

Water Management: Why the Resistance to Change?

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Duane D. Baumann

Southern Illinois University at Carbondale

William Werick

U.S. Army Corps of Engineers

Introduction

The opening scene of the award-winning Broadway play, *Fiddler on the Roof*, is that of Tevye observing a fiddler on the roof of his home. He asks himself (and the audience), "Why do we stay up there and how do we keep our balance? That, I can tell you in one word: Tradition."

Often our society follows Tevye's lead and has as a justification for doing something only the fact that it has always been done that way. But society does not remain constant. Major and continued change is the social fact of our time. The costs of tradition, then, are enormous. It is crucial, therefore, to continuously reassess current and new policies, new technologies, and methods/tools of analysis and evaluation. To survive in the global economy, we must embrace the concept of change and diminish the role of tradition.

Major sectors of our society, both public and private, have been slow to respond to changing conditions; in fact, we seem to be reminded daily of the costs to a society that steadfastly clings to tradition (Prowse, 1992). While there are examples of success, it is clear that we have not given our full attention and resources to dealing with the problem of adapting to change.

Examples are abundant. The failure of the American auto industry to restructure itself to the changing global market resulted in a major loss of market share and contributed significantly to our trade deficit. Similarly, the resistance of single firms, like IBM, to accommodate the changing market and be competitive has resulted in a major loss of market share. A notable example in the financial world occurred during the 1980s where creative financing was discouraged and actually punished. The response by federal regulators, politicians and journalists to the policies of Michael Milken reflect their lack of understanding and resistance to the innovative financing of new infrastructure in this country, especially in the financing of the information industry:

Since his [Milken's] incarceration, the entire case against him has collapsed. Never in history has a white-collar criminal been so luminously and elabo-

rately vindicated during his years in jail . . . for two years in a row, high-yield bonds — led by Mr. Milken — have been America's best fixed-income investment. While investors in blue-chip IBM lost some \$70 billion in market value in five years, holders of so-called junk gained \$100 billion . . . if the relatively few S&L's with large junk positions had been allowed to keep them, they would have earned hundreds of millions on their holdings and would have imposed no costs on the government. (Gilder, 1993)

These are but three instances that illustrate the enormous personal and social costs to the resistance of new policies and technologies to the changing demands of the global economy.

Our nation's lack of response to a changing national and global economy is evident also in the way we plan and manage our water resources. Many concepts, ideologies, policies and methods of analysis that were established decades ago have become obsolete and impediments to efficiency in a growing world economy. This concern of meeting the challenge of the future was a central focus of the Carnegie Commission. "Today's complicated and urgent environmental challenges cannot be addressed in the piecemeal fashion of the past"(Carnegie Commission, 1992).

This problem of change also was addressed directly at the recent *International Conference on Water and the Environment: Development Issues for the 21st Century*. The 338 government-designated experts from 113 countries reached agreement not only on guiding principles in water management, but also on an action agenda.

A few months later the world witnessed the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil. Although many were disappointed, important developments did occur by the creation of new international institutions, specifically, a new United Nations entity, the Sustainable Development Commission. "Of the formal intergovernmental institutions called for at UNCED, the Sustainable Development Commission is likely to have the greatest impact on global politics. The commission will be responsible for carrying out the objectives in the 'Institutions' chapter of Agenda 21" (Haas et al., 1992).

It is the purpose of this issue of *Update* to further the discussion on how our water industry can better respond to new information and technology in our rapidly changing society, thereby maximizing the net societal benefits.

Water resources Management: The Problem

A primary problem is the definition of our evaluation criteria, and secondly, even if we agree on a set of explicit criteria, we are faced with the problems of measurement and monitoring. Peter Rogers raises the questions of how we measure success in water resources, and how wide is the gap between what is and what should be. Are more reservoirs, inland waterways, acres of irrigated land a measure of success? Is the decline in total water use since 1980 and the fact that per capita use is less now than it was in 1965 a measure of success? But, at what cost? And, is total water use and even more so, per capita use, an appropriate performance indicator? At first glance, these may sound reasonable, but the question of the cost is not addressed.

