

THE ROLE OF LAW IN THE "POST-MODERN" CORPS OF ENGINEERS

Holly Doremus¹ and A. Dan Tarlock²

DO NOT QUOTE

[**N.B.** This paper is a first draft of a paper which will be presented at a Symposium on Regulatory Reform: Is the Process Too Top Heavy?, March, 2004 and published in the University of the University of Kansas Law Review. This article grows out of work that Professor Tarlock did for the National Research Council/National Academy of Sciences Committee to Assess the U.S. Army Corps of Engineers Methods of Analysis and Peer Review for Water Resources Project Planning and work that Professor Doremus and Professor Tarlock have been doing on the limits of science and rational processes to address environmental conflicts. The view expressed in this papers are solely the author's and represent only a preliminary analysis of the issues raised in this draft.]

¹ Professor of Law and Chancellor's Fellow , University of California, Davis.

² Professor of Law, Chicago-Kent College of Law.

I. INTRODUCTION: THE SHIFTING CURRENTS AND SANDS OF THE CORPS MISSIONS

The Enlightenment produced the idea of scientific and human progress which thrived until the beginning of the twentieth century. The method for achieving this progress was rationality. The twentieth century put an end to the idea of human progress but the idea of rational scientific progress had a good run. It became the basis for the legitimacy of the expert administrative agency. After World War II, advances on mathematics, especially game theory, held up the hope that rational solutions to problems such as resource use could be objectively calculated and measured. The U.S. Army Corps has long been an example of the promise of rational progress through objective resource management. The post-conservation era or "modern" Corps has long tried to better the human condition by improving nature through rational planning. For four centuries, the Corps has combined military discipline with the practice of rigorous state-of-the-art engineering to turn many of the nation's unruly rivers into technologically tamed systems which support commercial navigation, mitigate flood damage, generate hydroelectric power, provide water supplies for rural and urban areas, and provide extensive opportunities for water-based recreation. It has also tried to stabilize coastal areas.

The Corps missions have steadily expanded over time, and in the past three decades, the Corps' mission has been expanded to include environmental protection, primarily the regulation of wetland dredging and filling and aquatic ecosystem restoration. There is widespread recognition and appreciation for the economic benefits that the Corps has provided the nation, but the current or "post-modern" Corps is currently a stressed agency in search of a mission. Until recently, the agency existed to smooth out natural river hydrographs to reduce flood risks and harness them for productive use and to change changed coastal sand drift patterns. Today, the Corps is increasingly being asked to respect or restore the functions of the hydrograph that it so successfully eliminated or reduced. In the 1970s, two powerful forces came together to change the Corps role and to threaten the future of the agency and to undermine both the twin pillars of its mission: the need to improve nature and the ability to do with objective, rational processes. The Corps faces four different sources of conflicts over water management: "value", "interest", and "cognitive", and the diffusion of decision-making power and influence and "authority conflict".³ Both its historic and claimed new missions are questioned; traditional beneficiaries feel threatened by the rise of new interests; faith

³William Lord (1979)

in its front-end planning methods and the range and utility of expertise has eroded and its exclusive management authority challenged by other federal agency and NGOs.

The new environmental movement adopted many of the earlier fiscal criticisms of federal investment in water resources as inefficient to bring an end to the era of large dam construction and promote a "no new starts" policy. In retrospect, the passage of the Wild and Scenic Rivers of Act of 1968 signaled a fundamentally new direction in federal water resources policy. However, Congress did not abolish the Corps and other water resources agencies; it simply continued to fund them at lower real dollar levels and increased the fragmentation of the control over water resources throughout the federal government. Nor did Congress review and revise their missions; it simply added new layers of environmental regulation to existing statutory mandates and left it to the agencies, the courts and political give and take to sort out the issues. For example, the Corps must comply with project authorization mandates and with the environmental impact assessment duties of the National Environmental Policy Act and the mandates of the Endangered Species Act.⁴ The Clean Water Act permitted the newly created United States Environmental Protection Agency to play an increasingly important role in federal water policy through its power to control point source discharges into the waters of the United States. The net result is that the Corps historic mission has been substantially modified but its legal structure and decision-making procedures have not.

The Corps is a classic case study in the limits of rational processes that try to get at right "up front" to produce good results over time. The Corps invests great resources in the front-end planning of its activities and almost nothing on back end monitoring and adjustment. The result is the increasing lack of faith in the agency⁵ and in the continued refinement of its traditional analytical processes.⁶

The root of the agency's problems is that the Corps is a

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⁵ For a penetrating critique of this problem in all environmental agencies see Sidney A. Shapiro and Robert L. Glicksman, RISK REGULATION AT RISK: RESTORING A PRAGMATIC PERSPECTIVE (2003).

⁶ E.g. National research Council, Inland NavigationSystem Planning: The Upper Mississippi River- Illinois Water Way (2001)((Corps economic model too flawed to used in feasibility study of improvements in Upper Mississippi River navigation system).

post- modern administrative agency trying to operate by modern standards. Federal water policy remains an unrationalized accretion of the interests of many constituencies. It is much like Chinese dynastic history; each new history is added to others and nothing is subtracted or integrated. The second generation of multiple uses--water pollution and biodiversity maintenance- was simply piled on top of the first generation, navigation, flood control and hydroelectric power generation, with no integration. The Corps continues to operate dams, reservoirs, locks, levees and real estate for the purposes for which the project was authorized at the same time it is being asked to restore degraded ecosystems. It continues to execute these missions by rational planning and management processes that have been honed during the twentieth century. New project proposals are subject to rigorous benefit- cost analysis and it follows rigorous rational planning protocols at all stages of decision making. In short, the Corps operates in a world that was created at the turn of the 20th century and but shattered by the environmental movement.

Environmentalists have long criticized the Corps' destruction of nature through water projects and the issuance of Section 404 permits to dredge and fill wetlands.⁷ In fact, the Corps has been demonized by environmentalists as a perpetual pork grinder constantly spewing out the remnants of destroyed ecosystems. This article tries to move beyond this criticisms, however justified, because their mission is evolving more toward aquatic ecosystem restoration. Thus, it is appropriate to focus on the question of whether the continued reliance on rational planning, supported by the best available technical and scientific information, is the appropriate model for the "post-modern", post big dam era Corps and whether there are in fact viable alternatives to this model. There are three paradoxes of the current Corps that raise interesting legal issues. First, the Corps is a model of a "rule of law" agency. It pays careful attention to its Congressional mandates. However, one of the chief criticisms of the Corps is that it should adopt a more holistic, watershed approach to its activities in order to "instruct" Congress on improved water resources options. Second, it adheres rigorously to rational planning even the idea has lost intellectual credibility. Third, it the very model of an expert agency at a time when the very notion of scientific and technical expertise is being questioned and replaced with more participatory, ethical decision standards. The nation needs to think of the Corps has a river, coastal system and infrastructure management agency rather than an infrastructure investment and operations agency and there is a renewed interest in adapting the conservation movement's vision of comprehensive, large-scale or

⁷ Section 404 evaluates the impacts of change on a case by case basis over relatively small geographic scales as a previously NRC noted critically. National Research Council, COMPENSATING FOR WETLAND LOSSES UNDER THE CLEAN WATER ACT (2001).

holistic watershed and river basin planning and management to the full range of modern water uses that society now deems valuable.

On level, the necessity to adapt to changed conditions is not a new challenge for the Corps. It has always had to adapt to a changing political environment. The Corps' long tradition of applying engineering solutions to hydrologic variation directly involved it with the politics of river and harbor development. As a recent historian of the Corps has written to has written:

The Corps, try as it might, could never escape the fact that army engineering was often the political science that forced builders into complex disputes. Engineers considered themselves tough-minded problem solvers, men who cut through conjecture by staying true to the facts. Congress, however, increasingly relied on the builders to speculate, negotiate, bridge political conflicts, and use engineering in ways never discussed at West Point. (Shallat at 122).

