



More Than a Decade of Expert Analyses Highlight the Need for Significant Improvements to Corps Planning and the Importance of Effective Environmental Review
A Summary of Studies by the National Academy of Sciences, Government Accountability Office, Department of the Army Inspector General and other Experts

Projects planned and constructed by the Army Corps of Engineers affect the health and safety of millions of Americans and often involve large scale structural measures with multiple and complex impacts that can radically transform entire ecosystems. Poorly planned projects can lead to incomprehensible losses, like the flooding of New Orleans during Hurricane Katrina. Poor planning happens far too frequently.

More than a decade of reports from the National Academy of Sciences, Government Accountability Office, Army Inspector General, National Academy of Public Administration, U.S. Commission on Ocean Policy, and independent experts have revealed a pattern of stunning flaws in Corps project planning and implementation, and urged substantial changes to the Corps' project planning process. Congress enacted reforms to address a number of these concerns in the Water Resources Development Act of 2007, but these reforms have not yet been fully implemented.



2012, National Academy of Sciences, **Corps of Engineers Water Resources Infrastructure: Deterioration, Investment, or Divestment?**: finds, among other things, that large portions of the Corps' water resources infrastructure are experiencing various stages of decay and disrepair; that the Corps' infrastructure is wearing out faster than it is being replaced or rehabilitated; and that neither the Corps nor Congress have clear guiding principles that allow the Corps to prioritize operations, maintenance, and rehabilitation needs and investments.

2011 (December), GAO (GAO-12-41), **Mississippi River, Actions Are Needed to Help Resolve Environmental and Flooding Concerns about the Use of River Training Structures**: finds that in using river training structures in the Middle Mississippi River to help maintain a 9-foot navigation channel, the Corps has not complied with certain requirements of the National Environmental Policy Act or the Clean Water Act. For example, in constructing new river training structures the Corps has continued to rely on an environmental impact statement prepared in 1976 even though significant changes have occurred in the river and in the Corps' design of its structures since that time. While the Corps routinely assesses some of the hydrologic impacts of its Middle Mississippi training structures, it has not analyzed the environmental impacts. In addition, significant professional disagreements exist over the role of those structures in increasing flood heights which many experts believe could be resolved through additional physical and/or numerical modeling.

2010 (March), GAO (GAO-10-420), **Delaware River Deepening Project; Comprehensive Reanalysis Corrected Errors, but Several Issues Still Need to Be Addressed:** finds that although the Corps' efforts were responsive overall to GAO's 2002 recommendations on this project that GAO identified several additional limitations in the reanalysis. For example, in its analysis of economic uncertainty, the Corps considered the effects of negative-growth scenarios only for crude oil and refined petroleum, but not for the remaining commodities. The updates also did not determine the current status of shipping services on two trade routes that provide all of the benefits related to containerized cargo. Because of these and other omissions, decision makers do not have sufficient updated information to judge the extent to which market and industry changes would affect the project's net benefits.

2009, National Academy of Sciences, **Final Report from the NRC Committee on the Review of the Louisiana Coastal Protection and Restoration (LACPR) Program:** finds that "despite being given authority from the U.S. Congress for this project over three years ago, the Corps' LACPR draft final technical report does not offer a comprehensive long-term plan for structural, nonstructural, and restoration measures across coastal Louisiana, nor does it suggest any initial, high-priority steps that might be implemented in the short term. Instead, a variety of different types of structural and nonstructural options are presented, with no priorities for implementation." Further finds that "the lack of a comprehensive long-term hurricane protection and coastal restoration plan, and the lack of advice on initial high-priority steps and projects, represent substantial shortcomings of the LACPR draft final technical report."

