FEDERAL ENVIRONMENTAL RESTORATION INITIATIVES: AN ANALYSIS OF AGENCY PERFORMANCE AND THE CAPACITY FOR CHANGE

Robert Jerome Glennon* & John E. Thorson**

Table of Contents:

---

* Morris K. Udall Professor of Law and Public Policy, James E. Rogers College of Law, The University of Arizona.

** Special Master, Arizona General Stream Adjudication.

We are grateful for comments made by Hap Dunning on an earlier draft and for research and editorial assistance provided by Rick Yarde, class of 1999, Eric A. Handler, class of 2001, and Peter Culp, class of 2001, James E. Rogers College of Law, The University of Arizona.

I. INTRODUCTION AND OVERVIEW

Environmental restoration is the active shaping or reshaping of the natural world, "creating (or re-creating) communities of species that can live together in an ongoing, self-sustaining way."[1] The basic assumption of environmental restoration is that human beings are part of nature and can take an active role in creating and restoring an authentic natural place or community.[2] An early example of environmental restoration was the relocation of actual blocks of wetlands to allow for the expansion in 1968 of the Zurich, Switzerland airport runway.[3] Other instances have included reforestation projects in Malaysia;[4] primate habitat restoration in Kenya's Tana River National Primate Reserve;[5] and remediation of radioactive remains from the United States' atomic testing in the South Pacific, allowing the original residents of Bikini Atoll to return to their island.[6]

In the United States, the federal government began its involvement in environmental restoration with somewhat narrow efforts to remove specified pollutants from air[7] and water,[8] lessen hazardous waste conditions,[9] and reclaim

---

1. A. Dwight Baldwin, Jr. et al., *Introduction: Ecological Preservation versus Restoration and Invention*, *in* BEYOND PRESERVATION: RESTORING AND INVENTING LANDSCAPES 3, 9 (A. Dwight Baldwin, Jr. et al. eds., 1994) [hereinafter BALDWIN].

2. *See* Gerry O'Sullivan & Carl Pletsch, *Inventing Arcadia: An Interview with Frederick Turner*, 53 THE HUMANIST 10 (1993).

3. *See* Orie L. Loucks, *Art and Insight in Remnant Native Ecosystems*, *in* BALDWIN, *supra* note 1, at 128–31.

4. *See* David L. Gorchov, *Natural Forest Management of Tropical Rain Forests: What Will Be the "Nature" of the Managed Forest?*, *in* BALDWIN, *supra* note 1, at 36.

5. *See* Kimberly E. Medley, *Identifying a Strategy for Forest Restoration in the Tana River National Primate Reserve, Kenya*, *in* BALDWIN, *supra* note 1, at 154.

6. *See* Ralph Vartabedian, *After 50-Year Exile, Bikinians Embark on Long Road Home*, L.A. TIMES, July 24, 1996, at A5.

7. *See, e.g.*, Air Pollution Control Act of 1955, Pub. L. No. 84-159, 69 Stat. 322; Clean Air Act of 1963, Pub. L. No. 88-206, 77 Stat. 392; Air Quality Act of 1967, Pub. L. No. 90-148, 81 Stat. 48; Clean Air Act of 1970, Pub. L. No. 91-95, 91 Stat. 685 (1970), (amended 1977).

8. *See, e.g.*, Water Quality Act of 1965, Pub. L. No. 89-234, 79 Stat. 903; Clean Water Act, 33 U.S.C. §§ 1251–1387 (1994 & Supp. IV 1998).

9. *See, e.g.*, Comprehensive Environmental Response, Compensation & Liability Act, 42 U.S.C. §§ 9601–9675 (1994); Asbestos Hazard Emergency Response Act of 1986, 15 U.S.C. §§ 201–214 (1994).

mining sites.[10] American restoration activities have included coal mine and abandoned mine reclamation,[11] coastal reclamation in southern California,[12] groundwater recharge projects in Arizona and Florida,[13] and prairie restoration projects in the Great Plains, often using fire.[14] In recent years, the federal government has devoted more attention to restoring ecological communities and their habitat.[15]

Environmental restoration of a watershed, which is our principal focus, presents numerous questions. First, a definitional problem exists because many terms are used interchangeably, including restoration, reclamation, rehabilitation, and habitat creation.[16] For our purposes, environmental restoration is reestablishing the structure and function of a watershed's ecosystem.[17] An ecosystem's structure is the diversity of its native species while an ecosystem's function is its plant productivity and hydrology.[18] In contrast to restoration, rehabilitation focuses on the symptoms rather than the causes of ecosystem degradation.[19] For example, in response to pronounced streambank erosion, rehabilitation might involve lining the streambanks with rocks to improve stability. However, restoration would require identifying the underlying causes, such as timber cutting practices, and attempting to alter the causes rather than the symptom of environmental degradation.

Successful restoration efforts must consider not simply a river or stream, but an entire watershed. Similarly, restoration activities should address the viability of multiple species rather than a single endangered plant or animal. Only a broad focus on an entire watershed and the resident biological communities offers hope of long-term solutions that will restore a watershed ecosystem's structure and function.

---

10. *See* Surface Mine Control & Reclamation Act of 1977, 30 U.S.C. §§ 1201–3128 (1994).

11. *See, e.g., id. See also* A. Dwight Baldwin, Jr., *Rehabilitation of Land Stripped for Coal in Ohio—Reclamation, Restoration, or Creation?, in* BALDWIN, *supra* note 1, at 181.

12. *See* Tony Perry, *Showdown Over Coastal Restoration*, L.A. TIMES, Nov. 13, 1996, at A3 (covering the wetlands restoration plan for the San Dieguito Lagoon).

13. *See* ARIZ. REV. STAT. ANN. § 45-801.01 (West Supp. 1999); FLA. STAT. ANN. § 373.0395 (West 1997).

14. *See* THE TALLGRASS RESTORATION HANDBOOK FOR PRAIRIES, SAVANNAS AND WOODLANDS 78–79 (Stephen Packard & Cornelia F. Mutel eds.,1997).

15. *See infra* Part III.

16. *See* Jack E. Williams et al., *Understanding Watershed-Scale Restoration, in* WATERSHED RESTORATION: PRINCIPLES AND PRACTICES 1, 2 (Jack E. Williams et al. eds., 1997).

17. This definition is used by Williams et al. and originally traces to a National Research Council report from 1992. *Id.* at 2.

18. *See Id.*

19. *See* Michael Furtman, *Habitat: Thinking Like a River*, TROUT, Fall 1999, at 13.

A second dilemma of environmental restoration is the tension between "leaving things alone" and the temptation to engineer restorative solutions. Fisheries biologists, for instance, regularly use construction projects to rehabilitate degraded creeks and streams.[20] The idea is to modify the stream's physical features to enhance fish habitat. Such techniques have included using logs, rock riprap, rock boulders, and concrete blocks in order to increase the number of pools or to prevent streambank erosion.[21] However, a recent study found that these physical structures usually blow out during spring runoff.[22] Many have turned out to be counterproductive.[23] The point, simply stated by Williams, Wood, and Dombeck, is that "engineered stream rehabilitation that attempts to fix the channel to a particular form is incompatible with the dynamic rivers it seeks to restore. What does work is to reestablish ecosystem structure and function."[24] Short-term "quick fixes" offer easy political and low cost solutions to degraded rivers and streams by bringing in teams of engineers to build something, anything, that will make the problem go away. But an orientation toward engineering solutions does not necessarily insure environmental restoration of an ecosystem's structure and function. Other solutions, sometimes remarkably simple and inexpensive, involving changes in land-use patterns may provide easier, cheaper, and better environmental restoration.

A third restoration question asks who the decisionmakers are in regard to restorative activity. Many construction projects that so dramatically altered America's watersheds in the name of the "Progressive Conservation Movement" were the result of almost total deference to the expertise of civil engineers or the political product of the "iron triangle" of: (1) governmental agencies like the United States Army Corps of Engineers ("Corps") and United States Bureau of Reclamation ("Bureau"); (2) congressional subcommittees; and (3) agricultural interest groups.[25] This traditional, federally dominated decisionmaking process no longer suffices in an era of widespread public interest in the environment and increased citizen scrutiny of local land and water issues. Who should be involved in the new decisionmaking process for formulating public policies concerning environmental restoration? Where in the American federal system should these decisions be made?

---

20. *See id.*

21. *See id.*

22. *See* C.A. Frisell & R.K. Nawa, *Incidence and Causes & Physical Failure of Artificial Habitat Structures in Streams of Western Oregon and Washington*, 12 N. AM. J. FISHERIES MGMT. 182 (1992).

23. *See* Williams et al., *supra* note 16, at 10.

24. *Id. See also* David L. Galat, *Restoring the Natural Range of Missouri River Flow Variability to Benefit Declining Species*, 1999 AMERICAN WATER RESOURCES ASS'N CONF. 15, 18 ("Ecological systems function best in a stochastic environment where the full range of natural flow variability exists within the intra- and inter-annual uncertainty inherent in a natural hydrograph.").

25. *See* THEODORE LOWI, THE END OF LIBERALISM 279 (2d ed. 1979).

A fourth, central question in developing restorative policies, and the one we explore in depth, is whether existing water management agencies, often directly responsible for the environmental problems that now need restoration, are able to embrace and successfully implement restorative programs. Can these traditional agencies shift from a construction-development program to a restorative agenda? Put simply, the question is whether traditional bureaucratic organizations have the capacity to *change*.

We begin by examining, from the perspective of administrative theory, the change process and the barriers to change in an organizational setting. We then explore the genesis and progression of the federal government's involvement in environmental restoration in order to assess, in a real world setting, the possibility of organizational change.[26] We pay particular attention to the federal restorative policies expressed in the Clinton Administration's Clean Water Action Plan ("CWAP"), a boldly-stated initiative that applies a watershed focus to many federal environmental policies.[27] We then review recent activities of the U.S. Army Corps of Engineers and the U.S. Bureau of Reclamation, the federal government's traditional water management agencies, asking whether recent federal initiatives in the Florida Everglades,[28] California Bay Delta,[29] and Missouri River basin[30] mark a fundamental shift in restoration policies and methods, or are simply business as usual by politically savvy federal agencies under the guise of a currently popular slogan. Are federal agencies changing, or, in the environmental restoration field, will their resistance to change result in their being overshadowed by more dynamic organizations, often locally based, that are able to adjust and respond to the water management challenges of the future?

II. THE ORGANIZATIONAL CHANGE PROCESS

The Corps and the Bureau have historically been the most powerful entities in the water resources field. They have each survived by successfully dividing the field between themselves and dominating their respective sphere. The Corps has been preeminent in the East and along coastal waterways and the Bureau predominant in the American West with the building of Hoover, Glen Canyon, Grand Coulee, and other dams. When they have squared off, they have

---

26. We do not presume to evaluate the degree of change in all federal resource agencies. Nor have we systematically surveyed all programs of individual agencies. Using significant problem areas as examples, we do offer a preliminary assessment of the Corps' and Bureau's capacity for change.

27. *See Clean Water Action Plan* (visited Jan. 13, 2000) <http://www.cleanwater.gov> [hereinafter CWAP]. For more information on the CWAP, see Remarks Announcing the New Clean Water Initiative in Baltimore, 34 WEEKLY COMP. PRES. DOC. 284 (Feb. 19, 1998). *See also* Notices: Clean Water Act; Clean Water Action Plan, 63 Fed. Reg. 14,109 (1998) (announcing the availability of the CWAP).

28. *See infra* Part IV.A.1.

29. *See infra* Part IV.B.2.

30. *See infra* Part IV.A.2.

often reached accommodations that benefited both agencies. For instance, in the 1940s, the Corps and Bureau originally had rival plans for the development of the Missouri River. They temporarily shelved their rivalry and convinced Congress to build both plans—a shameless (and perhaps shameful) "shotgun wedding."[31]

An organization's relationship to other organizations and its work or task environment are not static and may dramatically shift based on technological developments, changing societal needs and preferences, and unanticipated events like wars or floods. A well-known example concerns Microsoft in the early 1990s when the firm realized that its dominance in desktop software would mean little in a world rapidly shifting to the internet. Microsoft dramatically changed course, invested billions of dollars in internet technologies, and has assumed a major role in the new environment.[32] A more recent example involves the *Encyclopedia Britannica*, long the leading compendium of Anglo-American knowledge. *Britannica* rejected a Microsoft offer to "bundle" an electronic version of its encyclopedia with Microsoft's ubiquitous home and office software programs.[33] As other publishers embraced these on line opportunities, *Britannica*'s sales plummeted, the number of employees fell, and the firm discontinued door to door sales.[34] In October 1999, *Britannica* belatedly began offering its encyclopedia on the internet, for *free*, hoping to profit from advertising.[35]

As the *Britannica* example illustrates, past prominence and success is no guarantee of power, importance, or even survival in the future. How may organizations such as the Corps and the Bureau ascertain when change is necessary? What strategies may an organization employ to make necessary changes?