The Corps continued its adaptation tradition when the environmental movement emerged. Contrary to many popular perceptions, the Corps has made many efforts to respond to the demand for new missions and greater openness and environmental stewardship.⁸ [Adaption is more difficult now because the basic problem facing the Corps is that its missions are being challenged at a time when there is no longer a clear federal water policy and the will to exercise the full range of Constitutional authority delegated to the national government to manage the nation's water resources This adaptation must also take place in a radically changed political environment. The end of the dam-building era heightens rather than lessens competing demands for water, but the Corps appears to have less ability shape water policy than it did in the past. Increasingly, water markets rather than federal and state water development projects will determine the allocation of scarce supplies. Power is now more diffused. Today, growing cities compete with proponents of aquatic ecosystem restoration and other traditional users. All of these old and new interests or "stakeholders" now demand a seat in the multi-party bargaining processes that characterize many allocation conflicts so federal agencies are often one of many powerful participants in water allocation disputes. The Corps will be call upon to manage its existing infrastructure more efficiently, to serve a wider range of demands and to support ecological restoration which requires a fundamentally different process of decision that the present agency culture..

This article traces the rise of the Corps as a rational

⁸ An early assessment is Daniel A. Mazamania and Jeanne Nienaber, CAN ORGANIZATIONS CHANGE? ENVIRONMENTAL PROTECTION, CITIZEN PARTICIPATION, AND THE CORPS OF ENGINEERS, the Brooks Institution, Washington D.C. 1979.

management agency, its fall and then analyzes the proposed reforms to adjust the Corps to its new restoration, reoperation mission. Any effort to reorient the Corps will raise challenging questions of administrative law. The great project of administrative law has been to strike a balance between controlling agency discretion and allowing it to exercise the necessary discretion to carry out its statutory mission. The underlying assumption behind this control is that the agency will engage in a rational process to reach a final decision, and that this process can be sufficiently understood by a court to check it against the appellate opinion model of rationality- a B plus law school exam. The reform proposals call for increased Corps delegation and less reliance of front end rational processes. To accomplish these objectives, both Congress and the courts will be unable to assert traditional levels of control.

II. THE RISE AND FALL OF THE MODEL EXPERT AGENCY

A. The Corps as National River Master

The 19th century bequeathed the twin ideas of progress and expertise to 20th. These ideas came together in the progressive movement and the branch that applied the broader ideals to natural resources, the progressive or scientific conservation movement. Progressives rejected Darwinistic determinism and posited that "evolution had produced intelligence . The Corps in many ways personified this optimism. Modern water management is product of the first three decades of the last century. The Corps mission greatly expanded between 1888 and 1936, as the role of the federal government expanded, but the federal government's commitment to large scale hydraulic public works is a product of conservation era ideas that were put into practice in the 1920s and 30s. The objectives of federal water policy were initially defined by competition among different agencies, and initially, the Corps thrived in this competitive environment. The Corps and its sister agency, the Bureau of Reclamation, emerged as major federal construction agencies when there was a strong consensus that the federal government should construct large multiple-purpose dams and undertake other water resources projects such as levee construction, international navigation, coastal and port dredging.

To promote economic development by taming the nation's water resources, the Corps carried forward the French engineering tradition of state financed, large-scale hydraulic works built to

serve the national military and commercial interest.⁹ In the turbulent early years of the Republic, the Corps was the most professional scientific organization in the United States, and played a major role in adapting European hydraulic studies and river manipulation techniques to the frontier in order to promote national growth. It's mission quickly expanded from the construction of defensive fortifications to roads, navigation enhancement and later flood control. However, the Corps' grand vision of centrally planned national public works and scientific surveys was opposed by successive early administrations. The Corps' role was controversial but until the 1960s, the debate was about the best ways to accomplish the Corps' objectives not about the objectives themselves.¹⁰

From the founding of the Republic to the late 1960s, there was a strong national consensus that nature was a commodity to developed and perfected for human benefit. Translated to water, this meant that the natural hydrograph of rivers had to manipulated and "smoothed out" to support national expansion and economic growth. Thus, the flow variability that nature imposed on rivers had to be substantially reduced by structural solutions to make them suitable for human use and benefit. In short, rivers, adjoining wetlands, riparian corridors and coastal systems were subjects for the application of engineering technology. As it mission expanded from its core navigation improvement function to the construction of flood control levees, multiple purpose reservoirs and maintaining coastal and inland ports, the Corps adhered to a consistent hydrologic vision of rivers and coastal waters which sustained it very well until the last three decades of the 20th century. The Corps was able to thrive in all political environments for two primary reasons. For two centuries, the Corp has both stood as an innovative force for integrated water resources planning and as vehicle for local interests to construct unintegrated projects of questionable economic, hydraulic and ecological merit. It has often been a scientific and policy innovator, although it has also often clung to ideas too long after advances in the physical and social sciences and engineering seriously questioned them. It initially worked on large interstate rivers such as the Missouri and Mississippi where there was a need for a national coordinating body on the scale of the Corps. Second, it has historically had the capacity to adapt to changing political and scientific conceptions because of the broad non-partisan consensus of the river for navigation improvements and flood control and carry-

⁹ [Todd Shallat, STRUCTURES IN THE STREAM: WATER, SCIENCE, AND THE RISE OF U.S. ARMY CORPS OF ENGINEERS, Austin, University of Texas Press 1994).

¹⁰ Beatrice Hort Holmes, HISTORY OF FEDERAL WATER RESOURCES PROGRAMS AND POLICIES, 1800- 1960, Department of Agriculture Misc. Pub. 1233, Washington, D.C. 1972).

over storage reservoirs.

B. The Revolutionary Era Intellectual and Historical Roots of the Corps

The Corps is a product of the Revolutionary War. It traces its origins to the construction of Bunker Hill fortifications and Forts Norfolk and Nelson on Chesapeake Bay in 1774- 1775. After the war, many politicians opposed a large standing professional army, and the idea of national public works was opposed on constitutional and political grounds. More generally, there were widespread prejudices against scientific knowledge and planning, a tension which has run through all efforts to control the use of natural resources to this day. The Corps was able to survive in this political environment; the Corps expertise in building military fortifications led naturally to its involvement in civil projects, but support for this mission fluctuated in the early 19th century as the federal role in national development was debated. A permanent Corps of Engineers was organized in 1802 at the same time that the Congress established the military academy at West Point. The Corps and West Point supported each other for much of the 19th century. For the first half of the nineteenth century,

After the War of 1812 (1812- 1814) the Corps was under-employed after Congress reduced the standing army to 10,000 men and it slowly began to carve out an important civilian role that matured in the late 19th century. The Corps national role was at the heart of internal improvement issue. During the 1820s, the earlier constitutional doubts about the power of the federal government to fund public works were resolved in favor of a national role. However, Congress never fully adopted the ideas of Albert Gallatin (Albert Gallatin, Report of the Secretary of the Treasury on the Subject of Public Roads and Canals, 1808) and Henry Clay's "American Plan" of protective tariffs and internal improvements, but the growing power of the western states created a powerful political constituency for nationally planned and financed public works. There was considerable opposition to internal road and canal projects, but the improvement of harbors and inland rivers were much more widely accepted as a national responsibility because they directly promoted interstate commerce. The Corps navigation protection and enhancement role has long rested on a firm constitutional footing. The United States Supreme Court upheld the power of Congress to regulate navigation in 1824¹¹ and consistently held that the states could not authorize interferences with interstate navigable waters. (Pennsylvania v. Wheeling & Belmont Bridge Co., 13 How. 518 (1851)).