2007 (September), GAO (GAO-07-1250T), **South Florida Ecosystem, Some Restoration Progress Has Been Made, but the Effort Faces Significant Delays, Implementation Challenges, and Rising Costs:** finds that while progress is being made on many projects that will improve water quality and water flow within the ecosystem and provide additional habitat for wildlife, "60 CERP projects, which are the most critical to the restoration's overall success" are among those that remain in the design and planning phase or have not yet started and that some of these projects are behind schedule by up to 6 years. In addition, instead of being driven by sound sequencing criteria, project selection is instead being driven largely by the availability of funds. In addition, "the total estimated costs for the restoration have increased by 28 percent—from \$15.4 billion in 2000 to \$19.7 billion in 2006 because of project scope changes, increased construction costs, and higher land costs. More importantly, these cost estimates do not represent the true costs for the overall restoration effort because they do not include all cost components for a number of projects."

2007 (February), National Academy of Public Administration, **Prioritizing America's Water Resources Investments, Budget Reform for Civil Works Construction Projects at the U.S. Army Corps of Engineers:** recommends, among other things, modernizing the Corps' outdated planning guidelines, improving the Corps' project planning process and revising the Corps' budgeting process.

2006 (September), GAO (GAO-06-934), **Hurricane Katrina, Strategic Planning Needed to Guide Future Enhancements Beyond Interim Levee Repairs:** finds that "the Corps is proceeding with over \$7 billion of interim repairs and construction [of the New Orleans hurricane protection system] without a comprehensive strategy and implementation plan to ensure that these various efforts are appropriately coordinated and integrated with each other as well as with any future plans for a stronger hurricane protection system." Instead, "the Corps appears to be following a piecemeal approach, similar to its past practice of building projects without giving sufficient attention to the interrelationships between various elements of those projects or fully considering whether the projects will provide an integrated

level of hurricane protection for the area.” The Corps’ approach will not ensure the efficient use of federal funds and runs counter to the findings of a Corps-established external review organization which found that “hurricane protection systems should be deliberately designed and built as integrated systems to enhance reliability and provide consistent levels of protection.”

2006 (June), U.S. Army Corps of Engineers, **Performance Evaluation of the New Orleans and Southeast Louisiana Hurricane Protection System Draft Final Report of the Interagency Performance Evaluation Task Force**: acknowledges that the New Orleans levees failed catastrophically during Hurricane Katrina because of poor design and flawed construction. In planning the system, the Corps did not take into account poor soil quality, and failed to account for the sinking of land, which caused some sections to be as much as 2 feet lower than other parts. Breaches in four New Orleans canals were caused by foundation failures that were “not considered in the original design.” The system was designed to protect against a relatively low-strength hurricane, and the Corps did not respond to repeated warnings from NOAA that a stronger hurricane should have been the standard. The Corps also did not re-examine the heights of the levees after it had been warned about significant subsidence. In discussing this report, the Corps’ Chief of Engineers acknowledged that the agency must change telling reporters that “words alone will not restore trust in the Corps.”

2006 (June), American Society of Civil Engineers, **Project Engineering Peer Review Within The U.S. Army Corps Of Engineers**: recommends that Congress enact legislation to mandate external, independent peer reviews for all major Corps projects that would include reviews of the feasibility report, subsequent design and engineering reports, the project’s plans and specifications, and construction. Reviews should be carried out by experts who have no connection to the Corps, to the local project sponsor, or to the particular project contract.

2006 (May), R.B. Seed, R. I. Abdelmalak, et al., (Report No. UCB/CCRM – 06/01), **Investigation of the Performance of the New Orleans Flood Protection Systems in Hurricane Katrina on August 29, 2005, Draft Final Report**: finds that the catastrophic failure of the New Orleans regional flood protection system was the result of “engineering lapses, poor judgments, and efforts to reduce costs at the expense of system reliability.” The Corps failed to design the system with appropriate safety standards, failed to adequately address the complex geology of the region, failed to provide adequate design oversight, and engaged in “a persistent pattern of attempts to reduce costs of constructed works, at the price of corollary reduction in safety and reliability.” These failings led to the “single most costly catastrophic failure of an engineered system in history” that caused the deaths of more than 1,290 people and some \$100 to \$150 billion in damages to the greater New Orleans area.

