*A SYMPHONIC APPROACH TO WATER MANAGEMENT:*
*THE QUEST FOR NEW MODELS OF WATERSHED GOVERNANCE*

DELIVERED BY

G. TRACY MEHAN, III[1]

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[1] Principal, The Cadmus Group, Inc. (www.cadmusgroup.com); former Assistant Administrator for Water, U.S. Environmental Protection Agency, 2001-2003; and Adjunct Faculty, George Mason University School of Law.

It is an honor and pleasure to be with you this afternoon to deliver this Distinguished Lecture here at Florida State University's College of Law. Coming to Tallahassee in late March is a delight. More importantly, I very much look forward to our discussion of the most challenging aspect of watershed management which, 38 years after passage of America's Clean Water Act, is still a stumbling block in our quest "to restore and maintain the chemical, physical, and biological integrity of the chemical, physical, and biological integrity of the Nation's waters."[2]

The challenge of which I speak is not that of managing our water resources as important as that may be. Rather, the challenge I have in mind is that of "managing ourselves" to adopt a phrase from Richard N. L. Andrews's history of American environmental policy.[3]

As Professor Andrews explains, "environmental issues are issues not just of science or economics but of governance."[4] "They concern problems that are not being solved by science and technology alone, nor by the 'invisible hand' of markets or individual actions, and for which advocates therefore seek collective solutions through government action."

[2] 33 U.S.C. Section 1251 (b)
[3] Richard N. L. Andrews, *Managing the Environment, Managing Ourselves: A History of American Environmental Policy* (Yale 2006)
[4] *Id* at p. xiv

Governance is a term which can also apply to effective collaboration in the private or not-for-profit sectors as well as public-private partnerships. All of these are relevant to my topic today.

For those of us who do prefer market-based approaches, be they the work of hands visible or invisible, Andrews is most certainly correct when he notes that, while government action clearly comprehends regulations, public investments, scientific research, technical assistance and the like, "Government policies themselves, moreover, are often causes of environmental problems as well as solutions to them." *Quis custodiet ipsos custodes?*[5]

Issues of governance, therefore, involve the governors as much as the governed. To appreciate this last point consider the negative environmental impacts caused by government subsidies for water development, agriculture, below-cost grazing, below-cost timber sales, fisheries exploitation, ethanol and, of great concern here in Florida, sugar tariffs which have probably contributed as much to the diminishment of the Everglades as any other federal policy.

I intend to describe why, at this juncture in our country's environmental history, particularly at this moment in time under the legal regime established by the Clean Water Act[6], we are forced to grapple with issues of watershed governance.

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[5] "Who will guard the guards themselves" or, for our purposes, Who will regulate the regulators? The quote is from Juvenal's *Satires* in which he may have been more concerned with the problem of hiring guards to prevent infidelity among women whose husbands were out of town. See Eugene Ehrlich, *Amo, Amas, Amat and More: How to Use Latin to Your Own Advantage and to the Astonishment of Others* (Harper & Row 1985), p. 239

[6] Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. Sections 1251-1387

I hope to explain how we have moved from an almost exclusive focus on pipes in the water to a broader vision of watershed management, at the landscape scale, which brings with it the imperative to embrace a symphonic approach[7] to water management, and explore new models of watershed governance scaled to basins of varying size and social composition.

**Progress to date in cleaning up the waters of the U.S.**

Before I discuss our present challenge and predicament, it is useful to recount our nation's tremendous success in cleaning up its waters. I think it is important to recall that Americans have achieved great environmental success in the past, thereby raising our hopes that we will continue to do so in the future.

One traditional baseline for assessing progress to date is the famous passage on Bubbly Creek which appears in Upton Sinclair's famous muckracking novel, *The Jungle*, a scathing critique of social conditions in the stockyards and packing houses of late 19th century Chicago. Allowing for hyperbole, artistic license, and some questionable water chemistry, the book offers a vivid picture of just how bad things had gotten in a young America single-mindedly building its economic base:

[7] My thoughts on this idea have evolved from a broader concern with ecosystem management (See G. Tracy Mehan, III, *Ecosystem Management in the Great Lakes Basin*, Fisheries, Vol. 21, No. 4, April 1996) to some preliminary ideas over the years. See G. Tracy Mehan, III, *A Symphonic Approach to Watershed Management*, Luncheon Address, Straddling the Divide: Water Supply Planning in the Lake Michigan Region, Southern Lake Michigan Regional Water Supply Consortium, Chicago, IL, February 16, 2005, and G. Tracy Mehan, III, *Working Together Holistically: A Symphonic Approach To Watershed Management*, Water Resources IMPACT, November 2006.

> "Bubbly Creek" is an arm of the Chicago River, and forms the southern boundary of the yards: 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. One long arm of it is blind, and the filth stays there forever and a day. The grease and chemicals that are poured into it undergo all sorts of strange transformations, which are the cause of its name; it is constantly in motion, as if huge fish were feeding in it, or great leviathans disporting themselves in its depths. Bubbles of carbonic acid gas will rise to the surface and burst, and make rings two or three feet wide. Here and there the grease and filth have caked solid, and the creek looks like a bed of lava; chickens walk about on it, feeding, and many times an unwary stranger has started to stroll across, and vanished temporarily. The packers used to leave the creek that way, till every now and then the surface would catch on fire and burn furiously, and the fire department would have to come and put it out. Once, however, an ingenious stranger came and started to gather this filth in scows, to make lard out of; then the packers took the cue, and got out an injunction to stop him, and afterward gathered it themselves. The banks of "Bubbly Creek" are plastered thick with hairs, and this also the packers gather and clean.[8]

These conditions no longer exist in Chicago, even on Bubbly Creek. Today you might see a four-pound coho salmon in the Creek or consider buying a million-dollar home nearby.[9]

Chicago eventually started cleaning up[10], as did the rest of the country, long before the passage of the Clean Water Act in 1972 which accelerated the restoration of the waters of the United States. Considering either pounds of pollution abated, stream segments improved, or fisheries restored, America has made tremendous progress over the past decades.

[8] Upton Sinclair, *The Jungle* (1906), Chapter 9
[9] Alby Gallun, "Flushing out Bubbly Creek," Chicago Business, July 25, 2004
[10] Actually, Chicago changed the directions of its rivers, reversing the flow. Instead of flowing into Lake Michigan where waste and disease accumulated, the City sent the waste heading in the opposite direction, down the Illinois and Mississippi Rivers all the way to the Gulf of Mexico. That was state-of-the-art wastewater treatment in those days.

Former EPA administrator William Ruckelshaus has observed that, even if all of our waters are not swimmable or fishable, at least they're not flammable. [11]

In truth, America has done considerably better than the former Administrator's self-deprecating humor would indicate. Focusing on another community on the Great Lakes, hardly a Garden of Eden, there are more signs of significant environmental improvement over the past three and a half decades. In 2006 Lake Whitefish, the number-one commercial fish in the Great Lakes, and a key indicator of water quality, were discovered spawning in the Detroit River in Michigan, the birthplace of the American auto industry, for the first time since 1916. This fishery was lost to pollution from oil, phosphorus, mercury, and organochlorines over many years. Since 1972, the year that the U.S. Clean Water Act (CWA) became law, pollution levels of some of these contaminants are down 95-98 percent. Mercury contamination in fish tissue is down 70 percent and PCB contamination is down 83 percent as measured in herring gulls from a nearby island.[12]

The essence of the Clean Water Act is its prohibition of the discharge of any pollutant into the waters of the United States, from any point source, except when specifically sanctioned in a permit.[13] It does not say anything about air deposition of mercury into a lake, habitat modification of a stream or fertilizer running off a farmer's field. These are

[11] I have been unable to find this remark in print, but several of the former Administrator's associates assured me of its veracity. It was usually an aside made in the course of a speech or congressional testimony.
[12] Sandra Morrison, "Lake Whitefish Returning to the Detroit River to Spawn; Federal Scientists Document First Reproducing Population of Whitefish in the River Since 1916," Sound Waves Monthly Newsletter, (U.S. Geological Survey, August 2006), http://soundwaves.usgs.gov/2006/08/research.html. Of course, other environmental laws and regulations contributed to this progress such as the ban on PCBs and regulation of mercury from incinerators under the Clean Air Act.
[13] Section 301, U.S.C. Section 1311.

just some of the dogs which do not bark in the Clean Water Act. There are no provisions directly regulating these threats to water quality and aquatic resources in the law itself.

