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Emissions Trading: A Cost-Effective Approach to Reducing Nonpoint Source Pollution

Sonya Dewan*

*Fordham University School of Law

NOTES

EMISSIONS TRADING: A COST-EFFECTIVE APPROACH TO REDUCING NONPOINT SOURCE POLLUTION

Sonya Dewan

A significant amount of U.S. water pollution originates from nonpoint sources,[1] which are "scattered, diffuse sources of pollutants, such as runoff from farm fields, golf courses, [or] construction sites."[2] The nation's environment is deteriorating and entire species are disappearing due to the ineffective control of nonpoint sources.[3] The regulation of these sources, particularly agricultural nonpoint sources, is a complex issue currently facing policy makers.[4]

Nonpoint sources have been regulated substantially less than point sources, which are "specific locations of highly concentrated pollution discharge, such as factories, power plants, sewage treatment plants, underground coal mines, and oil wells."[5] Previous efforts at

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1. Barry C. Field, Environmental Economics: An Introduction 287 (1994).

2. *See* WILLIAM P. CUNNINGHAM, UNDERSTANDING OUR ENVIRONMENT: AN INTRODUCTION 364 (1994).

3. *See generally,* Environmental Defense, *Nonpoint Source Pollution Control: Breaking the Regulatory Stalemate*, *at* http://www.envtn.org/docs/GTLP-PNG.PDF (last visited Dec. 19, 2004).

4. *See* Terry F. Young & Joe Karkoski, *Green Evolution: Are Economic Incentives the Next Step in Nonpoint Source Pollution Control?* 2 WATER POL'Y 151, 152 (2000), *available at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf .

5. CUNNINGHAM, *supra* note 2, at 366. *See also* Susan A. Austin, *Designing A Nonpoint Source Selenium Load Trading Program*, 25 HARV. ENVTL. L. REV. 337, 339 (2001) (defining nonpoint

controlling nonpoint source pollution have been unsuccessful, primarily because individual polluters were not held accountable for the pollution they emitted.[6] For most individual polluters, the cost of polluting without restraint has always been lower than the cost of self-regulation.[7] Therefore, to control agricultural nonpoint sources, policy makers have been searching for a system that will make each farmer personally accountable for the amount he pollutes.[8] The aim has been to achieve such a system without severely hindering farm practices.[9]

Regulators have investigated traditional command and control regulatory schemes for nonpoint source pollution control.[10] Under a command and control approach, uniform standards are applied to all individual polluters.[11] Although this achieves a certain level of accountability, this centralized approach to solving environmental problems has proven costly for polluters.[12] A command and control

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sources as, "discharges, such as farms, timber operations, urban runoff, storm water, erosion, and natural runoff").

6. *See* Environmental Defense *at* http://www.envtn.org/docs/GTLP-PNG.PDF, *supra* note 3, at 1 (noting "The commonly-accepted method for controlling nonpoint source pollution—voluntary adoption of 'Best Management Practices' or BMPs—has predictably achieved minimal success, particularly in areas where pollution control expenses are significant.").

7. Garret Hardin, *The Tragedy of the Commons, in* SOURCES: NOTABLE SELECTIONS IN ENVIRONMENTAL STUDIES 39, 42-43 (Theodore D. Goldfarb ed., Dushkin/McGraw-Hill 7th ed., 1997) (describing pollution as a reverse "tragedy of the commons" as people will pollute so long as it is more cost-effective than proper disposal of wastes).

8. *See generally*, Environmental Defense, *at* http://www.envtn.org/docs/GTLP-PNG.PDF, *supra* note 3.

9. *Id., at* http://www.envtn.org/docs/GTLP-PNG.PDF.

10. *See* Kurt Stephenson, Leonard Shabman, & L. Leon Geyer, *Toward an Effective Watershed-Based Effluent Allowance Trading System: Identifying the Statutory and Regulatory Barriers to Implementation*, 5 ENVTL. LAW. 775 (1999).

11. Lynn Scarlet, *Evolutionary Ecology, in* TAKING SIDES: CLASHING VIEWS ON CONTROVERSIAL ENVIRONMENTAL ISSUES 4, 13 (Theodore D. Goldfarb ed., Dushkin/McGraw-Hill 7th ed., 1997).