¹¹ Gibbons v. Ogden, 9 Wheat. 1 (1824)

C. Mission Expansion

The Corps was assigned the task of surveying road and canal routes of removing navigation hazards along the major inland rivers. The Corps removed thousands of snags in a futile fight against the treacherous Upper Missouri which claimed almost 1,000 steamers, ferries and snag boats in the 19th century before the railroads supplanted navigation.¹² Initially, there was no clear division between its military and civilian missions. The Board of Internal Improvements was premised on the unity of military and civilian works. The Corps began to innovate immediately. Major Stephen H. Long (later a major Western explorer) constructed an experimental wing dam to increase the velocity of the Ohio river to shrink a sandbar below Henderson, Kentucky. However, the Corps did not begin the widespread construction navigation dams and locks until 1874 when the David island lock and dam were constructed below Pittsburgh. The Corps major innovations were in snag bar removal and dredging technology. For example, the first hydraulic dredge was constructed in 1871,

Flood control is the Corps' most controversial mission and was added in 1850 when Congress appropriated money to survey the Mississippi River. Until 1936, navigation and flood control remained its two primary missions when it became increasingly authorized to construct multiple purpose reservoirs. From the beginning, the Corps role in flood control raised questions of basic science, science policy and federalism which remain unresolved after over one and one-half centuries of involvement. The Corps reflected the view that floods were not inevitable burdens that had to be endured but risks that could be predicted with reasonable accuracy and mitigated through structural modifications. Students of floods have long realized that flood mitigation creates amoral hazard problem: the more flood control production is provided, the more people move into flood plains so that when "extraordinary" floods occur, the damage is substantial. However, until relatively recently, the Corps has emphasized flood risks minimization through levees and later dams.

America's Great River, the Mississippi, was the Corps laboratory for flood control policy. To many the Mississippi is a classic case of the Corps' inflexibility because of its long insistence on a levees only policy to control floods.¹³ The 1861 Humphrey's Abbott Report was a major but incomplete study of the

¹² Robert Kelly Schneiders, *UNRULY RIVER: TWO CENTURIES OF CHANGE ON THE MISSOURI* 55 (University of Kansas Press, Lawrence, Kansas 1999).

¹³E.g. Arthur E. Morgan, *DAMS AND OTHER DISASTERS: A CENTURY OF THE ARMY CORPS OF ENGINEERS in Civil Works*, Boston, Porter Sargent Publisher 1971)

flow of a major river and established a flood control theory that continues to influence thinking today.¹⁴ Humphreys and Abbott believed that the flooding of the Mississippi could only be controlled by the construction of levees rather than reservoirs.¹⁵ Eventually they took credit for James B. Eads rival theories that jetty construction would increase the discharge of the river improving both flood control and navigation.

D. The Corps From the Progressive Conservation Era to the New Deal

The Progressive Conservation Era was a moment in time for American water resources policy. It coincided with the rise of the modern university with both the humanities, sciences and professional schools. Engineering was a highly prestigious profession which supported the For the first time, a holistic vision of watershed and river basins as integrated natural (we didn't use the word ecosystem) and social system emerged, although the ideas were not implemented until the end of the 1920s. To this day, the underlying ideal of water management based on hydrologic rationality rather than regional competition for individual, unintegrated projects has remained the major alternative to the politics of distribution that has characterized federal water resources policy. The idea that hydrologic rationality did not respect political boundaries, which the Supreme Court had earlier endorsed in its definitions of navigability, formed the basis for the "pure doctrine of river basin management": the construction and management of comprehensively planned, integrated federal projects on the nation's large rivers to promote regional development.¹⁶ Proponents of comprehensive watershed and river basin planning assumed that large-scale water resources projects were necessary to promote the efficient (non-wasteful) use of water through multiple purpose and provide widespread benefits to the nation.

Planning was designed to rationalize the project selection process among competing projects. Experts would use the full range of physical and social sciences, especially hydrology and economics, to choose the "best" projects. Planning federal budget coordination was seen as a rational alternative to an unfiltered politicized project planning and funding process.

¹⁴ A. A. Humphreys and H. L. Abbot, REPORT ON THE PHYSICS AND HYDRAULICS OF THE MISSISSIPPI RIVER (U.S.G.P.O. 1861)]

¹⁵ Barry, John M Rising Tide: THE GREAT MISSISSIPPI FLOOD OF 1927 AND HOW IT CHANGED AMERICA (Simon & Schuster 1997).

¹⁶ Norman Wengart,

The Progressive Conservation vision of national multiple-purpose development was never fully realized. Some officials in the newly organized Bureau of Reclamation, created to administer the Reclamation Act of 1902, enthusiastically endorsed the idea, but influential members of Congress never accepted the idea of the Inland Waterways Commission championed by President Theodore Roosevelt. However, the Corps clung to a narrow flood control and navigation vision and mission both to protect its autonomy, to maintain its support in Congress¹⁷ and because in the first decade of the 20th century the technology for large dams and long distance electric transmission lines had not been developed. Thus, the Corps came to multiple-purpose dam construction relatively late, as a result of its levees only policy, but then embraced the concept enthusiastically. Until the 1920s, its activities remained closely tied to commercial navigation enhancement and the construction and maintenance of flood control levees. In many instances, the Corps resisted both popular support for large -scale projects such as the Chicago-New Orleans Deep Waterway and new theories of water management such the multiple purpose dam movement.

In 1879 Congress created the Mississippi River Commission which implemented the levees only policy. This policy remained the basis of Corps flood control policies in the face of continued major floods and the success of the flood control dams built by the Miami Conservancy District in Ohio based on their pioneering work in estimating storm and flood frequencies.¹⁸ The Great Mississippi flood of 1927 was a traumatic and transformative event in both American politics and water policy. President Coolidge's characterization of the flood as an act of god and his refusal to support federal flood relief led to the argument that the federal government has the responsibility to supplement the levee program, designed to benefit navigation, with programs designed to protect the valley from future floods.¹⁹ This ultimately led to the adoption of a more comprehensive river basin approach with dams, levees and

¹⁷Samuel P. Hays, CONSERVATION AND THE GOSPEL OF EFFICIENCY THE PROGRESSIVE CONSERVATION MOVEMENT 1890- 1920, Harvard University Press pp. 208- 209, 1959] and Donald J. Pisani, WATER AND AMERICAN GOVERNMENT: THE RECLAMATION BUREAU, NATIONAL WATER POLICY, AND THE WEST, 1902- 1935, University of California Press, pp 286- 288 (2002).

¹⁸Martin A. Reuss, *Probability Analysis and the Search for Hydrologic Order in the United States, 1885- 1945*, 4 Water Resources Impact, No. 3, page 7, May, 2002.

¹⁹James M. Barry, RISING TIDE: THE GREAT MISSISSIPPI FLOOD OF 1927 AND HOW IT CHANGED AMERICA, New York, Simon and Shuster (1997).

floodways. In 1927 Congress authorized comprehensive River basin surveys, the 308 studies. In 1936 the Corps was authorized to build dams when flood control was declared a national responsibility.

The Flood Control Act of 1936 dramatically expanded the Corps planning role and is the foundation of its current efforts to use good engineering, physical and social science in project planning. In the go-go years of national dam building, the 1940s to the 1960s, it was able to build large reservoirs on many small Eastern and Midwestern tributaries. The 308 studies and New Deal's support of large scale public works enabled the Corps to expand its activities from the East, southeast and Midwest to the Inner-Mountain West and the Pacific Coast. For example, the Tucumcari District was established in arid New Mexico in 1935 to construct the Conchas Dam on the Canadian River. Subsequently, seven major dams were constructed in southern Colorado and New Mexico. On the Missouri, the Columbia and in parts of California, it successfully out maneuvered the Bureau of Reclamation for the construction and thus control of reservoirs on the Missouri mainstem,²⁰ the Columbia and the Kings and Kern Rivers in California.

