Maryland's TMDL Program – Offering More Problems than Solutions?

A Brief Policy Analysis

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I. Introduction

Although a variety of federal and state water quality programs have been in place in Maryland for many years, the Maryland section of the Chesapeake Bay watershed continues to suffer from poor water quality. Unfortunately, the latest water quality improvement mechanism, the state's Total Maximum Daily Load (TMDL) Program, may also be an inadequate policy option. Since its inception as Section 303 (d) of the 1972 Clean Water Act (CWA), the TMDL Program has had more than its share of design and implementation problems.

Home to more than 1.5 million people, the Bay receives nutrient and toxic pollution from the 64,000 square-mile watershed that drains parts of New York, Pennsylvania, West Virginia, Delaware, Maryland and Virginia and the District of Columbia. The Chesapeake Bay Program, which is a regional partnership, reports that while the nitrogen, phosphorous and sediment levels have declined in the non-tidal rivers of the Bay**,** nearly all tidal tributaries were rated as poor or fair. [1] Maryland's Eastern and Westerns Shore tributaries and the Potomac River still suffer from high nitrogen and phosphorous concentrations while water clarity in the mainstem of the Bay was rated as getting worse due to increased runoff from expanding agricultural and urban areas. According to one environmental organization, the Chesapeake Bay Foundation (CBF), on a scale of 0 to 100, the Bay's health for 2000 rates a 28 with no improvement from 1999. [2]

Though the Bay remains polluted, Maryland has made significant improvements over the years with the implementation of the Clean Water Act's technology-based program, the National Pollutant Discharge Elimination System (NPDES). However, this technology approach without regard to water quality standards has been insufficient from keeping the Chesapeake Bay from being included on the Environmental Protection Agency's (EPA) List of Impaired Waters. Though the NPDES program has made a great impact on cleaning up the bay, nutrient pollution from nonpoint sources (NPS) such as agriculture and storm sewer overflows overwhelm that success and continues to keep the Bay polluted. In response, Maryland has renewed its regional voluntary partnership, the *Chesapeake Bay Agreement* four times in an attempt to solve the Bay's problems via the voluntary Chesapeake Bay Program. Additionally,

Maryland has passed the *Water Quality Improvement Act* (WQIA) in 1998 to address nutrient pollution via implementation of voluntary farm nutrient management plans.

However, because the Bay Program and the WQIA are voluntary mechanisms, they lack an effective means for monitoring and ensuring compliance. Thus, these Programs may not be able to get the Bay and its tidal tributaries clean enough to be removed from the impaired waters list. Should these programs fail to do so, Maryland will be forced to return their authority to run the federal NPDES and TMDL programs to the EPA. [3]

Although all environmental statutes and their implementing programs experience problems and controversies, both the federal and Maryland's TMDL programs have had more than their fair share. Because of this, it is questionable whether the TMDL program, as it currently stands with numerous design and implementation problems, will be any more effective than the existing programs at cleaning up Maryland's section of the Chesapeake Bay and it's tidal tributaries. The TMDLs still hold promise, however, because they were intended to be a far-reaching, highly integrative, regulatory solution of last resort that would close all the remaining loopholes preventing waters from meeting their water quality standards. If Maryland can reform its TMDL program to fulfill it's intended potential, the Bay and its tributaries may have a chance yet.

This paper will provide a brief history and overview of the purpose of the federal TMDL program, as well as, an overview of Maryland's three-year old TMDL Program. Several design and implementation problems will be discussed, as will the shortcomings of existing state voluntary programs. Finally, in light of the ideal solutions that a TMDL program might be able to provide, a series of recommendations will be provided that could lead to meaningful clean-up of the Chesapeake Bay and removal of the Bay from the list of impaired waters.

II. Brief history and purpose of the federal TMDL program

The problem with TMDLs began at the "drawing board" when they were created as Section 303 (d) of the 1972 Clean Water Act. After relying on a state-controlled system of water-quality standards for

nearly thirty years, the nation's waterbodies were so polluted that the Senate felt it could no longer trust the states to clean up the nation's waters and thus designed the CWA to focus primarily on technology based standards. [4] Various industrial classes would be assigned National Pollution Elimination Discharge System (NPDES) permits based on technology standards and municipalities would be provided federal funding to construct wastewater facilities that would treat sewer before discharging to a waterbody.

The principal author of the Senate bill and Chair of the Public Works Committee, Senator Edmund Muskie (D-ME) thought that it would be politically impossible to pass a bill based only on federal control and technology standards. Thus, he and members of the Senate compromised with the members of the House and produced the state-focused, water quality-based, total maximum daily load program. The TMDL program would be called upon only if the technology-based program failed to clean up waterbodies sufficiently to meet water quality standards. Congress believed these two approaches would be successful enough to achieve a "fishable and swimmable goal" by 1983 and a "zero-discharge goal" by 1985. [a] Politically, however, the TMDL program was tainted from the start as Senator Muskie is alleged to have told an EPA official that when it came to allocation of resources, that the technology program should dominate EPA's efforts and to "assign secondary priority" to Section 303 (d). [5]

In 1982, ten years after the initiation of the federally controlled technology-based water pollution program, an age of New Federalism swept over the political arena and states and EPA began questioning whether the continued development of effluent guidelines "without respect to receiving water quality (was) the wisest course. [6] There was growing concern that though the technological solution did make some advances into improved water quality, that many waterbodies still were not meeting the states' water quality standards. In response to a scathing 1989 US Government Accounting Office (GAO) Report

[a] So sure was the Congress that the technology-based program and then the back-up water-quality based TMDL Program would be sufficient to reduce water pollution that an "interim national goal for water quality" was set to ensure that all water was clean enough for swimming and fishing (referred to as the "swimmable and fishable" goals) by 1983; just 11 years after the 1972 Act. And, if that wasn't challenging enough, a "national goal of eliminating the discharge of pollutants into navigable waters" (known as the "zero-discharge goal) was set to be achieved by 1985, just two years later. However, nearly 30 years later, with both the technology-based program and some TMDL water-quality-based programs in place, the nation is modestly closer to the "fishable and swimmable goal" set in the 1972 but no longer even mentions the naïve "zero discharge goal."