12. *Id.*

system provides polluters with no incentive to attain an optimum level of pollution.[13]

An alternative to a command and control system would be a tradable emissions program.[14] Under this approach, polluters are encouraged to act responsibly because doing so is cost-effective.[15] In an emissions trading system the government establishes an aggregate emissions limit for each region.[16] Permits are then distributed to individual polluters in an area according to the established emissions limit.[17] The tradable emission permits consequently create a market within the region, allowing individuals to buy and sell the right to pollute.[18] Although both command and control regulation and emissions trading may reduce nonpoint source pollution, a review of recent trading programs has demonstrated that a tradable permit system is likely to be more cost-effective.[19]

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13. *See generally* Stephenson, Shabman & Geyer, *supra* note 10 (arguing that command and control systems prevent new technology from emerging and do not provide cost-effective pollution control).

14. *See* Andrew P. Morriss, Bruce Yandle, & Terry L. Anderson, *Principles for Water,* 15 TUL. ENVTL. L.J. 335, 336-56 (2002) (establishing principles to use in evaluating command and control regulation of water pollution verses a market approach).

15. Austin, *supra* note 5, at 343 (arguing that economic instruments could reduce the economic cost of achieving a certain environmental standard in comparison to command and control regulatory policies); *See also* Stephenson, Shabman & Geyer, *supra* note 10.

16. ORG. FOR ECON. CO-OPERATION & DEV., EVALUATING ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL POLICY 17 (1997); *see also* Stephenson, Shabman & Geyer, *supra* note 10, at 781; Lily N. Chinn, *Can the Market Be Fair and Efficient? An Environmental Justice Critique of Emissions Trading*, 26 ECOLOGY L.Q. 80, 88-89 (1999).

17. ORG. FOR ECON. CO-OPERATION & DEV., *supra* note 16, at 17; *see also* Stephenson, Shabman & Geyer, *supra* note 11, at 781.

18. *See id.; see also* Morris, Yandle & Anderson, *supra* note 14, at 336.

19. *See* Austin, *supra* note 5, at 343 (explaining that the flexibility given to polluters through the use of economic instruments helps reduce the cost of attaining a particular level of environmental protection); *see also* Environmental Defense, *at* http://www.

An emissions trading program must meet five criteria in order to be effective: 1) polluters within the trading region must be given an incentive to meet water quality standards; 2) a locally controlled agency has to regulate polluters and enforce pollution limits; 3) there must be a cap on the amount of discharge allowed; 4) a system to monitor polluters must be in place; and 5) there must be a likelihood that differences exist in the marginal cost of reducing pollution among the various regional polluters. Region-specific programs meeting these criteria should thus be able to create markets for permits. As a result, through the creation of such markets, nonpoint source pollution may be reduced at the lowest possible cost.

Part I of this Note provides a brief background of water pollution policy in the United States. It discusses the inadequacy of previous regulation methods and the difficulties presented by the regulation of nonpoint source pollution. This Part also introduces the use of tradable emissions in the water context. Part II discusses the economic incentives of using tradable permits, and explains how tradable permits can reduce nonpoint source pollution at a lower cost than command and control regulation. Part III discusses the challenges of designing an effective tradable permit system. Finally, Part IV examines the Selenium Load Trading Program of California's San Joaquin Valley. This program was able to overcome the perceived challenges to satisfy the five conditions this author suggests are necessary for a successful trading program. This Part also explains how the fulfillment of each requirement facilitated trade within the region.

I. THE EVOLUTION OF WATER POLLUTION CONTROL IN THE UNITED STATES

In order to realize the benefits of regulating nonpoint source water pollution through tradable emission permits, it is important to explore the evolution of water pollution policy concerning nonpoint sources. Examination of past difficulties encountered in the regula-

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envtn.org/docs/GTLP-PNG.PDF, *supra* note 3 (explaining that economic incentives from trading program in Grassland Drainage Area provided financial rewards for innovative pollution control methods).

tion of nonpoint source pollution shall highlight the benefits of using an economic approach to address this problem.

The desire to regulate nonpoint source pollution is relatively new, and, until recently, control of nonpoint sources has been predominantly weak.[20] Limited prior to the 1970s,[21] the federal role in pollution control expanded with the creation of the Environmental Protection Agency ("EPA") in 1970, and further grew with the passage of the Federal Water Pollution Control Act, often referred to as the Clean Water Act ("CWA"), in 1972. The CWA effectively established federal water pollution policy.[22]

For the most part, the CWA does not address nonpoint source pollution.[23] Rather, the Act distinguishes between point source and nonpoint source pollution.[24] Although the CWA regulates point source pollution, agricultural discharges are specifically exempt from regulation,[25] resulting in inadequate control of these nonpoint pollution sources.[26]

Unable to rely upon nonpoint source regulation, environmental groups have focused on Section 303(d) of the CWA in their attempts to bring these sources under government regulation.[27] Section 303(d) requires that states "identify water bodies for which technology-based effluent limitations are not stringent enough to meet water quality standards, to establish a priority ranking of those waters, and to establish a Total Maximum Daily Load ("TMDL") at the level

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20. *See* Austin, *supra* note 5, at 337.