2006 (March), GAO (GAO-06-529T), **Corps of Engineers, Observations on Planning and Project Management Processes for the Civil Works Program**: finds that recent Corps studies “did not provide a reasonable basis for decision-making” because they were “were fraught with errors, mistakes, and miscalculations, and used invalid assumptions and outdated data.” Such problems are not unique as “the Corps’ track record for providing reliable information that can be used by decision makers . . . is spotty, at best.” The recurring problems “clearly indicate that the Corps’ planning and project management processes cannot ensure that national priorities are appropriately established across the hundreds of civil works projects that are competing for scarce federal resources.” Problems at the agency are “systemic in nature and therefore prevalent throughout the Corps’ Civil Works portfolio” so that effectively addressing these issues “may require a more global and comprehensive revamping of the Corps’ planning and project management processes rather than a piecemeal approach.”

2006 (March), American Society of Civil Engineers, **External Review Panel for the Interagency Performance Evaluation Task Force, Letter to the Corps' Chief of Engineers:** finds that decisions made during the original design phase led to the failure of the 17th Street Canal floodwall in New Orleans and are representative of "an overall pattern of engineering judgment inconsistent with that required for critical structures." These problems pose "significant implications for the current and future safety offered by levees, floodwalls and control structures in New Orleans, and perhaps elsewhere." The External Review Panel recommends a number of immediate actions to improve Corps planning for "levees and floodwalls in New Orleans and perhaps elsewhere in the nation" including external peer review of the Corps' design process for critical life-safety structures.

2006 (February), American Society of Civil Engineers, **External Review Panel Progress: Report Number 1:** finds that the catastrophic failure of the Corps' New Orleans hurricane protection system "demonstrates" that "fundamental flaws were part of how the system was conceived and developed."

2005 (November), R.B. Seed, P.G. Nicholson, et al. (Report No. UCB/CITRIS – 05/01), **Preliminary Report on the Performance of the New Orleans Levee Systems in Hurricane Katrina on August 29, 2005:** finds, based on field investigations performed by several teams of engineers and scientists in the wake of the passage of Hurricane Katrina, that three major and costly breaches in New Orleans levee systems appear to have resulted from stability failures of the foundation soils and/or the earthen levee embankments pointing to failings in the design and oversight of construction of the levees by the Corps of Engineers, and that many of the other levees and floodwalls that failed due to overtopping might have performed better if conceptually simple details had been added and/or altered during their original design and construction.

2005 (September), GAO, (GAO-05-946), **Army Corps of Engineers, Improved Planning and Financial Management Should Replace Reliance on Reprogramming Actions to Manage Project Funds:** finds that the Corps' excessive use of reprogramming funds is being used as a substitute for an effective priority setting system for the civil works program and as a substitute for sound fiscal and project management. In FY 2003 and 2004, the Corps reprogrammed funds over 7,000 times and moved over \$2.1 billion among projects within the investigations and constructions accounts.

2004 (October), National Academy of Sciences, **Review of the U.S. Army Corps of Engineers Restructured Upper Mississippi River-Illinois Waterway Feasibility Study (Second Report):** finds flaws in the models used by the Corps to predict demand for barge transportation and concludes that these flaws preclude a demonstration that expanding the locks is economically justified. NAS also concludes that the Corps' study does not provide sufficient attention to inexpensive, nonstructural navigation improvements that could ease current barge traffic.

2004 (September), U.S. Commission on Ocean Policy, **An Ocean Blueprint for the 21st Century Final Report of the U.S. Commission on Ocean Policy:** recommends that the National Ocean Council review and recommend changes to the Corps' civil works program to ensure valid, peer-reviewed cost-benefit analyses of coastal projects; provide greater transparency to the public; enforce requirements for mitigating the impacts of coastal projects; and coordinate such projects with broader coastal planning efforts. Also recommends that Congress modify its current authorization and funding processes to encourage the Corps to monitor outcomes from past projects and study the cumulative and regional impacts of its activities within coastal watersheds and ecosystems.