A crucial driver of the cleanup of America's waters since 1972 was the Clean Water Act's the imposition of secondary treatment, a technology-based standard, on publicly-owned treatment works (POTWs) or municipal wastewater systems to control sewage. This is a class of large "point sources"[14] discharging directly into the waters of the U.S.

Point sources are defined as any "discernible, confined and discrete conveyance."[15] While the definition now includes "concentrated animal feeding operation[s]," it excludes "agricultural stormwater discharges."[16]

Primary treatment is the use of screens and sedimentation tanks to remove most materials that float or settle. Secondary treatment is the use of bacteria and oxygen in trickling filters or in an activated sludge process to consume organic parts of the waste stream.[17]

As a result of the Clean Water Act, its ambitious wastewater grants program as well as its regulatory provisions, the U.S. population served by POTWs with secondary or greater (i.e., enhanced) treatment almost doubled between 1968 and 1996, from 85.9 million people in 1968 to 164.8 million people in 1996, notwithstanding exemptions then in

[14] The definition can be found in Section 502, U.S.C Section 1362 in the Clean Water Act.
[15] Section 502 (14), 33 U.S.C. Section 1362 (14).
[16] *Id.*
[17] For the lay person's, i.e., lawyer's, definition of primary and secondary treatment, see Robert V. Percival, Christopher H. Schroeder, Alan S. Miller and James P. Leape, *Environmental Regulation: Law, Science, and Policy, Sixth Edition* (Aspen 2009), pages 1266 and 1268, respectively.

effect for discharges to the ocean which encompassed another 17.2 million served by 45 POTWs without secondary.[18] Indeed, it was this regulatory intervention, with an assist from the U.S.-Canadian Great Lakes Water Quality Agreement, which restored the Great Lakes, including the once dying Lake Erie, by limiting discharges from point-source dischargers *only.*

Moreover, categorical, technology-based effluent guidelines were also imposed on industrial point-source dischargers, sector by sector, for numerous parameters or pollutants. In total, EPA concluded that 65 designated industries or categories were suitable for such regulation.[19] It created over 360 industrial subcategories among just the first 30 industries alone.[20]

It is hard to appreciate how all-consuming was this legislatively mandated task of developing technology-based standards for municipal and industrial point sources. It, along with permitting and enforcement, monopolized the time, energy, personnel and political capital of the Office of Water at EPA-just as Congress intended given its concern with the difficulty of calibrating or tailoring control of a specific discharger to the precise ambient water quality of a particular receiving water. Such a water-quality approach requires a lot of data and analysis, sometimes leading to "paralysis by analysis"

[18] Andrew Stoddard, Jon B. Harcum, Jonathan T. Simpson, James R. Pagenkopf, and Robert K. Bastian, *Municipal Wastewater Treatment: Evaluating Improvements In National Water Quality* (John Wiley & Sons, Inc. 2002), p. 52.
[19] Winston Harrington, *Regulating Industrial Water Polluton in the United States*, April 2003, Discussion Paper 03-03, Resources for the Future, p. 5, including footnote 6, available at http://www.rff.org.
[20] *Id* at p. 9.

as was often the case prior to 1972. As early as 1976, over 250 lawsuits challenging specific guidelines were filed.[21]

While I was Assistant Administrator at EPA, a senior career manager in the Office of Water told me that he could count on one hand the number of regulations promulgated *without* a court-ordered deadline, a comment which says a great deal about the density of the regulatory and political process as well as our national penchant for litigation.

For both industrial and municipal dischargers, technology-based permit requirements were to be augmented by additional water-quality based controls if the applicable water quality standards already in place for any given water body were not achieved after the imposition of the technology-based standards. Since permits roll over every five (5) years, this could be accomplished over time as necessary.

Again, point sources were and still are the only sources regulated under the Clean Water Act.[22] By way of comparison, runoff from row crop agriculture is not. This sector is considered a nonpoint source, not a point source.

As of 2007, under the Safe Drinking Water Act,[23] 92 percent of community drinking water system customers (262 million people) were served by facilities for which state

[21] *Id* at p. 10, citing the National Commission on Water Quality (1976).
[22] Stormwater is regulated under the law, but that is a complex case and beyond the scope of our discussion here.
[23] 42 U.S.C. Sections 300f-300j-26

programs reported no violation's EPA's health-based standards.[24] These sources are akin to point sources under the Clean Water Act and are also subject to regulation end-of-pipe, so to speak. The failure to reach 100 percent maybe excused given that there are 52,000 community water systems in the U.S., although just 8 percent of them (4,132) serve 82 percent of the population.[25] Compare this to England, Wales and Scotland which, together, have only 11 utilities.[26]

"The Clean Water Act has enjoyed considerable success in cleaning up the most obvious water quality problems," writes Professor Robin Craig,[27] expressing a view I also share. She cites EPA sources indicating that in 1972 only a third of the nation's waters were safe for fishing and swimming. Wetlands losses were estimated at about 460,000 acres annually. In contrast, by the late 1990s two-thirds of the nation's waters were safe for fishing and swimming. And the rate of annual wetlands losses was estimated at about 70,000 to 90,000 acres.

The governance structure for the regulation of point sources under the Clean Water Act was pretty straight-forward even if difficult to implement in practice. Congress passed the law. EPA issued regulations and guidance and delegated to qualifying states the authority over permitting, inspection and enforcement subject to federal oversight.

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[24] U.S. Environmental Protection Agency, *EPA's Report on the Environment: Highlights of National Trends 2008*, EPA-260-R-08-002, July 2008, p. 11, accessible at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=190806

[25] U.S. Environmental Protection Agency, *Factoids: Drinking Water and Ground Water Statistics for 2008*, EPA 816-K-08-004, November 2008, accessible at http://www.epa.gov/safewater/databases/pdfs/data_factoids_2008.pdf.

[26] Michael Rouse, *Institutional Governance and Regulation of Water Services: The Essential Elements (IWA Publishing 2007)*, pages 29 and 70.

[27] Robert Kundis Craig, *Environmental Law In Context: Cases And Materials* (Thomson/West 2005), p. 751.

The state programs then issued permits to municipal and industrial sources, monitored discharges and inspected and enforced against regulated entities as needed.

It was a linear, top-down system of command-and-control regulation of a large but discrete class of dischargers. While not terribly efficient, it has been effective. It was monophonic plainsong, hardly a symphony.

**Reaching the apogee of water quality?**

Despite the undeniable and tangible progress over the last 38 years, water quality managers perceive that forward momentum has slowed considerably. They perceive that the nation is treading water, so to speak. Moreover, they anticipate that a recovering, growing economy will present ongoing challenges as will the anticipated growth in U.S. population by more than 135 million over the next 40 years.[28]

In January 2009 EPA released its national report[29] to Congress on water quality for the 2004 reporting cycle as required by section 305(b)[30] of the Clean Water Act. This report summarizes water quality assessments from almost all of the states and territories. However, it draws its information from an admittedly small subset of the nation's total waters and may not be representative of water bodies which are not assessed, the vast majority actually. Since reporting jurisdictions assessed only 16 percent of the nation's

[28] State-EPA Nutrient Innovations Task Force, *An Urgent Call To Action: Report of the State-EPA Nutrient Innovations Task Group*, August 2009, p. 1, citing the U.S. Census Bureau. The report may be found at www.epa.gov/waterscience/criteria/nutrient.
[29] U.S. Environmental Protection Agency, *National Water Quality Inventory: Report to Congress-2004 Reporting Cycle*, EPA 841-R-08-001, January 2009, accessible at http://www.epa.gov/305b/.
[30] Section 1315(b), Clean Water Act

3.5 million river and stream miles, 39 percent of its 41.7 million acres of lakes, ponds and reservoirs, and 29 percent of its 87,791 estuary square miles, the statistical validity of the 305(b) reports is open to legitimate question. It is all we have had to rely on until just recently. As Shakespeare wrote, "…an ill-favoured thing, sir, but mine own…"[31]

The bottom lines from these reports are as follow:

- 44 percent of assessed river and stream miles were impaired, i.e., not meeting applicable water quality standards for one or more state-designated uses such as swimming, fishing, drinking water and the like;
- 64 percent of assessed lake acres were similarly impaired;
- As were 30 percent of assessed estuary miles.

EPA reports[32] that, for rivers and streams, pathogens, habitat alterations, and organic enrichment/oxygen depletion were leading causes of impairment. The top sources of impairment included agricultural activities, hydrologic modifications (e.g., water diversions and channelization), and other unknown or unspecified causes.