21. *See* A. Myrick Freeman II, *Environmental Policy Since Earth Day I: What Have We Gained?* 16 No. 1 J. OF ECON. PERSP. 125 (Winter 2002); *see also* FIELD, *supra* note 1, at 268-69 (noting that primary legislation pre-1970 consisted of the 1899 Refuse Act, the 1948 Water Pollution Control Act, the 1956 WPCA Amendments and the 1965 Water Quality Act).

22. Freeman, *supra* note 21, at 136; *see also*, Scarlet, *supra* note 11, at 166.

23. Freeman, *supra* note 21, at 137.

24. Austin, *supra* note 5, at 339.

25. *Id.* at 340 (asserting that the CWA regulates point source pollution with the National Pollutant Discharge Elimination System, a program that specifically exempts nonpoint source pollution).

26. *See id.*

27. *Id.* at 341.

necessary to meet water quality standards."[28] A TMDL establishes how much pollution can be discharged into a local water body, and dictates who is allowed to pollute at a particular level.[29] TMDLs are required for every location failing to meet water quality standards under current regulatory programs.[30]

In response to the efforts of environmental groups, the EPA began to recognize nonpoint source pollution as a serious environmental problem.[31] The EPA now requires TMDL allocations for nonpoint sources, deriving its authority to do so from the TMDL provisions of the CWA.[32] In addition, caselaw has established that the EPA has the ultimate authority to require and enforce state regulation of nonpoint sources, despite the belief held by some that regulation of these sources should be left solely to states.[33] Due to heightened awareness of the dangers these pollution sources pose, load allocations for nonpoint sources are becoming more common.[34]

In the past nonpoint sources, particularly farms, have not been subject to much control.[35] Nonpoint source regulation has been neglected largely due to a lack of federal legislation resulting from perceived difficulties in creating and enforcing any attempt at regulation.[36] Regulating nonpoint source pollution is thought to be a tremendous task requiring the control of numerous "small, independent, diverse pollution discharges" that are therefore hard to monitor.[38]

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28. *Id.*; *see also,* Federal Water Pollution Control Act § 303(d), 33 U.S.C. § 1313(d)(1) (1994 & Supp. IV 1998).

29. Austin, *supra* note 5, at 341.

30. *Id.* at 341-42.

31. *See id.*

32. *Id.*

33. *Id.; see also* Pronsolino v. Marcus, 91 F. Supp. 2d 1337, 1354 (N.D. Cal. 2000) (permitting EPA to withhold grant money from states that refuse to implement TMDLs).

34. Austin, *supra* note 5, at 341-42.

35. *Id., at* Policy.pdf, at 152-153.

36. Young & Karkoski, *available at* http://environmentaldefense.org/documents/654_FarmPoluution_WaterPolicy.pdf, *supra* note 4 at 152.

37. *Id., at* Policy.pdf, at 152.

38. *Id., at* http://environmentaldefense.org/documents/654_Farm Pollution_WaterPolicy.pdf.

These perceived difficulties led most programs striving to reduce agricultural nonpoint source pollution to request voluntary adherence to Best Management Practices ("BMPs").[39] BMPs are procedures that regulate the amount of pollution that enters a particular water source and are applied during several stages of the pollution producing activity.[40] Voluntary use of BMPs have not, however, sufficiently reduced nonpoint source pollution.[41] The essential problem with these prior programs is that they were voluntary. As a result, they did not hold individual farmers accountable for their pollution.[43] Farmers saw costs with few benefits resulting from their adherence to BMPs, and thus were disinclined to comply.[44] Mandatory programs, on the other hand, were thought to be administratively and economically impractical.[45]

Recently, Congress has incorporated economic efficiency standards into several environmental laws.[46] This has provided individual polluters with economic incentives to reduce their emissions.[47] An economic incentive encourages an individual to focus production and consumption in economically beneficial directions.[48]

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39. *Id.*, *at* http://environmentaldefense.org/documents/654_Farm Pollution_WaterPolicy.pdf.

40. Austin, *supra* note 5, at 340.

41. Young & Karkoski, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 152.

42. *Id.*, *at* http://environmentaldefense.org/documents/654_Farm Pollution_WaterPolicy.pdf.

