Resilience, Restoration, and Sustainability: Revisiting the Fundamental Principles of the Clean Water Act

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INTRODUCTION

Some think it unwise to revisit a place embedded with fond memories, for it is never quite the same, either because the place itself has changed, or because your memories have been filtered through the years. I prefer to think of it as a mixed blessing. The fond memories are refreshed, but something is always missing or significantly changed. Likewise, there is both utility and peril in revisiting bedrock principles held dear throughout a career of understandings and expectations. Thus, it is with some trepidation that I revisit the fundamental principles of the Clean Water Act ("CWA"),[1] a statute on which I have worked off and on for some thirty years. Then again, as John Lilly wrote: "Our only security is our ability to change."[2]

After engaging in what I hope is an objective analysis of those basic concepts, I reached conclusions that are, not surprisingly, mixed and that largely agree with those reflected in Professor Glicksman and Mr. Batzel's companion article.[3] Many of the basic ideas in the

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1. 33 U.S.C. § 1251 (2006).

2. RICHARD KEHL, BREATHING ON YOUR OWN, QUOTATIONS FOR INDEPENDENT THINKERS 24 (2001).

3. Robert L. Glicksman & Matthew R. Batzel, *Science, Politics, Law, and the Arc of the Clean Water Act: The Role of Assumptions in the Adoption of a Pollution Control Landmark*, 32 WASH. U. J.L. POL'Y 99 (2010).

CWA remain as sound today as they were when enacted in 1972.[4] For example, in section 301(a) of the Act, Congress reversed the prior presumption that discharges of pollutants into surface waters were permissible absent a showing of harm and changed the law to flatly prohibit all pollutant discharges absent valid permits and compliance with treatment requirements and other conditions.[5] The underlying goal of the statute for such sources is zero discharge of pollutants into the waters of the United States.[6] Along the same lines, Congress replaced the existing water quality-driven pollution control strategy with a requirement that all point source dischargers implement minimum technology-based standards, with water quality-based limitations as a backup to ensure attainment of water quality standards in individual water bodies[7] wherever attainable by 1983.[8] Third, although there had been significant precedent for whole watershed planning in earlier federal laws such as the Water Resources Planning Act of 1965,[9] the 1972 CWA amendments sought to expand the focus of analysis from the effects of individual dischargers on discrete water segments to one in which states must consider the comprehensive effects of point source discharges and other sources of pollution—including land disturbance and other polluted runoff—on a watershed basis.[10]

The fact that these bedrock principles of the 1972 Act remain sound, of course, does not mean that all of those concepts have been implemented fully and adequately. To name just a few important

4. By the "Clean Water Act," for purposes of this analysis, I am referring to the major amendments to the Federal Water Pollution Control Act adopted by Congress in 1972. Federal Water Pollution Control Act of 1972, Pub. L. No. 92-500, 86 Stat. 816 (1972) (codified as amended at 33 U.S.C. §§ 1251–1387 (2006)). Future references to the Act will be to section numbers of the statute in the text, and to the U.S.C. sections in footnotes, except as otherwise noted.

5. *See* 33 U.S.C. § 1311(a) (2006).

6. *See id.* §§ 1251(a)(1), 1311(b)(2)(A), 1316(a)(1). Glicksman and Batzel correctly question whether everyone in Congress viewed this as a realistic as opposed to an aspirational or politically motivated goal. Glicksman & Batzel, *supra* note 3, at 106.

7. *See id.* §§ 1311(b), 1314(b).

8. *See id.* § 1251(a)(2).

9. Water Resources Planning Act of 1965, Pub. L. No. 89-80, 79 Stat. 244 (codified as amended at 42 U.S.C. § 1962 (1965)).

10. *See, e.g.*, 33 U.S.C. § 1258 (2006). In the 1987 amendments, Congress adopted a more specific set of requirements for states to develop watershed-based plans and controls on nonpoint source pollution. *See id.* § 1319.

examples, not all point source discharges have been controlled properly;[11] enforcement is difficult and limited by resources and sometimes politics;[12] pollution from nonpoint sources remains significant, and in many cases, subject to weak or even nonexistent controls;[13] a large percentage of water bodies around the country continue to violate ambient water quality standards;[14] implementation has focused on chemical pollution to the detriment of other significant kinds of aquatic ecosystem impairment;[15] and permits for discharges of dredge-and-fill material into wetlands and other similar waters are dispensed so frequently that many of those waters have simply been eliminated entirely.[16]

However, in other respects and in some cases because of the significant implementation failures or gaps just mentioned, some of the major underpinnings of the CWA merit reconsideration given changes in science and society. Any attempt at such a sweeping analysis of a statute that spans hundreds of pages of text would necessarily be incomplete, especially in a relatively short symposium essay. Therefore, rather than even attempting a comprehensive review, I am taking a thematic approach based on the guiding principles Congress articulated in the law's opening provision: "The objective of this chapter is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[17]

From this overarching statement of the statutory goals, I will critique four major concepts. First, the concept of "integrity" was adopted and has been interpreted based on ecological concepts that have evolved considerably over time; today, there is greater

11. *See* William L. Andreen, *Water Quality Today—Has the Clean Water Act Been a Success?*, 55 ALA. L. REV. 537, 543 (2004).

12. *See id.* at 543–44 & nn.31 & 38; Clifford Rechtschaffen, *Enforcing the Clean Water Act in the Twenty-First Century: Harnessing the Power of the Public Spotlight*, 55 ALA. L. REV. 775, 776 (2004).

13. *See* Andreen, *supra* note 11, at 543–45; David Zaring, *Agriculture, Nonpoint Source Pollution, and Regulatory Control: The Clean Water Act's Bleak Present and Future*, 20 HARV. ENVTL. L. REV. 515, 528 (1996).

14. *See* U.S. Environmental Protection Agency, National Assessment Database, http://www.epa.gov/waters/305b/index_2004.html (last visited May 23, 2010).

15. *See* Robert W. Adler, *The Two Lost Books in the Water Quality Trilogy: The Elusive Objectives of Physical and Biological Integrity*, 33 ENVTL. L. 29 (2003).

16. *See id.* at 69; Andreen, *supra* note 11, at 545–46.

17. Clean Water Act § 101(a), 33 U.S.C. § 1251(a) (2006).

recognition of the understanding that healthy ecosystems are evolutionary rather than static. In Part I, I address the need to move from a focus on ecological stability or equilibrium to an emphasis on ecological health and resilience of the nation's waters. Second, although the text says "restore and maintain," the concept of restoration is unfortunately narrow in practice, in part due to limitations in the operative provisions of the law itself and in part due to the historically narrow focus of statutory implementation. In Part II, I propose a relative shift in focus from maintenance to restoration. Third, although Congress clearly recognized in 1972 that runoff from agriculture and other intensive land use contributes as significantly to water pollution as do discharges from municipal and industrial point sources, the operative provisions of the law were written—and certainly have been implemented—mainly with the latter in mind. In Part III, I suggest a shift in focus appropriate to the transition from an industrial to a post-industrial age. Finally, although Congress expressed a clear intent in 1972 to expand the scope of federal water pollution control efforts to the full extent permissible under the Constitution, its definition of the "waters of the United States" retained a reference to navigation, which the Supreme Court has interpreted as limiting the scope of the statute in some significant respects. In Part IV, I support efforts to expand the jurisdictional focus of the Act from navigable waters to sustainable waters, to better match the breadth of Congress's constitutional authority, and to better fulfill the statutory focus on watershed and ecosystem health.

I. REINTERPRETING THE INTEGRITY GOAL: FROM STABILITY TO RESILIENCE

As noted above, the overriding objective of the CWA is to "restore and maintain the chemical, physical, and biological *integrity* of the Nation's waters."[18] What, however, did Congress in 1972 mean by "integrity"? That term is not defined directly in the statute, but the legislative history of the 1972 amendments indicates that the committees sponsoring the legislation gave the term serious consideration. They considered the meaning of that term based on

18. *Id.* (emphasis added).

prevailing ecological concepts of stability and equilibrium, suggesting a return to a pristine, optimum ecological state or condition. Thus, the 1972 Senate Report explained:

> Maintenance of such integrity requires that *any changes* in the environment resulting in a physical, chemical or biological change in a pristine water body be of a *temporary nature*, such that by natural processes, within a few hours, days or weeks, the aquatic ecosystem will return to a state *functionally identical to the original*.
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> In those water bodies which are not pristine, it should be the national policy to take those steps which will result in *change towards that pristine state* in which the physical, chemical and biological integrity of the water body can be said to exist. Striving towards and maintaining the pristine state is an objective which minimizes the burden to man in maintaining a healthy environment, and which will provide for a stable biosphere that is essential to the well-being of human society.[19]

Similarly, the 1972 House Report defined the term "integrity" as:

> a concept that refers to a condition in which the natural structure and function of ecosystems is maintained. . . .
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> . . . .
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> Although man is a "part of nature" and a product of evolution, "natural" is generally defined as that condition in existence before the activities of man invoked perturbations which prevented the system from returning to its *original state of equilibrium*.
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> . . . .

