

## *Perspective Piece*

# Reflections on the Federal Role in River Management\*

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Federal government agencies' responsibilities for national water resources management grew rapidly in the 20<sup>th</sup> century, along with the budget to execute those responsibilities. In most places today, river flows are the result of rainfall and runoff, as well as the presence of the water development projects of these agencies. Meanwhile in the nation's watersheds, demands on water resources are changing along with changes in rainfall and runoff volume and patterns, suggesting the possible need for new investments and different management of the investments currently in place. However, by historical standards, there has been a radical reduction in the Federal roles and budgetary commitment to river management. This diminished Federal role has resulted from competing water management visions that I will refer to as "old water conservation," "new water conservation," and "watershed restoration." Old water conservation is where I begin.

Throughout the nation's first 200 years, engineering works (i.e., infrastructure) were supposed to remove the tails from the hydrograph – that is remove natural variation in river flows – promoting material prosperity and general social well-being. In 1934, the National Resources Planning Board declared<sup>1</sup>,

<sup>1</sup> Citations for extended historical quotes and other material can be found in Shabman, L. 2008. Water Resources Management and the Challenge of Sustainability. In: *Perspectives on Sustainable Resources in America*, R. Sedjo (Ed.). Resources for the Future Press, Washington, D.C., 45pps.

"In the interests of national welfare there must be national control of all the running waters of the United States, from the desert trickle that may make an acre or two productive to the rushing flood waters of the Mississippi."

In the words of the 1936 Flood Control Act "... the Federal Government should *improve* or participate in the *improvement* of navigable waters .... if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected." (emphasis added)

In 1963, when dedicating the Whiskeytown Dam on the Trinity River in California, President Kennedy concluded his remarks by endorsing the old water conservation vision, as follows:

{by these works water will not run} "... unused to the sea" when it could "... irrigate crops on the fertile plains of the Sacramento Valley and supply water also for municipal and industrial use to the cities to the south. And while running {its} course, ... generate millions of kilowatts of energy and help expand the economy of the fastest growing State in the Nation. In these ways ... *man can improve on nature*, and make it possible for this State to continue to grow." (emphasis added)

A drawing of an ideally managed *large* river basin in the 1950 Truman administration's report on water resources has an illustration of the old

water conservation. In the upper reaches of the smaller watersheds, cover crops and reforestation on eroded soils slow runoff and control erosion. Downstream, small dams are combined with diversion channels and other conveyance facilities to move water to irrigated farm fields and small communities. Previously wet areas are drained by small ditches leading to larger canals, with the drained land dedicated to cities and farms. On the larger rivers, dams create reservoirs to store water, while levees along the river edges and deepened river channels limit flooding of fertile soils. Cities are located adjacent to flood-protected rivers, and their manufacturing and other commercial facilities along the river edge are served by ports and barge terminals. The water stored in reservoirs irrigates agricultural fields, generates electric power, and provides for other water uses in dry times.

This grand vision of the ideally managed river basin was to be executed by Federal construction of levees, channels, dams, and reservoirs paid for by the Federal taxpayer. The Federal efforts were accompanied by state and local governments building water supply reservoirs, pipes, and open canals and transferring that stored water over long distances. This national investment in advancing the old water conservation vision transformed a natural water supply that varied unpredictably across watersheds (with the season and between years) into a reliable water source for all users in all regions of the nation. The high- and low-flow extremes of the natural hydrograph rarely interfered with normal uses of water or with the use of land adjacent to rivers and streams.

By the 1970s this old conservation vision had run its course, and was to be replaced by the new water conservation to then be supplanted by a management vision of watershed restoration. The 1960s nascent environmental movement grew to its current prominence around events such as the oil soaked beaches in Santa Barbara, California, when offshore wells blew out. However, perhaps most galvanizing for building a constituency for a new water conservation were proposals to build dams at Tocks Island in the Delaware Water Gap, in Hells Canyon in the Pacific Northeast and in the Grand Canyon National Park. In his classic book *Encounters with the Archdruid: Narratives About a Conservationist and Three of His Natural Enemies*,

John McPhee in 1977 wrote the following:

“In the view of conservationists, there is something special about dams, something – as conservation problems go – that is disproportionately and metaphysically sinister. The outermost circle of the Devil’s world seems to be a moat filled mainly with DDT. Next to it is a moat of burning gasoline. Within that is a ring of pinheads each covered with a million people – and so on past phalanxed bulldozers and bicuspid chain saws into the absolute epicenter of hell on earth, where stands a dam. The implications of the dam exceed its true level in the scale of environmental catastrophes. Conservationists who can hold themselves in reasonable check before new oil spills and fresh megalopolises mysteriously go insane at even the thought of a dam. The conservation movement is a mystical and religious force, and possibly the reactions to dams is so violent because rivers are the ultimate metaphors of existence and dams destroy rivers. Humiliating nature, a dam is evil ...”