that criticized EPA and its regional offices for not ensuring more state compliance with Section 303 (d), the Region X Chief gave hope to the environmental community that TMDLs were the solution to the nation's heavily polluted waters. Despite being the most criticized Regional Office, the Region X Chief was optimistic that TMDLs were "one of the most powerful but also one of the most-under-utilized tools of the CWA." Additionally, they were one of the "most frightening" because of their reach to nonpoint sources of pollution. [7]

In effect, the New Federalism instigated the first series of citizen lawsuits against the EPA citing failure by the states to achieve water quality standards and demanding that EPA take over state authority of the states' water quality programs. Citizen and environmental groups all over the country started to recall the existence of Section 303 (d) and believed that rejuvenating the TMDL program was they way to move forward toward achieving each state's water quality standards. A flood of lawsuits in the 1980s and 1990s identified a) states that failed to identify a list of impaired waters, b) states that had not calculated any TMDLs, c) states that promulgated TMDLs so slowly that it would take hundreds of years to achieve all the TMDLs and, d) states that did not include any nonpoint source TMDLs.

To date, there have been lawsuits in 38 states. Federal Courts have ordered EPA to take over the states' NPDES and TMDL programs in ten states if these states fail to implement acceptable TMDL programs: Alaska, Arizona, California, Delaware, Georgia, New Mexico, Oregon, Pennsylvania, Virginia, and West Virginia. Additionally, five states have been forced to receive water quality standards designed by EPA: Alabama, Arizona, Idaho, Pennsylvania, and Kansas. Maryland is one of eight states that remains in litigation. [8] In Region III, to which Maryland belongs, the four other states (Delaware, Pennsylvania, West Virginia and Virginia) were forced by consent decrees to promulgate TMDLs. If the states failed to do so according to a schedule recognized in Memorandum of Understanding (MOU) documents signed by the EPA and the appropriate state authorities, the EPA agreed to "backstop" the TMDL development by establishing its own TMDLs.

III. Overview of Maryland's TMDL program

A. Overview of lawsuit that has resulted in Maryland's TMDL Program

The non-government groups, the Sierra Club and the American Littoral Society represented by the Mid-Atlantic Environmental Law Center filed suit against the Environmental Protection Agency on November 13, 1997. Barely a year later, the Chesapeake Bay Foundation represented by EarthJustice Legal Defense Fund filed a second lawsuit in 1998 which was consolidated into the 1997 action. The three environmental groups [herein referred to as "the Plaintiffs"] sought an order vacating EPA's approval of Maryland's 1996 303(d) list, requiring EPA to: a) identify all impaired waters in Maryland, b) establish TMDLs for all such waters, and c) implement such TMDLs through the National Pollutant Discharge Elimination System (NPDES) permitting program. Because the Clean Water Act only allows the public to sue the EPA, the plaintiffs were not able to sue directly the Maryland Department of the Environment (MDE), the state water quality agency responsible for developing the TMDL program.

In anticipation that the TMDL compliance burden would fall on their members' shoulders, the Maryland Association for Municipal Wastewater Agencies (MAMWA) filed a Motion to Intervene in August 1999 to dismiss the claims by the Plaintiffs. The U.S. District Court Judge, William Nickerson, on September 13, 2000 ruled in part in favor and in part against the Intervenor's Motion to Dismiss and two items are still pending before the Court. [9] According to Jim Stuhltrager, attorney representing the Sierra Club, Judge Nickerson may be waiting until the Final Federal TMDL Rules are promulgated before he makes his final ruling on the case. [10] Given that Congress placed a moratorium from July 2000 to October 2001 on the Final TMDL Rules and that the Bush Administration may continue this moratorium, it is uncertain as to when the lawsuit might conclude.

Although the Judge's ruling essentially dismisses the Plaintiffs request to have EPA take over MDE's TMDL and NPDES programs, the lawsuit instigated MDE to enter into a 10-year MOU with EPA under which MDE will promulgate TMDLs, at least, until 2008. As soon as the lawsuit is settled, the next round of activities for the Plaintiffs will be to challenge individual TMDLs, to consider changing state

law to make nonpoint source TMDLs enforceable, and to organize educational campaigns to gain public support for the TMDL program.[11]

As most lawsuits provoke clandestine activities, there are two prime examples of the tense, if not adversarial atmosphere between the Plaintiffs, MDE, EPA and MAMWA. In their effort to gather evidence that the state was slow in complying with the Clean Water Act, the Plaintiffs had to wait three years before MDE released nearly 1,000 pages of documents. [12] The Plaintiffs filed a lawsuit in September, 2000 to obtain a copy of a report that MDE allegedly briefly showed one of its representatives three years ago that stated MDE needed to do "quick and dirty" plans to satisfy the EPA. [13] After an MDE official ignored an administrative law judge's order to release the documents, it took an appeal to Governor Glendening who ordered MDE to release all the documents before they finally did so.

The second example of the adversarial atmosphere between the lawsuit parties is the fact that MDE and EPA failed to disclose their signing of a Memorandum of Understanding (MOU) to the Plaintiffs or MAMWA. In November 1998, the State of Maryland and EPA Region III entered into a MOU regarding Sections 303 (d) of the Clean Water Act. [14] The Plaintiffs refer to the MOU as "a secret agreement" [15] that is to blame for the poor quality of Maryland's TMDLs. To the Plaintiffs, Maryland only promulgates "quick and dirty" TMDLs to comply with the MOU to demonstrate to the U.S. District Court Judge that MDE is making "progress."