In addition, he also points out that there is little agreement on the concept of "widely accepted principles" among water experts and planners. This problem is not only a function of the distribution of knowledge, but of differences in the perception of new information and technology.

Ben Dziegielewski further develops the role of perception when considering the manner in which we have dealt with droughts in urban areas. He notes that the problem is that water agencies have perceived drought as a hydrologic problem, clearly a professional bias, and subsequently have pursued only those solutions that involved intervention with the hydrologic cycle, not capturing the benefits of alternative, less costly approaches. Water agencies recast water resources problems into the shape of the missions, solutions, and professional perspectives that they have at their disposal. Everyone admires the idea of *integrated watershed* management, but it is the only perspective without an institutional champion. New models, such as the Drought Optimization Plan, have been developed to assist urban planners and water utility managers to formulate optimum drought plans; yet few have adopted the tools and continue to rely on past approaches.

Stuart Somach elaborates on the problem we are all aware of but have done little to change, the problem of policies that were formulated in an earlier era in this country that are now obsolete and become obstacles to the adoption of new practices. He highlights the strong resistance to policy change, such as within the U.S. Bureau of Reclamation where the bureaucracy has become part of the problem and is no longer the facilitator of solutions. Similarly, he addresses the great resistance to water marketing, an area where myths persist and many steadfastly refuse to recognize that water is a commodity. This recognition was considered of such importance by the participants at the

Dublin conference as to be identified as one of the guiding principles:

Principle No. 4— Water has an economic value in all its competing uses, and should be recognized as an economic good. Within this principle it is vital to recognize first the basic right of all human beings to have access to clear water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.

Similarly, Thomas Sowell observes in *Forbes*:

Transferable property rights in water would eliminate all the propaganda, political infighting and bitter recriminations among farmers, city-dwellers, environmentalists, and others with special axes to grind. Social tranquility may be even more of a benefit from market transactions than the economic efficiency it produces. (Sowell, 1991)

The magnitude of the hidden cost of resisting change can be gleaned from the existing water management system in the state of California. By not reforming the system of water allocation and not allowing free transfers of water among alternative uses, there is an enormous imbalance in the prices paid for scarce water supplies during drought.

Some farmers pay \$1 - \$3 per acre-foot while some urban areas have to pay up to \$1200 per acre-foot in order to avert water shortages (Dziegielweski et al., 1993). It is very difficult to attach a dollar value to this apparent inefficiency. By using some crude numbers, one could conclude that in the drought year of 1991, urban users paid a high premium per acre-foot of water obtained from expensive sources, while farmers were willing to give up a substantial amount of their water at a price of \$100 - \$150 per acre-foot. Considering the quantities of water involved, the approximate cost of not reforming the water management system could reach several billion dollars per year.

Chelsea Congdon focuses on the past inefficiencies in agricultural water management, and elaborates on the gap between sound management principles and actual practices. Congdon, as others, emphasizes the importance of price, the marketplace, and water transfers, and sees agriculture having to modify its approach and share in the benefits and risks associated with increasing scarcity, that is, with increasing costs.

A fundamental concern in the shift to price and markets is the notion of greater accountability, and to no surprise the concept of accountability is a strong theme throughout the literature and the papers in this issue. Those

who have a personal investment are likely to be more sensitive to performance. Hence, we observe the growing reliance of the market and price in determining the value and types of water uses. In the government sector, the lack of accountability is rife and is widely criticized. Seldom in the private sector is a system of investment established without explicit performance indices, and when accountability becomes lax, the market is, most often, unforgiving. The bottom line for public agencies is public approval, and in recent decades securing public approval has really meant avoiding embarrassing mistakes. We will not go boldly where we have never gone before if mistake-avoidance continues to be our guiding light. Water agency critics must be at least as anxious to write Congressmen about worthwhile agency initiatives as they would about waste or stubborn adherence to bankrupt ideas. Until there is a reason to manage for innovation, prudent agency leaders will try to do just what they have been asked to do while making as few mistakes as possible.