43. *Id.*, *at* http://environmentaldefense.org/documents/654_Farm Pollution_WaterPolicy.pdf, at 153.

44. *Id.*, *at* _WaterPolicy.pdf, at 152.

45. *Id.*, *at* http://environmentaldefense.org/documents/654_Farm Pollution_WaterPolicy.pdf.

46. *Id.*, *at* http://environmentaldefense.org/documents/654_Farm Pollution_WaterPolicy.pdf (referring to the Toxic Substances Control Act of 1976, the Federal Insecticide, Fungicide and Rodenticide Act of 1976 and the Safe Drinking Water Act Amendments of 1996, as three major environmental laws in which Congress has incorporated economic efficiency criteria).

47. FIELD, *supra* note 1, at 3.

48. *Id.* at 5.

At first, Congress specifically rejected using an economic approach to establishing environmental goals, particularly in the areas of clean air and clean water.[49] However, the use of tradable emission permits has subsequently gained acceptance as a valid technique for pollution reduction.[50]

Congress first acknowledged the feasibility of tradable emission programs in the Clean Air Act amendments of 1977.[51] Further amendments in 1990 expanded the availability of trading programs, making emissions trading an acceptable means for achieving goals set for acid rain reduction.[52] Emissions trading programs are now commonly used in air pollution regulation.[53] The benefits of emissions trading have recently been realized in water pollution control as well[54] in programs modeled after those created to reduce air pollution.[55]

II. TRADABLE EMISSIONS PERMITS: POLLUTION REDUCTION AT A LOWER COST THAN COMMAND AND CONTROL REGULATION

For the last century policy makers have used "command and control" regulation to address most environmental issues.[56] Under this

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49. Freeman, *supra* note 21, at 126 (noting that Congress in the early 1970s, in the Clean Air Act and the Federal Water Pollution Act, rejected an economic approach and focused on protecting human health and fishable and swimable water quality).

50. *See generally* Richard E. Ayres, *Expanding the Use of Environmental Trading Programs Into New Areas of Environmental Regulation*, 18 PACE ENVTL. L. REV. 87, 91 (2000).

51. *Id.* at 92; *see also* Chinn, *supra* note 16, at 87-88.

52. *Id.*

53. Ayres, *supra* note 50, at 91; *see also* ORG. FOR ECON. CO-OPERATION & DEV., *supra* note 16, at 57.

54. *See* Ayres, *supra* note 50, at 88 (describing initial trading programs in both the air and water context); *see generally* Austin, *supra* note 5, at 341 (illustrating the benefits of an emissions trading area in the Grassland Drainage Area of the San Joaquin Valley in California).

55. *See* Austin, *supra* note 5, at 343-44 (asserting that insight to a market based approach can be found in the air emissions context).

56. Morriss, Yandle & Anderson, *supra* note 14, at 335.

centralized approach, the EPA sets uniform standards and requires the use of specific technologies.[57] Reducing pollution through command and control regulation, however, is likely to be more costly than via a decentralized emissions trading program.[58] Trading programs provide a more cost-effective solution to pollution reduction by maximizing the use of local information and by providing polluters the incentive to reach their optimum level of pollution, both of which have encouraged technological development and experimentation.[59]

Obtaining the information needed to regulate nonpoint sources is usually more costly under a command and control system than in a trading program.[60] The federal EPA is less likely than a local agency to have detailed information about the pollution problems of a given body of water already on hand.[61] A national agency, like the EPA, is also likely to spend money and time gathering more information than is necessary to deal with a specific problem.[62] Trading programs, on the other hand, optimize the use of local knowledge by giving regulatory power to a locally controlled agency.[63] It is likely that a local agency already possesses much of the needed data, is more aware of the information needed to accurately address the particular problem, and is more capable of acquiring that information at

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57. *See* Scarlet, *supra* note 11, at 13.

58. *See generally* Morriss, Yandle & Anderson, *supra* note 14, at 335 (comparing command and control regulatory schemes to market regulation of water by focusing on ten principals); *see also* FIELD, *supra* note 1, at 383 (asserting that experimentation in the GDA would have been less likely if the use of specific technologies had been required).

59. *See* FIELD, *supra* note 1, at 259, 271 (predicting that trading programs will result in pollution control at a substantially lower cost than technology based effluent standards, standards used by the EPA in command and control regulation in requiring the use of certain technologies).

60. *See* Morriss, Yandle & Anderson, *supra* note 14, at 338.