19. S. REP. NO. 92-414 (1971), *reprinted in* 1972 U.S.C.C.A.N. 3668, 3742 (emphasis added).

> Any change induced by man which overtaxes the ability of nature to restore conditions to "natural" or "original" is an unacceptable perturbation.[20]

Notably, these explanations reflected a somewhat sophisticated understanding that ecosystems are healthy—or possess "integrity"—based on their *function* as well as their *structure*. At the same time, however, and as Professor Glicksman and Mr. Batzel also note,[21] the committee reports reflect a belief that the path to ecological integrity lay in the return to an optimum biological state or equilibrium condition that existed prior to human disturbance of aquatic ecosystems, and that any deviation from that pristine condition is presumptively bad and must be reversed. That concept is reflected operationally in the nature of most of the individual criteria that have dominated implementation of the Act's water quality standards program and that serve as the primary measure against which the law's system of technology-based controls are assessed. Those criteria consist mainly of individual component indicators and are articulated primarily in terms of maximum (or in some cases, minimum) levels of particular contaminants or other chemical or physical characteristics deemed sufficient to protect biological integrity and other beneficial uses of water and water bodies.[22] Along with development, implementation, and enforcement of the Act's complex and comprehensive system of technology-based effluent limitations for municipal and industrial point sources, adoption, monitoring, and implementation of these discrete water quality standards have been the dominant foci of activity under the law. These foci suggested that ecosystem integrity depends on attainment of some optimal level of a composite of individual parameters, rather than a more holistic measure of overall ecosystem health.

Through the lens of nearly four decades of experience and developments in the science of ecology, these ideas can be critiqued on at least two major grounds. First, the scientific paradigm for

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20. H.R. REP. NO. 92-911, at 76–77 (1972) (emphasis added).

21. *See generally* Glicksman & Batzel, *supra* note 3.

22. *See* OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, WATER QUALITY STANDARDS HANDBOOK, app. I (2d ed. 1994), http://www.epa.gov/waterscience/standards/handbook/handbookappxI.pdf.

ecosystem integrity has shifted from the idea of "stability" to a concept of dynamic change and resilience, the significance of which other commentators have discussed in other environmental law contexts.[23] Recognizing that ecosystems as well as individual species have evolved considerably over time, ecologists no longer suggest that there is some single, optimal state to which ecosystems should be "restored and maintained." Rather, they increasingly define integrity in terms of successful "community *functioning*," "the capacity to withstand stress" (or "resilience" to perturbations), optimal capacity for a wide range of development options, and maximum ability to change and develop in the face of changing environmental and biological conditions.[24]

This evolving concept of ecological integrity clearly has not been ignored in the development of a national water quality program, from either a scientific or a legal/regulatory perspective. Just a decade after the 1972 CWA, Dr. James Karr and others began to develop multivariate indices of aquatic ecosystem health designed to assess the overall health or integrity of aquatic ecosystems more holistically, i.e., as indicators of the system's capacity to evolve and to retain its ecological functions over time.[25] Based on a robust set of ecological parameters and likened to the index of economic indicators used to gauge the health of the national economy as a whole,[26] those indices are now the basis for biological water quality criteria (often referred to as "biocriteria") adopted by many states with strong

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23. *See, e.g.*, Julie Thrower, *Adaptive Management and NEPA: How a Nonequilibrium View of Ecosystems Mandates Flexible Regulation*, 33 ECOLOGY L.Q. 871, 871 (2006); Timothy H. Profeta, Note, *Managing without a Balance: Environmental Regulation in Light of Ecological Advances*, 7 DUKE ENVTL. L. & POL'Y F. 71 (1996); A. Dan Tarlock, *The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law*, 27 LOY. L.A. L. REV. 1121, 1129 (1994).

24. *See* Robert E. Ulanowicz, *Toward the Measurement of Ecological Integrity*, *in* ECOLOGICAL INTEGRITY: INTEGRATING ENVIRONMENT, CONSERVATION, AND HEALTH 99, 99 (David Pimentel, Laura Westra & Reed F. Noss eds., 2000) [hereinafter ECOLOGICAL INTEGRITY].

25. *See* James R. Karr, *Assessment of Biotic Integrity Using Fish Communities*, 6 FISHERIES 21 *passim* (1981); James R. Karr & Daniel R. Dudley, *Ecological Perspective on Water Quality Goals*, 5 ENVTL. MGMT. 55 *passim* (1981).

26. *See* James R. Karr, *Health, Integrity, and Biological Assessment: The Importance of Measuring Whole Things*, *in* ECOLOGICAL INTEGRITY, *supra* note 24, at 209, 221.

encouragement from EPA.[27] Moreover, for purposes of assessing the status and health of U.S. aquatic ecosystems nationally, EPA has embarked on widespread efforts to measure ecological integrity through multivariate indices and field monitoring protocols that look to direct indicators of ecosystem health rather than numeric indicators of discrete pollutants.[28] However, it would be a stretch to suggest that those assessment methods and criteria do more than augment the numeric water quality criteria for individual chemical and physical characteristics that continue to dominate the CWA program.

The second ground on which the original notion of ecosystem integrity can be critiqued concerns practical considerations involving human beings' activities in the environment. The more sophisticated tools for monitoring and assessing aquatic ecosystem health rely on comparisons of ecological indicators relative to conditions expected of similar systems absent any anthropogenic changes or stressors (known as "reference systems"), and therefore are based on the fundamental premise that ecological integrity varies from optimal integrity in proportion to the degree of human-induced changes to the system.[29] This idea means that the idealized notion reflected in the 1972 legislative history that all U.S. waters can be returned to their full state of "chemical, physical, and biological integrity," although noble in aspiration, is unrealistic absent a wholesale retreat from a modern industrial economy and society. With enough money and work, we may be able to attain water quality levels defined by most or all individual water quality criteria in most or all of our waters by continuing to reduce or eliminate pollutant discharges. However, given this revised notion of "integrity," it is unreasonable to assume attainment of that objective in any but the most highly protected waters and surrounding lands, such as national parks.[30]

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27. *See generally* JAMES R. KARR & ELLEN W. CHU, RESTORING LIFE IN RUNNING WATERS: BETTER BIOLOGICAL MONITORING (1999); Adler, *supra* note 15, at 70–75; Robert W. Adler, *Filling the Gaps in Water Quality Standards: Legal Perspectives on Biocriteria*, *in* BIOLOGICAL ASSESSMENT AND CRITERIA: TOOLS FOR WATER RESOURCE PLANNING AND DECISION MAKING 345 (Wayne S. Davis & Thomas P. Simon eds., 1995).

28. *See, e.g.*, OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, WADEABLE STREAMS ASSESSMENT: A COLLABORATIVE SURVEY OF THE NATION'S STREAMS (2006).

29. *See* Karr, *supra* note 26, at 212–13.

30. *See id.* at 214.

Moreover, the use of idealized reference conditions as a benchmark against which to measure ecosystem integrity begs the question of how much deviation from that reference condition should be deemed "acceptable" for any given portion of our aquatic ecosystems, given that human disturbance of those systems varies dramatically from intensely developed urban areas to relatively pristine wilderness. Those issues necessarily involve some degree of value judgment as opposed to purely scientific assessment.[31] Although the same is true to some degree for water quality criteria based on numeric water quality parameters, especially for non-threshold pollutants,[32] risk assessment methodologies are used to draw those lines, however controversial those methods may be.[33] By contrast, we continue to grapple with the problem of how to reach societal—as opposed to scientific—judgments about what level of deviation from entirely unimpaired ecosystems is the appropriate target for restoration. These judgments do not lie in the realm of pure science, but they instead involve questions that cannot be answered by science alone, questions that nuclear physicist Alvin Weinberg termed "trans-scientific."[34]

What significance does this shift in ecological philosophy suggest for the CWA? It would go much too far to suggest that broad-based indicators of ecological integrity should *replace* water quality criteria for individual pollutants. First, many of those criteria are adopted to protect against serious human health impacts caused by human exposure to contaminated drinking water, recreational waters, and

31. *See* Alan Holland, *Ecological Integrity and the Darwinian Paradigm*, *in* ECOLOGICAL INTEGRITY, *supra* note 24, at 45, 46 (discussing "integrity" as a normative concept); R. Bruce Hull & David P. Robertson, *The Language of Nature Matters: We Need a More Public Ecology*, *in* RESTORING NATURE: PERSPECTIVES FROM THE SOCIAL SCIENCES AND HUMANITIES 97, 107–09 (Paul H. Gobster & R. Bruce Hull eds., 2000).

32. A non-threshold pollutant is one for which some degree of harm occurs even at the lowest levels of contamination, making it necessary to reach a value judgment about an "acceptable" level of risk for any pollutant concentration above zero. *See* Natural Res. Def. Council, Inc. v. U.S. Envtl. Prot. Agency, 824 F.2d 1146, 1148 (D.C. Cir. 1987) (en banc) (discussing nature of vinyl chloride as non-threshold pollutant).

33. *See* John S. Applegate, *A Beginning and Not an End in Itself: The Role of Risk Assessment in Environmental Decision-making*, 63 U. CIN. L. REV. 1643, 1643–47 (1995); Mark Eliot Shere, *The Myth of Meaningful Environmental Risk Assessment*, 19 HARV. ENVTL. L. REV. 409, 411 (1995).

