution, the Chesapeake Bay Conference was held in 1983.⁷³

In 1983, the Administrator of EPA, the governors of Maryland, Virginia, and Pennsylvania, the Mayor of Washington, D.C., and members of the scientific, industrial, agricultural and public interest spheres attended the Chesapeake Bay Conference.⁷⁴ The Conference provided a forum for the development of an agenda to slow and ultimately reverse the deterioration of the Bay's health.⁷⁵ The Conference resulted in the Chesapeake Bay Agreement of 1983, through which the concerned parties coordinated their efforts to address the Bay's pollution problems.⁷⁶ At the Conference, former EPA Administrator William Ruckelshaus confirmed the Agency's commitment to the rejuvenation of the Bay.⁷⁷ Thereafter, EPA continued the Chesapeake Bay Programs, compiling data and acting as liaison between the federal government and states surrounding the

68. FINDINGS AND RECOMMENDATIONS, *supra* note 57; see also 1985 CHESAPEAKE EXECUTIVE COUNCIL, FIRST ANN. PROGRESS REP. UNDER THE CHESAPEAKE BAY AGREEMENT, 1, 3 [hereinafter FIRST ANNUAL CHESAPEAKE REPORT].

69. FIRST ANNUAL CHESAPEAKE REPORT, *supra* note 68, at 3. This vegetation provides food as well as a protective filter for many of the Bay's organisms. *Id.*

70. *Id.*

71. *Id.*

72. See Eichbaum, *supra* note 10, at 10,237.

73. FIRST ANNUAL CHESAPEAKE REPORT, *supra* note 68, at 1.

74. CITIZENS PROGRAM FOR THE CHESAPEAKE BAY, INC., CHOICES FOR THE CHESAPEAKE: AN ACTION AGENDA 6 (1984) (report of the Chesapeake Bay Conference) [hereinafter CHOICES FOR THE CHESAPEAKE]; FIRST ANNUAL CHESAPEAKE REPORT, *supra* note 68, at 1.

75. CHOICES FOR THE CHESAPEAKE, *supra* note 74, at 14-19.

76. Hutter, *supra* note 35, at 193; FIRST ANNUAL CHESAPEAKE REPORT, *supra* note 68, at 4.

77. CHOICES FOR THE CHESAPEAKE, *supra* note 74, at 6.

Bay.⁷⁸ The responsibility for persuading states' legislatures to enact laws to meet these goals, however, rested on the sponsors of the Conference.⁷⁹

At the federal level, Congress reaffirmed EPA's commitment to the rejuvenation of the Chesapeake Bay in the 1987 amendments to the Clean Water Act.⁸⁰ Prior to the 1987 amendments, the Clean Water Act addressed nonpoint source pollution in only one provision, putting the responsibility for initiating such programs on the individual states.⁸¹ The 1987 amendments added a section dealing exclusively with nonpoint source pollution.⁸² Under the 1987 amendments, states must identify waters that are expected to fail to meet federal water quality standards because of nonpoint source pollution and to devise programs to bring these waters in line with the standards.⁸³ In particular, the 1987 amendments provide funding and support for several specific clean-up programs throughout the country, including the Chesapeake Bay Program.⁸⁴

IV. PENNSYLVANIA'S ROLE IN CONTROLLING NONPOINT SOURCE POLLUTION - THE NUTRIENT MANAGEMENT ACT

A. Agricultural Sources of Nutrients

The Nutrient Management Act,⁸⁵ as passed by the Pennsylvania General Assembly in 1993, specifically addressed nonpoint source

78. FIRST ANNUAL CHESAPEAKE REPORT, *supra* note 68, at 1; see Hutter, *supra* note 35, at 193-94; *BNA Special Report*, *supra* note 27, at 11.

79. FIRST ANNUAL CHESAPEAKE REPORT, *supra* note 68, at 1.

80. *BNA Special Report*, *supra* note 27, at 11.

81. JOHN H. DAVIDSON & ORLANDO E. DELOGU, 4 FED. ENVTL. REG. 1, 2-30 to 2-32 (1993); see also CWA § 49, 33 U.S.C. § 1314(f). Studies indicate that pollution from such sources, including agricultural land, is a leading cause of water quality damage. 55 FED. REG. 47,991 (1990); 56 FED. REG. 56,548 (1991).

82. CWA § 319, 33 U.S.C. § 1329; see also *BNA Special Report*, *supra* note 27, at 6; Esther Bartfeld, *Point-Nonpoint Source Trading: Looking Beyond Potential Cost Savings*, 23 ENVTL. L. 43 (1993). The 1987 amendments more specifically addressed non-point sources such as oil, grease, and chloride runoff from roadways, pesticide and nutrient runoff from farmland, and chemical runoff from construction sites and mining areas. *BNA Special Report*, *supra* note 27, at 1.

