THE TMDL PROGRAM: LAND USE AND OTHER IMPLICATIONS

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I. INTRODUCTION

Over the past twenty-five years, the United States has made "tremendous strides in cleaning up its rivers, lakes, and coastal waters."[1] At one time Oregon's Willamette River experienced a loss of salmon and was also declared off-limits to recreation; Boston Harbor was called "America's dirtiest harbor;" the Androscoggin River in Maine was said to be "too thick to paddle and too thin to plow;" the Connecticut River was thought of as "the best-landscaped sewer in the country;" a stench rose from Lake Erie; and the Cuyahoga River in Cleveland was "so polluted it burst into flames."[2]

Today, these and many other bodies of water are well on their way to recovery and people are increasingly using the nation's waters for fishing, swimming and other forms of recreation.[3]

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1. EPA & USDA, CLEAN WATER ACTION PLAN: RESTORING AND PROTECTING AMERICA'S WATERS, at i (Feb. 1998), *available at* http://www.cleanwater.gov/action/cwap.pdf. *See also* Clean Water Act, Clean Water Action Plan, 63 Fed. Reg. 14,109, 14,109 (Mar. 24, 1998).

2. EPA & USDA, *supra* note 1, at i, *available at* http://www.cleanwater.gov/action/cwap.pdf; *see also* Clean Water Act, Clean Water Action Plan, 63 Fed. Reg. at 14,109.

3. *See* EPA & USDA, *supra* note 1, at i, *available at* http://www.cleanwater.gov/action/cwap.pdf; *see also* Clean Water Act, Clean Water Action Plan, 63 Fed.

The positive strides that the United States has made in the battle against water pollution are directly attributable to our success in controlling "point source" pollution.[4] As the term suggests, point source pollution comes from a single point of origin and is introduced into a body of water from a discernible and discrete outlet, such as a pipe.[5] Factories and city sewers are two common point source polluters.[6]

Effective control of point source pollution began with passage of the Clean Water Act[7] and its primary regulatory mechanism, the National Pollutant Discharge Elimination System ("NPDES").[8] The NPDES program is an effluent limitation-based regulatory regime for point source pollution that restricts discharges to a technology-based standard.[9] Under NPDES, discharges of effluents are allowed only if they are in compliance with national limitations, and only by first obtaining a permit to discharge within those limits.[10] Permits are issued by the federal government or by states if the state has an Environmental Protection Agency ("EPA") approved plan, with limitations no less strict than the national standards.[11] The NPDES program has shown great promise as a regulatory tool. In fact, "[b]y any measure, the technology approach [to point source pollution] has produced significant results. Industrial pollution has plummeted [and] municipal loadings have dropped, despite the doubling and more of the populations they serve."[12]

Overall, our success in cleaning up pollution from point sources, has not been matched by efforts to curb "nonpoint source" pollution.[13] Nonpoint source pollution includes runoff from sources such as agriculture, construction, and urban areas, as well as forestry, ranching, and mining operations.[14] In contrast to point source

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Reg. at 14,109.

4. *See* EPA & USDA, *supra* note 1, at 11, *available at* http://www.cleanwater.gov/action/cwap.pdf.

5. The Clean Water Act defines the term "point source" as "[A]ny discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture." 33 U.S.C. § 1362(14) (1994).

6. *See* EPA & USDA, *supra* note 1, at 11, *available at* http://www.cleanwater.gov/action/cwap.pdf.

7. *See* 33 U.S.C. §§ 1251-1387 (1994). *See also* Oliver A. Houck, *TMDLs: The Resurrection of Water Quality Standards-Based Regulation Under the Clean Water Act*, 27 ENVTL. L REP. (Envtl. L. Inst.) 10,329, 10,329 (1997) [hereinafter Houck, *TMDLs*].

8. *See* 33 U.S.C. § 1342 (1994).

9. *See id*.

10. *See id.*

11. *See id.*

12. Houck, *TMDLs*, *supra* note 7, at 10,329-30.

13. *See id*.