34. *See* Alvin M. Weinberg, *Science and Trans-Science*, 10 MINERVA 209 (1972).

fish and wildlife.[35] Although pollution of water bodies with chemicals or pathogens sufficient to generate those human health risks might impair the integrity of the aquatic ecosystem as well, it is possible that a system could be healthy in general, i.e., have sufficient resilience due to other attributes of ecological health to withstand some levels of pollution, but still contain discrete pollutants at levels that pose human health risks. The CWA and applicable EPA regulations require states to adopt and enforce both water quality standards sufficient to protect all existing and designated uses, and the specific criterion necessary to protect the most sensitive use for any given pollutant.[36] Second, numeric criteria provide the kind of certainty that lawyers prefer for purposes of enforceability and accountability. Numeric criteria can be written into specific, enforceable water quality-based effluent limitations in ways that simply are not possible for criteria derived from multivariate indices of ecological factors such as species richness or trophic community structure.[37]

For purposes of achieving the statutory goal of aquatic ecosystem integrity as opposed to protection of human health, however, it would seem that individual numeric water quality criteria are, at best, necessary but not sufficient to attain aquatic ecosystem health. Indeed, Congress appears to have recognized this reality by clearly distinguishing between water quality criteria that focus on the "presence," "concentration and dispersal," and "effects" of "pollutants" in water bodies, and on other "factors necessary to restore and maintain the chemical, physical, and biological integrity" of waters.[38] Clearly, Congress envisioned that water quality standards would address factors other than concentrations of individual pollutants.

This potential for focus on other factors has several important implications for implementation or modification of the CWA. Although it might seem heretical to old regulatory and enforcement

35. *See* Environmental Protection Agency, Revisions to the Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000), 65 Fed. Reg. 66,443, 66,445 (Nov. 3, 2000).

36. 33 U.S.C. § 1313(c) (2006); 40 C.F.R. § 131.11(a) (2009).

37. *See* Adler, *supra* note 15, at 73–75; Adler, *supra* note 27.

38. *Compare* 33 U.S.C. § 1314(a)(1) (2006), *with id.* § 1314(a)(2).

attorneys (like me), individual criteria based on generic science rather than the needs of specific water bodies might not necessarily be considered inviolate. In other words, a water body might violate individual water quality parameters and still be "healthy" or demonstrate ecological "integrity" based on broader indicators of ecosystem health. In fact, under the evolving concept of ecological *resilience*, the goal of environmental protection is not necessarily to restore an ecosystem to some fixed state defined by a suite of specific numeric or other parameters, but to ensure that the system has sufficient capacity to respond to environmental perturbations or disturbances while still retaining its basic ecological structure and functions.[39] As such, those very attributes of resilience may provide a system with sufficient capacity to deal with some increases in pollutant concentrations beyond that defined by discrete water quality criteria. A truly healthy system may be able to withstand more "pollution" than defined by the individual standards. I do not make that assertion lightly, and in a perfect world we might insist on attainment both of all discrete water quality criteria and of broader measures designed to define and measure ecological health. In a world of limited resources, however, it is possible that we have been exalting the former at the expense of the latter. Of course, the opposite may also be true in some cases. A system that is stressed by too much pollution may be so disturbed that it cannot be restored to natural structure and function.[40]

Still, this evolving scientific understanding of the conditions necessary to ensure ecological integrity suggests that our virtually exclusive implementation focus on the discharge of chemical pollutants has been at the expense of efforts to redress other forms of pollution.[41] It has been clear for some time—particularly after we succeeded in eliminating or significantly reducing discharges of dramatic amounts of chemical and biological pollutants—that the

39. *See* BRIAN WALKER & DAVID SALT, RESILIENCE THINKING: SUSTAINING ECOSYSTEMS AND PEOPLE IN A CHANGING WORLD 1 (2006).

40. *See* Holly L. Menninger & Margaret A. Palmer, *Restoring Ecological Communities: From Theory to Practice*, *in* FOUNDATIONS OF RESTORATION ECOLOGY 88, 95–96 (Donald A. Falk, Margaret A. Palmer & Joy B. Zedler eds., 2006).

41. *See* Donald Brown et al., *Implementing Global Ecological Integrity: A Synthesis*, *in* ECOLOGICAL INTEGRITY, *supra* note 24, at 385, 385.

health of aquatic ecosystems is impaired far more dramatically by habitat losses and degradation from a much wider range of human activities, such as dams, channelization, dredging, levees, hydrological modification of watersheds, and introduction of invasive species, than by chemical pollution alone.[42] Thus, we have made far more progress in reducing chemical pollution than we have in restoring the physical and biological integrity of the nation's waters.[43]

There are several possible reasons for this relatively narrow focus to date. First, we have spent most of our time and money on increasingly stringent point source controls, at the expense of efforts to address other sources of ecosystem harm.[44] Spending limited resources tilting at the zero discharge windmill[45] while ignoring so many other sources of impairment may not reflect the best use of society's resources, even though a change in practice in this area would challenge a sacrosanct principle of the CWA.[46] Second, we have shied away from efforts to deal with other forms of impairment because it is so difficult to reverse so many past actions and activities that adversely affect aquatic ecosystem health, especially where doing so would conflict with private property rights and development "at the water's edge."[47]

Most clearly, however, we have not redressed the most significant reasons for the loss of aquatic ecosystem integrity because there is a mismatch between the breadth of the underlying objective of the CWA and the scope of its operative provisions. In the following two Parts, I propose distinct but related ways to correct that mismatch.

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42. *See* OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, *supra* note 28, at 62, 65, 78; ROBERT A. ABELL ET AL., FRESHWATER ECOREGIONS OF NORTH AMERICA, A CONSERVATION ASSESSMENT 1, 17–20, 62–70 (2000).

43. *See generally* Adler, *supra* note 15.

44. *See* ROBERT W. ADLER, JESSICA C. LANDMAN & DIANE M. CAMERON, THE CLEAN WATER ACT: 20 YEARS LATER 14–16 (1993).

45. *See* 33 U.S.C. § 1251(a)(1) (2006).

46. To be clear, I do not advocate a retreat from the concept of technology-based controls in favor of a return to a purely water quality-based approach. The zero discharge requirement, however, is not necessary to the basic concept of requiring adoption of the best technology available to control pollutant discharges from individual sources.

47. *See* Robert W. Adler, *The Law at the Water's Edge: Limits to "Ownership" of Aquatic Ecosystems*, *in* WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? 201, 201–02 (Craig Anthony Arnold ed., 2005) [hereinafter WET GROWTH].

II. EXPANDING THE TOOLS: FROM MAINTENANCE TO RESTORATION

To some degree, even the most basic operative provision of the CWA is designed to achieve restoration as well as maintenance of the nation's waters. Section 301(a) of the Act flatly prohibits the discharge of any pollutant into the waters of the United States without a valid permit and compliance with treatment requirements designed to ensure attainment of water quality standards and implementation of "best technology" mandates intended to approach or achieve zero discharge of pollutants.[48] Clearly, progress in reducing the massive amounts of pollutants that were routinely spewed into our rivers and other waters before 1972 was an essential first step to restore the integrity of those waters. Equally clearly, however, reduction of pollutants alone is not sufficient to meet the broader objectives of the law.

Once point source pollutant discharges into a water body are reduced significantly, most of the operative, *enforceable* provisions of the law and its implementing regulations then shift from restoration to maintenance, regardless of whether the ecological integrity of the water body has actually been restored. By contrast, nothing in the law *mandates* steps to reduce or eliminate other sources of water body impairment, although some provisions of the law at least authorize or encourage such measures.

The current CWA focus on maintenance is reflected most clearly in the water quality standards provisions. Technology-based treatment requirements were most responsible for restoring chemical integrity to many water bodies. Once ambient water quality standards are met for discrete water quality parameters, the anti-degradation component of the water quality standards program then kicks in to ensure that additional or increased discharges are not allowed in ways that would either degrade existing levels of water quality, or to impair or eliminate existing water body uses.[49]

However, two related attributes of the water quality standards provisions limit the degree to which the statute—at least as currently implemented—can focus on affirmative restoration of aquatic

48. 33 U.S.C. § 1311(a) (2006).
49. *See* 40 C.F.R. § 131.12 (2009).

ecosystems impaired by factors other than pollutant discharges. First, although the development of biocriteria and other more ecologically sophisticated forms of water quality criteria and monitoring methods has helped EPA and states identify the degree of impairment of water bodies based on a broader range of ecological indicators, the mechanism by which those indicia of impairment can be translated into enforceable corrective measures is anything but clear.[50] Permit-writers can impose stricter water quality-based effluent limitations on point sources where numeric water quality criteria for specific pollutants are exceeded.[51] However, if biological monitoring suggests that a water body is ecologically impaired, and the causes are likely to be any of a range of habitat impairments, such as flow reductions, channelization, loss of riparian wetlands, or floodplain habitat, etc., there is no equally direct mechanism to require corrective measures. Likewise, the total maximum daily load ("TMDL") provision of the CWA,[52] designed to provide a mechanism for states or EPA to redress water quality standards violations, provides no clear mechanism for imposing requirements other than numeric water quality-based effluent limits for point sources,[53] and the nomenclature itself (maximum daily *loads*) suggests the focus on discharges of pollutants rather than other sources of water body impairment.