83. CWA § 319(a), (b)(1), 33 U.S.C. § 1329(a), (b)(1); *BNA Special Report*, *supra* note 27, at 3.

84. CWA § 319(h), 33 U.S.C. § 1329(h); see *BNA Special Report*, *supra* note 27, at 10-12. The amendments direct EPA to oversee and fund programs in Avalon, California; Walker Township, Pennsylvania; Taylor Mill, Kentucky; New York City; Boston Harbor, Massachusetts; the Great Lakes Area; and the Chesapeake Bay. *BNA Special Report*, *supra* note 27, 10-11. Furthermore, CWA § 208(j) encourages nonpoint source control by providing federal funds and technical assistance for agricultural nonpoint source control projects. CWA § 35, 33 U.S.C. § 1288(j).

85. See generally NMA, *supra* note 1.

pollution.⁸⁶ Although there are several causes of nonpoint source pollution,⁸⁷ NMA primarily addresses nutrient pollution from agricultural operations, particularly those that either use or produce animal manure.⁸⁸ NMA requires agricultural operations, such as crop or livestock farms to cooperate with the proper state officials to create plans to manage nutrients.⁸⁹ A nutrient management plan is essentially a site-by-site analysis of the unique condition and uses of a parcel of land in order to determine the best way to manage nutrient use and conservation.⁹⁰

86. *Id.* Nonpoint source pollution is the result of excess nutrient concentrations in runoff and ground water from silviculture, agriculture, mining, construction, urban runoff, construction of roads and buildings, subsurface excavation, and hydrologic modifications. John E. Bonine & Thomas O. McGarity, *Note on Non-point Sources of Water Pollution*, THE LAW OF ENVIRONMENTAL PROTECTION - CASES - LEGISLATION - POLICIES, 358 (2d ed. 1992); MASON, *supra* note 13, at 96-99. Nutrients like nitrogen and phosphorous may be manmade or natural and are usually of most concern in controlling nonpoint source pollution. MASON, *supra* note 13, at 97. NMA defines a "nutrient" as "[a] substance or recognized plant nutrient, element or compound which is used or sold for its plant nutritive content or its claimed nutritive value. The term includes, but is not limited to, livestock and poultry manures, compost as fertilizer, commercially manufactured chemical fertilizers, sewage sludge or combinations thereof." NMA § 1703. NMA presumes nitrogen to be the "nutrient of primary concern," unless the Commission provides otherwise. *Id.* § 1704(1)(i).

Although the nutrients naturally exist in the environment, the optimum concentrations of these nutrients are upset by certain types of land use and land treatments. MASON, *supra* note 13, at 97-99. For example, the use of fertilizers in farming in conjunction with constant tilling of the land causes a large amount of water to percolate through the soil, drawing the soluble plant nutrients into waterways. *Id.* at 96. Excesses of plant nutrients like nitrogen and phosphorous cause algal nuisances in bodies of water that do not freely circulate in order to flush the nutrients out to sea. *Id.* at 96-98.

87. For a non-inclusive list of the potential sources of nonpoint source pollution, see Bonine & McGarity, *supra* note 86, at 358.

88. 3 PA. CONS. STAT. ANN. § 1702.

89. *Id.* § 1706(b) & (c). The NMA applies to any "concentrated animal operation where the animal density exceeds two AEU's (Animal Equivalent Units) per acre on an annualized basis." *Id.* § 1706(a). An "Animal Equivalent Unit" is "one thousand pounds live weight of livestock or poultry animals, regardless of the actual number of individual animals comprising the unit." *Id.* § 1703. "Concentrated animal operations" are agricultural operations where animal density on the property is greater than two thousand pounds (two AEU's) per acre annually. *Id.* § 1706(a). NMA defines an "agricultural operation" as an operation that manages and uses "farming resources to produce livestock, crops or poultry." *Id.* § 1703. NMA, however, does not define "farming resources," which leaves the definition of "agricultural operation" somewhat ambiguous. *See id.*

90. Debbie Sivas, Comment, *Groundwater Pollution from Agricultural Activities: Policies for Protection*, 7 STAN. ENVTL. L.J. 117 (1987-88). Two general methods of nutrient management are generally utilized: best management practices ("BMPs") and land use controls. BMPs attempt to reduce or eliminate erosion and the amount of nutrients in runoff. For a further discussion of BMPs, see *infra* notes 148-57 and accompanying text. Land use controls include restrictions on where farming activities may be conducted, the types of crops that can be planted at

NMA requires the State Conservation Commission ("Commission"), in cooperation with several other organizations,⁹¹ to create regulations that establish minimum criteria against which nutrient management plans are to be evaluated.⁹² The Commission is to periodically evaluate and re-evaluate these criteria in order to keep them current and practicable.⁹³ In addition, the Commission must devise a program to educate and assist the agricultural operators in the proper use and management of nutrients.⁹⁴ The Commission is also empowered to issue orders and take actions necessary to enforce NMA,⁹⁵ including delegating administrative or enforcement

various times of the year, the types and quantities of fertilizers that can be used and where and how fertilizers must be stored. See *infra* notes 158-60 and accompanying text; see also Mandelker, *supra* note 16, at 482, 486-89 (explaining land use controls).

