NACWA Strategic Watershed Task Force

Recommendations For A Viable And Vital 21st Century Clean Water Policy

October 18, 2007

The National Association of Clean Water Agencies (NACWA) is the leading advocate for responsible national policies that advance clean and safe waters and a healthy, sustainable environment. NACWA represents the collective interests of America's clean water utilities – dedicated public servants and true environmental champions.

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EXECUTIVE SUMMARY

In the 35 years since the Clean Water Act was passed, clean water agencies have contributed significantly to improvements in the quality of the nation's waters. Despite these and other improvements from point-source discharges and the significant reductions in the concentrations of pollutants that have been achieved in our lakes, rivers and streams, the incremental rate of water quality improvement has slowed significantly. Increasing amounts of resources are now being spent to curtail end-of-pipe discharges, but a proportionate return on investment is not being seen in improved water quality. NACWA's clean water agency members remain on the frontlines of protecting and restoring our nation's waters. They continue to upgrade their treatment processes and have increased their overall environmental protection capabilities, but they are also increasingly aware of the disconnect between current management, monitoring and implementation practices and what is needed to achieve the goals of the Clean Water Act.

Responding to the overwhelming evidence that water quality problems were often caused by multiple and often diffuse sources of pollution within a watershed, clean water agencies and the U.S. Environmental Protection Agency (EPA) began in the early 1990s to explore the concept of a watershed-based approach to improving water quality as a possible solution to achieving the Clean Water Act's goal of restoring the integrity of the nation's waters. Since that time there have been many attempts by EPA and others to spur interest in the concept. But a meaningful, functional watershed approach remains elusive.

In March 2007, NACWA formed a Strategic Watershed Task Force to investigate if the concept of a "watershed approach" may still prove to be the path forward to improve the quality of the nation's waters further. The Task Force was charged with identifying the obstacles to achieving a true watershed approach and the changes that need to be made for it to succeed.

Framed by a discussion of the opportunities provided by a meaningful and effective watershed approach, as well as the current obstacles to implementing such an approach, the Task Force developed several key short and long-term recommendations.

In the short-term, the Task Force used the Clean Water Act as a starting point and recommended the following actions:

1. Reinvigorate the watershed-based planning process as outlined in Section 208 of the Clean Water Act;
2. Pursue new, more aggressive measures and funding to address needed controls on agricultural nonpoint sources;
3. Promote adaptive implementation of water quality improvement measures based on valid science;
4. Better utilize market-based approaches;
5. Break down programmatic regulatory and enforcement silos within EPA's organizational structure;
6. Use a more appropriate sequence for establishing total maximum daily loads (TMDLs); and,
7. Prioritize actions and planning that are currently underway according to watershed needs.

As we contemplate water quality issues over the next several decades, long-term changes are also necessary to fully align current environmental laws and regulations with a comprehensive, holistic watershed approach. These will require tremendous leadership from Congress, EPA, the Departments of Agriculture and Interior,

and participation from all stakeholders in order to succeed. The Task Force recommends the following actions to achieve a long-term solution:

1. Establish a new water quality framework via a 21st century Watershed Act;
2. Reorganize EPA to reflect this new watershed framework; and
3. Conduct monitoring and research to show that progress is being made via a watershed approach.

NACWA's Strategic Watershed Task Force recommendations do not detract from one of the greatest challenges facing the nation's Clean Water Act programs – the water infrastructure funding gap, estimated by EPA and other federal agencies to be between $300 – 500 billion over the next 20 years. Clearly, a massive investment in the nation's existing wastewater infrastructure will be needed simply to sustain current water quality levels. NACWA believes that, while a watershed approach will not eliminate existing needs, it is the appropriate approach to prioritize investments and resource allocations, and will result in the greatest benefit to the environment.

A meaningful and effective watershed approach offers regional and local authorities the tools they need to ensure the next generation of water quality improvements. NACWA is excited about the recommendations contained in this report and the vital role its members will continue to play over the next 35 years in advancing clean and safe waters and a healthy, sustainable environment.

I. BACKGROUND AND INTRODUCTION

The amendments to the Federal Water Pollution Control Act of 1972 (or Clean Water Act) set an ambitious objective to "restore and maintain the physical, chemical, and biological integrity of the nation's waters," by, among other things, eliminating the discharge of pollutants into navigable waters. In 35 years of implementing the Clean Water Act, vast improvements have been made to the health of the nation's lakes, streams, rivers, and coastal waters. As the only organization dedicated solely to the interests of the Nation's public wastewater treatment agencies, the National Association of Clean Water Agencies (NACWA) is proud of its members' key role in this environmental progress. Although progress under the Clean Water Act has been significant, more improvements are needed, especially for the 40 percent of the nation's waters that are still classified as impaired. NACWA believes that a comprehensive, integrated watershed approach that considers all uses and sources of pollution within hydrologically-defined areas is needed to meet the goals of the Clean Water Act in the future.

Before implementation of the Clean Water Act, many of the nation's waters were used as open receptacles for untreated sewage and industrial waste. The following passage from Upton Sinclair's *The Jungle* describes Chicago's Bubbly Creek in 1906: "all the drainage of the square mile of packing-houses empties into it, so that it is really a great open sewer a hundred or two feet wide... Here and there the grease and filth have caked solid, and the creek looks like a bed of lava..." The Cuyahoga River caught fire multiple times between 1936 and 1969, when it was described as "chocolate-brown, oily, bubbling with subsurface gases, it oozes rather than flows."[1] Fortunately, these notorious examples of polluted waters, which helped draw the nation's attention to the extent of the problem, no longer exist. Bubbly Creek is now the site of residential development with million-dollar homes and the home of an occasional four-pound coho salmon.[2] While work on improving the water quality of the Cuyahoga River continues, river fires are a distant memory. Many other rivers and lakes that were previously considered "dead" now have recovering or healthy aquatic life populations.