E. Rational Planning

The modern era has been characterized by an unsuccessful search for the "perfect rational" planning process, planning at more rational geographic scales, the expansion of the Corps mission, and increasing criticisms of its missions. The idea of project and city planning is an old one but during the first two decades of the 20th century city and resource planning evolved from a purely architectural or engineering function into a scientific processes of information assembly and problem solving.²¹ The founding of the United States Geological Survey in 1879 was an important in shifting hydrological research from a diffuse private sector to the government. Under the leadership of pioneers such as Robert E. Horton, the focus of hydrology was the on "the conservation of water mass at the scale of the river

²⁰ John R. Ferrell, *BIG DAM ERA: A LEGISLATIVE AND INSTITUTIONAL HISTORY OF THE PICK-SLOAN MISSOURI BASIN PROGRAM*, Missouri Division U.S. Army Corps of Engineers, Omaha, Nev. 1993); Marc Reisner, *CADILLAC DESERT THE WEST AND ITS DISAPPEARING WATER*, New York, Viking 176-194 (1986).

²¹ Mel Scott, *AMERICAN CITY PLANNING SINCE 1980* 120- 121 (1971, University of California Press, Berkeley, CA).

basin"²² which fit nicely with the idea of integrated, technical planning at large scales.

There was broad public support for this vision of the well-managed watershed where water management was synonymous with controlling how rivers behave, and more particularly with taming that behavior. Water project structures were to result in control of the hydrologic extremes and reclamation of arid lands and riverine environments for the prosperity of the nation. Even calls for non-structural measures (the legacy of Gilbert White) rested on a logic that people should adjust to nature (flood and drought) because adjustment was a practical and cost effective response to hydrologic extremes and not because attempts to control natural variability was either detrimental to rivers biological communities or was simply "wrong".

Over time states and local governments came to rely on Federal agency leadership and federal funding for water control projects that often provided local areas with the direct benefits. Decisions about funding (which areas got how much of the federal financial largesse) were often based on political vote trading in the Congress where individual representatives worked with the agencies and the agencies and their constituents who stood to benefit from the projects -- the water project "pork barrel"²³. The executive branch role in this process often was limited to screening out the least justified projects from Congressional consideration, rather than budgeting for an optimum set of projects derived from by a carefully developed planning process.

In response, since the Presidency of Theodore Roosevelt watershed and river basin planning was proposed to "rationalize" the design of and choice among possible water control projects. Water management organizations, defined by hydrologic boundaries, would rely on experts who would employ the best science from areas as diverse as hydrology and economics to rationalize project choices, being the antidote to the politicization of the funding process because the watershed plan and the process of doing the planning would bring about federal agency and budget coordination and consistency. The result would be the sequence of construction and spending that would best promote the nations economic prosperity.

Rational decision making is one of the fruits of developments in 20th century mathematics. We continue to reply on it because it provides a standard against which agency decision

²² National Research Council. OPPORTUNITIES IN THE HYDROLOGIC SCIENCES 41- 42 ().

²³ Arthur, Maass, Muddy Waters (195) remains the classic.

can be made. In fact, it is the basis for deference to expertise. The problem is that it has been demonstrated that it is an illusion. However, it is an illusion that is deeply ingrained in the Corps' culture.

Modern water resources rational planning developed rapidly from the end of World War II through the early 1960s in response to the construction of new dams and other water resources projects. Until the late 1940s, engineers made all important water resource decisions. They formed the core of the emerging discipline of water resources project planning became an important academic subject.²⁴ In 1955, the Rockefeller Foundation funded the Harvard Water Program, a joint water resource system design seminar for graduate students and government personnel.²⁵ The Corps provided support for the program from 1961- 1965. The Harvard program combined engineering, systems analysis and economics in an attempt to plan and design "optimal" projects. It was assumed that a project had a finite number of outputs and they could be measured and thus alternative projects could be ranked and that optimality could be mathematically calculated through sophisticated models that maximized the desired project outcomes.

The Harvard Program became operational during the first Eisenhower Administration which implemented a policy a no new starts policy for large water projects. Senator Robert Kerr chaired a Senate Committee which recommended the construction of new water resources projects which more sensitivity to pollution and newly identified environmental issues. In 1965, following the report of the Kerr Committee, the Congress passed 1965 Water Resources Planning Act, the high water mark of federal commitment to rational water resources planning. Ironically, the Act was passed as the national commitment to water control projects was waning and thus the analytical tools developed for the ideal or optimal project were, like the 1950s automobile, obsolete almost from birth. In one view, the Congressional acquiesce to this 1965 act was an effort to revive what had become a flagging program. That act created a three part national planning approach to national water resources management, to be administered by a Federal Water Resources Council and regional River Basin Commissions. Water projects were to follow evaluation practices set forth by the Council.

²⁴ Arthur Maass et al, DESIGN OF WATER-RESOURCE SYSTEMS, 1962 (Harvard University Press, Cambridge, MA).

²⁵ Maynard M. Hufschmidt, THE HARVARD PROGRAM- A SUMMING UP, IN WATER RESEARCH, Alan K. Kneese and Stephen C. Smith eds. , 1966, (Johns Hopkins University Press); [Robert Kelly Schneiders, UNRULY RIVER: TWO CENTURIES OF CHANGE ON THE MISSOURI 55 (University of Kansas Press, Lawrence, Kansas 1999).

The WRC completed two National Water Assessments, that were called level A planning. The Council formed river basin commissions and made efforts to issue (but never issued) guidelines for large scale watershed planning. The principal legacy of the WRC is the Principles and Standards for planning water and related land resources projects.

D. The National Water Commission: The Curtain Comes Down

The last major effort to develop a rational, coordinated federal water policy occurred in response to fears of a large-scale diversion from the Columbia River Basin to southern California, and, ironically, the result was to signal the end of the big dam or public works era and usher the era of environmental protection and greater market discipline. Congress created, staffed and adequately funded the National Water Commission. It's 1973 Report²⁶,, was unfortunately lost in the Watergate scandal. Nonetheless, the Report accurately described and endorsed many of the major subsequent developments in water policy because it reflected the transition from the large dam and construction project era to the post- large dam era. The basic message was that the case for subsidized water development no longer existed. It called for an end to future subsidies for reclamation projects and navigation improvements, greater use of water transfers, the more accurate pricing of both irrigation and M & I water, and it criticized the excessive reliance on structural flood control measures.

WATER POLICIES FOR THE FUTURE contained a penetrating critique of water resources decision making. It called for greater integration of land use and water planning on the erroneous assumption that Congress would pass a national land use planning act which would include federal grants for improved state and local planning. It called for the integration of water quality and quantity planning which still occurs only on an ad hoc basis. It also addressed the longstanding problem of competition and duplication among agency functions and called for a centralized data collection agency. The Commission stopped short of calling for a Department of Natural Resources because it forecast the Bureau of Reclamation's long term role as resource manager rather than project construction agency and saw a similar but more radically diminished role for the Corps of Engineers.

The National Water Commission carefully studied existing river basin management. The river basin planning commissions authorized by Title II of the water Resources Planning Act of 1965 were still functioning but the Commission noted their lack of construction and management authority that ultimately contributed to their demise. It endorsed the interstate compact as the preferred allocation

²⁶ WATER POLICIES FOR THE FUTURE: FINAL REPORT TO THE PRESIDENT AND TO THE CONGRESS OF THE UNITED STATES BY THE NATIONAL WATER COMMISSION (1973).

method but it concluded that more innovative governance mechanisms were needed and endorsed the creation of a new type of federally chartered river basin corporation that would have planning, construction and regulatory functions. The Commission endorsed the principle that the river basin is the right management unit and called for careful review of all federal projects, especially inter-basin transfers, and it called for the creation of "an independent review board . . . to keep a check on the project evaluation biases of the Federal construction agencies."

