

Katrina's Costly Wake



HOW AMERICA'S MOST DESTRUCTIVE HURRICANE EXPOSED A DYSFUNCTIONAL, POLITICIZED FLOOD-CONTROL PROCESS

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Executive Summary

Hurricanes Katrina and Rita cost 1,400 lives, destroyed tens of thousands of buildings and displaced one-million people. The U.S. Geological Survey reports that the storms converted 118 square miles of coastal wetlands to open water. It will cost federal taxpayers more than \$100 billion to respond to the disaster, making Katrina the most expensive hurricane in United States history and the deadliest since 1928.

Katrina caused the greatest harm in Louisiana, and New Orleans in particular. Louisiana may have more federal flood-control infrastructure than any other state in the country. Federally constructed levees line all sides of New Orleans as well as its interior canals. Levees similarly line not only the entire Mississippi River in Louisiana but also nearly every other river in the coastal area. Yet, despite this extensive infrastructure, the state suffered tremendous harm. How did this happen?

It is not a coincidence that the nation's worst flood occurred here, despite this massive flood-control infrastructure. Experience has shown that the areas behind levees serve as magnets for development. And when these levees fail, far more damage occurs.

Fundamental failures in flood control

Katrina highlights several fundamental failures of the nation's flood control policy.

- Much of what passes for flood control actually increases property damage from floods over time. Some of the areas in New Orleans where Katrina wreaked the greatest damage were intensively developed only recently as a result of the U.S. Army Corps of Engineers' flood-control projects.
- A deliberate failure to prioritize flood control for the areas that need it the most has led Congress to fund less important or wasteful projects at the expense of true priorities. In the five years before Katrina, Louisiana received more water-project funding than any other state but spent only a pittance on New Orleans levees.
- The highly political, earmark-laden, authorization and funding process frequently leads to dangerously distorted analyses. Engineering and other analytical failures contributed greatly to the flooding of New Orleans.
- The disruption of natural water flows not only damages the environment, it also increases flood risks. Hurricane Katrina's impact was magnified by the fact that prior flood-control projects had already destroyed so much of Louisiana's coastal land.

Recommended reforms

These flaws call for obvious yet basic reforms, which some members of Congress are championing. They include:

- Changes to the criteria for evaluating Corps' projects to stop encouraging new development in harm's way;
- A process for establishing priorities to encourage Congress to direct money to the most important projects;
- Independent peer review of the analysis for costly, controversial or critical projects;
- Improved environmental mitigation standards.

For decades, the country has accepted a flood-control system designed to dispense political favors. Katrina exposed that we can no longer afford it.

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Introduction

The worst flood in the nation's history occurred in Louisiana in the wake of Hurricane Katrina, despite the fact that Congress, over the past five years, has spent more on water projects there—\$1.9 billion—than in any other state. In fact, Louisiana probably has more flood-control infrastructure than any other state in the country.

Katrina revealed a stark truth to the nation: The process for identifying, prioritizing, funding and building flood-control projects is broken, both within the U.S. Army Corps of Engineers and Congress. Although the Corps has spent \$123 billion on flood-control projects since the 1920s, average annual flood damages had almost tripled in real dollars even before Katrina struck. Taxpayers are spending more and more on protection while property is becoming increasingly vulnerable.

This report outlines the lessons the nation must learn from Katrina, and recommends the reforms that are essential to avoid even higher costs in the future—in both property and lives.

Lesson 1: The nation's flood-control projects often increase flood damage

To most people, “flood control” means protecting places like central New Orleans where people have long settled for sound historical reasons. But Congress has defined the term to include the drainage of floodplains and other flood-prone areas to spur new development or to create more land for growing crops.¹ Flood control has served to subsidize the development of flood-prone land. There is no special subsidy for building on dry land. But if a developer wants to build on a floodplain, the federal government helps make it possible by providing flood “protection.”

Unfortunately, many of these “protected” areas remain vulnerable to large floods. The typical flood-control project involves a “100-year levee.” That does not mean the levee will prevent all flood damage for 100 years. Rather, it means that there is a 1% chance that a flood will spill over the levee in any given year. Although this may sound rare, the risk is substantial over time. Over a 100-year period, an overtopping flood has a 63.5% chance of occurring. Over a typical 30-year mortgage, there is a 26% chance that a flood will overtop the levee and destroy property behind it.²

To be eligible for flood insurance, new buildings in a floodplain must generally be elevated above the 100-year flood level. Yet once a 100-year levee exists, the normal rules imposed by the flood insurance program do not apply. Under those rules, the land is no longer considered part of the floodplain. Behind such a levee, people can therefore construct new buildings at ground level and without buying flood insurance—regardless of the vulnerability of these structures to flooding. Avoiding flood insurance restrictions is now a primary goal of many flood-control projects. New developments sprout up, and when a big flood spills over the levee, terrible damage typically ensues.



Katrina destroyed the majority of the buildings in New Orleans East. Most of this growth occurred because of levees the Corps constructed after Hurricane Betsy to spur development in the area's wetlands.

Katrina highlighted this basic flaw in flood control. The first storm surge from Hurricane Katrina entered New Orleans from the southeast, destroying New Orleans East in the process. But unlike many of the historic structures that were destroyed in the heart of New Orleans, most of the buildings in New Orleans East did not even exist when Hurricane Betsy made landfall in 1965. After Betsy, Congress asked the U.S. Army Corps of Engineers to improve flood protection for New Orleans. Rather than focusing its full efforts on protecting the existing city, the Corps decided to spend millions of dollars to extend levees into the virgin wetlands of New Orleans East specifically for the purpose of spurring development.

Then freshman Representative Bob Livingston (R-LA) recognized the folly of this approach in 1978, asserting: "If hurricane protection to the people and properties is the paramount importance ... the portion that you would want to complete first would be those levees surrounding inhabited areas rather than those around uninhabited areas."³ He also questioned: "Would it not have been far cheaper to construct this plan around inhabited areas only, and to have eliminated the barriers or levees around the uninhabited areas?"⁴

Others objected to the same proposed design elements on environmental grounds.⁵ The Corps disregarded these concerns and opted to extend the levees. In fact, the Corps relied heavily on the improved property values from draining the wetlands to justify the project's costs (estimated in 1978 at \$409 million).⁶ These wetlands were subsequently developed into the New Orleans East Parish neighborhoods, which Katrina rendered almost universally uninhabitable.