B. The Basics: An outline of the TMDL Process and the essentials of a TMDL Plan

When originally created by the 1972 Federal Water Pollution Control Act (now called the Clean Water Act or CWA), the federal TMDL Program was designed as a "back-up plan" and officially relegated to play second fiddle to the prescriptive, NPDES, technology-based standards program that legislators believed would finally clean-up the nation's waterbodies.

Should a waterbody fail to meet the state's water quality standards even after different Best Available and Best Practicable Control Technology (BAT, BPT) was applied to industrial and municipal point sources of pollution, the state was to implement a TMDL Program. Section 303 (d) of the CWA

outlines the provisions for the TMDL Program with a checklist of activities for each state to implement, including:

a) identifying a list of waterbodies that fail the state's water quality standards for applicable pollutants,
b) prioritizing waterbodies on that list,
c) calculating the total maximum daily load of a type of pollutant that the waterbody could endure without exceeding the water quality standards, and
d) dividing that maximum daily load among the pollution sources discharging to the water body.

An actual TMDL can be explained with this simple formula: TMDL = WLA + LA + MS + FA. In short, the total maximum daily load is the sum of the waste load allocations (WLA) for point sources of pollution, the load allocations (LA) for nonpoint sources, a margin of safety (MS) to account for seasonal fluctuations and modeling errors and future allocations (FA) to account for discharges from future sources of pollution. In the case of point sources that are assigned a WLA, when their NPDES permit expires after 5 years, the permit is to be recalculated to reflect the new waste load allocation. As for nonpoint sources, their assigned load allocation should be implemented through existing state "best management practices" that provide the state with a "reasonable assurance" of compliance. [16]

Key to understanding the TMDL is that it is a mass per unit time, ideally, a mass of pollutant per day (hence the total, maximum daily load) that the waterbody can assimilate without violating water quality standards. Currently in Maryland, TMDLs are written primarily for nitrogen, phosphorous, sedimentation, biological oxygen demand (BOD), and toxic chemicals.

C. Maryland's TMDL approach is sound but it's implementation, a farce

As outlined by the otherwise compromised MOU, the method for implementing TMDLs in Maryland is ideally a good one. The MOU requires MDE to establish TMDLs for all impaired waters on the 1998 303 (d) lists by 2008 via a "Watershed Cycling Strategy." The State has been divided into five large watersheds - each encompassing approximately 20% of the State. The Cycling Strategy consists of three sequential, one-year long stages: (1) monitoring, (2) modeling and TMDL development, and (3) implementation and watershed-based permitting.

Maryland anticipates that each of the three stages will take approximately one year to complete in each watershed and thus, the cycling strategy will allow for two five-year cycles. (See Figure 1) In a given year, the watershed cycling strategy concentrates approximately 80% of MDE's available resources between stage one: monitoring and stage two: TMDL development. The remaining 20% of MDE's monitoring resources are reserved for high-priority waters and immediate NPDES permitting needs.

Figure 1: MDE's Two-Cycle, 10-Year Watershed Cycling Strategy.[17]

		Watershed 1: Choptank, Lower Eastern Shore, Coastal	**Watershed 2: Upper Eastern Shore, Upper Western Shore**	**Watershed 3: Patapsco/Back, Lower Western Shore**	**Watershed 4: Patuxent River, Middle Potomac, Lower Potomac**	**Watershed 5: Upper Potomac**
CYCLE 1	Stage 1: Monitoring	1998	1999	2000	2001	2002
	Stage 2: TMDL Development	1999	2000	2001	2002	2003
CYCLE 2	Stage 1: Monitoring	2003	2004	2005	2006	2007
	Stage 2: TMDL Development	2004	2005	2006	2007	2008

Unfortunately, according to the MOU, the third stage of implementation and watershed-based permitting, lies outside the scope of the Agreement. Thus, no implementation of any of the developed TMDL plans is necessary and MDE is not required to re-issue NPDES permits based on the developed TMDL plans.

MDE should be credited with what appears to be a meaningful attempt to focus on "high priority waters." [18] The Watershed Cycling Strategies approach excludes Baltimore Harbor from the five watersheds and has assigned a special committee to develop a TMDL for the Harbor by 2005. Given the

harbor's hydrologic complexity and the large number of point sources of pollution that will scrutinize the TMDLs, it is important for the harbor to get this priority attention.

Each year on or before August 1, MDE will submit an annual work plan that identifies the watersheds that will be the focus of each of the two stages. The 10-year deadline may be extended if all the TMDLs on the list have not been established due to Maryland's inability to obtain additional funding or some other unforeseen circumstances. Otherwise, the EPA may exercise its discretion to establish the TMDL program in Maryland itself.

IV. TMDLs are not working in Maryland

As the program exists today, Maryland's TMDL program is not helping to clean up the Chesapeake Bay. Because the implementation and watershed-based permitting phase of the Watershed Cycling Strategy lies outside the expectations of the Memorandum of Understanding with EPA, MDE is under no obligation to do anything with the TMDL plans other than file them in a filing cabinet. Even without this reality, the TMDL program and the actual TMDLs that have been submitted to and approved by EPA suffer from many serious design and implementation problems.

A. Design Problems

1. Incomplete "Impaired Waterbodies List"

Although 130 waterbodies, including the Chesapeake Bay, are listed on Maryland's 303 (d) list needing approximately 300 TMDLs, EPA has allowed Maryland to exclude the Bay from receiving its own TMDL. [19] EPA asserts that developing a TMDL for the Bay itself will require considerable data gathering and analysis and cooperative efforts from all of the Bay states and the District of Columbia. Though EPA did hold two meetings in 1999 to discuss the development of a joint TMDL for the Bay, no further progress has been made. By excluding the Bay from Maryland's Cycling Strategy and by not developing a TMDL for at least Maryland's portion of the Bay, there will be no way effective and official means of discerning whether the TMDLs for the tributaries to the Bay are sufficient to improve the Bay's water quality by 2010.