A. Fundamental Change: The "Paradigm Shift" Process

One process by which fundamental change occurs is via a "paradigm shift." The change process begins when traditional practices no longer produce satisfactory results.[36] When the governing paradigm cannot explain these "anomalies," these failures lead to a crisis accompanied by extraordinary experimentation—"the tradition-shattering complement to the tradition-bound activity of normal science"—that often leads to a fundamentally different world view.[37] Those who are heavily invested in the traditional paradigm often oppose

---

31. MARK D. O'KEEFE ET AL., BOUNDARIES CARVED IN WATER: AN ANALYSIS OF RIVER AND WATER MANAGEMENT IN THE UPPER MISSOURI RIVER BASIN 15 (1986).

32. *See generally* PAUL ANDREWS, HOW THE WEB WAS WON: MICROSOFT FROM WINDOWS TO THE WEB (1999).

33. *See* Jonathon Gaw, *Britannica Relents, Goes on Internet*, ARIZ. REPUBLIC, Oct. 20, 1999, at A1.

34. *See id.*

35. *See id.*

36. *See generally* THOMAS S. KUHN, THE STRUCTURE OF SCIENTIFIC REVOLUTIONS (1962).

37. *Id.* at 6.

the new paradigm; hence, "its assimilation requires the reconstruction of prior theory and the re-evaluation of prior fact, an intrinsically revolutionary process that is seldom completed by a single man and never overnight."[38]

B. The Dominant Instrumental Paradigm

Our western organizational complex, both public and private, has long embraced a narrowly rationalistic paradigm. Some organizational theorists have labeled this rationalism "instrumental rationality;" it is focused on efficiency, technology, and profits.[39] Theorists contrast this narrow rationality with "substantive rationality," which, to the extent it can be defined, refers to integrated culture and existence.[40] In this broader rationalism, the intellectual, affective, spiritual, mystical, productive, moral, environmental, and social aspects of life are combined in an interdependent whole.[41]

Organizational historian and theorist Alberto Ramos argued that substantive rationality was fundamental to pre-market western societies.[42] The development of market-based economies introduced a new meaning of rationality. In efforts to maximize economic rents in the marketplace, human enterprises placed a growing emphasis on efficiency, an instrumental definition of rationality that abstracted out one single element of human experience (the cognitive-productive), transformed it beyond recognition, and elevated it above all human dimensions.[43]

The ascendancy of instrumental rationality came with the industrial revolution and the growing reliance on organizations to improve efficiency of production, often at the expense of the human dimensions of rationality. Max Weber, writing with his observations of German/Prussian armies in mind, documented the embodiment of instrumental rationality in bureaucratic structures.[44] Franz Kafka depicted these European bureaucracies in novels such as *The Castle*[45] and *The Trial*.[46] Through the division of labor, careful specification of offices and roles, and hierarchical relationships, the nonessential (substantive) characteristics of pre-market societies were purged in service of efficiency. Objective experiences (facts) were relevant to these bureaucratic structures;

---

38. *Id.* at 7.

39. *See, e.g.*, MAX HORKHEIMER, ECLIPSE OF REASON 18 (1947).

40. *See, e.g.*, ALBERTO GUERREIRO RAMOS, THE NEW SCIENCE OF ORGANIZATIONS 24–43 (1981). *See also* JÜRGEN HABERMAS, KNOWLEDGE AND HUMAN INTERESTS 301–17 (Jeremy J. Shapiro trans., 1971).

41. *See* RAMOS, *supra* note 40, at 24–43.

42. *See id.* at 32–33.

43. *See id.* at 85–95.

44. *See generally* MAX WEBER, THE THEORY OF SOCIAL AND ECONOMIC ORGANIZATION (A.M. Henderson & Talcott Parsons trans., 1947).

45. FRANZ KAFKA, THE CASTLE (Willa & Edwin Muir trans., Knopf 1954).

46. FRANZ KAFKA, THE TRIAL (Willa & Edwin Muir trans., Schocken Books 1968).

subjective experiences (values) were not. This was Weber's "iron cage of rationality" in which modern men and women soon found themselves.[47] In this vein, Herbert Marcuse has also suggested that bureaucratic society and its values produce only one-dimensional humans—economic optimizing creations.[48]

As America industrialized, the concept of instrumental rationality became embodied in the work of Frederick W. Taylor, who had tremendous influence on American government and business in the early twentieth century.[49] Taylor's approach relegated humans to being mere components in productive machinery.[50] Though committed to the noble premises of public service, Woodrow Wilson planted a form of instrumental rationality in the American government by indicating that values had no place in executive agencies, a so-called "politics-administration" dichotomy.[51]

Even though the early twentieth century Progressive Conservation Movement had a strong populist undercurrent, historian Samuel Hays viewed the conservation movement as the application of the scientific management approaches underway in other parts of American business and government to natural resources. The Movement supported the 1902 Reclamation Act[52] that encouraged the development and irrigation of small western farms, and the Federal Power Act[53] that prevented Wall Street monopolists from controlling prime hydroelectric power sites. But the Progressive Conservation Era also had a strong instrumental, "one best way" approach to natural resource management.[54] Hays concluded that the Progressive Conservation Movement was not essentially a populist uprising; instead, he argued that it was the application of multi-

47. FROM MAX WEBER: ESSAYS IN SOCIOLOGY 50–51 (H.H. Gerth & C. Wright Mills trans., 1958). Like Weber, Karl Marx was concerned with the implications of instrumental rationality and bureaucratic structures on humanity. He explored the alienation of workers that resulted from the separation of work from capital and from impersonal jobs. Through dialectic historical progresses, he predicted the day when these bureaucratic structures would wither away leaving people in an unstructured society with their relations governed by mutually shared, cooperative norms.

48. *See generally* HERBERT MARCUSE, ONE DIMENSIONAL MAN (1964). *See also generally* Herbert Marcuse, *Industrialization and Capitalism in the Work of Max Weber*, *in* NEGATIONS: ESSAYS IN CRITICAL THEORY 201–65 (Jeremy J. Shapiro trans., 1968).

49. *See generally* FREDERICK WINSLOW TAYLOR, THE PRINCIPLES OF SCIENTIFIC MANAGEMENT (1947).

50. *Id.* at 11.

51. *See generally* Woodrow Wilson, *The Study of Administration*, 2 POL. SCI. Q. 197 (1887).

52. Reclamation Act, ch. 1093, 32 Stat. 388 (1902) (codified as amended in scattered sections of 43 U.S.C.).

53. 16 U.S.C. §§ 791(a)–825(r) (1994).

54. *See generally* SAMUEL P. HAYS, CONSERVATION AND THE GOSPEL OF EFFICIENCY: THE PROGRESSIVE CONSERVATION MOVEMENT, 1890–1920 (1959).

disciplinary, scientific theories to the nation's natural resources by an appointed, professional, expert corps.[55]

While instrumental rationality is deeply planted as the governing paradigm of western society, anomalies abound. In many areas, the limits of instrumental rationality are obvious. Looking at individuals in organizations, psychologists such as A.H. Maslow argued that command-regulatory structures cannot elicit desired responses from unwilling members.[56] Human motivations must be given full attention and organizations must be designed around these motivational premises. Providing job "hygiene" factors, such as good pay, does not yield job satisfaction.[57] Satisfaction is achieved only with improvements in the content, challenge, and responsibility of the job.[58] Developmental psychologists argue that organizational design must recognize the life-development phases of individual members.[59] Organizational phenomenologists argue that an organization's significance depends more on the meaning these structures have in the members' lives than on the efficiency of production.[60]

Public administration scholars challenge the separation of fact and value, and the separation of politics and administration, in our governmental structures.[61] Arguing for a return to more substantive rationality, Ramos suggested that bureaucratic organizations must be "delimited" to respect the boundaries of other important "enclaves" of human experience.[62]

The Corps and Bureau have long applied instrumental rationality to the water development paradigm. America's dams, dikes, dredged canals, and harbors

---

55. *See id.* at 265–66.

56. *See generally* ABRAHAM MASLOW, TOWARD A PSYCHOLOGY OF BEING (2d ed. 1968); ABRAHAM MASLOW, THE FARTHER REACHES OF HUMAN NATURE (1971).

57. *See* ABRAHAM MASLOW, THE FARTHER REACHES, *supra* note 56, at 305.

58. *See generally* FREDERICK HERZBERG ET AL., THE MOTIVATION TO WORK (1959); FREDERICK HERZBERG, WORK AND THE NATURE OF MAN (1966).

59. *See generally* Richard L. Schott, *The Psychological Development of Adults: Implications for Public Administration*, 46 PUB. ADMIN. REV. 657 (1986).

60. *See generally* ALFRED SCHUTZ, THE PHENOMENOLOGY OF THE SOCIAL WORLD (George Walsh & Frederick Lehnert trans., 1967); Larry Kirkhart, *Toward a Theory of Public Administration*, *in* TOWARD A NEW PUBLIC ADMINISTRATION (Frank Marini ed., 1971); Hwa Yol Jung, *The Political Relevance of Existential Phenomenology*, 33 REV. POLITICS 538 (1971).

61. Proponents of Critical Social and Legal Studies also urge a sober examination of many of the fundamental premises in our society. One critical legal theorist posits a factory worker, who after promising her employer to pay for raw materials and the use of equipment, removes some of the goods she produces and sells them on her own. Our society labels such behavior as "embezzlement;" but why is the factory owner, who promises to pay wages, not guilty of embezzling the employee's labor? The point is, our organizational structures are not benign entities; they are fused with value. For a discussion of this intellectual debate, see ROBERT B. DENHARDT, THEORIES OF PUBLIC ORGANIZATION 150–73 (1984).

62. RAMOS, *supra* note 40, at 121.

are monuments to that value investment, and include some of America's best known physical features: Hoover Dam, Glen Canyon Dam, Grand Coulee Dam, the St. Lawrence River Waterway, and the Mississippi River navigation channel. As in other instrumentally dominated organizations, the failures of this paradigm have accumulated over thirty years, e.g., dam problems, continued flooding, reduced water-borne commerce on some waterways, devastated biota, the rejection or abandonment of ambitious river development plans, and a public that increasingly prefers preexisting natural conditions. It is unclear whether the Corps and the Bureau, as water management agencies, comprehend the basic limitations to their traditional paradigm and the need to undertake "extraordinary experimentation" for new approaches. They may only be fighting a rear-guard action against inevitable change.[63]

C. Barriers to Change

The impediments to change are many. The instrumental rationality of an organization may inhibit its ability to change. An instrumental organization may appear efficient and successful within a narrow value range, e.g., dam construction, but be unsuccessful when other considerations, such as overall watershed health, are observed, thereby producing Kuhn's "anomalies."[64] An organization may be "rationally bounded" if the organization or its members make only a parochial search for optimal solutions to a problem. This tunnel vision is "satisficing," in that the organization selects a sub-optimal solution that minimally satisfies the immediate constraints.[65]

Other barriers to change typically include the benefits of stability that certain actors receive from the status quo, the psychological costs of change, and an institutional inability to change.[66] Organizations are often incapable of change because: (1) members perceive a strong need for stability and to avoid chaos; (2) familiar approaches have become respected and sanctioned over time; (3) employees and managers are unable to think "outside the box;" (4) the organization has resource limitations, large "sunk costs," or appears to be buffered by a monopolistic position or large market share; (5) the organization's managers are narrowly focused on immediate concerns; or (6) the strategic advantages of "what already obtains" seductively discourages managers from making the "changes which postmortems inform us they should have adopted."[67] Indeed, organizations often "slip into their unyielding ruts by imperceptible stages because

---

63. *See* HERBERT KAUFMAN, THE LIMITS OF ORGANIZATIONAL CHANGE 5–40 (1971).

64. KUHN, *supra* note 36, at 52–53.

65. HERBERT A. SIMON, ADMINISTRATIVE BEHAVIOR: A STUDY OF DECISION-MAKING PROCESSES IN ADMINISTRATIVE ORGANIZATION xxvi (1957).

66. *See* KAUFMAN, *supra* note 63, at 8.

67. *Id.* at 10.

their attention is so totally concentrated on the specialized functions that must be completed day by day...."[68]

Frequently, legal constraints must be overcome. AT&T would have remained an antiquated monopoly and long distance competitors would not have survived if traditional antitrust policies had been enforced throughout the Reagan administration.[69] Barriers to change also result from the resistance of groups with vested interests in the status quo. For example, the National Education Association resists competency-based teacher evaluation[70] and cotton growers resist reductions in the federal crop-subsidy program. Often, the barriers to change are economic; firms do not have sufficient resources to invest in research or new technologies.

At the organizational level, many barriers to change result from an inadequate relationship between the organization and its environment. When organizations become dominant and powerful, they may ignore their task environment. For years, the American auto industry dictated vehicular characteristics and prices to the nation. IBM did the same with computers. Today, few organizations have a long-term, dominant presence in their organizational environments.

