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Developing a More Holistic Approach to Water Management in the United States

by William L. Andreen

Editors' Summary: Unlike many other parts of the world, the United States enjoys abundant freshwater resources. And while efforts to protect these valuable resources have experienced some success, these efforts are not enough. One of the reasons for this deficiency in U.S. water management policy is the existence of various jurisdictional barriers. EPA, the U.S. Army Corps of Engineers, the U.S. Fish & Wildlife Service, the states, and local governments all have different roles to play in relation to water rights, the protection of water-based ecosystems, and land use in the United States. In this Article, Prof. William Andreen argues that a better understanding of the relationship between land use and water, and an improved institutional ability to act on that understanding, is needed in order to truly improve our aquatic resources. He also presents several reforms that could be made within the existing legal structure to better integrate U.S. land and water policy.

I. Introduction

The freshwater resources in the United States are truly immense. They include 3.5 million miles of rivers and streams—enough to extend from the earth to the moon over 12 times. The Great Lakes occupy 94,000 square miles, and there are another 100,000 lakes of over 100 acres in size throughout the continental United States. And in Alaska alone there are several million such lakes. In addition, between these open waters and dry land lie some 278 million acres of wetlands.¹ This abundant national resource has been a significant factor in building and sustaining a healthy economy. Surface waters in the United States provide drinking water to approximately one-half of the population, and more than 13 trillion gallons of water are used every year to manufacture goods and process food.² These waters also

generate electricity, help grow many of our crops, transport goods and raw materials, and provide recreation. Over most of our history, however, Americans have largely ignored the value of the ecological services that these waters provide,³ and we have all too often failed to fully appreciate the importance and inherent beauty of well-functioning freshwater systems.⁴

For the most part, Americans have treated water, just like land and our forests, as a commodity for human use, manipulation, and degradation. Little thought or attention was paid to the adverse environmental effect of reduced stream flows, the destruction of wetlands, the damage caused by hydrologic modifications such as dams and channelization projects, and the degraded conditions produced by the pollution discharged by American industry, our cities, and agriculture.⁵ Today, approximately 40% of American rivers and streams are impaired in terms of water quality—in other words, they are unable to support one or more of their designated uses due to some form of pollution, habitat modifica-

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1. See William L. Andreen, *Water Quality Today—Has the Clean Water Act Been a Success?*, 55 ALA. L. REV. 537, 552-53 (2004).

2. See OFFICE OF WATER, U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA), *LIQUID ASSETS: A SUMMERTIME PERSPECTIVE ON THE IMPORTANCE OF CLEAN WATER TO THE NATION'S ECONOMY* 10 (1996).

3. For a thorough discussion of the services supplied by freshwater systems, see Sandra Postel & Stephen Carpenter, *Freshwater Ecosystem Services*, in NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS 195 (Gretchen C. Daily ed., 1997). The value of wetlands systems is explored at Katherine C. Ewel, *Water Quality Improvement by Wetlands*, in NATURE'S SERVICES: SOCIETAL DEPENDENCE ON NATURAL ECOSYSTEMS 329 (Gretchen C. Daily ed., 1997). See also Andreen, *supra* note 1, at 583-84.

4. See ELLEN WOHL, *DISCONNECTED RIVERS: LINKING RIVERS TO LANDSCAPES* 2-3 (2004).

5. See SANDRA POSTEL & BRIAN RICHTER, *RIVERS FOR LIFE: MANAGING WATER FOR PEOPLE AND NATURE* 1-3 (2003).

tion, or flow alteration.⁶ Wetlands have been drained, filled, and dredged in such remorseless fashion that less than one-half of the 221 million acres of wetlands that greeted the original English settlers remains intact today in the lower 48 states.⁷ In addition, over 600,000 miles of river have been flooded by thousands of dams, while thousands of additional miles have been “channelized, dewatered, rip-rapped, and otherwise altered in ways that impair or destroy important habitat.”⁸

As a result, the four groups of species most at risk of extinction in the United States are all groups that depend upon rivers, streams, and lakes: freshwater fish, crayfish, amphibians, and freshwater mussels. Thirty-seven percent of U.S. freshwater fish species—some 303 different kinds of fish fauna—are at risk of extinction.⁹ Fifty-one percent of crayfish and 40% of amphibians are either imperiled or vulnerable to extinction,¹⁰ while more than 70% of the freshwater mussel species in the United States are currently endangered, threatened, or at risk.¹¹ The problem, moreover, is not limited to specific species. So many aquatic species are in trouble and so few U.S. freshwater ecosystems remain intact¹² that entire “faunal assemblages are in a precarious state.”¹³

Progress, however, has been made. Due to point source regulation and the construction of municipal wastewater facilities under the Clean Water Act (CWA), the amount of organic waste discharged from publicly owned waste treatment plants has fallen 45% and the amount discharged from industry has dropped a whopping 93%.¹⁴ Dissolved oxygen levels have increased downstream from point source discharges all over the country, and the improvements are so substantial that they can often be discerned throughout en-

tire river basins.¹⁵ The progress is not limited to conventional pollutants, but includes heavy metals and toxic pollutants as well.¹⁶ As the result of the CWA¹⁷ and several conservation programs primarily administered by the U.S. Department of Agriculture,¹⁸ annual wetlands losses in the coterminous United States have fallen from an average of 550,000 acres in the mid-1970s to approximately 58,500 acres by the mid-1990s.¹⁹ The Endangered Species Act (ESA),²⁰ furthermore, technically limits, in some cases, both the kind of infrastructure that can be placed in the nation’s waters as well as the operation of existing infrastructure. The ESA may also limit the amount of water that cities and irrigation projects can remove from streams. Many states have also taken steps to establish minimum stream flows, which are generally aimed at protecting specific species of fish.²¹ In addition, a significant number of communities have taken steps to control nonpoint source pollution by creating buffer zones along streams, by limiting certain kinds of development in riparian areas, and by promulgating detention requirements, sedimentation controls, and other land use restrictions. Many cities and towns also mandate water conservation and the use of more efficient irrigation methods.²²

These efforts, however, have been too limited in scope. The pollution control program found in the CWA was not designed to address nonpoint source pollution in a straightforward comprehensive manner.²³ Consequently, it should come as no surprise that nonpoint source pollution has evolved into the primary obstacle to improving water quality. For example, approximately 82% of the rivers and streams that fail to meet water quality standards and 77% of such lakes are impaired due to agricultural runoff and hydrological modifications.²⁴ The CWA program designed to protect wetlands, moreover, has not been as aggressively administered by the U.S. Army Corps of Engineers (the

6. See OFFICE OF WATER, U.S. EPA, NATIONAL WATER QUALITY INVENTORY, 2000 REPORT TO CONGRESS 10-11 (2002). EPA also estimates that some 10% of the sediment underlying the nation’s waters is so contaminated with toxic substances that they pose a possible risk to humans, wildlife, and aquatic species that consume fish. OFFICE OF WATER, U.S. EPA, CONTAMINATED SEDIMENT MANAGEMENT STRATEGY 1-2 (1998).

7. THOMAS E. DAHL, FISH & WILDLIFE SERVICE, WETLANDS LOSSES IN THE UNITED STATES 1780s TO 1980s 1 (1990), available at <http://www.npwrc.usgs.gov/resource/otrdata/wetloss/wetloss.htm> (last visited Jan. 24, 2006).

8. Robert W. Adler, *The Two Lost Books in the Water Quality Trilogy: The Elusive Objectives of Physical and Biological Integrity*, 33 ENVTL. L. 29, 51 (2003). There are approximately 75,000 dams in the United States that are over two meters in height, and some 10 million cubic meters of water are diverted from U.S. surface waters every day. Jill S. Baron et al., *Meeting Ecological and Societal Needs for Freshwater*, 12 ECOLOGICAL APPLICATIONS 1247, 1249 (2002). For a more thorough, but concise discussion of dams in the United States, see WILLIAM R. LOWRY, DAM POLITICS: RESTORING AMERICA’S RIVERS 28-38 (2003).

9. NATURE CONSERVANCY, RIVERS OF LIFE: CRITICAL WATERSHEDS FOR PROTECTING FRESHWATER BIODIVERSITY 6 (1998). Over the last century, 40 fish species have disappeared, an extinction rate three times higher than what would be expected from nonanthropogenic causes. Anthony Ricciardi & Joseph B. Rasmussen, *Extinction Rates of North American Freshwater Fauna*, 13 CONSERVATION BIOLOGY 1220, 1222 (1999).

10. NATURE CONSERVANCY, *supra* note 9.

11. See D.L. Saunders et al., *Freshwater Protected Areas: Strategies for Conservation*, 16 CONSERVATION BIOLOGY 30, 31 (2002).

12. ROBIN A. ABELL ET AL., FRESHWATER ECOREGIONS OF NORTH AMERICA: A CONSERVATION ASSESSMENT 59 (2000).

13. *Id.* at 75.

14. See Andreen, *supra* note 1, at 569.

15. *Id.* at 571-72.