Aside from the Bay issue, the Sierra Club insists that the list of 130 impaired waterbodies, compiled by MDE, is incomplete. They believe that a list compiled by the Department of Natural Resources is a better list to use as it contains additional waters that may threaten endangered species. [20]

2. Timing: Plans are produced too quickly and with poor public participation

Although most of the states designing TMDL plans are criticized for dragging their feet, Maryland is accused of not taking enough time to develop their TMDLs. Within two years of signing the MOU, MDE submitted and received approval for 26 TMDLs for 21 waterbodies to the EPA, producing a little more than one TMDL per month. Although MDE does have some 30 full-time staff members working on TMDLs and contracts out most of its modeling for determining the load allocations, subsequent discussions will posit that the quality of the TMDLs suffered under this rapid development. Representatives from both the environmental and wastewater treatment community enjoy calling these rapidly produced plans, "drive-by TMDLs." [21] The environmental community believes that MDE is just "banging out the TMDLs" [22] to appease the District Court Judge in order for EPA and MDE to win the lawsuit. Until then, MDE will merely go through the motions of complying with the MOU.

Unfortunately, the schedule for calendar year 2001 and 2002 are no less rigorous, with 18 waterbodies identified for 2001 and 28 waterbodies identified for 2002. [23] As 90% of the upcoming TMDLs will be nutrient-focused, MDE should brace itself for contentious public comment periods as wastewater treatment facilities contend that the nutrient-TMDLS are biased against them and allow nonpoint sources off the proverbial, hook.

Another problem that results from developing TMDLs too quickly is the lack of sufficient public participation. Members of the wastewater treatment community have complained to their trade association, MAMWA, that they received a copy of the draft TMDL a week or so into a thirty-day comment period. Robert M. Beringer, President of MAMWA reminded MDE's Secretary Jane Nishida in an April 21, 2000 letter that "if MDE wants to insure that TMDLs will be willingly implemented by local jurisdictions, then these jurisdictions must have a greater voice in the process than they do now." [24]

3. Poor use or no use of science

Many of the fundamental flaws in Maryland's current TMDLs is their lack of the use of the best available science, poor application of scientific methods and in one major case, the lack of much monitoring altogether. Since TMDLs are based on scientific estimates of the maximum amount of a given pollutant that a body of water can assimilate without violating water quality standards, the editor of a wastewater treatment association newsletter points out that "scientific estimates can always create debate." [25] The editor ponders: "Who does the estimate? What procedures are used? What assumptions are made? Is a model used? Is it the right model? What about data? Do adequate data exist? Are they good data?"

Estimating is nothing new to science and environmental regulations. All the major environmental laws require similar, "best guess" judgements when decisions have to be made and the decision-makers are at the far edge of science. "Good science" – a catch phrase of the 1990s – does not mean precision; it means the best science can do at the time. [26]

Unfortunately, the Achilles heel of the current TMDLs is that MDE does not appear to be interested in attempting to use the best science possible in its development of TMDLs. For example, when determining that a chlordane TMDL was unnecessary for Baltimore Harbor, both the U.S. Fish and Wildlife Service (USFS) [27] and the Plaintiffs [28] posit that MDE used faulty logic to justify using outdated fish tissue data from 1987 instead of waiting a few more months to analyze newly collected data. The MDE bases their TMDL for Baltimore Harbor on the following logic. First, because chlordane was banned 15 years ago, chlordane loading from external sources such as storm water runoff is negligible and thus, internal sources, such as sediments, must be the source of chlordane. Secondly, since recent data indicate sediment concentrations of chlordane in the Harbor are below those expected to result in violation of water quality criteria for the protection of fish consumption, no action is necessary.

According to the USFWS, not only does the MDE use outdated data but the concentrations from the data appeared to be two orders of magnitude above water quality criteria. But since MDE did not

provide details such as the location of sampling sites and timing of sampling, the USFS was unable to adequately assess MDE's methodology. In USFWS's opinion, MDE's procedures for determining the chlordane TMDL in the Harbor sets a dangerous precedent for managing other legacy contaminants, such as PCBs that have been banned but still may be found in storm water runoff.

The Plaintiffs have similar and additional complaints about the chlordane ruling. The Plaintiffs point out that MDE sets a water quality concentration for chlordane of 0.00059 ug/L instead of establishing an allowable load as prescribed by the Clean Water Act. The total maximum daily load must be a mass per unit time to implement the applicable water quality criterion of 0.00059 ug/L. Additionally, the Plaintiffs point out that not only was the data used by MDE outdated but MDE ignored data from industrial storm sewer permit applications, industrial storm sewer monitoring, and from the National Toxic Release Inventory.

Finally, because so much of the TMDL design is based on the use of modeling, albeit contracted out to such reputable groups as the Army Corps of Engineers and the University of Maryland, they will always be subject to criticism. Often viewed as a mysterious a "black box" that few experts let alone laypersons can understand, modeling is only as good as the assumptions used in defining the problem. As critics of modeling like to say, "garbage in, garbage out." [29]

This lack of commitment to data collection, using recent and appropriate data, and providing sufficient information about the monitoring stations of whatever data is collected may be the downfall of the TMDL program. Should MDE try to require new NPDES permits based on existing non-scientifically sound TMDLs, the NPDES permit holders will have solid legal grounds for protesting the application of the new permit.

4. Nonpoint Sources are ignored in TMDL while Point Sources are held financial responsibility

Despite only contributing about one-fifth the nitrogen pollution to the Chesapeake Bay, point sources have been assigned the great majority of the load allocation in the current nutrient-focused TMDL

plans. [30] For example, the Corsica River Centerville wastewater treatment plant in Somerset County contributed only four percent of the average annual nitrogen load and 11 percent of the phosphorous load – yet only point source reductions are required by the nitrogen-focused TMDL. [31]

As agricultural nonpoint sources in Maryland contribute over 50% of the nitrogen pollution in the Bay (25% comes from atmospheric deposition), even zero discharge from point sources will not solve the problem. By ignoring the primary source of nutrient pollution in the allocation of TMDLs, MDE is missing the opportunity to meaningfully include agricultural sources in the TMDL framework that would help remove the Bay and it's tidal tributaries from the impaired waters list.