These stories of water quality improvement illustrate the success brought about by the Clean Water Act in the past 35 years, mostly through the "end of pipe" regulations of the National Pollutant Discharge Elimination System (NPDES) permit program and a successful municipal grants program. All point source discharges to waters of the U.S., such as those from municipal, industrial, and other commercial facilities, require NPDES permits, and the pollutants entering waters through these point sources are, therefore, strictly controlled. Through NPDES permits, the U.S. Environmental Protection Agency (EPA) initially imposed technology-based effluent guidelines on discharges, requiring that most sewage undergo secondary (biological) treatment and ensuring that other wastewater received the best treatment available and economically achievable before discharge. More recently, as improvements in water quality were made, EPA and the states have used water quality-based permit requirements, which limit discharges based on the water quality standards for the receiving water, where technology-based standards are not enough.

Despite these significant point-source discharge reductions, the incremental rate of improvement to water quality has slowed significantly. Increasing amounts of resources are spent to continue curtailing end-of-pipe

[1] *Time*, "The Cities: The Price of Optimism," August 1, 1969, *http://www.time.com/time/magazine/article/0,9171,901182,00.html.*
[2] *Chicago Business*, "Flushing Out Bubbly Creek," July 25, 2004, *http://chicagobusiness.com/cgi-bin/news.pl?id=13288&seenIt=1.*

discharges, but a proportionate return on investment is not being seen in the quality of the nation's waters. In the 35 years since the Clean Water Act was passed, clean water agencies have significantly upgraded sewage treatment processes and increased their environmental protection capabilities. Publicly owned treatment works (POTWs) will continue to play a major role in water quality improvement as aging infrastructure is repaired or replaced and new practices achieve better treatment performance. However, NACWA members are increasingly aware of the disconnect between current water quality management and implementation practices and what is needed to achieve the original goals of the Clean Water Act.

As early as 1992, when reauthorization of the Clean Water Act was being actively pursued, NACWA (then known as the Association of Metropolitan Sewerage Agencies) spearheaded a massive effort to develop a comprehensive watershed management act that recognized the need for more creative and flexible approaches to controlling increasingly complex and diverse sources of pollution. The Comprehensive Watershed Management Act of 1993, though never introduced in Congress, set out a bold framework for increased stakeholder involvement, active participation by local governments and clean water agencies, the formation of Watershed Commissions to guide implementation, and provisions to ensure sustained progress. Since that time there have been many attempts by EPA and others to spur interest in the concept, but an effective watershed-based approach to water quality has remained elusive at the national level.

To preserve the progress already made and to continue improving the quality of our nation's waters, investments in water quality between point sources and nonpoint sources, such as urban and agricultural runoff, must be allocated more equitably. The Clean Water Act envisioned that both point and nonpoint sources of pollutants would be controlled, with a goal "that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution." While the Clean Water Act clearly outlined the regulatory framework for point sources, a similar regulatory framework was not provided for nonpoint sources. Because of this historic regulatory focus on point sources, nonpoint sources are now responsible for more impaired water bodies than point sources.

With these facts in mind, we must find ways to reinvigorate our nation's commitment to the Clean Water Act's objective to "restore and maintain the chemical, physical, and biological integrity of the nation's waters," and we must develop new strategies and approaches to deal with the most significant pollution problems that we face today. It is time to move beyond the point source by point source approach and consider the overall contributions of diffuse and individual sources of pollution that impair the health of aquatic ecosystems, or watersheds. Water that is free of chemical or bacteriological pollutants provides little benefit if erosion, lack of habitat, or other negative impacts prevent the water from meeting the goals of the Clean Water Act.

Approaches to the future of water quality need to be guided by stewardship of the environment and responsible management of public resources. A comprehensive and integrated watershed approach to water quality will fully incorporate the chemical, physical, and biological needs of the watershed into planning and management decisions. The comprehensive consideration of all water needs recognizes the multiple uses of water resources and provides for participation of all stakeholders in making watershed decisions. When prioritization of watershed needs occurs, the best use of public and private funds can be made by addressing the top causes of water quality impairment first.

II. NACWA'S STRATEGIC WATERSHED TASK FORCE

To mark the 35th anniversary of the Clean Water Act on October 18, 2007, NACWA believes it is time to re-examine the direction of the nation's water program. EPA has described the watershed approach as the way to move forward with water quality improvement since 1991, but NACWA's utility members have found it difficult to put the watershed approach into practice in the current legislative and regulatory context. EPA has studied this problem itself, convening a forum, *A Watershed Approach to Utility Management*, in December 2006 to examine the successes that a few utilities have had with watershed approaches. The forum resulted in several broad recommendations for better implementation of the watershed approach, including the need to "explore legal, regulatory, and policy changes with the purpose of legitimizing integrated watershed and source water protection programs." EPA asked the National Advisory Council for Environmental Policy and Technology (NACEPT) to identify ways the Agency could improve its "sustainable approaches to water resource management and infrastructure to meet watershed goals." In addition, the National Academy of Public Administration (NAPA) completed a report at the request of the White House Office of Management and Budget, examining the Chesapeake Bay program as an example of the performance of the nation's environmental programs.

These previous initiatives all suggest important paths to improvement, and NACWA agrees with many of the recommendations. However, NACWA saw a need to add the experiences of its members, the clean water agencies that have been responsible for much of the improvements to water quality in the last 35 years. The NACWA Strategic Watershed Task Force was formed to investigate how a watershed approach could work to improve the nation's waters, the obstacles to achieving these improvements, and the changes that need to be made for a watershed approach to succeed. The members of the Task Force are clean water professionals with years of experience in the public policy, regulatory and legal issues that govern watershed management, and their experiences provide a valuable basis for the recommendations contained in this report. The recommendations offer specific changes that could be made immediately or in the near future to facilitate a watershed approach, and broader, long-term changes that are needed to make a watershed approach the basis of the nation's water policy and programs.

III. THE WATERSHED APPROACH

A. *Section 208 of the Clean Water Act*

The idea of a watershed approach to water resource quality management is not new. Section 208 of the Clean Water Act, Areawide Waste Treatment Management, envisioned regional water quality management planning that would today be referred to as a "watershed approach." Under this part of the Clean Water Act, each state must identify the boundaries of areas with substantial water quality control problems and designate a single representative organization to formulate a management plan for the area. Section 208 states that the plan should include, but is not limited to, the following elements: identification of treatment works needed for municipal and industrial waste; identification and control of agricultural, mine-related, and construction activity-related sources of pollution; identification and control of salt water intrusion into rivers, lakes, and estuaries; and control of the disposal of wastes on land or in excavations. Watersheds that span political boundaries are recognized, with states instructed to form one designated agency to plan for an area located in more than one state.