91. 3 PA. CONS. STAT. ANN. § 1704(1). In 1945, the Conservation District Law established the State Conservation Commission. 3 PA. CONS. STAT. § 849 *et seq.* (1945). In enforcing NMA, the Commission must work in conjunction with DER, the Department of Agriculture, and the Nutrient Management Board, which was created by § 1708 of NMA. *Id.* § 1701(1).

92. *Id.* § 1704(1). The criteria the Commission must establish include: the identification of the offending nutrients (with a presumption that nitrogen is the nutrient of primary concern), procedures to ascertain the appropriate amounts of nutrients that lands require based on the nature of their use and pre-existing concentrations of nutrients, BMPs for proper nutrient management, systems of record keeping to track nutrient application and distribution on lands, standards for the storage of animal manure, requirements for valid amendments to nutrient management plans, emergency procedures relating to manure management during an outbreak of contagious disease, and alternative procedures in times of emergencies when compliance with established procedures is potentially destructive to the economic well-being of agricultural operations. *Id.* § 1704(1)(i)-(viii). For a discussion of BMPs, see *infra* notes 147-57 and accompanying text. NMA defines a BMP as a method or combination of methods that the Commission determines is effective and practicable, based on the nutrient requirements, technology available, and economic and institutional considerations, to manage nutrients and protect surface and ground water. *Id.* § 1703. The Commission must consider the needed nutrients for crop growth, available technology, and economic and institutional considerations. *Id.* BMPs may include such methods such as crop rotation, soil testing, manure testing and conservation tillage. *Id.* Essentially, a BMP is a nonpoint source control method that reduces nutrient loading from runoff, animal waste, field nutrient management and erosion control. Bartfeld, *supra* note 82, at 54 n.34.

In establishing the minimum criteria, the Commission must refer to the contents of the Act and any other regulations enacted to implement the Act. 3 PA. CONS. STAT. ANN. § 1704(1).

93. 3 PA. CONS. STAT. ANN. § 1704(2)-(3).

94. *Id.* § 1704(5). The Commission must establish educational programs in conjunction with the Department of Agriculture, conservation districts, the Nutrient Management Advisory Board, and the Cooperative Extension Service. *Id.* NMA defines "conservation district" as a county conservation district as created by the Conservation District Law. *Id.* § 1703 (referring to 3 PA. CONS. STAT. § 849 (1945)). NMA identifies the Cooperative Extension Service as a branch of Pennsylvania State University. *Id.*

95. 3 PA. CONS. STAT. ANN. § 1704(7).

powers to those county conservation districts which are capable of handling the responsibility.⁹⁶

NMA requires certain agricultural operations to have a proposal for a nutrient management plan drawn up by certified nutrient management specialists,⁹⁷ according to the time when the operation came into existence.⁹⁸ The affected agricultural operations are identified as "concentrated animal operation[s]"⁹⁹ where "animal density exceeds two Animal Equivalent Units ("AEUs") per acre on an annualized basis."¹⁰⁰ In essence, this provision requires that plans must be developed by agricultural operations whose animals' combined live weight is greater than or equal to one AEU, or two thousand pounds per acre per year.¹⁰¹ NMA requires that these plans be developed by individuals who are certified nutrient management specialists. After a proposed plan is developed, it must then be submitted for review to the local conservation district, or to the Commission if the necessary authority has not been delegated to the district.¹⁰²

Furthermore, NMA establishes a plan submission schedule for the concentrated animal operations.¹⁰³ This schedule is based on the time when the operation came into existence in relation to the effective date of the regulations.¹⁰⁴ Upon receiving a proposed plan or a proposed amendment to an existing plan, a reviewing body, as provided for under NMA, has ninety days in which to approve, modify, or disapprove the proposal.¹⁰⁵ A decision to modify or disapprove the proposal must be accompanied by a detailed ex-

96. *Id.* § 1704(8).

97. *Id.* § 1706(c). NMA provides for the certification of nutrient management specialists under the oversight of the Department of Agriculture. *Id.* § 1707(a). The Department of Agriculture is responsible for creating the certification program, but until the program is in operation individuals may serve as interim specialists if they meet qualifications set forth in the Act. *Id.* § 1707(b).

98. *Id.* § 1706(a).

99. 3 PA. CONS. STAT. ANN. § 1706.

100. *Id.*

101. *Id.* § 1706(b); *see also id.* § 1706(d)(1)-(2).

102. *Id.* § 1706(e).