For lakes and reservoirs, mercury, PCBs, and nutrients were leading causes; and top sources encompassed atmospheric deposition, agriculture and other unknown/unspecified sources.

[31] *As You Like It*, Act v, Sc.4 quoted at http://www.bartleby.com/100/138.10.html.
[32] See the Executive Summary, *National Water Quality Inventory*, p.ES-2.

For bays and estuaries pathogens, organic enrichment/oxygen depletion, and mercury were the major reasons for impairments. Interestingly, only in this category of waters were municipal/discharges, i.e., point sources, listed as top sources of impairment along with atmospheric deposition and other unknown/unspecified sources.

EPA and the states have commenced a round of probability-based surveys to complement the 305(b) reports which are of limited scope. These surveys select sites at random to provide estimates of the condition of a class of waters in a state or region. In 2006 the agency released its Wadeable Streams Assessment, the first statistically-valid survey of the biological condition of small streams throughout the country, conducted in 2004-2005.[33]

This assessment focused on streams that feed rivers, lakes, and coastal areas and was based on sampling 1,392 sites representing similar ecological characteristics in various regions conducted by more than 150 field biologists. It revealed that only 28 percent of the streams were in good condition, 25 percent in fair condition, and 42 percent in poor condition. Again, even with the application of state-of-the-art sampling and surveying techniques, the findings as to water quality in this class of waters leaves much room for improvement.

One begins to sense that we have reached the apogee in the nation's quest for water quality under the existing regulatory regime. A look at the most significant of the

[33] U.S. Environmental Protection Agency, *Wadeable Streams Assessment: A Collaborative Survey of the Nation's Streams*, EPA 841-B-06-002, December 2006, accessible at http://www.epa.gov/owow/streamssurvy/.

nation's watersheds offers more reasons to be concerned about the current state of our national water program in terms of overcoming contemporary challenges to water quality.

Professor Craig and I had the honor of serving on several committees reviewing water quality on the Mississippi River and in the Gulf of Mexico under the auspices of the National Research Council of the National Academies. In our first committee report, we noted that the hypoxic or "Dead Zone" in the Gulf is caused by polluted runoff draining 41 percent of the land in the lower 48 states from the Mississippi, Ohio and Missouri River basins. This hypoxic zone has been measured at various stages as the size of New Jersey or Massachusetts. 90 percent of the nitrogen delivered to the Gulf, the primary cause of its over-enrichment and oxygen depletion, comes from unregulated, diffuse, agricultural nonpoint sources of pollution, approximately 50 percent from fertilizer and mineralized soil nitrogen.[34]

It is a measure of how small is the relative contribution of traditional, regulated point sources (the pipes in the water) to the Gulf hypoxic problem that Chicago's wastewater system may be the single biggest point-source discharger of nutrients to that body of water-at least since the reversal of the flows of the local rivers to avoid polluting Lake Michigan at the end of the 19th century.[35] These waters now flow across the basin divide, down the Illinois River, into the Mississippi and down to the Gulf.

[34] National Research Council, *Mississippi River Water Quality and the Clean Water Act: Progress, Challenges, and Opportunities* (National Academies Press 2008), p. 40, available at www.nap.edu.
[35] I have made this assertion in the presence of officials with the Chicago Water Reclamation District several times, without eliciting any protests, just smiles.

In 2001 the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force submitted to Congress its first "Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico." Resources have been insufficient, but some observers believe an important reason for lack of action "is the lack of a central institution with the mandate and structure that match the scale of the problem."[36] Robert Wayland, former director of EPA's Office of Wetlands, Oceans, and Watersheds and chair of the task force coordination committee argued that "There is not a watershed-wide organization with the right mandate to pursue this work, but there has been no champion from Louisiana, arguing for significant funding for EPA or any other agency to try to put the institutional framework in place."[37]

"So it really has been a shoestring effort," said Wayland.

The Chesapeake Bay presents another disturbing case study of the limits of our ability to protect and restore one of the world's most significant estuaries, a watershed overlapping six states and Washington, D.C. The Bay is home to almost 17 million people. About 150,000 people move to the area each year, and the population is predicted to reach nearly 20 million in 2030, most of whom live within a few minutes of one of 100,000 streams and rivers draining into the Bay.[38]

[36] Rebecca L. Gruby and Larry B. Crowder, *Still Waters Run Deep*, The Environmental Forum (Environmental Law Institute November/December 2009), p. 27.
[37] *Id* at p. 27, quoting Robert Wayland.
[38] This discussion draws on materials in Chesapeake Bay Program (EPA), *Bay Barometer: A Health and Restoration Assessment of the Chesapeake Bay and Watershed in 2008*, EPA-903-R-001, March 2009, p.1, available at www.chesapeakebay.net.

The Bay and its tributaries are suffering primarily from excess nitrogen, phosphorus and sediment entering their waters. The main sources are agriculture, urban and suburban runoff, wastewater, and airborne contaminants. Assuming 100 percent represents a fully restored Bay ecosystem, EPA's Chesapeake Bay Program ranks its overall health at 38 percent with the water quality component coming in at a very poor 21 percent for 2007 and 2008.

Agriculture is the "number one source of pollution to the Bay," according to EPA.[39] It covers roughly 25 percent of the watershed with 87,000 farms across 8.5 million acres. While some large-scale livestock operations are regulated, the application of fertilizers, i.e., nutrients, and pesticides, are not addressed by the Clean Water Act.

That said, urban and suburban stormwater runoff, another major source of pollution in the Bay watershed, "is the only source of pollution that is increasing."[40] It is correlated with population growth, affluence and, most directly, with impervious surfaces-roads, rooftops, parking lots, etc.-which prevent infiltration, retention of water on site, and evapotranspiration, thereby removing pollutants, reducing velocity and avoiding increases in water temperature.

At a certain level of imperviousness in a watershed, a condition known as "urban stream syndrome" develops characterized by "flash flooding," elevated nutrient and contaminant

[39] *Id* at p. 10.
[40] *Id* at p. 10.

levels, altered stream morphology, sedimentation from eroded stream banks, and loss of species diversity. The stream ends up in a concrete box or channel.

I am privileged to serve on the board of the Potomac Conservancy[41] which publishes an annual *State of the Nation's River Report* for the Potomac River, one of the top three tributaries to the Chesapeake Bay, delivering 19 percent of the flow and the largest amount of sediment.[42]

The Potomac Conservancy's recent 2007 report indicates that the amount of developed land in the watershed has doubled since 1970. In the next 20 years, the population of the Potomac watershed will likely grow by 10 percent per decade, adding 1 million inhabitants. Fairfax County, Virginia, ground zero in the Washington suburban boom, has lost 26 percent of its forest area between 1986 and 1999. Between 2000 and 2030, models predict that developed land in the Washington, D.C., area will increase by 80 percent.

The Conservancy's 2007 report also cites the local Council of Governments for the fact that impervious cover in the Washington, D.C., area grew from 12.2 percent to 17.8 percent from 1986 to 2000. "Consider that it took more than 200 years to cover the forests and fields with the 12.2 %, and in 14 years we have watched the percentage of impervious surface increase by almost 50 %," says the report.

[41] Information cited from the Potomac Conservancy's annual reports may be found at www.potomac.org.
[42] *Bay Barometer* at p. 10.

Although stormwater is essentially a species of nonpoint source pollution, in 1987 Congress jammed it into the mold of a point source pollutant, when it wrote Section 402(p)[43] of the Clean Water Act, bringing it into the permitting program and empowering EPA to regulate certain industrial activities and municipal separate storm sewer systems. This, of course, is dealing with the problem after the fact, given that land use, planning and zoning, building and highway codes are all primarily controlled by local governments which have the capacity for dealing with the spread of impervious cover most effectively at the front end of development. In any event, the addition of these new sources to the permitting program expanded EPA's responsibilities "by almost an order of magnitude" according to a recent report of the National Research Council.[44]

The stormwater program has a long way to go to achieve the rigor of traditional point-source regulation. It may never quite get there, but it will most certainly improve over time. Yet, prevention is better than remediation; and state and local governments ought to become involved in "building excellence in" rather than trying to regulate errors out, to take a line from the Total Quality Management movement. In other words, local governments can guide their communities to avoid or minimize impervious surfaces in the first place, protect green space, protect and expand urban tree cover, and create incentives for "green" infrastructure and low-impact development (LID) in the form of green roofs, rain gardens, rain barrels, green walls, vegetated bio-swales, and permeable pavement.

