The Story of Katrina:

New Orleans and the Political Economy of Catastrophe

Roger D. Congleton
Professor of Economics
George Mason University
Fairfax, VA 22030

congleto@gmu.edu

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I. Introduction: Natural Risks, Politics, and Opportunities

At 5:00 a.m. Monday morning, August 29, 2005, hurricane Katrina touched a thin peninsula of the Louisiana Bayou where the Mississippi River enters the Gulf of Mexico as a category 4 hurricane. Six hours later it left the bayou and entered the continental mainland at the border of Louisiana and Mississippi as a category 3 hurricane. The eye of the hurricane crossed Mississippi with gradually diminishing winds, falling to the level of a major tropical storm at 11:00 p.m. in Columbus, Mississippi and to an "ordinary" major storm in Tennessee, just west of Nashville. Along the coast, a 10-20 foot-tall storm surge erased small towns and cities along the Mississippi coast, and uprooted and damaged oil platforms, harbors, and bridges. A storm surge entered Lake Pontchartrain through its channel to the Gulf, overcame floodwalls that protected New Orleans from the lake, and flooded 80 percent of downtown New Orleans. High winds and torrential rains damaged buildings and left more than two million people in Louisiana, Mississippi, and Alabama without electricity and more than a half million without homes. Together, the failure of the dikes, the storm surge, wind, and rain led to more than 1,200 deaths.

Although not the most powerful hurricane to strike the United States in recent history, Katrina was by far the most deadly in the past half century.[1] Katrina was also by far the most economically costly hurricane to strike the U. S.. Although billions of dollars of damages are inflicted by hurricanes nearly every year, no recent *series* of hurricanes has imposed more than 40 billion dollars of damages on the U. S..[2] Estimated damages from Katrina are in excess of 200 billion dollars.[3]

It bears noting, however, that the economic damages and deaths associated with hurricanes are jointly determined by nature and man. The great storms called hurricanes occur only in relatively warm climates. The great waves accompanying hurricanes damage properties only very close to the coast, and the deadly effects of wind and rain diminish rapidly as major storms move inland. Dikes and levees, of course, cannot fail unless they have first been built. In the absence of economic development along the Gulf coasts, both losses to property and life would clearly have been far lower.

Less than two months after Katrina passed through Louisiana and Mississippi, an equally large and fierce storm passed through Florida. Hurricane Wilma was for a short time the most intense storm ever recorded, although it also faded to a category 3 hurricane by the time it struck southern Florida on October 24. It had an enormous eye wall, which meant

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1 In 1969 a category 5 hurricane, Camille, struck Mississippi and Louisiana. In 1992 a category 5 hurricane, Andrew, struck Florida and Louisiana. In 2004 a category 4 hurricane, Charlie, struck Florida; a category 3 hurricane, Ivan, struck Alabama and Mississippi; and another category 3 hurricane, Jeanne, struck Florida. The deadliest hurricane in recent US history prior to Katrina, was Camille, leaving 256 deaths in its wake. NOAA reports that Katrina was the deadliest hurricane to strike the United States since the Palm-Beach Okeechobee Hurricane of September 1928.

(It bears noting, however, that hurricane Jeanne caused 3,000 deaths in Haiti in 2004.) ["Climate of 2004 Atlantic Hurricane Season," 13 December 2004, National Climatic Data Center. See also "Tropical Weather Summary," 2005, NOAA.]

2 Nine major storms affected the U. S. during 2004 and inflicted about 42 billion dollars of damages. The third most expensive hurricane season was in 1992, the year that hurricane Andrew struck. That season is estimated to have imposed 35 billion dollars in damages. ["Climate of 2004 Atlantic Hurricane Season," National Climatic Data Center (13 December 2004).]

3 This overview and that developed below in more detail is a synthesis of dozens of newspaper accounts (principally those of the *New York Times, Washington Post, Wall Street Journal,* and *Times Picayune*), websites (principally those of NOAA and the *Natural History Magazine)* and personal viewing of numerous press conferences and interviews of local, state, and national government officials on C-Span. The most significant of these sources are cited in the footnotes below.

that its highest winds struck a very broad swath of Florida. It had a storm surge as high as 18 feet, and its winds caused more than 3 million customers to lose electricity.[4] Yet far fewer persons lost their lives (22) and property damage although substantial ($14.4 billion) was not nearly as large as Katrina caused in Louisiana and Mississippi. Was this difference in destruction entirely a consequence of luck, or did private and public decisions play a role?