The system creates a self-propelling spiral of taxpayer costs: money to build the levee, money for the inevitable disaster relief, and money to rebuild the levee bigger after each disaster. Although the Corps has spent \$123 billion on flood control projects since the 1920s,⁷ average yearly flood damages had almost tripled *in real dollars even before Katrina struck*.⁸

Recommended reform

The solution requires the Corps to change the basic criteria by which it evaluates potential projects. Densely populated areas and critical infrastructure require a high level of protection. The Corps must also avoid constructing projects that will increase property at risk in floodplains. At a minimum, when evaluating a project, the Corps needs to consider the risk that property damages will increase when large floods occur as a result of development the project may induce.

Lesson 2: Because the Corps' spending is dictated by earmarks, not substantive priorities, key projects are often shortchanged

Spending millions of dollars to drain wetlands when the Corps should have focused on providing adequate flood protection to the City of New Orleans highlights a related flaw in the nation's flood-control policies: There has been a deliberate failure to set priorities.

The law requires the Corps to recommend a project if it estimates that the benefits to *anyone*, even a handful of landowners, will exceed the costs to taxpayers by as little as one cent.⁹ This is not a typical benefit-cost analysis for public investments. The law does not distinguish truly public projects from those that provide benefits only to a small number of landowners who could fund the projects on their own. In other words, the federal government may use taxpayer dollars to drain wetlands to grow more crops or to build shopping centers in floodplains. If these projects were truly economical, private interests would pay for them.

The existing benefit-cost policy assumes that the government should, in effect, transfer taxpayer money to private landowners if Corps' planners believe that borrowing money to do so will generate an excess return of one cent. This ridiculously low return on taxpayer investment assumes virtually no costs to the government in collecting taxes and that the taxes used to pay for the project have no further economic disincentives or other costs on the citizens who pay them.¹⁰ The policy also assumes that the government can direct the nation's economic resources as wisely as the free market—so wisely, in fact, that even one cent of estimated excess benefit warrants a project. The government is unlikely to be so accurate in the best of circumstances, and as discussed below, the political nature of the process virtually locks-in mistakes.

The process also fails to consider that tight budgets demand clear priorities. The Corps' low economic justification hurdle assumes that a project to drain land for corn and soybeans is as meritorious as a project to protect downtown New Orleans or Sacramento—despite the government's repeated efforts to pay farmers to remove land from production to reduce surpluses of these crops. The Corps will “green light” agricultural drainage projects or projects that drain new land for development as long as the proposal passes the benefit-cost ratio. And Congress will nearly always authorize such projects regardless of whether they would take away money from more important projects.

With such a permissive process, it is no wonder that there is now a \$58-billion backlog of approved projects.¹¹ The Corps receives approximately \$2 billion annually in construction funding.¹² Even absent any additional authorizations, it would take nearly 30 years to clear the backlog.

Furthermore, with such a broad prospective workload, Congress is forced to spread limited Corps' construction funding across many projects. In Louisiana, for example, the President's fiscal year 2006 budget proposal included 41 line items or projects solely for Louisiana, totaling \$268 million. That works out to \$6.5 million per project on average. The House Energy and Water Appropriations bill similarly included 39 line items or projects totaling \$254 million. Again, this translates to roughly \$6.5 million per project. The Senate added 71 line items or projects at an additional \$375 million, allocating only \$5.3 million per project.¹³ Thus, the Senate added many more projects, but provided significantly less money per project. This pattern is evident across the Corps' budget. In fact, in the five fiscal years

between 2002 and 2006, Congress has directed \$835 million in Corps construction funding for projects outside the Corps' primary mission areas of navigation, flood and storm damage reduction, and ecosystem restoration.¹⁴ Katrina has revealed the consequences of the Corps' failure to prioritize national needs. The project to protect New Orleans was never actually completed, and appropriations for that purpose dwindled.¹⁵ Meanwhile, despite broad recognition that the levee system would not protect the city from a major storm,¹⁶ funds for a study to improve the existing system never fully materialized.

The problem was not lack of money. To the contrary, in the five years preceding Katrina, Louisiana received \$1.9 billion for water projects—but spent only a pittance of those funds on New Orleans' levees.¹⁷ California came in a distant second for funding and received less than \$1.4 billion over the same period even though its population is seven times as large as Louisiana's.¹⁸ The Louisiana delegation continues to push for federal dollars for marginal projects like the \$205-million Port of Iberia project,¹⁹ whose economic justification is largely to steal existing business from ports in Texas.²⁰

Elsewhere, the Corps continues to support projects that would drain wetlands to grow more soybeans and cotton, major recipients of federal crop subsidies. In southeastern Missouri, for example, the Corps is pushing a \$108-million project to drain approximately 75,000 acres of frequently flooded land. Ninety percent of the stated benefits of the project are in the form of increased soybean, corn and cotton production.²¹ In Mississippi, the Corps is pursuing a \$181-million project including, the world's largest pump to drain tens of thousands of acres of critically important wetlands, also primarily for crop production.²²

Recommended reform

Given the overwhelming size of the Corps' backlog and Congress' insatiable demand for water projects, the system needs a credible process for establishing water project priorities to guide spending and future project development.

Lesson 3: The politicized nature of the system leads to distorted analyses, which waste taxpayer money and may have deadly consequences

The only check on unwise spending in this system for funding flood control is the analysis by Corps' planners of a project's economic and environmental merits. The Corps incorporates its elaborate studies into lengthy feasibility and environmental impact statements. The Corps' own rules require it to reject projects if the costs exceed the benefits, or if the project causes significant environmental harm. This is a very low bar. Nonetheless, because Congress almost always authorizes the projects the Corps supports, this low bar is the only true check in the process.

Unfortunately, the Corps' analyses are often distorted. They provide a classic example of the "iron triangle"—Congress, special interests and federal agencies. Because projects subsidize private development, private beneficiaries team-up with their Congress members to put enormous pressure on the Corps to support projects that will make them money. The Corps often goes along because their budget will be increased to finance the new project. Moreover, those who resist such political pressure tend to find it has a negative effect on their careers.

Congress is involved at virtually every stage of the project process. Individual members of Congress seek authority to study a project in the first place, seek authorization for each project once studied, and finally seek funds from annual appropriations once the project is authorized. The process thus involves repetitive earmarking at each stage.

Constituents expect their representatives to fight for projects, and only the most courageous politician refuses to play the game. The result is a system that involves elected officials at every step, and they place great pressure on the Corps to “green light” projects.