[43] Section 1342(p), Clean Water Act
[44] National Resource Council, *Urban Stormwater Management In The United States* (National Academies Press 2009), p.1, available http://www.nap.edu.

According to the National Research Council, citing data from EPA's 2002 305(b) report, urban stormwater was listed as the primary source of water quality impairment for 13 percent of all rivers, 18 percent of all lakes, and 32 percent of all estuaries.[45] "Although these numbers may seem low, urban areas cover just 3 percent of all of the land mass of the United States, and so their influence is disproportionately large." Developing and developed areas contain some of the most degraded waters in the country, notes the Council. One might add that stormwater flow is the underlying cause of one of the most significant, certainly the most expensive, urban wet weather issue, Combined Sewer Overflows (CSOs).

Connecting water quality managers and regulators with local or municipal officials who control roads, building codes and development is a major challenge in terms of watershed governance. Unfortunately, in most communities these are parallel universes. There are outstanding exceptions to this state of affairs in cities such as Seattle, Portland (Oregon), Philadelphia, Cincinnati, Chicago and Milwaukee, to name a few, very few.

**The symphonic approach**

Peter Drucker, the godfather of American management consulting, once said, "Whom the gods would destroy, they first give forty years of success."[46]

While Drucker may have been thinking of General Motors, his comment describes America's current predicament in terms of its water quality. 38 years after passage of the

[45] *Id* at 25.
[46] Russell Lincoln Ackoff & Sheldon Rovin, *Redesigning Society* (2003), p. 165.

Clean Water Act, we are closing in on that 40-year mark. The gods have reason to be displeased:

> There is a flattening out of the upward curve of progress towards better water quality in America. We confront seemingly intractable challenges, primarily stemming from our inability to grapple with diffuse, polluted runoff…most of which, like row crop agriculture and the expansion of impervious surfaces in rapidly urbanizing communities, are largely beyond the regulatory reach of the CWA [Clean WaterAct].[47]

For too long water quality management has been characterized by compartmentalization and the creation of artificial boundaries among and between various aspects of what should be a unified approach to water quality in terms of the chemical, physical and biological integrity of the nation's waters. It has tolerated, even encouraged a bifurcated approach, allowing unnecessary polarities to dominate policy and practice: water quality versus quantity; land versus water; surface water versus groundwater; point versus nonpoint sources; energy versus water; and supply-side versus demand-side management.

The water policy community in America has struggled to implement the vision of John Wesley Powell, the great explorer of the Colorado River and second director of the U.S. Geological Survey, as articulated in his remarks to the Montana Constitutional Convention in 1889:

> I want to present to you what I believe to be ultimately the political system you have got to adopt in this country, and which the United States will be compelled sooner or later ultimately to recognize. I think each drainage basin

[47] G. Tracy Mehan, III, *Establishing Markets for Ecological Services: Beyond Water Quality to a Complete Portfolio*, NYU Environmental Law Journal, Vol. 17, No. 1, 2008, p. 638.

> in the arid land must ultimately become the practical unit of organization, and it would be wiser if you could immediately adopt a county system which would be convenient with drainage basins.[48]

The watershed approach can be described 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."[49]

Arid or humid, west or east of the 100th Meridian, the watershed approach makes sense even if tradition and our constitutional system preclude jurisdictional arrangements contemplated by Powell. So it is necessary to work over, under, around and through the political boundaries which appear to constrain watershed perspective.

A 2009 report from the Aspen Institute on its recent dialogue on sustainable infrastructure echoes Powell's plea.[50] The report sets out three principles as the basis for its many recommendations for redefining the nation's concept of infrastructure and putting it on the "Sustainable Path." First, "the traditional definition of water infrastructure must evolve to embrace a broader, more holistic definition of sustainable

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[48] Quoted in Daniel Kemmis, *This Sovereign Land: A Vision of Governing the West* (Island Press 2001), p. 177. Evidently, the presentation did not go all that well according to the environmental historian, Donald Worster who describes the event in *A River Running West: The Life of John Wesley Powell* (Oxford 2001), p. 481, citing the *Proceedings and Debate of the Constitutional Convention [Montana]*, pp. 920-23 (in footnote 17).

[49] NACWA[National Association of Clean Water Agencies] Strategic Watershed Task Force, *Recommendations For A Viable and Vital 21st Century Clean Water Policy*, October 18, 2007, p. 6, citing various EPA sources.

[50] R. Bolger, D. Monsma, & R. Nelson, *Sustainable Water Systems: Step One-Redefining the Nation's Infrastructure Challenge. A report of the Aspen Institute's Dialogue on Sustainable Water Infrastructure in the U.S., May 2009, pp. 6-7, accessible at http://www.aspeninstitute.org*. This writer participated in the Dialogue. See G. Tracy Mehan, III, "Redefining Water Infrastructure for the 21st Century," Roll Call, July 20, 2009, www.rollcall.com.

water infrastructure that includes both traditional man-made water and wastewater infrastructure *and* natural watershed systems." Second, this principle "should be embraced by all public and private entities involved in water management, and these same entities have a shared role in ensuring their decisions consider and integrate a set of criteria that include environmental, economic and social considerations (the Sustainable Path)." The third principle explicitly states "that a watershed-based management approach is required for drinking water, wastewater and stormwater services to ensure integrated, sustainable management of water resources."

The Aspen report states that water and wastewater utilties "can lead the way by developing policies and practices that promote preservation and restoration of water resources by fostering strategic partnerships to collaboratively use integrated water resources planning and management as a tool to examine assumptions concerning supply, demand and alternative methods of meeting unmet future demand and social, economic and environmental challenges."

Implementing the ideas of John Wesley Powell and the Aspen Institute, across a span of 120 years, has been daunting given the range of players a watershed manager has to engage if he or she is to address issues inherent in an authentic ecological or watershed approach. The water manager is truly "playing without the ball." Many other parties have the authority, the resources, the expertise and the political capital required to achieve the goals of restoration and protection at landscape scale.

Consider the numerous actors implicated in the agricultural sector who must be mobilized to achieve nutrient reductions needed to achieve water quality standards-farmers, ranchers, concentrated animal feeding operations or CAFOs, processors, fertilizer companies and dealers, grocery chains, chemical companies and pesticide dealers, land grant universities, extension agents, trade associations, federal and state agencies.

In the area of stormwater runoff and impervious surfaces, the roster of players includes but is not limited to mayors, city and county councils, township governments, planning and zoning departments, home builders, housing officials, real estate developers, homeowners, lawn fertilizer businesses, banks, public works and highway departments, parks and recreation officials, local land trusts, pavement manufacturers and regional councils of governments.

If watershed management is going to be effective, it must address the human dimension as well as hydrology, soils science, biology and water chemistry. For this reason wateshed governance requires reinventing the watershed as a social as well as a scientific reality.

A famous theologian said, "Truth is symphonic."[51] A symphony means "sounding together." There is sound, then "different sounds singing together in a dance of sound."[52]

[51] Hans Urs von Balthasar, *Truth is Symphonic: Aspects of Christian Pluralism* (Ignatius 1987). The title of the German original is *Die Wahrheit ist symphonisch; Aspekte des christlichen Pluralismus* (1972 Johannes Verlag, Einsiedeln).
[52] *Id at p. 1.*

All the instruments are different, even striking, not a bad thing, each with its own timbre. "The composer must write for each part in such a way that this timbre achieves its fullest effect." "In the symphony, however, *all* the instruments are integrated in a whole sound."

Yet, claims this theologian, "The orchestra must be pluralist in order to unfold the wealth of the totality that resounds in the composer's mind."

While the unity of the composition comes from the Divine, the purpose of the pluralism is to allow the members of the orchestra "symphonically to get in tune with one another and give allegiance to the transcendent unity."[53] But it is important to keep in mind that "Sym-phony by no means implies a sickly sweet harmony lacking all tension. Great music is always dramatic...dissonance is not the same as cacophony."[54]

At the risk of breaching the wall separating church and state here at this great state university, the idea of symphonic truth provides some insights into the essential requirements of watershed management, especially as it relates to managing diverse and varied human activities across the landscape which threaten the integrity of streams, rivers, lakes and estuaries.

The idea of pluralism inherent in the symphonic approach is congenial to the idea of democracy, limited government and a healthy, diverse civil society, all of which are implicated in issues relating to watershed governance.