Section 208 also provides for cooperation with the U.S. Department of Agriculture (USDA) agencies to establish programs for "installing and maintaining best management practices to control nonpoint source pollution for improved water quality." Funding was authorized for appropriation by the Secretary of Agriculture for contracts with owners and operators of rural land to implement soil conservation and other best management practices, but only for fiscal years 1979 through 1982.

States were required to complete regional watershed management plans under Section 208 and submit the plans to EPA after the Clean Water Act was passed. In most cases, though, funding was never provided to implement these plans, and they have not been used and have become irrelevant. While Section 208 planning has not been fully utilized or implemented, it does lay the initial framework for implementation of a watershed approach. Before discussing how such an approach could be successfully used to improve water quality, it is important to define what constitutes a watershed approach.

B. *EPA Definitions of a Watershed Approach*

EPA began consideration of watershed approaches as part of its water quality policy in the early 1990s. EPA's Office of Water endorsed a *Watershed Protection Approach Framework* in 1991, then updated it in 1996. This *Framework* provided a general definition of a watershed approach as "a coordinating framework for environmental management that focuses public and private sector efforts to address the highest priority problems within hydrologically-defined geographic areas, taking into consideration both ground and surface water flow."

The watershed approach is currently one of EPA's "Four Pillars" for sustaining water infrastructure. As part of the Four Pillars, the watershed approach definition is expanded, "to encourage the adoption of watershed management principles and tools into utility planning and management practices, so that key decision-makers consider watershed-based, cost effective alternatives along with traditional treatment technology investment choices. Watershed management approaches include, but are not limited to, source water protection, water

quality trading, centralized management of decentralized systems, and smart growth approaches to stormwater and wastewater management." [3]

EPA's Office of Wetlands, Oceans, and Watersheds provides another definition of watershed approach, stating that a watershed approach:

- Is hydrologically defined
  - geographically focused
  - includes all stressors (air and water)

- Involves all stakeholders
  - includes public (federal, state, local) and private sector
  - is community based
  - includes a coordinating framework

- Strategically addresses priority water resource goals (e.g. water quality, habitat)
  - integrates multiple programs (regulatory and voluntary)
  - based on sound science
  - aided by strategic watershed plans
  - uses adaptive management[4]

C. *NACWA Definition of a Watershed Approach*

For the recommendations contained in this report, a definition of a watershed approach that builds on the EPA definitions will be used. NACWA's definition is as follows:

> A watershed approach is a holistic, collaborative framework that focuses water quality protection and restoration efforts within a hydrologically-defined area (i.e., a watershed). A watershed approach:
> - Considers the physical, chemical, and biological aspects of water quality;
> - Allows prioritization of watershed needs based on scientific data and available resources;
> - Involves all stakeholders in prioritization and planning;
> - Provides for coordinated implementation of all water quality restoration and maintenance activities; and
> - Ensures any activities affecting water quality address established watershed priorities.

NACWA believes that the existing Section 208 program of the Clean Water Act, though not a ready-made solution, can provide the initial framework for a watershed approach as defined above. Other regulatory changes will be necessary to realize the opportunities for water quality improvement that a watershed approach can provide and remove the obstacles to implementation.

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[3] EPA Office of Water, *Sustaining our Nation's Water Infrastructure*, August 2006, *http://www.epa.gov/waterinfrastructure/pdfs/brochure_si_sustainingournationswaters.pdf.*
[4] *http://www.epa.gov/owow/watershed/approach.html*

IV. OPPORTUNITIES PROVIDED BY A WATERSHED APPROACH

A watershed approach provides multiple opportunities for improving stewardship of both the environment and public resources. Some municipalities have already been able to incorporate aspects of a watershed approach into their water resource management plans, and several key examples help to illustrate the potential opportunities under a watershed approach.

A. *Integrated Water Resources Management*

Integrated water resources management under a watershed approach considers water quantity, water quality, and habitat together, rather than as separate issues. Combining these issues recognizes the physical, chemical, and biological considerations that are called for in the Clean Water Act. Consider the following examples of two communities that have attempted to link multiple regulatory frameworks into a comprehensive watershed approach.

> Philadelphia, Pa. - The Philadelphia Water Department's Office of Watersheds uses a watershed approach to deal with combined sewer overflows. Their approach targets dry weather water quality and aesthetics, healthy living resources, and wet weather water quality and quantity. The approach focuses on improving the accessibility and aesthetics of streams and restoring them to a more natural state, which in turn helps to improve dry weather water quality. Dry weather water quality is also improved with a focus on infrastructure, including sewer line rehabilitation, elimination of defective laterals, and proper treatment of wastewater. Streams become healthier living resources through a focus on improved habitat and healthy aquatic life populations, restoration of natural stream conditions, and addition of fish ladders and modification of dams to allow for fish passage. Wet weather quality and quantity is managed with a combination of traditional "gray infrastructure," which uses tanks and tunnels to store excess stormwater and wastewater, and "green infrastructure," which increases pervious surfaces and allows more infiltration and natural storage of stormwater. In addition, stormwater management is improved through innovative stormwater regulations, with financial incentives given for reducing impervious areas and increasing the infiltration of stormwater. All of these efforts are managed in a coordinated fashion, enabling the Office of Watersheds to assess the impact of the entire program on the health of the watershed.
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> Chicago, Ill. - The Metropolitan Water Reclamation District of Greater Chicago (Chicago) recently was given statutory authority for stormwater management for Cook County's 1,000 square miles. The county is composed of seven watersheds, some being wholly within the county and others having area both upstream and downstream in three other Illinois counties and two other states. Planning coordination with the extraterritorial areas is a critical component. Four watersheds have areas served by both combined and separate sewer systems. Although a long-term control plan (LTCP) for combined sewer overflows (CSOs) is nearing completion of construction, enhanced stormwater management for surface water is expected, at least partially, to reduce the load on the CSO facilities and reduce future CSOs. The use of green technologies and infrastructure for stormwater management will be emphasized through outreach to, and education of, the 130 municipalities in the county. Widespread use of these low-tech best management practices will retain more water at or near

the point of origin for enhanced water resource management. Stormwater management planning and a companion regulatory ordinance will address flooding, erosion, water quality and protection/restoration of riparian/wetland habitat.