61. *See id.*

62. *See id.*

63. *See id.*

a lower cost.[64] These advantages make a local agency better suited to determine and enforce pollution limits than the centralized EPA.[65]

Trading programs, unlike command and control regulation, provide financial incentives for polluters to reach the pollution level that is the most cost-effective for their own individualized interests.[66] These incentives encourage market activity (such as bargaining) among polluters and support the development of new pollution-reducing technologies.[67] Tradable emissions programs achieve these results by using a cap-and-trade, market-based approach.[68] Under this approach, the government determines the total amount of pollution a particular region is allowed to emit.[69] A local agency then divides that total pollution amount into marketable permits, which are then assigned to individual parties.[70] The permits can be bought and sold among parties, allowing each party to determine its own most economical pollution level.[71] While it may be more cost-effective for some parties to pollute at or above the allotted level, others have the incentive to develop new pollution reduction technologies or to change their overall method of production.[72] As a result, farmers are induced to choose their optimal level of pollution. This is unlike what occurs under a command and control system, where uniform pollution levels are set, deployment of certain technologies required, and trading proscribed.[73]

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64. *See id.*
65. *See generally* Morriss, Yandle & Anderson, *supra* note 14.
66. Chinn, *supra* note 16, at 89.
67. Scarlet, *supra* note 11, at 13.
68. Chinn, *supra* note 16, at 88-89.
69. *Id.* at 89; *see also* Austin, *supra* note 5, at 348.
70. Chinn, *supra* note 16, at 89.
71. *Id.*
72. Scarlet, *supra* note 11, at 13.
73. *Id.; see also* Chinn, *supra* note 16, at 89; *see also* Austin, *supra* note 5, at 383.

III. POSSIBLE CHALLENGES IN APPLYING TRADABLE EMISSIONS PERMITS

Tradable emissions permits can only work where well-functioning markets for permits may be created.[74] If the proposed five requirements for a successful trading program are met, the genesis of a market environment will ensue due to the incentive to trade. Meeting these requirements, however, may pose a problem for policy makers in certain regions.

The first requirement of an emission trading market is an incentive sufficient to motivate polluters to meet water quality standards. This requirement is fundamental to a successful trading system. If polluters perceive the environment as owned by no one, they are likely to pollute at any level they choose.[75] Despite a recent emphasis on environmental preservation, morals and ethics alone will not encourage polluters to reduce the amount they pollute.[76] Economic incentives, on the other hand, are more likely to encourage polluters to meet water quality standards.[77] If the economic incentives from tradable permits are insufficient motivation for polluters the trading program will not work.[78]

The second requirement is a locally controlled agency directly regulating polluters and enforcing their pollution limits. Since most water pollution problems are specific to a particular region,[79] a regional regulatory agency is likely to be better informed of the issues. Therefore, this agency will be more effective in assigning permits

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74. *See* Ayres, *supra* note 50, at 87.

75. Scarlet, *supra* note 11, at 7.

76. FIELD, *supra* note 1, at 4-5.

77. *Id.*

78. *See generally* Austin, *supra* note 5, at 337 (stating that if dischargers incur same marginal cost curve there will not be enough incentive to trade, and as a result, the trading program will not work); *see also* Dennis M. King, *Managing Environmental Trades: Lessons From Hollywood, Stockholm, and Houston*, 32 ENVTL. L. REP. 11317 (2002) (asserting that if trading rules established by regulators are too strict trading may be inhibited).

79. *See generally* FIELD, *supra* note 1, at 290.

and implementing rules.[80] Polluters must be regulated directly, and control by a local agency effectively achieves this goal.[81]

The third requirement, a cap on the total amount of pollution the region can emit, provides a "baseline" to structure a trading program.[82] Several methods can be used to establish a discharge cap.[83] One possibility includes implementing a TMDL; another contemplates legislation at the state level.[84] Complications may arise in establishing a cap;[85] for example, data needed for setting a cap becomes difficult to obtain when the pollutants break down into other chemicals in the environment.[86] If it is impossible to calculate a cap for allowable pollution, there will be no baseline on which to create a market.[87] Furthermore, even if a cap can be set on the amount of discharge permitted, problems might arise in attempting to assign permits and establish trading rules.[88]

Due to the nature of nonpoint source pollution, the fourth requirement—a measurement system to monitor polluters—is one of the most important issues that must be addressed when designing such a trading program. While monitoring nonpoint source pollution levels is extremely difficult, discharge amounts and reductions must be measured and estimated to establish a viable trading program.[89] If pollution levels cannot be monitored, enforcement of pollution limits will be impossible.[90] The cost of creating a monitoring mechanism must be weighed against the benefits of creating an emissions mar-

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80. *See* Austin, *supra* note 5, at 351 (describing the importance of a regional agency in the Grassland Drainage Area).