[53] *Id* at p. 9.
[54] *Id at p. 15.*

The crucial question remains: What models of watershed governance align with this concept of symphonic truth, and its inherent pluralism, given the diversity, dispersion and relative independence of so many of the actors in the watershed? As will become clear, various models of governance will exist contemporaneously with one another implicating different levels of government, economic sectors, geographic areas or civil society including the private and not-for-profit realms. They will embody concurrent, sometimes mutually reinforcing modes of regulation and collaboration.

**Models of watershed governance**

There are a range of governance models for watershed management which span a continuum ranging from command-and-control to more collaborative models. The viability of these options is dependent upon constitutional, statutory, cultural, social, economic and prudential limitations of each individual watershed community.

The Clean Water Act does not grant EPA direct control over land-based activities, although Congress could extend direct regulation to individual farmers or communities if it so desired. For the foreseeable future, it appears to prefer extending conservation subsidies to agriculture to achieve water quality ends.[55]

[55] A recent example is the U.S. Department of Agriculture's (USDA) new Mississippi River Basin Healthy Watersheds Initiative (MRBI)[55] to be implemented by its Natural Resources Conservation Service (NRCS) which is designed to "help producers in selected watersheds in the Mississippi River Basin voluntarily implement conservation practices that avoid, control, trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity." The MRBI will direct an additional $80 million each fiscal year, FYs 2010-2013, into selected watersheds. See http://www.nrcs.usda.gov/programs/mrbi/mrbi_overview.html .

States, as sovereign governments, cannot be required to do what the federal government wants or have their officials commandeered to do its bidding.[56] That said, most states have voluntarily taken on the responsibilities for carrying out and implementing federal environmental statutes, including the Clean Water Act, in order to gain some control over the regulatory apparatus, keep government closer to home and garner at least some financial aid. In order to receive this delegation, states have put in place statutes, regulations and enough capacity (money and personnel) to carry out these responsibilities subject to EPA oversight to ensure compliance with federal law.

*The SIP model*

States are free, say, to regulate row crop agriculture, land use and other activities using their independent sovereign powers which are presently not given to EPA by Congress. It was originally proposed by the Clinton administration and now the Obama administration, that EPA require states to regulate sources which cannot presently be regulated by EPA as a condition of its Clean Water Act delegation.[57] Thus, such an approach could be termed the *SIP model*, named after State Implementation Plans or SIPs utilized in the Clean Air Act,[58] the most prominent example in environmental law in which the federal government calls upon states to do that which it does not have the authority, political will or resources to do itself.

[56] *New York v. United States*, 505 U.S. 144 (1992)
[57] Jonathan Cannon, *A Bargain For Clean Water*, NYU Environmental Law Journal, Vol. 17, No. 1, 2008, pp. 623-625. Cannon served at EPA in the Clinton administration before it tried to require implementation of such an approach. He does, however, counsel trying again. As it turns out, the complexion of Congress is entirely different from then, at least for now.
[58] Section 110; 42 U.S.C. Section 7410

Under the Clean Air Act EPA establishes nationally uniform ambient air quality standards and then requires states to develop and submit for approval SIPs specifying measures to assure that air quality within areas of non-attainment in the states to meet those standards. EPA cannot dictate the precise mix of control measures taken to accomplish the goal as long as the state program can credibly achieve the desired outcome.[59] The states can use a variety of regulatory and economic tools and legal authorities to accomplish the goal.

If the SIP does not pass muster with EPA, it can impose a Federal Implementation Plan (FIP) to enforce air quality controls which are available under the law. It will, of necessity, focus on larger sources.

The SIP approach for water quality was tried once under the Clinton administration in the face of a hostile Congress which beat it back. The attempt was made in the context of something called the Total Maximum Daily Load (or TMDL) program, a kind of pollution budget required under Section 303 of the Clean Water Act for impaired waters, those not achieving water quality standards for the protection of various designated uses. Under a TMDL the state establishes waste load allocations for regulated point sources, which are then incorporated into permits, as well as load allocations for even unregulated classes of nonpoint sources such as row crop agriculture. Generally, states must demonstrate with reasonable assurance that TMDLs will achieve water quality standards.

[59] *Virginia v. EPA*, 108 F.3d 1397 (D.C. Cir. 1997).

While the federal Clean Water Act cannot reach nonpoint sources, states may do so, utilizing their own authorities or resources, be they regulatory or in the nature of subsidies for best management practices. In fact, some states such as California[60] require implementation of TMDLs already. Most do not. There is no federal requirement for implementation of the entire TMDL at least as to the load allocation for nonpoint sources. However, due to a unique set of circumstances on the Chesapeake Bay, involving judicial consent decrees stemming from previous litigation, and a motivated Obama administration, the SIP-like approach to TMDL implementation appears to be undergoing a revival.

In December EPA wrote to the states in anticipation of a court-ordered TMDL to go into effect in December 2010 requiring implementation plans and milestones for achieving water quality standards in the Chesapeake Bay.[61] The letter describes the establishment of a "new accountability framework" regarding identified actions to be taken if either a state or Washington, D.C., "does not demonstrate satisfactory progress toward achieving nutrient and sediment allocations established by EPA in the Chesapeake Bay TMDL." States are expected to do whatever it takes to get the job done using whatever tools are at their disposal, including the development of "appropriate mechanisms to ensure that non-point source load allocations are achieved."

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[60] *Pronsolino v. Nastri*, F.3rd 1123 (9th Cir. 2002).

[61] "EPA Outlines Framework for Holding States, D.C. Accountable for Reducing Chesapeake Bay Watershed Pollution; Additional $11.2 Million Provided," News Release from Region 3, U.S. Environmental Protection Agency, December 29, 2009; letter to The Honorable L. Preston Bryant, Chair of the Principals' Staff Committee of the Chesapeake Bay Council, from Shawn M. Garvin, Regional Administrator, December 29, 2009, with attachments, accessible at http://www.epa.gov/region3/chesapeake/.

As to the "identified actions" which EPA might take if states don't meet the mark, the letter and an enclosure outlines eight (8) different ones including expanding the Clean Water permitting program to previously unregulated stormwater or animal feeding operations utilizing Residual Designation Authority in the regulations; objecting to proposed permits which EPA deems inadequate; requiring net improvement offsets before new sources may be permitted; increased federal enforcement; conditioning and redirecting EPA grants.

The Washington Post expressed its support for EPA's new or updated and expanded approach in a recent editorial headline: "Bring on the sticks."[62]

Requiring state implementation of TMDLs as to nonpoint-source load allocations, is akin to the SIP model under the Clean Air Act. It is controversial, in part, because it has never been done before given the long-standing and mandated focus on regulating point sources under the Clean Water Act. SIPs largely impact large industrial organizations, although tail pipe regulation has experienced its share of flak over the years. On the other hand, TMDL implementation will impact residential development, farmers, local planning and zoning and more distributed sources of pollution.

It is possible that the political culture of the Bay states will enable them to comply with these demands. Whether or not such an approach will work in Illinois or Iowa or Colorado is an open question. The stick can shift to another hand. States always have

[62] "Bring on the sticks. The EPA outlines consequences for inaction on Chesapeake Bay cleanup," The Washington Post, January 2, 2010, p. A12.

the option of returning their delegated programs back to EPA, a frightening prospect for budget managers at the agency.

*Current statutory models*[63]

One of the reasons why previous administrations and EPA have been driven to the SIP model, is the inability to promote watershed governance effectively through many of the existing statutory provisions. These *current statutory models* have elicited only modest political will and little financial support from the federal government over the last few decades.

Take for instance Section 208[64] of the Clean Water Act relating to areawide facilities planning which envisioned regional water quality management planning and the establishment of an organization to accomplish this task.. Under this section each state was to identify the boundaries of areas with substantial water quality control issues and designate a single organization to formulate management plans. The plans were to include, *inter alia,* the identification and control of nonpoint-source pollution from agriculture, silviculture, mining, construction and other sources.

[63] This discussion relies heavily on Alan H. Vicory and G. Tracy Mehan, III, *Look to the Watershed. A broader approach is needed for U.S. Water quality management,* Water Environment & Technology (WE&T), June 2005, pp. 32-37, and Chapter 2, "The Clean Water Act," National Research Council, *Mississippi River Water Quality And The Clean Water Act: Progress, Challenges, and Opportunities* (National Academies Press 2008), specifically, pp. 82-94, accessible at www.nap.edu.
[64] 33 U.S.C. Section 1288

Only Milwaukee is presently using this section of the Clean Water Act and will be discussed below.