Organizations are often unable to adapt to new conditions, allowing standard operating procedures to prevail even though those responses are no longer relevant to changed circumstances. For example, during the Cuban missile crisis, the United States Air Force utilized its "standard form" of aerial reconnaissance over Cuba even though this unusual confrontation with the Soviet Union called for a different over-flight procedure.[71]

D. Organizational Change Strategies

Unless an organization is able to dominate its environment which, as the earlier *Encyclopedia Brittanica* example indicates, is becoming increasingly unlikely,[72] organizational resistance to change must be overcome. An organization must both understand and improve its relationship to its environment. Managers must introduce the appropriate change strategies and provide the leadership and vision necessary to achieve the organization's intended results.

---

68. *Id.* at 21.

69. *See* Louis Galambos, *When Anti-Trust Helped, and Why It Doesn't Now*, WASH. POST, June 13, 1999, at B5.

70. *See* K.L. Billingsley, *What's Wrong with the American Education System?*, SAN DIEGO UNION-TRIB., Oct. 14, 1989, at B13.

71. *See generally* GRAHAM T. ALLISON & PHILIP ZELIKOW, ESSENCE OF DECISION: EXPLAINING THE CUBAN MISSILE CRISIS (2d ed. 1999).

72. *See supra* Part II.

1. Understanding the Task Environment

Establishing a relationship with the environment is a "boundary spanning" activity.[73] The organization must gain a better appreciation of which policies and organizations affect its own interests and activities. The organization also must understand the impact it has on its environment and develop better means for evaluating its performance in its environment. Private sector organizations have an advantage in that feedback is available in terms of market share and profit margin. In the public sector, organizational success is often difficult to ascertain; this lack of feedback occasionally results in an unanticipated "blow-up" in the legislature or, more typically in the natural resources field, in a lawsuit. Public participation secures environmental feedback in the public sector, but is difficult to maintain on a continuous basis. Some organizations have undertaken systematic efforts to monitor trends in the environment, similar to "trends analysis" as undertaken by Westrends of the Council of State Governments.[74] Robert Biller developed diagnostic criteria to help managers better understand the task environment in which an organization operates.[75] Biller's list of organizational-environmental criteria places organizations on a scale that describes a stable, "bedrock" task environment, on one end, and a turbulent, "swamp" task environment on the other end.[76] A bedrock task environment is characterized by a low number of relevant actors, clear, shared goals and criteria, settled ground rules, known decision rules, and few surprises and variations from normal procedures.[77] In contrast, a swampy environment has many relevant actors, goals, criteria, ground rules, and decision rules that are all in debate, and many surprises and deviations from normal procedures.[78] Making an accurate diagnosis is critical; if managers use change strategies inappropriate to the organizational task environment, the organization's failure is assured.

2. Basic Change Strategy

One of the basic models of organizational change[79] was developed by Kurt Lewin, who posited that in any organization setting, an equilibrium exists between competing forces.[80] *Driving forces* for increased production, such as the

---

73. JAMES D. THOMPSON, ORGANIZATIONS IN ACTION: SOCIAL SCIENCE BASES OF ADMINISTRATIVE THEORY 81 (1967)

74. *See generally, e.g.*, WESTRENDS, THE SECOND HALF OF LIFE: REDEFINING AGING IN AMERICA (1998).

75. *See* Robert P. Biller, *Public Policy and Public Administration: Implications for the Future of Cross-Cultural Research and Practice*, 9 KOREA OBSERVER 258 (1978).

76. *See id.* at 257–59.

77. *See id.*

78. *See id.*

79. These change processes are often referred to as "organizational development" or "applied behavioral science."

80. *See generally* Kurt Lewin, *Frontiers in Group Dynamics: Concept, Method and Reality in Social Science; Social Equilibria and Social Change*, 1 HUM. REL. 5 (1947).

introduction of computers, are neutralized at some level of production by *restraining forces*, such as employee culture or poor training.[81] To produce change, the *driving forces* must be intensified, the *restraining forces* weakened, or both.[82] Lewin also suggested a three-phase process to change the equilibrium in a desired direction.[83] First, existing behaviors are *unfrozen* through physically disrupting existing routines, undermining social supports, rewarding willingness to change, and punishing resistance to change.[84] Second, *change* occurs when organizational members are introduced to new models and behavioral patterns and then placed into situations that require exercising these new behaviors.[85] The change process concludes by *refreezing* the newly acquired desirable behaviors, which become "integrated as patterned behavior into the individual's personality or ongoing significant emotional relationships...."[86]

This basic change strategy has been elaborated more recently by Harvard Professor John P. Kotter.[87] Kotter expanded upon Lewin's three-step process, emphasizing the importance of leadership to effective change.[88] He also argued that effective leaders deeply embed new behaviors into the organizational fabric.[89] Kotter's "vision" requires that an organizational leader first articulate a preliminary, new organization vision which the leadership coalition then discusses, debates, and refines. The end result is a statement "that is desirable, feasible, focused, flexible, and is conveyable in five minutes or less."[90]

Robert Biller is less confident that the vision or direction of organizational change can be intuited from the leadership corps.[91] He believes that the direction for change, especially in a "swampy" environment, comes from the iterative process of monitoring and interacting with the task environment.[92] Change initiatives in turbulent settings should be short-term, specific, and accompanied by prompt evaluation and plan modification with an adaptive, temporary, and responsive organizational structure.[93] Temporary team management or matrix structures allow greater flexibility.[94] Management should concentrate on the major challenges facing the organization, avoid catastrophic

---

81. *See id.* at 16.
82. *See id.* at 26.
83. *See id.* at 34–35.
84. *See id.* at 35.
85. *See id.*
86. PAUL HERSEY ET AL., MANAGEMENT OF ORGANIZATIONAL BEHAVIOR: UTILIZING HUMAN RESOURCES 482 (7th ed. 1996).
87. See JOHN P. KOTTER, LEADING CHANGE (1996).
88. *See id.* at 175.
89. *See id.* at 85.
90. *Id.* at 81.
91. *See* Biller, *supra* note 75, at 262–63.
92. *See id.* at 261–62.
93. *See id.* at 260.
94. *See id.*

error, and make an organization's units justify their current activities.[95] The key is to "try a lot of things," avoid investing vast amounts of the organization's capital in any one approach, and evaluate whether changes are successful.[96]

Organizational-level approaches cannot succeed without attention to the need for change by organization members. As is true at the organizational level, there must be an unfreezing of existing behaviors at the individual or group level, experimentation with new behaviors, and a refreezing of new, more responsive behaviors.[97]

In many organizational settings, group members' capacity for change is enhanced by giving them major responsibility for determining how the organization will adapt to new environmental circumstances. This occasionally results in organizational changes that allow semi-autonomous workgroups to have maximum responsibility for making needed changes. For instance, many automobile manufacturers have restructured their production systems to allow greater workgroup autonomy.

Individual change also requires investment in job training and job enrichment. In some instances, however, individuals in an organization, often the professional corps, may be unable or unwilling to change. If so, the organization may benefit by early identification of this inability or unwillingness. The organization may need to ease the transition of these individuals to other productive work.

With this basic organizational change theory in mind, we now examine several federal environmental restoration initiatives, the principal water management agencies charged with these restoration responsibilities, and assess whether these organizations are capable of changing to embrace these new endeavors.

III. FEDERAL RESTORATIVE INITIATIVES & OPPORTUNITIES FOR CHANGE

A new century is an appropriate occasion to contemplate change and our ability to effect change. No area of concern is more deserving of this scrutiny than the complex relationship we share with our nation's waterways and watersheds. The capacity of our technological-industrial society to manipulate aquatic environments is unquestionably immense. For instance, in the forty years following World War II, "the Columbia [River] was transformed...into [America's] most elaborately engineered electricity-irrigation-transportation machine," with at least thirteen big dams built on its mainstem and more than a

95. *See id.*
96. *See id.*
97. *See* HERSEY ET AL., *supra* note 86, at 481–83.

hundred on its tributaries.[98] Comparably, the Stanislaus River is dammed fourteen times on its route to the Pacific Ocean.[99] In fact, every significant river in California except one has been dammed at least once since the early 1900s.[100]

Despite this extraordinary display of scientific and engineering prowess, the health of our nation's watersheds and waterways is greatly imperiled. As of 1996, 2196 fish consumption advisories warned the public against consumption of fish contaminated with toxic chemicals.[101] Similarly, roughly thirty-eight percent of tidal estuaries have been impaired for one or more designated uses.[102] By 1990, at least twenty-two states had lost fifty percent or more of their original wetlands, while seven states had lost more than eighty percent of their original wetlands.[103]

While these statistics paint a grim picture, we can learn from our past mistakes and implement positive, restorative change to our aquatic resources. With the fundamentals of organizational change theory in mind, we analyze several federal environmental restoration initiatives and the capacity of federal water management agencies to alter their business practices from being exploitive to being restorative. What factors and strategies will allow agencies such as the Corps and the Bureau to survive another century and perform in ways that protect the environment? Will traditional federal agencies be able to lead the restoration mission or will other groups and institutions have to fill the void? The federal government's recent involvement in environmental restoration suggests answers to these questions.

The federal government's interest in environmental conservation traces to the creation of Yellowstone National Park in 1872 and the administration of Teddy Roosevelt in the early twentieth century.[104] The federal government's involvement in environmental restoration, however, did not begin in earnest until the 1960s with the emergence of the modern environmental movement. Since then, the federal government has actively pursued both environmental protection and restoration.

---

98. BLAINE HARDEN, A RIVER LOST: THE LIFE AND DEATH OF THE COLUMBIA 17 (1996).

99. *See* MARC REISNER, CADILLAC DESERT: THE AMERICAN WEST AND ITS DISAPPEARING WATER 9 (2d ed. 1993).

100. *See id.*

101. *See* U.S. ENVIRONMENTAL PROTECTION AGENCY, REPORT BROCHURE, NATIONAL WATER QUALITY INVENTORY: 1996 REPORT TO CONGRESS, *available at* <www.epa.gov/ow/resources/brochure/broch2.html>.

102. *See id.*

103. *See* T.E. DAHL, FISH AND WILDLIFE SERVICE, WETLANDS LOSSES IN THE UNITED STATES 1780S TO 1980S (1990), *available at* <www.epa.gov/ow/resources/brochure/fig19.gif>.

104. *See* HAYS, *supra* note 54, at 5.

A. Clean Water Act

The 1972 Clean Water Act[105] is perhaps the most important piece of environmental legislation in American history. The Act embraced two approaches to environmental protection: an ambient-quality approach that focuses on the overall quality of a particular lake or river,[106] and a technology-based approach that focuses on discharge of water at particular point sources.[107] The Act has three parts: a research program,[108] a construction program for municipal wastewater treatment plants,[109] and a regulatory program of water standards for lakes and rivers[110] and permits for discharging pollutants into navigable waters.[111] The Act sought to eliminate all "discharge of pollutants into navigable waters...by 1985,"[112] a standard that turned out to be hopelessly idealistic.

Nonetheless, the change in the nation's lakes and rivers since 1972 has been quite dramatic. In 1972, cities regularly dumped raw sewage into harbors and rivers. Industrial pollution seriously degraded many rivers. In 1969, the Cuyahoga River in Ohio literally caught fire. Today, municipal water treatment plants have all but eliminated the discharge of sewage into watercourses. End-of-the-pipe limits on toxic chemicals have significantly reduced industrial pollution. The percent of rivers that are safe for swimming and fishing has risen from thirty to forty percent to approximately seventy percent.[113]

Yet many challenges remain. The Clean Water Act requires each state to report bi-annually on the conditions of the state's waters.[114] In 1996, states reported that between thirty-six percent and forty percent of their rivers, streams, lakes, and estuaries had impaired water quality and an additional four to ten percent were threatened.[115] For the Great Lakes, which contain twenty percent of all the fresh water on earth, ninety-seven percent of the shoreline miles had impaired water quality.[116] Some 15,000 water bodies currently fail to meet the Act's clean water standards.[117]

---

105. Federal Water Pollution Control Act of 1972, 33 U.S.C. §§ 1251–1387 (1994).

106. *See id.* § 1313(d).

107. *See id.* §§ 1311, 1312.

108. *See id.* §§ 1251–1272.

109. *See id.* §§ 1281–1299, 1381–1387.

110. *See id.* §§ 1311–1330.

111. *See id.* §§ 1341–1345.

112. *Id.* § 1251(a)(1).

113. *See* CWAP, *supra* note 27, at 1.

114. *See* 33 U.S.C. § 1315.

115. *See* CWAP, *supra* note 27, at 7.

116. *See id.*

117. *See id.* In September 1998, the EPA and U.S. Department of Agriculture ("USDA") released a joint draft of the Unified Animal Feedlot Operations Strategy. *See* Notices: Unified National Strategy for Animal Feeding Operations, 63 Fed. Reg. 50,192 (1998). Other studies have reached similar conclusions.