81. Young & Karkoski, *available at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 167; *see generally*, ORG. FOR ECON. CO-OPERATION & DEV., *supra* note 16, at 351.

82. Ayres, *supra* note 50, at 109.

83. *See* Austin, *supra* note 5, at 389.

84. *Id.*

85. *See* Ayres, *supra* note 50, at 109.

86. *Id.*

87. *Id.*; *see also* ORG. FOR ECON. CO-OPERATION & DEV., *supra* note 16, at 17.

88. FIELD, *supra* note 1, at 260; *see also* Austin, *supra* note 5, at 352-53.

89. Austin, *supra* note 5, at 390.

90. *See id.*

ket.[91] If the cost exceeds the total benefit, emissions trading would not be advantageous.[92]

The fifth requirement essential for a functioning is the existence of differences among dischargers in their marginal costs of reducing pollution. In other words, the cost associated with reducing pollution by some small amount must vary for different polluters if there is to be any incentive to trade.[93] If the region does not include some polluters with the incentive to continue polluting and some polluters with the incentive to reduce pollution, through the development of a new technology or the use of different agricultural methods for example, there will be no incentive to trade.[94] Trading will only occur if there are parties that have different optimum levels of pollution.[95]

IV. DESIGN OF A SUCCESSFUL TRADING PROGRAM: THE GRASSLAND DRAINAGE AREA

One emissions trading program for nonpoint source water pollution has proven particularly successful, despite the challenges it faced. The Selenium Load Trading Program ("SLTP") in the Grassland Drainage Area ("GDA"), an agricultural region of California's San Joaquin Valley, was one of the first successful trading programs to adequately reduce nonpoint source pollution in the nation.[96] Built into this program are the five criteria this author proposes as necessary for any successful emissions trading program. An analysis of the SLTP highlights the importance of these criteria in any trading program to reduce nonpoint source pollution.

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91. *Id.* at 385.

92. *Id.*

93. *Id.* at 390; *see also* ROBERT COOTER & THOMAS ULEN, LAW & ECONOMICS 20-21 (Addison Wesley Longman, Inc., 3rd ed., 2000).

94. *See* Austin, *supra* note 5, at 390; *see also* Young & Karkoski, *available at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 156 (asserting that marginal cost differences will affect the magnitude of cost savings in a trading program).

95. *See also* COOTER & ULEN, *supra* note 93, at 20-21.

96. Susan A. Austin, *The Tradable Loads Program in the Grassland Drainage Area, at* http://ageco.tamu.edu/faculty/woodward/et/grassland.htm (last visited Feb. 1, 2000).

An Incentive to Meet Water Quality Standards

Although the GDA received national attention in 1983, when farm drainage high in selenium caused deformed baby birds in the Keterson Reservoir, farmers did not appreciably reduce the amount they polluted.[97] Drainage high in selenium posed a threat to many wildlife species, necessitating a reduction of drainage discharge to meet water quality standards.[98] Yet, after eight years of encouraging voluntary BMPs, such a program has proven unsuccessful in improving water quality.[99] Voluntary adherence to BMPs did not result in a sufficient decrease in nonpoint source pollution.[100]

Economic incentives, as an alternative to BMPs, were proposed in 1994 by the Environmental Defense Fund ("EDF") to control the selenium problem.[101] The EDF argued that there were advantages to using tradable discharge permits among irrigation districts.[102] The plan proposed to make the districts directly responsible for their pollution discharges, giving them incentive to try to reach their optimal pollution level.[103] A variety of practices have been implemented by districts, following the implementation of this trading program, including newsletters and other forms of communications among

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97. U.S. Envtl. Prot. Agency, *Grassland Bypass Project: Economic Incentives Help Improve Water Quality,* §319 Success Stories, Vol. III, *at* http://www.epa.gov.owow/nps/Section319III/CA.htm (last visited Dec. 19, 2004); *see also* Young & Karkoski, *available at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 152-53.

98. Young & Karkoski, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 153.

99. *Id., at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf.

100. *See id., at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf.

101. *Id., at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf.

102. *Id., at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, at 152-53.