This paper tells the story of Katrina, paying particular attention to political and economic decisions that created unusual risks in the New Orleans area. Some of the story developed below will be familiar to those who followed the tragedy in the news, but many details were not widely reported and many others were systematically misreported, which made a coherent story difficult to assemble. Section II provides a brief historical overview of the founding of New Orleans, its natural advantages and disadvantages, its economic development, and nearly three centuries of government efforts to manage flood risks in the Mississippi River basin. Section III analyzes the political efforts to manage the residual risk of flood and the response to Katrina. In the United States, efforts to reduce risks associated with natural disasters and emergency responses to those disasters involve the interdependent decisions of local, state, and national governments, which require a variety of free-riding and coordination problems to be overcome. Katrina proves that current institutional solutions to those problems are far from perfect. Section IV summarizes the analysis and draws public choice and institutional lessons from Katrina. Crisis management is inherently more error prone than ordinary policy making, because surprise implies the existence of significant information problems, and urgency implies that time does not exist to address those problems completely (Congleton 2005). In New Orleans the unavoidable mistakes of crisis management were compounded by policy choices made well before Katrina made land fall, as well as federalism, partisan politics, corruption, and incompetence.

[4] See "Hurricane Wilma," National Weather Service Forecast Office, Miami, South Florida, NOAA (10-24-05)

II. Setting the Stage: Natural and Manmade Opportunities and Risks

Nature, of course, creates opportunities as well as risks, and it is largely because of those opportunities that New Orleans developed near the mouth of the Mississippi River. Water has long been the lowest cost method of transportation in tons per mile. The Mississippi Basin contains one of the largest inland waterways in the world, which created an enormous comparative advantage for economic development along the final stretch of the Mississippi River, where merchandise produced upstream could be exchanged for that brought from afar on ocean-going ships. Other smaller rivers provided similar, although smaller, opportunities for the development of other port cities throughout the Gulf region. Thus, it is "natural" that enormous capital investments were made and that millions of families chose to live in cities along the coast of the hurricane-prone Gulf of Mexico.

Many of the risks faced by settlers of the New Orleans region, however, were essentially unique, because the river basin that it serves is so large and the land upon which New Orleans rests is entirely the product of a long history of floods.

A. The Risk of Flood Is Not New

About fifteen thousand years ago, an enormous sheet of ice across North America began to melt. At that time the sea level was approximately 400 feet lower than it is today, because so much of Earth's water was in the form of ice. As the ice melted, the oceans rose, and new land was created at the ends of rivers, as sediments carried by the glacial runoff were dropped at the places where the water slowed as it met the sea. The runoff from the south central part of the American ice flowed south and carved out and deepened existing drainage channels to the Gulf of Mexico; the most important of these in the United States being the Mississippi River and its many tributaries. Variation in weather upstream produced repeated flooding downstream, which left low, wide, and deep deltas at the river ends and fertile flood plains along much of their lengths.

Other things being equal, large rivers carry more sediment than small rivers; so a relatively large delta formed at the end of the Mississippi River. Although the coastline of

the Gulf and elsewhere generally retreated as sea level rose, Louisiana's coastline gradually expanded—at least for a time—and the brackish Lake Pontchartrain formed as part of the gulf was surrounded by the expanding delta some three thousand years ago. The river's major and minor channels through the delta shift course every few hundred years or so, creating an irregular delta with lobes where the river's main channels reach the Gulf. In this manner, much of southern Louisiana rose as a series of swamps (bayous) created by erosion further north. Without repeated flooding over a very long time, Louisiana would be a much smaller state, and there would be no Lake Pontchartrain and no New Orleans.