As we enter the new millennium, the most significant water pollution problem no longer comes from municipal sewage or industrial contaminants. It is instead polluted runoff from farmlands. "[A]griculture is the most extensive source of water pollution, affecting 70 percent of impaired rivers and streams and 49 percent of impaired lake acres."[118] Pesticides, fertilizers, and animal waste that reach watercourses are the most important contemporary source of water pollution.[119] The EPA lacks authority to regulate most of these sources. The Clean Water Act ("CWA") granted the EPA authority to set point source ("end-of-the-pipe") restrictions and require minimum water ambient standards for lakes and rivers, but the CWA does not directly regulate non-point source pollution for which there is no single discharge location.[120] Instead, as a condition to federal grants for the construction of state wastewater treatment plants, each state must develop a plan to identify and control nonpoint source pollution.[121]

B. The Clean Water Action Plan

In February 1998, the Clinton Administration announced a major new federal initiative, *The Clean Water Action Plan: Restoring and Protecting America's Waters*.[122] CWAP has two components. The first is a set of over 100 major federal agency actions that have been or will be undertaken. The second component, and the centerpiece of CWAP, is an initiative that would integrate efforts to protect and restore water quality and associated natural resources on a watershed basis.

1. Federal Agency Actions

CWAP's proposed actions aim to strengthen and enhance existing programs in order to: (1) better protect public health; (2) enhance the stewardship of natural resources; (3) strengthen regulatory standards over runoff; and (4) improve the flow of information to citizens.[123] To protect public health, various federal agencies, in coordination with state and tribal agencies, are charged with assuring that fish and shellfish are safe to eat, that beaches are safe for swimming,

---

118. CWAP, *supra* note 27, at 9.

119. *See generally* UNITED STATES GEOLOGICAL SURVEY, THE QUALITY OF OUR NATION'S WATERS (1999).

120. *See* 33 U.S.C. § 1362(14) (1994) (defining point source and specifically excluding "agricultural stormwater discharges and return flows from irrigated agriculture" from the definition). There is no definition of non-point source in the code. *See also id.* § 1311(e) (1994) (granting authority for the regulation of point source discharges). There is no similar authority for the regulation of non-point source discharges.

121. *See id.* § 1288 (b)(2). *See also* Natural Resources Defense Council v. EPA, 915 F.2d 1314, 1316 (9th Cir. 1990).

122. *See* CWAP, *supra* note 27. On the CWAP, see Brian R. Hanson, *Clean Water Action Plan: Dramatic New Approach To Water Quality Protection*, ABA SEC. NATURAL RESOURCES, ENERGY & ENVTL. LAW NEWSLETTER, Mar.–Apr. 1999, at 1.

123. *See* CWAP, *supra* note 27, at 20.

that water is safe to drink, and that there is a reduction in exposure to hormone-disrupting pollutants.[124] To protect natural resources, federal agencies are charged with developing a unified policy for managing federal lands and resources, increasing the maintenance and obliteration of roads on national forests, accelerating Bureau of Land Management ("BLM") and Forest Service programs to protect riparian areas and stream corridors, and implementing or accelerating changes to range allotment programs in order to improve the health of federal rangelands.[125] Other stewardship actions aim to protect wetlands and coastal waters by strengthening U.S. Department of Agriculture's Wetland Reserve and Conservation Reserve programs.[126]

For coastal situations, the National Oceanic and Atmospheric Administration ("NOAA") will amend its Fisheries Management Plans to develop recommendations to minimize impacts of state pollution runoff.[127] In this connection, the NOAA and the EPA will work with coastal states to implement the Coastal Zone Management Act of 1990.[128] The final stewardship component of CWAP creates incentives for private land owners to encourage, through federal demonstration projects, stream corridor restoration.[129]

The third set of proposed federal actions strengthens controls over polluted runoff.[130] Federal agencies will coordinate closely with state and tribal agencies to implement various water quality programs that address non-point source pollution.[131] CWAP commits greater federal resources to state and tribal agencies to help implement these non-point source programs.

One controversial element is CWAP's attempt to expand application of the Clean Water Act's pollution discharge permits to animal feeding operations ("AFOs").[132] It is a critical issue because there are approximately 450,000 AFOs throughout the United States and only a small percentage have National Pollution Discharge Elimination System ("NPDES") permits.[133] CWAP also proposes a variety of new incentive and coordinated programs with states and tribes to improve management of AFOs.[134]

The final portion of the proposed federal agency actions improves the flow of information to citizens by requiring better water resource monitoring and

---

124. *See id.* at 23–28.
125. *See id.* at 31–34.
126. *See id.* at 40.
127. *See id.* at 46.
128. 16 U.S.C. §§ 1451–1465 (1994).
129. *See* CWAP, *supra* note 27, at 48.
130. *See id.* at 52–62.
131. *See id.* at 53.
132. *See id.* at 59–62.
133. *See id.* at 59–60.
134. *See id.* at 59–62.

publishing more useful reports.[135] CWAP commits the Administration to providing information in a useful and accessible format to citizens.[136]

CWAP has already spawned significant regulatory initiatives by EPA and the Corps under the Clean Water Act. Through rulemaking and implementing regulations, significant changes are underway with respect to the Water Quality Standards Program, the Total Maximum Daily Load ("TMDL") Program, coordinated agency implementation of the Clean Water Act and the Endangered Species Act ("ESA"), and amendments to the Corps' Nationwide Permit ("NWP") Program.[137]

2. Unified Watershed Assessments

By organizing protection and restoration efforts on a watershed basis, CWAP hopes to achieve more rapid and more widespread achievement of clean water goals. CWAP aims to develop "Unified Watershed Assessments," which expand recent federal government multi-agency responses to complicated watershed problems.[138]

Unified Watershed Assessments will identify those watersheds in need of restoration and identify particularly sensitive watersheds.[139] Federal agencies, in partnership with state, tribal, and local governments, will prioritize which watersheds merit most urgent attention.[140] Having established such priorities, federal agencies again in partnership will then develop Watershed Restoration Action Strategies.[141] This emphasis on partnership aims to develop grassroots constituencies with long-term commitment to protection of local watersheds.

Many local organizations and partnerships have had great success in the past. One illustration is Chesapeake Bay, which was once one of the most productive oyster regions in the world before the oyster population was decimated by dredging and municipal sewage. In 1967, scientists and citizens combined to form the Chesapeake Bay Foundation, in cooperation with state governments. The foundation's restoration efforts have been very successful.[142]

CWAP provides assistance grants to encourage the involvement of local citizens' organizations in particular watersheds.[143] Various federal agencies will

---

135. *See id.* at 64–69.

136. *See id.*

137. For an analysis of these changes, see generally Lisa A. Kirschner & Kevin C. Harvey, *Clean Water Act Programs of the Next Millenium: Predicting the Flow of Things to Come*, 45 ROCKY MT. MIN. L. INST. 17-1 (1999).

138. *See* CWAP, *supra* note 27, at 71–73.

139. *See id.* at 73.

140. *See id.*

141. *See id.* at 77.

142. *See* Francis X. Clines, *For Chesapeake Oysters, Future May Lie in Past*, N.Y. TIMES, Aug. 2, 1999, at A11.

143. *See* CWAP, *supra* note 27, at 43.

convene a National Watershed Forum to coordinate the various watershed programs.[144] On February 22, 2000, U.S. Departments of Agriculture, Commerce, Defense, Energy, and Interior, the EPA, the Tennessee Valley Authority, and the Army Corps of Engineers released notice of a proposed Unified Federal Policy on Watershed Management.[145] The goal is to insure that all federal land management agencies cooperate to manage resources on a watershed basis.[146] The *Proposed Unified Federal Policy* aims to implement a watershed approach in a unified and cost effective manner, basically tracking CWAP.

Not everyone is happy with CWAP. In June 1999, the Wyoming Association of Conservation Districts filed suit challenging the legality of the adoption of CWAP.[147] The suit claims that the process of developing CWAP violated the Administrative Procedure Act's rulemaking requirements.[148] Notably, the suit challenges the expansion of federal authority over private lands, CWAP's definition of non-point source pollution as pollutant runoff, and EPA's authority to establish wasteload-waste allocations (TMDLs) for nonpoint sources of pollution.[149]

IV. FUNDAMENTAL CHANGE OR BUSINESS AS USUAL?

The Clean Water Action Plan is a bold approach to watershed environmental quality and restoration. The Plan has all the appearances of a major paradigmatic shift in the water management programs of the federal government. To ascertain whether the federal government truly has embraced a new environmental restoration paradigm requires a closer look at recent programs and activities of the major federal water management agencies. Have these agencies embraced the new framework of environmental restoration as pronounced by the Administration? Or have these agencies simply reclothed their traditional water development tendencies in superficial, contemporary garb?

A. U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers, a Department of Defense agency, undertakes military construction projects and, since its creation in 1802, its civilian branch has had a greater impact on rivers and coastal areas than any other agency in the world.[150] From its initial modest role of dredging harbors for ships, the

144. *See id.* at 83–84.

145. *See* Notices: Unified Federal Policy for Ensuring a Watershed Approach to Federal Land and Resource Management, 65 Fed. Reg. 8834 (2000).

146. *See id.*

147. Wyoming Ass'n of Conservation Dists. v. United States Environmental Protection Agency, No. 99-1179 (D. Colo. filed June 23, 1999).

148. *See id.* at 16.

149. *See id.* at 33–37.

150. *See* REISNER, *supra* note 99, at 172–73. *See generally* ARTHUR MAASS, MUDDY WATERS: THE ARMY ENGINEERS AND THE NATION'S RIVERS (1951).

Corps in the late nineteenth century began to alter rivers to accommodate barges and large ships. Beyond this navigation role, the Corps also found a niche in flood control for which it is justly famous or infamous. Levees, dikes, and dams built by the Corps served to control floods and also provided enormous quantities of cheap water for western farmers.

The Corps is best known for its activities with respect to the nation's rivers which it has dammed, deepened, straightened, bridged, reversed, and riprapped.[151] These activities have had disastrous effects on the rivers' associated riparian habitat.[152] Many of the Corps' activities, undertaken in the name of flood control, actually worsened flooding.[153] A deepened, straightened river, lined with concrete or soil cement, moves flood water downstream faster and more dangerously than would a river in its natural state with meanders and wetlands to absorb much of the flood's energy.[154]

The Corps' efforts to control beach erosion along coastal areas and the Great Lakes shores has had similarly perverse effects. The Corps has spent billions of dollars building jetties, seawalls, breakwaters, and what it calls "beach renourishment projects."[155] This euphemism refers to artificial beaches and dunes built by Corps engineers and underwritten by the federal government. Seawalls best capture the misguided philosophy of the Corps' approach to curbing coastal beach erosion. A seawall, made of concrete, riprap, or other material, seems at first blush to provide an ideal solution to a property owner's reasonable desire to protect his or her beachfront cottage from the ravages of a hurricane or other ocean storm. But the decision of one homeowner to erect a beachwall means that the impact of any particular storm will become more severe on his or her neighbors who, in turn, must build their own seawalls. A collection of seawalls actually causes greater erosion of the beach.[156] Beaches do not need protection from the sea; in fact, they *are* the protection against the sea.[157] Beaches smooth out and absorb the energy of large waves during storms. Although severe storms may cause significant beach erosion, sand naturally regenerates during normal periods of average wave size. A seawall prevents the sea from carrying out this

151. *See* MARTIN HEUVELMANS, THE RIVER KILLERS 165 (1974); REISNER, *supra* note 99, at 173; Harold L. Ickes, *Forward* to MAASS, *supra* note 150, at xiv ("No more lawless or irresponsible Federal group than the Corps of Army Engineers has ever attempted to operate in the United States, either outside or within the law."). *See generally* ARTHUR E. MORGAN, DAMS AND OTHER DISASTERS (1971). *But see* THE U.S. ARMY ENGINEERS–FIGHTING ELITE ix–x (Franklin M. Davis, Jr. & Thomas T. Jones eds., 1967).

152. *See, e.g.*, HEUVELMANS, *supra* note 151, at 167–68.

153. *See* REISNER, *supra* note 99, at 172–73.

154. *See* NANCY D. GORDON, STREAM HYDROLOGY: AN INTRODUCTION FOR ECOLOGISTS 92 (1992). *See also* LUNA B. LEOPOLD & THOMAS MADDOCK, JR., THE FLOOD CONTROL CONTROVERSY: BIG DAMS, LITTLE DAMS, AND LAND MANAGEMENT 28–30 (1954).

155. ORRIN H. PILKEY & KATHERINE L. DIXON, THE CORPS AND THE SHORE 75–82 (1996).

156. *See id.* at 38–53.

157. *See id.* at 20.

wonderfully natural function of changing a beach's shape during and after a storm event, thereby affording the shoreline *less* protection from erosion in the long run. In light of this understanding, many states have prohibited seawall construction.[158] The Corps' "replenishment projects" are merely bandaids on a serious wound; renourished beaches eventually will wash away again.[159] Beach renourishment is not an example of environmental restoration because the efforts result in no permanent protection.