14. The Clean Water Act does not define the term "nonpoint source." It is generally acknowledged to include any source that cannot be defined as a "point source." *See* Houck, *TMDLs*, *supra* note 7, at 10,342.

pollution, nonpoint source discharges are not regulated under the Clean Water Act's NPDES permit program.[15] Issues related to nonpoint source pollution were simply not a focus of attention during the 1972 Clean Water Act debates.[16] The Act would have been structured much differently had it been a priority.[17] Congressional debate suggested that nonpoint source pollution was difficult to address and would take time and new technology to adequately control.[18] Thus, instead of being subject to regulation, nonpoint sources have traditionally been addressed through voluntary methods such as planning, public education, incentive and cost-share mechanisms, best management practices ("BMPs"), and other approaches.[19]

Unfortunately, the voluntary methods listed above have been largely ineffective. Often, the incentive to undertake voluntary measures is lacking, and positive results that may follow are sometimes seen as too remote.[20] For example, regarding use of public education as a method to combat nonpoint source pollution, one commentator has stated the following:

> It may even work where people are asked to do things that will cost little and result in perceptible short-term benefits to them as individuals. Thus, public education may indeed convince large numbers of people to wet down their campfires in order to avoid forest fire. It may even get many people to send waste to recycling centers if they are convinced that local tax rates will be held down as a result.[21]

The commentator goes on to suggest, however, that public education is less effective where an agricultural landowner is forced to make difficult decisions "perceived as leaving the landowner less competitive with surrounding neighbors."[22]

Because public education and other nonregulatory methods have fallen short, many rivers, streams, and lakes do not meet water quality standards.[23] State section 303(d) lists reveal that close to forty percent of waters surveyed are too polluted for basic uses like fishing or swimming.[24] Although the validity of these lists are

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15. *See* ZYGMUNT J.B. PLATER, ET AL., ENVIRONMENTAL LAW AND POLICY: NATURE, LAW, AND SOCIETY 835 (1992).

16. *See* Houck, *TMDLs*, *supra* note 7, at 10,337.

17. *See id.* at 10,337-38.

18. *See id.* at 10,337.

19. *See id.* at 10,342.

20. *See generally* John H. Davidson, *Ecosystem Management in the Smaller Watershed*, 2 GREAT PLAINS NAT. RESOURCES J. 68, 71 (1997) (stating that incrementalism is a problem inherent in all pollution control efforts in that it will be unsuccessful in confronting other effects).

21. *Id.* at 72.

22. *Id.*

23. *See id.* (questioning whether education will indeed prompt the public to "good works" regarding water quality standards).

24. *See* EPA & USDA, *supra* note 1, at i, *available at* http://www.cleanwater.gov/action/cwap.pdf.

questionable, they represent the best assessment information we have for our lakes, rivers and streams. The statement is often made that while pollution from factories and sewage treatment plants has been dramatically reduced, runoff from city streets, agricultural enterprises and other nonpoint sources continues to degrade the environment and puts drinking water at risk.[25] In recent years, it has become clear that both point and nonpoint sources of pollution must be addressed if our nation hopes to overcome its water quality challenges. While clearly not a cure-all, the Total Maximum Daily Load ("TMDL") program may assist in achieving the desired result.

II. THE TMDL PROGRAM

Although it may seem to some that the TMDL program burst onto the national water quality scene only a few years ago, that is far from the truth. Instead, the TMDL program was created by section 303(d) of the Clean Water Act, [26] the same piece of legislation that created the NPDES program that has been so effective in curbing point source pollution.[27] Section 303(d) and the TMDL program were included in the Act as a second-string safeguard against failure of the primary water quality improvement mechanism, the NPDES program.[28] As a result of its backup status, the TMDL program was not aggressively or broadly pursued until the late 1980s[29] and early 1990s when it became clear that the NPDES program alone could not solve the country's water quality problems.[30] At that time, a series of citizen lawsuits compelled EPA and states to focus their efforts on the TMDL program.[31] In brief, section 303(d) of the Clean Water Act requires states to 1) identify waters that are and will remain polluted after the application of technology standards (i.e., the NPDES program),[32] 2) prioritize the waters, taking into account the severity of their pollution,[33] and 3) establish total maximum daily loads for the waters at levels necessary to meet applicable water quality standards.[34]