2004 (May), Congressional Research Service (RL32401), **Agriculture as a Source of Barge Demand on the Upper Mississippi and Illinois Rivers: Background and Issues:** finds that the grain traffic forecasts being used by the Corps to justify lock expansion on the Upper Mississippi River were overly optimistic as more and more grain is used to produce ethanol, livestock and other value-added products – products that are generally shipped by truck and rail, not barge. CRS further reports that significantly more grain is now being shipped by rail to Canada and Mexico (since passage of NAFTA) and to West Coast ports for shipment to Asia.

2004, National Academy of Sciences, **U.S. Army Corps of Engineers Water Resources Planning: a New Opportunity for Service:** recommends modernizing the Corps' authorities, planning approaches, and guidelines to better match contemporary water resources management challenges.

2004, National Academy of Sciences, **Adaptive Management for Water Resources Project Planning:** recommends needed changes to ensure effective use of adaptive management by the Corps for its civil works projects.

2004, National Academy of Sciences, **River Basins and Coastal Systems Planning Within the U.S. Army Corps of Engineers:** describes the challenges to water resources planning at the scale of river basins and coastal systems and recommends needed changes to the Corps' current planning practices.

2004, National Academy of Sciences, **Analytical Methods and Approaches for Water Resources Planning:** recommends needed changes to the Corps' "Principles and Guidelines" and planning guidance policies.

2003 (October), GAO (GAO-04-30), **Improved Analysis of Costs and Benefits Needed for Sacramento Flood Protection Project:** finds that the Corps dramatically miscalculated the costs and benefits of the Sacramento Flood Control Project in California, over-counted the residential properties that would be protected, miscalculated the area that would be protected, and used an inappropriate methodology to calculate prevented flood damages. GAO recommends that the Corps improve its cost benefit analysis and cost accounting procedures and submit the project to independent review (estimated to cost \$57 million in 1996, by 2003 project costs had skyrocketed to between \$270 and \$370 million).

2003 (August), Pennsylvania Transportation Institute (PTI), **Analysis of The Great Lakes/St. Lawrence River Navigation System's Role in U.S. Ocean Container Trade:** finds fundamental flaws in the Corps' plan to expand the Great Lakes navigation system, including a host of factors not considered by the Corps that make the Great Lakes ports unattractive to international containerized cargo. PTI concludes that the Corps has not demonstrated that expansion is needed or that it would produce the claimed benefits and has not developed the necessary cost estimates to support an accurate benefit-cost analysis of the project.

2003 (May), Pew Oceans Commission, **America's Living Oceans, Charting a Course for Sea Change, A Report to the Nation, Recommendations for a New Ocean Policy:** recommends enactment of "substantial reforms" of the Corps, including legislation to ensure that Corps projects are environmentally and economically sound and reflect national priorities. Recommends development of uniform standards for Corps participation in shoreline restoration projects, and transformation of the Corps over the long term into a strong and reliable force for environmental restoration. Also recommends that Congress direct the Corps and other federal agencies to develop a comprehensive floodplain management policy that emphasizes nonstructural control measures.

2002 (September), GAO (GAO-02-803), **Oregon Inlet Jetty Project: Environmental and Economic Concerns Need to Be Resolved:** finds that the Corps' economic analysis does not provide a reliable basis for deciding whether to construct the project, as it relies on outdated and incomplete data and unsupported assumptions, and fails to account for risk and uncertainty in key variables that could significantly affect the project's benefits and costs. In addition GAO reports that Departments of Commerce and the Interior do not believe that the Corps has adequately mitigated for environmental concerns, including the project's impact on fish larvae migration, beach erosion, and wildlife habitat. GAO recommends that the project not proceed if the environmental concerns cannot be addressed.