The Corps has developed a reputation as an effective advocate before Congress for its activities. Members of Congress may expect Corps support for projects in their districts in exchange for their support for other Corps projects. For generations, western representatives and senators were repeatedly reelected by constituents grateful for the construction projects brought home. The political coalition of powerful committee chairs, the Corps (and its sometimes ally the Bureau), and construction interests is formidable indeed. In 1977, President Carter found this out the hard way when he created a "hit list" to cut back on pork barrel construction projections throughout the country. Carter's effort was quickly condemned by Congress, including otherwise erstwhile liberals, like Morris K. Udall of Arizona, who savagely attacked the president and his plan.[160]

We now examine three of the Corps' current environmental restoration projects. We do so to assess whether the agency is making a fundamental change from its construction tradition to a more restorative, environmentally sensitive orientation. These include projects in the Florida Everglades, the Missouri River Basin, and a proposal to develop an Arizona flood control project. Following these examples, we review recent budget proposals involving the Corps to ascertain whether construction or restoration is likely to be the future emphasis of the agency.

The Corps certainly has begun to change; in fact, proposals for change have come, perhaps surprisingly, from within the Corps. In the aftermath of disastrous flooding in the Mississippi River Basin and lower Missouri River Basin in 1993, President Clinton established an Interagency Floodplain Management Review Committee ("IFMRC") to examine the consequences of the flood, to assess the role that human activity played in exacerbating the extent of the damage, and to determine how the nation should respond in order to prevent a reoccurrence. The Committee report, *Sharing the Challenge: Floodplain Management Into the 21st Century*,[161] became known as the Galloway Report after the head of the Committee, Corps Brigadier General Gerald E. Galloway. The

158. *See, e.g.*, FLA. STAT. ANN. § 161.041 (West 1997) (establishing permit requirements for building seawalls).

159. *See* Pilkey & Dixon, *supra* note 155, at 86–91.

160. On the rivalry with the Bureau of Reclamation, see REISNER, *supra* note 99, at 176–221. On the Carter hit list, see *id.*, at 317–43.

161. INTERAGENCY FLOODPLAIN MANAGEMENT REVIEW COMMITTEE, SHARING THE CHALLENGE: FLOODPLAIN MANAGEMENT INTO THE 21ST CENTURY (1994) [hereinafter GALLOWAY REPORT].

Report signaled a significant change in policy by calling for greater emphasis on non-structural solutions, including the acquisition and restoration of wetlands.[162] It also called for stricter limits on developments in floodplains and changes in federal farm policy that would discourage converting wetlands into crop land.[163] The Committee advocated a shift in the focus of floodplain management from structural solutions to a strategy of, first, avoiding the hazard of floods through implementation of non-structural alternatives; second, minimizing the impact of floods; and, finally, mitigating harm should floods occur.[164]

1. Florida Everglades

Non-structural approaches to environmental restoration are appropriate in some circumstances, but not all. Consider Everglades National Park, where the "river of grass" depends on the slow, southerly flow of water through the Park, which historically emptied out into Florida Bay. Beginning early in the twentieth century, however, farmers began diverting water for sugar and other crops, water that would have once flowed into the Park. In the 1950s, the Central and South Florida Project built over 1000 miles of levees, canals, gates, and pumping stations that profoundly disrupted the flow of water to the Everglades.[165]

In 1999, after six years of planning and negotiations, a coalition of federal government agencies, state and local governments, and a myriad of environmental organizations released a plan devised by the Corps to restore water flows to the Everglades.[166] This $7.8 billion project will attempt to replumb the area north of the Everglades to mimic natural conditions. Given the incredible population boom in south Florida over recent decades, it will not be possible to simply replicate the natural system. The plan devised by the Corps instead will attempt to recapture water currently being diverted that ends up flowing into either the Atlantic Ocean or the Gulf of Mexico.[167] Through a variety of reservoirs, quarries, and aquifers, stored water will be redistributed to the Everglades region. Treated municipal effluent and agriculture runoff also will enhance the flow to the Everglades. This plan will require the construction of some new canals and levees, but it also involves the removal of 240 miles of canals and levees.[168] The Everglades ecosystem is complicated and nuanced. Only a multifaceted restoration plan, including various structural components, offers the hope of achieving significant restoration.

---

162. *See id.* at 5.
163. *See id.*
164. *See id.* at 5–6.
165. *See* Tom Kenworthy, *Pumping Billions Into the Everglades; Ambitious U.S Restoration Plan Is 'Most Critical Step Yet,' Gore Says*, WASH. POST, July 1, 1999, at A3.
166. *See id.*
167. *See id.*
168. *See id.*

2. Missouri River Basin

The Missouri River flows 2540 miles from its headwaters near Three Forks, Montana, to its confluence with the Mississippi River upstream of St. Louis. The river basin covers 530,000 square miles, an area roughly one-fifth of the continental United States. The basin is quite diverse, consisting of ten states, twenty-eight tribes, federal land, and multiple land use patterns ranging from sparsely populated counties to major cities.[169]

Although the Corps began dredging and diking the river after the Civil War, most Missouri River development resulted from 1944 federal legislation.[170] Severe flooding during 1943 prompted Congress to ask for a report by the Corps concerning flood control needs.[171] By February 1944, the Corps developed what is now known as the Pick Plan for flood control and navigation.[172] Shortly thereafter, the Bureau released its more comprehensive Sloan Plan for upper Missouri River Basin development.[173] The two plans were eventually merged into the Flood Control Act of 1944,[174] which comprehensively addressed flood control and development in the Missouri River basin.

The Pick-Sloan Plan is the blueprint by which a large mainstem and several tributary dams have been built, levees and a 300-foot wide by 9-foot deep navigation channel constructed, hydroelectric turbines and transmission lines installed, and irrigation projects undertaken.[175] Six major dams, all built by the Corps, now stem the flow of the Missouri River. The reservoirs have a total capacity to store 74 million acre-feet of water, enough to provide domestic water for 225 to 375 million people for one year.[176] Because of channelization, also performed by the Corps, the total length of the lower Missouri (from Sioux City, Iowa to its mouth near St. Louis) has been reduced by one-third and its floodplain has been narrowed in some places from a mile to 300 feet. Except for one beautiful, unspoiled wild and scenic stretch in north-central Montana, the river has been transformed into what might be described as the Missouri "reservoir" in its upper basin and the Missouri "canal" in its lower reaches.

Flood control, which was an important goal of the legislation, has been largely achieved in the basin. Since 1954, $2.7 billion in flood damage has been

---

169. For a history of the Missouri River and the role of the Corps, see generally JOHN E. THORSON, RIVER OF PROMISE, RIVER OF PERIL: THE POLITICS OF MANAGING THE MISSOURI RIVER (1994).

170. *See id.* at 56.

171. *See id.* at 63–64.

172. *See id.* at 64.

173. *See id.*

174. *See* Flood Control Act of 1944, Pub. L. No. 78-534, 58 Stat. 887 (codified in scattered sections of 16 U.S.C., 33 U.S.C., & 43 U.S.C.). *See also* THORSON, *supra* note 169, at 67.

175. *See* THORSON, *supra* note 169, at 75.

176. *See id.* at 2.

prevented, not including an estimated $7.7 billion in avoided damage during the severe 1993 Mississippi and Missouri River floods.[177] Since flooding still occurs, federal and state agencies have considered flooding low-lying fields to reduce river volume during peak flood events.

Navigation was another major feature of the Plan. Estimates in the 1940s projected 5 million tons of annual commercial tonnage as the result of navigation improvements.[178] In recent years, commercial tonnage on the river has declined, totaling 1.5 million tons in 1996.[179]

As a result of flood control and navigation "improvements," the river's ecology has been savaged. River "improvements" resulted in the loss of fish and habitat, the reduction of flows at critical times for fish and wildlife movement and reproduction, the elimination of beaches and sandbars so important for birds, the near total removal of timber and native grasses, the destruction of the plant succession process, and the dewatering of oxbow lakes that serve as breeding areas for many species. An ancient fish, the pallid sturgeon, is on the federal endangered species list.[180] Two sand nesting birds are also in jeopardy: the least tern is endangered and the piping plover is threatened.[181] The river is "not a very good fishery. It's just a canal.... The channel is for navigation. It's not for fish. It's not for ducks."[182]

There are some encouraging signs. Local citizens and governments are becoming aware of the multiple values of a healthy river. Local projects, such as Nebraska's Boyer Chute, a backwater wildlife preserve, are pioneering efforts at restoring significant stretches of the river.

At the basin level, the Corps will complete in 2001 an environmental impact statement process that started a decade ago at the insistence of then-Senator Quentin Burdick.[183] This study will improve the Corps' ability to weigh different

---

177. *See* John E. Thorson, *What Future for the Missouri River?*, 1999 AMERICAN WATER RESOURCES ASS'N CONF. 3, 4.

178. *See* THORSON, *supra* note 169, at 77–78.

179. *See* U.S. ARMY CORPS OF ENGINEERS, 1996–1997 MISSOURI RIVER MAINSTEM RESERVOIRS ANNUAL OPERATING PLAN 79 (1996).

180. *See* Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1540 (1994); Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for the Pallid Sturgeon, 55 Fed. Reg. 36,641 (1990).

181. *See* Michael M. Olson et al., *Endangered Species Issues of the Missouri River*, 1999 AMERICAN WATER RESOURCES ASS'N CONF. 11 (1999).

182. *See* ROBERT KELLEY SCHNEIDERS, UNRULY RIVER: TWO CENTURIES OF CHANGE ALONG THE MISSOURI 239 (1999).

183. Sen. Burdick, then chair of the powerful U.S. Senate Environment & Public Works Committee, wrote President George Bush in October 25, 1989, expressing his "extreme displeasure with the Army Corps of Engineers in its management of the Missouri River during a prolonged and severe drought." THORSON, *supra* note 168, at 176. "Within two days, Brigadier General Patrick J. Kelly, Director of Civil Works, announced that the corps would undertake a[n update of the] master water control manual." *Id.* at 177.

reservoir management policies for the river. These operational regimes mean the difference between continued degradation of the river, with little economic justification, and the possibility of river and species restoration, accompanied by a more equitable sharing of river-related benefits. In June 1999, Nebraska Senator Robert Kerrey introduced legislation committing $320 million to river restoration.[184] Shortly thereafter, Kerrey visited the river with Secretary of the Interior Bruce Babbitt who heralded a new day for the river.[185] On August 30, 1999, state members of the Missouri River Basin Association proposed that the Corps periodically increase flows for fish and wildlife purposes, allow upper basin states to retain more water in the large reservoirs during drought, establish a recovery committee for fish and wildlife purposes, and begin to apply principles of adaptive management to the river.[186] The Corps incorporated much of the Association's proposal in its preferred alternative, issued in January 2000. The agency, however, has withdrawn the preferred alternative pending formal consultation with the U.S. Fish and Wildlife Service over threatened fish and birds.[187]

Fifty years ago, upper basin residents were interested in irrigated agriculture, lower basin residents were interested in navigation and flood control, and the Corps was interesting in building dams. Today, encouraging signs suggest that the "bandwidth" of policy considerations is much broader and includes water quality, fish and wildlife, riparian habitat, species regeneration, recreation, and others.

Still, the anticipated modification of reservoir operations has been criticized by environmental groups as a modest, insufficient response to the problem.[188] The Corps may be limited in its ability to implement changes in reservoir operations by a rider to the Energy and Water Appropriations Act of 2000, which prohibits revising the Missouri River Reservoir Master Control Manual to increase springtime water releases during heavy spring snowmelt and rainfall in states with rivers joining the Missouri River below Gavins Point Dam.[189] While the Corps has been listening more to basin states and tribes, the individual governments of the basin have done little to develop a lasting governance structure for the river. Litigation over the Corps' final decision is inevitable.

---

184. S. 1279, 106th Cong. (1999).

185. *See Babbitt Says More Money Needed to Protect Missouri River*, U.S. WATER NEWS, July 1999, at 19.

186. *See* Richard H. Opper, *Perched on a Razor: Planning Activities in the Missouri River Basin*, 1999 AMERICAN WATER RESOURCES ASS'N CONF. 7.

187. Michael Mansur, *Missouri Plan on Hold: Corps to Consider Options to Help Declining Species*, KANSAS CITY STAR, Mar. 30, 2000, at B1.

188. The environmental group American Rivers submitted its own plan to the Corps of Engineers recommending a flow regime it believes is more favorable to species recovery. *See* American Rivers, *Recovering The Missouri* (visited Mar. 25, 2000) <www.amrivers.org/missourirecover.html>.

189. *See* Energy and Water Appropriations Act of 2000, Pub. L. No. 106-60, § 103, 113 Stat. 483, 487 (1999).

3. Tortolita Mountains Drainage Project

While the Corps is experimenting with new approaches in highly visible areas like the Missouri, organizational change may be stymied by the agency's entrenched bureaucracy that embraces the Corps' traditional mission to build things. The Tortolita Mountain drainage project, a recent Corps flood control proposal, illustrates how difficult it is to change an agency's direction.