States are also required to include a margin of safety to reflect scientific uncertainty about pollution discharges and water quality, and account for the

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25. *Id.*
26. *See* 33 U.S.C. § 1313(d) (1994).
27. *See* National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. . 2960 (Jan. 12, 2001) (to be codified at 40 C.F.R. pts. 122 & 412) [hereinafter National Pollutant Discharge Elimination].
28. *See* National Pollutant Discharge Elimination, 66 Fed. Reg. at 2960.
29. *See* WESLEY M. JARRELL, GETTING STARTED WITH TMDLS ii (YSI 1999), *available at* http://www.YSI.com/extranet/EPGKL.nst (last visited Nov. 29, 2001).
30. *See* National Pollutant Discharge Elimination, 66 Fed. Reg. at 2965.
31. *See* JARRELL, *supra* note 29, at ii, *available at* http://www.YSI.com/extranet/EPGKL.nst.
32. *See* 33 U.S.C. § 1313(d)(1)(A).
33. *See id.*
34. *See id.* § 1313(d)(1)(C).

likelihood of future growth in the area surrounding the impaired body of water.[35] States must then submit their inventories and TMDLs to EPA for approval.[36]

In regard to defining the program, a total maximum daily load is simply a calculation of the maximum amount of a pollutant that an impaired water body can receive and still meet water quality standards.[37] Accordingly, the TMDL specifies the amount of a particular pollutant that may be present in the impaired water body, allocates allowable pollutant loads among sources, and provides the basis for attaining and maintaining water quality standards.[38] Explained another way, in-stream levels of the pollutant are capped at an acceptable threshold.[39] Then, with the threshold level capped, the state must allocate amounts of that particular pollutant to both point and nonpoint sources in the watershed.[40] Finally, the state must institute control actions and management measures that are designed to reduce point and nonpoint source loads to the threshold level.[41]

As the above definitions demonstrate, the TMDL program is difficult to conceptualize. Thus, it may be easier for some people to think of the TMDL program as a "pollution budget." A simple example may provide further assistance in understanding how TMDLs operate.

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35. *See id.* In August 1999 EPA proposed changes to its current TMDL regulations. *See* Proposed Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revision to the Water Quality Planning and Management Regulation, 64 Fed. Reg. 46,012 (Aug. 23, 1999) (to be codified at 40 C.F.R. pt. 130) [hereinafter Proposed Revisions to the Water Quality Planning]. In comments accompanying the proposed regulations, EPA stated that "[E]xisting regulations define . . . a TMDL as the sum of the individual waste load allocations for existing and future point sources and the load allocations for existing and future nonpoint sources and for natural background." Proposed Revisions to the Water Quality Planning, 64 Fed. Reg. at 46,030. EPA has since issued its final TMDL regulations, which are expected to become effective October 1, 2001. *See* Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revision to the Water Quality Planning and Management Regulation, 65 Fed. Reg. at 43,586 (July 13, 2000) (to be codified at 40 C.F.R. pts. 9, 122, 123, 124, 130) [hereinafter Revisions to the Water Quality Planning]. Section 130.32(b)(10) states that a TMDL *must include* an "[a]llowance for reasonably foreseeable increases in pollutant loads including future growth." Revisions to the Water Quality Planning, 65 Fed. Reg. at 43,668. In the preamble to the final regulations, however, EPA tempers its position by stating that, "[I]f a State, Territory, or authorized Tribe does not anticipate increased loadings in a TMDL, it may satisfy this element by indicating it does not expect there to be such increases and providing a brief explanation why." Revisions to the Water Quality Planning, 65 Fed. Reg. 43,624. Thus, states will be required to at least factor future growth into their TMDL analysis. The decision whether to include an allowance for future growth, however, appears to be left to the discretion of each state. How states decide to handle the future growth issue remains to be seen.

36. *See* 33 U.S.C. § 1313(d)(1)(D)(2).

37. *See* Revisions to the Water Quality Planning, 65 Fed. Reg. at 43,667.