III. MODERN CHALLENGES

A. Changing Societal Values and the Benefit-Cost Controversy

One of the great unanswered questions of public policy is whether governments can in fact spend money efficiently- assuming that this is a desirable goal. Fiscal discipline has been one of the great projects of welfare economics, and federal water resources spending has been a great laboratory. In 1936, the Corps was instructed by Congress to calculate the costs and benefits of its projects but there was little understanding of what this meant. Gradually, economists created the applied art of benefit-cost analysis to do this. By the 1950s, the Corps began to face two separate challenges which increasingly came together and led to a shift away from large-scale dams, levees and channel improvement projects and to a greater emphasis on environmental protection.²⁷ The first came from economists and students of river basin development. These critics [Maass, etc] raised questions about the technical methods that the Corps used to compute costs and, mainly, benefits and more generally questioned the economic desirability promoting regional development through dam construction. Other such as the distinguished Gilbert White questioned the almost sole reliance on structural flood control measures and advocated a broader mix of structural and non-structural alternatives. Flood plain protection is a classic moral hazard problem: the more the flood plain was protected, the more attractive it became for development, creating the cycle of moral hazard problems that continues to this day.

Formal benefit-cost analysis was an important innovation, although the efficiency of large scale public works had been questioned since Thomas Jefferson's presidency. The Corps has tried to execute its cost-benefit mandate but its assumptions and calculations have long been questioned and often found wanting. This reflects a long tension between the Corps vision of an elite, expert agency and the more democratic idea that public spending

²⁷See Beatrice Hort Holmes, *HISTORY OF FEDERAL WATER RESOURCES PROGRAMS AND POLICIES, 1961- 1970*, Department of Agriculture Misc. Pub. 1379, Washington, D.C. 1979)]

should be disciplined. The former idea was beautifully expressed by a Corps officer in 1826. When a nation undertakes a work of great public utility . . .the revenue is not the central object to take into consideration; its views are of a more elevated order- they are all, and it may be said exclusively, directed toward the great and general interests of the community" ²⁸ The Corps responded to the requirement that it do cost benefit analysis by developing a highly structured rational planning process. Cost-benefit analysis as other techniques such as flood frequency calculations have always been as much as art as a science. The uncertainties under which the Corps has had to operate has made it possible to manipulate to achieve a desired political outcome, a favorable project authorization recommendation.

B. The Environmental Movement

The most fundamental challenge to the Corps is the environmental movement. It both questioned the basic mission of the Corps- hydrologic modification- but it also throws into question the crucial assumption of all Corps methodology- the calculation of an optimum solution. Environmental NGOs initially used the economic critique to challenge the whole range of Corps activities from dams to stream channelization and in the process has substituted a new paradigm of river use for the pure river basin development one. To the Corps, rivers have long remained objects of an imperfect nature to be improved for human progress through the application of science and engineering. As a result of environmentalism, we now see rivers as integral parts of a natural landscape which can provide valuable ecosystem services along with the historic benefits. We also see them as part of wilderness heritage; natural ribbons of awe and grandeur to be enjoyed in the wild or restored state. The passage of the Wild and Scenic Rivers Act marked the beginning of the end of the Big Dam era, although this realization did not hit the water resource agencies until the 1970s.

The initial reaction to the Corps was, as was most of the environmental movement, negative. The object was to stop projects by legal or political means. More recently, the process of "environmental accounting" has recently led to a more radical ecological ideal of managing river systems to maximize ecological functions, the maintenance of the river's historic natural "service The newer ecological integrity vision is less clearly articulated than multiple use because it rests on a more complex view of the human role in the functioning of natural systems. It starts from the premise that we must try to integrate human uses of a river system with the maintenance of its natural environmental

²⁸Simon Bernard et al, Report from the Board of Engineers . . . Concerning the Proposed Chesapeake and Ohio Canal 66 House Document 10, 19th Cong. 2d Sess. 1826).

sustainability both in the design of new projects and the re-engineering and operation of existing facilities. The current focus is on restoration because river systems as modified but dynamic, ever-changing functioning ecosystems which serve a variety of functions from the maintenance of consumptive uses to the provision of a whole range of a whole range of services such as biodiversity, polluter filtering and flood retention"²⁹

This is not a not a simple river preservation concept because it will be realized, if at all, within the framework of environmentally sustainable use and development. River use must always accommodate a sustainable, non-wasteful level of consumptive use.³⁰ Although some aquatic scientists want to subordinate human use to the "normative" river, the newer river-as-ecosystem concept starts from the premise that we must try to integrate human uses of a river system with the maintenance of its natural environmental sustainability both in the design of new projects and the re-engineering and operation of existing facilities.

The environmental movement has had four major impacts on the Corps: (1) it Corps became a regulator and thus it has dual and potentially conflicting missions, (2) the environmental movement focused more critical attention on all Corps activities, especially on its cost-benefit practices, and on its processes of decision making (3) the movement contributed to the adoption of formal cost sharing in 1986, and this has changed the nature of projects, and (4) increasingly the Corps' mission has been expanded to include the restoration of ecosystems that it helped alter. It is participating in aquatic ecosystem restoration and would like to increase its responsibilities in this area as illustrated by the billions of dollars being spent on the Everglades restoration experiment. However, there are manifold problems with these changes and new missions. First, the Corps' regulatory jurisdiction over the dredging and filling of wetlands is not well integrated into the Corps project planning, construction and operation mandates.

The Corps has viewed environmental protection and restoration as an activity which would be pursued with its existing expertise and within its legal authorities. A 1991 statement made it clear that the environmental activities of the Corps must be grafted onto the existing programs and will not be a totally new dimension for the agency. This requirement for a linkage between either an existing Corps project which has caused the degradation, or for

²⁹ James Salzman and J.B. Ruhl, *Currencies and Commodification of Environmental Law*, 53 Stan. L. Rev.607 (2000).

³⁰ This concept was endorsed by WATER IN THE WEST: CHALLENGE FOR THE NEXT CENTURY 3-2 - 3-3 (1998).

modification of a Corps project to be demonstrably the most cost effective means to reverse a degradation, is expected to focus the scope of Corps environmental efforts. The Corps environmental mission remains undeveloped. They have no working definition of restoration of the environment.

IV. THE POST-MODERN AGENCY AND ACCOUNTABILITY

The Corps is often portrayed by environmentalists as an unaccountable "out of control" construction agency. The reality is that the Corps is a highly accountable agency to its main constituent, Congress. Paradoxically, this makes traditional accountability almost impossible. The traditional model of agency accountability assumes a unified Congressional understanding of the agency's policy. Oversight committees then police deviations from adherence to the policy. In the post-modern political world, things are more complex. In a recent article, Professors J.R. DeShazo and Jody Freeman identify a disturbing new administrative phenomina which they call disjoined and sub-majoritarianism. In brief, collations of oversight committee members are able to subvert an unamended statute by tempering its specific application to specific geographical areas. The major problem is that agencies are not, as constitutional law would suggest, accountable to the formal mandate of Congress, but to individual members who reject the mandate. The Corps does not strictly fit this model because there is no uniform federal water policy but the model highlights the fact that there may be other examples of undesirable, unanticipated forms of accountability. We suggest that the Corps suffers from a structural hyper-accountability. To complicate matters, the Corps appears as a monolithic central agency. It is formally and there are clear lines of authority between headquarters and the field but in reality the Corps is a federal agency. Increasing power has devolved to the local districts. The main reason is cost sharing.