The CWA does include several more comprehensive planning provisions that can, at least in theory, be used as tools to promote efforts tailored specifically to restoration of more holistic ecological

50. *See* Robert W. Adler, *Integrated Approaches to Water Pollution: Lessons from the Clean Air Act*, 23 HARV. ENVTL. L. REV. 203, 221–23 (1999).

51. *See* 33 U.S.C. §1311(b)(1)(C); 40 C.F.R. § 122.4(d) (2009).

52. 33 U.S.C. § 1313(d) (2006).

53. Section 303(d) requires states to identify all waters for which the first round of technology-based limitations were insufficient to "implement any water quality standard applicable to such waters." *Id.* § 1313(d)(1)(A). In principle, that could include biocriteria or other standards violated for reasons other than chemical pollutants. *Id.* § 1313(d)(1)(C). However, the operative corrective provision only mandates that the state develop and implement the "maximum daily load" for "pollutants." Although those load calculations may include both point and nonpoint sources of those pollutants, *see* Pronsolino v. Nastri, 291 F.3d 1123, 1126 (9th Cir. 2002), they do not include other forms of water body impairment, although the potential utility of the TMDL process in addressing other sources of impairment was the subject of intensive debate by the Federal Advisory Committee on TMDLs and in subsequent debates over the scope of EPA's TMDL regulation. *See generally* OFFICE OF THE ADM'R, U.S. ENVTL. PROT. AGENCY, REPORT OF THE FED. ADVISORY COMM. ON THE TOTAL MAXIMUM DAILY LOAD (TMDL) PROGRAM (1998).

integrity. Section 208, adopted as part of the 1972 Act, provides both for area-wide waste treatment and management programs and for plans to address various nonpoint sources of pollution.[54] If "pollution" were viewed with the full breadth suggested by the statutory definition of that term,[55] this planning process could have been used to initiate broader restoration programs. However, most of the specific language in section 208 refers to runoff of pollutants from sources such as agriculture, silviculture, mining, and construction activities,[56] and the provision has largely been understood as being focused on those kinds of nonpoint source pollution.[57]

The more specific nonpoint source pollution planning provision Congress added in 1987 (section 319 of the Act) continues this latent ambiguity about the breadth of controls on nonpoint source pollution. State assessment reports required under section 319(a) must identify "nonpoint sources of pollution" (not "pollutants"), which, absent adequate controls, are not sufficient to "attain or maintain applicable water quality standards or the goals and requirements of this chapter."[58] If we interpret the reference to all water quality standards seriously, section 319 assessments must address violations of narrative criteria, biocriteria, and other forms of standards designed to measure and reflect ecological integrity as well as chemical pollutants. Moreover, the additional reference to the "goals and requirements of this chapter"[59] must include not only the Act's subsidiary goals such as zero discharge of chemical pollutants[60] and attainment of water quality levels necessary to protect fishable and

54. 33 U.S.C. § 1288 (2006).

55. "The term 'pollution' means the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water." *Id.* § 1362(19). It is not clear, from the legislative history or otherwise, whether Congress intended the apparent distinction between this definition of "pollution" as applying to "water" and the overall objective of the statute, which applies to the "chemical, physical, and biological integrity of the nation's *waters*." *Id.* § 1251(a) (emphasis added).

56. *See id.* § 1288(b)(2)(F)–(H).

57. *See, e.g.*, Lawrence P. Wilkins, *The Implementation of Water Pollution Control Measures—Section 208 of the Water Pollution Control Act Amendments*, 15 LAND & WATER L. REV. 479, 496 (1980).

58. 33 U.S.C. § 1329(a)(1)(A) (2006).

59. *Id.*

60. *Id.* § 1251(a)(1).

swimmable waters,[61] but also its overriding objective of restoring and maintaining the integrity of the Nation's waters. The more specific management provisions mandated in section 319(b), however, revert to references to "best management practices and measures . . . to *reduce pollutant loadings*" from each category of nonpoint sources.[62] Without meaning to mince words too finely, even the broader mission articulated for section 319 management plans is a grammatical oxymoron ("controlling pollution *added* from nonpoint sources").[63] If "pollution" is read in view of its statutory definition ("alteration" of "chemical, physical, biological, and radiological integrity"),[64] it is difficult to see how nonpoint sources can "add" an "alteration" of such integrity. Such fine textual interpretation aside, from a practical perspective it is clear that section 319 has been implemented, as was section 208, with a focus on the runoff of pollutants from nonpoint sources, and not as a tool to restore water bodies impaired by other kinds of physical and biological impairment.

Despite these limitations in the language and structure of the CWA itself, however, over the past several decades there has been a significant proliferation of collaborative watershed-based programs, at a wide range of scales and using diverse institutions and methods, many of which aspire to restore water body integrity by addressing chemical, physical, *and* biological sources of impairment. Some of those efforts are conducted under water body-specific provisions of the Act, such as the Chesapeake Bay Program, the Great Lakes Program, and various efforts under the National Estuary Program.[65] The success of those programs has been mixed, and they have been both praised and critiqued as a result.[66] Regardless of the merits of

61. *Id.* § 1251(a)(2).
62. *Id.* § 1329(b)(2)(A) (emphasis added).
63. *Id.* § 1329(b)(1) (emphasis added).
64. *Id.* § 1362(19).
65. *See id.* §§ 1267–1270 (water body-specific watershed programs), § 1330 (National Estuary Program).
66. *See, e.g.*, Annecoos Wiersema, *A Train without Tracks: Rethinking the Place of Law and Goals in Environmental and Natural Resources Law*, 38 ENVTL. L. 1239, 1281–1300 (2008); A. Dan Tarlock, *Putting Rivers Back in the Landscape: The Revival of Watershed Management in the United States*, 14 HASTINGS W.-N.W. J. ENVTL. L. & POL'Y 1059, 1059–60 (2008); Jon Cannon, *Choices and Institutions in Watershed Management*, 25 WM. & MARY

those efforts, however, they are not mandated by the CWA for all significant sources of aquatic ecosystem impairment in all impaired water bodies. A more systematic approach is needed if we are truly serious about restoring *and* maintaining the chemical, physical, *and* biological integrity of the Nation's waters and aquatic ecosystems.

So what form might such an effort take, and what revisions to the CWA would be necessary to achieve it? It does not seem feasible or appropriate to emulate the operative provision of the CWA designed to control point source discharges of pollutants, the National Pollutant Discharge Elimination System ("NPDES")[67] and its accompanying suite of technology-based effluent limitations.[68] Although the universe of point sources in the United States is extremely large,[69] leading to major debates about the legally-mandated scope of the program,[70] it is at least finite compared to the full list of activities, structures, and human-induced conditions that contribute in some way to the "man-made or man-induced alteration" of the chemical, physical, and biological integrity of our waters. Taken to the extreme, that universe encompasses virtually every human activity. Thus, although it has been feasible, if difficult, to prohibit all point source discharges absent a permit imposing specific treatment requirements,[71] an analogous solution for all sources of aquatic ecosystem degradation would be infeasible both politically and administratively.

Instead, it would seem more appropriate to amend the water quality standards-driven components of the CWA, including the TMDL provisions in section 303(d) and the nonpoint source control provisions of section 319, to eliminate the latent ambiguity discussed above, i.e., to clarify that specific remedial measures must be undertaken to redress all violations of water quality standards,

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ENVTL. L. & POL'Y REV. 379, 380–81 (2000); Robert W. Adler & Michele Straube, *Watersheds and the Integration of U.S. Water Law and Policy: Bridging the Great Divides*, 25 WM. & MARY ENVTL. L. & POL'Y REV. 1, 2, 55–66 (2000).

67. *See* 33 U.S.C. § 1342 (2006).

68. *See id.* §§ 1311(b), 1314(b).

69. *See* Rechtschaffen, *supra* note 12, at 775.

70. *See, e.g.*, S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 104 (2004); Nat'l Wildlife Fed'n v. Gorsuch, 693 F.2d 156, 161 (D.C. Cir. 1982); Natural Res. Def. Council v. Costle, 568 F.2d 1369, 1371–72 (D.C. Cir. 1977).

71. *See* 33 U.S.C. § 1311(a).

whether numeric and pollutant-specific or biologically and ecologically based. Thus, when states are required to identify impaired water bodies for purposes of developing both TMDLs and nonpoint source management plans,[72] they will clearly be required to include all impaired water bodies, regardless of the source. Section 303(d) should be amended to clarify that remedial plans must include affirmative steps to either eliminate or to mitigate adverse effects from identifiable sources of impairment of water body integrity, either through watershed restoration efforts or by modifying adverse land uses and other activities. For example, if the absence of appropriate physical habitat and structure is a more significant impediment to restoring and maintaining a diverse, indigenous biota in a stream, the required restoration effort might be to restore the stream substrate, introduce woody debris into the system, and restore natural channel geometries,[73] rather than to require additional controls on pollutant discharges. Although difficulties in ascertaining precise cause and effect might suggest an adaptive management approach to such efforts,[74] uncertainty should not serve as an excuse for paralysis. Likewise, section 319 can be amended to clarify that nonpoint source management plans and controls should include efforts to reduce, mitigate, or eliminate the effects of all forms of nonpoint source pollution, and not just runoff of pollutants from nonpoint sources.[75]

The traditional objection to imposing CWA requirements on a broader range of economic activities is the specter of federal intrusion into land use and economic policies that, from a federalism

72. In the next Part, I make the independent argument that section 319 should be strengthened to make controls developed under that provision mandatory and enforceable.