38. *See* Revisions to the Water Quality Planning, 65 Fed. Reg. at 43,662.

39. *See* EPA & USDA, *supra* note 1, at 1-2, *available at* http://www.cleanwater.gov/action/cwap.pdf.

40. *See id.*, *available at* http://www.cleanwater.gov/action/cwap.pdf.

41. *See* Revisions to the Water Quality Planning, 65 Fed. Reg. at 43,663.

Imagine that a state has determined a body of water is being impaired by "pollutant X." The state must then "cap" pollutant X at an amount that will allow the body of water to meet water quality standards. In our example, let us assume the state decides that capping pollutant X at 100 "units of pollution" will allow water quality standards to be met. Let us also assume that the following point and nonpoint sources are responsible for discharging pollutant X into the water body:

- A municipal waste water treatment plant that discharges 20 units of pollutant X directly into the water body
- A group of animal feeding operations where runoff of pollutant X from waste application fields enters the water body at an amount equaling 20 units
- A factory that discharges 20 units of pollutant X directly into the water body
- A group of farms where runoff of pollutant X from crop fields enters the water body at an amount equaling 20 units
- A number of other small point and nonpoint sources that discharge pollutant X, either directly or via runoff, into the water body at an amount equaling 40 units

In the example, the state has determined that 100 units of pollutant X will allow the water body to meet water quality standards, yet the amount of pollutant X currently entering the body of water is 120 units. The state must then proceed with the difficult task of deciding how to allocate units of pollutant X among the sources, so that no more than 100 units enter the water body.

Complicating this already difficult task is the requirement that the state include a margin of safety to reflect scientific uncertainty about pollution discharges and water quality.[42] For example, the state cannot be completely sure that twenty units of pollutant X are entering the water body as a result of runoff from the animal feeding operations. Surface runoff is difficult to measure for a number of reasons.[43] First, runoff is diffuse and can originate from many sources such as farms, driveways, rooftops, parking lots, etc.[44] Second, the primary surface runoff pollutants,

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42. *See* Revisions to the Water Quality Planning. 65 Fed. Reg. at 43,668.

43. *See* Ebere Akobundu and David W. Riggs, *Pervasive Permitting: The EPA's Proposed TMDL Rules*, Water Resources IMPACT (Int'l Ground-Water Modeling Ctr., Goldern, C.O.), May 2000, at 4, 5.

44. *See id.*

phosphorus and nitrogen, occur naturally in the environment.[45] Without sufficient monitoring, it is difficult to determine whether these pollutants are coming from a farm or from natural background sources.[46] Oliver Houck, a leading authority on the TMDL program, has stated:

> Pollution control systems based on [water quality] standards have always relied more on science than science can deliver. They are looking for numbers, thresholds, and fixed limits. They require proof of causes and effects that, arguably, come from other causes and have other effects, and pinning the tail on the right donkey has plagued air, water, and toxics programs from their inception. [47]

After including the scientific uncertainty margin of safety, the state may decide it only has ninety units of pollutant X to divide among current sources.

The requirement that the state also account for the likelihood of future growth complicates matters even further.[48] The future growth allowance is a pollutant load that is counted toward the target pollutant level but, rather than being allocated to an existing source, is set aside for future growth.[49] In other words, it provides a reserve pollutant load to be apportioned among new or expanding facilities in the watershed. After factoring in future growth, the state may ultimately decide it has only eighty units of pollutant X to divide among sources that are currently discharging 120 units. As this simple example demonstrates, where the TMDL program is concerned, new and difficult decisions must be made.

III. THE TMDL PROGRAM AND ITS RELATION TO LAND USE

The TMDL program represents a significant shift in the manner in which water quality objectives are achieved.[50] As the example indicates, the TMDL process is a holistic watershed approach.[51] TMDLs must identify both point and nonpoint sources that contribute to a water body's impairment and seek reductions to assure that pollutant levels entering the water body stay below the target level.[52] Thus,

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45. *See id.*

46. *See id.*

47. Oliver A. Houck, *TMDLs IV: The Final Frontier*, 29 Envtl. L. Rep. (Envtl. L. Rep.) 10,469, 10,474-10,475 (Aug. 1999) [hereinafter Houck, *The Final Frontier*].