Having a political budget built by earmarks yields a predictable outcome. There is a strong bias throughout the Corps to justify projects, particularly those that will generate work for the agency. Only five years ago, the Army Inspector General (IG) validated an accusation by a Corps’ economist that top officials had ordered staff to distort their studies to justify an expensive project expanding barging on the Upper Mississippi River.²³ In doing so, the IG found the Corps was systematically biased in favor of expensive projects. He further found that many Corps’ employees have no confidence in the integrity of the agency’s planning process.²⁴ The Government Accountability Office recently reviewed several Corps’ projects and found them “fraught with errors, mistakes and miscalculations” that probably required a “comprehensive revamping” of the system to correct.²⁵

In New Orleans, this system of distorted analysis had deadly consequences. A joint investigation by an independent team of professional engineers indicates that basic engineering design flaws caused much of the harm.²⁶ In fact, the investigation attributes at least three levee failures along the banks of the 17th Street and London Avenue Canals to defects in the soils underlying the levees, rather than to overtopping.²⁷

Other sources indicate that as much as 92% of the floodwaters in some parts of the city is attributable to levee breaches.²⁸ Available evidence indicates that the storm surge was several feet below the top of the floodwalls in these locations, but nonetheless penetrated the earthen embankment due to “stability failures within the embankment or foundation soils at or below the bases of the earthen levees.”²⁹

A May 2, 2006, report from the American Society of Civil Engineers confirms that the Corps had failed to “account for design shear strengths in the clay beneath

the slope and beyond the toe of the levee lower than those recommended beneath the centerline, did not account for the fact that the strength of the clay increased markedly with depth, and did not account for a water-filled gap on the flood side of the sheet-pile wall.”³⁰ It appears that even where overtopping occurred, the levees may have performed better if the Corps had incorporated “relatively inexpensive modifications of the levee and floodwall system details.”³¹ Such failures are significant, because flood

Scientific reviews have found that much of the flooding in New Orleans occurred because of design flaws in the construction of interior levees on canals going through the city.



Jocelyn Augustino/FEMA

damage associated with breaches are much greater than those associated with overtopping.³²

Apparently, the Corps was aware that the hurricane protection system was flawed. In fact, before the hurricane protection project was constructed, the Corps knew that the floodwalls would fail in precisely the way they did; extremely unstable soils under sections of the floodwalls warranted a much stronger design; the floodwall design did not meet the Corps' own guidelines; and the levees needed to be higher than planned.³³

For example, new hurricane data showing that higher levees were needed was given to the Corps in 1972, but this data was not incorporated into the project, even though many of the structures that failed during Katrina were not designed until the late 1980s and early 1990s.³⁴ The Corps had intended for the floodwalls to protect New Orleans from a Category 3 storm.³⁵ But the levees failed to even provide this moderate level of protection. Katrina was a Category 3 storm by the time it reached New Orleans.

Scientists have confirmed that another Corps' project contributed to the destruction by concentrating and intensifying Katrina's initial storm surge. The Mississippi River Gulf Outlet Canal (MRGO), known locally as "Mr. Go," is a 76-mile channel that provides a shorter route between the Gulf of Mexico and the New Orleans port facilities on the Mississippi River. The Corps constructed the canal in 1965, but like many Corps' waterways, it never supported the predicted traffic.³⁶ Although shorter than the river, MRGO requires traffic to pass through the Inner Harbor Navigation Canal (Industrial Canal) and a navigation lock. It is also significantly shallower than the river, reducing benefits for modern large ships. The Corps constructed an alternative to the route Mother Nature provided, and the market spoke. While never high, traffic on MRGO has also declined by more than 50% since 1985.³⁷ In 2003, there was, on average, less than one ocean-going ship per day on the canal traveling in each direction, yielding an operation and maintenance cost of \$22,420 per one-way trip.³⁸

MRGO also imposes a tremendous environmental cost. Creating the Outlet destroyed 20,000 acres of wetlands that once acted as a natural hurricane barrier, and wetlands along it continue to erode.³⁹

Hassan Mashriqui of the Louisiana State University Hurricane Center has conducted extensive modeling on a supercomputer to show that the outlet was a "critical and fundamental flaw" in the Corps' hurricane defenses, a "Trojan Horse" that could increase storm surges 20 to 40 percent.⁴⁰ Mashriqui has since run the models to assess the Outlet's impact on storm surge and confirmed his predictions. The models indicate that the Outlet's "funnel" intensified the initial surge by 20%, raising the wall of water by three to five feet.

Mashriqui's research also indicates that the Outlet raised the velocity of the surge, which in turn contributed to the scouring that undermined the levees and floodwalls along MRGO and the connecting Industrial Canal. He found that Katrina's surge moved through nearby Lake Borgne at less than three feet per second. But the rate was about six feet per second at the mouth of the funnel, and as much as eight feet per second in the funnel itself.⁴¹ "Without MRGO, the flooding would have been much less," Mashriqui found. "The levees might have overtopped, but they wouldn't have been washed away."⁴²

Scientists and environmentalists have long called for the channel's closure.⁴³ But despite studying the issue for many years, the Corps has never heeded this warning. Even in this extreme case, the Corps has been unable to stand up to the pressures of its local beneficiaries.⁴⁴

Recommended reform

Obviously, political pressure will always exist, and it is difficult to correct the problems with the Corps' analyses because of the tremendous pressure on the agency from Congress. But as the late Supreme Court Jurist Louis Brandeis said, "sunlight is the best disinfectant." A key improvement would be a system of independent expert review of costly or controversial projects, and projects that present key risks for loss of life and property. This approach would not only help catch and discourage cheating, but would help generate improved practices for the analysis of projects that are harder to ignore over the long term.

Lesson 4: Flood-control projects often have harsh environmental consequences that may contribute to further flooding

The environmental costs of flood-control projects are evidenced today by the vast sums of money required to fix them. The nation has embarked on a multi-billion dollar venture to restore natural water flows in the Everglades.⁴⁵ This project is essentially an attempt to undo the consequences of the Corps' massive re-plumbing of south Florida for drainage purposes under the banner of flood control. Similar large-scale efforts are being developed elsewhere, such as the central valley of California. But nowhere have Corps' projects had a more dramatic environmental effect, or contributed so directly to increased flood risks and taxpayer costs, than in coastal Louisiana.