At the base of the Tortolita Mountains north of Tucson, Arizona is a broad alluvial fan. Although the area is a floodplain, some development is occurring thanks to the Federal Emergency Management Agency ("FEMA"), which provides flood insurance to those who import fill and build above specified flood elevation stages. Under section 6 of the Flood Control Act of 1938, the Corps has authority to undertake various flood control studies, including study of the Gila River and its tributaries in Arizona.[190] While the Gila River is a major river that was once navigable, the dry washes of the Tortolita Mountain foothills are a far cry from anything one might consider navigable. Water never flows in these washes except after storm events; the washes drain into the Santa Cruz River, a tributary of the Gila River.

In 1996, the Pima County Department of Transportation and Flood Control District requested that the Corps initiate a reconnaissance study. The 1996 study analyzed the existing situation, identified flood control problems and opportunities for correcting them, formulated a plan for solving the flood control problems, evaluated various alternatives, decided which alternatives warranted further consideration, engaged in a preliminary benefit/cost analysis of each alternative, and presented details on those alternatives that had a satisfactory benefit/cost ratio.[191] The reconnaissance study concluded that "[t]he most significant benefit category is savings from reduced flood proofing costs which generates 99% of all potential benefits."[192] Translated into English, this means that if the Corps undertakes flood control, homeowners and developers will not have to undertake drainage improvements or import structural fill. Thus, the benefits flow entirely to a specific group of private property owners while the costs are borne by the public tax coffers.

The study considered both "structural and non-structural alternatives" to flood control.[193] The structural flood control options were typical: concrete lined channels, culvert crossings, bridge crossings, soil cement embankments (approximately ninety-two miles worth), and detention/retention basins, i.e.,

---

190. *See* Flood Control Act of 1938, ch. 795, 52 Stat. 1215 (codified as amended in scattered sections of 33 U.S.C.).

191. *See* UNITED STATES ARMY CORPS OF ENGINEERS, LOS ANGELES DISTRICT, TORTOLITA DRAINAGE AREA, ARIZONA, RECONNAISSANCE STUDY, FLOOD CONTROL AND RELATED PURPOSES (1996).

192. *Id.* at iv.

193. *Id.* at 57.

dams.[194] Most revealing were the Corps' non-structural alternatives. The first non-structural alternative that the study considered was "raising existing structures above the flood hazard level or removing homes and other structures from the flood zones."[195] This alternative offers insight into the Corps' lexicon. It is breathtaking that the Corps thinks a non-structural alternative is to elevate or move homes and structures. However, history demonstrates that the Corps is in the business of controlling the flow of water by building levees and dams and dredging waterways. To the Corps, measures that control the flow of water are structural; elevating or moving homes is "non-structural" because it does not alter the flow of water.

Other non-structural alternatives included installing a flood warning system and purchasing land in the flood areas.[196] The report concluded that all the structural alternatives, with costs ranging between $69 and $116 million, were worth further consideration while none of non-structural alternatives merited further consideration.[197]

The rationale for not pursuing the non-structural alternative of purchasing lands in the flood prone area reveals the Corp's inability to change. The report dismissed this alternative because:

> No flood control benefits would result. There would be no benefits derived from elimination of flood proofing costs because no flood proofing would take place.... The cost to purchase all lands in the flood zones may be less than the structural alternatives available. However, no flood control benefits would result, therefore [this alternative] was eliminated from further consideration.[198]

Purchasing land and withholding it from development would not produce any flood control benefits. It would not prevent floods. But the report ignores that there would be no need for flood control benefits if the land is not developed! Apparently the goal of this regional Corps District is to undertake measures that produce flood control benefits. Although purchasing and setting aside the land would eliminate the flood proofing costs because no homeowner would need to install drainage improvements or import fill, the report remarkably reasoned this was not a benefit because "no flood proofing would take place."[199] The tail is wagging the dog. Only Corps initiated and constructed flood control benefits are placed on the positive side of the benefit-cost ledger. The Corps is an agency committed to undertaking structural flood control measures. There were no "flood control benefits" because the Corps would not engage in any construction activity that would alter the natural drainage pattern of the floodplain. In the end, the

194. *See id.* at 57–61.
195. *See id.* at 61.
196. *See id.*
197. *See id.* at 68–72.
198. *Id.* at 72.
199. *Id.*

Corps decided that only the $69 million alternative was worth pursuing, at a cost well in excess of the cost to purchase and set aside the land in the floodplain.[200]

The Tortolita study exposes an agency singularly driven by a desire to reach a preordained conclusion. Even if Congress determines to reorient the Corps away from an overwhelming emphasis on construction projects and the Corps leadership buys into a new mission, the Corps still must convince its rank-and-file bureaucracy to depart from the tradition of only engaging in construction projects.

4. Water Resources Development Act of 1999

Federal water resources development legislation personifies pork barrel politics. Senators and representatives lobby long and hard for seats on the Senate Environment and Public Works Committee or the House Transportation and Infrastructure Committee because of these committees' history, in which the "Subcommittee Chairman got two dams, the Ranking Member got one, and everyone else on the Committee got a promise...."[201] There is some indication that this tradition is changing. Senator Moynihan thinks that there is a "quiet revolution in the development of water resource projects," which he attributes to more rational cost/benefit economic criteria, a greater obligation on behalf of state and local governments to share in the costs, a change in the nature of the Corps' professionalism, and a more fiscally responsible Congress.[202]

However, in the three years since Congress last passed a water resources development bill, a pent-up desire to feed the construction lobby in each member's district or state has developed. The Water Resources Development Act of 1999 ("WRDA") authorizes more than $2 billion in federal funds for forty-five major Corps projects for flood control, navigation, beach renourishment, and, significantly, environmental restoration.[203] The Act also authorizes over 200 modifications to current projects (generally increasing the spending limits) and

---

200. In the cost/benefit analysis of their preferred alternative, the Corps allocated as a benefit some $26,862 per year as a reduction in the amount of administrative costs associated with processing the federal flood insurance program. *See id.* at 50. If this is a benefit for the Corps' preferred alternative, then purchasing and retiring the land would also have the same benefit: there would be no federal flood insurance administrative costs because there would be no homes in the area that have flood insurance.

We conclude that, unfortunately, Corps studies have often manipulated the costs and benefits in order to arrive at alternatives that justify structural construction projects. Corps terminology has nuanced, contextual meanings difficult for outsiders to fathom. Therefore, structures protected by flood control projects are benefits in a cost/benefits ratio. This historical paradigm for cost/benefit analysis is ill-suited for alluvial flood plains or for moving from structural to non-structural alternatives.

201. *Water Resources—Corps of Engineers*, WESTERN STATES WATER (Western States Water Council, Midvale, Utah), Mar. 19, 1999, at 1.

202. *Id.*

203. *See* WRDA, Pub. L. No. 106-53, § 101, 113 Stat. 269, 273–81 (1999) (to be codified at 33 U.S.C. § 2201).

authorizes the Corps to build or prepare feasibility studies for over 100 additional projects.[204]

Quite notably, the WRDA authorizes these projects but does not provide funding. Congress must appropriate funds to make the projects a reality. The Corps already has a $27 billion backlog for existing authorized but unfunded projects.[205] At current funding levels, it would take twenty years just to complete ongoing authorized projects.[206]

WRDA authorizes plenty of money for traditional Corps activities like flood control, navigation, and beach rebuilding. Yet it also charts environmental restoration as a critical Corps activity, setting a new, greener course for the Corps. Indeed, over one-third of the authorization ($1.5 billion) is for environmental mitigation and restoration, sewage discharge cleanup projects, and stormwater retention.[207] Noticeably, "the Corps has elevated its environmental restoration and protection mission to a status equal to its flood damage reduction and navigation missions."[208]

Of course, it is possible (some might say inevitable) that the Corps will pursue this new mission of environmental protection and restoration with the same engineering mindset that it used for navigation, beach replenishment, and flood control: "Bring in the engineers and devise structural solutions for any and all environmental problems." Will the Corps change its philosophy?

Congress expects this type of change, as witnessed by a dramatic new program, the Flood Mitigation and Riverine Restoration Program (also known as Challenge 21).[209] First developed by the Corps itself in response to the *Galloway Report*,[210] Challenge 21 declares that we should rely on wetlands and floodplains to retain and store excess flood water rather than build dams, floodwalls, and levees to control flooding.[211] The program, funded by a sixty-five percent federal contribution and thirty-five percent local share, would buy properties in floodplains, relocate the owners, tear down the structures, and restore the natural ecosystem.[212] Challenge 21 aims to reduce flood hazards by restoring "the natural functions and values of rivers," authorizing studies and projects that "emphasize,

---

204. *See id.* §§ 102–105, 301–373, 401–460, 501–595.

205. *See* Statement by the President, Aug. 19, 1999, *available in* 1999 WL 24353026.

206. *Id.*

207. *See* WRDA §§ 101, 105, 106, 208, 210, 212, 219, 113 Stat. 269, 273, 283, 284, 286, 287, 288, 294 (to be codified at scattered sections of 33 U.S.C.).

208. *See Estuary Restoration, Wetlands Duck Stamps: Hearings on H.R. 1775 Before the Subcomm. on Fisheries, Conservation, Wildlife, and Oceans of H.R. Comm. on Resources*, 106th Cong. (1999) (statement of Michael L. Davis, Deputy Assistant Secretary of the Army for Civil Works), *available at* 1999 WL 27594801.

209. *See* WRDA § 212, 113 Stat. 269, 288 (to be codified at 33 U.S.C. § 2332).

210. *See generally* GALLOWAY REPORT, *supra* note 161.

211. *See* WRDA § 212, 113 Stat. 269, 288 (to be codified at 33 U.S.C. § 2332).

212. *See id.*

to the maximum extent practicable and appropriate, nonstructural approaches to preventing or reducing flood damages."[213]

The program requires the Corps to cooperate fully with state and local agencies and tribes to insure that projects restore the floodplain's natural functions.[214] The program begins with twenty-three projects around the country where local communities have expressed interest in non-structural solutions to flood control problems.[215]

WRDA authorizes $200 million over five years for Challenge 21, with a maximum of $30 million for any single project.[216] Authorization of $200 million in $4.3 billion legislation for various Corps projects is hardly a major commitment to non-structural alternatives to flood control, but at the same time, it is not insignificant.

Whether Challenge 21 signals a truly new direction for the Corps may depend on whether the agency will alter its traditional culture of endorsing measures that alter the natural flow of water. So long as the Corps continues to view raising homes and relocating homes as "non-structural," Challenge 21 may not require much change from the Corps. A Corps proposal that made its way into CWAP identified nontraditional, non-structural strategies as including "the purchase of easements, land acquisition, construction of setback levees, and structural floodproofing."[217] The average person and, we dare say, members of Congress who voted for WRDA with Challenge 21, may be reminded of Alice in Wonderland when contemplating that non-structural strategies include constructing setback levees and structural floodproofing. But if the Corps is able to think outside the box and begin to recognize that purchasing and retiring floodplain lands has positive benefits in controlling the damages from flooding, then Challenge 21 will come to be understood as a paradigmatic shift in the Corps' mission and philosophy.

B. U.S. Bureau of Reclamation

The Department of the Interior, home of the U.S. Bureau of Reclamation, is clearly the centerpiece of the federal government's environmental restoration efforts. The Department is quite diverse, housing the National Park Service, the Bureau of Land Management, the Fish & Wildlife Service, and the Office of Surface Mining. Despite the plethora of agencies under the Interior Department umbrella, the Bureau of Reclamation is the principal agency to observe in order to assess the capacity for organizational change. The Bureau operates 217 dams, 7000 miles of canals and ditches, and 58 hydroelectric powerplants, which, in addition to their fundamental impacts on the environment (largely negative), have

213. *Id.*
214. *See id.*
215. *See id.*
216. *See id.*
217. CWAP, *supra* note 27, at 43.

also shaped the demographics and economy of the American West.[218] The Bureau is the largest supplier and manager of water in the seventeen Western states, delivering water to 31 million people for agricultural, municipal, industrial, and domestic purposes.[219] Its electric generating plants make it the fifth largest producer of electric power in the West.[220] Its annual power revenues are approximately $1 billion.[221]

Over decades, the Bureau established enormous political clout in Congress in the same way as the Corps. The Bureau appealed to local communities through promises of technical engineering and the federal government's financial support, which were supplied with the only requirement being a modest payback to the federal government. The Bureau's feasibility studies typically exaggerated the benefits of the project, minimized its costs and disadvantages, and allocated substantial costs to "federal" purposes that were non-reimbursable.[222] Moreover, costs absorbed by local communities were repaid over an extended time frame, often fifty years, either without interest charges or at rates sharply discounted from market rates.[223]

Recent years have witnessed a rather significant change in the philosophy and administration of the Bureau. Modest reform efforts began with the 1982 Reclamation Reform Act.[224] In 1987, the Bureau issued a remarkable self-assessment, conceding that the "era of constructing large federally financed water projects is drawing to a close."[225] The assessment anticipated that the Bureau would change "from an agency based on federally supported construction to one based on resource management."[226] The pace of change accelerated when President Clinton named Bruce Babbitt Secretary of the Interior. High ranking Bureau officials were concerned about this appointment because Babbitt once called for the abolition of the Bureau and dubbed it the "Bureau of Wreck and

---

218. *See generally* WESTERN STATES WATER (Western States Water Council, Midvale, Utah), Dec. 17, 1999.