The Final Federal TMDL Rules make it explicitly clear that nonpoint source TMDLs are essential to ensuring water quality, it is unfortunate that Maryland's TMDLs revert to relying on point sources for additional nutrient reductions. Wastewater treatment plants that are already engaged in pollution reduction efforts are, of course, frustrated with being made responsible for the nutrient pollution caused by agricultural sources. Point sources posit that additional controls will result in only marginal water quality benefits but each unit of benefit will require a greater and greater unit cost, questioning whether this "law of diminishing returns" is worth the additional financial burden.[32]

In an April 21, 2000 letter sent by MAMWA to MDE, [33] the wastewater treatment association expressed their concerns about the program's fairness and effectiveness:

"It appears to us that despite all of the rhetoric about the TMDL program providing the means to finally get at the remaining, unregulated sources of pollution, the TMDL program in Maryland to-date has failed to include any requirements for meaningful nonpoint source reduction. Instead, we believe that the TMDLs are focusing all specific pollutant load reduction requirements on wastewater treatment plants. MAMWA is concerned that not only is this approach technically invalid and highly inequitable, it simply will not achieve the targeted water quality improvements."

5. Case study highlighting Maryland TMDL's generally poor design quality

In addition to highlighting the poor application of science and the absence of adhering to proper TMDL procedures, this case study highlights what may be the first and only attempt by MDE to reissue a NPDES permit based on TMDL plan.

On June 19, 1998, the Somerset County Sanitary District Inc. requested that MDE keep open the Public Hearing Record regarding the reissuance of the Prince Anne Wastewater Treatment Plant (WWTP) discharge permit. In a six-page memo, Earl Ludy, Superintendent of Princess Anne WWTP carefully made his case for why the MDE's proposed total nitrogen limit of 3 mg/l to solve a supposed eutrophic condition in the river was unnecessary and unfounded. [34]

First, the District is already implementing a 1995 Biological Nitrogen Reduction (BNR) Agreement to design, install, and maintain cutting-edge BNR technology to achieve a seasonal total nitrogen goal of 3 mg/l. As the Agreement is still in the design phase, any new permit limit beyond this cooperative goal will have to be delayed for several years. Second, Mr. Ludy points out that the draft permit also proposes, for the first time in the state, a mass limit for nitrogen (a total maximum daily load) which would be received as a "breach of faith" of on going efforts.

Third, Ludy provided a checklist of procedures that MDE did not follow when determining the nitrogen limitations as a water quality based effluent limit (WQBEL), or a total maximum daily load for the Manokin River. For example, according to the processes of the State Code, MDE did not scientifically establish that the Manokin River is either eutrophic or approaching a eutrophic condition, nor did MDE establish that the WWTP's discharge contains nutrients that are causing the eutrophic condition of the river. Also, MDE's in-stream modeling was based on outdated (1993 water quality survey) and unrepresentative data (not validated using other field survey data) for the WWTP's facility and shows no justification for a nitrogen limit.

Further, the District argued that the entire WQBEL process was absent including: no evaluation of water quality standards in-stream, no evaluation of technology based effluent standards, no accounting of nonpoint sources and other point sources, no TMDL determination, no WLA process and no public participation for the WQBEL aspects. Thus, the nitrogen effluent limitation is unwarranted.

One month later, Mr. Stephen Luckman, Chief of Municipal Permits Division of MDE responded to Mr. Lady's letter. Mr. Luckman posited that the Manokin River is eutrophic because of the high algae levels in the upper portions of the River and its tributaries and because the Manokin is included on

Maryland's Section 303 (d) list of impaired waterbodies (for nutrients, suspended solids, and fecal cloakrooms). However, Mr. Luckman did not go so far as to identify the Princess Anne WWTP as responsible for the eutrophic conditions. Mr. Luckman wrote, "Since you (Mr. Ludy) do not agree that the river conditions require a nitrogen limit of 3 mg/l at Princess Anne, we will postpone permit reissuance until we have evaluated additional water quality data on the Manokin." [35]

B. Implementation, or lack there of

As mentioned before, the MOU signed between MDE and the EPA does not include the third phase of TMDL implementation and watershed-based permitting. The reasoning behind this agreement may be inferred from a letter from Thomas J. Maslany, the Director of EPA Region III's Water Protection Division to the Hon. Jane Nishida, Secretary of the Maryland Department of the Environment. Mr. Maslany writes that "While EPA recognizes that Section 303 (d) is not the only tool Maryland can use to improve water quality, it is an important part of the CWA's framework for restoring and maintaining water quality." [36] In effect, the EPA may have been recognizing that the Tributary Strategies of the Chesapeake Bay Agreement were in place and should clean up the Bay sufficiently to remove the Bay from the EPA's List of Impaired Waters.

Finally, another speculation why EPA may have allowed MDE to skip the implementation stage in order to allow MDE to concentrate on churning out TMDL in an attempt expedite dismissal of the lawsuit. This theory stems from the fact that Region III may have wanted to avoid the potential of taking over yet another state's TMDL program. EPA Region III office has faced six lawsuits related to TMDL development --- one in each of Region III's six states. Four states have been settled while lawsuits in Maryland and D.C. remain in active litigation. EPA was forced by consent decree to "backstop" the TMDL development in the four states, Pennsylvania, Delaware, West Virginia and Virginia by establishing TMDLs if the states failed to do so on a specific schedule.