Coastal Louisiana is largely wetland, laid down by the sediments flowing down the Mississippi River and built up by wetland plants. This land mass is literally disappearing. More than 1.2-million acres of wetlands—an area the size of Delaware—has turned into open water since the 1930s.⁴⁶ This represents 80% of the coastal wetland loss in the entire continental United States.⁴⁷

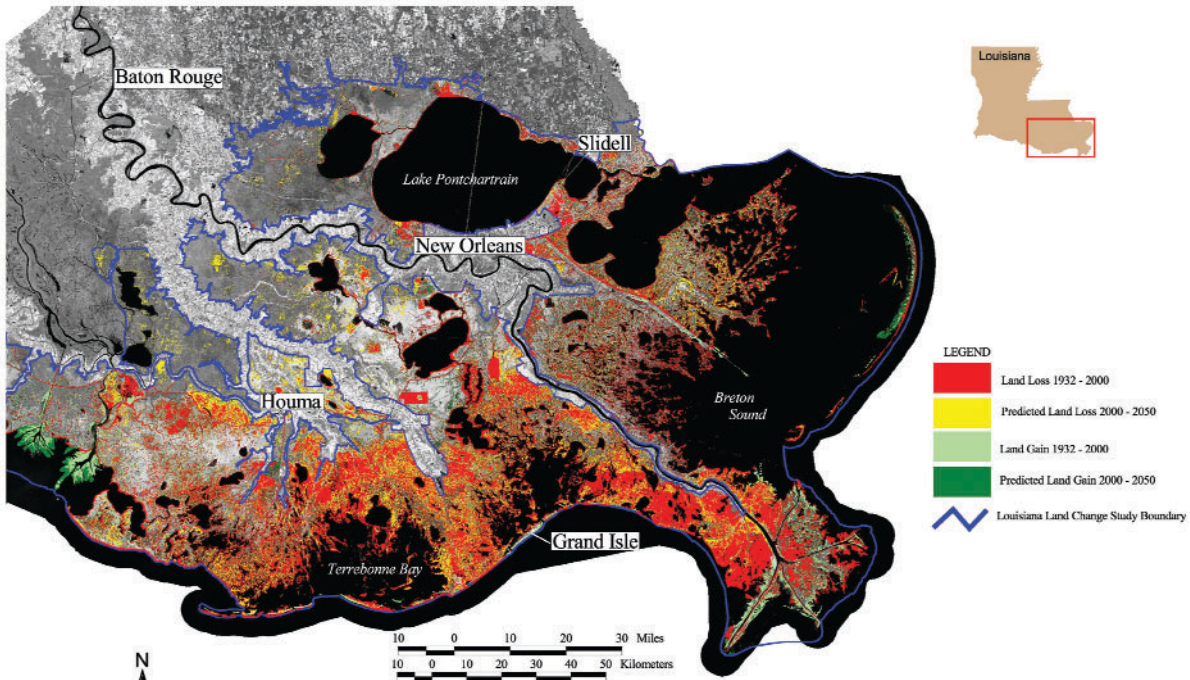
Even prior to Katrina, scientists predicted Louisiana would lose an additional 630,000 acres of coastal marshes, swamps and islands by 2050, absent additional restoration efforts.⁴⁸ Hurricanes Katrina and Rita destroyed an additional 100 square miles of coastal wetlands.⁴⁹ Because these wetlands provide the nursery grounds for most of the Gulf of Mexico's fisheries and serve as a significant wintering and migratory ground for birds, the environmental implications are enormous.

Yet, the most dramatic effect of this wetland loss is the impact on the region's storm protection. Many miles of wetlands once buffered New Orleans from coastal hurricane storm surges. Today, only a few miles remain in many directions, and there is no buffer against storm surges moving up MRGO. Meanwhile, built-up areas are sinking, in large part because drained wetland soils quickly decompose.

Wetlands are known to absorb storm energy.⁵⁰ Researchers at Louisiana State University have found that levees in and near New Orleans "with a buffer of wetlands had a much higher survival rate than those that stood naked against Katrina's



100+ Years of Land Change for Southeast Coastal Louisiana



LEGEND

- Land Loss 1932 - 2000
- Predicted Land Loss 2000 - 2050
- Land Gain 1932 - 2000
- Predicted Land Gain 2000 - 2050
- Louisiana Land Change Study Boundary

SUMMARY
 Coastal Louisiana has lost an average of 34 square miles of land, primarily marsh, per year for the last 50 years. From 1932 to 2000, coastal Louisiana has lost 1,900 square miles of land, roughly an area the size of the state of Delaware. If nothing is done to stop this land loss, Louisiana is expected to lose another 700 square miles of land, or about equal to the size of the greater Washington D.C.-Baltimore area, in the next 50 years. Further, Louisiana accounted for an estimated 90 percent of the coastal marsh loss in the lower 48 states during the 1990s. The area shown on this map represents over 75 percent of the total land loss for coastal Louisiana.
 Backdrop is 2000 TM panchromatic band.

Prepared by:
 U.S. Geological Survey
 National Wetlands Research Center
 Lafayette, LA



USGS

Areas in red indicate Louisiana wetlands transformed to open water since 1932. Areas in yellow indicate expected losses.

assault.”⁵¹ Ultimately, if this land loss continues, coastal Louisiana will become virtually uninhabitable simply because it will erode away.

Flood-control projects have played a major role in this wetland loss by separating the nourishing silt and freshwater of the Mississippi River from the wetlands that depend on these resources. The Mississippi River historically discharged through many distributaries in the Delta. During floods, freshwater and silt re-nourished the area’s wetlands. Levees now prevent this interchange, killing the vegetation and allowing erosive forces to go unchecked. Plans for restoring coastal Louisiana require expensive diversions to reconnect the Mississippi River to its wetlands.⁵²

Recommended reform

Harmful flood-control projects are not merely a thing of the past. The Corps continues to pursue expensive large-scale drainage projects. In fact, it is contemplating building new levees across rural Louisiana as part of a future flood-control project. Better standards are essential to assure that the Corps fully considers the environmental impacts of these proposals.⁵³

Conclusion: Prospects for reform

Many members of Congress are ignoring the lessons of Katrina. Instead, they are pushing to authorize even more water projects. The Senate Environmental and Public Works Committee reported another massive water projects bill out of committee last year (S. 728). This bill is poised to add at least another \$12 billion to the water-project backlog. It would authorize such unjustified and notorious projects as the Upper Mississippi River navigation project and the Port of Iberia expansion.

But some members of Congress are pushing to modernize the Corps, reduce taxpayer costs, and help make water resources development less environmentally damaging. These measures include:

- Changes to the criteria for evaluating the Corps' projects to stop subsidizing and encouraging new development in harm's way;
- A process for establishing priorities to encourage Congress to direct taxpayer dollars to where they are needed most;
- Independent peer review of costly, controversial, or critical projects;
- Improved environmental mitigation standards.

For decades, the country has accepted a flood-control system designed primarily to dispense political favors. After 1,400 lives and more than \$100 billion Katrina shows that we can no longer afford it.