Note that McPhee claims to be a conservationist, but as an expression of a new and different vision for river management. This new water conservation would stand in opposition to any further engineering works that altered the hydrology of the nation’s rivers and the associated wetlands and riparian areas.

Other critiques of the old water conservation vision also were ascendant in the 1970s and these were given prominence in the 1972 report to Congress by the National Water Commission. First, no longer were water projects accepted as stimulants to economic growth. Water projects were judged on an economic efficiency logic that was given voice by academics such as Otto Eckstein at the Harvard water program and John Krutilla at Resources for the Future. For example, new investments in our waterway system were expected to serve documented transportation demand and are not expected to stimulate such demand.

There was more to the economic efficiency idea as well. The nation needed to make the best of the already built water infrastructure, before spending added dollars on projects that would

change a watershed's hydrologic regime. And, economic efficiency demanded that beneficiaries paid for project services to the extent they could be identified and made to pay. And, non-Federal levels of government would pay more toward the costs of such projects. By 1986, user fees, trust funds, and cost sharing by project beneficiaries were in place.

The new water conservation would replace the old and then 25 years later create the foundation for watershed restoration as a new principle for water resources management. Whether in the humid east or the arid west, the new water conservation meant stopping any and all changes to the existing flow regimes, wetlands, and riparian areas. Watershed restoration would call for putting back some of the variability in the hydrograph to support species that have life cycles dependent on the pre-water control hydrologic regime. Watershed restoration would mean reestablishing and rehabilitating wetlands and riparian areas that were altered by previous human activity. The value premise of the new water conservation and the link to watershed restoration was that humans should make do with less in dry years, retreat to high ground in wet years, cease efforts to control river flows, and actively reengineer rivers to replicate past variability.

These twin challenges to the old water conservation took hold and over the past 40 years have brought fundamental change to Federal roles in water resources management. Three Federal water development agencies were relied upon to deliver the old water conservation. Beginning in the early 1900s the Bureau of Reclamation had water programs in the 17 western states. In the 1950s the Department of Agriculture had a robust water development program for "small watersheds." The Corps of Engineers operated across the nation with a history dating to 1824, but its program grew dramatically beginning in the 1920s. Just prior to World War II and then into the early 1950s these three programs constituted as much as 3-5% of all Federal spending. Today the figure is probably far less than 0.05%.

Now the United State Department of Agriculture (USDA) program is all but gone and the Bureau is limited to taking care of what it built many years ago. The Corps carries on, but has to be motivated more by agency survival than with the old water conservation vision of multipurpose planning

and management, as described in the vision of the Truman era report of 1950. To survive it has organized its program and is budgeting around single purpose mission areas that can assure some public support – flood hazard reduction (risk management) and support for waterway and harbor navigation.

In 1999, the Corps did add a free standing aquatic ecosystem restoration mission, that was to "... (restore) significant ecosystem function, structure, and dynamic processes that have been degraded to partially or fully reestablish the attributes of a naturalistic, functioning, and self-regulating system." Eight years later Congress acted to affirm this new free standing aquatic ecosystem restoration mission. This mission has its own planning and decision-making criteria and its own budget justification criteria, and is in competition for funds with the flood and navigation missions.

How has that worked out for redirecting the focus of this remaining Federal water management agency? One answer to the question is found in the total Corps budget which is about \$7 billion each year, if we ignore post disaster emergency supplemental funding, which is targeted to areas that suffered significant flood or hurricane damage and the use of funds is limited to those areas.

First, the Corps' annually appropriated budget in inflation adjusted terms has been essentially flat for decades, and today as much as 30% of its funding comes from the users of ports and waterways and must be spent on that old water conservation mission area. This means that the dollars available from the general taxpayer to the Corps for flood protection and restoration are around \$3-4 billion to be spread over the 50 states, the tribal areas, and the territories. In this budget setting, funds have increasingly shifted to operating, maintaining, and rehabilitating what was built in the heyday of the old water conservation, leaving few dollars for new investments in ports, waterway locks and dams, flood risk management, or for ecosystem restoration.

Today, when the Corps is in the news it is mostly about criticism and rarely about praise – and the reason can be traced to these severe budget constraints. Consider a few high profile – in the news – illustrations, but there are dozens of other examples across the nation. Addicks and Barker

dams above Houston had to be operated during Hurricane Harvey in ways that flooded thousands of homes, because there had been no investments in increasing storage capacity – there was no money. The hurricane protection system for New Orleans was compromised by Katrina and the replacement has, by the Corps recent reporting, an “unacceptable” rating – there was limited money to provide protection before Katrina and there were limited dollars afterward.<sup>2</sup>

The poster child for restoration – the Florida Everglades system – is a massive engineering project of historic portion. This most significant restoration will mean more engineering and more concrete and more bull dozers – and significant amounts of money. However, the failure to move aggressively forward on Everglades restoration after decades of study and analysis, is related in part to the difficulty in justifying the allocation of scarce Corps budget funds to that effort.