These are just two examples where wastewater authorities have dramatically improved the coordination among water related programs. Future integrated water resources management efforts could expand on these programs to include even more of the relevant community planning and management authorities.

B. *"Water is Water"*

A watershed approach is holistic, acknowledging that "water is water" – an expression used to indicate that the traditional regulatory categories (e.g., wastewater, stormwater, drinking water) are artificial divisions of overall water quality issues. For a holistic watershed approach that implements the idea that "water is water" to succeed, all stakeholders must be willing to work cooperatively in making water resource management decisions. Many communities are already recognizing the value of looking at all water as a single resource. The City of Los Angeles, for example, has recently completed a 20-year plan for wastewater, drinking water, and water reuse, recognizing that these areas are closely integrated, especially in the City's arid climate. Involvement of a wide-range of stakeholders from the outset was vital to constructing a plan that all divisions of the City's government and the community could embrace.

The recognition that "water is water" also facilitates water quality credit trading programs and market-based incentives that may help stakeholders find optimal solutions to water quality issues. Water quality credit trading programs operate by allowing point sources to meet regulatory requirements by reducing pollution from another point or nonpoint source in the same watershed. The trade occurs so that overall water quality objectives can be met for the watershed more effectively and/or at a lower cost, often times resulting in ancillary benefits that were not the focus of the trade. Water quality credit trading is endorsed and supported by EPA as a way of achieving significant environmental and economic benefits.[5]

> Hillsboro, Ore. – Clean Water Services has used a water quality credit trading program to meet objectives for water quality, water quantity and habitat in the Tualatin River watershed. This river has a TMDL requirement to reduce the thermal loads discharged to it, and the wastewater treatment facilities were having difficulty meeting this requirement. Rather than refrigerating the wastewater effluent, the temperature requirement has been met by planting over 34 miles of shaded buffers along the river, augmenting in-stream flows and by reusing effluent for irrigation instead of withdrawing river water for irrigation. Water quality credit trading has also occurred in the watershed between point sources, allowing one wastewater treatment facility to discharge ammonia at a slightly higher rate due to the significant reductions made at another treatment facility.

By taking a holistic, systems-view of the watershed, significant cost-effective environmental benefits can be derived.

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[5] January 13, 2003, *Final Water Quality Trading Policy*, *http://www.epa.gov/owow/watershed/trading/ finalpolicy2003.html*, and August 2007, *Water Quality Trading Toolkit for Permit Writers*, *http://www.epa.gov/owow/watershed/trading/WQTToolkit.html*

C. *Prioritization*

An important opportunity provided by a watershed approach is the science-based prioritization of water quality, water quantity and aquatic habitat issues in a watershed. When setting priorities, the overall goals of protecting human health and restoring the integrity of the environment should be emphasized. Priorities and solutions that provide the largest overall environmental impact can then be developed based on current scientific data and research. This type of prioritization recognizes the need to consider both environmental progress and the wise use of public resources, allowing available funding to address the most significant water quality problems first. Effective use of taxpayer, ratepayer, and other public funds is maximized, and money is spent on projects in the order that will improve the environment most expeditiously.

Good monitoring and modeling data is needed to evaluate priorities appropriately. The Milwaukee Metropolitan Sewerage District (MMSD) in Milwaukee, Wis. has partnered with the Southeastern Wisconsin Regional Planning Commission (SEWRPC) under a memorandum of understanding to conduct parallel planning efforts under the *Water Quality Initiative*. The District's Section 201 facilities plan and SEWRPC's Section 208 regional plan shares resources, data, water quality models and analyses under the umbrella of a watershed-based, water quality planning approach to identify and address the dominant sources of pollution in the watersheds of southeastern Wisconsin. This science-based study found that 90 percent of the water pollution in area watersheds resulted from nonpoint sources. The monitoring data and modeling from the study enable discussions about priorities and how water quality can be improved most effectively. In Milwaukee's case, it is clear that nonpoint sources must be the focus of water quality improvement efforts.

Milwaukee is not an isolated case. Other communities have collected similar data indicating that additional controls on pollutant sources that have historically been targeted may no longer be the most cost-effective means of improving water quality.

D. *Comprehensive, Innovative Solutions*

The concepts and opportunities embodied in a watershed approach should lead to greater use and acceptance of innovative, natural system solutions that can improve water quality and have other environmental benefits. A primary example of this type of innovation is green infrastructure, which imitates natural processes to facilitate the infiltration, evapotranspiration, and/or reuse of stormwater and wastewater. Green infrastructure can provide multiple environmental benefits, such as stormwater control, air quality improvements, reduced energy demands, and improved habitat. EPA recognizes these benefits and has begun to encourage the increased use of green infrastructure.[6] Green infrastructure often offers a cost-effective, sustainable method for improving and maintaining the physical, chemical, and biological integrity of water. Many communities are already putting these concepts into practice.

> Portland, Ore. - To reduce combined sewer overflows, the City of Portland, Oregon is using a comprehensive approach that includes green infrastructure management of stormwater runoff. Stormwater runoff is slowed, filtered, cleansed, and infiltrated through soil and plant systems.

[6] *Green Infrastructure Statement of Intent* Boornazian, Linda, and Mark Pollins, *Memorandum on Use of Green Infrastructure in NPDES Permits and Enforcement*, EPA Water Permits Division and Water Enforcement Division, August 15, 2007

Infiltration gardens, vegetated swales, stormwater curb extensions, stormwater planters, and green roofs are all used to manage the stormwater runoff, with the added benefit of aesthetically enhancing the community. The green infrastructure is supplemented by traditional gray infrastructure improvement, using increased storage capacity to contain stormwater runoff until it can be treated.