219. *See* UNITED STATES DEP'T OF THE INTERIOR, BUREAU HIGHLIGHTS: BUREAU OF RECLAMATION, at BH-25, *available at* <www.doi.gov/budget/2000/00_web_hilite/bureau/00E_BOR.pdf>.

220. *See id.*

221. *See id.*

222. *See* Thomas M. Power, *An Economic Analysis of the Central Arizona Project* (1978), *reprinted in* JOSEPH L. SAX ET AL., LEGAL CONTROL OF WATER RESOURCES: CASES AND MATERIALS 654–56 (2d ed. 1991).

223. *See* SAX ET AL., *supra* note 222, at 645.

224. Reclamation Reform Act, Pub. L. No. 97-293, 96 Stat. 1261 (1982) (codified as amended at 43 U.S.C. §§ 373a, 390aa to 390zz-1, 422e, 425b, 485h, 502).

225. *See* SAX ET AL., *supra* note 222, at 665 (quoting UNITED STATES DEP'T OF THE INTERIOR, BUREAU OF RECLAMATION, ASSESSMENT '87: A NEW DIRECTION FOR THE BUREAU OF RECLAMATION (1987)).

226. *Id.*

Lamentation."[227] In 1992, the Bureau released a new strategic plan, titled *Agent of Change*, that set forward its new mission as a resource manager.[228] According to its plan, the Bureau would market water resources, promote water conservation, protect the environment, and safeguard the federal government's investment.[229] The strategic plan embodied a remarkable change in philosophy.

Change continued in 1993 when Commissioner of Reclamation Daniel Beard issued *Blueprint for Reform: The Commissioner's Plan for Reinventing Reclamation.*[230] It reaffirmed the new mission and moved to complete the Bureau's transition from a water resources development agency to a water resources management agency. To traditional water interests, the transformation was disturbing indeed. While the Bureau traditionally served the interests of irrigated agriculture, the *Blueprint for Reform* committed the Bureau to "place greater importance on the needs of Western urban communities and Native Americans."[231]

We consider whether the Bureau's orientation has fundamentally changed by examining the Bureau's role in two controversies, both in California: the Central Valley Project ("CVP") and the San Francisco Bay-Sacramento River Delta.

1. Central Valley Project

Commissioner Beard's 1993 pledge had ominous implications for irrigated agriculture interests because new uses by urban areas and Native Americans would obviously create potential conflicts with existing water users. We have seen some movement in this direction already, particularly with the 1992 Central Valley Project Improvement Act ("CVPIA").[232] The Act aimed to increase water use efficiency and to protect and restore fish and wildlife habitat in the Central Valley river basins.[233] CVPIA encourages the project's farmers to participate in water markets, changes the pricing structure for CVP water, and creates a fish and wildlife fund that will finance the restoration, improvement, and

227. Gale Diane Cox, *Change of Course, Status Quo is Threatened on America's Most Litigated River*, NAT'L L.J., Sept. 13, 1993, at 36.

228. *See Agent of Change: The Bureau of Reclamation's New Strategic Plan*, WATER STRATEGIST, July 1992, at 1.

229. *See id.* at 2.

230. COMMISSIONER, BUREAU OF RECLAMATION, BLUEPRINT FOR REFORM: THE COMMISSIONER'S PLAN FOR REINVENTING RECLAMATION (1993).

231. *Id.* at 2.

232. Central Valley Project Improvement Act, Pub. L. No. 102-575, §§ 3401–3412, 106 Stat. 4600, 4706–31 (1992). *See also* NATURAL RESOURCE LAW CENTER, UNIV. OF COLO., RESTORING THE WATERS 38 (1997).

233. *See* Harrison C. Dunning, *Confronting the Environmental Legacy of Irrigated Agriculture in the West: The Case of the Central Valley Project*, 23 ENVTL. L. 943, 961 (1993).

acquisition of sensitive habitat.[234] It also allocates up to 800,000 acre feet of water for instream uses and an additional 400,000 acre feet for Central Valley wetlands.[235] The core of CVPIA is the creation of incentives for the transfer of water from agricultural to urban uses.[236] Quite notably, any transfers must be voluntary ones in which farmers decide that it is in their best interest to transfer water rights.[237]

Since 1992, implementation of CVPIA has proceeded but the Act remains controversial.[238] Numerous water transfers have occurred between farmers and irrigation districts but only one long-term transfer has occurred, between a dairy farm and a municipal provider.[239] The restoration fund created under the act is financed by water and power users and provides $40 million each year for restoration activities.[240] In 1993, the Bureau allocated 800,000 acre feet for instream uses, but, due to drought, only 600,000 acre feet in 1994.[241] The Bureau's restoration efforts in California's Central Valley Project include acquiring water for anadromous fish, providing long-term water deliveries for wildlife refuges, acquiring land to improve wildlife habitat, and constructing fish screens and other facilities.[242]

The CVPIA is one of the most significant legislative enactments in the history of western water policy. The Bureau has launched a major restorative effort. More time is necessary to ascertain whether the commitment is sufficient to restore the environmental harm that has resulted from earlier reclamation practices.

2. The Bay-Delta

California, in cooperation with the federal government, is undertaking the largest environmental restoration project in American history.[243] The restoration of

---

234. *See generally* Douglas E. Noll, *Analysis of Central Valley Project Improvement Act*, 3 SANJALR 3 (1993).

235. *See* Dunning, *supra* note 233, at 963.

236. *See* Carl Boronkay & Timothy Quinn, *The Central Valley Project Improvement Act: An Urban Perspective*, 3 SANJALR 57, 61–64 (1993). *See also* Richard W. Wahl, *Market Transfers of Water in California*, 1 WEST-N.W. 49, 62–63 (1994).

237. *See* Boronkay & Quinn, *supra* note 236, at 62–64.

238. *See* Sue McClurg, *Central Valley Project Improvement Act Update*, WESTERN WATER, Jan.–Feb. 2000, at 4.

239. *See* CONGRESSIONAL BUDGET OFFICE, WATER USE CONFLICTS IN THE WEST: IMPLICATIONS OF REFORMING THE BUREAU OF RECLAMATION'S WATER SUPPLY POLICIES 36 (1997).

240. *See* Bureau of Reclamation, United States Dep't of Interior, *The Central Valley Project* (visited Apr. 7, 2000) <http://www.mp.usbr.gov/cvp >.

241. *See* CONGRESSIONAL BUDGET OFFICE, *supra* note 239, at 38.

242. *See* UNITED STATES DEP'T OF THE INTERIOR, *supra* note 219, at BH-26.

243. *See* Thomas M. Berliner, *Introduction and Overview of the California Process*, A.B.A. SEC. ENV'T, ENERGY & RESOURCES 1:629, :630 (1999); Gregory A.

the San Francisco Bay/Sacramento-San Joaquin River Delta area northeast of San Francisco is expected to take thirty years and cost $10 billion.[244] The program is notable both for its magnitude and for an innovative partnership among state agencies, federal bureaus, and local governments and organizations.

A key fact to appreciate about the Bay-Delta region is that it provides two-thirds of the drinking and irrigation water for California's 30 million residents.[245] The water supports an economy with a gross annual output of almost $1 trillion.[246] The Bay-Delta system also is home to 130 types of fish and 620 other wildlife species.[247] Two major river systems, the Sacramento from the north and the San Joaquin from the south, converge at the Delta. The fresh water from these sources then blend with the tidal waters of the San Francisco Bay. The water in the Bay-Delta region is held back by a multitude of low-lying levees that protect farms and communities from flooding. Major intakes located in the southern portion of the Delta are the two major north-south water projects: the California-operated State Water Project ("SWP") and the Bureau-operated Central Valley Project. The SWP takes water as far south as the Los Angeles urban area. The Delta also provides water for many San Francisco region communities, including those served by the East Bay Municipal Utility District.

The water in the Delta region has progressively become more saline and polluted due to drought conditions during the 1970s and 1980s, increased diversions of fresh water from the Delta, and reverse flows created by the large pumping plants. Non-native aquatic species threaten native fish populations. When California failed to adopt the necessary water quality standards under the federal Clean Water Act, the U.S. Environmental Protection Agency threatened to take over the water quality program in the Delta region and promulgate its own standards as allowed under the Clean Water Act.[248] In December 1994, the EPA adopted temporary water quality standards to address the Delta region's water quality problems.[249]

Thomas, *An Environmentally Optimal Alternative for the Bay-Delta: A Response to the CALFED Program*, A.B.A. SEC. ENV'T, ENERGY & RESOURCES 1:643, :644 (1999). *See generally* Sunne Wright McPeak, *Recommendations from the Business Community on CALFED*, A.B.A. SEC. ENV'T, ENERGY & RESOURCES 1:633 (1999); NATURAL RESOURCE LAW CENTER, *supra* note 232, at 34.

244. *See* Glen Martin, *Farmers, Fish Share in Ballyhooed Water Plan; But Reactions from Both Sides Tepid at First Read*, S.F. CHRON., June 26, 1999, at A17.

245. *See* Berliner, *supra* note 243, at 1:630.

246. *See id.*

247. *See id.*

248. Clean Water Act of 1977, Pub. L. No. 95-217, 91 Stat. 1566 (codified at 33 U.S.C. §§ 1251–1387).

249. *See* Final Rule, Water Quality Standards for Surface Waters of the Sacramento River, San Joaquin River, and San Francisco Bay and Delta of the State of California, 60 Fed. Reg. 4664–4669 (1995); Berliner, *supra* note 243, at 1:632.

To avoid a situation where the EPA would be forced to assert additional authority over Delta water management, perhaps exceeding its jurisdictional mandate, state, federal, and local entities concluded a framework agreement in 1994 that set out a three-part plan to reverse the deteriorating conditions in the Bay-Delta.[250] The first part of the plan set a goal to develop water quality standards acceptable to state and federal agencies.[251] Second, the parties agreed to coordinate better the operations of the State Water Project and the Central Valley Project. Third, the entities pledged to develop a long-term plan for the improvement of the Bay-Delta Estuary.[252]

The first element of the plan was rapidly achieved with the promulgation of the Bay-Delta Accord on December 15, 1995.[253] State and federal agencies, along with agricultural, environmental, and urban stakeholders, signed a three-year agreement to improve the flow regime through the Delta, limit salt loading in the estuary, and take measures to prevent fish from being trapped in Delta diversion facilities. The second element of the plan, improved operations of the state-federal water projects, was accomplished with the establishment of an operations group that meets frequently to coordinate operations with greater sensitivity to endangered species needs, water quality concerns, and other problems.[254]

The third element of the framework plan, however, has taken much more time. This effort is called the CALFED Bay-Delta Program, which has a professional staff and is assisted by the Bay-Delta Advisory Council (chartered under the Federal Advisory Committee Act). The staff and advisory council have worked since 1995 to define the problems of the region, develop solutions, and promulgate a preferred program alternative along with the necessary environmental studies. A draft preferred alternative was released during summer 1999 and should be finalized by the end of 2000.[255] The plan consists of four interrelated program areas:

1. Ecosystem restoration: undertaking activities to restore ecological processes and to provide beneficial conditions for fish, wildlife, and plants;
2. Water quality: improving water quality for all beneficial users of Bay-Delta water;
3. Levee improvement strategy: rehabilitating many miles of levees that are vulnerable to flooding; and

---

250. *See* NATURAL RESOURCES LAW CENTER, *supra* note 232, at 35.
251. *See id.*
252. *See id.*
253. *See* Berliner, *supra* note 243, at 1:632.
254. *See* McClurg, *supra* note 238, at 4, 13.
255. *See* CALFED BAY-DELTA PROGRAM, STRATEGIC PLAN FOR ECOSYSTEM RESTORATION, REVISED DRAFT (Feb. 1999).