103. *See* 3 PA. CONS. STAT. ANN. § 1706(d)(1)-(3).

104. *Id.* § 1706(d)(1)-(3). Concentrated animal operations in existence on the effective date of the regulations have one year in which to develop and submit for review an acceptable nutrient management plan. *Id.* § 1706(d)(1). Operations which come into existence after the effective date have three months from the latter of the effective date or the date the operation begins in which to submit a plan for review. *Id.* § 1706(d)(2). An operation which expands to the point of meeting the size requirements for a concentrated animal operation is allowed three months from the date of expansion. *Id.* § 1706(d)(3).

105. *Id.* § 1706(e).

planation of the judgment.¹⁰⁶ Should the reviewing body disapprove the proposed plan or amendment, the submitting operation is allowed an additional ninety days from receipt of the notice of disapproval in which to amend and resubmit the plan.¹⁰⁷ Finally, if the reviewing body fails to act within ninety days of receipt of a plan on initial submission or resubmission, the plan is deemed approved.¹⁰⁸

On receipt of notice of an approved plan or on deemed approval of a plan, an operation must implement the plan within three years of the date of receipt of that notice.¹⁰⁹ An additional two-year implementation period, however, is permitted if the plan requires extensive capital improvements and the agricultural operation can show that the funds required for the improvements are not available through existing funding mechanisms.¹¹⁰

Behavior determined by the Commission to be in violation of NMA¹¹¹ may subject the transgressor to fines consisting of a maxi-

106. *Id.*

107. 3 PA. CONS. STAT. ANN. § 1706(e).

108. *Id.* § 1706(e).

109. *Id.* § 1706(g).

110. *Id.* § 1706(g)(1). The Commission must provide financial assistance to existing agricultural operations in the form of loans and grants for the implementation of approved nutrient management plans. *Id.* § 1709. Eligibility for loans or grants is based on several factors: the anticipated benefit of the plan for the environment or population of the Commonwealth of Pennsylvania, the cost effectiveness of the plan compared with alternative means of accomplishing the goal, and the requesting operation's ability to maintain the plan properly. *Id.* § 1709(b)(1)-(3). The Commission may set terms such as the interest rate and the duration of the loan, based on whatever factors are deemed important. *Id.* § 1709(c). The minimum interest rate allowed is one percent. *Id.*

It is the responsibility of the operation to demonstrate that sufficient funds have not been appropriated for grants and loans to the Nutrient Management Fund within one year of the effective date of the regulations. *Id.* § 1706(g)(2). For this requirement to be effective, the Nutrient Management Fund must receive at least \$2,000,000 for grants and loans, in addition to any money that the Fund may appropriate to the Chesapeake Bay Nonpoint Source Pollution Abatement Program. *Id.* If an operation receives funds under the Chesapeake Bay Program or under this Act, the operation is obligated to develop and implement a nutrient management plan as a condition of receiving financial aid. *Id.* § 1706(i). Once a plan is approved, however, it is transferable to a subsequent owner if the district is notified of the change and if the change in ownership does not require an amendment to the plan. *Id.* § 1706(k).

111. 3 PA. CONS. STAT. ANN. § 1711. NMA provides that "[i]t shall be unlawful to fail to comply with or to cause or assist in the violation of any order or any of the provisions of this act or the rules and regulations adopted under this act or to fail to comply with a nutrient management plan." *Id.* NMA enumerates rights and duties for enforcement of its operating provisions. *Id.* § 1714 (a)-(c). Pursuant to NMA, an agent of the Commission or a conservation district is authorized to enter any agricultural operation to investigate and take action necessary to enforce NMA, so long as it occurs at a reasonable time. *Id.* § 1714(a). Furthermore, no

mum of \$500 for the first day of the offense and \$100 for each additional day that the offense continues.¹¹² The amount of the fine, however, is discretionary and may be moderated to reflect the severity of the violation, the potential and resultant harm to the environment and public, the existence of previous violations, the willfulness of the action, and the presence of economic benefit to the transgressor for violating NMA.¹¹³ If the violator is unable to pay the fine, the matter will be referred to the Office of the General Counsel or Attorney General to institute an action against the violator, seeking a lien on the violator's property in the amount of the outstanding fine.¹¹⁴

Violators of NMA may also be subject to non-pecuniary punishments. Specifically, they may be subject to proceedings brought in equity or law for the abatement of a public nuisance.¹¹⁵ The court has the discretion to permit an operation a reasonable time in which to eliminate the nuisance.¹¹⁶ If the violation dramatically affects the health of the people or the environment, additional equitable remedies exist.¹¹⁷ A mandatory preliminary injunction, a special injunction or a temporary restraining order may be available in accordance with the rules of equity.¹¹⁸ A person affected by an

owner or operator may hinder or interfere with the authorized access of such an agent. *Id.* § 1714(b).