48. *See id.* at 10,471-73.

49. *See id.* at 10,475.

50. *See* EPA & USDA, *supra* note 1, at i-iii, *available at* http://www.cleanwater.gov/action/cwap.pdf.

51. *See id.* at iii, *available at* http://www.cleanwater.gov/action/cwap.pdf.

52. *See* Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revision to the Water Quality Planning and Management Regulation, 65 Fed. Reg. 43,586, 43,667-8 (July 13, 2000) (to be

instead of simply monitoring discharges from discrete, identifiable pollution sources such as factories, water quality programs will be increasingly focused on in-stream water quality and ambient water quality standards.[53] This distinction is an important one because nonpoint source pollution can be primarily attributed to the manner in which land is used and managed.[54] TMDLs, therefore, raise the specter of at least limited federal involvement in private land use, and the strong possibility of more assertive state and local involvement.[55]

As indicated above, the nation's problems with nonpoint source pollution are essentially an outgrowth of land-use decisions—for example, the manner in which animal waste is applied to an application field by a dairy farmer; the manner in which soil is managed on a new construction site in an urban area; or the manner in which a clear-cut operation is conducted by a logger. Some land-use decisions have only minor water quality consequences.[56] However, with the introduction of new technologies and man's more intense use of the landscape, water quality impacts are more frequently observed. As a result, new water quality control measures, including the TMDL program, are more likely to have land-use consequences.

The distinction between environmental regulation and land use regulation is often difficult to discern.[57] In this regard, the United States Supreme Court stated, "[t]he line between environmental regulation and land-use planning will not always be bright . . . ."[58] While the line may not be bright, individuals' reactions to environmental regulation and land use regulation are easily distinguishable. Consequently, it has been stated that:

> Although there may be no clear logical or legal distinction between land-use regulation and environmental control, there certainly is a palpable political distinction between the two. The American public reacts in radically different ways to legal controls addressing one or the other. Poll after poll indicates that most people will accept painful sacrifices in the name of environmental protection while they passionately resist added restrictions on the use of their land. Apparently many Americans do not perceive as inevitable the linkage of environmental protection and land-use regulation.[59]

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codified at 40 C.F.R. pts. 9, 122, 124, 130).

53. *See* EPA & USDA, *supra* note 1, at iii, *available at* http://www.cleanwater.gov/action/cwap.pdf.

54. *See* Davidson, *supra* note 20, at 71.

55. *See* Revisions to the Water Quality Planning, 65 Fed. Reg. at 43,586.

56. *See* Davidson, *supra* note 20, at 71-72.

57. *See* PLATER ET AL., *supra* note 15, at 947.

58. Cal. Coastal Comm'n v. Granite Rock Co., 480 U.S. 572, 587 (1987).

59. PLATER, ET AL., *supra* note 15, at 947.

One possible explanation for our vehement opposition to land-use regulation is that Americans, as a culture, have for many years "strongly linked land ownership with individual personal freedom—especially freedom from the exactions of government."[60] Another commentator has stated:

> Even in urban America large numbers of people who own no land still wear psychologically the coonskin caps of land hungry pioneers and the rose-tinted glasses of speculators. This early American attitude toward land, this cultural baggage from the past, continues to dominate popular thinking on the rights and obligations of land ownership.[61]

Despite American opposition to land-use regulations, a quick look around us reveals that we are already living with such regulations. Zoning laws represent the most well known form of land-use regulation and affect most of us in some way or another almost every day. Although zoning typically does not evoke strong opposition, at one time zoning regulations were routinely struck down by the courts.[62] All of that changed with the 1926 United States Supreme Court decision in *Village of Euclid v. Ambler Realty Company*.[63] In upholding the Village of Euclid's zoning regulations, the Supreme Court explained its reasoning as follows:

> Until recent years, urban life was comparatively simple; but with the great increase and concentration of population, problems have developed, and constantly are developing, which require, and will continue to require, additional restrictions in respect of the use and occupation of private lands in urban communities. Regulations, the wisdom, necessity and validity of which, as applied to existing conditions, are so apparent that they are now uniformly sustained, a century ago, or even half a century ago, probably would have been rejected as arbitrary and oppressive. Such regulations are sustained, under the complex conditions of our day, for reasons analogous to those which justify traffic regulations, which, before the advent of automobiles and rapid transit street railways, would have been condemned as fatally arbitrary and unreasonable. And in this there is no inconsistency, for while the meaning of constitutional guaranties never varies, the scope of their application must expand or contract to

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60. Lynton Keith Caldwell, *Land and the Law: Problems in Legal Philosophy*, 1986 U. ILL. L. REV. 319, 320.

61. *Id.*

62. *See generally* Vill. of Euclid v. Ambler Realty Co., 272 U.S. 365, 390-91 (1926) (discussing lower court decisions in which zoning was struck down).

63. *See id.* at 365.

> meet the new and different conditions which are constantly coming within the field of their operation.[64]

What the Court said nearly three-quarters of a century ago is just as true today. Our population has exploded, problems have developed, and life in general is substantially more complex than it was in 1926. For example, in regard to the environment, although "the number of U.S. livestock and poultry operations is declining due to ongoing consolidation in the animal production industry . . . larger, more industrialized, highly specialized operations account for a greater share of all animal production."[65] It has further been stated, "[t]his has the effect of concentrating more animals, and thus more manure and wastewater, in a single location, thereby raising the potential for significant environmental" damage.[66] Where agriculture is concerned, the challenge lies in harmonizing clean water issues with an entrepreneurial spirit that drives food production activities in a country that daily is called upon to feed more of the world.[67]

In 1926, the United States found a land-use solution to its growth problems in the form of zoning.[68] Today, it appears that the TMDL program may provide a land-use solution to the problem of nonpoint source pollution. Production agriculture should take steps to provide leadership at the state and national level to cope with new water quality concerns, while at the same time blunting the efforts of government to directly regulate privately held agricultural lands. New programs can be developed that provide predictable and acceptable solutions while keeping government regulatory programs one step removed from agricultural operations.

IV. LAND USE AND OTHER IMPLICATIONS

The previous section, which described the TMDL program and its relation to land use, touched briefly upon land-use implications. As indicated above, the TMDL program is a holistic watershed approach, addressing both point and nonpoint sources of pollution.[69] A decision to control runoff pollution is a decision to address the manner in which land is used and managed.[70]

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64. *Id.* at 386-87.

65. National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, 66 Fed. Reg. 2960, 2974 (Jan. 12, 2001) (to be codified at 40 C.F.R. pts. 122, 412).

66. National Pollutant Discharge Elimination System, 66 Fed. Reg. at 2974.

67. *See* National Pollutant Discharge Elimination System, 66 Fed. Reg. at 2974.

68. *See generally Euclid*, 272 U.S. at 365 (deciding that a village zoning ordinance is a valid exercise of authority and therefore constitutional).

69. *See* JARRELL, *supra* note 29, at 1, *available at* www.YSI.com/extranet/EPGKL.nst (last visited Nov. 29, 2001).

70. *See id.* at 46-7, *available at* www.YSI.com/extranet/EPGKL.nst.

Under the TMDL program, identification of pollutants and allocation of loads does not signal an end to the process.[71] In our earlier example, in order for the TMDL to be effective, sources of pollutant X will be required to reduce their current loads. For the point sources, reductions may involve installation of equipment that makes use of newer and better technology.[72] For the nonpoint sources, measures to reduce loads will likely come in the form of best management practices ("BMPs") that are designed to control pollution from runoff.[73] Examples of BMPs include erosion control from urban developments, agriculture and forestry sites; fertilizer and animal waste management on farms; riparian zone installation on agricultural land, rangelands and forested lands; and runoff management in urban systems.[74]