Chicago, Ill. - The Chicago area sits upon a sub-continental divide that was breached at the start of the 20th Century to reverse the flow of the Calumet and Chicago Rivers, saving Lake Michigan source water from being polluted by the city's sewage and runoff. With all treated effluent now discharged to the Mississippi River Basin, Chicago is the largest point source of municipal wastewater nutrients draining to the Gulf of Mexico. Recognizing the high cost and energy demand of conventional nutrient removal technologies, the Metropolitan Water Reclamation District of Greater Chicago (Chicago) is looking to wetlands to solve its large nutrient load. Vast areas of bottom land along the Illinois River can be reverted to the wetlands they once were to reduce the nutrients of not only Chicago's municipal wastewater, but also of the even greater nutrient load draining from the corn-belt farm lands in central Illinois, as well as the wastewater of other municipalities in the watershed. Created and restored wetlands along the Illinois River and its tributaries provide benefits beyond nutrient removal, including biodiversity, flood storage, recreation and wildlife habitat. Chicago is working on a pilot project to demonstrate these benefits and the workability of water quality trading. The reduced energy demand using wetlands together with their ability to sequester carbon offers significant climate change advantages as well.

Innovative "gray infrastructure" solutions can also be critical components of a watershed approach. These solutions may provide the most cost-effective method for addressing a specific watershed priority, and regulatory flexibility may be needed for these infrastructure projects.

Cincinnati, Ohio - The City of Cincinnati is using a peak excess flow treatment facility (PEFTF) as a demonstration project for managing excess stormwater flow. The PEFTF operates only during wet weather events, providing primary treatment and disinfection to the stormwater. Although the PEFTF results in significant water quality improvement, there is currently no regulation allowing its use as a permanent facility. Cincinnati was allowed to construct and use the PEFTF for a specified time period and perform an evaluation to show the effectiveness of the facility. Ideally, regulations will be developed to allow the facility to remain permanently – if proven to be the best, most reasonable solution to the overflow problem.

A watershed approach, with its comprehensive evaluation and prioritization of water quality needs, can provide a regulatory framework and support for these types of innovative solutions. Current regulatory implementation and enforcement practices often do not allow for natural system approaches, such as pollutant reductions in wetlands downstream of a discharge which might offset the necessity of installing higher levels of treatment at the utility, and are proving to be significant obstacles to this type of innovation. For example, a watershed approach would allow for examination of the value of the discharge itself to low-flow streams, which may not be able to support aquatic ecosystems without these additional flows. A watershed approach could also allow for consideration of the additional energy demands of requiring more advanced treatment.

V. OBSTACLES TO IMPLEMENTING A WATERSHED APPROACH

Municipalities considering implementation of a watershed approach have encountered many obstacles resulting from current regulatory and political structures. These obstacles will need to be resolved before the opportunities available through a watershed approach can be fully realized.

A. *Regulatory Silos – Roadblocks to Implementation*

A watershed approach is inherently hampered by regulatory "silos" that discourage the holistic planning and management required for watershed improvements. These silos include the different legislation that affects watershed management, such as the Clean Water Act, the Safe Drinking Water Act, and the Endangered Species Act. The separate provisions of each Act do not recognize that "water is water" or that integrated watershed management and prioritization of watershed needs can result in the greatest overall environmental benefits.

> Los Angeles, Calif. – For the Los Angeles County Sanitation Districts, this disconnect between the regulations that currently govern wastewater, drinking water, stormwater, and water reuse is resulting in very real consequences. Confronted with a stringent TMDL for chloride, the Districts are faced with the option of building a pipeline to the ocean to discharge secondary effluent or the more expensive alternative of installing the microfiltration and reverse osmosis needed to meet the requirements of the chloride TMDL for discharging into a nearby stream. Neither option is ideal as the cheaper pipeline would result in the loss of flow in the stream, hurting downstream farmers by greatly diminishing the supply of irrigation water.
>
> In this case, focusing on water quality issues on a pollutant-by-pollutant, segment-by-segment basis, as is mandated by current Clean Water Act regulations, rather than considering all pollutants on a watershed basis, could lead to an ineffective use of public money. Implementation of either the microfiltration and reverse osmosis treatment process or the secondary treatment pipeline would require an investment in the range of $350 million to $400 million, all to address a chloride impairment which occurs only within a very limited section of the river with no prior, existing, or planned agricultural uses that would be sensitive to salt levels. These costly, non-ideal solutions would result in high energy consumption, water wastage, and/or the adverse hydrologic impacts noted above. A comprehensive watershed-level analysis would much better assure that the public's investment was directed toward the project that would result in the greatest improvement of the ecology of the river and protection of the various uses of the river.

Regulatory silos also exist in EPA's organizational structure, with these silos particularly evident in the separation of the Office of Enforcement and Compliance Assurance (OECA) from the various program offices (e.g., the Office of Water). With its sole focus of enforcement, combined with the government's propensity to measure effectiveness based on quantity rather than quality, EPA's enforcement office will often target compliance violations that result in little or no environmental impact. This creates an adversarial relationship between EPA and the entities it regulates, rather than the cooperative relationship necessary for a watershed approach. The separation of enforcement actions from Office of Water management and implementation

decisions greatly decreases the flexibility needed for the prioritization and innovative solutions that could lead to success under a watershed approach.

Silos also exist in the issuance of discharge permits. Although EPA allows and encourages NPDES permitting on a watershed-basis,[7] it is very difficult to synchronize the timing of permits, and permits are still issued on an individual basis to utilities and other entities. True watershed permitting would comprehensively account for all sources (not just point sources), consider the needs of all stakeholders in terms of watershed priorities, and prioritize improvement and restoration activities to achieve the greatest environmental benefit, regardless of the specific regulatory framework.

B. *Regulations Established Ahead of Science*

Many regulations and permit requirements are established without proper scientific research and data, due to legislative or court-imposed schedules or some other external driver. These regulations and requirements often do not address the most significant sources of pollution, or do not adapt with time to reflect current conditions. For example, numeric limits that are currently imposed on point source dischargers can be poor management tools for protection of uses and ecosystems for some pollutants. National numeric limits for nutrients are a prime example. Each watershed will respond differently to a particular load of nutrients, and setting permit limits based on a national, one-size-fits-all approach would not account for the different assimilative capacities of watersheds. For many pollutants, better performance measures that promote optimization of environmental benefits and available resources are needed.