73. *See, e.g.*, Menninger & Palmer, *supra* note 40, at 95.

74. Adaptive management is the process by which managers of ecosystem restoration or management programs "learn by doing" through a considered process of developing and testing hypotheses about the responses of the ecosystem to various restoration or management efforts, and revising the process iteratively based on the knowledge gained. *See generally* Carl J. Walters & C.S. Holling, *Large-Scale Management Experiments and Learning by Doing*, 71 ECOLOGY 2060 (1990); KAI N. LEE, COMPASS AND GYROSCOPE: INTEGRATING SCIENCE AND POLITICS FOR THE ENVIRONMENT (1993).

75. Actually, it would be even better to eliminate the considerable duplication in planning and management efforts reflected in sections 208, 303, 304(l), and 319 of the CWA, and to merge them into a single, integrated planning and remediation provision. Those structural improvements in the CWA, however, are beyond the scope of this Article.

perspective, are viewed as more appropriate for state and local regulation. By leaving these issues firmly in state control via the section 303(d) and 319 planning mechanisms, such extensive federal intervention should be avoided. However, it is reasonable to predict that progress will remain elusive if EPA lacks the authority to review and approve the proposed remedial measures, and to hold states accountable for attainment and maintenance of all forms of water quality standards through restoration or other efforts.[76] Some reasonable balance is needed between respecting state and local prerogatives and providing accountability for CWA implementation. States *should* have a strong incentive, however, to embrace water body restoration approaches to CWA implementation. Restoring riparian wetlands and other riparian habitats might significantly reduce costs of storm water management and treatment. Restoring natural stream morphology and bank integrity might resolve sedimentation and other problems and therefore reduce or eliminate treatment costs from other sources. As noted above, systems that possess conditions closer to natural ecosystem structure and function are more resilient, or able to withstand other stressors without adverse effects. In short, restoration approaches are investments that not only will help to achieve the goals of the CWA, but might save other pollution control costs that are less effective and potentially unnecessary.

A second major objection is likely to be money. Aquatic ecosystem restoration efforts are often extremely expensive. Of course, where significant impairments are caused by private economic activities, which are nonpoint rather than point source in nature, there seems to be no reason why those sources should not be required to internalize the costs of reducing or eliminating those impacts in the same way as point sources are required to obtain the requisite NPDES permits and to install the necessary pollution control technology. Where impacts are caused by a more diffuse range of sources or by "legacy" sources of pollution for which no

76. *Cf.* Arnold W. Reitze, Jr., *Air Quality Protection Using State Implementation Plans—Thirty-Seven Years of Increasing Complexity*, 15 VILL. ENVTL. L.J. 209, 357–65 (2004) (critiquing accountability problems in the analogous Clean Air Act State Implementation Plan ("SIP") process).

current responsible parties can be identified, or where the problems are public or generic in nature, restoration costs will have to be borne by the public at large. If significant public restoration costs are imposed through an amended CWA, states likely will protest them as "unfunded federal mandates." Whether or not those objections are valid theoretically,[77] they are very real politically.

Given the massive federal investment in public point source pollution controls during the 1970s and 1980s through the CWA's Title II construction grants program, and the realization that so many water bodies remain significantly impaired despite those investments, it is appropriate to propose a "restoration grants" program of similar magnitude. Environmental restoration creates jobs and addresses significant environmental needs. Therefore, such a program might receive support for its economic stimulus as well as its environmental value.

III. EXPANDING THE TOOLS (PART II): FROM AN INDUSTRIAL TO A POST-INDUSTRIAL AGE

The historical weakness of nonpoint source pollution control cannot be explained by the claim that, in 1972, Congress adopted much stricter controls on industrial and municipal point sources than on nonpoint sources because it was less fully aware of the latter problem.[78] On the contrary, when Congress enacted the 1972 Amendments it was quite well aware of the problem of nonpoint source pollution. The 1972 Senate Report explained:

> One of the most significant aspects of this year's hearings on the pending legislation was the information presented on the degree to which nonpoint sources contribute to water pollution. Agricultural runoff, animal wastes, soil erosion, fertilizers, pesticides and other farm chemicals that are a part of runoff, construction runoff and siltation from mines and acid mine drainage are major contributors to the Nation's water

77. *See* Robert W. Adler, *Unfunded Federal Mandates and Fiscal Federalism: A Critique*, 50 VAND. L. REV. 1137 *passim* (1997).

78. *See* ADLER ET AL., *supra* note 44, at 172–73.

> pollution problem. Little has been done to control this major source of pollution.
>
> It has become clearly established that the waters of the Nation cannot be restored and their quality maintained unless the very complex and difficult problem of nonpoint sources is addressed.[79]

Despite this awareness of the relative severity of the nonpoint source pollution problem discussed above, Congress adopted solutions for those problems with notably duller teeth than for major industrial and municipal sources. In essence, although Congress realized that runoff from agriculture and a wide range of other land uses was at least equally responsible for the nation's epidemic of water pollution, it focused its efforts on the most obvious and most readily redressed sources of pollution from factories and large municipal treatment plants. The law aimed at industrial sources in an industrial age. The initial strategy can be defended or at least explained, however, on several grounds. We knew far more about how to treat pollutants from major point sources, and engineers could develop even better control methods based on available or readily obtained information and technology. Imposing strict, uniform federal controls on factories was more politically defensible than federal efforts aimed at state and local land use policies, and major industries were a more acceptable target politically than tens of thousands of farmers, developers, or other small businesses. Congress believed—or at least articulated the view—that states and localities were better suited to address land use and other nonpoint source pollution problems that varied widely with different local geography, climate, topography, economies, and other factors, and for which more finely tuned solutions were appropriate.[80]

Ironically, just a year after Congress adopted the 1972 Act, Daniel Bell published his prophetic book *The Coming of Post-Industrial Society*, in which he predicted a shift from manufacturing to service industries, from blue collar to professional employment, from labor-dominated to information- and technology-based economies, and

79. S. REP. NO. 92-414, (1971), *reprinted in* 1972 U.S.C.C.A.N. at 3668, 3705.
80. *See id.* at 3703–06; 33 U.S.C. § 1251(b) (2006).

from rural to urban and suburban residence.[81] That set of predictions, of course, has been remarkably accurate and has significant implications for the CWA and other environmental laws and policies. Since 1972, the United States has continued its massive migration to urban and suburban areas, and sprawl[82] now threatens the integrity of our waterways as much or more than industrial discharges did in the 1960s. High-tech and information-based businesses increasingly dominate the economy,[83] and while they typically do not spew massive volumes of pollutants into our waters in the same way as steel mills and chemical plants once did, they contribute to sprawl and massive building booms, with significant environmental implications.

To avoid overstating the case, manufacturing and other industries clearly continue to contribute significantly to the U.S. economy and to its environmental problems as well. It would be a mistake to lower our guard by retreating from implementation and enforcement of the key point source control provisions of the CWA, which have succeeded in reducing, but not yet eliminating, threats from discharges of toxic and other pollutants into the Nation's waters.

At the same time, however, we have not been nearly so successful at reducing the impacts of either the kinds of nonpoint source pollution identified in the 1972 legislative history and legislation (agriculture, silviculture, mining, construction, etc.), or the increasingly-predominant effects of urbanization and suburbanization (sprawl) that have radically altered the hydrology and other characteristics of so many watersheds around the country. Rivers and streams in urbanized areas exhibit serious ecological changes due to the impacts of urbanization on water quality and temperature; runoff timing and volumes; river and stream profiles; sediment flow and streambed composition and morphology; riparian vegetation; and

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81. DANIEL BELL, THE COMING OF POST-INDUSTRIAL SOCIETY: A VENTURE IN SOCIAL FORECASTING (1973).

82. *See generally* Craig Anthony (Tony) Arnold, *Introduction: Integrating Water Controls and Land Use Controls: New Ideas and Old Obstacles*, *in* WET GROWTH, *supra* note 47, at 1, 3–7.