Another simple example may help to provide some insight into potential land-use implications of TMDLs. Our earlier example included a group of animal feeding operations ("AFOs") where runoff of pollutant X from waste application fields entered the water body at an amount equaling twenty units. Assume the state has implemented a TMDL and determined that the AFOs must reduce their load to fifteen units. In accordance with this new allocation, a series of BMPs are mandated, one of which adjusts that portion of each AFO's comprehensive nutrient management plan ("CNMP") dealing with crop rotation on waste application fields. It is determined that the optimum cropping system to achieve profitability while removing excess nutrients from the soil is a rotation of soybeans followed by corn. The AFO operators plant and harvest soybeans according to their CNMPs. But as they prepare to plant corn, the bottom suddenly falls out of the corn market. The price drops low enough that projected profitability cannot be achieved, putting the producers in a position that they cannot make mortgage payments. To maintain profits, the farmers have no choice but to plant another rotation of soybeans. In order for a soybean crop to be successful however, the state's climate requires that it be planted within the next three months.

In this hypothetical situation, what options are available to the AFO operators? Do they ignore their TMDL mandated CNMPs and plant soybeans, risking possible fines or other sanctions? Do they blindly abide by their CNMPs and plant corn, perhaps facing the need to refinance? Or do they go to the state and request that their CNMPs be adjusted in light of current market conditions? If they choose the last option, how likely is it that the state will adjust the CNMPs within the three-month planting window? Given the pace at which the government generally operates, there is a minimal probability that the CNMPs can be successfully modified. It is possible that answers to these and other questions will vary from jurisdiction to jurisdiction, and TMDL to TMDL. One thing is certain, however; flexibility must be built into the TMDL administrative process, and individuals affected by the TMDL must be

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71. *See id.* at 39, *available at* www.YSI.com/extranet/EPGKL.nst.
72. *See id.* at 36, *available at* www.YSI.com/extranet/EPGKL.nst.
73. *See id.* at iv, *available at* www.YSI.com/extranet/EPGKL.nst.
74. *Id.* at 46-7, *available at* www.YSI.com/extranet/EPGKL.nst (last visited Nov. 29, 2001).

provided access to the program's administrators in order for their concerns to be addressed.

In addition to the land-use implications discussed above, the TMDL program raises another implication that is potentially more important, the impact on future economic growth. It was mentioned earlier that the state, in its TMDL calculations, must include an allowance for scientific uncertainty and it must account for future growth. Where the future growth allowance is concerned, it is not difficult to envision possible economic implications and ultimately, the potential to inhibit rather than promote future growth.

In the first example, 120 units of pollutant X were being discharged into the water body. The state determined that a maximum discharge of 100 units was needed in order to satisfy water quality standards. The state also included a ten-unit allowance for scientific uncertainty and a ten-unit allowance for future growth. How the ten-unit future growth allowance is divided raises some difficult questions. For example, what if the factory that is currently discharging twenty units of pollutant X decides to expand, and will need an additional allocation of five units to do so? Will the expansion be allowed or is the factory already receiving its fair share? Perhaps a large animal feeding operation opens in the watershed and will need all ten units of the allowance in order to operate. Will the new AFO be entitled to the entire future growth allocation? Will the allowance be distributed on a first-come, first-served basis or, alternatively, will it be auctioned to the highest bidder? If the new AFO is given all ten units, the future growth allowance will be exhausted. In that event, will sources currently discharging in the watershed be required to cut back in order to free up more units? If so, who cuts back and by what amount? Will everyone be required to cut back in proportion to his or her discharge, or will the largest polluters be required to bear more of the burden? Will polluters that have already cut back once be called upon to cut back again? Will polluters simply be allowed to continue discharging at their current levels, thus signaling an end to future growth in the region? Will property owners in the watershed that are not currently discharging pollutant X be factored into the analysis? Will failure to do so deprive them of an important property right? Responding to these questions will, in the end, require difficult and potentially painful decision-making.

In addition to the land-use and economic implications described above, the TMDL program, in general, raises a number of other important questions and considerations, including the following:

- Once load allocations have been decided upon and the TMDL is implemented, who will be responsible for follow-up administration of the program, and how will success, both programmatic and environmental, be measured? TMDLs must be developed with a great deal of flexibility, therefore, traditional state top-down programs may not be appropriate.