The Clean Water Act, in spite of its broad goals, has primarily focused on end of pipe discharges, reflecting the most significant sources that existed 35 years ago. Because of the Act's successes, the major sources of pollutants have shifted. In the 1970s, a majority of the bacteria loadings to urban waters were attributable to CSOs. Now, for those combined sewer communities who have made significant progress in implementing their long-term control plans, the contribution of bacteria from urban runoff has far surpassed that of CSOs. Yet the regulatory focus is still on the point sources. The current understanding of pollution sources is not reflected in the regulations and more pollution studies are needed to accurately determine the sources of water pollution so they can be effectively addressed. Prioritization of watershed needs could then occur, rather than spending more money on reducing sources that are already comparatively small.

Total maximum daily load (TMDL) schedules can require water resources management decisions ahead of the development of the science to support those decisions. TMDLs are developed on a contaminant-by-contaminant basis, resulting in individual contaminant TMDLs that often conflict with each other. Comprehensive approaches to reducing or controlling contaminants should be used in developing TMDLs and other regulatory tools along with adaptive management with clearly definable milestones/performance standards.

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[7] July 20, 2007, *Watershed-Based National Pollutant Discharge Elimination System (NPDES) Permitting Technical Guidance*, *http://cfpub.epa.gov/npdes/wqbasedpermitting/wspermitting.cfm*

C. *Insufficient Flexibility for Finding Solutions*

Long-term goals and sustainable solutions need to be developed for water quality problems. For water resources management, the current 5-year NPDES permits are too restrictive and promote only short-term water quality goals. Most water quality problems require a long-term commitment and significant capital investment, and longer term plans and permits would be more appropriate. Even for long-term wet weather plans, 20 years may not be enough time to address all of the problems affordably.

Holistic solutions to water quality on a watershed scale will require more adaptability than traditional, end-of-pipe focused techniques. Flexibility is needed with permitting and compliance to allow adaptation in response to the field performance of new and innovative integrated approaches. Green infrastructure will require adaptive management because of the natural processes employed, which may in turn be affected by other natural processes such as severe weather, and because the vegetation involved may take many years to mature and achieve optimum performance. The experiences of the municipal separate storm sewer system (MS4) program provide a foundation for such an approach.

Finally, the overall environmental benefit of green infrastructure needs to be recognized and quantified to encourage its use and acceptance. Balance of overall environmental benefit also needs to be used in the evaluation of green infrastructure's effectiveness. For example, restoration of urban riparian corridors designed to reduce nutrient runoff, reduce erosion, and provide shade may also attract more wildlife and actually increase bacteria loadings to the stream. Flexibility in the implementation of water quality requirements is required to allow for and acknowledge these types of situations.

D. *Uneven Enforcement*

Enforcement of environmental regulations often does not reflect the most important sources of water quality problems. As discussed previously, the majority of impaired waters now results from nonpoint sources instead of point sources, but the Clean Water Act remains squarely focused on point sources. Point sources become government enforcement priorities, while nonpoint source improvement programs generally rely on voluntary participation. Water quality will not see significant improvement until this disparity is resolved or improvements are appropriately incentivized.

Prioritization of watershed needs and the most cost-effective solutions are often hampered by, or even prohibited under, current regulations. This is illustrated by the current situation with sewer overflows and the enforcement actions taken against municipalities that have overflows. Although reduction and elimination of sewer overflows are goals that environmentalists and clean water agencies share, aging and inadequate infrastructure usually requires tremendous capital expenditures to meet these goals. In cases where only a small amount of bacteria comes from overflows, addressing the problem of bacteria in urban runoff before reducing overflows might be more cost-effective and result in greater environmental benefits. Zero tolerance and aggressive enforcement, especially related to wet weather overflows, have resulted in court-ordered spending with no real linkages to water quality. Taxpayer and rate-payer funds may be better spent, and more water quality improvements made, if projects are prioritized and sequenced so that those with the best cost/benefit ratio are conducted first.

E. *Political Issues*

Watersheds often extend beyond traditional jurisdictional boundaries, requiring different legal entities to work together. This cooperation requires that all entities involved provide funding and give up some amount of control to achieve holistic watershed improvement. Without a political and enforcement framework to guide these interactions, there is little incentive for different jurisdictional authorities to work together to prioritize and implement water quality projects. Partnerships are needed between regulators, dischargers, and environmental groups, and these partnerships must be able to survive changes in political leadership.

VI. RECOMMENDATIONS FOR SHORT-TERM IMPROVEMENTS

Many changes must occur before all of the obstacles to watershed-level implementation can be overcome. NACWA offers the following set of recommended actions, based on the real-world experience of its members, that it believes would set the nation's water program on the right course for the future. Many of these actions can be accomplished in the short-term, while others will require a larger, longer-term commitment from legislators and regulators.

Our recommendations for short-term improvements use the Clean Water Act as a starting point. The Clean Water Act contains many provisions that can be used in a watershed approach, including the initial, overall objective that the Act restore and maintain the physical, chemical and biological integrity of the nation's waters. Better utilization of the watershed planning approach outlined in Section 208, better TMDL implementation, and better program integration can at least partially realize some of the benefits of a watershed approach. In addition, existing EPA and other federal government programs can be modified or improved to recognize the value and necessity of a watershed approach. NACWA's short-term recommendations are as follows:

1. **Reinvigorate the planning process of Section 208 of the Clean Water Act.** As discussed previously, Section 208 envisioned regional water quality management planning within areas of substantial water quality control problems. The management plans, formulated by a single representative organization, would consider all sources of pollution and control measures for them. While all states were required to complete the Section 208 process after the Clean Water Act was passed, the management plans have generally been ignored since that time.

   In some of the few places where the plans were followed or have been revived, successes have been seen on the watershed level. In Milwaukee, a Section 208 planning effort was completed in 2007 and has shown that in order to realize the greatest water quality benefit, the investments must include more emphasis on nonpoint pollution. The Section 208 planning effort has opened the door for a more detailed TMDL analysis, which will "shine a light" on the remaining pollutant sources and help to break down the barriers between plan development and implementation.

   To facilitate Section 208 planning and implementation, federal funding from the Farm Bill could be directed to watershed planning, in addition to conservation. Watershed planning would help the conservation funds to be used to the greatest advantage in protecting and improving water quality. Section 208 is not ready-made for this new role, but it provides a clear framework in which to better coordinate planning and clean-up efforts on a more holistic level.