112. *Id.* § 1712(a).

113. *Id.* Not all punishments are severe and of a financial nature. If a violation neither harms human health nor damages the environment, and the transgressing operator takes immediate action to remedy the violation, the Commission may issue a warning rather than assess a fine. *Id.* Furthermore, if the violation occurs despite compliance with an approved nutrient management plan, the operator is not subject to penalties under this Act. *Id.*; see also *id.* § 1713 (full and proper implementation of approved plan considered mitigating factor in civil action for penalties or damages allegedly caused by use of nutrients pursuant to plan).

114. 3 PA. CONS. STAT. ANN. § 1712(b). Any funds collected as fines or received from other acceptable sources are to be placed in the Nutrient Management Fund. *Id.* § 1710(a). These funds may be supplemented from other sources, but no administrative action will be permitted to divert any moneys from the Fund to any other purpose. *Id.* § 1710(a), (b) & (e). Other sources may include state funds, federal funds, proceeds from the sale of bonds made available to the Commission, repayment of the interest and principal of loans made by the Commission, gifts from public and private sources, and fund administration. *Id.* § 1706(b). The Fund exists for the purpose of perpetuating activities of NMA. *Id.* § 1710(a).

115. *Id.* § 1712(c).

116. *Id.*

117. *Id.* § 1712(d).

118. 3 PA. CONS. STAT. ANN. § 1712(d). If the violation is sufficiently severe, a court in equity may also assess fines in accordance with the NMA. *Id.*

order issued pursuant to NMA, however, may appeal the decision within thirty days of actual or constructive notice of the decision.¹¹⁹

NMA was promulgated in 1993 to completely occupy the field of regulation of nutrient management, totally preempting contradictory local regulations.¹²⁰ Upon adoption of the regulations under NMA, however, local laws may be enacted which are in accord with and no more stringent than those regulations.¹²¹ Likewise, no penalty may be assessed pursuant to a local law for a violation which is already assessable under NMA, thus protecting farmers from double monetary penalties.¹²²

B. Non-Agricultural Sources of Nutrients

NMA provides for assessment of other sources of nonpoint source pollution.¹²³ NMA authorizes the Department of Environmental Resources ("DER") to examine the pollution from other nonpoint sources, to analyze the effectiveness of existing regulations addressing those sources, and to make recommendations on improving those pollution management efforts.¹²⁴ Other than agricultural operations, the nonpoint sources that are the focus of NMA regulation include on-site sewers,¹²⁵ improperly constructed water wells,¹²⁶ fertilizers and chemicals used for non-agricultural purposes,¹²⁷ storm water runoff¹²⁸ and the results of atmospheric deposits.¹²⁹ At the conclusion of its examination, DER must make a general determination as to whether existing legislation is sufficient to address these sources of pollution.¹³⁰ These non-agricultural sources of nutrients, however, are not the primary focus of NMA.

119. *Id.* § 1715.

120. *Id.* § 1717.

121. *Id.*

122. 3 PA. CONS. STAT. ANN. § 1717.

123. *Id.* § 1702(4).

124. *Id.*

125. *Id.* § 1705(1).

126. 3 PA. CONS. STAT. ANN. § 1705(2).

127. *Id.* § 1705(3). This includes the use of fertilizer for such purposes as golf courses and home lawns. *Id.*

128. *Id.* § 1705(4).

129. *Id.* § 1705(5).

130. 3 PA. CONS. STAT. ANN. § 1705(6).

V. CONCERNS ABOUT THE NUTRIENT MANAGEMENT ACT

A. Implementation

By enacting NMA, the Pennsylvania legislature intended to satisfy the state's responsibility in accomplishing the Bay states' goal of a forty percent reduction in nutrients reaching the Bay by the year 2000.¹³¹ In reality, this goal is unlikely to be met.¹³² Pennsylvania is the only one of the Bay states to have a nutrient management law.¹³³ Even though Pennsylvania is the primary contributor of nutrients to the Bay, NMA will not be implemented soon enough to accomplish Pennsylvania's share of the goal.

In a reasonable best case scenario, implementation of NMA will take until 2000. NMA provides that regulations necessary to implement the law will be drafted in the two years following NMA's passage in 1993.¹³⁴ Following the promulgation of the regulations, NMA provides farmers one year to develop their nutrient management plans and submit these plans to the appropriate local agency for approval.¹³⁵ This agency then has three months to review the plan, or the farmer is allowed to implement it as submitted.¹³⁶ Either way, the implementation of an approved or an unapproved plan will not take place until late 1996. Farmers then have three years after their plans are approved, until late 1999, in which to comply with their plans.¹³⁷ Moreover, a two year extension is available to farmers if the legislature does not provide the necessary

131. *Pa. Enacts Mandatory Nutrient Management Law*, BAY J. (Baltimore, Md.), June, 1993, at 8.