- After the TMDL is implemented, who will be responsible for deciding how to allocate the future growth allowance? Urban centers will control political decisions. In addition, if future growth allocations are put out for bid, agricultural producers cannot compete with the municipal and industrial sectors, at least in the short term.

- Not all pollutant loads are "created equal." Temporal and spatial complexities make pollutant loads difficult to "define," which, in turn, makes effluent trading scenarios difficult to develop and manage.

- How will government ensure compliance with TMDL programs? Will government inspectors be out in privately owned fields making sure BMPs are being implemented, or that animal waste is being applied properly? And what will be done with individuals and entities deemed to be in violation of TMDL mandates? Will they be subject to fines and other sanctions, or something less penal? New programs that feature a combination of farmer friendly and regulatory programs may be an attractive alternative.

V. CONCLUSION

The Clean Water Act could arguably "lay claim to being the most successful" piece of environmental legislation ever.[75] As Oliver Houck states

> Since its enactment in 1972, industrial discharges to the nation's waters are precipitously down; rates of wetland loss have slowed and in some regions even reversed; and municipal loadings, the subject of nearly $128 billion in public funding for treatment works, have dropped by nearly 50 percent while their populations served have doubled.[76]

Houck goes on to state that, although the Act is

> [o]ft-criticized for its "impossible" goals (e.g., zero discharge), "unrealistic" deadlines and "command-and-control" mechanisms, the ineludible fact is that the Act's fixed deadlines, technology standards, permits, and enforcement mechanisms have stimulated measurable compliance, new and improved technologies, source reduction, waste

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75. Houck, *The Final Frontier*, *supra* note 47, at 10,469.
76. *Id.*

> recycling, and a growing number of voluntary, quasi-voluntary, and alternative abatement schemes.[77]

Although the Clean Water Act has proven successful in controlling point source pollution, the challenge now lies in developing new programs for water quality issues left unaddressed by the Act. Section 303(d) and the TMDL program indicate that policy makers were aware of polluted runoff issues.[78] Elected officials were also aware that nonpoint source problems were incredibly complex and packed with emotion.[79] Today, polluted runoff issues have finally matured. This comes at a time when rural America no longer controls Congress and unprecedented economic growth and prosperity reign.[80] As a result, the urban/suburban constituency can look beyond economic considerations and focus on such issues as clean water and leisure time activities.

As EPA, environmental groups, and others wait for agricultural water quality issues to fully mature and significant problems to materialize, production agriculture should consider leading an effort to develop water quality programs that are tailored to its unique needs. The industry can take this opportunity to put in place programs that take a common sense approach, or it can let others lead and hope to strike a compromise that produces acceptable programs.

Solutions to nonpoint source problems rest squarely on the manner in which land is used and managed.[81] TMDLs represent one of the first government environmental programs to examine land-use management issues on privately held agricultural lands and, as a result, they are likely to be costly. The TMDL program is also unforgiving because it is based upon the premise that numbers do not lie—if water quality standards are not being met, for example, relevant data should reveal the impairment.[82] Thus, agricultural interests must insist that TMDLs rely on sound science and water quality monitoring data. Agricultural interests should also insist that TMDLs and any future programs maintain the competitiveness of the industry and keep privately held agricultural lands one step removed from direct government regulation.

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77. *Id.*

78. *See id.* at 10,473.

79. *See* Houck, *TMDLs*, *supra* note 7, at 10,332-35.

80. *See* Oliver A. Houck, *TMDLs, Are We There Yet?: The Long Road Toward Water Quality-Based Regulation Under the Clean Water Act*, 27 Envtl. L. Rep. (Envtl. L. Inst.) 10,391, 10,401 (Aug. 1997).

81. *See id.* at 10,391, 10,399-401.

82. *See* Revisions to the Water Quality Planning and Management Regulation and Revisions to the National Pollutant Discharge Elimination System Program in Support of Revision to the Water Quality Planning and Management Regulation, 65 Fed. Reg. 43,586, 43,667 (July 13, 2000) (to be codified at 40 C.F.R. pt. 130) (describing TMDL which specifies the amount of a pollutant that an impaired body of water can receive and still meet quality standards).