4. Water management strategy: implementing traditional and innovative water management strategies including conservation, recycling and transfers to assure that long-term needs are satisfied. One particularly innovative proposal is the environmental water account, similar to the water bank concept in other states, that allows the deposit and trade of a range of assets including water, money, water storage, and water conveyance capacities.[256]

Some parties believe additional water storage must be part of the long-term plan, especially if diversions out of the Delta are limited during the year.[257] State and federal project contractors desire increased storage capacity to draw upon when diversions are curtailed.[258] A more controversial measure being considered is a "through" Delta water conveyance. By enlarging an existing channel in the Delta and, perhaps, dredging a second channel, the flow of better quality Sacramento River water might be improved to the state and federal pumping plants in the southern portion of the Delta.[259]

The CALFED process was jump-started by the growing crisis over the lack of adequate water quality standards for the Bay-Delta. California wanted to avoid the embarrassment of relinquishing its water quality control program to a federal agency and the EPA did not want the ongoing headache of administering such a program in an antagonistic political environment. Both the Clinton administration, with an eye on the 1996 election, and Governor Pete Wilson, with his own presidential ambitions, were eager to solve a major problem. The initial Bay-Delta Accord was facilitated by Department of Interior officials desirous of demonstrating the benefit of collaborative processes.[260]

CALFED has benefited greatly from the enormous amount of money that has been directed or promised to the effort—almost $1.5 billion to date.[261] Almost immediately after the initial agreement, state water interests such as the Metropolitan Water District contributed $21 million for studies and restorative activities.[262] California voters passed a bond issue in November 1996 that will supply $600 million to this effort with an additional $429 million in matching federal funds. Proposition 13, approved by California voters on March 7, 2000,

---

256. CALFED BAY-DELTA PROGRAM, ECOSYSTEM RESTORATION PROGRAM PLAN, STRATEGIC PLAN FOR ECOSYSTEM RESTORATION, JUNE 1999, *available at* <http://www.calfed.water.ca.gov/environmental_docs/revised_draft.html>.

257. *See* McPeak, *supra* note 243, at 640.

258. *See id.* at 641.

259. *See* California Water Clearinghouse, *CALFED Bay-Delta Program* (visited Mar. 28, 2000) <http://www.bay-delta.org/done/calfed.html>.

260. *See* Elizabeth Ann Rieke, *The Bay-Delta Accord: A Stride Toward Sustainability*, 67 U. COLO. L. REV. 341, 357–61 (1996).

261. *See* Thomas, *supra* note 243, at 1:644.

262. *California Water Clearinghouse, Category III and the Ecosystem Roundtable* (visited March 28, 2000) <http://www.bay-delta.org/done/eco.html>.

authorized $1.97 billion in bonds for a multitude of water management activities. Subject to appropriation by the California legislature, $250 million may be used for Bay-Delta purposes. The bond measure was referred to the electorate by the California legislature with its passage of the Safe Drinking Water, Clean Water, Watershed Protection and Flood Control Act of 1999.[263] The Clinton administration's Fiscal Year 2001 budget seeks $60 million for the Bay-Delta, with $36 million dedicated for ecosystem restoration.[264]

Another resource readily available to the region is the enormous intellectual talent of the Bay-Delta area, including countless universities, research institutes, public interest organizations, and large public agencies. While it is often difficult to get these agencies and organizations "on board," they have enormous capacity to solve problems when they are moving in the same direction. CALFED has used an aggressive public education and outreach program, as well as scientific advisory, interagency, and public advisory groups to inform the public and develop good science.

The CALFED process is a promising example of environmental restoration on a major scale. As one business leader indicated, "Never before have the full constellation of state and federal agencies...joined together with...stakeholders to attempt to forge a long-term management plan for a *landscape scale* biohydrologic resource."[265] The participants in the process have aimed high, sharing the "realization that the status quo is woefully suboptimal from the standpoint of all communities."[266] The process may pioneer many procedures and technologies that can be applied in aquatic restoration throughout the world. Unfortunately, few other regions have the resources, both financial and intellectual, to undertake a project of this magnitude.

CALFED may be facing its most critical moment. The flush of excitement about the framework plan itself and the 1994 Bay-Delta Accord is now five years old. Various stakeholders are now realizing how specific restoration proposals will affect them. Some of CALFED's strongest supporters are now among its harshest critics. The Natural Heritage Institute, in changing its position, identified these shortcomings:

> CALFED's failure to obtain independent technical analysis, leading to political posturing rather than "technical illumination";
>
> undue reliance on state officials "who have simply brought their institutional perspectives into a new arena;"

---

263. Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act, 1999 Cal. Legis. Serv. ch. 725 (A.B. 1584) (West), *available at* <http://www.bay-delta.org/download/bondfacts.pdf>.

264. *See also* WESTERN STATES WATER 1 (Western States Water Council, Midvale, Utah), Feb. 11, 2000.

265. Thomas, *supra* note 243, at 1:644 (emphasis added).

266. *Id.*

neglect of basic economic principles, thereby embracing water storage alternatives while rejecting "an array of faster, cheaper and more environmentally acceptable alternatives;"

disregard of information suggesting that the entire water delivery system is susceptible to catastrophic failure in the event of a serious earthquake; and

resistance to the possibility of a new governance structure by existing agencies protecting their turf.[267]

The Natural Heritage Institute concluded, "The process has been conducted as if the final outcome was to be a compromise of claims and positions in a grand settlement."[268]

The political opposition is likely to grow since "[i]t seems to be impossible to develop any major water program, whether to help the environment or the water users, without bringing every special interest out of the woodwork."[269] The next few years will test whether CALFED's visionaries have the political fortitude to see the Bay-Delta project to completion and implementation.

V. CONCLUSION

This Article began by asking whether federal water management agencies will be able to change in order to embrace, among their other organizational priorities, the need for environmental restoration. It is ironic, as the country moves into an era of environmental restoration, that the two principal agencies charged with implementing federal restoration projects are the Corps and Bureau, the two agencies who have done the most to create the need to restore what they have wrought. It will be interesting to observe whether the Corps and the Bureau can successfully redefine their missions and take advantage of new opportunities to expand their activities in the direction of environmental restoration.

It will not be easy for the Corps to change. According to Marc Reisner, a fierce critic, the Corps is "as opportunist and ruthless an agency as American government has ever seen."[270] The general consensus among historians is that the Corps has successfully frustrated periodic attempts by Congress or the public to change it.[271] One obstacle to the Corps' makeover will be entrenched members of Congress who have a strong interest in funding large construction projects for their districts.[272] The Water Resources Development Act of 1999 authorizes $4.3 billion

267. *Id.*
268. *Id.* at 644–45.
269. Berliner, *supra* note 243, at 1:632.
270. REISNER, *supra* note 99, at 171.
271. *See* TODD SHALLAT, STRUCTURES IN THE STREAM 1–9 (1994).
272. *See, e.g.*, Energy and Water Development Appropriations Act of 1999, Pub. L. No. 106-60, 113 Stat. 483 (1999) (to be codified at 43 U.S.C. § 2241). That Act provided $20.9 billion in budget authority for previously authorized construction. A large chunk of this money went to New Mexico, thanks to the efforts of U.S. Senator Pete

in construction projects.[273] As the Everglades example illustrates, some environmental restoration projects require major construction projects.[274] A number of recent Corps feasibility studies, and others authorized by WRDA of 1999, have environmental restoration as their primary purpose, yet will keep the Corps' engineers busy.[275]

On a positive note, the Challenge 21 program may move the Corps in a new direction by taking a watershed-based approach to flood proof prevention and emphasizing non-structural solutions. It is unclear whether the Corps will be able to shift its focus away from building flood control structures and toward managing natural resources. Some time may pass before the Corps changes from its emphasis on construction projects. Change may be slow in coming to an agency with an annual budget of over $4 billion, a $27 billion backlog of congressionally approved but unfunded construction projects, and a new partially-funded infusion of $4.3 billion in authorizations.[276]

As for the Bureau, many of its dams and other facilities for delivering water have been turned over to irrigation districts or other water users for their operations. As a consequence, the operations component of the Bureau has been reduced and is a decreasing percentage of the Bureau's budget and concern.

Due to these changes, the Bureau has increased its research component and now has a variety of projects aimed at preparing complicated hydrologic models of how particular water systems function. While the U.S. Geological Survey ("USGS") is a basic and applied research agency, the Bureau is concerned about research in an institutional setting, for example, how the lower Rio Grande river system might be administered. Also, in concert with the Corps, the Bureau is involved in efforts to restore the Everglades ecosystem.[277] The Bureau has increased its environmental restoration work, but the agency's traditional engineering mentality may still characterize its approach toward environmental restoration.

The California Bay-Delta is the Bureau's and Interior Department's largest effort at ecosystem restoration. The Bureau's proposed budget for 2000

Domenici, who, as Chair of the Senate Energy & Water Development Appropriations Subcommittee, secured funding for New Mexico. Domenici's office issued a press release detailing every item in the Appropriations Bill that will bring funds to the state of New Mexico. It is quite an impressive list. *See* 1999 Energy and Water Appropriations Bill Now Law, Gov't Press Releases, Oct. 7, 1998, *available at* 1998 WL 19792975.

273. *See* WRDA, Pub. L. No. 106-53, 113 Stat. 269 (1999) (to be codified at scattered sections of 33 U.S.C.).

274. *See supra* Part IV.A.1.

275. *See generally* U.S. ARMY CORPS OF ENGINEERS, RIO SALADO, SALT RIVER, ARIZONA, FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT (1998). *See also* U.S. ARMY CORPS OF ENGINEERS, TRES RIOS, ARIZONA, FEASIBILITY STUDY (1999); WRDA, Pub. L. No. 106-53, 113 Stat. 269 (to be codified at scattered sections of 33 U.S.C.).

276. *See supra* Part IV.A.4.

277. *See supra* Part IV.A.I.

includes $95 million for Bay-Delta restoration.[278] In 1997, the Bureau unveiled its Strategic Plan to guide its activities between 1997 and 2002, incorporating the mission-changing principles of the 1992 Strategic Plan and the Commissioner's *Blueprint for Reform.*

Our review suggests that, for the Corps and the Bureau, the anomaly-crisis-extraordinary experimentation process is still underway. A new paradigm has yet to be stated and embraced. These agencies have invoked restorative terminology and have experimented with restorative approaches. Nonetheless, as demonstrated by our review of their budgets and some of their programs, these agencies, particularly the Corps, remain enamored with construction projects and structural cures.

Generally, we observe that, in order for change to occur, the impending crisis must be severe, public attention to the problem must be especially acute, and the forces driving for change must be particularly strong. Otherwise, existing patterns of organizational behavior will continue. Where innovations have occurred, as in the Everglades or Bay Delta cases, they have been initiated by forces and leadership outside the agencies. The catalysts have been violations of water quality and endangered species laws, which at times have resulted in near ecosystem collapse. The localized nature of the Tortolita flooding problem, by contrast, seems to have evoked the traditional construction tendencies of the Corps.[279] As to the Missouri River, the forces for change have been insufficient to expedite a process to revise the operations of mainstream dams.[280]

We also observe that, in a growing number of areas around the country, environmental restoration is being pursued vigorously by local groups. Much energy and talent is being applied to these problems by people who are devoted to restoration and believe that their communities benefit—environmentally, economically, and politically—when environmental problems like these are solved. Local organizations and citizens have been instrumental in these creative approaches while the federal water management agencies are somewhat behind the curve.

In certain instances however, the scale of an environmental problem or the magnitude of the federal presence dictates a major federal role, such as in the CALFED process. Increasingly, we believe the federal government should concentrate more on being the catalyst to local restorative efforts. CWAP's watershed strategies may provide the mechanism for locally initiated but federally-funded restoration projects. One other method might be a centrally collected fund dedicated and distributed to local entities that undertake restoration projects. Local

278. *See* UNITED STATES DEP'T OF THE INTERIOR, *supra* note 219, at 25.
279. *See supra* Part IV.A.3.
280. *See supra* Part IV.A.2.

groups could partner or contract with any number of governmental agencies, nonprofit organizations, or private sector firms in their restoration efforts.[281]

Nevertheless, federal water management agencies like the Corps and the Bureau are unlikely to dominate the environmental restoration era as they did during the water development era. They are unlikely to stand above the crowd as the leaders of the restorative process. At best, they may become part of the leadership group that charts and implements major restorative initiatives. Rather than a single, dominant agency, the restorative era may be characterized by temporary, ad hoc, geographically defined organizations that link together, in a complex and changing fashion, governments at all levels, private sector entities, universities, and public interest groups. These compound, matrix organizations could well define the environmental restoration era in the same way that the Corps and Bureau characterized the water development era.

281. The Land and Water Conservation Fund of 1965, Pub. L. No. 88-578, 78 Stat. 897 (codified at 16 U.S.C. § 4601-4 to -11), is a matching grant program to assist local government in acquiring recreational land and open space. The funds are not available for restoration activities. Federal funds should be available for that purpose. For example, the federal government is an excellent collector and distributor of revenues, and this ability could be the basis for an American Heritage Fund. The fund, chartered by Congress, would have as its purpose the financial support of watershed initiatives to restore damaged environmental conditions. The fund would be supported by a permanent funding source, most likely a royalty or tax on the use or depletion of a nonrenewable resource such as oil or gas. For instance, a 1/10th cent per gallon surcharge on gasoline sales would yield $150 million per year. Annual revenues to the Fund would be automatically apportioned to subsidiary entities (e.g., the Missouri River Heritage Fund) for major river basins. The apportionment formula would consider basin population and the incidence of riparian environmental damage. These river basin entities, the recipients of this dedicated federal funding, would be lean operations whose primary function would be to establish broad restorative priorities and to distribute grants or loans to local groups on a competitive basis.