The legal consequences of this are significant because it presents a set of legal problems different from the usual administrative law ones. The great project of modern administrative law has been to cabin the exercise of agency discretion. Although the Supreme Court has virtually refused to use the delegation doctrine has a control³¹, it has shown great, if wildly inconsistent enthusiasm for the general project. The "hard look" doctrine opened the whole area of informal or non-adjudicatory, non-rulemaking action to judicial review. *Chevron* appeared to abandon the project but the court has recently recognized that there is a role for judicial review of agency policymaking. The Corps is not primarily a regulatory agency. They do not operate under a general organic statute. Rather, they construct and (in many but not all cases) operate and maintain projects that are individually authorized by

³¹ *Whitman v. American Trucking Association*, 521 U.S. 457 (2001).

Congress.

A. Cost Sharing and Federalism

The Corps does not act according to a general organic mandate. It builds (or, in the case of the Everglades, rebuilds) what Congress wants it to. Congress now authorizes projects by omnibus water legislation. WRDAs sometimes contain general directives to the Corps but these are seldom funded. The introduction of formal cost-sharing has had impacted the Corps both in ways that were anticipated by the supporters of the concept and those that were not. Non-federal beneficiaries of Corps projects had long borne some of the costs on an ad hoc basis, mainly in the form of land and easement transfers and dredged material disposal areas. In the 1970s, momentum for increased fiscal discipline in the began to build. The Corps had long been criticized for flawed benefit-cost studies, especially for over-stated benefits. A coalition of fiscal conservatives and environmentalists agreed that formal cost-sharing was a desirable Corps reform because it would eliminate projects of marginal value.

The 1986 Water resources Development Act [1986 WRDA] adopted cost-sharing and also authorized a back-log of delayed projects. The cost-sharing rules are quite complex and may be waived in appropriate instances,³² but the concept has fundamentally changed the nature of the agency. Cost-sharing has increased the power of local sponsors and their Congressional representatives to influence project selection and design. It has thus narrowed the geographic scale of Corp planning at a time when many are claiming on it to expand it to a watershed or river basin. It has fundamentally changed the traditional iron triangle narrative. Numerous studies have observed the close relations among the Corps,

³²In brief, cost-sharing is based on ability to pay and the Secretary of the Army may vary the formulas for structural and non-structural flood control measures and for agricultural water supply projects. For example, for harbor projects, construction cost-sharing increases with the harbor depth. Operation and maintenance cost-sharing reverses the equation. Shallow harbors must pay 100% of the costs but deep-draft harbors need only pay a maximum of 50% of these costs. The cost sharing rules for structural flood control require a minimum 25% land, material and a minimum 5% cash contribution from local sponsors. Non-structural flood control measures have a separate cost-share formula; they must either contribute 25% of the cost in land, cash, easements, disposal sites or make up the difference in Inland navigation projects remain 100% federally financed but the federal share is evenly split between general revenues and the user fees.

members of Congress and local project proponents to the exclusion of the executive branch and the general public.³³ The assumption was the Corps that was either in control of the process or an equal partner. Cost-sharing often makes the courts the implementation agency for decisions taken by the project sponsors and members of Congress. At a minimum, it is harder for the agency to exercise its traditional independent review function. Cost-sharing has also made the Corps more federal because it increases the power of divisional offices at the expense of central command.

The Corps rational planning process has been compromised because cost-sharing makes local sponsors and their Congressional representatives more powerful than the Corps. Cost-sharing has eliminated some marginal projects and some with high environmental costs. However, it has contributed to the fragmentation of Corps authority in two important ways. The, it has kept alive or revived "Legacy" projects, (controversial projects that had been shelved by the 1986 cost sharing reforms and by Washington level reviews. However, a series of actions in the mid 1990s that relaxed the review of project justifications and that relaxed cost sharing requirements for these selected projects allowed these legacy projects to re-gain momentum. Second, it has given local sponsors, local Representatives and senators a greater role in project select, design and, most importantly scope. Local project sponsors have few incentives to link projects to a larger watershed perspective, for example.

Recent National Academy of Sciences studies of the Corps point out three problems with Corps planning. First, the planning occurs in a policy vacuum. The United States government no longer has a coherent federal water policy. Second, the Corps should plan on a larger scale than they have in the past. All NRC studies and others have endorsed the idea that the watershed is the correct scale for project planning. Third, the studies have identified marginal technical improvements in the evaluation techniques used from non-user value assessment to flood risk confidence levels. These evaluations have indirectly raised but have not confronted the larger question: what, if anything, does rational project planning mean in world when fewer large -scale projects are likely to be undertaken.

B. Proposed Reforms: Power Sharing and Rational Experimentation

The Corps is being pulled in two directions. One asks it to let

³³e.g. Arthur Maass, *MUDDY WATERS: THE CORPS OF ENGINEERS AND THE NATION'S RIVERS* (1951); John A. Ferejohn, *PORK BARREL POLITICS: RIVERS AND HARBORS LEGISLATION 1947- 1968* (Stanford University Press, Stanford, CA 1974).

go of its claimed monopoly on expertise in the name of water management in the national interest and engage in open-ended collaborative processes which solve problems by consensus. The watershed revival is an example of this reform. They also being asked to adopt new rational techniques- adaptive management- to plan and manage at the largest geographic scale possible to implement holistic resource polices that integrate

1. The Watershed Revival

The current buzzword in water management is watershed planning. This interest is a reflection of the bankruptcy of earlier central river planning efforts and of the limits of command and control regulation to address problems that do not admit of a simple technological solution. 1970s to the 990s saw efforts to "scale down" and decentralize water resources planning. Earlier river basin commissions were dismantled and smaller, watershed-level initiatives sprang up across the to address modern issues such as aquatic ecosystem restoration and the control of non-point source pollution, in the absence of express federal legislation. As a substitute for actual management, many federal agencies including EPA, the Forest Service and the Corps have turned to the idea of watershed planning. The basic idea is to substitute stakeholder processes and voluntary agreements for top down regulation. Watershed protection efforts must overcome fragmented, incomplete and shared regulatory exists both among the three levels of government and within these levels as well as the existing allocation of water and land entitlements. Thus, the geographic focus of legal regulation is inevitably narrow ,and it is difficult for mission agencies to cross political and cultural boundaries and for units of government to cooperative and to share power among themselves as well as the former regulated community who are now characterized as "stakeholders."There are numerous large and small watershed initiatives underway in the United States. Some are simply information sharing fora and others seek to solve specific physical and regulatory problems by using consensus among stakeholders to secure government and private approval of specific programs that meet federal and state regulatory objectives- usually the Endangered Species Act.

Watershed planning and governance effectively means that the , the Corps must both carry out its statutory mandates and increasingly share it power with other units of governments but other stakeholders have the ability to influence watershed decisions. There are numerous watershed initiatives underway in the United States. Some are simply information sharing fora and others seek to solve specific physical and regulatory problems³⁴ by using consensus among stakeholders to secure government and private

³⁴Natural Resources Law Center, THE WATERSHED SOURCE BOOK: WATERSHED-BASED SOLUTIONS TO NATURAL RESOURCE PROBLEMS (undated).

approval of specific programs that meet federal and state regulatory objectives. These efforts are an example of a number of experiments to supplement rigid command and control regulation with more flexible collaborative governance processes. Collaborative governance generally seeks to craft a consensus among a limited group of stakeholders to support private and public solutions. In some watersheds the Corps is a major player; in others they are not.