Underlying any prospect for change in water resources planning and management, either in the private or public sector, is the problem of dealing with risk. Warren Viessman calls to our attention the importance of the problem by referring to an article by S. J. Keith: "There are problems surrounding the quantification of risk, the perception of risk and the level of risk to be accepted by society." Viessman then comments: "Unfortunately, there are not many good models for risk communication to the public." While the literature on risk is voluminous, a recent study by Cliff Russell (Russell et al., 1993) for the Institute of Water Resources summarizes the literature on risk communication and provides planners with specific guidelines in dealing with risk in water resources planning.

David Getches is optimistic concerning which way the winds of change are blowing, especially in the West. He reports that the principles of beneficial use, integrated water policy, and institutional reform are being revisited, but this time he finds reason to believe that practices may change. What kind of market constraints will develop is in the formative stage, but the emphasis is clearly on the expectations that water is becoming increasingly marketable. He recognizes, as does Peter Rogers, the unlikelihood of abolishing existing committees and agencies; however, he is hopeful that new missions can be given to old institutions. The problems and prospects of institutional change in water management has a lengthy debate; yet, the question stands, can you teach an old institution new tricks? The phrasing suggests the answer. "New tricks" such as alternative dispute resolution and demand management are real skills, like hydrology, which require educated practitioners. Agencies must recognize this in the allocations of budgets, in hiring, and in the formulation of work groups.

We are currently re-assessing the role of watershed management and integrated resources planning in dealing

with our environmental problems. While both concepts were developed in the decades of the 1960s and 1970s, little development and implementation occurred in the 1980s. Warren Viessman stresses: "Cities, counties, states, and even nations, are often too limited in jurisdiction to deal appropriately with water issues that transcend their boundaries. A broad understanding of the functioning of entire ecosystems must become the basis for unified action." A national conference on watershed management was held in March, 1993 (Watershed '93) and there is a fresh look at the role of integrated resources planning in water resources planning and management (Beecher and Stanford, 1992). However, any optimism about our nation's endeavor to change is greatly diminished when we face the fact that last year the U.S. Geological Survey's Water Resources Research Program (Sec. 105) went unfunded. This four million dollar annual program each year generated approximately 260 research proposals, nearly all from our universities requesting approximately 30 million dollars. The impact is severe: the training of graduate students is diminished, faculty researchers are likely to develop other research interests, and new knowledge in the water resources field is not forthcoming. And, there was no program established to fill the void for water resources research needs. More importantly, the overwhelming preponderance of money and attention paid to water resources is still passed through agencies which by law or tradition are managed to achieve limited objectives: irrigation, or flood control, or water supply. Challenged simultaneously by funding cuts and the rejection of this old paradigm, will agencies respond by *pretending* to be watershed managers? Will they fight to keep the old perspectives funded? Or will they embark on new approaches?

To some, persistent concern is the conflict between the economic perspective and the views of the environmentalists. The Carnegie Commission argues for a well-directed research development program including carefully presented results if "sustainable development" is to be achieved "... growth that is a product of efficient consumption of energy and materials, minimizing waste and maximizing recycling, stabilizing land use, and assuring growth that does not damage the future environment on which further growth depends" (Carnegie Commission, 1992). Yet, the concepts of efficiency, waste, stabilizing and damage have very different meanings to biologists, engineers and economists. The prospect for a marriage between the economic and environmental perspective was recently assessed in a critical review of the literature, and concluded with recommendations that could lead to mutually agreeable approaches in environmental planning and management (Russell, 1993).

While one could continue with numerous examples that illustrate the enormous societal cost that results from the absence or slowness to change, the more important query emerges: Why? Why do we not embrace new policies if the costs of not doing so are so enormous?

The Resistance to Change

It is not the purpose of this brief introduction to review the vast literature of the past three decades on decision-making and the factors related to the adoption of new practices and ideas. It is helpful, however, to reflect on the past literature on decision-making and natural resource use, such as the earlier contributions of Gilbert F. White, Walter Firey and Everett Rogers. White provides a general paradigm of decision-making in resource use which includes four major elements:

- 1) the nature of the quantity and quality of the physical environment;
- 2) the relevant technology;
- 3) the economic marketplace; and
- 4) social-cultural guides.