Section 319[65] covers nonpoint source management programs for the states. Under this section states had to identify impaired waters due to nonpoint sources and describe a process and program to deal with them. This, in turn, made them eligible for a very small grant program which, while sometimes leveraging solid improvements, is simply too small to achieve critical mass relative to the size and scope of the challenge.

EPA requires states to use one-half of their 319 dollars to develop and implement watershed-based plans, albeit focused on nonpoint sources only.

Section 319 has demonstrated concrete results in terms of collaborative problem-solving at smaller geographic scales.[66] In several instances waters impaired by nonpoint sources were "de-listed," i.e., brought into attainment of applicable water quality standards. Since watershed restoration, even at larger scales, requires on-the-ground, bottom-up projects to succeed, a significant infusion of federal dollars into this program, at even a fraction of the amount invested in hard infrastructure financing, would generate tremendous results.

Section 319(g) does authorize EPA to convene a management conference of all states in a watershed where upstream sources impair downstream water quality. If the states can

[65] 33 U.S.C. Section 1329
[66] U.S. Environmental Protection Agency, *Section 319 Nonpoint Source Success Stories,* http://www.epa.gov/nps/success/ which outlines 172 such cases.

reach an agreement, they must incorporate it into their nonpoint programs. This process has been used very infrequently. Therefore, its efficacy is still a matter of speculation.

A more robust program, at least in the collaborative if not regulatory sense, is the National Estuary Program (NEP) under Section 320.[67] This section applies to 28 estuaries such as Tampa Bay and Puget Sound. NEPs conduct long-term planning and management to address the myriad issues that contribute to the deterioration of estuaries such as development. NEPs are nominated by state governors and accepted by EPA if certain criteria our met which ensures local buy-in, thus making them operationally community-based.

In a 2005 report EPA documented the benefits of NEPs in terms of governing across political boundaries according to a watershed approach; using science to develop and implement management plans; fostering collaborative problem solving; informing and involving stake holders to sustain commitment; leveraging limited funding resources to ensure implementation; and measuring and communicating results to build support in the community.[68]

At the scale they operate, NEPs appear to be viable models of symphonic governance, one that can complement regulatory or subsidy approaches by providing access and transparency to local citizens and stakeholders. However, NEPs do not seem to drive concentrated regulatory action or even critical mass in terms of funding broad-gauge

[67] 33 U.S.C. 1330.
[68] U.S. Environmental Protection Agency, *Community-Based Watershed Management; Lessons From The National Estuary Program*, EPA-842-B-05-003, February 2005, available at www.epa.gov/owow/estuaries.

programs. So scaling up such an approach would present challenges on large watersheds such as the Mississippi or Ohio Rivers or Great Lakes.

The Clean Water Act also contains several sections by which EPA can promote and fund, at a modest level, water quality and continuous planning processes funded by a percent of infrastructure loan and grant dollars as contemplated by Sections 604 (b)[69], 205(j)[70] and 303 (e)[71]. If the recent uptick in Congressional funding for water infrastructure continues, this might be a promising development for the watershed approach, although, again, at relatively modest funding levels.

Unlike the SIP model, none of these statutory approaches require states or private parties to do anything they do not want to do already. They are process-based but cannot compel action, say, with respect to presently unregulated sources of pollution or water quality impairments.

A recent variant of these statutory approaches, scaled up substantially, is a proposed Staff Discussion Draft of a "Sustainable Watershed Planning Act"[72] being circulated for comment by the House Sub-committee on Water Resources and Environment, Committee on Transportation and Infrastructure. This is very much a work in progress and will be revised continually in the weeks ahead.

[69] 33 U.S.C. 1384.
[70] 33 U.S.C. 1285.
[71] 33 U.S.C. 1313.
[72] July 31, 2009 (5:58 p.m.), copy in author's file.

This draft legislation contemplates the establishment of an Office of Sustainable Watershed Management in the Executive Office of the President to oversee the establishment and partial funding of Regional Watershed Planning Boards for ten (10) watersheds within a certain state or states which voluntarily want to take advantage of this process and funding mechanism. It is focused on large-scale watersheds the size of a portion of one of the Great Lakes or the entire Chesapeake Bay.[73] It takes a big-picture approach in terms of the scale of the watersheds targeted and is comprehensive in its approach to all aspects of watershed management (land, water, surface and groundwater, etc.). Finally, it seeks to align state, federal, private and other interests in a consistent approach to watershed planning and management.

This draft legislation also guarantees diverse representation on regional watershed planning boards established which will be co-chaired by one federal and one state representative with additional representatives for interstate agencies or compacts, Indian tribes, local governments and nongovernmental entities from a range of stakeholder interests, e.g., ranching and recreation, and geographic distribution.

The legislation eschews any interest in overriding state control of water quantity and rights. Whether this assurance, the voluntary nature of the process and the promise of greater funding will generate sufficient political support remains to be seen.

[73] That is, "not smaller than the boundaries defined by the 4-digit hydrologic unit code level, as defined by the United States Geological Survey." Section 201 (a)(2), Sustainable Watershed Planning Act, Staff Discussion Draft, July 31, 2009.

*The interstate compact model*[74]

Since 1936 states have entered into interstate compacts for joint basin management on the Delaware, Susquehanna, Potomac, and Ohio basins as well as those sharing the Great Lakes and Lake Tahoe. About one-half of the contiguous states are signatories to a compact created for water quality or water resources management.

Section 103[75] of the Clean Water Act requires the EPA Administrator to encourage cooperative activities by the states and encourage compacts, but that is a provision more honored in the breach.

For those commissions established prior to 1972, of which there are six (6), funding is available for various functions under Section 106[76] of the Clean Water Act just as if they were a delegated state program if they do such things as develop TMDLs, and carry out activities relating to water quality standards, monitoring, and the like.

While these interstate commissions with Clean Water Act responsibilities are confined to the northeastern quadrant of the country, they may be a solid platform from which to build out more ambitious watershed-scale activities across political boundaries and societal sectors.

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[74] For this discussion, see Alan H. Vicory and G. Tracy Mehan, III, *Look to the Watershed. A broader approach is needed for U.S. water quality management*, Water Environment & Technology (WE&T), June 2005, pp. 32-37 and Chapter 7, "Collaboration for Water Quality Improvement Along the Mississippi River Corridor," National Research Council, *Mississippi River Water Quality And The Clean Water Act: Progress, Challenges, and Opportunities*, (National Academies Press 2008), pp. 190-211, accessible at www.nap.edu.

[75] 33 U.S.C. 1253.

[76] 33 U.S.C. 1256.

An exciting example of such an evolution is the collaboration between ORSANCO, the Ohio River Valley Water Sanitation Commission[77] and EPRI, the Electric Power Research Institute,[78] on regional water quality trading in the Ohio River basin for control of nitrogen, phosphorus and greenhouse gases resulting from the power sectors' air quality removal actions which, in turn, result in water discharges.[79] Both EPRI and EPA are providing financial support. The American Farmland Trust is also participating as is a national law firm, a prominent consulting firm and the University of California at Santa Barbara.

Given the scale at which this trading project will operate, power companies, farmers and other industrial dischargers will be participating in this cost-effective program which takes advantage of the differential control costs and multiple environmental benefits to be derived from point-to-nonpoint source trading.[80] The eventual participation of POTWs would be a logical development if this project is actually implemented.[81]

The EPRI-ORSANCO effort also contemplates participation in emerging greenhouse gas markets since agricultural Best Management Practices (BMPs) which reduce nutrient

[77] www.orsanco.org.
[78] www.epri.com.
[79] Details of this multi-credit trading program may be found at www.epri.com/ohiorivertrading.
[80] For more on trading see U.S. Environmental Protection Agency, *Final Water Quality Trading Policy*, January 13, 2003, accessible at http://www.epa.gov/owow/watershed/trading/finalpolicy2003.html, and *Water Quality Trading Toolkit for Permit Writers*, August 2007, http://www.epa.gov/owow/watershed/trading/WQTToolkit.html.
[81] While I was Assistant Administrator for Water at EPA, we looked at the Ohio River as an excellent opportunity for large-scale water quality trading because it had a good mix of point sources and agricultural nonpoint sources, allowing for cost-effective trading. At the time we were not even thinking of the role that power plants might play.

runoff or nonpoint source pollution will likely reduce, say, nitrous oxide releases. One ton of nitrous oxide has the same warming impact of 310 tons of carbon dioxide. "Approximately 74 percent of all U.S. nitrous oxide emissions come from agriculture, primarily from agricultural soil management activities such as commercial fertilizer applications and other cropping factors,"[82] states a 2003 report from the World Resources Institute.