In retrospect, the advocates for the new conservation and restoration visions have beaten back all three of the Federal programs that delivered the old water conservation. However, while old water conservation is on the ropes, advocates for restoration have not secured a significant Federal financial commitment to that cause. Both old water conservation – now limited to the flood risk reduction and navigation missions – and restoration are starved for Federal funds, and advocates for all these missions are frustrated. The Congressional frustration is curious, and perhaps disingenuous, because Congress has been reluctant to provide robust Federal funding for decades.

Another dimension of Congressional expressions of frustration with the Corps is the 25 years (and counting) of decision gridlock over how to manage the water flows that are now controlled by dams on the Missouri, Columbia, and Snake Rivers, or how to operate reservoir outflows from places such as Lake Lanier. The fact is that the old water conservation capital stock created real and de facto property rights to certain flow regimes that were locked in place in operating manuals and project

operations. Current beneficiaries of a project need not accept changes in project operations to serve changing demands (water supply at the expense of flood control) or watershed restoration – even when such restoration is to comply with the Endangered Species Act. The Corps is blamed for being inflexible, but the inflexibility lies in the rigid operating rules and political opposition of those who benefit from current project operations. Offering financial or other forms of compensation to those who would lose current benefits might ease the way for making changes in project operations, but compensation schemes would cost money that Congress has not provided.

The Corps cannot build new projects to serve the old water conservation vision due to opposition or lack of funds. It cannot move aggressively on the restoration mission – again for lack of funds. And it has barely enough funding to keep what it has built and is now being asked to make operational changes to meet new demands in the face of significant opposition. Perhaps this might satisfy some interests. However, there are changing demands on our water resources. There are foreseeable changes in the patterns of rainfall and runoff. And there is a tradition of Federal water project infrastructure that we rely on to align demands and new supply realities. I am not sure how much more money will be needed, but I am sure it is more than Congress is now providing.

However, new funds only will follow if opinion leaders can agree on a different way to frame the river management discussion and the Federal role in that management. Here is an opportunity for what is old to become new. What do I mean? The trendy concept of ecosystem services might be usefully relabeled “watershed services.” The relabeling as watershed services might make space in water management discussions to consider both the services that motivated advocates for the old water conservation and the services that now motivate watershed restoration. The relabeling as watershed services is a recognition that in most places humans will and must continue to bend and manage nature – even as nature itself is changing. The relabeling as watershed services would acknowledge that water resources planning and decision-making is about intentionally manipulating the existing hydrograph and geomorphic conditions to secure

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<sup>2</sup> Woolley, D. and L. Shabman. 2008. Decision Making Chronology for the Lake Pontchartrain & Vicinity Hurricane Protection Project. Final Report for the Headquarters, U.S. Army Corps of Engineers. Available at: <https://biotech.law.lsu.edu/katrina/hpdc/hpdc.htm>.

socially preferred vectors of watershed services.<sup>3</sup> The relabeling as watershed services leaves behind the limited focus of the old water conservation, the new water conservation, and watershed restoration, which have become competing visions of how we should manage rivers.

These ideas are not new. Gilbert White in the 1960s called for full consideration of all water management measures – what today we call gray and green – to serve “multiple purposes” – what I would call multiple watershed services. The water research programs of decades past wrote about analytical procedures to help decision makers recognize and then honestly and openly debate the pros and cons of the tradeoffs among means, multiple services, and multiple social objectives as rivers were being managed. Today there is a strong interest in analysis to support “shared” or “collaborative” decision-making for watersheds.<sup>4</sup> If these old ideas become new then Federal water management programs might again grow in ways that make a contribution to national river management.

committees in areas as diverse as the Great Lakes, the Missouri River Basin, Chesapeake Bay, South Florida, and Coastal Louisiana. Shabman has served on or chaired 18 National Academy of Sciences Committees focused on water and related resources management and in 2004 was recognized as an Associate member of the National Academy of Sciences. He may be contacted at [Shabman@rff.org](mailto:Shabman@rff.org).

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**LEONARD SHABMAN**, Senior Fellow at Resources for the Future, joined RFF in 2002 after 30 years on faculty at Virginia Tech, where he also served (10 years) as the Director of the Virginia Water Resources Research Center. He received his Ph.D. from Cornell University. He also has served as Staff Economist at the United States Water Resources Council; Scientific Advisor to the Assistant Secretary of Army, Civil Works; Visiting Scholar at the National Academy of Sciences; and Arthur Maass-Gilbert White Scholar at the Corps of Engineers Institute for Water Resources. Dr. Shabman’s work balances research with advisory activities in order to have a bearing on the design and execution of water and related land resources policy. His publications include over 300 book chapters, journal papers, technical reports, and outreach papers on decision-making for water resources and water quality management. He has held leadership positions on governmental advisory

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<sup>3</sup> This proposed framing for decisions on river management is consistent with the logic of novel ecosystems management. Available at: <https://www.ecologyandsociety.org/vol19/iss2/art12/>.

<sup>4</sup> For example, see: <https://onlinelibrary.wiley.com/doi/full/10.1111/jawr.12067>.