While our choices are always constrained by the characteristics of the physical environment, the level of technology, and our culture — laws, regulations, policies, and public attitudes — the actual choice by a resource manager (however small the unit) is a function of the perception of the four elements of decision-making. Thus, if change is to happen it must be related to that perception. And that perception, in turn, is influenced by one's knowledge, belief, and ideologies. A person's knowledge, beliefs, and ideologies are molded by experience from early childhood by social milieu and professional training. Indeed this last factor -- professionalization -- is both a source of expertise and resistance to change. The professional who feels safe and secure in an arena of knowledge and pattern of work may be understandably reluctant to admit the relevance of new factors of which he or she is ignorant.

The earlier work by Everett Rogers notes that those who embrace change and adopt new policies are more likely to be younger, to have a financial commitment, are better educated, and have had more diverse professional experiences. They also are more competent users of information, including both personal and impersonal sources.

Thus, both perception and the availability and quality of information are fundamental factors in natural resource decision-making and policy change. The need for better information was recurrent in several of the papers. Most notably, Warren Viessman notes forcefully: "Education and communication are fundamental elements in shaping the direction of water policy." He also argues for public involvement in water planning, and again emphasizes the importance of an informed public.

Similarly, the Carnegie Commission emphasizes the importance of cultivating a continuing supply of well-trained professionals and public. They note that, "Our ability to respond to environmental and economic challenges of today and tomorrow is strongly dependent on the

quality of information produced by a well-organized and productive federal research and development system" (Carnegie, 1993). One of the Commission's recommendations calls for a strengthening of our educational programs in the environmental sciences and emphasizes the importance of a multi-disciplinary curriculum.

Both government and the private sector should take deliberate steps to improve educational programs in the environmental sciences. Undergraduate biological, physical, engineering, business, and economics education programs should include an environmental science component in their curricula. Graduate and postdoctoral training programs in the environmental and social sciences should be expanded. (Carnegie, 1993)

Corroborative conclusions were reached in a recent report by the World Bank, *Development and the Environment*. The report addresses the problems of removing impediments to action:

Even when straightforward ways of tackling environmental problems exist, governments have often found it difficult to translate them into effective policy. The reasons for the gap between intentions and performance include political pressures, an absence of data and knowledge, weak institutions and inadequate participation of local people in finding solutions. (World Bank, 1992)

What Can We Do?

For our society to grow, we must embrace the concept of change and diminish the notion of tradition. To be competitive, to increase our disposable income, to reduce social and environmental costs, we must view the future as an endless array of opportunities, and look to the past with suspicion. This fundamental shift in perspective, while met with great resistance, can be promoted at the federal, the state, and local level, and especially starting with our entire school system.

The prospects for facilitating change appear to be severely constrained. Peter Rogers emphasizes the problem of fragmentation as a severe obstacle to re-organization. He notes that ". . . there exist 25 federal agencies, eleven independent federal agencies in nine cabinet departments, three agencies in the Executive Office of the President, five river basin commissions, the federal courts, and two bureaus which currently exercise responsibility for water programs. . . . The federal government alone has over 90,000 employees working on water problems. . . . By the 102nd Congress, there were seventeen House Committees with 102 subcommittees plus 15 Senate committees with 82 subcommittees." The Carnegie Commission also notes that "more than a dozen federal departments and agencies conduct environment-related R&D; total spending is some \$5 billion a year"

(Carnegie, 1992). The Commission continues that the R&D program was developed over several decades and today the result is diffuse and uncoordinated programs.

But what are the prospects for change? What can we do? Peter Rogers argues for improved coordination among joint authorizing committees of the U.S. House and Senate since, in his view and others, restructuring, consolidation, and reorganization of committees and agencies are unlikely. Gerald Galloway offers several views on alternatives for federal action, such as the reestablishment of the Water Resources Council and a bipartisan, broad-based National Water Commission. Regardless of which alternatives are explored, all are dependent upon a strong, vibrant and rigorous research/development program and an aggressive educational system where we come to realize that learning is a life-long process and is not suspended at graduation.