Although the initial object of the Ohio River Basin Trading Program is to anticipate numeric water quality standards for nutrients on the Ohio itself, the long-term possibilities for addressing Gulf hypoxia are tantalizing indeed. The Ohio River accounts for approximately 28-30 percent of the total nitrogen ultimately heading south.[83]

**Collaboration as model and theme: the role of utilities**

No categorization of governance models is perfect. Such arrangements always partake of different modes of interaction in the real world. This is definitely true in the matter of watershed management at the local, regional or interstate level. While the NEPs or National Estuary Programs discussed above are derived from the Clean Water Act, they are very collaborative in design and practice.

Interstate compact organizations or commissions, established by acts of state legislatures and Congress, must pursue collaboration in the setting of priorities and the

[82] Suzie Greenhalgh & Amanda Sauer, *Awakening The "Dead Zone": An Investment for Agriculture, Water Quality, And Climate Change* (World Resources Institute 2003), p. 6, accessible at http://sustag.wri.org/deadzonehypoxia-pub-3803.html.
[83] National Research Council (2008) at p. 40.

implementation of programs simply by reason that all its members of sovereign entities unto themselves.

Finally, a voluntary collaboration might come into existence due to the difficulties in complying with regulatory mandates. It may facilitate a smoother, cost-effective means of compliance which minimizes cost while yielding multiple kinds of environmental benefits. Restoring a riparian corridor with trees and native grasses will not only improve water quality but also provide habitat, sequester carbon and offer a pleasing aesthetic view.[84]

Collaboration as an element of symphonic watershed governance is really a theme or component which can be incorporated or integrated into various other models.

Given the difficulties of actualizing watershed governance at the regional and interstate levels, there is some evidence that water and wastewater utilities are well suited to assume a leadership role in effectively organizing the diversity of stakeholders, the plurality of interests and the mobilization of resources in the service of successful, i.e., symphonic, watershed management.

[84] A recent study documents the monetary benefits of "green" infrastructure or low-impact development (LID) approaches in the context of urban wet weather issues (CSOs, stormwater, etc.) in Philadelphia's proposed CSO plan. Stratus Consulting, *A Triple Bottom Line Assesment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds: Final Report*, August 24, 2009, available from the Philadelphia Water Department.

*New York City filtration avoidance*

While not a purely collaborative undertaking, at least from the standpoint of many "Upstate" citizens, New York City's filtration avoidance program, pursuant to the Safe Drinking Water Act,[85] illustrates the possibilities of the watershed approach in the service of a utility's mission. Driven by new regulatory requirements, New York pursued an alternative to spending $6 to $8 billion on a new filtration plant to protect the 1.5 billion tons of drinking water it supplies to nine million New Yorkers daily. 90 percent of the water comes from the Catskill-Delaware watershed, 125 miles north and west of the city.

EPA gave its blessing to New York City to pursue a watershed management approach at a cost of only $1.5 billion. It effectively made the city responsible for restoring stream corridors, reforestation, buying land, paying for manure management techniques and fencing animals out of waterways, and other land- or watershed-based BMPs.[86]

Just last month the New York City announced another $3.1 million purchase of 685 acres of land for watershed protection, bringing the total land protected to date, by purchase of either fee simple interest or easement, to 105,000 acres in "upstate" New York.[87]

Instead of only managing its hard or grey facilities, New York is noe responsible for managing its immense watershed as well.

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[85] For information see http://www.epa.gov/region2/water/nycshed/filtad.htm.

[86] This discussion of New York City is drawn from James Salzman, *Creating Markets for Ecosystem Services*, New York Law Review 870 (2005), quoted at length in Robert V. Percival, Christopher H. Schroeder, Alan S. Miller and James P. Leape, *Environmental Regulation: Law, Science, and Policy, Sixth Edition* (Aspen 2009), p. 36.

[87] "New York City to Acquire 685 Acres of Land for Watershed Protection. City Has Purchased Land or Easements on More than 105,000 Acres of Upstate Land," New York City Department of Environmental Protection, February 28, 2010 accessible at http://www.nyc.gov/htm/press_release/10-20pr.shtml.

Water and wastewater utilities, if empowered by their boards, political leaders, ratepayers and executive leadership, are well-suited to the task of collaborative governance within their own watersheds. They bring unique expertise to the table on a variety of water management matters. While facing their fair share of financial challenges, they are blessed with a steady stream of income from ratepayers as well as government loans and grants. Given that most of the American sector is municipally owned, utilities are experienced and knowledgeable in the delicate dance of inter-governmental relationships since they simultaneously fill the roles of regulator and regulated. They also understand the need to be responsive to the broader community which makes up their ratepayer base.

*Milwaukee's "Sweetwater Trust"*

The Milwaukee Metropolitan Sewerage District (MMSD)[88] provides a useful case history of the potential of utility leadership in leading a symphonic approach to watershed governance to address urban wet weather issues under the Clean Water Act. It is not only an example of a utility pursuing a collaborative model but also an instructive if paradoxical case. MMSD's long-term success may depend on an entirely new nongovernmental organization, a public-private, not-for-profit partnership, a kind of voluntary association, with a life all its own.[89]

[88]See http://v3.mmsd.com for more information on MMSD.

[89] What follows is based, in part, on numerous conversations with Kevin Shafer, Executive Director of MMSD over the past three years as well as his PowerPoint Presentation, April 28, 2008, entitled, "The Milwaukee Regional Partnership Initiative in the author's file. See also Milwaukee Metropolitan Sewerage District, *Fresh Coast Green Solutions: Weaving Milwaukee's Green & Grey Infrastructure Into A Sustainable Future*, undated, accessible at http://v3.mmsd.com/Sustainability.aspx.

MMSD provides wastewater and flood management services to 1.1 million customers in 28 communities, serving 411 square miles on the shore of Lake Michigan.

As with many older communities in the Northeast, Midwest and West Coast, MMSD had to respond to urban wet weather issues, especially Combined Sewer Overflows (CSOs), releases of massive amounts of wastewater during big-storm events resulting from an infrastructure design in which sewage and stormwater were conveyed in the same pipes to treatment plants. When the pipes overflow, and to avoid disrupting biological treatment processes, the wastewater is allowed to overflow into receiving waters.[90]

CSOs make up approximately 5 percent of MMSD's service area, but bring with them tremendous financial and environmental consequences.

As a result of federal policy and regulation, MMSD invested $3 billion in "grey" infrastructure through the 1990s as part of its Water Pollution Abatement Program (WPAP), for structural work, i.e., large underground deep tunnels to hold overflows for treatment after the storm event subsided. It is currently finishing another $1 billion investment.

Before WPAP came on line, MMSD experienced between 50 and 60 overflows per year with an annual average volume of 8 billion to 9 billion gallons of overflow. Presently, it

[90] U.S. Environmental Protection Agency, *Report to Congress: Impacts and Control of CSOs and SSOs,* EPA 833-R-04-001, August 2004, available at www.epa.gov/npdes.

has only two overflows per year with an annual average of one billion gallons of overflow.

Unfortunately, within the six (6) sub-watersheds in MMSD's service area and tributary to Lake Michigan, 37 percent of the annual bacteria load comes from rural nonpoint sources and 56 percent from urban stormwater.[91] Beach closings still occur after significant storm events. These challenges now eclipse CSOs as the main obstacle to further gains in water quality

In addition, University of Wisconsin researchers are predicting that extreme precipitation events will become 10 to 40 percent stronger in southern Wisconsin due to climate change and variability. CSO events, with resultant overflows into Lake Michigan, will rise by 50 to 120 percent by the end of this century.[92]

While MMSD already used the Clean Water Act's Section 208 planning process, the only POTW in the country that does, it has decided to pursue a collaborative approach to watershed management, focusing on flow reduction coming from stormwater and nonpoint sources which are either insufficiently regulated or not regulated at all. As part of this effort, it invests heavily in regional water quality monitoring on a watershed basis.