Though pure speculation, the June 1998 Manokin case may have been a red flag to both MDE and EPA that the poor quality of MDE's TMDLs was highly susceptible to legal challenge. Thus, EPA

and MDE may have decided that the TMDLs implementation stage should be outside the scope of the 10-year MOU that was signed in November 1998. When MDE attempted to resissue the Princess Anne permit for nitrogen discharge, the WWTP superintendent made a effective case why a TMDL-based new NPDES permit was unwarranted and unjustified. Given the numerous design problems surrounding the current Maryland TMDLs, EPA and MDE may have realized that they will face costly litigation should MDE attempt to re-issue NPDES permits based on TMDLs.

V. TMDLs have promise, maybe

Given all these design and implementation problems, it may appear that TMDLs in Maryland are doomed. What started out as a "step-child" program to the technology standards NPDES program in the 1972 Clean Water Act, in the 1980s and 1990s started looking like the environmental community's saving grace to clean up polluted waters. However, if the overall quality and general ineffectiveness of Maryland's TMDL Program is any indication of the situation in other states, the TMDL Program is now feared to be a "paper tiger." [37]

As intended by it's creators in 1972, the TMDL program is a thoughtful mechanism for cleaning up waters still polluted after the adoption of NPDES technology standards. Because of its comprehensive regulatory framework and what could be a scientifically sound and technically transparent process, a effective state-by-state implementation of the federal statute should move the nation closer to its "fishable and swimmable goal." Ideally, the TMDL program holds tremendous opportunity for interstate and cross-sector coordination that would get to the heart of water pollution problems and close all the remaining loopholes preventing improved water quality.

Steve Rohm, the Ecoletter's [b] Delaware Correspondent offered a hopeful perspective on the potential for TMDL programs, in general. He pointed out that there are two main forces encouraging collaboration and cooperation. As pollution knows no boundary, Delaware's efforts to improve water

[b] Ecoletter is the publication of the Water and Waste Operators Association (WWOA) of Maryland, Delaware, and the District of Columbia, & the Chesapeake Water Environment Association, (CWEA) Spring 2000.

quality concerns will impact Maryland's mitigation efforts as several major Eastern Chesapeake Bay tributaries originate in Delaware including the Choptank, Nanticoke and Pocomoke. Secondly, Mr. Rohm pointed out that the TMDL issue is one issue that will truly pull all of us together." [38] Agricultural runoff, urban stormwater discharge and our wastewater treatment discharges are all intermingled in this effort.

V. Other state-based programs that are expected to be successful but may not be

Another major reason that the Maryland TMDL program may be having so many problems is that not only is it playing "second chair" to the other federal program (NPDES), it appears to be playing "second chair" to two other programs: the Chesapeake Bay Program and the Water Quality Improvement Act.

A. The Chesapeake Bay Program

The Chesapeake Bay Program was formed in 1983 by the first *Chesapeake Bay Agreement*, to be a regional voluntary partnership with Pennsylvania, Virginia, the District of Columbia, the Chesapeake Bay Commission and the EPA. The Agreement was re-adopted in 1987 committing to a 40% reduction in controllable nutrient loads to the Bay. Amended again in 1992, the Bay Agreement states committed to tributary-specific reduction strategies, called the 10 Tributary Strategies, to achieve the reduction goal.

In 2000, the bay states again renewed their support for the Agreement. This time, however, the 2000 Agreement "agrees to the goal of improving water quality in the Bay and its tributaries so that these waters may be removed from the impaired waters list prior to the time when regulatory mechanisms under Section 303 (d) of the Clean Water Act would be applied." [39] In other words, should the Agreement fail to clean up the bay, EPA could exercise its discretion to take over all of the bay states' Clean Water Act programs: the TMDL and NPDES programs.

The 40% reduction goal in nitrogen and phosphorus pollution from 1985 levels by the end of 2000 was achieved for phosphorus but just fell short of the nitrogen goal. The main causes for not meeting the goal, according to the Bay Program, stems from population growth and development. The

Bay Program has been working on adopting more ambitious nutrient reduction goals for the last two years in order to achieve the new 40% reduction goal by 2010**.**

The Bay Program's primary mechanism for achieving the nutrient reduction goal is the Tributary Strategies Teams. By calculating the total loads of nitrogen and phosphorous in each of the 10 tributaries, the Teams, made up of hundreds of volunteers will attempt to fulfill these nutrient reduction goals by providing technical and financial assistance through "Best Management Plans."

Although the Bay Program should be credited for its tremendous stakeholder involvement and thoughtful implementation infrastructure, it is hard to imagine significant and speedy compliance of this program given its voluntary nature. Additionally, unlike the TMDL program, the Bay Program benefits from public support from government officials which environmentalists think is misplaced because "the relevant difference (between the two programs) is that a TMDL is enforceable." [40]

If the Bay Agreement fails by 2010, it would finally force the region to develop and implement their TMDL plans. However, the states would then get another 15 years to achieve the TMDL plans– making a "clean" Bay more than a quarter century away, not just a decade. Given that the Bay Program barely made their phosphorous goal and missed their nitrogen goal, the Program is now revising its goals and due to finish those revisions by the end of 2001. Additionally, it will be the end of 2002 before new tributary strategies to achieve the new goals will be designed. "That leaves little time – eight years – to do more than was done in the last 13 years since 1987 when the 40% reduction goal was established, said David Anderson, Chesapeake Bay Foundation attorney.

B. Maryland's Water Quality Improvement Act, 1998

Another major mechanism for cleaning up nutrient pollution in Maryland's waters and the Bay is the Water Quality Improvement Act (WQIA) passed by the General Assembly in 1998. The WQIA was enacted in response to the *Pfiesteria piscicida* outbreak in Eastern Shore fishing areas in 1997. Up to 50,000 fish were found dead in the Pocomoke River, Chicamacomico River and Kings Creek (a tributary of the Manokin River). In addition, scientists and fishermen reported short-term memory losses,

respiratory problems, and epidermal lesions. The WQIA offers many opportunities for meaningful nutrient reduction from the agricultural sector in Maryland and represents a major change in MDE's approach to controlling agricultural nutrient pollution.