B. Economic Origins of New Orleans

Human settlers arrived well before this geological process had established the current contours of southern Louisiana, and substantial communities based on farming and fishing were established in the Mississippi's lowlands about 2,500 years ago. About two millennia later, in the sixteenth and seventeenth centuries, Spanish and French explorers passed through the Gulf coast region, and, as Europeans were prone to do at that time, they claimed the "new-found" lands for their respective empires. Although several rivers along the Gulf were noted by European explorers, beginning with De Soto in 1541, the significance of the Mississippi River remained hidden by its bayou and its labyrinth of channels. The Mississippi was finally "discovered" from the north by La Salle, who traveled down the river from its headwaters near the Great Lakes in 1673.

A French colony at Biloxi, Mississippi, was founded shortly thereafter in 1699 (it was part of Louisiana at the time) and European settlement of contemporary Louisiana began. In 1718 New Orleans was founded by French and Scottish entrepreneurs. The location chosen for their new trading post was a relatively high and dry spot where Indians transported their canoes between the Mississippi River and Lake Pontchartrain. It was a convenient place to trade with the long-established natives for crops, fish, and furs. Colonial rule of New Orleans subsequently shifted from France to Spain and back again owing to European wars and politics, and finally to the United States in 1803 as Jefferson consummated his great land purchase from Napoleon. Much of the new territory acquired was undeveloped and little

used, but the part most densely inhabited under French rule became the state of Louisiana a few years later in 1812.

As Americans moved into the Ohio Valley and the Louisiana territory in the nineteenth century, commerce along the Mississippi River expanded and New Orleans became a small city. River commerce also accelerated when new steam boats came into service, allowing goods to move upriver nearly as easily as down. The low-lying trading post at New Orleans became a major port city. By 1860, it included nearly 170,000 residents and was one of the largest cities in the country (McNabb and Madere 1983). Growth continued for the next century as river traffic continued to expand and as valuable reserves of oil and natural gas were discovered along the Gulf's continental shelf. In 1960, the population of New Orleans reached 627,525.[5]

C. The Mississippi River, Floods, and Government Levees

Life was never simple in New Orleans. The site of the New Orleans' trading post was initially higher than the Mississippi and protected from minor floods by its river banks which formed a natural levee; however, flooding was a problem from its earliest days. The first recorded flood of the city occurred shortly after its founding, and floods continued to be perennial problems for its early residents. Between 1735 and 1871 there are 38 recorded floods of New Orleans from river, rainfall, and Lake Pontchartrain. Nine inundated New Orleans (Reeves 2005). Consequently, houses were often built above ground on piers, and manmade levees were added to the ones that nature provided. The first generations of levees were constructed by community businessmen and by town and county (parish) governments. Within a century of the city's founding, these new manmade levees extended 135 miles from New Orleans to Baton Rouge and beyond (Penland 2005).

Public finance books often mention flood control and land reclamation as local public-good problems, but they rarely mention that the levee-building efforts of private

[5] U.S. Census reports that about 10 percent of the city's residents in 1860 were slaves. Today's population is 67.3 percent black, 28.1 percent white, and 3.1 percent Hispanic. The 1.3 million residents of the entire metropolitan area, however, are 57.3 percent white, 37.5 percent black and 4.4 percent Hispanic, qualitatively similar to the state of Louisiana as a whole.

persons, municipalities, and state governments along rivers *also create externality problems.* As towns upriver are protected by higher and stronger levees, more water remains in the river channel and towns downstream face higher water and stronger currents with which to deal. The narrower river channels produced by levees may also cause flooding upstream insofar as flow rates are less than would have been the case in the old unrestricted flood plans. Levees and dikes, thus, whether privately or publicly financed, *create externalities* for those living farther upstream and downstream from the new levees. Together with the natural variability of rainfall in the Mississippi Basin, these local public goods projects implied that successive generations of "bigger and better" levees continued to be surmounted by the Mississippi River.

Welfare economics implies that such local intergovernmental externalities create a role for more encompassing levels of government. Following a major flood in 1844, the U.S. Congress passed the *Swamp Act* in 1849, which provided land grants to individual levee districts, the proceeds of which were to be used to fund construction of bigger and better levees by local levee authorities. Major floods continued, however, with notable ones in 1850, 1858, 1862, 1865, and 1874.