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[91] Timothy Bate, William Krill, Troy Diebert, Leslie Shoemaker and Kevin Kratt, "Milwaukee's Next Step: Watershed Restoration Plans (*Instead of TMDLs)*, Figure 1, a paper delivered to WEFTEC, Chicago, IL, October 2008, in the author's files. The authors included members of MMSD staff and outside consultants.
[92] Jonathan A. Platz, MD, MPH, Stephen J. Vavrus, PhD, Christopher K. Uejio, MA, Sandra L. McLellan, PhD, *Climate Change and Waterborne Disease Risk in the Great Lakes Region of the U.S.,* American Journal of Preventive Medicine, November 2008, p. 451; "Great Lakes' Study Ups Chances for Waterborne Disease," Water & Wastewater News, October 10, 2008.

It is also developing watershed restoration for its six (6) sub-watersheds. Ultimately, it hopes to incorporate at least some of these areas into a watershed-based permit to control all point and nonpoint sources across numerous municipal jurisdictions.[93]

MMSD is already promoting watershed-based, distributed "green" infrastructure approaches such as disconnection of downspouts, use of rain barrels, vegetated swales, cisterns, installation of green roofs and urban reforestation to supplement grey infrastructure by reducing flow through infiltration, retention and evapotranspiration at the site level. Subject to design, scaling and management, MMSD has documented capital cost savings from pursuing this approach.

It is already working with the Conservation Fund, the second largest land conservancy in the nation, to buy and restore floodplains to manage flooding and reduce stormwater flows. This "Greenseams" program has already acquired over 2,000 acres since 2002 and has identified a total of 15,000 acres for purchase. MMSD has spent $13.4 million from its capital improvements budget and has also received some grants for the program.

Kevin Shafer, the Executive Director of MMSD, came to realize that suburban communities, business, agriculture, environmental groups, universities and a range of stakeholders will have to be brought into the watershed process if the goal of transforming the landscape, in both its urban and rural aspects, is to be attained. This will

[93] Watershed-based permits are (1) issued on a watershed basis, (2) focused on multiple pollutant sources, (3) targeted to achieve watershed goals, and (4) integrate permit development among monitoring, water quality standards, nonpoint sources and other programs. Patrick Bradley/LimnoTech, "NPDES Watershed Based Permitting," Powerpoint to the Southeast Wisconsin Watershed Trust, July 13, 2009. Bradley was the leading EPA expert on this subject before joining LimnoTech in 2008.

be accomplished by means of "green" infrastructure for stormwater control and BMPs for agricultural nonpoint sources. Shafer eventually came upon Chicago Wilderness[94]as a prototype of the kind of collaborative model MMSD needed to engage the larger community, including numerous local jurisdictions with a particular interest in stormwater compliance.

Chicago Wilderness is an alliance of organizations interested in protecting and restoring biodiversity in urban, suburban and rural areas in and around the Chicago metropolitan region. With its more than 240 members, this organization seeks to raise awareness and knowledge about nature, healthy ecosystems and biological resources, especially prairie landscapes; increase public participation and stewardship; build alliances among diverse constituencies; and facilitate applied natural and social science research, BMPs and the sharing of information. It also seeks to generate broad-based public and private support and attract resources to achieve its goals.

Shafer and other leaders in Milwaukee's water community were was able to initiate an extended process of consultation and deliberation among interested stakeholders with funding from a local foundation and facilitated by a local university professor.

MMSD, working with the Southeastern Wisconsin Regional Planning Commission (SEWRPC)[95] had already revised its Section 208 plan and resolved on a regional partnership, the Milwaukee Regional Partnership Initiative, to develop restoration plans

[94] http://www.chicagowilderness.org.
[95] http://www.swrpc.org.

for each of its six (6) sub-watersheds. As originally conceived, it included an Executive Steering Council with various policy, legal, technical and scientific advisory committees with direct oversight of plan development. The Council was fairly representative of the community if limited in number.

In time, something like a consensus was realized on a new entity akin to Chicago Wilderness: the Southeast Wisconsin Watershed Trust (SWWT),[96] popularly known as the "Sweet Water Trust." Formed in 2008, it sought to focus on "integrated water resources management" across political boundaries and engage in "second level planning" to fulfill the regional plan previously developed and in conjunction with the individual "Watershed Restoration Plans" to be undertaken in each sub-watershed. To that end, it has established "Watershed Action Teams" under the direction of an expanded Executive Steering Council.

One of its key goals is to "Identify/support land use practices and designs that enhance/improve water resources and promote and restore ecological benefits." It also aims to "Forge and strengthen relationships to leverage funding and recommend policies to assist in the implementation of projects to produce lasting water resource benefits and cost savings throughout the Greater Milwaukee Watersheds and nearshore Lake Michigan."

Among its primary purposes is "To build partnerships and enhance collaborative decision-making and joint project implementation engaging government, business, the

[96] http://www.swwtwater.org

building industry, agriculture, environmental, and other stakeholder organizations to obtain broad agreement and recommend where to invest funds to get the greatest benefit."

SWWT's membership includes individuals, units of government, nongovernmental organizations and the business community. It is hiring staff and has received a $1.9 million grant from the Joyce Foundation.[97] It also convenes a well-attended annual conference.

**Conducting a watershed symphony**

Alternative forms of watershed governance are not mutually exclusive. In the complex political, legal and social realities of American communities and their watersheds can be found a mix of top-down, bottom-up, command-and-control and collaborative approaches necessary to managing water resources and the citizens who reside there. But the centrality of the land-water nexus and the overarching challenge of land-based pollution and physical alterations, which impair the chemical, physical and biological integrity of the nation's waters, make it imperative that water managers take a symphonic approach to watershed governance. In this way they can account for the diversity and pluralism of human activities across the landscape while attending to their paramount mission of watershed protection and restoration.

[97] "Sweet Water Trust and Its Environmental Partners Get Boost to Improve Water Quality in the Milwaukee River Basin," Press Release, July 7, 2009, Southeast Wisconsin Watershed Trust. In a complementary move, Joyce is also providing the national environmental organization, American Rivers a $375,000 grant, with a $150,000 match from MMSD, to work with Milwaukee communities to adopt sustainable "green" infrastructure solutions to wet weather problems. "Milwaukee's communities and clean water benefit from grant awarded to American Rivers," Press Release, May 1, 2009, http://www.americanrivers.org.

While the largest of the nation's watersheds will be governed according to their own tailor-made ways, the most common, logical means of effectuating a symphonic watershed governance model across the country is through the instrumentality of water, wastewater and stormwater utilities who need to assume a greater leadership role in their respective home watersheds. This will require that utility managers redefine their roles in terms of both watershed protection, community involvement and facilities management.

Water managers, especially those in the utility sector, must engage, educate, enlist and motivate many different citizens and economic sectors in the cause of water quality. They will have to become composers, conductors and active members of a symphonic orchestra of restoration. They cannot escape this responsibility if they hope to achieve their ultimate aims in service to their customers, citizens and the environment. Simply managing a facility is no longer sufficient. The problem extends far beyond their immediate service area to the entire basin, catchment, drainage or watershed.

Fortunately, Americans have a knack for the kind of collaboration or partnerships which can bring success by means of a symphonic approach to watershed management and governance.

In his 1835 masterpiece, *Democracy in America,* Alexis de Tocqueville, reported on his observations of the American scene after an extensive tour of the new Republic. Of special interest to our discussion is the following passage:

> Americans of all ages, all conditions, and all dispositions constantly form associations. They have not only commercial and manufacturing companies, in which all take part, but associations of a thousand other kinds, religious, moral serious, futile, general or restricted, enormous or diminutive. The Americans make associations to give entertainments, to found seminaries, to build inns, to construct churches, to diffuse books, to send missionaries to the antipodes; in this manner they found hospitals, prisons, and schools. If it is proposed to inculcate some truth or to foster some feeling by the encouragement of a great example, they form a society. Whenever at the head of some new undertaking you see the government in France, or a man of rank in England, in the United States you will be sure to find an association.[98]

Tocqueville saw voluntary, intermediate associations that mediate between individuals and government, as unique institutions which, even in the early 19th century, flourished among Americans.

This American genius for voluntarism and collaboration is a strength which water managers need to draw upon as they reach out to their watershed communities and orchestrate a symphonic approach to watershed governance. If truth is symphonic, a symphony is what they must compose.

Thank you for your attention.

[98] Alexis de Tocqueville, *Democracy in America*, ed. Phillips Bradley (New York, 1945) II, p. 106