Notes

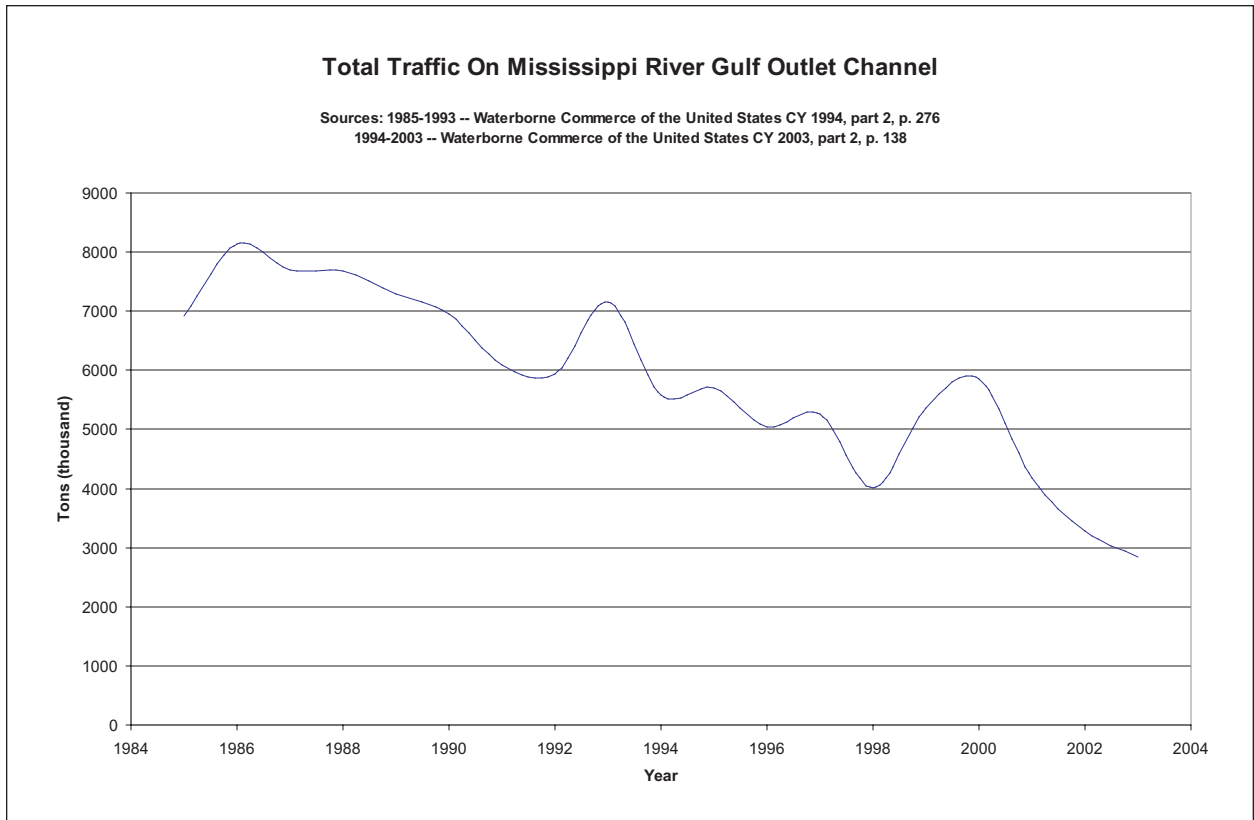
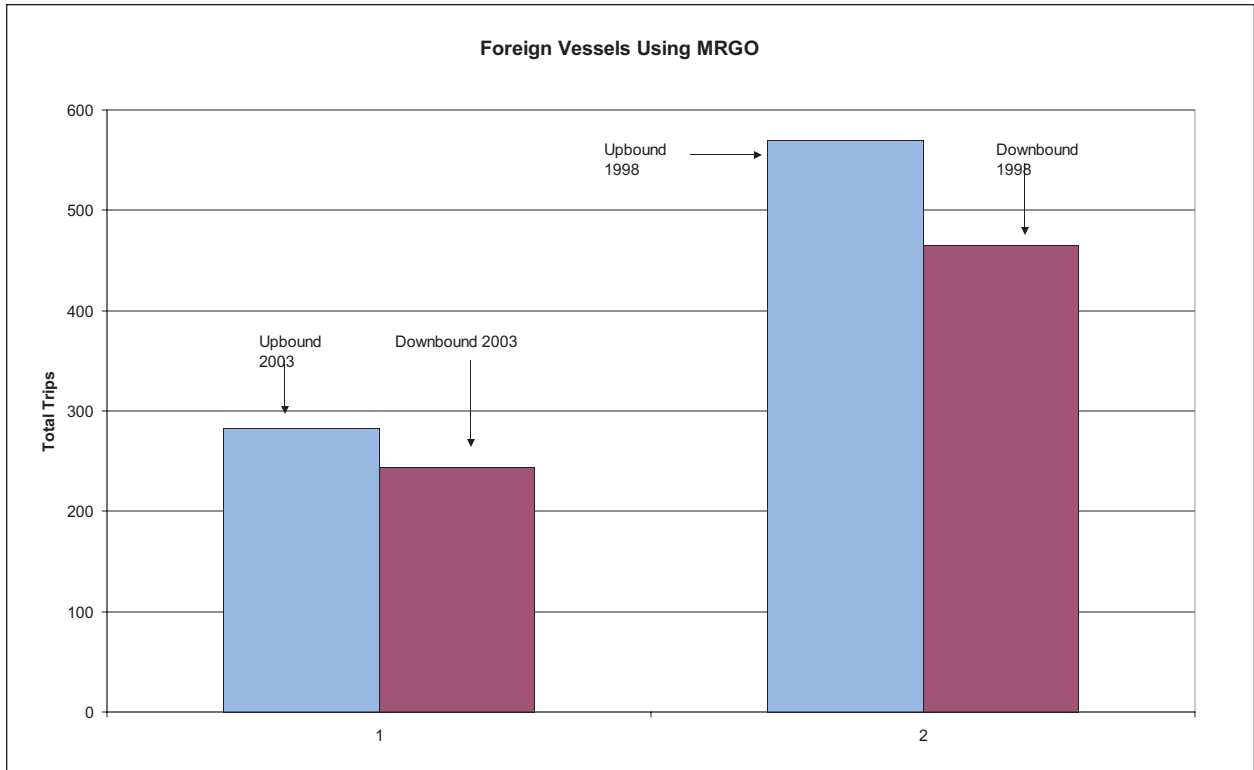
- ¹ Codifying the Corps of Engineers actual practice, Congress provided in 1944 that the “words ‘flood control’ . . . shall be construed to include channel and major drainage improvements . . .” 33 U.S.C. § 701a-1.
- ² FEMA, “Frequently Asked Questions.” (Available online at http://www.fema.gov/plan/prevent/fhm/fq_ins.shtm).
- ³ Hearing before the Subcommittee on Water Resources of the Committee on Public Works and Transportation. House of Reps. 95th Cong, 2d Sess. (Jan. 5, 1978), p. 39 (question from Representative Bob Livingston).
- ⁴ 1978 Hearing, *ibid.*, p. 57.
- ⁵ 1978 Hearing, *ibid.*, p. 11 (letter dated Dec. 16, 1977 from the League of Women Voters of New Orleans) (“We believe that a barrier system would encourage rapid growth in the East New Orleans wetlands, some of which are still productive and therefore development should not be allowed.”).
- ⁶ Jim Barnett, “Instead of Shoring up Levees, Corps Built More,” *The Oregonian*, Sept. 18, 2005; Lake Pontchartrain and Vicinity, Louisiana Report, House Document No. 231, July 6, 1965 pp. 71, 167, 168 (“The project will make possible the drainage and development of the entire area of [St. Charles Parish]”; calculating enhanced development value).
- ⁷ U.S. Army Corps of Engineers, Information Paper CECW-ZD, “Civil Works Program Statistics as of September 30, 2002,” Jan. 31, 2003 (Available online at <http://www.usace.army.mil/inet/functions/cw/cecwb/GWiz03.htm>).
- ⁸ Flood damages vary greatly by year, so trends must be seen by grouping years. According to the National Weather Service, damages have risen in 2002 dollars from \$1.9 billion as a yearly average in 1903-12 (the first 10 years for which such data are available) to an average of \$6.2 billion from 1995-2004. (http://www.nws.noaa.gov/oh/hic/flood_stats/Flood_loss_time_series.shtml). Obviously, including damages caused by Katrina, Rita and Wilma in 2005 would greatly increase the annual average damages.
- ⁹ *See* Flood Control Act of 1936, 33 U.S.C. § 701a (“[T]he Federal Government should improve or participate in the improvement of navigable waters or their tributaries, including watersheds thereof, for flood-control purposes if the benefits to whomsoever they may accrue are in excess of the estimated costs”).
- ¹⁰ For at least one study on the hidden costs of taxes, see Joint Economic Committee, United States Congress, Dec. 2001, “Hidden Costs of Government Spending” (Available online at <http://www.house.gov/jec/hidden.pdf>) (explaining that when these factors are taken into account, the cost of raising an additional \$1 in taxes is not \$1, but closer to \$1.40).
- ¹¹ National Wildlife Federation & Taxpayers for Common Sense, Mar. 2004, “Crossroads: Congress, The Corps of Engineers and the Future of America’s Water Resources,” p. i.
- ¹² *See, e.g.*, Fiscal Year 2007 Civil Works Budget for the U.S. Army Corps of Engineers, Feb. 2006, p. 3 (Available online at <http://www.usace.army.mil/civilworks/cecwb/budget/budget.pdf>) (providing \$1.83 billion for construction and flood control on the Mississippi River and tributaries); USACE, “Press Release: President’s Fiscal Year 2005 Civil Works Budget Released,” Feb. 2, 2004 (reporting \$1.69 billion for construction and flood control on the Mississippi River and tributaries) (Available online at http://www.usace.army.mil/civilworks/hot_topics/ht_2004/usace_budget05.htm); USACE, “Press Release: President’s Fiscal Year 2005 Civil Works Budget Released,” Feb. 3, 2003 (reporting \$1.63 billion for construction and flood control on the Mississippi River and tributaries) (Available online at http://www.usace.army.mil/inet/functions/cw/hot_topics/ht_2003/usace_budget04.htm).
- ¹³ Testimony of Steve Ellis, Before the Subcommittee on Federal Financial Management, Government Information, and International Security, U.S. Senate Committee on Homeland Security and Governmental Affairs, March 16, 2006, “Hearing on Earmark Reform: Understanding the Obligation of Funds Transparency Act.” (Available online at http://hsgac.senate.gov/_files/031606Ellis.pdf).
- ¹⁴ Budget of the United States Government, Fiscal Year 2007, p. 252. (Available online at <http://www.whitehouse.gov/omb/budget/fy2007/pdf/budget/corps.pdf>).