16. *Id.* at 573.

17. 33 U.S.C. §§1251-1387, ELR STAT. FWPCA §§101-607.

18. These programs include the Swampbuster program under the Erodible Land and Wetland Conservation and Reserve Program, 16 U.S.C. §§2821-24 (2000). For a list and some discussion of other federal programs aimed at wetlands preservation, see Alyson C. Flournoy, *Section 404 at Thirty-Something: A Program in Search of a Policy*, 55 ALA. L. REV. 607, 615 n.45, 643, 647-48 (2004).

19. See Andreen, *supra* note 1, at 585.

20. 16 U.S.C. §§1531-1544, ELR STAT. ESA §§2-18.

21. See POSTEL & RICHTER, *supra* note 5, at 104; Baron et al., *supra* note 8, at 1251; Reed D. Benson, “The Supreme Court of Science” *Speaks on Water Rights: The National Academy of Sciences Columbia River Report and Its Water Policy Implications*, 35 ENVTL. L. 85, 97 (2005); Joseph W. Dellapenna, *The Law of Water Allocation in the Southeastern States at the Opening of the Twenty-First Century*, 25 U. ARK. LITTLE ROCK L. REV. 9, 37 (2002); A. Dan Tarlock, *We Are All Water Lawyers Now: Water Law’s Potential But Limited Impact on Urban Growth Management*, in WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? 57, 77 (Craig Anthony (Tony) Arnold ed., Env’tl. L. Inst. 2005).

22. Craig Anthony (Tony) Arnold, *Is Wet Growth Smarter Than Smart Growth?: The Fragmentation and Integration of Land Use and Water*, 35 ELR 10152, 10156-58 (Mar. 2005).

23. As Prof. Oliver Houck has explained, nonpoint sources were simply omitted from the “features that made the [point source] program work.” OLIVER A. HOUCK, THE CLEAN WATER ACT TMDL PROGRAM: LAW, POLICY, AND IMPLEMENTATION 87 (Env’tl. L. Inst. 2d ed. 2002).

24. See Andreen, *supra* note 1, at 564, 578-83.

Corps) as it could have been.²⁵ The ESA only applies when an endangered or threatened species is involved and only to the extent that a project would either jeopardize or harm the species. Many states still lack instream flow protections,²⁶ and those that have done so have simply set minimum flow requirements that continue to allow damage to occur by dampening natural flow variability.²⁷ And too few communities have adequately contained the rising demand for water or adequately controlled nonpoint source pollution. In fact, large traditional water projects are still the preferred way of doing things in many places. The Texas State Water Plan, for instance, envisions the expenditure of \$17 billion to construct new dams and water pipelines to serve the state's growing population.²⁸

One of the primary reasons that we have been unable to effectively balance human needs with those of the aquatic environment is the existence of so many jurisdictional barriers. While most of the ingredients of the point source pollution program are federal in origin, and its implementation is overseen by the U.S. Environmental Protection Agency (EPA), the responsibility for regulating nonpoint pollution lies in state hands. Wetlands regulation is the province primarily of the Corps (although there are a number of overlapping state programs), whereas the enforcement of the ESA in inland waters belongs to the U.S. Fish and Wildlife Service (FWS). While pollution law and the protection of biodiversity reside largely in federal hands, water law, by contrast, is a product of state law. And to add yet another layer of complexity, land use management is largely the domain of local government, although federal and state regulation may have some impact in particular cases.²⁹

These barriers or boundaries make it difficult to deal effectively with the protection of such complex ecosystems, where whatever happens in one part of a watershed—whether on land, in the water, or at the water's edge—may have a real detrimental impact on the health of the aquatic resource. As Prof. Holly Doremus recently wrote: “The core of the current problem is . . . our failure to bridge the land-water interface and other artificial boundaries we have created.”³⁰ This kind of regulatory fragmentation is tailor-made for those who oppose comprehensive watershed regulation. Regulators have little incentive to step forward as leaders since none are perceived as leaders. No single regulator, therefore, is likely to be blamed for the fail-

ure to develop an integrated approach.³¹ Those who oppose regulation can also exploit the complexity of this multi-layered jurisdictional puzzle, while those who desire effective, comprehensive regulation are unsure about where to look for help.³²

Perhaps the most promising way to bridge these “artificial boundaries” is through the creation of watershed institutions across the entire nation—institutions that would help coordinate in a knowledgeable and environmentally sensitive fashion the water quantity, water quality, and land use decisionmaking authority possessed by these diverse agencies and political entities. However, as Professor Doremus has pointed out, a requisite condition precedent to effective action in this area must be education and the provision of information about cross-boundary impacts and the shortcomings of our current regulators.³³ We have spent decades creating specialized disciplines and separate legal systems to govern land use, water use, and water pollution, and it will take considerable effort to demonstrate to voters, economic interests, and decisionmakers at all levels of government precisely how land use and water are inextricably connected throughout the whole of a watershed.

Before discussing these two proposals, however, this Article will first address the separate legal regimes governing water rights, the protection of water-based ecosystems, and land use in the United States. The Article will then address both the need for more information and the creation of an institutional mechanism at the watershed level that will facilitate the kind of broad action and cooperation necessary to abate the degradation of the nation's aquatic resources. Finally, the Article will set forth a number of more focused reforms within the existing legal structure dealing with environmental protection, water use, and land management. These reforms would produce some improvement even in the absence of a new watershed management approach. However, if these reforms are enacted within the context of a better understanding of the relationship between land use and water and an improved institutional ability to act on that understanding, then perhaps we will have created a firm foundation upon which not just to slow, but to reverse, the relentless tide of aquatic decline.

II. Water Law

Water law in the United States largely depends on geography. In the East, where water tends to be abundant, a doctrine known as riparian rights developed. Under this doctrine, water is treated as a kind of common property, which all riparian owners share. Since all riparian owners have a right to reasonable use of the resource, the amount of water they use and how they use it is, in the absence of an adjudication, a matter for their own judgment.³⁴ In the arid West,

25. See NATIONAL RESEARCH COUNCIL, COMPENSATING FOR WETLAND LOSSES UNDER THE CLEAN WATER ACT 3, 20, 101, 103 (2001) (examining the Corps' implementation of in-lieu mitigation); Robert W. Adler, *Fresh Water*, in STUMBLING TOWARD SUSTAINABILITY 197, 223 (John C. Dernbach ed., Env'tl. L. Inst. 2002) (discussing Corps enforcement).

26. Barton H. Thompson Jr., *Water Management and Land Use Planning: Is It Time for Closer Coordination?*, in WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? 95, 107 (Craig Anthony (Tony) Arnold ed., Env'tl. L. Inst. 2005).

27. Baron et al., *supra* note 8, at 1251. In the western states, moreover, the instream rights are junior, having fairly recent priority dates, and thus they have no impact on more senior, established uses. Benson, *supra* note 21, at 97 n.58.

28. Thompson, *supra* note 26, at 107.

29. See Arnold, *supra* note 22, at 10165-66.

30. Holly Doremus, *Crossing Boundaries: Commentary on “The Law at the Water's Edge,”* in WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? 271 (Craig Anthony (Tony) Arnold ed., Env'tl. L. Inst. 2005).

31. See William W. Buzbee, *Recognizing the Regulatory Commons: A Theory of Regulatory Gaps*, 89 IOWA L. REV. 1, 22-23 (2003) (referring to the problem where no single regulator has primacy over an activity or its effects as one of “jurisdictional mismatch”); see also Doremus, *supra* note 30, at 300-01 (concluding that the “division of responsibility and authority can allow damaging impacts to the environment to slip through the cracks, either through inadvertence or because all the various institutions find ignoring those impacts feasible and politically attractive”).

32. See Buzbee, *supra* note 31, at 6.

33. See Doremus, *supra* note 30, at 295-96, 302-03.

34. Dellapenna, *supra* note 21, at 9.

however, the riparian doctrine was rejected in favor of a system that treats water as a kind of private property—permitting people to appropriate water and even ship it far from the stream from which it was taken. This right to appropriate water is acquired on a first come, first served basis under a doctrine commonly referred to as prior appropriation.³⁵ There is yet a third system of water law in the United States today. It is found in about one-half of the eastern states where, due to increasing demands and competition for water, the state legislatures have supplemented the riparian rights system with permit schemes governing large water withdrawals. However, few of these regulatory systems are comprehensive in nature.³⁶

For the most part, water law in the United States reflects its 19th century origins. At that time, water was viewed as a commodity to be manipulated and exploited for human purposes, and that growth-oriented bias is still found in the law today.