The emphasis on watershed planning and management has many implications for the Corps as the various specific committee reports in this series make clear. A watershed approach will require the Corps to give much more attention to non-structural alternatives to flood damage reduction. For example, after the extraordinary Mississippi Valley floods of 1993, the administration formed an Administration Flood Management Task force. The ensuing report³⁵ recommended a comprehensive watershed-based approach to flood reduction that included non-structural, as well as structural, measures such as permanent evacuation of floodplains and the maintenance and creation of wetlands to retard flood pulses.

2. Restoration: A Second Change to Correct Past Mistakes

The Corps would like to reform itself by correcting many of its past "mistakes." Aquatic ecosystem restoration has brought the Corps program to center stage, far out of proportion to the agency's budgetary significance, was the "restoration movement". The restoration mission of the Corps has been steadily expanding as aquatic ecosystem restoration becomes a major national priority.³⁶] In 1986, Congress directed the Corps to consider how operation of existing projects might be altered to achieve environmental purposes. Section 1153 was not implemented until fiscal year 1991. Subsequent special legislative provisions and omnibus rivers and harbors development acts have authorized environmental projects to mitigate for past damages and to restore areas that had been degraded in the past. For example, Section 306 of WRDA 90 identified "environmental protection" as a central mission for the Corps.³⁷ Section 307 called for the development of a wetlands action plan to achieve the goal of "no overall net loss" of the nation's wetland base.³⁸ The Coastal Wetlands Planning, Protection and

³⁵SHARING THE CHALLENGE: FLOODPLAIN MANAGEMENT IN THE 21ST CENTURY (Report of Interagency Floodplain Management Review Committee, Washington, D.C. 1994),

³⁶National Research Council , RESTORATION OF AQUATIC ECOSYSTEMS (1992).

³⁷33 United States Code Section 2316.

³⁸33 United States Code Section 2317.

Restoration Act of 1990 (PL 101-646) authorized the Corps to cooperate with other agencies and the state of Louisiana to identify and construct wetlands projects. "Ecosystem protection and restoration" is a relevant element in Corps watershed and river basin assessments,³⁹ and the agency may "carry out an ecosystem restoration and protection project: if it will improve the quality of the environment and will be cost effective."⁴⁰

Restoration undercuts the very foundation of 200 years of national water management policies. It argued that past hydrologic alterations that affected watershed hydrologic and geomorphologic processes must be reversed to the extent possible if we were to realize the goal of the CWA to "restore the chemical, *physical* and biological integrity of the nation's waters", intentionally or unintentionally captures a significant shift in our attitudes toward water management. As for the Corps "physical integrity" refers to "restoring" patterns and timing of flows and geomorphic processes in our watersheds. Physical integrity means restoring the natural flows and pulses to our riverine (riparian) areas and strategically recreating wetlands-upland complexes in our watersheds. To be sure, restoration is as much an engineering problem as the traditional water development programs, and extends to such matters as scheduling reservoir releases to better mimic historical flows (just one example). The restoration concept was given momentum by a 1993 NRC report, "Restoration of Aquatic Ecosystems" and focused the nation's attention on the need to think about water quality as more than just a chemistry problem.

The restoration movement has two motivations. First, some argue that only by restoring the physical integrity of our watersheds (as described above) can the "ecological services" now highly valued by the nation's population be realized. Even if restoration comes at the expense of some of our current uses of the watershed (say navigation) the net benefits warrant the shift toward restoration. This is an argument built on a utilitarian ethics and an anthropocentric view of the purposes of watershed management. A second motivation for restoration rests on a different ethical proposition - an eco-centric view that rivers in a more natural state should be desired as ends in themselves which posits that many dams are candidates for removal.

³⁹33 United States Code Section 2267a(a).

⁴⁰33 United States Code Section 2330.

C. Adaptive Management: Forcing the Corps to Think Outside the Box: The Missouri River Case Study

In the 1950s, the Corps built six mainstem reservoirs on the Missouri River primarily for flood control and navigation support. The Pick-Sloan project radically changed the Missouri River ecosystem and has placed several listed endangered or threatened species at risk. The Corps is now being asked to use adaptive management to re-engineer the system to try and conserve these fish and avian species.

1. What is Adaptive Management

Adaptive Management [AM] is part theology and part science. As an early proponent observed, with perspicacity, "[a]daptive management is not really much more than common sense. But common sense is not always in common use."⁴¹ AM was developed in the late 1970s as a criticism of static or deterministic environmental assessment. The basic argument was that "a fixed review of an independently designed policy"⁴² was inconsistent with the experience of resource managers world-wide and with what has come to be called non-equilibrium ecology. The need for rigorous but flexible procedures to make decisions under conditions of uncertainty has a long intellectual pedigree. Howard Raiffa's pioneering work in the 1960s on decision analysis which led to his famous decision trees⁴³ was one of the major influences on the development of AM.⁴⁴ As Fred Bosselman and Peter Orebech have pointed out, 1973 OPEC oil embargo and the resulting price shocks helped undermine faith in long-term corporate strategic planning and to led to the recognition of the need to continually learn from experience and adapt to new information and conditions.

There was comparatively little interest in AM both within and without government until the Endangered Species Act [ESA] emerged as a major barrier to a wide variety of private and public activities in the late 1980s and early 1990s and the Clinton administration Department of Interior responded by promoted multi-species Habitat Management Plans as a way to conserve species and allow continued land development. AM was proposed as a way to push hard problems such as the risk of the failure of a habitat management plan into the future. In the process, AM lost much of

⁴¹ ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT 136 (C.S. Holling ed. 1978).

⁴² Id. at 1.

⁴³ Howard Raiffa, DECISION ANALYSIS (1968).

⁴⁴ ADAPTIVE ENVIRONMENTAL ASSESSMENT at 119.

its initial theoretical rigor and coherence and came to stand for any action that had an experimental component and some monitoring.

AM requires a continuous process of acquiring and evaluating scientific information. It also requires the practice of regulatory science. Regulatory science is science designed to answer, to the best extent possible, causal questions about management choices and a socially desired outcome such as the preservation of a species from extinction or an ecosystem that functions more like it did prior human intervention. Regulatory science requires scientists to contribute to the establishment of standards that have both a normative and scientific component and then to devise ways to measure whether these standards are being met over time. For example, AM is almost always used in restoration-broadly defined- efforts. Any effort to create past conditions requires baselines and performance targets. These are not strictly scientific questions because they require normative judgments about the value of the past and the extent to which we wish to try and re-create. Nonetheless, these decisions must be informed by science.

2. Adaptive Management in the Courts

Adaptive management is hard for the Corps because it must both contravene clear historic mandates and undertake potentially costly and risky experiments without clear Congressional guidance. The United States Corps of Engineers argues that its duties to protect downstream Missouri River communities from flood damage and to maintain a nine foot navigation channel for a very small, and decreasing, amount of barge traffic prohibits an alteration in release patterns to protect endangered species or to begin to restore the river and its adjacent flood plains. Environmentalists argue that the Corps- which traditionally opposes judicial review on the ground that there is "no law to apply- has discretion under its existing statutes or the Endangered Species Act. These arguments came to a head in the summer of 2003.

In 2003, the Corps decided to respond to a drought by releasing water from the largest reservoir in South Dakota, Lake Oahe, to maintain a nine foot navigation channel downstream. South Dakota successfully sued to enjoin the release because it to reduce the prey of a major reservoir sport fish, the walleye. The Corps then proposed to take the water from Lake Francis Case, lower on the system, but South Dakota obtained an injunction requiring the water levels be maintained in both lakes through the spawning season. To prevent the Corps from moving upstream, North Dakota obtained an enjoin to protect Lake Sakakawea. Nebraska in turn obtained an injunction requiring a water release. Th Eight Circuit ultimately held that the Corps was bound by its own Master Manual because the Corps was estopped to claim that it was nonbinding.⁴⁵ The upstream

⁴⁵ South Dakota v. Ubbelohde, 330 F.3d 1042 (8th Cir. 2003).

states sued to protect an "exotic" sport fishery. The Missouri also has two species of fish that need Spring rises and two endangered birds.