The foundation of our society has been and increasingly is based upon knowledge and technology. As we know, those societies that invest in the knowledge industry become more and more competitive and efficient; thus, the fuel for the knowledge industry is clearly research, development and education. While the responsibility to foster research and development and education rests upon everyone and every public and private institution, the federal government could and should play a major role. This effort should be directed toward three objectives:

- 1) Research and Development;
- 2) Education and Technology Transfer;
- 3) Monitoring/Performance Indices

Research and Development. The future role of the federal government in water resources planning and management should develop new approaches to guide and invest in research and development. The development costs of many research and development efforts very often far exceed the capability of an individual entity to bear; yet, the application of the new information or product is beneficial to many water managers and/or planners. Thus, funding research and development programs should explore new public/private relationships and gradually result in an ongoing reassessment and modification in the management of our nation's water resources. New incentives to foster R&D can surely be developed, thereby encouraging the participation of the private sector. The federal government should play a major role in providing guidance in the establishment of research and development priorities. While this idea is not new, the renewed federal emphasis on R&D would be, and clearly the research shows the dividends from R&D to be significant contributions to our competitive edge.

Education and Technology Transfer. Concurrently, the federal investment would include a major role of information and technology transfer. Warren Viessman argues strongly and persuasively for a more informed citizenry as

essential to more efficient and equitable water resource management. Creative ways to disseminate new information including the use of new technologies should be explored and quickly developed. In addition to seminars, workshops, the implementation of electronic bulletin boards and information clearinghouses could provide instant and interactive use of current information. Again, new public and private sector relationships could be created as we grow into the information age. Perhaps the biggest single indicator of how "principled" and successful the practice of water management will be is the quality of the people doing the practice. Sadly, this is also one of the greatest weaknesses of the current system. Our system rarely produces managers who approach the "ideal" -- the person well schooled in the liberal arts and the sciences, conversant in the dozen or so professions that dominate water management, familiar with the literature, experienced in the field, a "people person" capable of generating the trust and respect necessary to bring different agencies, users, and interest groups together, a competent, energetic optimist.

In this new thrust, the federal establishment would likely play a decreasing role in the actual management of water resources, a policy that has already been growing in popularity and implemented, albeit at a small scale, such as the continual efforts by the U. S. Army Corps of Engineers to involve local and state governments and the private sector in the operation and maintenance of recreation and natural resources projects. This illustrates how the problem of accountability is shifted to the managers and users of water, more into the market place and away from the political/bureaucratic arena, as discussed by Stuart Somach.

The World Bank report reinforces the need for accountability; one of the priorities is: "Clarify objectives and ensure accountability. The public agencies that implement programs for the environment . . . need to be held accountable for the environmental impacts of their activities . . ." (World Bank, 1992).

Monitoring Performance Indices. The federal government would definitely need to establish a monitoring program in order to assess not only how well we are doing but to identify the problems requiring additional attention. Again, the World Bank emphasizes the need to establish priorities and ensure accountability (World Bank, 1992). Likewise, Larry Larson's dismal portrayal of flood loss reduction programs supports the need for accountability. He argues: "Federal agencies have little experience or expertise in running programs delegated to the local level," and adds that any delegated program needs oversight and monitoring.

In the private sector, monitoring of results is an obvious and essential part of every program, of every investment. The same standards should apply to public programs and investments. Specific performance indices and periodic deadlines of evaluations would necessarily be

established thereby providing feedback on how to improve and what needs to be changed. This would be a major step in the direction of promoting accountability, again as argued by Stuart Somach. In time, with a focus on performance and who is accountable, we might find our existing institutions changing from within to meet the new objectives and cultivate an environment that rewards innovation.