A. The Development of Riparian Rights

Following the Revolutionary War, the states along the eastern seaboard began to develop their own approaches to water law. The dominant approach of that early common law followed the natural flow rule under which each riparian landowner had a right to use a stream in its natural condition without artificial inference.³⁷ Thus, any diversion or impoundment that lessened the amount of water flowing to lower riparian owners was impermissible, although one had a right to use water for domestic purposes and to water stock.³⁸

Tension soon arose between legal doctrine and economic reality, however, as the nation began to use flowing water to power the early stages of the industrial revolution. The natural flow regime was simply incompatible with the construction of dams to run new enterprises such as large integrated cotton mills—the productive capacity of which increased six-fold in the years between 1820 and 1831.³⁹ Although some courts were nudging the law in the direction of change, other courts and writers were adamant in support of the rule against all uncompensated diversions or obstructions.⁴⁰ Then, in 1827, Justice Joseph Story wrote what would become an extremely influential opinion in the case of *Tyler v. Wilkinson*.⁴¹ He declared that water law did not prohibit all interference with natural flows, just those that were “positively . . . injurious.”⁴² Each riparian owner, therefore, was permitted to make reasonable use of the water, and this meant, according to Justice Story, that one’s use could not interfere with reasonable use by downstream riparian owners.⁴³

Within a year, Chancellor James Kent, citing Story’s opinion, wrote approvingly of the reasonable use doctrine in his treatise. Relying upon the treatise, a number of courts in both England and the United States soon discarded the natural use doctrine, and by 1850 the transition to the reasonable use doctrine of riparian rights was complete.⁴⁴ Today, however, no state relies entirely upon pure riparian rights law. All eastern states have at least some legislation that deals with water quantity issues. Nonetheless, about one-half of the eastern states continue to use common-law riparian rights as the basis for deciding water allocation disputes.⁴⁵

Riparian rights are limited to property owners whose land is adjacent to a stream. Under the traditional, common-law approach, therefore, it was difficult to use water on land that either failed to abut a stream or was not within the stream’s basin.⁴⁶ This limitation would, at least in theory, make life extremely difficult for many municipal water suppliers, most of whose customers are not riparian owners and many of whom often reside in other watersheds. The common law, however, has adjusted to this reality, and today it allows non-riparian use and, in some instances, even non-watershed use at least where there is no substantial harm to other riparians.⁴⁷

As Prof. Joseph Dellapenna has pointed out, the riparian rights approach suffers from the lack of any system to deal with water shortages, other than litigation, and litigation over water rights suffers from the unpredictability and vagueness of the criteria for resolving such conflicts. According to the *Restatement (Second) of Torts*, the factors that should influence a decision about reasonable use include: (1) the purpose of the use; (2) the suitability of the use to the water in question; (3) the economic value of the use; (4) the social value of the use; (5) the harm that it causes; (6) the practicality of avoiding or minimizing the harm by adjusting the use; (7) the practicality of adjusting the amount of water used by each riparian; (8) the protection of existing values of water uses and investments; and (9) the justice of requiring the user causing the harm to bear the loss.⁴⁸ Since the test is a relative one, factors (1) through (4) as well as (7) must be applied to the use of water by both the plaintiff and defendant.⁴⁹

B. Prior Appropriation

The first American settlers of the arid lands west of the 100th meridian (the area west of a line running from North Dakota south into Texas) believed that their demands for water for mining, ranching, and farming could not be met by the application of riparian rights. After all, mines were often located far from any stream, and many mines, especially placer mines, needed water to operate. Many dry land farms were also far from any available surface water.⁵⁰ So westerners developed their own approach that detached water

35. See DAVID H. GETCHES, *WATER LAW* 20-21 (1990).

36. See Tarlock, *supra* note 21, at 77.

37. MORTON J. HORWITZ, *THE TRANSFORMATION OF AMERICAN LAW, 1780-1860*, at 35 (1992).

38. *Id.* at 35-36. Some states, however, did allow diversions of water as long as the surplus was discharged back into the stream. GETCHES, *supra* note 35, at 17 (citing the example of Connecticut and Massachusetts).

39. HORWITZ, *supra* note 37, at 40.

40. *Id.* at 36-38.

41. 24 F. Cas. 472 (C.C.D.R.I. 1827).

42. *Id.* at 474.

43. See HORWITZ, *supra* note 37, at 39.

44. See GETCHES, *supra* note 35, at 19.

45. Dellapenna, *supra* note 21, at 11.

46. Tarlock, *supra* note 21, at 73.

47. See *id.* at 74-75.

48. RESTATEMENT (SECOND) OF TORTS §850A (1979). In most riparian rights states, water use for domestic purposes, husbandry, and maintaining a small garden are not subject to reasonableness restrictions. GETCHES, *supra* note 35, at 33.

49. GETCHES, *supra* note 35, at 49.

50. *Id.* at 20.

rights from riparian ownership. Water could be diverted by anyone, and their right to use the water perfected so long as the diverted water was used beneficially for mining, irrigation, municipal water supply, or hydropower.⁵¹ The system is based upon a simple concept: “first in time, first in right.”⁵² One’s water right is based upon seniority—not need, utility, or reasonableness.

In times of shortage, there is no pro rata curtailment. Junior rights must cut back so that senior right holders will obtain the full amount of their rights. Holders of senior rights are entitled to take the full amount of their rights regardless of the comparative efficiencies of junior and senior uses.⁵³

The doctrine of prior appropriation may well have been “the greatest innovation in the history of the arid West.”⁵⁴ It made water into a commodity, which could be owned and sold or leased just like land, minerals, timber, or livestock⁵⁵—like “so many ‘acre-feet’ banked in an account.”⁵⁶ While the concept of beneficial use included a rule against waste, the rule has only been enforced sporadically since it is “difficult to police . . . and in some cases to define.”⁵⁷ And although the constitutions in the western states all declare water to be a public resource, water was generally appropriated free of charge to private parties who intended to use it for private profit.⁵⁸ The state water agencies that were established in the western states administered this legal regime in routine fashion, handing out permits according to the established rules of prior appropriation and enforcing the rights of record.⁵⁹ However, state engineers would deny permits if all of the water in a stream were already allocated.⁶⁰ While they also had statutory authority to deny permits that would violate the public interest in some way, in most instances the state engineers “simply rubber-stamped all appropriations.”⁶¹ The public interest was apparently satisfied whenever water was diverted and the use was “beneficial.”

Prof. Dan Tarlock aptly described prior appropriation as “the ultimate river and watershed engine of destruction because it allows the last drop of a stream to be diverted . . . and

allows trans-watershed diversions.”⁶² And, due to its “first in time, first in right” principle, the doctrine encouraged people to divert as much water as possible as quickly as possible, thus often fostering wasteful and inefficient practices. Furthermore, senior users continued to have little incentive to economize on their use of water since a senior user loses nothing during a period of low water, at least not until all of the more junior appropriators have lost everything.⁶³ It was, as Prof. Charles Wilkinson has remarked, the very embodiment of social-Darwinism.⁶⁴

Today, some states such as California and Washington have started to enforce the public interest requirement. New water permits may be denied or conditioned in some way if the proposed withdrawal could harm recreation or the environment.⁶⁵ Many states have also modernized their processes for buying and selling water rights, a development that allows existing and often inefficient uses to be transferred more easily to new, more pressing needs.⁶⁶ However, while most western states have programs for recognizing instream flows to protect recreation, fish, wildlife, or scenic amenities like waterfalls, the instream protections are just like regular water rights; they carry priority dates and apply to specific locations and quantities of water. So, while the instream protections have really helped in certain locations, they can have no impact on most senior uses since the instream flow rights are relatively junior.⁶⁷ Thus, depending on how much water is already allocated to existing senior uses, the minimum flow rates may be of little or no help during low flow conditions.

Much of the American West has been re-plumbed by an extensive series of federal, state, and municipal water projects.⁶⁸ Massive canal and pipeline systems, for example, convey water from northern California and the Colorado River to southern California. Virtually, the entire Columbia River is impounded, and nine major tunnels convey water under the continental divide from the western slope of the Rocky Mountains to the suburbs of Denver, Colorado, on the eastern side. Throughout the West, over 294 million acre-feet of water is stored in over one million man-made reservoirs and lakes.⁶⁹ Much of that water simply evaporates in the western heat. Some 14.6 million acre-feet are lost to evaporation each year from the western reservoirs, leaving a higher concentration of salt and minerals in the remaining water. Irrigated agriculture is responsible for using 80% to 90% of the remaining water. In most places, these irrigators still use traditional methods—leaking earthen canals and overland flow irrigation. Forty-one percent of the diverted water is consumed by the growing crops, 46% is returned to the streams, and 13%—or approximately 24 million acre-feet per year—is lost through leakage and evaporation.⁷⁰ The return flow, moreover, contains salts, silt, fer-

51. Tarlock, *supra* note 21, at 78.

52. Dellapenna, *supra* note 21, at 21.

53. Tarlock, *supra* note 21, at 78.

54. DONALD J. PISANI, *TO RECLAIM A DIVIDED WEST: WATER, LAW, AND PUBLIC POLICY, 1848-1902*, at 11 (1992).

55. *Id.* A market for appropriative rights, however, never developed to any significant degree. Dellapenna, *supra* note 21, at 25.