- ¹⁵ Andrew Martin & Andrew Zajac, “Flood-Control Funds Short of Requests,” *Chicago Tribune*, Sept. 1, 2005, p. 7 (Available online at <http://www.chicagotribune.com/news/nationworld/chi-0509010170sep01,1,5853346.story?coll=chi-news-hed>).
- ¹⁶ See, e.g., John McQuaid and Mark Schleifstein, “The Big One: A major hurricane could decimate the region, but flooding from even a moderate storm could kill thousands. It’s just a matter of time,” *New Orleans Times Picayune*, June 24, 2002 (Available online at http://www.nola.com/hurricane/index.ssf?/washingaway/thebigone_1.html).
- ¹⁷ Michael Grunwald, “Money Flowed to Questionable Projects,” *The Washington Post*, Sept. 8, 2005, p.A01 (Available online at <http://www.washingtonpost.com/wp-dyn/content/article/2005/09/07/AR2005090702462.html>). See also data analyzed by National Wildlife Federation, Fact Sheet on Civil Works Construction Appropriations – FY 2001 – 2005 with MR&T, (NWF, Washington DC, Office of Congressional and Federal Affairs, dated September 28, 2005).
- ¹⁸ Ibid.
- ¹⁹ S. 728, “Water Resources Development Act,” 109th Congress, §1001(b)(4) (April 6, 2005).
- ²⁰ USACE, New Orleans Dist., Aug. 2005, “Port of Iberia, Louisiana: Draft Feasibility Report,” Appendix A, Vol. 2 p. A-21 (Available online at <http://www.mvs.usace.army.mil/PortOfIberia/Draft%20App%20A%20Economics-Port%20of%20Iberia.pdf>). (“[T]he contracts that fabricators from the Port of Iberia are expected to win, with a deeper channel, will be at the expense of other domestic fabricators.”). Notably, Senator Landrieu tucked language into an amendment in an Emergency Appropriations bill that explicitly permitted the Corps to consider such benefits. See H.R. 1268, 109th Congress, §6009 (2005) (“Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Tsunami Relief, 2005”).
- ²¹ See Michael Grunwald, “An Agency of Unchecked Clout: Water Projects Roll Past Economic, Environmental Concerns,” *The Washington Post*, Sept. 10, 2000, p. A01. For estimated benefits from the project, see U.S. Army Corps of Engineers, June 2002, “Revised Supplemental Environmental Impact Statement, St. Johns Bayou/New Madrid Floodway Project, Missouri,” p. B-33 (Table 25) & B-24.
- ²² National Wildlife Federation & Taxpayers for Commonsense, “Crossroads,” p. 53 (describing the Yazoo Backwater Pump, which will cost \$181 million and “drain and damage tens of thousands of acres of ecologically significant wetlands”; “83% of the claimed benefits are from increased agricultural production—primarily for soybeans on frequently-flooded lands.”).
- ²³ U.S. Army Inspector General, 2000, Case No. 00-019, “Report of Investigation,” pp. 7-8.
- ²⁴ Ibid. p. 8.
- ²⁵ US Gov’t Accountability Office, GAO-06-529T, Testimony Before the Subcommittee on Energy and Resources, Committee on Gov’t Reform, House of Reps., Mar. 15, 2006, “Corps of Engineers: Observations on Planning and Project Management Processes for the Civil Works Program,” at 5 & 12 (Available online at <http://www.gao.gov/new.items/d06529t.pdf>).
- ²⁶ Ibid. See also: Testimony of Peter Nicholson, on behalf of the American Society of Civil Engineers Before the Committee on Homeland Security and Governmental Affairs, Nov. 2, 2005, “Hurricane Katrina: Why Did the Levees Fail?” (Available online at <http://www.asce.org/files/pdf/katrina/testimony.pdf>).
- ²⁷ Raymond Seed, et al., Report No. UCB/CITRIS – 05/01, Nov. 17, 2005, “Preliminary Report on the Performance of the New Orleans Levee Systems in Hurricane Katrina on August 29, 2005,” Center for Information Technology Research in the Interest of Society (University of California, Berkeley) p. vi. (Available online at: http://hsgac.senate.gov/_files/Katrina/Preliminary_Report.pdf).
- ²⁸ Personal communication with Paul Kemp, Director, Natural Systems Modeling Group, Louisiana State University, Feb. 14, 2006.
- ²⁹ Seed at al., Report No. UCB/CITRIS, pp. 8-2 & 2-3 to 2-8 (describing breaches in detail).
- ³⁰ Letter from the American Society of Civil Engineers External Review Panel to LTG Carl A. Strock, Chief of Engineers, re: “External Review Panel Progress Report,” May 1, 2006, at 5 (Available online at http://www.asce.org/files/pdf/erp_progressreport.pdf).
- ³¹ Seed at al. Report No. UCB/CITRIS, p. 8-3.