83. *See* ROSS C. DEVOL ET AL., MILKEN INST., NORTH AMERICA'S HIGH-TECH ECONOMY: THE GEOGRAPHY OF KNOWLEDGE-BASED INDUSTRIES 11 (2009).

other physical, chemical, and hydrological characteristics.[84] Hydrologic changes in urbanized areas may pose more substantial barriers to aquatic ecosystem restoration than chemical pollution.[85] Likewise, runoff from agriculture and other categories of nonpoint sources that Congress recognized in the 1972 law remains the largest source of pollutants that continue to contaminate the Nation's waters.[86]

The real challenge, then, is to adapt a law written primarily to address industrial water pollution into one that addresses the more subtle but ubiquitous problems of a post-industrial age.[87] For the most part, despite three and a half decades of efforts, first under section 208 and later under section 319, nonpoint sources of pollution remain subject to a patchwork of state and local control programs, many of which are voluntary or poorly enforced. Although comprehensive watershed approaches are the logical approach to ensuring that the full range of impairments are identified and addressed within individual watersheds, even the best watershed programs will remain limited if the tools to address many of the leading sources of harm remain dull.[88]

The irony of the CWA is that when the 1972 law was enacted, Congress chose the strictest regulatory approaches for what appeared

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84. *See, e.g.*, Larry R. Brown et al., *Introduction to Effects of Urbanization on Stream Ecosystems*, 47 AM. FISHERIES SOC'Y SYMPOSIUM 1, 1–2 (2005); U.S. GEOLOGICAL SURVEY, U.S. DEP'T OF THE INTERIOR, EFFECTS OF URBANIZATION ON STREAM ECOSYSTEMS FS-042-02 (2002); JAMES F. COLES ET AL., U.S. DEPARTMENT OF THE INTERIOR, PROFESSIONAL PAPER 1695, THE EFFECTS OF URBANIZATION ON THE BIOLOGICAL, PHYSICAL, AND CHEMICAL CHARACTERISTICS OF COASTAL NEW ENGLAND STREAMS (2004); Faith A. Fitzpatrick et al., *Urbanization Influences on Aquatic Communities in Northeastern Illinois Streams*, 2004 J. AM. WATER RES. ASS'N 461 *passim* (2004); LORI A. SPRAGUE, ROBERT E. ZUELLIG & JEAN A. DUPREE, U.S. DEP'T OF THE INTERIOR, EFFECTS OF URBAN DEVELOPMENT ON STREAM ECOSYSTEMS ALONG THE FRONT RANGE OF THE ROCKY MOUNTAINS, COLORADO AND WYOMING FS 2006-3083 (2006).

85. For a discussion of hydrologic changes in urban areas, see Christopher P. Konrad & Derek B. Booth, *Hydrologic Changes in Urban Streams and Their Ecological Significance*, 47 AM. FISHERIES SOC'Y SYMPOSIUM 157 *passim* (2005).

86. *See* Andreen, *supra* note 11, at 564.

87. From a temporal perspective, of course, agricultural runoff could be viewed as pre-industrial rather than post-industrial. The nature of the problem, however, is the same. The key tools in the CWA to address industrial (and municipal) pollution do not apply in the same way to either urban or agricultural nonpoint source pollution.

88. *See supra* note 66 and accompanying text.

to be the most acute sources of harm—strict, mandatory, and enforceable permitting and treatment obligations for large municipal and industrial point sources[89]—while choosing more flexible approaches for non-industrial sources of pollution. The approach was designed in and for an industrial society, during which industrial sources of pollution were viewed as the most severe. However appropriate that dichotomy may have been at the time, it no longer serves the purposes of the Act in an increasingly post-industrial society, when at least the most severe pollution from industrial sources has been curtailed, and in which other economic and land use forces now pose the most serious barriers to attainment of the goals of the CWA.

As I have written elsewhere,[90] the best way to close the gap between industrial and non-industrial pollution sources is to adopt a mandatory system of enforceable "best practice" standards for polluted runoff and other kinds of nonpoint source pollution analogous but not identical to the system of mandatory, technology-based controls on municipal and industrial point sources. Those standards cannot logically aspire to the same degree of uniformity as secondary treatment requirements for municipal sewage discharges or as effluent limitations for similarly designed and operated facilities within properly defined classes and categories of industrial point sources. Rather, such standards should be sufficiently flexible to account for differences in climate, soils, topography, land uses, economics, and other factors. The inherent variability in conditions affecting nonpoint source pollution, however, is not a sufficient reason to address this major source of pollution with less force than we have for industrial sources. Future strategies for water pollution control now must be tailored to the problems and realities of a post-industrial society.

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89. In terms of the nature of the pollution and the kinds of control strategies that are best suited to addressing them, municipal sewage treatment plants fit more appropriately into the "industrial" category, particularly given the fact that many industrial sources discharge into municipal treatment systems and are regulated by the CWA pretreatment program. *See* 33 U.S.C. § 1317(b) (2006).

90. *See* Robert W. Adler, *Water Quality and Agriculture: Assessing Alternative Futures*, 25 ENVIRONS ENVTL. L. & POL'Y J. 77, 85–87 (2002).

IV. EXPANDING THE SCOPE: FROM NAVIGABLE TO SUSTAINABLE WATERS

When Congress adopted the 1972 amendments to the CWA, it clearly recognized that the traditional focus on nineteenth century concepts of navigability in earlier federal water pollution control legislation was unduly narrow. The 1972 legislative history reflects that Congress understood that water flows in hydrologic cycles, and that there is a clear relationship between upstream sources and downstream water quality and aquatic ecosystem health.[91] As such, Congress noted that it intended to expand the statutory scope to the limits permissible under the Commerce Clause of the United States Constitution.[92]

However (and in my view, unfortunately), rather than *replacing* the term "navigable waters" with something more expansive, Congress chose to expand the jurisdictional reach of the law by *defining* "navigable waters" as the "waters of the United States."[93] As a result, for many decades EPA and the U.S. Army Corps of Engineers have struggled to find a workable theory of CWA jurisdiction consistent with the statutory text and the scope of the Commerce Clause.[94] While Congress likely did not intend the meaning to be limited to navigable water, the Supreme Court ultimately seized on Congress's continued use of the term "navigable waters" to limit the jurisdictional scope of the statute to those waters that are, at least in some way, linked to waters subject to the traditional tests of navigability.[95] That limitation generated yet another series of legal disputes about the jurisdictional reach of the

91. *See* S. REP. NO. 92-414 (1971), *reprinted in* 1972 U.S.C.C.A.N. 3668, 3742–43.

92. *See* H.R. REP. NO. 92-911, at 131 (1972); Kim Diana Connolly, *Any Hope for Happily Ever After? Reflections on* Rapanos *and the Future of the Clean Water Act Section 404 Program*, *in* THE SUPREME COURT AND THE CLEAN WATER ACT: FIVE ESSAYS 40, 48–49 (L. Kinvin Wroth ed., 2007).

93. 33 U.S.C. § 1362(7) (2006).

94. *See* ROBIN KUNDIS CRAIG, THE CLEAN WATER ACT AND THE CONSTITUTION: LEGAL STRUCTURE AND THE PUBLIC'S RIGHT TO A CLEAN AND HEALTHY ENVIRONMENT 110–48 (2d ed. 2009).

95. Solid Waste Agency of N. Cook County v. U.S. Army Corps of Eng'rs, 531 U.S. 159, 167–68 (2001). For the traditional tests of navigability in different contexts, see *United States v. Appalachian Elec. Power Co.*, 311 U.S. 377, 380 (1940), and *The Daniel Ball*, 77 U.S. 557, 563–64 (1870).

statute.[96] Later still, the Supreme Court issued a widely split set of opinions on how this required linkage to navigable waters should be interpreted with respect to different water bodies based on the degree to which they are "adjacent to" navigable waters.[97] Once again, that decision has generated disputes and confusion in the lower courts about the jurisdictional reach of the CWA.[98]

Bills have been introduced in Congress to clarify the scope of the CWA in ways that are not so strictly limited to the protection of navigable waters.[99] That legislation properly recognizes that the federal interest in water quality and aquatic ecosystem integrity extends far beyond the nineteenth century interest of expanding and maintaining the safety of navigable waters for purposes of commerce, and that those interests are well within the reach of congressional authority under the Constitution, including but not limited to the Commerce Clause. What has been missing from the debate, perhaps, is a more comprehensive theory of, and effort to articulate the nature of, that federal interest. Moreover, since 1972 we have improved and expanded our scientific understanding of the inextricable linkages among various components of the aquatic ecosystem, and of the fact that no components of those systems are "isolated" from a hydrologic or ecological perspective.[100]

Water is fundamental to national economic sustainability in ways that extend far beyond the concept of navigability, and the evolving

96. *Compare, e.g.*, United States v. Deaton, 332 F.3d 698, 710–11 (4th Cir. 2003), *cert. denied*, 541 U.S. 972 (2004) (reading *SWANCC* narrowly and finding CWA jurisdiction over all waters with a hydrological connection to navigable waters), *with In re* Needham, 354 F.3d 340, 345–46 (5th Cir. 2003) (finding CWA jurisdiction over only navigable waters and water bodies immediately adjacent thereto).

97. Rapanos v. United States, 547 U.S. 715, 717, 788, 808, 811 (2006).

98. *Compare, e.g.*, N. Cal. River Watch v. City of Healdsburg, 457 F.3d 1023, 1025 (9th Cir. 2006) (finding CWA jurisdiction based on Justice Kennedy's "significant nexus" test), *with* United States v. Chevron Pipe Line Co., 437 F. Supp. 2d 605, 615 (N.D. Tex. 2006) (rejecting CWA jurisdiction absent clear connection between oil spill and navigable water).

99. *See* Clean Water Restoration Act of 2007, H.R. 2421, 110th Cong. § 4 (1st Sess. 2007) (drafted "to amend the Federal Water Pollution Control Act to clarify the jurisdiction of the United States over waters of the United States"). On June 18, 2009, the Senate Committee on Environment and Public Works approved and reported a version of this bill introduced by Senator Russell Feingold (D. Wis.), S. 787, 111th Cong. (1st Sess. 2009), *available at* http://thomas.loc.gov/cgi-bin/bdquery/z?d111:s.00787.