56. DONALD WORSTER, *RIVERS OF EMPIRE: WATER, ARIDITY, AND THE GROWTH OF THE AMERICAN WEST* 52 (1985). An acre-foot is the amount of water that will fill an acre of land 12 inches deep in water or about 326,000 gallons of water. See Benson, *supra* note 21, at 87 n.4.

57. CHARLES F. WILKINSON, *CROSSING THE NEXT MERIDIAN: LAND, WATER, AND THE FUTURE OF THE WEST* 235 (1992).

58. *Id.* at 235, 241-42.

59. *Id.* at 240.

60. Benson, *supra* note 21, at 96.

61. WILKINSON, *supra* note 57, at 240. Wilkinson summarized the activities of these captured agencies in the following fashion:

Thus, the mission of the water agencies was to serve the bidding of the rights holders: to record their rights, to make them official by administrative and court adjudications, to enforce them by shutting junior headgates when the flows were low, and informally, but not incidentally, to lobby—for new projects, regardless of the costs to the public.

Id.

62. A. Dan Tarlock, *Reconnecting Property Rights to Watersheds*, 25 WM. & MARY ENVTL. L. & POL’Y REV. 69, 88 (2000).

63. See Dellapenna, *supra* note 21, at 22-24.

64. WILKINSON, *supra* note 57, at 240.

65. *Id.* at 286.

66. *Id.* at 285.

67. *Id.*

68. See MARC REISNER, *CADILLAC DESERT: THE AMERICAN WEST AND ITS DISAPPEARING WATER* (1986).

69. WILKINSON, *supra* note 57, at 258-59.

70. *Id.* at 260-61.

tilizers, and pesticides. What may appear as a miraculous Eden in the desert may, in fact, be nothing more than a non-sustainable Rube Goldberg device.⁷¹

C. Regulated Riparianism

Since the 1950s, about one-half of the states east of the 100th meridian have supplemented, to one extent or another, the riparian rights system with an administrative permit scheme.⁷² Statutes in many of these states have replaced the vague content of the common law with more precise formulations. In most states, however, the new regulatory system is far from comprehensive. The statutes commonly require: (1) the submission of information about withdrawals; (2) the issuance of permits for large withdrawals; and (3) an explanation of the impacts associated with any trans-watershed diversions.⁷³ The permits determine the rights of the parties, and the criterion that is used in issuing the permits is reasonable use. The concept of reasonable use, however, is used in a different manner than under traditional riparian doctrine. The relevant state agency in determining whether a use is reasonable considers social policy and the impact of the withdrawal on other water users.⁷⁴ These statutes also often require that the agency establish some sort of minimum flow.⁷⁵ Moreover, in many states the permits are issued for a set period of time (3 to 20 years), and when a permit expires, the state can decide whether the use continues to be reasonable.⁷⁶ A number of states, however, have exempted certain classes of existing users from the permit requirement either because of the political clout wielded by those particular users or because the legislatures feared the consequences of takings litigation.⁷⁷

III. Laws to Protect the Aquatic Environment

A. The CWA

The primary control strategy of the CWA is aimed at regulating discharges from point sources—pipes, conduits, and other discernible conveyances⁷⁸—through which pollutants are added to waters of the United States.⁷⁹ Such discharges are prohibited unless the discharger complies with a number of requirements.⁸⁰ Geographically, this prohibition extends

to most streams in the nation because the U.S. Congress intended jurisdiction under the Act to be given the broadest possible application under the Commerce Clause of the U.S. Constitution.⁸¹

Among the requirements that apply to point source discharges are several that anticipate the establishment of nationally uniform effluent limitations that apply to all dischargers in particular industrial categories.⁸² These limits are usually based upon the application of specific kinds of control technology for particular waste streams: best conventional treatment for conventional pollutants⁸³; best available technology for many toxics as well as non-toxic, non-conventional pollutants like ammonia⁸⁴; and best available demonstrated technology for new facilities.⁸⁵ For sewage treatment plants, the Act calls for secondary treat-

81. In defining “navigable waters” to mean “waters of the United States,” the House-Senate conference committee wrote that it “fully intend[ed]” to give the term “the broadest possible constitutional interpretation.” S. REP. NO. 92-1236, 92d Cong. 144 (1972). Rep. John Dingell (D-Mich.), who had introduced the principle House bill, confirmed this approach on the floor of the House when he declared that this “new and broader” definition included “all ‘the waters of the United States’ in a geographical sense,” and thus “encompass[ed] all water bodies.” 118 CONG. REC. 33756-57 (1972). The conference version of the bill had expanded on the earlier Senate approach, which would have extended jurisdiction in a significant way, but only to the extent of including all “navigable waters of the United States, portions thereof, and the tributaries thereof.” S. 2770, §502(n) (1971). The Senate committee wrote that this more limited expansion was necessary because “[w]ater moves in hydrologic cycles and it is essential that discharge[s] of pollutants be controlled at the source.” S. REP. NO. 92-414, at 77 (1971).

The original Senate version, therefore, had only incorporated the administrative definition of “navigable water,” which was then being applied under §13 of the Rivers and Harbors Act of 1899. 33 U.S.C. §407 (prohibiting the discharge of industrial waste into any “navigable water”). President Richard M. Nixon’s 1970 Executive Order, which directed the Corps to create a permit program under §13, referred to “navigable waters . . . or their tributaries” (Exec. Order No. 11574, 3 C.F.R. 188 (1970)), and the Corps’ 1971 regulations extended jurisdiction to every “navigable waterway or tributary.” 36 Fed. Reg. 6565 (Apr. 7, 1971). Clearly, Congress went further than this in extending jurisdiction under the CWA.

According to the U.S. Supreme Court, however, Congress did not intend to extend jurisdiction to isolated, intrastate freshwater ponds, at least when federal jurisdiction was predicated upon their use or potential use as a habitat for migratory waterfowl. *Solid Waste Agency of N. Cook County v. U.S. Army Corps of Eng’rs* (SWANCC), 531 U.S. 159, 161, 174, 31 ELR 20382 (2001). The Court’s assertion that navigability must still be given some significance in determining jurisdiction under the Act and its concern about the outer limits of Commerce Clause jurisdiction have created more than a little uncertainty about the scope of CWA jurisdiction. See Robert R.M. Verchick, *Toward Normative Rules for Agency Interpretation: Defining Jurisdiction Under the Clean Water Act*, 55 ALA. L. REV. 845 (2004); Michael P. Healy, *Law, Policy, and the Clean Water Act: The Courts, the Bush Administration, and the Statute’s Uncertain Reach*, 55 ALA. L. REV. 695 (2004). In the spring of 2006, the Supreme Court will face the issue of CWA jurisdiction once again in *Rapanos v. United States*, 376 F.3d 629, 34 ELR 20060 (6th Cir. 2004), cert. granted, 74 U.S.L.W. 3228 (U.S. Oct. 11, 2005) (No. 04-1034), and *Carabell v. U.S. Army Corps of Eng’rs*, 391 F.3d 704, 34 ELR 20147 (6th Cir. 2004), cert. granted, 74 U.S.L.W. 3228 (U.S. Oct. 11, 2005) (No. 04-1034).

82. A powerful motivating factor underlying Congress’ adoption of uniform effluent limitations was to eliminate the temptation that might otherwise exist for states to compete with each other by setting less stringent standards than their neighbors. *Natural Resources Defense Council v. Costle*, 568 F.2d 1369, 1378, 8 ELR 20028 (D.C. Cir. 1977).

83. CWA §301(b)(2)(E), 33 U.S.C. §1311(b)(2)(E).

84. *Id.* §301(b)(2)(A), (C), (D), (F), 33 U.S.C. §1311(b)(2)(A), (C), (D), (F).

85. *Id.* §306, 33 U.S.C. §1316.

71. Reuben (“Rube”) Lucius Goldberg (1883-1970) was an American cartoonist who became famous for his drawings of exceedingly complex devices that perform very simple tasks in a very indirect and convoluted way. Reference.com, *Reuben Goldberg*, at http://www.reference.com/browse/wiki/Rube_Goldberg (last visited Jan. 24, 2006).

72. Dellapenna, *supra* note 21, at 31.

73. Tarlock, *supra* note 21, at 77. The statutes also generally provide the state administering agency with the authority to deal with water shortages, including the power to cut back on permitted uses. See Dellapenna, *supra* note 21, at 36.

74. 1 WATERS AND WATER RIGHTS §9.03(a) (Robert E. Beck ed., 2001).

75. Dellapenna, *supra* note 21, at 37.

76. *Id.* at 35.

77. *Id.* at 36.

78. CWA §502(14), 33 U.S.C. §1362(14).

79. *Id.* §502(12), 33 U.S.C. §1362(12). Although the Act speaks in terms of the discharge of pollutants to “navigable waters,” *id.*, it immediately defines “navigable waters” expansively as “waters of the United States.” *Id.* §502(7), 33 U.S.C. §1362(7).