132. *See e.g.*, Lamonte Garber, Chesapeake Bay Foundation, Letter to the Editor, "Defends Nutrient Management Bill," PENNSYLVANIA FARMER, Apr. 1993 (agreeing with statement in prior editorial in PENNSYLVANIA FARMER entitled "'Corking the Cow' Environmental Dilemma," that "having all 25,000 farms in the basin signed up still probably wouldn't be enough to meet the bay program's 40 percent nutrient reduction deadline.").

133. *Pa. Enacts Mandatory Nutrient Management Law*, *supra* note 131, at 8. Maryland failed in 1993 to enact a bill that called for nutrient management plans and legislators in Virginia had not even introduced a plan when Pennsylvania passed NMA. *Id.*

134. *See id.* On March 4, 1994, State Agriculture Secretary Boyd E. Wolff announced that the interim pre-certification program had begun seeking individuals who are interested in obtaining interim nutrient management certification. *Pennsylvania Agriculture Department to Certify Nutrient Managers*, Mar. 4, 1994 PR Newswire, available in LEXIS, Nexis Library.

135. 3 PA. CONS. STAT. ANN. § 1706(d)(1); *see also Pa. Enacts Mandatory Nutrient Management Law*, *supra* note 131.

136. 3 PA. CONS. STAT. ANN. § 1706(e).

137. *Id.* § 1706(g).

funding for loans and grants, and if the farmers can show that alternative funding is unavailable.¹³⁸

The slow phasing in of NMA's provisions renders unrealistic the goal of a forty percent reduction in nutrients which flow into the Bay by 2000. Mere implementation and compliance with NMA is not likely to occur until late 1999, at the earliest. Furthermore, results from efforts to improve water quality do not quickly manifest themselves;¹³⁹ therefore, the effects of such nonpoint source controls will not be substantially felt until after the turn of the century. An array of independent factors are likely to further impede the satisfaction of NMA's clean-up goal. NMA is expected to affect only fifteen to twenty percent of the farms in Pennsylvania.¹⁴⁰ Although these farms house sixty to sixty-five percent of the state's farm animals,¹⁴¹ the remaining thirty-five to forty percent of the animals are not addressed and have a significant effect on nonpoint source pollution. Moreover, some affected agricultural operations may resist implementation and compliance or will seek extensions.¹⁴² Furthermore, a certain amount of nutrient flow is a natural occurrence and will also contribute to the Bay's nutrient concentration.

Despite this negative forecast, the best way to reduce nonpoint source pollution is to address its "sources." Although the deadline "drawn in the sand" of the year 2000 may not be met, for the good of the environment these efforts must continue. Perhaps the success of the program and the affiliated benefits from its recommended methods will encourage other, smaller, farmers to comply voluntarily.¹⁴³

B. Methods Used

NMA provides essentially two general methods of approaching the agricultural nonpoint source pollution problem by addressing

138. *Id.*

139. *The Impact of Wetlands and Nonpoint Source Pollution Regulations on Agriculture Land: Hearings Before the House Agric. Subcomm. on Env't, Credit and Rural Dev., [hereinafter Subcommittee Hearings]* 103 Cong., 2d Sess. 113 (1994) (testimony of John F. Tarburton, Secretary, Delaware Department of Agriculture, on behalf of the National Association of State Departments of Agriculture).

140. *Pa. Enacts Mandatory Nutrient Management Law*, *supra* note 131.

141. *Id.*

142. For a further discussion, see *infra* notes 168-70 and accompanying text.

143. See *Subcommittee Hearings*, *supra* note 139. In fact, many farmers desire more information on controlling nonpoint source pollution. *Id.* at 3.

the sources of the pollutants.¹⁴⁴ One method of reducing nonpoint source pollutants is to address the sources of those pollutants, at least as nearly as possible, through the use of BMPs.¹⁴⁵ The other method is through land use controls.¹⁴⁶ BMPs and land use controls have been used to address point source pollution with very similar means and effects; however, when applied to nonpoint source pollution the differences between these pollution control methods are important enough to warrant separate treatment.

1. Best Management Practices

NMA provides that farmers use BMPs in analyzing the quality of a nutrient management plan.¹⁴⁷ Through the use of BMPs such as conservation tillage practices,¹⁴⁸ modified cropping patterns,¹⁴⁹ structural erosion control measures,¹⁵⁰ and conversion of cropland to less intensive uses,¹⁵¹ farmers reduce or prevent contamination of groundwater and surface water from erosion and runoff from cropland.¹⁵²

Choosing and using BMPs is not a simple procedure and requires a great deal of cost-benefit analysis. The methods used to

144. For a further discussion, see *supra* notes 148-60 and accompanying text; see generally Mandelker, *supra* note 16, at 482-91 (discussing BMPs and land use controls).