103. *See generally* Young & Karkoski, *available at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 152-62.

farmers, the installation of improved irrigation systems and the use of a drainage recycling system.[104]

A Measurement System That Monitors Polluters

The SLTP has developed a unique pollution monitoring system.[105] Drainage is collected in underground pipes located on each farm.[106] This drainage is then conveyed to a swamp at the end of the field and pumped into district pipes or canals that transport it to a discharge point outside the district.[107] Metering of swamp discharges and periodic measurement of salinity and selenium concentrations make tracking of individual farm discharges possible.[108] Another method used is the measurement of water inputs as an alternative to pollution outputs.[109]

Measurement systems were an essential part of the design of the trading program in the GDA.[110] The program first assigns a pollution limit to each district, then creates a penalty structure to enforce

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104. U.S. Envtl. Prot. Agency, *at* http://www.epa.gov/owow/nps/Section319III/CA.htm, *supra* note 97.

105. *Compare* Young & Karkoski, *available at* http://environmentaldfense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 154, *with* Rock River Watershed Group, Summary of Watershed Studies 3, *at* http://clean-water.uwex.edu/rockriver/summary%20PDFs/volumeII.pdf (August, 2000) (on file with the Fordham Environmental Law Journal) (describing measurement system in the Rock River Pilot project which involves a model developed for this particular region called the Soil and Water Assessment Tool).

106. Young & Karkoski, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 154.

107. *Id.*, *at* http://environmentaldefense.org/documents/654_Farm Pollution_WaterPolicy.pdf.

108. *Id.*, *at* http://environmentaldefense.org/documents/654_Farm Pollution_WaterPolicy.pdf.

109. *Id.*, *at* http://environmentaldefense.org/documents/654_Farm Pollution_WaterPolicy.pdf.

110. Austin, *supra* note 5, at 352-53.

the limits, and finally establishes trade rules.[111] Each of these steps requires dependable monitoring mechanisms.[112]

A Cap on Allowable Discharge

The Agreement for Use of the San Luis Drain ("Use Agreement"), a five-year contract between the United States Bureau of Reclamation and the Grassland Area Farmers, establishes and legally enforces a cap on the amount of discharge permissible for the region.[113] The cap essentially provided a regulatory framework for the irrigation districts and for the farmers to develop an emissions trading program.[114]

Under this agreement the regions' farmers are permitted to use a federal canal, the San Luis Drain ("The Drain"), which transports drainage directly into one specific river tributary bypassing wildlife refuges.[115] The farmers are not permitted to discharge elsewhere.[116] The Use Agreement specifies the amounts of selenium that can be discharged per month and per year.[117] For the first two years the cap on permissible pollution was established at the historical regional average, and each subsequent year thereafter the permissible pollution level will decrease at a set percentage.[118] If discharges should ever exceed 120% of the annual cap on allowable selenium, the farmers will lose the right to use the Drain.[119] There are very few

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111. *Id.*

112. *Id.*

113. *Id. at* 348-51; *see also* Young & Karkoski, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 157 (asserting that an extensive monitoring program was also required under the agreement recognizing that violations of water quality standards might still occur).

114. *See generally* Austin, *supra* note 5.

115. Young & Karkoski, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 156.

116. *Id.*, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf.

117. Austin, *supra* note 5, at 351-52.

118. *Id.*

119. *Id.*

exceptions to the 120% limit, the primary exception being "unforeseeable and uncontrollable" circumstances.[120]

A Locally Controlled Agency That Regulates Polluters and Enforces Pollution Limits

The organization of the GDA supported the creation of agencies that could locally regulate and enforce pollution limits.[121] Farms were grouped into irrigation and/or drainage districts, each responsible for its own water allocation and drainage problems.[122] The districts that diverted drainage into the Drain formed an entity called the Grassland Area Farmers ("GAF").[123] The governing body of the GAF, the Grassland Basin Drainage Steering Committee ("Steering Committee"), consists of representatives from each district.[124] Rules for the Steering Committee were agreed upon among the representatives and formalized in the "Activity Agreement."[125] Finally, an executive officer of the Steering Committee, the Regional Drainage Coordinator, was appointed.[126] The Coordinator's duties include collecting and processing regional information, preparing reports and representing the GAF at meetings and hearings.[127]

Once established, this local agency was able to focus on the concerns of the particular region and determine the best methods to

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120. *Id.* at 363-74 (defining "unforeseeable and uncontrollable" circumstances to generally mean uncontrollable acts of God; also, noting that in 1998, an El Niño year, the heavy rainfall was deemed an "unforeseeable and uncontrollable" circumstance and fees for exceeding load allocations were waived).

121. *See generally* Young & Karkoski, *available at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 153-55.

122. *Id.*, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, at 154-55.