100. *See, e.g.*, PATRICK COMER ET AL., NATURESERVE, BIODIVERSITY VALUES OF GEOGRAPHICALLY ISOLATED WETLANDS IN THE UNITED STATES 4 (2005).

concept of sustainability could serve as a unifying principle for CWA jurisdiction fully consistent with constitutional limits. Aside from air, water is the natural resource most fundamental to human existence. Every business in the country, from local shops to major industries, uses and relies heavily if not essentially on water on a daily basis. Irrigation water is essential to grow food and other crops traded nationally and internationally. In manufacturing, water is used as a raw ingredient for countless goods, and serves cleaning, processing, cooling, and other functions for others. In the natural world, water moves through a global hydrological cycle whose atmospheric, surface water, and ground water movements respect no geopolitical boundaries. Economically, water is bought and sold across state and international lines, and is the subject of interstate compacts and international treaties.[101] As a result, the Supreme Court has ruled that ground water is a commodity,[102] and has also held that navigable waters, their tributaries, and upstream sources that affect those waters are channels of commerce, for purposes of federal Commerce Clause authority.[103] Interstate and international water disputes have even led to war,[104] and others have noted the relationship between water and terrorism,[105] suggesting that the federal interest in protecting water

101. *See, e.g.*, Colorado River Compact, UTAH CODE ANN. § 73-12a-2 (1953) (distributing water originating from the Colorado River Basin among seven western states); Delaware River Basin Compact, Pub. L. No. 87-328, 75 Stat. 688 (1961) (establishing a water resource agency to govern water distribution in Delaware, New Jersey, New York, and Pennsylvania); Treaty on the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, U.S.-Mex., Feb. 3, 1944, 59 Stat. 1219 (allocating water from the Colorado, Tijuana, and Rio Grande Rivers); Treaty Between the United States and Great Britain Relating to Boundary Waters between the United States and Canada, U.S.-Gr. Brit., Jan. 11, 1909, 36 Stat. 2448 (setting water distribution among lakes and rivers that form the international border between the United States and Canada). *See generally* SHLOMI DINAR, INTERNATIONAL WATER TREATIES: NEGOTIATION AND COOPERATION ALONG TRANSBOUNDARY RIVERS (2008) (studying transboundary environmental problems).

102. Sporhase v. Nebraska, 458 U.S. 941, 953–54 (1982).

103. United States v. Appalachian Elec. Power Co., 311 U.S. 377, 380 (1940); The Daniel Ball, 77 U.S. 557, 565–66 (1870).

104. *See* Mark F. Giordano, Meredith A. Giordano & Aaron T. Wolf, *International Resource Conflict and Mitigation*, 42 J. PEACE RES. 47, 47–48 (2005) (noting conflict among the ten countries sharing resources from the Nile basin); Peter H. Gleick, *Environment and Security: Water Conflict Chronology Version 2006–2007*, *in* THE WORLD'S WATER 2006–2007: THE BIENNIAL REPORT ON FRESHWATER RESOURCES 189 (Peter H. Gleick ed., 2006) [hereinafter THE WORLD'S WATER].

105. *See* Peter H. Gleick, *Water and Terrorism*, *in* THE WORLD'S WATER, *supra* note 104,

resources has national defense and foreign policy implications as well. For similar reasons, I propose elsewhere that the historically limited federal role in water resource law and policy (as opposed to water pollution control law and policy) should be reconsidered as well,[106] and that we need to bridge the current artificial divisions between laws and policies designed to address water quality and those designed to address water quantity, between surface water and ground water, and between water law and land use policy.[107]

Therefore, although Congress in 1972 clearly recognized the value of water and water bodies for many uses beyond navigation, and the need to protect waters for those diverse uses,[108] the time has come to amend the law in ways that more expressly articulate the use and value of water and aquatic ecosystems. The evolving concept of "sustainability"[109] provides a useful rubric for that expanded basis for the comprehensive approach to water pollution control possible through application of the CWA to all U.S. surface waters, without regard to artificial notions of adjacency to navigable waters. So long as the concept of sustainable waters is linked appropriately to national economic welfare and security, as is clearly true, that expanded focus of the Act is well within Congress's constitutional authority. Moreover, that broader concept also suggests a better integration of water quality and aquatic ecosystem restoration and protection with water resources management, as the Supreme Court has already indicated is appropriate to some degree, even given the current focus of the law.[110]

This focus on the comprehensive sustainability of waters and water bodies, however, highlights one of the most perplexing paradoxes inherent in the CWA as currently interpreted and implemented: the dramatic distinction between the level and nature of

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at 1.

106. *See* Robert W. Adler, *Climate Change and the Hegemony of State Water Law*, STAN. ENVTL. L.J. (forthcoming 2010).

107. *See* Robert W. Adler, *Institutions Affecting the Urban Water Environment*, *in* THE WATER ENVIRONMENT OF CITIES 212–13 (Lawrence A. Baker ed., 2009).

108. *See* 33 U.S.C. §§ 1313(c), 1314(a) (2006).

109. *See generally* AGENDA FOR A SUSTAINABLE AMERICA (John C. Dernbach ed., 2009).

110. *See* PUD No. 1 of Jefferson County v. Wash. Dep't of Ecology, 511 U.S. 700, 704 (1994).

protection afforded to waters under section 402 and section 404 of the CWA. Under the former, protection is strict and based largely on concepts of prevention. Under the latter, at least in practice, protection is comparatively weak and based more on principles of mitigation than prevention.

The distinction is highlighted dramatically—and disturbingly—by a case decided by the United States Supreme Court at the very end of the 2008–2009 term.[111] The case involved a pristine Alaskan lake adjacent to a large proposed mining operation, into which the mine operator proposed to discharge tremendous volumes of mine tailings and other wastes. Section 301(a) of the Act flatly prohibits such discharges absent a valid permit and compliance with the terms and restrictions of that permit.[112] If governed by section 402, the discharge would be prohibited entirely under applicable EPA effluent limitations for this category of gold mining operation, in favor of upland disposal of the waste material.[113] That result would be consistent with one of the key goals of the Act, to eliminate the discharge of pollutants into the nation's waters wherever feasible.[114] Even if a technology-based effluent limitation allowed some discharges, however, stricter water quality-based effluent limitations would be required to ensure attainment of applicable state water quality standards.[115] Those water quality standards, in turn, mandate the protection of water quality and other conditions necessary, wherever attainable, to provide for "protection and propagation of fish, shellfish, and wildlife and . . . recreation in and on the water."[116]

Instead of meeting those strict requirements, however, the applicant sought and obtained a permit from the U.S. Army Corps of Engineers under section 404 of the Act rather than from EPA under section 402. That permit allowed unlimited discharges of waste material in a manner that would destroy the entire biota of the lake

111. Coeur Alaska, Inc. v. Se. Alaska Conservation Council, 129 S. Ct. 2458 (2009).
112. 33 U.S.C. § 1311(a).
113. *See* New Source Performance Standards (NSPS), 40 C.F.R. § 440.104 (2008).
114. *See* 33 U.S.C. §§ 1251(a)(1), 1311(b)(2)(A), 1316(a)(1) (2006).
115. *See id.* §§ 1311(b)(1)(C), 1312.
116. *Id.* § 1251(a)(2).

for some twenty years, with only a promise of restoration after mining operations and discharges cease.[117]

In the review of this case by the Supreme Court, my colleague Professor Amy Wildermuth and I (along with the respondents and other *amici curiae*) argued that section 404 does not properly apply to this kind of discharge, and urged the Court to affirm the Ninth Circuit ruling.[118] In an opinion written by Justice Kennedy, however,[119] the Supreme Court upheld this perverse result by upholding the Corps's interpretation of ambiguous statutory provisions as conferring authority on the Corps to issue the permits in question,[120] which in turn, the Court ruled, divested EPA of the authority to do so.[121] That holding, in my view, has the matter entirely backwards. In section 402, Congress granted EPA (or states delegated authority to administer the NPDES program[122]) the *primary* authority to issue permits for discharges of pollutants under the Act, and in section 404, Congress delegated to the U.S. Army Corps of Engineers the authority to issue permits only for a narrowly defined category of pollutants ("dredged or fill material . . . at specified disposal sites"[123]). Given that the discharge in question constituted industrial wastes subject to EPA's categorical effluent limitations for this category of facility, the limited exception in section 404 did not apply. Justice Kennedy's opinion, therefore, turned the exception into the rule as applied to this case.

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117. This result was prevented initially when, at least pending Supreme Court review on Petition for Certiorari, the permit was vacated and remanded by a panel of the Ninth Circuit. Se. Alaska Conservation Council v. U.S. Army Corps of Eng'rs, 479 F.3d 1148, 1152–53 (9th Cir. 2007).

118. Brief for the Honorable G. Tracy Meehan, III, Former Assistant Adm'r for Water at the U.S. Envtl. Prot. Agency as Amicus Curiae in Support of Respondent at 14, Coeur Alaska, Inc. v. Se. Alaska Conservation Council (Nos. 07-984 and 07-990). I note this involvement in part to disclose my obvious bias in this matter.