145. For a discussion of the use of BMPs, see *infra* notes 148-57.

146. For a discussion of efficient land use practices, see *infra* notes 158-60.

147. See 3 PA. CONS. STAT. ANN. § 1706. BMPs are general methods of managing the land — as opposed to restrictions on its use. *Id.* § 1703; see Mandelker, *supra* note 16, at 482-91 (distinguishing between BMPs and land use controls).

148. SAVING BAYS AND ESTUARIES, *supra* note 24, at I14-I16. Several different types of conservation tillage practices exist, including no till, ridge till, strip till, mulch till and reduced till. For an explanation of each of these tilling methods, see *id.* at I15.

149. *Id.* at I14 - I16. Modified Cropping Pattern methods reduce erosion by planting crops or plowing to reduce the ease with which water flows across the land. *Id.* at I16. These methods include contour farming, contour strip cropping, and cover cropping. For an explanation of each of these methods, see *id.*

150. *Id.* at I16-I17. Farmers can construct means of diverting water flow from high erosion areas or filtering pollutants from water to reduce nutrient concentration flowing off of their land. *Id.* These structural erosion control methods include diversion and terrace systems, grass filter strips (to filter out pollutants), and tree planting and forest buffer strips. For an explanation of these methods, see *id.*

151. *Id.* at I14-I17. Less intensive uses of cropland involve abandoning the land for agricultural purposes if it is in an area where erosion is severe. Marc O. Ribando, et al., *Land Retirement as a Tool for Reducing Agricultural Nonpoint Source Pollution*, 70 LAND ECON. 77 (Feb. 1994). For example, the U.S. Department of Agriculture recommends the retirement of croplands to such uses as “[forests], wetlands or wildlife habitat.” *Id.*

152. Neil D. Hamilton, *Sustainable Agriculture: The Role of the Attorney*, 20 Envtl. L. Rep. (Envtl. L. Inst. 10,021, 10,031 (Jan. 1990) (quoting S. REP. NO. 779, 101st Cong. 1st Sess. (1989)).

prevent erosion and runoff often diametrically oppose efficient agricultural and economic practices. For example, in conservation tillage practices, at least thirty percent of the previous year's crop residue remains on the soil surface rather than being tilled under.¹⁵³ Under the most extreme method of conservation tilling, known as "no till," the soil is left essentially undisturbed, other than for the planting of seeds, resulting in a notable reduction in the risk of erosion.¹⁵⁴ On the other hand, although erosion is contained, "no till" may produce a considerable weed problem which must be controlled primarily with herbicides.¹⁵⁵

Not only must the costs and benefits of erosion reduction and weed control be considered, but the financial costs vary widely for implementing different BMPs.¹⁵⁶ Using the no till conservation tillage technique, the costs of different planting techniques, increased labor, increased fertilizers, and pesticides and herbicides necessary to maximize crop size may be much higher than they would be if standard farming practices were utilized.¹⁵⁷

2. *Efficient Farming*

Nutrient management plans are intended to encourage the efficient use of fertilizers and manure, maximizing production and minimizing nutrient runoff.¹⁵⁸ In such a nutrient management plan, a farmer applies only the nutrients which are necessary for the plants to grow, and utilizes natural means of rejuvenating the soil so that less fertilizer needs to be applied.¹⁵⁹ Examples of natural rejuvenation programs include: crop rotation, discriminating use of animal manure, and the use of "green" manures, like nitrogen fixing legumes.¹⁶⁰ Through the use of efficient practices such as these, lower amounts of nutrients will be available to enter runoff. In addition, although farmers may incur greater costs in ascertaining the nitrogen and phosphorous content of their land, they will save money in fertilizer costs.

153. *Id.*

154. *Id.*

155. *Id.*

156. Mandelker, *supra* note 16, at 483.

157. *See generally id.* (costs and benefits of BMPs).

158. *Pa. Enacts Mandatory Nutrient Management Law*, *supra* note 131, at 8 ("By not applying more fertilizer than required by the crops, there is less potential for nutrients to contaminate ground water or run off the fields into local waterways."); *see also Subcommittee Hearings*, *supra* note 139.

159. Hamilton, *supra* note 152, at 10,031.

160. *Id.*

C. Other Concerns

Prior to NMA's enactment, expense to both the Commonwealth of Pennsylvania and its farmers was a major cause for opposition to the Act.¹⁶¹ NMA imposes financial burdens on farmers who attempt to comply with it.¹⁶² Likewise, the financial penalties for non-compliance are potentially severe.¹⁶³ These costs could result in financial ruin for some small farmers and ultimately force them out of business.¹⁶⁴