- ³² Personal communication with Dr. Paul Kemp.
- ³³ Letter from the American Society of Civil Engineers External Review Panel to LTG Carl A. Strock, Chief of Engineers, March 23, 2006 (Available online at <http://www.asce.org/files/pdf/erpletterformat.pdf>); Joby Warrick and Peter Whoriskey, "Army Corps Is Faulted on New Orleans Levees," *The Washington Post*, Mar. 25, 2006 (Available online at <http://www.washingtonpost.com/wp-dyn/content/article/2006/03/24/AR2006032401819.html>); Bob Marshall, "Corps Never Pursued Design Doubts," *New Orleans Times Picayune*, Dec. 30, 2005 (Available online at <http://www.nola.com/news/t-p/frontpage/index.ssf?/base/news-4/1135925892299960.xml>).
- ³⁴ Bob Marshall and Mark Schleifstein, "Corps Ignored Crucial Levee Data, Reports Showed Need for Higher Defenses," *New Orleans Times Picayune*, Mar. 8, 2006 (Available online at <http://www.nola.com/news/t-p/frontpage/index.ssf?/base/news-5/1141802754126640.xml>).
- ³⁵ Notably, the American Society of Civil Engineers has called the "rationale" for providing this level of protection "questionable." "External Review Panel Progress Report," p. 3.
- ³⁶ R.H. Caffey and B. Leblanc, 2002, "Closing the Mississippi River Gulf Outlet: Environmental and Economic Considerations, Interpretive Topic Series on Coastal Wetland Restoration in Louisiana, Coastal Wetland Planning, Protection, and Restoration Act," National Sea Grant Library No. LSU-G-02-004, at 1. (Available online at http://www.ccmrgo.org/documents/closing_the_mrgo.pdf).
- ³⁷ Attachment One indicates traffic along the Mississippi River-Gulf Outlet (1985-2003). Because the channel is intended to transport deep-draft vessels, this figure refers only to ocean-going ships, and reports each "up and down route" as a single ship.
- ³⁸ There were a total of 526 one-way trips by foreign deep-draft vessels in 2003, roughly divided between these going up and down the channel. USACE, 2003, Water Borne Commerce Statistics, p. 298 (Available online at www.iwr.usace.army.mil/ndc/wcsc/wcsc.htm). Cost per trip can be determined by dividing 2003 operation and maintenance costs (\$11,794,324) by total trips (526). Annual operation and maintenance costs are provided in Civil Works Status of 3011 A Funds Report 3. FY 2003, p. 25. This data focuses only on deep-draft vessels, since the canal was built for that purpose, and they carry 86% of the canal's tonnage. USACE, 2003, Water Borne Commerce Statistics, p. 138 (Available online at www.iwr.usace.army.mil/ndc/wcsc/wcsc.htm) (of 2,847 thousand short tons total traffic, 2,442 thousand short tons were from foreign freight traffic). MRGO also carries about one upward and one downward towboat each day, pushing on average fewer than two barges. These barging figures are also minimal and they do not depend on a deep-draft channel for transport.
- ³⁹ R.H. Caffey and B. Leblanc, "Closing the Mississippi River Gulf Outlet," p. 1 (citing US Army Corps of Engineers, New Orleans District, 1999, "Habitat Impacts of the Construction of the MRGO," prepared for the Environmental Subcommittee of the Technical Committee Convened by EPA in Response to St. Bernard Parish Council Resolution 12-98).
- ⁴⁰ Joby Warrick and Michael Grunwald, "Investigators Link Levee Failures to Design Flaws, Three Teams of Engineers Find Weakened Soil, Navigation Canal Contributed to La. Collapses," *The Washington Post*, Oct. 24, 2005, p. A01. (Available online at http://www.washingtonpost.com/wp-dyn/content/article/2005/10/23/AR2005102301200_pf.html).
- ⁴¹ Ibid. See also: Working Group for Post Hurricane Planning for the Louisiana Coast, Jan. 26, 2006, "A New Framework for Planning the Future of Coastal Louisiana after the Hurricanes of 2005," p. 17. (Available online at <http://www.umces.edu/la-restore/New%20Framework%20Final%20Draft.pdf>). Attachment Two depicts the hurricane funnel.
- ⁴² Joby Warrick and Michael Grunwald, "Investigators Link Levee Failures to Design Flaws".
- ⁴³ R.H. Caffey and B. Leblanc, "Closing the Mississippi River Gulf Outlet," p. 1.
- ⁴⁴ On May 4, 2006, the Senate voted to instruct the Corps to develop a deauthorization plan as part of a supplemental, emergency spending bill. But even after Katrina, the plan seems more oriented toward maintaining deep-draft navigation on MRGO than eliminating the high-risk, low-reward channel.