The most far-reaching requirement of the WQIA is that all agricultural operations with annual incomes greater than $2,500 or more than eight animal units (one animal unit equals 1,000 pounds live weight) must have and implement a nitrogen- and phosphorus-based nutrient management plan by a prescribed date. The Act requires that anyone "who in operating a farm, uses chemical fertilizer" must have a nitrogen- and phosphorus-based plan by December 31, 2001, which must be implemented by December 31, 2002. With regard to persons using sludge or animal manure, they have until July 1, 2004, to submit a nitrogen- and phosphorus-based nutrient management plan, which must be implemented by July 1, 2005.

Although the WQIA will do a lot to improve the nutrient pollution in Maryland's rivers and the Bay, it has its share of shortcomings that will undermine the rapid and complete fulfillment of its aggressive goals. As the nutrient management plans are voluntary activities, encouraging farmers to implement them will depend on an army of persuasive field staff providing technical and financial assistance. To date, the nutrient management program has only 40 staff members. Even if these staff could reach all the thousands of Maryland farmers, they would be unable to sufficiently monitor the farmers to gauge compliance and progress.

VI. Conclusion

Given all the current design and implementation problems, it is hard to believe that any improved water quality will come from Maryland's TMDL Program. However, with significant political will and a radical overhaul of the program, TMDLs could be the solution to Maryland's polluted tidal tributaries and the Chesapeake Bay. That is, if Maryland's officials expected high quality TMDLs from MDE and expected the TMDLs to be implemented effectively, the TMDL program may be the best solution.

In an ideal world, the TMDL program provides every ingredient for successful water pollution remediation. It is a federal program that provides a comprehensive framework, a thoughtful scientific methodology, a rigorous schedule, a professional staff with adequate resources, and a real, enforceable implementation mechanism to ensure that change occurs. It is Maryland's challenge to realize this opportunity and fulfill the ideal framework with real world substance and commitment.

A. Recommendations

1. Fix the current design and implementation problems.

All of the design problems discussed earlier need to be addressed and solved. MDE should resolve the use of different Section 303 (d) impaired waters lists with DNR. The Chesapeake Bay should fall under the "high priorities" category like Baltimore Harbor and a special committee should be tasked with developing a joint TMDL for the entire Bay. By ignoring the opportunity to adopt the comprehensive TMDL framework for the largest estuary in the United States will only prolong the clean-up of the Bay and make it more difficult to accomplish as time goes on.

To re-instate the public trust and earn public support from government officials, MDE should take all the criticism it's received about the quality of its "drive-by TMDLs" and correct those problems. The TMDLs need to be carefully developed and allow public reviewers the full 30-day public comment period. The TMDL developers need to make use of the best available scientific data to calculate the TMDL and prolong the development period if new data is about to be published. MDE should provide all necessary details when justifying their use of particular data sets, such as location of monitoring stations, methodology and frequency of data collection, etc. to allow for transparency and meaningful feedback from pubic reviewers. Finally, MDE should fulfill the essence of the first stage in its MOU by actually collecting data themselves so as to actually "monitor" the current status of an impaired waterbodies' water quality.

Without scientifically sound TMDLs that demonstrate MDE followed all the proper procedures for monitoring water quality conditions and calculating and dividing load allocations, the TMDLs will be

subject to protest and litigation by the wastewater treatment facilities they are currently aimed at - and will not hold up in court.

To satisfy the wastewater treatment association and the environmental communities alike, MDE needs to fairly divide the TMDL among point source and nonpoint sources according to proportion of pollution contributed by each source. Maryland's TMDL framework needs to officially recognize agricultural sources as the dominant contributors of nutrient pollution to the Bay and non-tidal tributaries and incorporate them officially and equally into the TMDL infrastructure.

Finally, if MDE corrects these problems, it will have meaningful, scientifically sound TMDLs that have stakeholder buy-in and support from public officials. Then, MDE needs to go beyond what is required in the MOU with EPA and actually implement the TMDLs by re-issuing NPDES permits for point sources and monitoring "best management plans" for nonpoint sources.

2. Provide for market flexibility by considering a TMDL permit-trading program.

As regulatory mechanisms for ensuring compliance can stifle technological innovation, reduce cost-effectiveness, and burden some groups more than others, MDE should consider a flexible permit trading program. By reviewing the water pollution trading programs of other states (Wisconsin, Colorado, North Carolina, New York, [41] and now Delaware [42]) Maryland could design an effective trading TMDL program that might achieve even greater than required pollution reduction at lower costs. Trading of TMDL-based NPDES permits among point sources should be the first stage in developing a trading program. MDE should also consider fostering trading between point source - that may have more financial resources but are technologically at a stage of diminishing returns, and non-point sources - that are financially strapped and can achieve large amounts of reduction at little cost.

3. **Coordinate and integrate the Bay Program and the TMDL Program.**

The tension between the Bay Program and the TMDL program only hampers the success of either program. It is unclear; both on paper [c] and from interviewing a variety of representatives from the water pollution prevention community [d] just how the two programs are coordinating. From a newsletter published by an environmental group, the Alliance for the Chesapeake Bay, one article hints that the Bay Program is moving forward with developing new water quality criteria, new load calculations and new best management practices – without coordination with the TMDL program. If altogether different standards, different load allocations and different implementation plans are being designed, there is an awkward and embarrassing redundancy of efforts with the TMDL Program.