2. **Pursue new, more aggressive measures and funding to address needed controls on agricultural nonpoint sources.** The Farm Bill has been used to promote and fund conservation efforts in the agriculture sector leading to demonstrated water quality improvements. However, as EPA's Science Advisory Board noted in its recommendations on the Gulf of Mexico hypoxia problem, the voluntary programs in the Farm Bill are not likely to obtain significant reductions in key pollutants as long as

there are limited economic incentives (positive or negative) to encourage participation.[8] In addition, the significant sums of money already dedicated to the Farm Bill's various conservation programs must be spent more effectively. To maximize pollutant reductions, targeted and competitive bidding mechanisms could help to ensure that lands enrolled achieve maximum environmental benefits at the lowest cost. Conservation compliance requirements, with targeted reductions in key pollutants, could also be included to ensure that funding is linked with environmental improvement. Additional efficiency could be achieved through the consideration of ancillary benefits – a project that will restore a wetland may be selected over a less costly cropland management plan due to the additional benefits (e.g., habitat, flood control) that the wetland would bring. Providing additional federal funding for nonpoint source controls with the addition of new measures like these should be a priority, but there must also be an oversight regimen to ensure that the funds are in fact being spent as intended.

3. **Promote adaptive implementation of water quality improvement measures based on science.** NACWA and the wastewater industry recognize that nobody fully understands yet how to effectively implement a meaningful watershed approach on a national basis. Adaptive implementation will therefore be required, and decisions will need to be made about watershed priorities and what approaches work well for a specific watershed based on scientific monitoring and data assessment that should occur in a coordinated, watershed-wide manner.

   Addressing nonpoint sources of pollution before further addressing most point sources is likely the most logical adaptive implementation strategy for many watersheds. The answers to how well nonpoint sources can be controlled and what techniques will work best are not yet fully known. We do know, however, that with point source controls maintained at current levels, any gains in nonpoint source control will improve water quality. As data is collected on the effectiveness of nonpoint source controls, decisions can be made about how to devote regulatory energy and financial resources to continue improving both point and nonpoint source controls in the future.

   Adaptive management is also necessary for the innovative solutions enabled under a watershed approach. By their nature, the performance of innovative solutions is not completely predictable, and monitoring will be necessary to prove their effectiveness or to show that other approaches would be better. Adaptive implementation is especially important for green infrastructure, because it uses and depends on natural materials and processes.

4. **Better utilize market-based approaches.** Water quality credit trading efforts are already being implemented, but most credit trading occurs between point sources. A viable method of credit trading between point sources and nonpoint sources is needed, such as the Clean Water Services, Oregon example of planting trees to shade river waters instead of refrigerating the effluent from wastewater treatment facilities. With this type of credit trading, point sources can invest in nonpoint source controls to achieve better environmental results in a more cost-effective manner. In addition, further efforts to control point sources, approaching the limits of technology, will decrease the opportunities for meaningful water quality credit trading. Additional use of watershed-based permits, including

[8] July 24, 2007, *Draft Advisory Report of the Science Advisory Board (SAB) Hypoxia Panel*, *http://www.epa.gov/sab/pdf/hap_draft_advisory_report_7-24-07.pdf*

integrated municipal permits, should be a priority and will provide more opportunities to use market-based solutions.

5. **Break down programmatic regulatory and enforcement silos within EPA's organizational structure.** EPA's Office of Water should evaluate the watershed management aspects of all its offices and divisions. Reorganization should occur as necessary to provide a structure that will allow watershed planning and implementation to proceed with a minimum amount of conflict between the responsibilities of each office and division. EPA's Office of Enforcement and Compliance Assurance must also be involved in these discussions, so that watershed goals can be pursued without threat of enforcement actions.

   EPA has already shown promising steps of increasing cooperation between divisions in regards to green infrastructure. In one recent example, a joint memo issued from the Water Permits Division and the Water Enforcement Division to the EPA Regions and state NPDES directors clarified how green infrastructure can be considered in enforcement activities and incorporated into permits, stormwater plans, and CSO long-term control plans.[9] EPA should continue and increase these efforts to coordinate the actions of its offices and divisions that deal with water quality issues.

   EPA should also look for ways to work with other federal agencies on watershed issues, as with its May 2007 agreement with the USDA to coordinate and cooperate in the prioritization and implementation of nutrient reduction activities for the Chesapeake Bay watershed. With 25 percent of the watershed used for agricultural purposes, conservation programs with the USDA are vital to improving the Bay's water quality.

6. **Use the proper sequence for establishing total maximum daily loads (TMDLs).** The National Research Council's 2001 report on the TMDL program cautioned that the Clean Water Act's goals of fishable and swimmable waters are too broad to be statements of designated uses. Instead, the report recommended additional stratification in designated uses at the state level to recognize that there is no one size fits all solution to water quality. The timing of this evaluation of uses is critical. The Council's report recommended that prior to development of a TMDL, the designated use should be evaluated to determine if it is appropriate. In other words, we must evaluate our goals (the designated use) before developing our plan to achieve that use (the TMDL). Conducted in this order and under the umbrella of a larger watershed effort, these use evaluations and subsequent TMDLs will be less likely to conflict with other water quality-related activities.

7. **Prioritize actions and planning that are currently underway according to watershed needs**. EPA is already focusing time and energy on several major watershed problems with its Chesapeake Bay program and study of the hypoxic zone in the Gulf of Mexico. For these projects, the actions need to be prioritized to result in the most water quality benefits for the money spent.

[9] Boornazian, Linda, and Mark Pollins, *Memorandum on Use of Green Infrastructure in NPDES Permits and Enforcement*, EPA Water Permits Division and Water Enforcement Division, August 15, 2007

For example, EPA's Science Advisory Board released a draft report earlier this year that recommended improving nutrient removal at wastewater treatment facilities within the Mississippi-Atchafalaya River Basin (MARB) to near the limit of technology despite the fact that nonpoint sources contribute the majority of the nutrient loading.[10] A 2004 report of the Chesapeake Bay Commission showed that the costs for point source upgrades were approximately two to five times more expensive (in dollars per pound of nutrient removed) than agricultural nonpoint source controls, such as nutrient management and conservation tillage.[11] With the relatively small contribution of nutrients from wastewater treatment facilities and the high cost of adding additional treatment technology, reducing nutrients from agricultural runoff first would be a more logical and cost-effective prioritization of watershed improvement actions for the MARB.