2002 (June), GAO (GAO-02-604), **Delaware River Deepening Project: Comprehensive Reanalysis Needed:** finds that the Corps overstated the project's benefits by 200 percent (the GAO found at most \$13.3 million annual benefits vs. the Corps' \$40.1 million), that the Corps' benefit cost analysis was based on invalid assumptions and outdated information, and that the Corps could not explain its own analysis and instead blamed \$4.7 million of the differential on a computer error. GAO concludes that the Corps' analysis is so flawed that it can not provide a reliable basis for deciding whether to proceed with the project, and makes numerous recommendations for improving the Corps' analysis.

2002 (May), GAO (GAO-02-574), **Scientific Panel's Assessment of Fish and Wildlife Mitigation Guidance:** finds that the Corps has proposed no mitigation for almost 70% of its projects, and for those few projects where the Corps does perform mitigation, 80% of the time it does not carry out the mitigation concurrently with project construction.

2002, National Academy of Sciences, **Review Procedures for Water Resources Planning:** recommends creation of a formalized process to independently review costly or controversial Corps projects.

2001, National Academy of Sciences, **Compensating for Wetland Losses under the Clean Water Act:** highlights the significant problems with mitigation efforts to date, including mitigation carried out by the Corps (this report looks at issues beyond the Corps).

2001, National Academy of Sciences, **Inland Navigation System Planning: The Upper Mississippi River-Illinois Waterway:** finds that the Corps was using a fundamentally flawed model to assess the lock expansion project; Congress should direct the Corps to fully evaluate use of nonstructural measures; the Corps was not properly accounting for the environmental consequences of its proposed plan; and the Corps' adaptive mitigation strategy is inconsistent with the principles of adaptive management articulated in the natural resources management literature.

2000 (November), Department of the Army Inspector General (Case No. 00-019), **Investigation of Allegations against the U.S. Army Corps of Engineers Involving Manipulation of Studies Related to the Upper Mississippi River and Illinois Waterway Navigation Systems:** finds that the Corps deceptively and intentionally manipulated data in an attempt to justify a \$1.2 billion expansion of locks on the Upper Mississippi River, and that the Corps has an institutional bias for constructing costly, large scale structural projects.

2000 (February and September), Leonard Shabman and Laura Zepp, Department of Agricultural and Applied Economics Virginia Tech, **An Approach for Evaluating Nonstructural Actions with Application to the Yazoo River (Mississippi) and Review Comments on Yazoo Backwater Area Reformulation:** finds that the Corps' proposal to construct the \$191 million Yazoo Backwater pumping plant in Mississippi

overestimates just the agricultural benefits by \$144 million, and claims almost \$3 million in annual benefits that are explicitly prohibited by the Corps' own rules.

1999, National Academy of Sciences, **New Directions in Water Resources Planning for the U.S. Army Corps of Engineers:** recommends key changes to the Corps' planning process and examines the length of time and cost of Corps studies in comparison with similar studies carried out by the private sector.

1994 (June), Interagency Floodplain Management Review Committee, **Sharing the Challenge: Floodplain Management Into the 21st Century, a Report to the Administration Floodplain Management Task Force (often referred to as the Galloway Report after the report's primary author, Brig. Gen Gerald Galloway):** recommends changes to the nation's water resources policies based on lessons learned from the great Midwest Flood of 1993, including modernizing the Corps' Principles and Guidelines, requiring the Corps to give full consideration to non-structural flood damage reduction alternatives, requiring periodic reviews of completed Corps projects, adopting floodplain management guidelines that would minimize impacts to floodplains and reduce vulnerabilities to population centers and critical infrastructure, and reinstating the Water Resources Council to facilitate improvements in federal water resources planning.

1994, National Academy of Sciences, **Restoring and Protecting Marine Habitat: The Role of Engineering and Technology:** finds, among other things, that the Corps and all federal agencies with responsibility for marine habitat management should revise their policies and procedures to increase use of restoration technologies; take into account which natural functions can be restored or facilitated; improve coordination concerning marine resources; include environmental and economic benefits derived from nonstructural measures in benefit/cost ratios of marine habitat projects; and examine the feasibility of improving economic incentives for marine habitat restoration.