In 2000 the Fish and Wildlife Service issued a Biological Opinion that recommended a Spring rise every three years to benefit these species but this option was considered by the Corps and then dropped after extreme pressure from downstream navigation interests. .⁴⁶ However, in 2003, the Fish and Wildlife Service engaged in more "political" science and issued a Supplemental Biological Opinion that found no jeopardy because "future operation will be consistent with the 2000 Biological opinion." After the Eight Circuit vacated the North and South Dakota injunction, an environmental NGO convinced a District Court in Washington to require a Spring rise, to preserve the pallid sturgeon, and to limit summer flows to prevent the nests of least terns and piping plovers. The district court held that the Corps had the discretion to comply with the ESA, that compliance "can come at the expense of other interests," and that the 2003 Supplemental BiOp was inconsistent with the ESA because it was likely that it had no reasonable chance of occurring. Eventually, the cases were transferred to a district judge in Minnesota under the complex litigation transfer procedure, and the judge held that the agency must comply with the ESA.

American Rivers was an easy case because the crucial scientific document carried its own death wound. The court found "that the FWS has failed to articulate any reasonable explanation for its departure- not to say abandonment- of the analysis contained in the 2000 BiOp." More broadly the case illustrates two problems with AM, interference with prior entitlements and the practice of faux AM.

AM often increases the risk to existing stakeholders that will now not enjoy their historic entitlements, land development access to the consumptive use of water or commodity production. The elimination of historic entitlements often raises substantial taking issues under the 5th and 14th Amendments to the federal Constitution. There is a need to offer stakeholders sufficient incentives to both participate and agree on an AM regime. The current Bay Delta process is an example of lack of stakeholder confidence in a changed management regime and thus the substitution of process for substance. Incentives are usually defined as financial ones. For example, the Department of Interior's "no surprises policy" shifts the responsibility to deal with future changed conditions to the federal government rather than private landowners. Financial incentives will be an essential component of any incentive package, but the incentives can be scientific as well. AM exposes stakeholders and entitlement holders to new risks of a diminished entitlement or undesirable outcome. AM can not eliminate all risk, but scientific information may be able to bound the risk and

⁴⁶ *American Rivers v. U.S. Army Corps of Engineers*, ___ F. Supp.2d ___ (D.C. 2003).

convince stakeholders that the risks can be managed and accommodated. For example, aquatic restoration does not always require the same flow each year. Thus, if the resilience of the system were better understood, stakeholders might be more willing to participate in restoration schemes because the risk of cut backs in a single dry year might be minimal.

AM may interfere with prior entitlements, but not all entitlements are equal and not all The perceived entitlements influence the agency management culture. Resource managers are generally rewarded for following the law and satisfying powerful constituencies. The two reward structures are closely related because the existing user constituencies are the beneficiaries of earlier laws designed to promote intensive resource use. This leads agencies to construe laws, or adopt the position- often not grounded in a formal legal analysis- that existing laws preclude any change.

The second problem is the practice of faux AM. Courts can police the practice of faux AM by careful scrutiny of the crucial assumptions that the agency makes and a comparison to "real" AM. For example, a "real" AM experiment must establish baselines and conservation targets. Scientists must then assess whether they are being maintained. This usually requires a high level of cross-disciplinary integration and informed speculation. It is not enough to collect data and decide what inferences can be drawn from the data. Scientists must often draw inferences about the likely impact of a management policy from less than ideal data. Such decisions must be defended as scientifically sound and slogans such as "good science" and legal standards such as "best available science" should not be allowed to prevent well-designed and executed Am experiments from going forward. The correction process over the long term rather than the quality of data at any given point in the process is the best guarantee of the integrity AM. However, it not permissible to use Am as a justification to defer all hard questions about the success of an experiment to the future.

A opinion by the respected Judge Levi, *National Wildlife Federation v. Babbitt*⁴⁷, provides an example of how AM can be policed. The Fish and Wildlife Service and various governmental units negotiated an ambitious regional HCP for a 53, 000 acre largely, relatively undeveloped flood plain near Sacramento, California. Development will occur because local and perhaps federal flood control protection will trigger the usual moral hazard cycle: flood protection will increase development which in turn will increase the amount of flood damage when the inevitable "extraordinary" flood occurs. California is one of the world's endangered species hot spots and several listed species live in the basin. Unlike HCPs which start with the assembly of a large block of land, the Natomas Basin plan obligated a multi-jurisdictional

⁴⁷ 128 F. Supp.2d 1274 (E.D. Ca. 2000).

agency, the Natomas Basin Conservancy to assemble several connected blocks of land funded by development fees. The pay off for the plan was the Fish and Wildlife Service's issuance of a Biological Opinion that permitted umbrella incidental take permits to several local governments and water districts.

HCPs have to balance a front- end of development which is immunized from a Section 9 taking suit and the implementation of a multi-species plan over a long period of time. To do this, the plan has to make crucial assumptions. The Natomas Basin Plan's assumption were (1) only about a third of the basin would in fact be developed and future threats to the species continued survival as development took place around the reserve system could be minimized through aggressive adaptive management. The National Wildlife Federation challenged the basic theory that the Incidental Take Permits could proceed a complete plan based on extensive scientific research. Specifically, it argued that the Plan must estimate the number of species and the number that will be taken. The court brushed this aside by holding that the HCP meet the minimum statutory requirements under the *Chevron* deference standard. Plaintiffs also challenged the Service's projection (speculation) that only 17,500 acres of the basin would be developed and the consequent conclusion that a combination of reserve and retention of agricultural land would be sufficient to protect the covered species. These were found to be with the Service's expert discretion because they concerned "the uncertainties inherent in the market-based mitigation mechanism employed by an HCP" and an inevitable part of the complicated decision making that led to the HCP.

Instead of invalidating the key risk assumptions behind the plan, the court zeroed in of the weakest deals, the disconnect between a regional plan and the lack of regional responsibility and the Department's inability nail down adequate funding.⁴⁸ First, the court invalidated the Service's conclusion that the amount of the mitigation fee would be sufficient to acquire the necessary habitat because it was unsupported by substantial evidence and therefore arbitrary. Administrative purists may object to combining an adjudicative and rule making or informal decision standard but the court in effect enforced the Supreme Court's Nolan-Dolan standard. Nolan-Dolan require that land exactions be based on a reasonable showing of need and that the exaction is proportionate to need generated by the land use activity. By failing to demonstrate compliance with the standard, the Department of Interior may have over or underestimated the necessary level of exaction. Likewise, the court held that the Department could not issue a permit after the city refused to assume financial liability for the implementation of the plan.

⁴⁸ See John Kostyack, *NWF v. Babbitt: Victory for Smart Growth and Imperiled Wildlife*, 31 *Envl. L. Rep.* 10712 (2001). See generally William Rodgers, *The Myth of Win-Win: Misdiagnosis in the Business of Reassembling Nature*, 42 *Ariz. L. rev.* 297 (2000).

The Service's willingness to go ahead without an adequate funding mechanism also extended to its willing to approve a regional HCP premised on the participation of only one public actor, the city of Sacramento, when it fact the success ultimately depends on multi-jurisdictional cooperation. This was a fatal for several reasons including the failure to discuss the effect on the reserve and corridor design if only the city participated in the plan. In short, the Service's failure to consider whether the survival of the species will be put at risk by the City's permit , if the regional mitigation approach of the HCP is not available, is arbitrary and capricious."