These recommended short-term changes work within the existing environmental laws and regulations that govern water quality issues. Work on these changes can begin immediately with strong commitments from Congress, EPA, the Departments of Agriculture and Interior, and watershed stakeholders. The changes will help to implement watershed management and planning that can result in significant water quality improvements, and will also help to change the regulatory culture to make the watershed approach the accepted manner of considering water quality issues.

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[10] July 24, 2007, *Draft Advisory Report of the Science Advisory Board (SAB) Hypoxia Panel*, *http://www.epa.gov/sab/pdf/hap_draft_advisory_report_7-24-07.pdf*

[11] December 2004, *Cost-Effective Strategies for the Bay, Chesapeake Bay Commission*, *http://www.chesbay.state.va.us/Cost_Reports.htm*

VII. RECOMMENDATIONS FOR LONG-TERM IMPROVEMENTS

Although the recommended short-term changes will help move the nation's water policy toward more watershed-based implementation, long-term changes are necessary to fully align environmental laws and regulations with a comprehensive, holistic watershed approach. Legislation is needed to establish a framework that will hold all watershed stakeholders accountable for water quality, and the organization of EPA will need to reflect this new framework. To ensure water quality accountability, ongoing monitoring and research will be required on a watershed basis. The details of these recommendations are provided below.

1. **Establish a new water quality framework via a 21st Century Watershed Act.** To achieve significant gains in water quality, a legal framework that considers all impacts on a watershed is necessary. The separate environmental legislation that initiated environmental responsibility and accountability in the U.S. (National Environmental Policy Act, the Clean Water Act, the Safe Drinking Water Act, the Endangered Species Act, and the Clean Air Act) all have similar goals for environmental improvement. However, the fragmented approach from these different laws is now preventing further progress from being made. A Watershed Act would recognize that "water is water" and would consider all water issues together, rather than through independent and sometimes conflicting statutory authority.

   All sources of water quality problems must be considered equitably in a new Watershed Act. The contributions of both point and nonpoint sources must be recognized, with mandatory programs for controlling both types of sources. The costs of water quality improvements must be borne by all watershed stakeholders, with each source – whether point or nonpoint – contributing to costs according to their impact on water quality.

   In addition to the fair sharing of costs, stable funding sources must be specified in a Watershed Act. Although the Clean Water Act initially resulted in large funding sources for water infrastructure, funding has lagged over time and municipalities are currently searching for ways to fund improvements to their infrastructure. A comprehensive funding program needs to be established for the necessary improvements to be made to water infrastructure and to implement new nonpoint source control practices.

   The authority to oversee the provisions of a Watershed Act will need to be considered carefully. Watersheds frequently cross jurisdictional boundaries, even across state and national borders. Watersheds can also be considered on different scales, from local to regional. For example, the Mississippi River basin consists of many other river basins, including the Ohio River basin and the Missouri River basin, which are in turn fed by multiple smaller rivers and creeks. It may be necessary to establish local watershed authorities that then cooperate on a larger, regional-scale.

2. **Reorganize EPA to reflect new watershed framework.** EPA's Office of Water recognizes the importance of the watershed approach for achieving water quality improvements, and includes it as one of its "Four Pillars" for sustainable water infrastructure. Unfortunately, EPA is prevented from fully implementing a watershed approach due to the current regulatory silos established by the separate environmental acts and reflected in the internal organization of EPA. A new Watershed Act

could give EPA the ability to bring its activities together for comprehensive implementation of watershed improvement activities.

After a new Watershed Act is passed, EPA and other resource agencies would need to reorganize to reflect the new watershed framework. This reorganization would be more comprehensive than the short-term changes suggested for breaking down silos within EPA. The new EPA structure must continue to the EPA Regions, which are responsible for much of the management and enforcement of environmental regulations. Enforcement practices would need to be changed to reflect the comprehensive watershed approach, with incentives given for EPA staff to pursue those enforcement actions that will result in the most benefit to the environment, not those that are simply the "low hanging fruit."

3. **Conduct monitoring and research to show that progress is being made via a watershed approach.** The comprehensive watershed approach and the innovative solutions to water quality problems that are included in the approach have not been used in a widespread manner, and water quality results from use of the approach need further long-term evaluation. All watershed stakeholders must be responsible for monitoring their impacts on water quality. Analysis of the monitoring data must reflect the long-term commitment made to water quality with the watershed approach, such as green infrastructure taking years or even decades to become fully effective. Any regression in water quality would still need to be addressed immediately through identification of the sources of the problem and appropriate, practical and adapted solutions to the problem.

VIII. CONCLUSION

NACWA believes it is time to move beyond the chemical and pollutant-specific approaches that have been the basis for implementation of the regulatory programs and enforcement of the Clean Water Act for the past 35 years and instead consider the overall health of aquatic ecosystems, or watersheds, as the main driver for future water quality improvement efforts and investments. A comprehensive and integrated watershed approach to water quality can fully incorporate the chemical, physical, and biological needs of the watershed into planning and management decisions. Watershed-based management can recognize the multiple uses of water resources and provide for participation of all stakeholders in making critical decisions. When prioritization of watershed needs occurs, the best use of all investment dollars can be made by addressing the top causes of water quality impairment first.

NACWA hopes that the recommendations of its Strategic Watershed Task Force will add to the ongoing dialogue on the need for reform in the nation's Clean Water Act, Safe Drinking Water Act, and Endangered Species Act programs. There are clearly changes that could be made now to facilitate more widespread adoption of watershed-based management concepts. But to fully recognize the potential of a true watershed approach, longer-term improvements, as well as visionary leadership from Congress, EPA, and the Departments of Agriculture and Interior will be needed.

NACWA is excited about the promise of further water quality improvements within a holistic, watershed framework, and about the vital role its members will continue to play over the next 35 years of water quality improvements.

For additional information regarding NACWA's
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