80. *Id.* §301(a), 33 U.S.C. §1311(a).

ment,⁸⁶ a standard based on reducing the oxygen demand from organic waste and total suspended solids by 85%.⁸⁷ Industrial polluters who discharge into public sewage systems must comply with pretreatment standards for pollutants that may either interfere with the functioning of the sewage treatment facility or pass through with inadequate treatment.⁸⁸ These standards often prescribe the same limits as would apply to a direct discharger.⁸⁹

The CWA also provides for a system of state water quality standards.⁹⁰ Unlike uniform, technology-based effluent limitations, water quality standards are tailored to the uses and values of specific waters. Under this program, all states are required, subject to federal approval, to zone their waters for specific uses—such as fish and wildlife protection and propagation, or public water supply—and then set technical criteria—maximum levels of certain chemicals, minimum levels of dissolved oxygen, and perhaps a narrative description of the desired ecosystem—that are designed to meet that use.⁹¹ So while effluent limitations focus on the waste stream as it flows out of a pipe, water quality standards focus on the overall quality of the receiving water. This is a vital aspect of the Act's comprehensive regulatory strategy because compliance with effluent limitations does not necessarily result in good or adequate stream quality. This is not an unlikely scenario for streams receiving heavy discharges from many sources, for streams with relatively low flows or high use classifications, or for streams that suffer from a significant diversion or interruption of flow. For such waters—waters that are unable to meet water quality standards after the application of effluent limitations—the states are to establish total maximum daily loads (TMDLs) and allocate those pollutant loadings among the responsible sources.⁹²

To implement and monitor compliance with the technology-based limitations and any more stringent limits that may be needed to satisfy water quality standards, every point source discharger must obtain a permit and comply with its terms.⁹³ These national pollutant discharge elimination system (NPDES) permits serve as a means for transforming general regulatory requirements into enforceable obligations of the individual discharger. Although 45 state programs have been granted authority to issue NPDES permits,⁹⁴ states must apply federal requirements and are subject to an EPA veto should they fail to do so.⁹⁵ However, states may require compliance with permit conditions that are more stringent than federal law would require.⁹⁶

In addition to the NPDES program, the CWA contains four other important programs, two of which are relevant to this discussion.⁹⁷ First, the Act prohibits the discharge of

dredged or fill material into waters of the United States, including most wetlands, without first obtaining a §404 permit from the Corps.⁹⁸ This program is not exclusively administered by the Corps. Dredge and fill permits are crafted pursuant to guidelines promulgated by EPA, and the permits are subject to EPA review and a possible veto.⁹⁹ While the dredging of navigable channels and the disposal of that dredged material is often contentious, the most controversial aspect of the program arises from the program's regulation of the use and development of wetland areas, the vast majority of which remain in private hands in the lower 48 states.¹⁰⁰

Not all sources of water pollution involve point source discharges. Most water pollution in the United States today, in fact, is caused by generalized runoff from fields and forests, construction sites, parking lots, and even from air pollution.¹⁰¹ Recognizing this problem, Congress has twice attempted, albeit in half-hearted fashion, to craft programs to control the most severe nonpoint source problems. The current approach requires the states to identify those waters that, without some action to control nonpoint source pollution, will not meet water quality standards. The states are then called upon to develop management plans to reduce that nonpoint source pollution.¹⁰² Unfortunately, Congress permitted the states to use exclusively nonregulatory avenues—such as technical assistance, education, training, and demonstration projects—to implement these management plans.¹⁰³ As a result of that decision, plus inadequate funding and the fact that EPA has no authority to implement a federal plan in instances where state plans are inadequate, the CWA's approach to nonpoint source pollution has failed to make much progress.¹⁰⁴

In short, Congress left the problem in the hands of the states, and most states have proven unequal to the task. The states have also been reluctant to use the water quality standards program in the fight against nonpoint source pollution. EPA has defined TMDLs as the sum total of point source and nonpoint source wasteloads; as a result, states could take action against nonpoint sources whenever TMDLs were set for water quality impaired waters. However, states have tended to shy away from doing this, and EPA has been unwilling to require states to target nonpoint sources for specific reductions.¹⁰⁵

The states have largely ignored another strong tool that the CWA gives them to protect the integrity of their waters. Section 401 of the Act provides states with the authority to review and, if appropriate and they so wish, to condition or

86. *Id.* §301(b)(1)(B), 33 U.S.C. §1311(b)(1)(B).

87. *See* 40 C.F.R. §133.102(a)(3) (2004).

88. CWA §307(b), 33 U.S.C. §1317(b).

89. Andreen, *supra* note 1, at 548.

90. CWA §303, 33 U.S.C. §1313.

91. *Id.* §303(c), 33 U.S.C. §1313(c).

92. *See id.* §303(d), 33 U.S.C. §1313(d).

93. *Id.* §301(a), 33 U.S.C. §1311(a).

94. Clifford Rechtschaffen, *Enforcing the Clean Water Act in the Twenty-First Century: Harnessing the Power of the Public Spotlight*, 55 ALA. L. REV. 775, 781 (2004).

95. CWA §402(d), 33 U.S.C. §1342(d).

96. *Id.* §510, 33 U.S.C. §1370.

97. The other two programs include one that deals with unanticipated or accidental spills of oil, events for which a permit system is ill-de-

signed, and one that provides federal financial assistance for the construction of municipally owned sewage treatment facilities. *See* Andreen, *supra* note 1, at 551-52.

98. CWA §§301(a), 404, 33 U.S.C. §§1311(a), 1344.

99. *Id.* §404(b), (c), 33 U.S.C. §1344(b), (c).

100. Some 75% of wetlands in the lower 48 states remain in private hands. ORGANISATION FOR ECONOMIC CO-OPERATION & DEVELOPMENT, ENVIRONMENTAL PERFORMANCE REVIEWS: UNITED STATES 82 (1996).

101. OFFICE OF WATER, U.S. EPA, SECTION 319 SUCCESS STORIES, III, at 1 (2002).

102. CWA §319(a), (b), 33 U.S.C. §1329(a), (b).

103. *See id.* §319(b)(2)(B), 33 U.S.C. §1329(b)(2)(B).

104. ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 696 (2003).

105. *See* HOUCK, *supra* note 23, at 107-08.

veto any federally licensed or permitted activity that may harm water quality or the aquatic environment.¹⁰⁶ This applies to such things as hydroelectric facilities (licensed by the Federal Energy Regulatory Commission), nuclear power plants (licensed by the Nuclear Regulatory Commission), dredge and fill permits issued by the Corps, and any NPDES permits issued by EPA. The U.S. Supreme Court, in fact, upheld a §401 water quality certification that limited the amount of water that could be diverted from a stream for a hydroelectric project in the state of Washington.¹⁰⁷ This power, however, goes largely unused.¹⁰⁸

B. The ESA

The ESA is the primary federal statute providing for the preservation and protection of biodiversity. Threatened and endangered species are protected in two primary ways under the Act. First, §7 requires all federal agencies to ensure, in consultation with the FWS, that no action authorized, funded, or carried out by them is likely to jeopardize the continued existence of any such species.¹⁰⁹ Second, §9 regulates private and state conduct by making it illegal to “take” any threatened or endangered species.¹¹⁰ “Take” is broadly defined by the statute to include “harass, harm, . . . kill, [or] capture,”¹¹¹ and “harm” has been administratively defined to include “significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.”¹¹²

Although the language appears draconian, few federal projects have actually been killed by §7. The vast majority of consultations, which involve projects that will likely affect protected species, are informal proceedings that result in no project modifications.¹¹³ Even when consultations result in jeopardy findings, the FWS allows most projects to proceed with only minimal modifications.¹¹⁴ In the 1990s, however, federal agencies began to use the consultation process in a more creative way. For instance, the U.S. Department of the Interior joined with the states of Colorado, Utah, and Wyoming to create a recovery program for endangered fish species in the upper Colorado River Basin. Rather than just halt the decline in the health of these species, the plan is attempting to achieve their full recovery. And in 1994, the federal government and California agreed on a long-term management plan to try to protect the endangered species in the San Francisco Bay-Delta area.¹¹⁵ On the other hand, the decision to halt the flow of federal irrigation water to farmers in California’s Klamath River Basin to protect endan-

gered salmon was reversed by the George W. Bush Administration following strong protests from the agricultural community and the issuance of a new controversial biological opinion.¹¹⁶ Shortly thereafter, 33,000 wild salmon died in a large fish kill that was caused, according to scientists from the California Fish and Game Department, by the resumption of the federal diversion.¹¹⁷

The prohibition against private takings in §9 is also not quite as tough as might appear at first. Section 10(a) authorizes the FWS to issue incidental take permits for state and private projects as long as a habitat conservation plan is prepared that will minimize the impact of the incidental takes and there is a finding that the action will not appreciably reduce the likelihood of the species’ survival.¹¹⁸

C. The National Environmental Policy Act (NEPA)

Frustrated by the insensitivity of many federal agencies to the environmental consequences of their actions, in 1969 Congress enacted NEPA.¹¹⁹ NEPA represented an unprecedented attempt to protect the environment by broadly injecting environmental concerns into the calculus of federal decisionmaking.