123. Austin, *supra* note 5, at 351.

124. *Id.*

125. *Id.* (declaring that under the Activity Agreement a unanimous vote of present Steering Committee members is required and ratification of rules by each district is necessary before rules go into effect).

126. *Id.*

127. *Id.*

regulate and enforce pollution limits. The GAF met regularly with this as their overarching goal.[128] On June 26, 1998, the "Rule Establishing a Tradable Loads Program for Water Year 1998" was adopted.[129] This Rule determined the boundaries of acceptable trades, taking into consideration the discharge limits established under the Use Agreement.[130] Under this Rule, trading was allowed in any increment and for any form of consideration, as long as the pollution limits established for the particular region were not exceeded.[131] Trading was only permitted among those that could discharge through the Drain.[132]

Although a reduction in pollution was realized under the 1998 Rule, the Steering Committee farmers modified the Rule to make it even more effective based on the results observed during that year.[133] The Steering Committee, leveraging its close connection to the farmers, was able to establish a Rule that increased accountability, essentially facilitating trade within the region.[134] The modifications to the 1998 Rule were instituted in the "Rule Enforcing Selenium Load Allocation and Establishing a Tradable Load Program for Water Year 1999."[135] The new Rule authorized the Steering Committee to levy a fine or impose restrictions on a district that surpassed discharge allocations. Sanctions were possible even if over-

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128. *See generally* Young & Karkoski, *available at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 158-59.

129. *Id.*, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, at 159.

130. *Id.*, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf.

131. *Id.*, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf.

132. Austin, *supra* note 5, at 365.

133. *See* Young & Karkoski, *available at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf, *supra* note 4, at 160.

134. *Id.*, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf.

135. *Id.*, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf.

all regional allocations were not exceeded.[136] In addition, the Rule requires districts exceeding discharge allocations to pay penalties both under the Use Agreement and under a rebate provision, establishing a fund from which group members who discharge less than their allotted amount could be compensated.[137]

The rebate system implemented under the 1999 Rule is an illustration of the benefit of having a local agency that regulates and enforces pollution limits. In theory, a market that is functioning properly would obviate the necessity for a rebate system.[138] The Steering Committee, however, was able to cater to the specific needs of the GAF and determined that rebates would temporarily assist the market in achieving the least costly solution to selenium reduction.[139] The Steering Committee took care to set the rebate amount low enough not to distort this particular market.[140] Since the Committee was local to the region, it could observe unique problems that would hinder trading and effectively resolve these matters.

Differences Among Polluters in the Marginal Cost of Reducing Pollution

District managers were unsure whether differences existed among polluters in their marginal costs of reducing pollution at the time the trading program was implemented.[141] Once the plan was in place, however, marginal cost differences were realized and trading occurred.[142] Although it is not imperative to know beforehand the exact differences in marginal costs of polluting, it is imperative that they exist for effective trading.[143]

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136. *Id.*, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf.

137. *Id.*, *at* http://environmentaldefense.org/documents/654_FarmPollution_WaterPolicy.pdf; *see also* Austin, *supra* note 5, at 361.

138. Austin, *supra* note 5, at 361.

139. *See id.*

140. *Id.*

141. *Id.*

142. Austin, *supra* note 5, at 390.

143. *Id.*

V. CONCLUSION

Nonpoint source water pollution poses a serious threat to our environment and has recently received much attention from policy makers. Voluntary Best Management Practices have proven to be ineffective in reducing such pollution. The EPA, deriving its authority from the Clean Water Act, has started taking stronger action against nonpoint source polluters by establishing total maximum daily loads for locations that do not currently meet water quality standards.

The market trading of emissions allocations has been offered as an alternative to traditional command and control regulation of nonpoint source pollution. Experience has shown that such a market-based approach to pollution reduction can effectively reduce nonpoint source pollution, and may do so economically. Economic pollution reduction may be achieved through the premise that trading programs provide polluters with an incentive to meet their optimum level of pollution.

A tradable emissions program requires a functioning market where there are incentives and benefits to trade. Five conditions that are necessary to establish such a market within a particular region are: 1) an incentive for polluters within the region to meet water quality standards; 2) a locally controlled agency that regulates polluters and enforces pollution limits; 3) a cap on the amount of discharge that will be allowed; 4) a measurement system that monitors polluters; and 5) the likelihood that differences exist among individual polluters in the marginal cost of reducing pollution. Satisfying these conditions may pose a problem in designing an emissions trading program. Where these criteria can be met, as they have been in the Selenium Load Trading Program of the San Joaquin Grassland Drainage Area, a trading program that effectively and economically reduces nonpoint source pollution should result.