Each of the papers in this volume addresses the problems our society faces because of our reluctance to more readily evaluate and adopt new ideas and technologies. Some have offered suggestions as to what needs to be changed and a few have made specific suggestions. However, the grandest proposal to deal with our future environmental and water resources problems has been developed by the Carnegie Commission. As the Commission very poignantly states, "If the federal government is to meet the environmental and natural resources challenges of the future, the distribution of R&D responsibilities across all departments and agencies must be rethought" (Carnegie Commission, 1992). The following is a brief summary (prepared by the Commission) of the Commission's bold proposal for re-organization, new goals, and a program of monitoring and accountability:

In order to respond effectively to the environmental challenges of the future, the nation needs a more dynamic, interrelated organizational structure and more effective assessment and policymaking processes. The key to devising and operating such a system is stronger leadership within the executive Office of the President, as well as a restructuring and redirection of the work of the mission agencies.

Many of the recommendations in the Commission's report can be implemented without significant new federal expenditures by reorganizing and revitalizing the current R&D infrastructure. The report recommends, among other measures, strengthening and streamlining R&D infrastructure, providing strong leadership, encouraging multidisciplinary research efforts, and improving coordination among research programs.

In the White House. According to the Robert Fri, Co-Chair of the Carnegie Task Force responsible for preparing this report, "It is essential that the White House apparatus include a viable analytical unit, directed by an individual who has a seat at the policymaking table, in order to assure that environmental considerations are incorporated into the full range of federal policies, particularly those related to energy and the economy."

The report recommends integrating the activities of the Council on Environmental Quality (CEQ) into the White House Office of Environmental Quality (OEQ). The Director of OEQ would simultaneously serve as Assistant to the President for the Environment. OEQ would be responsible for developing broad environ-

mental, sustainable development, and risk-related policy options for the consideration of the President and the Cabinet. The Office would assure an integrated federal response to global and national environmental challenges. The director should be given broad authority to look across all departments and agencies and to identify ways in which federal activities can be directed toward the environmental, sustainable development, and risk-reduction objectives of the President.

"Strong leadership at the White House level is essential in order to assure an integrated and responsive federal environmental R&D system that can provide a foundation for the critical environmental and economic decisions of the 1990s and beyond," said H. Guyford Stever, Co-Chair of the Commission Task Force.

To aid the OEQ director, the Commission recommends establishing an Institute for Environmental Assessment (IEA) to evaluate global and national environmental problems and develop alternative approaches to them. IEA's primary responsibility would be to bridge the chasm that exists between the reporting of environmental R&D findings and the development of effective environmental policy. IEA would not make policy, but would provide the data and analysis necessary to the formulation of effective policy recommendations.

To devise and implement an integrated R&D plan, the Commission also recommends that the President undertake an environmental Research and Monitoring Initiative. Headed by the directors of OEQ and the White House Office of Science and Technology Policy, the initiative would bring together key administrators of federal R&D programs and the Office of Management and Budget to develop broad short- and long-term goals for federal environmental R&D programs. The objective of the initiative would be to establish a common policy framework for all federal environmental R&D programs, coordinate the diverse activities of federal departments and agencies, and heighten the priority of environmental R&D across the government.

At the Agencies. The report presents a variety of suggestions for improving the R&D programs of individual departments and agencies. A key recommendation calls for a new federal agency, the U.S. Environmental Monitoring Agency (EMA), to be organized by combining the National Oceanic and Atmospheric Administration (NOAA) with the U.S. Geological Survey (USGS). EMA could function either within a proposed Department of the Environment or as an independent agency. EMA's mission would include monitoring and evaluation of both natural processes and the social activities that are driving forces for environmental deterioration. The report also recommends establishing a National Center for Environmental Information (NCEI) within EMA to serve as a focal point for the storage and

retrieval of information. NCEI would coordinate the information gathered by the many government environmental R&D projects, accumulating data from a wide range of federal departments and agencies, state and local governments, academia, industry, and non-governmental organizations.