The Act begins with an elaborate declaration of national policy with respect to the environment. Congress prescribed, in short, that “it is the continuing policy of the Federal Government . . . to use all practicable means . . . to create and maintain conditions under which man and nature can exist in productive harmony.”¹²⁰ Congress recognized, however, that a lofty expression of national policy would have little impact on the priorities of mission-oriented agencies without additional action-forcing features. Consequently, NEPA sets forth a number of instructions to federal agencies.

First, Congress directed all federal agencies to apply their policies and the laws they administer in accordance with the broad national policy enunciated in NEPA. Thus, the Act’s policy is not merely hortatory; it is intended to be implemented.¹²¹ In addition, the Act contains a procedural mechanism designed to translate its policy into action. All federal agencies are required to produce “a detailed statement” for federal actions “significantly affecting the quality of the human environment.”¹²² Such an environmental impact statement (EIS) must address the environmental ramifications, including indirect impacts, of the proposed federal action and all reasonable alternatives.¹²³ EISs are first produced in draft form, subjected to comment both from the public and from agencies that have jurisdiction or expertise with respect to any environmental impact involved, and then issued in final form.¹²⁴ Even if an agency believes that an action is environmentally insignificant, it must first prepare an environmental assessment (akin to a mini-EIS), and only after

106. 33 U.S.C. §1341.

107. PUD No. 1 of Jefferson County v. Washington Dep’t of Ecology, 511 U.S. 700, 24 ELR 20945 (1994) (holding that states could condition §401 certifications not only on numerical criteria, but on broader water quality standards such as minimum in-stream flows).

108. See ROBERT W. ADLER ET AL., THE CLEAN WATER ACT 20 YEARS LATER 203-04 (1993).

109. ESA §7(a)(2), 16 U.S.C. §1536(a)(2).

110. *Id.* §9(a), 16 U.S.C. §1538(a).

111. *Id.* §3(19), 16 U.S.C. §1532(19).

112. 50 C.F.R. §17.3 (2004).

113. See PERCIVAL, *supra* note 104, at 895.

114. Oliver A. Houck, *Reflections on the Endangered Species Act*, 25 ENVTL. L. 689, 692 (1995).

115. PERCIVAL, *supra* note 104, at 903.

116. Holly Doremus & A. Dan Tarlock, *Fish, Farms, and the Clash of Cultures in the Klamath Basin*, 30 ECOLOGY L.Q. 279 (2003).

117. PERCIVAL, *supra* note 104, at 896.

118. 16 U.S.C. §1539.

119. 42 U.S.C. §§4321-4370d, ELR STAT. NEPA §§2-209.

120. NEPA §101(a), 42 U.S.C. §4331(a).

121. *Id.* §102(1), 42 U.S.C. §4332(1).

122. *Id.* §102(2)(C), 42 U.S.C. §4332(2)(C).

123. 40 C.F.R. §§1502.14, 1502.16 (2004).

124. See *id.* §§1502.9, 1503.1, 1503.2.

the assessment has been completed and commented upon can the agency issue a finding of no significance.¹²⁵

NEPA only applies to federal actions such as permitting, licensing, funding, or construction. It does not apply to state action, and only 15 states have enacted environmental impact assessment (EIA) statutes of their own.¹²⁶

D. The Public Trust Doctrine

The public trust doctrine asserts that some resources are so uniquely imbued with the public interest that they are subject to a perpetual trust that excludes private ownership.¹²⁷

The leading case establishing the doctrine in the United States held that the states could not sell or otherwise alienate public land underlying navigable waters.¹²⁸ That is about as far as the doctrine went until Prof. Joseph Sax suggested in 1970 that it could be used by the courts as an innovative way to protect commonly held natural resources.¹²⁹ A decade later, the idea caught the eye of the most important state court in the country. Citing Professor Sax's article, the California Supreme Court broadly applied the public trust doctrine when it authorized the state of California to reallocate already appropriated water rights. More specifically, the court held that the state agency, which had issued Los Angeles a permit in 1940 to divert water from the tributaries to Mono Lake, had failed at that time to consider the public's interest in the environmental and recreational values of the lake and its tributaries.¹³⁰ The agency thus had a duty to revisit the issue and, this time, to balance Los Angeles' interests with those of the public trust since no person or entity can claim "a vested right to divert waters once it becomes clear that such diversions harm the interests protected by the public trust."¹³¹

After additional litigation, a settlement was eventually reached. Los Angeles agreed to cut its diversions from the Mono Lake tributaries from approximately 100,000 acre-feet per year to 12,000. Instead of looking elsewhere for another diversion, Los Angeles made up the difference through water conservation.¹³² The doctrine has only been used in such sweeping fashion in one other state. In 2000, the Hawaiian Supreme Court also held that vested water rights were subject to the public trust.¹³³

125. See *id.* §§1501.4(b), 1508.9. Agencies, however, may establish categories of actions that require neither the production of an EIS or an environmental assessment. *Id.* §1501.4(a)(2). These "categorical exclusions" apply to "actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by [the relevant agency to implement the requirements of NEPA]. *Id.* §1508.4.

126. DANIEL R. MANDELKER, *NEPA LAW AND LITIGATION* §12:01 (2004).

127. See Joseph D. Kearney & Thomas W. Merrill, *The Origins of the American Public Trust Doctrine: What Really Happened in Illinois Central*, 71 U. CHI. L. REV. 799, 800 (2004).

128. Illinois Cent. R.R. Co. v. Illinois, 146 U.S. 387, 452-53 (1892).

129. Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471 (1970).

130. National Audubon Soc'y v. Superior Court, 658 P.2d 709, 13 ELR 20272 (Cal. 1983).

131. *Id.* at 712.

132. Craig Anthony (Tony) Arnold, *Working Out an Environmental Ethic: Anniversary Lessons From Mono Lake*, 4 WYO. L. REV. 1, 4 (2004).

133. In re Water Use Permit Applications for Interim Instream Flow Standard Amendments, and Petitions for Water Reservations for the Waiahole Ditch, 9 P.3d 409 (Haw. 2000).

IV. Land Use Management

Land use management is primarily a matter of local law, although both state and federal law may affect land use in certain instances. Local planning law exists to protect: (1) public health, welfare, and safety; and (2) private property from harm that may be caused by nearby land uses.¹³⁴ City and county planning law normally consists of a comprehensive plan, a zoning code, and a system for issuing various kinds of discretionary permits—for example, conditional use permits, variances, subdivision plats, planned unit developments, site plans, and so on.¹³⁵

There are 38,971 cities, townships, and counties in the United States, most of which have authority to regulate land use decisions within their political boundaries and sometimes a little further.¹³⁶ Land use decisions that affect water use and water quality in a particular watershed may, therefore, involve dozens if not hundreds of different regulatory actors, and there is little incentive for the coordination of their efforts. In addition to the fragmented nature of land use management, local land use decisions are often not very environmentally sensitive. Local planners are not generally experts in water issues.¹³⁷ Moreover, communities typically view development as a way to enhance local revenues and expand their employment base.¹³⁸ Consequently, they are inclined, at least in many instances, to use their zoning and discretionary permitting authority to approve of developments that may well harm, directly or indirectly, the aquatic resources in the area.¹³⁹

V. An Agenda for Progress

The CWA, the ESA, EIAs, and the public trust doctrine are all tools that have been used to protect our aquatic resources in significant ways. All of them, however, can be improved upon or given greater scope. Nevertheless, there would still exist a problem with coordination, both vertically with respect to federal environmental law, state water law, and local land use management, and horizontally with respect to the various agencies and political entities that have responsibilities within each subject area.¹⁴⁰ Thus, we must rethink how we approach the protection of our freshwater systems in order to better connect, in terms of law and institutions, the natural and symbiotic relationship between land use and water.

A. Education and Information

Education is a key ingredient to help society see across artificial boundaries and better understand the relationship between land and water. Although experts have long understood the problem posed by nonpoint source pollu-

134. See Arnold, *supra* note 22, at 10164.

135. See *id.* at 10172-174.

136. See *id.* at 10165. There are also thousands of county, municipal, regional, and private water suppliers. See *id.* at 10166.

137. Thompson, *supra* note 26, at 110.

138. Buzbee, *supra* note 31, at 10 (describing local governments as "growth machines").

139. See Arnold, *supra* note 22, at 10166.

140. See *id.* at 10165 (speaking of "vertical" and "horizontal disconnects" in this regard).

tion,¹⁴¹ the average layperson has probably, until only recently, focused on large point sources rather than nonpoint sources as the primary cause of water pollution. And the average person probably understands even less about the detrimental impacts caused by hydrologic and habitat modifications and by the long-range problems posed by poor decisions involving land use and water allocations. Improving their understanding of these relationships and the possible detrimental impacts upon their local waters may help to create the kind of political momentum and motivation necessary to improve the environmental performance of many of the governmental entities involved in making land and water use decisions.¹⁴² An improved level of public awareness about the wide-ranging, but interrelated problems facing our aquatic systems might also induce many of these governmental bodies to sit down together and work more cooperatively in an effort to protect and maintain the sustainability of this vital resource.