119. The majority opinion was joined by Chief Justice Roberts and by Justices Thomas, Breyer, and Alito, and in part by Justice Scalia, who concurred in part and concurred in the result in part. A dissent written by Justice Ginsburg was joined by Justices Stevens and Souter.

120. *See* Coeur Alaska, Inc. v. Se. Alaska Conservation Council, 129 S. Ct. 2458, 2469–2477 (2009). In my view, Justice Kennedy's deference to an agency interpretation that had not been reflected in any prior formal agency decision was misplaced as a matter of administrative law, but that is beyond the scope of this Article.

121. *See id.* at 2467.

122. *See* 33 U.S.C. § 1342(b) (2006).

123. *Id.* § 1344(a).

However, the *Coeur Alaska* case and the history of section 404 implementation generally suggest a much more troubling question. For those cases in which section 404 does properly apply to a discharge, why are some waters allowed to be destroyed (or "filled") entirely, while discharges permitted under section 402 require absolute protection via either strict technology-based controls (with a goal of zero discharge wherever technologically and economically feasible) or through absolute attainment of applicable water quality standards adequate to protect all existing and designated water body uses?[124] Indeed, how can permits allowing dischargers to destroy entire wetlands or other water bodies, or at least significant portions thereof, be reconciled with the underlying statutory goal to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters"?[125]

The regulations promulgated by EPA under section 404(b) of the Act theoretically prohibit discharges under section 404 if there is any practicable alternative with less damaging effects to the waters of the United States,[126] and EPA retains the authority to veto any Corps-issued permit that it deems might have an "unacceptable adverse effect" on various listed resources.[127] Moreover, applicants for a section 404 permit must seek certification from the state in which the discharge occurs that the discharge will comply with state water quality standards,[128] presumably including the obligations to protect existing and designated water body uses[129] and antidegradation requirements.[130] In practice, however, the Corps grants the vast majority of the permits requested under section 404; states rarely object to those permits under section 401, even where a wetland area is destroyed entirely; and EPA has used its section 404(c) veto authority in only a small handful of cases.[131] Thus, in most cases in

124. *See* 40 C.F.R. §§ 131.10, 131.12 (2009).
125. 33 U.S.C. § 1251(a) (2006).
126. *See* 40 C.F.R. § 230.10(a) (2009); Utahns for Better Transp. v. U.S. Dep't of Transp., 305 F.3d 1152, 1163 (10th Cir. 2002), *modified on other grounds*, 319 F.3d 1207 (10th Cir. 2003).
127. 33 U.S.C. § 1344(c) (2006).
128. *See id.* § 1341.
129. 40 C.F.R. § 131.10 (2009).
130. *Id.* § 131.12.
131. *See* Adler, *supra* note 16, at 69.

which an applicant seeks permission to discharge dredged or fill material into a water of the United States, the result is that all or a portion of the target water body is eliminated entirely, not just degraded to some degree deemed permissible by the permitting authority based on water quality standards and other factors.

One possible explanation for this apparent inconsistency is that many permits sought and issued under section 404 allow discharges into wetlands on private property for purposes of development, whereas most section 402 permits authorize discharges of pollutants into public waters. Permit denials under section 404 thus risk the possibility of constitutional takings challenges under the Fifth and Fourteenth Amendments to the Constitution.[132] However, if otherwise subject to the jurisdiction of the CWA, or if a river or stream flows through private property, NPDES permits are subject to the same strict requirements as apply to other waters. A landowner can no more destroy a water of the United States running through private property with industrial discharges than it could any other water body.

A second possible explanation is that under the applicable section 404 regulations, parties granted permission to fill wetlands must both minimize the resulting harm and mitigate that harm by restoring wetlands with equivalent functions and values elsewhere, preferably within the same watershed and as proximate to the areas destroyed or degraded as possible.[133] In that sense, one might argue that the values and functions of specific wetlands are simply being displaced rather than eliminated entirely. However, considerable uncertainty remains about the efficacy of wetlands restoration, and many "restored" or "created" wetlands do not replace the actual functions and values of the wetlands that were destroyed.[134] Moreover, damage caused through discharges permitted under section 402 is not permitted simply because other similar areas are restored, i.e., an industrial discharger cannot destroy or significantly degrade a stream so long as

132. *See* U.S. CONST. amends. V, XIV.

133. *See* 40 C.F.R. §§ 230.10(d), 230.70–230.77 (2009).

134. *See* THOMAS E. DAHL, U.S. FISH AND WILDLIFE SERVICES, STATUS AND TRENDS OF WETLANDS IN THE CONTERMINOUS UNITED STATES 1998 TO 2004, 15–17 (2006).

she compensates for that loss by restoring another stream in a nearby location.

A third possible explanation, perhaps the most plausible, is that the diametrically opposite standards applicable to section 402 permits and to section 404 permits resulted from an historical accident, and hence received little or no attention from Congress. After all, it was only after being sued by environmental groups that the Corps of Engineers began to use section 404 to permit discharges into wetlands, as opposed to open bodies of water.[135] As Professor Allyson Flournoy has aptly noted,[136] the Corps's use of permits for discharge into wetlands has resulted in the use of this permitting tool, designed largely to control the discharge of pollutants, in deciding either to protect wetland habitats as a resource conservation goal or to allow landowners to develop their property.

Once again, refocusing the section 404 program from one that protects navigable waters (and navigability) to one that protects the sustainability of aquatic ecosystems may make more sense. Decades of litigation—with no apparent end in sight—show that the navigability rubric makes no sense when addressing the ecological significance of "water" bodies whose hydrological and ecological transition from dry land to open water "is not necessarily or even typically an abrupt one."[137] Revising this aspect of the CWA will no doubt be fraught with peril both for landowners and for environmentalists seeking greater protection. After all these years, however, perhaps we have been asking the wrong question. Rather than asking when it is permissible to discharge dredged and fill material into wetlands, maybe we should be asking which wetlands must be protected in order to restore and maintain the overall integrity of watersheds within an area, as part of a comprehensive effort to restore and maintain the ecological sustainability of those

135. *See* Natural Res. Def. Council v. Calloway, 392 F. Supp. 685 (D.D.C. 1975) (holding Army Corps of Engineers without authority to alter Congress's definition of "navigable waters").

136. *See* Alyson C. Flournoy, *Section 404 at Thirty-Something: A Program in Search of a Policy*, 55 ALA. L. REV. 607, 618–20 (2004) (noting the problem of using a pollution control permitting tool for habitat protection).

137. United States v. Riverside Bayview Homes, Inc., 474 U.S. 121, 132 (1985).

systems and the ecological functions they perform and services they provide.

CONCLUSION

The last truly significant revisions to federal water pollution legislation, at least in terms of overall approach, occurred in 1972, almost forty years ago. True, Congress adopted lengthy and complex amendments to the CWA in 1977 and 1987, and more targeted amendments in other years, but all of those revisions added or changed details, not the basic philosophies and implementing methods reflected in the law.

As far as it goes, the CWA has been among the nation's more successful environmental statutes. Where implementation tools have matched the statutory objectives, especially with respect to control of point source discharges of pollutants into surface waters, the law has resulted in significant progress in improving the quality of the Nation's waters. However, when viewed from the broader statutory objective to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters,"[138] the statutory tools are either too dull to accomplish the task, or in some cases the appropriate tools have yet to be forged at all. We have focused far more on maintenance than on restoration, and we have focused on chemical integrity to the virtual exclusion of physical and biological integrity. In some cases, especially but not exclusively in the context of the discharges to wetlands, we have sanctioned the complete destruction of many waters of the United States.

To some degree, this disconnect may have resulted from the fact that, while articulating a broader set of ecological goals for the future of the Nation's waters, the more specific problems Congress addressed in 1972 from an operative perspective were those of industrial pollution in an industrial age. The CWA's permitting programs, effluent limitations, and water quality standards were focused specifically on those problems, and only more generally on the statute's broader objectives. Perhaps that narrower focus was appropriate in 1972; conversely, perhaps a broader operative focus

138. 33 U.S.C. § 1251(a) (2006).

would have spread resources too thin to accomplish what we have to date. That largely rhetorical and probably unanswerable question aside, however, the more pertinent question for the future is how to retool the CWA to address those statutory goals that have received relatively less attention, and to focus on the prevailing threats to the health and integrity of aquatic ecosystems in a post-industrial world.

In this Article, I have argued that the focus of the CWA should be modified or expanded in four ways if we are to realize the ambitious but entirely appropriate objectives Congress articulated in 1972. First, in refining the statutory target of "chemical, physical and biological integrity," we need to make better use of current concepts of ecosystem resilience rather than the notion of ecosystem "stability" that prevailed when the 1972 law was passed. Second, while continuing to ensure that the health of aquatic ecosystems is not further degraded, we need to develop the statutory and other tools necessary to press forward with the restoration goal of the statute. Third, we need to pursue the long-recognized statutory gap in redressing non-industrial forms of water pollution from a much wider range of sources than traditional industrial and municipal point source discharges. Finally, we need to revise our definitions and overall notions of "waters" and "waters of the United States" to focus on the sustainability of aquatic ecosystems for human and natural uses, rather than on the antiquated concept of navigability. The details of each of those projects, of course, will require considerably more fine-tuned analysis than is possible in this brief Article.