The legislature attempted to address these financial concerns and NMA, in its final form, is now supported by all three Pennsylvania farm groups; however, small farmers may still have difficulties in compliance.¹⁶⁵ Problems in implementing nonpoint source pollution reduction plans are caused by individual rebellious farmers refusing to undertake certain extra actions as required by the conservation district and Department of Agriculture.¹⁶⁶ These problems are primarily the result of farmers' inability to comply financially.¹⁶⁷ Opposing NMA, Pennsylvania House Representative Frank A. Serafini argued that in addition to the great expense of the Act to the Commonwealth of Pennsylvania, it is unfair to fine

161. See Daina Savage, *Farmers In County Fear Nutrient Management Bill*, INTELLIGENCER J. (Lancaster, Pa.), Nov. 23, 1992, at A6 (expressing concerns of farmers that the Bill was not written clearly and was being "rammed down [their] throats."). For more commentary on farmers' concerns with NMA, see Tim Buckwalter, *2 Farmer-Lawmakers from County Split on Farm Runoff Bill*, LANCASTER NEW ERA, June 27, 1991, at A1 (discussing concerns of Rep. Terry Scheetz, supporting early bill and Rep. John Barley, opposing early bill); Jon Rutter, *'Saving the Bay' Plan Grows on Local Farmers*, SUNDAY NEWS (Lancaster, Pa.), Mar. 22, 1992, at A1; Daina Savage, *Farmers Unite to Change Bill on Runoff*, INTELLIGENCER J. (Lancaster, Pa.) Mar. 31, 1992, at B-1; Margaret Hopkins, *250 Area Farmers Share Concerns Over Nutrient Management Bill*, YORK DAILY RECORD, Apr. 1, 1992, at 3B; *Nutrient Management, Other Concerns Aired at Legislative Meeting*, LANCASTER FARMING, April 4, 1992, at A25 (state farm leader calling for state-wide regulation of nutrient management); Daina Savage, *Amish to Decry Nutrient Management Bill*, INTELLIGENCER J. (Lancaster, Pa.), May 6, 1992, at B-11; Daina Savage, *Amish Oppose Nutrient Legislation*, INTELLIGENCER J. (Lancaster, Pa.), May 7, 1992, at A1; Todd R. Weiss & Tim Buckwalter, *A Last Minute Battle on Manure Bill*, LANCASTER NEW ERA, Nov. 23, 1992, at C14; Editorial, *An Improved Manure Bill*, LANCASTER NEW ERA, Nov. 24, 1992, at A10 (recognizing Pennsylvania farmers' hostility toward NMA because Maryland farmers would not face same restrictions).

162. For a general discussion of farmers' concerns regarding NMA, see Gould, *supra* note 23, at 487-89.

163. For specific fine information and enforcement discussion, see *supra* notes 111-19, and accompanying text.

164. *Subcommittee Hearings*, *supra* note 139, at 125.

165. Garber, *supra* note 132 (expressing that NMA "is one case in which the farm and environmental communities openly communicated and developed consensus.").

166. *Subcommittee Hearings*, *supra* note 139, at 132.

167. *Id.*

farmers daily for a pollution situation that cannot be completely solved within months or years.¹⁶⁸

Pennsylvania House Representative Thomas E. Armstrong, who also voted against NMA, expressed his concern that “[t]he local farmer does not like to be manhandled and mandated in [pollution control] programs.”¹⁶⁹ Representative Armstrong feared that NMA, as passed, will force farmers to cheat and avoid compliance costs, while a non-mandatory plan would provide farmers with a chance to take voluntary action to improve their nutrient management practices on their farms.¹⁷⁰ The bottom line appears to be that although the severity of the water pollution problem in the Chesapeake Bay warrants drastic measures, the welfare of Pennsylvania farmers is a concern that in some circles outweighs the situation in the Bay.

VI. CONCLUSION

Pennsylvania’s Nutrient Management Act of 1993 is a step in the right direction for water quality efforts, particularly for its inspiration, the Chesapeake Bay. In order to reach the lofty goal of reducing nonpoint source pollution in the Bay by forty percent by the year 2000, Pennsylvania’s NMA ensures that nonpoint source pollution gets some of the attention that it deserves and that awareness of the problem will continue to increase. It is crucial that the other Bay area states follow Pennsylvania’s lead to control nonpoint source pollution in the Chesapeake. The problems involved in implementing NMA and obtaining compliance are unavoidable. If a program is noncompulsory in nature, it risks failure because people are naturally not inclined to voluntarily undertake expensive conservation responsibilities. In order to effectuate nonpoint source pollution controls, the controls must be enforceable under law; so that while there still may be some parties who resist compliance, there will be means of extracting that compliance from them. Furthermore, no law that restricts how one deals with the environment is without sacrifices and inconvenience; NMA is no exception. The costs of nutrient management imposed on a few individuals, rela-

168. *Id.*

169. *Id.* at 125.

170. *Subcommittee Hearings, supra* note 139, at 125.

tive to the number of individuals affected by the actions of the few, however, is an acceptable price to pay for saving the bay.

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