We also need more and better monitoring information. Under §305(b) of the CWA, states are required to prepare a report on the condition of their water quality every two years. EPA, in turn, is directed to transmit these reports to Congress along with the Agency's analysis of the state results.¹⁴³ However, financial and other resource constraints preclude a thorough evaluation.¹⁴⁴ The 2000 report, for example, covered less than 20% of the nation's rivers and streams.¹⁴⁵ Moreover, the surveys overstate our actual knowledge about water quality. While some of the state estimates are based upon actual monitoring data, other estimates are subjective and predicated upon best professional judgment.¹⁴⁶ This must end. EPA and the states must devote adequate resources to conducting baseline monitoring and assessment activities. If necessary, the federal government could link annual CWA grants for state administration of the NPDES program to the development and implementation of better state monitoring programs.¹⁴⁷

B. New Watershed Institutions

The concept of watershed management is not a new idea. During the New Deal era, a progressive senator from Connecticut, Augustine Lonergan (D-Conn.), introduced a bill that would have largely implemented a federal water pollution control program through administrative units organized at the watershed level.¹⁴⁸ Although Lonergan's bill received

widespread support, it was never enacted into law.¹⁴⁹ Then, during the Great Society, President Lyndon Johnson proposed the establishment of permanent river basin organizations that would coordinate action to carry out new watershed-level pollution control plans, as well as help to administer and enforce water quality standards.¹⁵⁰ Johnson's initiative, however, also failed to be enacted into law.¹⁵¹

More recently, there have been a number of efforts to create watershed institutions. In 1980, the Columbia River states of Idaho, Montana, Oregon, and Washington formed the Northwest Power Planning Council to try to balance fish and wildlife protection with hydroelectric generation.¹⁵² While the effort has suffered from the lack of actual management authority—the Corps and the U.S. Bureau of Reclamation actually run the dams and irrigation projects along the river¹⁵³—the Council has funneled federal funds to sub-basin groups where federal, state, local, and tribal organizations have been working together on management plans.¹⁵⁴ Unfortunately, when the Columbia River Forum was proposed to bring the federal agencies, tribes, and states into a more comprehensive coordinating entity for the entire basin, Idaho decided not to participate due to concerns that a regional organization might dilute its control over the state's water resources.¹⁵⁵

Perhaps more promising is the example set by a number of state and federal agencies that have been trying to deal with the water quantity, endangered species, and pollution problems in the San Francisco Bay-Delta area, the CALFED/Bay Delta Program.¹⁵⁶ Another good example has been set by the Great Lakes Water Quality Board (an advisory body to the International Joint Commission) in which the federal governments of Canada and the United States and all five states and the two provinces that border the lakes have striven to develop a comprehensive approach to protect the environmental and hydrological integrity of the basin.¹⁵⁷ Finally, the Delaware River Basin Compact Commission—which consists of the federal government as well as the four states in the watershed—is regarded as having done a good job in protecting water quality, allocating water, and managing river flows.¹⁵⁸

Creating successful watershed bodies, however, is not easy. How do you balance farming and fishing, urban growth, and the preservation of nature? As Professors

141. See Carl A. Rambo & Robert O. Sylvester, *Methodology in Establishing Water-Quality Standards*, in WATER RESOURCES MANAGEMENT AND PUBLIC POLICY 111 (Thomas H. Campbell & Robert O. Sylvester eds., 1968).

142. Doremus, *supra* note 30, at 303.

143. CWA §305(b)(1), (2), 33 U.S.C. §1315(b)(1), (2).

144. Andreen, *supra* note 1, at 566.

145. Doremus, *supra* note 30, at 303-04.

146. Andreen, *supra* note 1, at 567.

147. See Doremus, *supra* note 30, at 304. Comprehensive assessments of sustainably available water supplies are also needed in order to inform local development officials, land use planners, water supply entities, and environmental agencies, as well as the public. See Janet Neuman, *Dusting Off the Blueprint for a Dryland Democracy: Incorporating Watershed Integrity and Water Availability Into Land Use Decisions*, in WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? 119, 160 (Craig Anthony (Tony) Arnold ed., Envtl. L. Inst. 2005).

148. See William L. Andreen, *The Evolution of Water Pollution Control in the United States—State, Local, and Federal Efforts, 1789-1972:*

Part II, 22 STAN. ENVTL. L.J. 215, 227-29 (2003). Prof. Robert Adler has traced the concept of integrated watershed management back to several Progressive Era commissions including the 1908 Inland Waterways Commission, the 1909 National Conservation Commission, and the 1912 National Waterways Commission. Robert W. Adler, *Addressing Barriers to Watershed Protection*, 25 ENVTL. L. 973, 1005 (1995).

149. See Andreen, *supra* note 148, at 229-33.

150. *Id.* at 251.

151. *Id.*

152. Neuman, *supra* note 147, at 144-45.

153. *Id.* at 145.

154. See *id.* at 156-59.

155. *Id.* at 145.

156. See *supra* note 115 and accompanying text; Neuman, *supra* note 147, at 144.

157. See Tarlock, *supra* note 62, at 93-98; see generally MARK SPROULE-JONES, RESTORATION OF THE GREAT LAKES: PROMISES, PRACTICES, PERFORMANCES 5, 40-48 (2002) (discussing the agreements on Great Lakes water quality).

158. See Neuman, *supra* note 147, at 146.

Doremus and Tarlock have observed: “Science alone cannot determine how water should be allocated among . . . competing demands.”¹⁵⁹ Instead, hard policy choices will have to be made among competing interests in order to accommodate, in sustainable fashion, both nature and the economy.¹⁶⁰ In the past, train wrecks have occurred where one interest or another have refused to compromise. For instance, the Apalachicola-Chattahoochee-Flint River Basin Compact¹⁶¹ between Alabama, Florida, and Georgia recently collapsed for lack of agreement over how to allocate water in a way that would protect the unique ecosystem of Florida’s Apalachicola Bay while satisfying the ever-increasing demands of a growing Atlanta.¹⁶²

Despite the difficulties, decisions on water allocations must be integrated with watershed protection, and decisions on land use must be integrated with both. It is, after all, fundamental that activities that occur in one place in a watershed will have an inevitable impact on water quality and quantity elsewhere in that watershed. That simple, fundamental fact must eventually be recognized by government decisionmakers. So far, there has been a good deal of rhetoric about the need for watershed planning. Lip-service, however, is not enough. Action, real action, is needed.

Institutional structures, therefore, must be planned and constructed to facilitate the coordinated management of land use, water use, and water quality. The ideal structure would be a regional body that, in the words of Prof. Janet Neuman, had “some amount of real integrated management authority.”¹⁶³ Her model would be the Delaware River Basin Compact Commission, an entity that has comprehensive planning authority as well as power over many aspects of managing the Delaware watershed.¹⁶⁴ It would likely take one of several things to occur for many of these state and local entities to overcome their parochial approach to these issues and to assent to such an arrangement: a resource crisis in that particular area; an especially strong emotional bond to a particular river or stream; or federal legislation, coupled with grant money. Such an arrangement need not necessarily be an institution with some degree of real management authority—although that might be the ideal—since a new institution or council for regional planning and coordination would still be a significant step forward.

What is clear is that the most direct route for comprehensive action would be federal legislation, and the most logical place to locate it would be in the CWA. The Act contains a provision calling for the preparation of areawide waste treatment plans,¹⁶⁵ a program that was abandoned in the 1980s.¹⁶⁶ The program could be reinstated, as Rob Adler, Diane Cameron, and Jessica Landman have advocated, and

recast as a national watershed planning and protection program.¹⁶⁷ In doing so, the legislation should certainly refer to the larger policy goals of sustainable management and the conservation of biodiversity, the use of such tools as ecosystem and adaptive management, and the application of “local, collaborative processes that tailor the larger concepts to specific places.”¹⁶⁸ The new program could follow the approach of the Northwest Power Planning Council¹⁶⁹ and nest small-scale, sub-basin planning within a large-scale planning and management process for each of the major watersheds in the United States.¹⁷⁰

These watershed institutions could be responsible for managing or coordinating a whole range of activities that affect the ecological sustainability of a particular watershed. These activities could include enhanced water quality monitoring, water quantity assessments, water allocations, waste load allocations, point source and nonpoint source controls, watershed restoration actions, and the production of a comprehensive watershed protection plan.¹⁷¹ Such an effort would take the inclusion of the relevant federal and state agencies, as well as local planning authorities, and the active participation of the public.¹⁷² The precise design for these institutions lies well outside the scope of this Article, but it is certainly time for a serious discussion and debate about this kind of approach.¹⁷³ Of course, Congress would have to be persuaded to act, and federal funds would have to be provided to finance this new organizational structure and its activities. In the current political climate, that is a huge, perhaps insurmountable, challenge, but the time is ripe to begin to seriously explore ways in which to “reforge the natural connections we have spent years denying and trying to break.”¹⁷⁴

C. Other Proposals for Reform

A number of other tools could be recast in various ways to make them better mechanisms for integrating land and

159. Doremus & Tarlock, *supra* note 116, at 349.

160. *Id.* at 349-50. In fact, Professor Doremus has written elsewhere that the toughest problem for environmental policy lies in deciding how much room should be left for nature. Holly Doremus, *Environmental Ethics and Law: Harmony, Dissonance, Cacophony, or Irrelevance?*, 37 U.C. DAVIS L. REV. 1 (2003).