The solution is not to drop either of the programs but to whole-heartedly embrace and integrate both programs. Otherwise, if the Bay Program were dropped in favor of the TMDL program, all their cost-effective and inexpensive "best-management practices" activities that are directly targeting agricultural nutrient pollution would be lost. Additionally, the stakeholder involvement from hundreds of volunteers that are mobilized in an effective decentralized infrastructure would be jeopardized. If the TMDL program were dropped in favor of the Bay Program, the potential to strengthen a comprehensive, federal framework that provides a regulatory mechanism for monitoring, developing and implementing meaningful load reductions to achieve water quality standards would be lost.

Only by properly integrating both programs with support from the highest branches of government and support from all the appropriate implementing organizations will the Chesapeake Bay achieve meaningful water quality improvement in a timely fashion.

[c] Referring to the Chesapeake Bay Agreement, the MDE-EPA Memorandum of Understanding, and MDE's TMDL Program documents.

[d] Referring to environmentalists, MDE staff, DNR staff, and wastewater treatment staff.

ENDNOTES

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[2] State of the Bay Report 2000. Chesapeake Bay Foundation. Save the Bay. September 2000.

[3] Letter from Mr. Thomas J. Maslany, Director Water Protection Division, Environmental Protection Agency, Region III to Honorable Jane Nishida, Secretary Maryland Department of the Environment. September 1999.

[4] The Clean Water Act TMDL Program: Law Policy, and Implementation. Oliver A. Houck. Environmental Law Institute. Washington D.C., December 1999.

[5] See note 4.

[6] See note 4.

[7] See note 4.

[8] "Lawsuit on MDE papers in court." By Andrea F. Siegel. SunSpot.net, Maryland's Online Community. September 27, 2000.

[9] United States District Court for the District of Maryland Judgement in Sierra Club, et al. V United States Environmental Protection Agency, et al. Civil Action WMN-97-3838. Judgement by Mr. William M. Nickerson, United States District Judge. September 13, 2000.

[10] Interview with Mr. Jim Stuhltrager, lawyer with Mid-Atlantic Environmental Law Center representing the Sierra Club. March 21, 2001.

[11] See note 10.

[12] Interview with Kim Coble, Maryland Senior Scientist, Chesapeake Bay Foundation. March 21, 2000.

[13] "Lawsuit on MDE papers in court." By Andrea F. Siegel. SunSpot.net, Maryland's Online Community September 27, 2000.

[14] Memorandum of Understanding between Maryland Department of Environment and the Environmental Protection Agency, August 1, 1998.

[15] Interview with Ed Merrifield, Maryland Sierra Club Policy Director, March 20, 2001.

[16] Maryland's TMDL Program website: www.mde.state.md.gov/tmdl

[17] See note 14.

[18] See note 14.

[19] Letter from EPA Region III Stefania D. Shamet, Assistant Regional Counsel and Joseph T. Piotrowski, Associate Director, Office of Watersheds to Counsel of Plaintiffs, Intervenors and MDE, August 18, 1999.

[20] See note 15

[21] Interview with Cy Jones, Regional Regulatory Affairs Director, Washington Suburban Sanitary Commission, April 10, 2001.

[22] Interview with David Andersen, lawyer, Chesapeake Bay Foundation. April 11, 2001.

[23] See note 16.

[24] Letter from Robert M. Beringer, President of MAMWA to Secretary Jane T. Nishida, MDE on April 21, 2000.

[25] Editor's Corner. Ecoletter, publication of the Water and Waste Operators Association (WWOA) of Maryland, Delaware, and the District of Columbia, & the Chesapeake Water Environment Association, (CWEA) Spring 2000.

[26] See note 4.

[27] Letter from Mr. John Wolflin, Field Supervisor, Chesapeake Bay Field Office, U.S. Fish and Wildlife Service to Ms. Elaine Harbold. Office of Watersheds, U.S. Environmental Protection Agency. November 2, 2000.

[28] Letter Mr. James Stuhltrager, Esq. and Susan D. Mack, Mid-Atlantic Environmental Law Center to Ms. Margie Crawford, Water Management Administration, Maryland Department of the Environment. November 27, 2000.

[30] "Bay, Long Island Sound take sharply divergent cleanup paths." By Karl Blankenship. Bay Journal. Alliance for the Chesapeake Bay, April 2001.

[31] "Of TMDLs and Lamp Posts," by Earl Ludy, Chair of MAMWA's Permitting Committee and Plant Superintendent of Somerset County Sanitary District, Ecoletter, Publication of the Water and Waste Operators Association (WWOA) of Maryland, Delaware, and the District of Columbia, & the Chesapeake Water Environment Association, (CWEA) Spring 2000.

[32] "Clean Water Act Section 305 (b): A Potential Vehicle for Incorporating Economics into the 'TMDL' and Water Quality Standards-Setting Processes." Melissa Thorme. Tulane Environmental Law Journal. Winter 1999.

[33] See note 24.

[34] Letter from Mr. Earl C. Ludy, Superintendent, Princess Anne Wastewater Treatment Plant, Somerset County Sanitary District to Mr. Stephen Luckman, Chief Municipal Permits Division, Maryland Department of the Environment. June 19, 1998.

[35] Letter from Mr. Stephen Luckman, Chief Municipal Permits Division, Maryland Department of the Environment to Mr. Earl C. Ludy, Superintendent, Princess Anne Wastewater Treatment Plant, Somerset County Sanitary District, Inc. July 20, 1998.

[36] See note 3.

[37] See note 10.

[38] "Delaware TMDLs – Continuing into the New Millennium." Steve Rohm, Delaware Correspondent, Ecoletter Editorial staff, Ecoletter. Publication of the Water and Waste Operators Association (WWOA) of Maryland, Delaware, and the District of Columbia, & the Chesapeake Water Environment Association, (CWEA) Spring 2000.

[39] Chesapeake 2000. A Watershed Partnership. Chesapeake Bay Program.

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[41] "Reducing Nitrogen Pollution on Long Island Sound: Is There a Place for Pollutant Trading?" Anne Powers, Columbia Journal of Environmental Law. 1998.

[42] "See note 38.