Within the Environmental Protection Agency (EPA), the report recommends consolidating the 12 existing national laboratories into four major labs: A National Ecological Systems Laboratory, a National Environmental Monitoring Systems Laboratory, a National Environmental Engineering Laboratory, and a National Health Effects Research Laboratory. It also recommends establishing up to six major Environmental Research Institutes (ERIs) associated academic institutions and nongovernmental organizations around the country. The ERIs would be EPA's "flexible, problem-oriented, multidisciplinary" arm, while the national labs would maintain their "more structured, discipline-oriented, intramural" identity.

This is a critical period in the evolution of the nation's environmental programs. Decisive action is needed to ensure that the government can anticipate and respond not only to the challenges the nation and the world face today, but also to those that are likely to arise in the years ahead. In *Environmental Research and Development: Strengthening the Federal Infrastructure*, the Carnegie Commission on Science, Technology, and Government focuses on realistic, effective "fixes" to modernize the federal environmental R&D system and redirect its resources to the emerging problems of the 21st century. The report is meant to contribute to the discussion and debate of a full range of proposals for improving the nation's capacity to protect the environmental and ensure the sustainable use of national and global resources.

Whatever path we choose, choose we must. As we move farther into the information age, the R&D, education and technology transfer programs need to change, need to be strengthened, and need to become a primary objective. We need to cultivate a perspective that embraces change, a culture that continually seeks new information and re-evaluates current practices. Then tradition has little merit and the future gap between what can be and what is closes.

References

Beecher, Janice A., and John D. Stanford. 1992. *Integrated Water Resources Planning: Discussion Paper*. Columbus, Ohio: The Ohio State University. Natural Regulatory Institute.

Carnegie Commission. 1992. *Environmental Research and Development: Strengthening the Federal Infrastructure*. New York: 10 Waverly Place.

Dziegielewski, Benedykt, Hari P. Garbharran, and John Langowski, Jr. 1993. *The Great California Drought of 1987-1992: Lessons for Water Management*. Planning and Management Consultants, Ltd. for the U.S. Army Corps of Engineers, Institute for Water Resources.

Gilder, George F. 1993. "America's Best Infrastructure Program." *The Wall Street Journal* (March 2, 1993): A-16.

Firey, Walter. 1960. *Man, Mind and Land: A Theory of Resource Use*. Glencoe, IL: Free Press.

Haas, Peter M., Marc A. Levy and Edward A. Parson. 1992. "Appraising the Earth Summit." *Environment* 34 (October, 1992): 6-11.

Klein, Victoria, Tom Fiock, Ed Pettit, and Tim Feather. 1992. *Annotated Bibliography: Value of Environmental Protection and Restoration*. Planning and Management Consultants, Ltd. for the U.S. Army Corps of Engineers, Institute for Water Resources.

Langowski, John and Ed Pettit. 1992. *An Annotated Bibliography*. Planning and Management Consultants, Ltd. for the U.S. Army Corps of Engineers, Institute for Water Resources.

Prowse, Michael. 1992. "Is America in Decline?" *Business Review* (July-August): 34-45. *Harvard*

Rogers, Everett. 1962. *Diffusion of Innovations*. New York: The Free Press.

Rogers, Everett M. and F. Floyd Shoemaker. 1971. *Communication of Innovations*. New York: The Free Press.

Russell, Clifford. 1993. *Guidebook for Risk Perception and Communication in Water Resources Planning: Underpinnings and Planning Application*. Planning and Management Consultants, Ltd. for the U.S. Army Corps of Engineers, Institute for Water Resources.

Russell, Clifford, Victoria Klein and Jennifer Homan. 1992. *First Steps in the Development of a Method for Evaluating Environmental Restoration Projects*. Planning and Management Consultants, Ltd. for the U.S. Army Corps of Engineers, Institute for Water Resources.

Sowell, Thomas. 1991. "Natural Resource Economics." *Forbes* (July 22): 6S.

"Watershed '93: A National Conference on Watershed Management." March 21-24, 1993, Alexandria, Virginia.

White Gilbert F. 1961. "The Choice of Use in Resource Management." *Natural Resources Journal!* (March): 23-40.

World Bank, World Development Report. 1992. *Development and the Environment*. New York: Oxford University Press.