161. Pub. L. No 105-104, 111 Stat. 2219 (1997).

162. William L. Andreen, *Alabama Water Law Survey*, in 6 WATERS AND WATER RIGHTS 44 (Robert E. Beck ed., Cum. Supp. 2004).

163. Neuman, *supra* note 147, at 161.

164. *Id.* at 167-68 (including water quality, water allocation, recreation, watershed preservation, hydroelectric generation, and flood control).

165. CWA §208, 33 U.S.C. §1288.

166. See Andreen, *supra* note 1, at 545 n.42.

167. ADLER ET AL., *supra* note 108, at 251.

168. Doremus & Tarlock, *supra* note 116, at 350.

169. See *supra* notes 152-55 and accompanying text.

170. See ADLER ET AL., *supra* note 108, at 251.

171. See *id.* at 252.

172. As Prof. Eileen Gauna has noted, any new watershed institutions would have to be sensitive to the fact that their actions might adversely affect indigenous people, people of color, and the poor. Eileen Gauna, *Environmental Justice in a Dryland Democracy: A Comment on Water Basin Institutions*, in WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? 171 (Craig Anthony (Tony) Arnold ed., Evtl. L. Inst. 2005). “One way to attempt to avoid these unintended consequences is to pursue aggressively capacity building and collaborative approaches.” *Id.* at 198.

173. One approach that should be considered is the use of experts to evaluate and share information about the efforts in each watershed in order to provide feedback and an opportunity for adjustment. See Buzbee, *supra* note 31, at 61 (discussing the “open method of coordination” used in the European Union). Another approach would base additional programmatic funding upon the production of a planning document which was approved by an interagency committee. See Doremus & Tarlock, *supra* note 116, at 350.

Additional recent scholarship pertaining to the structure of watershed management institutions and programs includes ADAPTIVE GOVERNANCE AND WATER CONFLICT: NEW INSTITUTIONS FOR COLLABORATIVE PLANNING (John T. Scholz & Bruce Stiftel eds., 2005); WILLIAM BLOMQUIST ET AL., COMMON WATERS, DIVERGING STREAMS: LINKING INSTITUTIONS AND WATER MANAGEMENT IN ARIZONA, CALIFORNIA, AND COLORADO (2004); and SWIMMING UPSTREAM: COLLABORATIVE APPROACHES TO WATERSHED MANAGEMENT (Paul A. Sabatier et al. eds., 2005).

174. Doremus, *supra* note 30, at 313.

water. A non-exhaustive list of such steps would include the following.

1. CWA Reforms

Section 319,¹⁷⁵ which deals with state nonpoint source management programs, can be strengthened by giving EPA a stick as well as a carrot in dealing with state agencies. Currently, EPA has little recourse when confronted with an inadequate state plan for controlling nonpoint source pollution. EPA can only approve or disapprove of state plans; it cannot promulgate a federal plan in lieu of an inadequate state plan. If EPA disapproves of a state plan, it will only deprive the state of federal funds that would otherwise enable the state to make at least some progress.¹⁷⁶ The provision should be amended, therefore, to give EPA the authority to promulgate a federal plan setting forth a management program, including best management practices, in the event a state agency fails to submit an acceptable plan to deal with nonpoint source problems.

The exemption of return flows from irrigated agriculture from the permitting requirements of the Act¹⁷⁷ should be repealed.¹⁷⁸ These return flows, when collected in ditches or pipes or conduits, clearly constitute point sources that discharge pesticides, silt, and nutrients and should be regulated as such.

Section 303¹⁷⁹ should be amended to make it clear that a water is impaired whenever it cannot meet its existing designated use, not just when particular chemical criteria are violated. In addition, water quality criteria should be expanded to include biological criteria, including minimum natural flows, that will protect wildlife and the aquatic ecosystem.¹⁸⁰

The continuing loss of wetlands must end. The enforcement of §404¹⁸¹ by the Corps and EPA must be strengthened, and the shortcomings in the Corps' program to mitigate the authorized loss of wetlands must be addressed.¹⁸² Congress should also act to make it clear that CWA jurisdiction extends to isolated wetlands whenever the loss of those wetlands would have an adverse impact on interstate commerce or involve Congress' authority to implement treaties protecting migratory birds.¹⁸³

175. 33 U.S.C. §1329.

176. Fran Dubrowski, *Crossing the Finish Line*, ENVTL. F., July-Aug. 1997, at 32-33.

177. CWA §§402(1)(1), 502(14), 33 U.S.C. §§1342(1)(1), 1362(14).

178. See ADLER ET AL., *supra* note 108, at 242.

179. 33 U.S.C. §1313.

180. See ADLER ET AL., *supra* note 108, at 229.

181. 33 U.S.C. §1344.

182. The Corps currently permits about 24,000 acres of wetlands to be filled each year and requires approximately 42,000 acres of compensatory mitigation (restored, created, enhanced, and sometimes merely preserved). These mitigation projects, however, have often not been carried out, even though required by the terms of a permit, and compliance inspections have been rare. Even where mitigation projects have been undertaken, many sites are not performing as well as predicted. Andreen, *supra* note 1, at 545 n.45.

183. This amendment is necessary to try to overturn the effect of the Supreme Court's decision in *Solid Waste Agency of N. Cook County v. U.S. Army Corps of Eng'rs*, 531 U.S. 159, 31 ELR 20382 (2001). See *supra* note 81.

A more complete list of steps that should be taken to strengthen the nation's efforts to protect our remaining wetlands can be found at

Section 401¹⁸⁴ on state water quality certifications should be amended to make it clear that it applies not only to numeric chemical criteria, but also to use impairment¹⁸⁵ and to biological criteria, including minimum natural flows.

Section 402,¹⁸⁶ which establishes the NPDES permitting system, should be amended to make it clear that §9 of the ESA¹⁸⁷ applies to permits issued by authorized state programs. EPA should further ensure through its regulations and annual state agreements that authorized state programs utilize a process that is functionally equivalent to the NEPA process when issuing NPDES permits.

2. EIAs

Although NEPA was the first EIA statute in the world and remains one of the most exacting, EIAs continue to languish at the state level in the United States. Only 15 states have enacted EIA statutes, which means that a great many actions—state-issued NPDES permits, water allocation permits, state-funded projects, and so on—take place without thorough environmental reviews. More states, therefore, should enact “little NEPAs,” and all of these little NEPAs (existing statutes, as well as new ones) should apply to major land use approvals that take place at the local level.

3. Public Trust Doctrine

More state courts should consider using the public trust doctrine to require state water agencies to consider the impact of water diversions on the public's interest in the environmental and recreational values of the surface waters that are being affected.

4. Pricing

Cities should at least meter their water—a reform that has often lowered water consumption by one-third.¹⁸⁸ Cities, moreover, should consider moving to a tiered pricing system under which customers pay more per gallon as they consume more water.¹⁸⁹

5. Land Use Planning

Local officials should require the use of appropriate actions to protect the aquatic environment including: adequate riparian buffer zones; restrictions on land uses in sensitive areas; vegetation and slope stabilization; runoff retention basins; natural filtration; limits on impervious cover; porous paving material; more efficient irrigation practices; and more effective conservation measures.

Center for Progressive Reform, *Wetlands*, at <http://www.progressive-regulation.org/perspectives/wetlands.cfm> (last visited Feb. 13, 2006).

184. 33 U.S.C. §1341.

185. See ADLER ET AL., *supra* note 108, at 246.

186. 33 U.S.C. §1342.

187. 16 U.S.C. §1538.

188. Thompson, *supra* note 26, at 103.

189. *Id.*

VI. Conclusion

Freshwater is a gift. It is a product of nature and does not conform to the artificial boundaries created by law or political institutions. If we want to preserve this resource for future generations, then our laws and institutional structures must better reflect the realities of nature. This will not be an easy task. There are numerous historical, constitutional, political, and economic hurdles to overcome, and difficult policy judgments will eventually have to be made about the balance we want and need to strike between nature and human exploitation. We have, however, come a long way. There is growing recognition about the relationship of water quantity

to water quality; more understanding about the sources and magnitude of nonpoint source pollution; and increasing awareness about the linkage between land use and water. With more public awareness and better data, we may be able to move forward and expand some of our existing legal tools to better protect water quality and biodiversity. And perhaps we may even be able to overcome our fragmented regulation of the activities that harm watershed integrity by creating institutional structures that will encourage coordinated action to manage land use, water quality, and water consumption in a way that would help ensure that we leave sufficient room for nature.