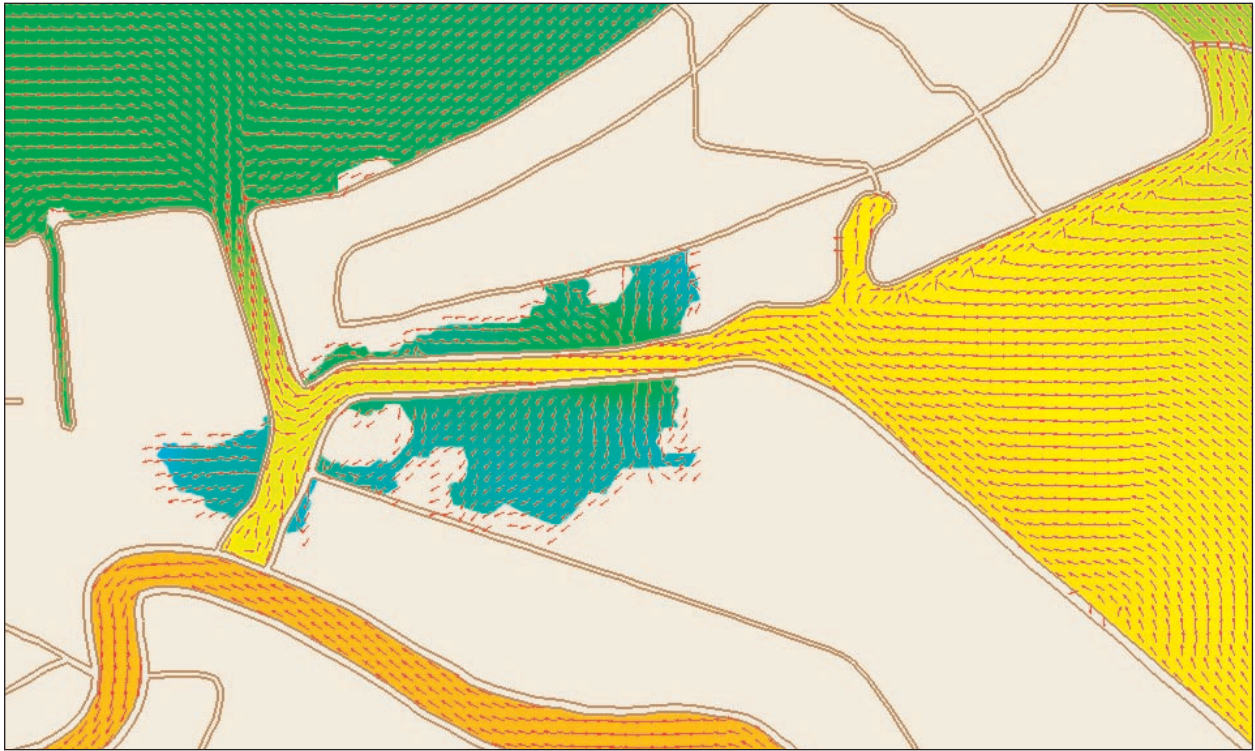
- ⁴⁵ See, e.g., U.S. Army Corps of Engineers, “Comprehensive Everglades Restoration Plan Fact Sheet” (Available online at http://www.evergladesplan.org/docs/fact_sheet_cerp_feb_2006.pdf) (dubbing the Everglades Restoration Plan the “largest environmental restoration effort in the world”).
- ⁴⁶ CRS Report RS22276, Sept. 26, 2005, “Hurricanes Katrina and Rita and the Coastal Louisiana Ecosystem Restoration,” by Jeffrey Zinn, at 2. (Available online at <http://fpc.state.gov/documents/organization/54248.pdf>).
- ⁴⁷ Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority, 1998, “Coast 2050: Toward a Sustainable Coastal Louisiana.” Louisiana Department of Natural Resources. Baton Rouge, La., at 1. (Available online at: <http://www.lacoast.gov/programs/2050/MainReport/report1.pdf>).
- ⁴⁸ Ibid. See also: Working Group for Post-Hurricane Planning, p. 8 (estimating a 500-square-mile loss over the same period).
- ⁴⁹ U.S. Geological Survey, U.S. Department of the Interior. Nov. 1, 2005. “Press Release: USGS Reports Preliminary Wetland Loss Estimates for Southeastern Louisiana from Hurricanes Katrina and Rita.” (Available online at http://www.nwrc.usgs.gov/releases/pr05_007.htm).
- ⁵⁰ Bob Sullivan, “Wetlands erosion raises hurricane risks: Natural storm ‘speed bump’ around New Orleans now missing,” MSNBC online, Aug. 29, 2005 (Available at <http://www.msnbc.msn.com/id/9118570/>).
- ⁵¹ Bob Marshall, “Studies Abound on Why the Levees Failed,” *New Orleans Times Picayune*, Mar. 23, 2006 (Available online at <http://www.nola.com/search/index.ssf?/base/news-3/1143101527153500.xml?nola/>).
- ⁵² See, e.g., Working Group for Post-Hurricane Planning, p. 1 (concluding that “hurricane protection for larger population centers, including the New Orleans region, can only be secured with a combination of levees and a sustainable coastal landscape,” which would require “distributing Mississippi River water and sediments across the coastal landscape”); U.S. Army Corps of Engineers, 2003, “Louisiana Coastal Area, LA – Ecosystem Restoration: Comprehensive Coastwide Ecosystem Restoration Study.” U.S. Army Corps of Engineers: New Orleans, LA (providing a range of options ranging from \$4.3 billion to \$14.7 billion.); “Coast 2050: Toward a Sustainable Coastal Louisiana,” (providing a conceptual outline for a \$14-billion plan to restore the coast over a 50 year period); Donald F. Boesch, et al., May 1994, “Scientific Assessment of Coastal Wetland Loss, Restoration and Management in Louisiana,” *Journal of Coastal Research*, Special Issue No. 20 (advocating a “comprehensive strategy that addresses restoration across the entire region”).
- ⁵³ As citizen groups focused on purely fiscal policies, Taxpayers for Common Sense and National Taxpayers Union do not take a position on the preceding section (“Lesson 4”) of this report.

Attachment 1



Attachment 2

Hurricane PAM - Initial Flooding Pathways



FEMA Hurricane PAM