In 1879, after this history of "local" flood disasters, the U.S. Congress created a new agency with authority over the entire river system, the Mississippi River Commission. Under its authority, the Army Corps of Engineers took charge of flood control and transport within the entire basin (Penland 2005). Shipping channels were dredged and new levees built. In 1927 another great flood trumped a half century of engineering efforts by the Corps of Engineers, killing 500 people. This led still bigger and better levees to be designed and built. This time, however, the new levees were combined with modest efforts to restore some flood plains, and spillways were constructed to divert waters into other river channels in southern Louisiana. Such measures reduce rather than increase flood pressures downstream, although "good" farmland finds itself occasionally under water.

Some risk of flooding on the river system always remains, but river flooding in Louisiana declined after 1927, in large part because of these more sophisticated efforts at water-level management. Unfortunately, better management of Mississippi water levels did

not entirely end the creation of new risks through public policy mistakes and coordination problems.

D. Lake Pontchartrain

As noted above, the old New Orleans trading post was sited at the point of portage between the Mississippi River and Lake Pontchartrain. The original settlement was above the river, the river is above sea level, and Lake Pontchartrain is essentially at sea level. The city initially grew along a strip of high ground along a bend in the Mississippi River (hence its nickname of "Crescent City") and subsequently downward from the river toward Lake Pontchartrain filling in the gap. Levees were built to protect these new parts of the city from river floods and to drain and protect land from swamp and lake. An unfortunate secondary effect of the success of the various levee projects was that as the protected areas dried out, they continued to settle, which gradually caused most of New Orleans to fall below sea level.

Lake Pontchartrain remained more or less at sea level, however, and so became a new flood risk for New Orleans. Although lakes do not move as rivers do, their water levels are affected by inland storms, and in the case of Lake Pontchartrain also by storms in the Gulf of Mexico. New Orleans has been flooded by Lake Pontchartrain several times, and, as the case with the River floods, successive lake floods led to successively bigger and better levees. In 1871 the Mississippi River poured though a crack in the river levee at Bonnet Carre into Lake Pontchartrain; where aided by north winds and a weak lake levee it caused major flooding of New Orleans and many deaths.[6] In 1947 a storm surge associated with an unnamed hurricane flooded Jefferson Parish to depths of about three feet causing about 100 million dollars in damages.[7] This led to the construction of new taller and stronger

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[6] The levee failure at Bonnet Carre was later copied by the Army Corp of Engineers as a method of reducing "up town" risks from river floods. In 1932, a six mile long Bonnet Carre Spillway was completed, which was designed to divert flood waters from the Mississippi River into Lake Pontchartrain to take pressure off the River levees during times when the river was especially high. The spillway had been used to reduce pressure on the river levees in New Orleans eight times as of 1997 (*Environmental Atlas of the Lake Pontchartrain Basin*, United States Geological Service, 1997). The risk from lake and river floods are, thus, not entirely separate.

[7] The convention of giving hurricanes names began in 1950. Women's names were used until 1978, when men's names joined the lists. Hurricane names are generally reused, except in cases in which damages are extraordinary. In such cases a name may be retired by the World Meterological

"hurricane levees" along Lake Pontchartrain. In 1965 Hurricane Betsy produced a 10-foot storm surge that overcame that levee system, causing extensive flooding and still more deaths. The Orleans Levee Board, with the help of the national government, funded still higher and wider levees along Lake Pontchartrain. The new system of levees was designed to resist the pressures of a class 3 hurricane, although Katrina proved those calculations to be somewhat optimistic (Handwerk 2005).

The natural risk of flooding from the lake is increased somewhat by a series of manmade canals between the Mississippi and the lake and between the lake and the Gulf. (As noted above, the lake was once part of the Gulf.) Some channels were dug to increase river commerce and others were dug to control flooding. For example, the Inner Harbor Navigation Canal (IHNC) connecting the Mississippi River to Lake Pontchartrain was completed in 1923. In the mid-1960s, a 500-foot-wide and 36-foot-deep channel from IHNC through Lakes Pontchartrain and Borgne to the Gulf of Mexico (a distance of some 76 miles) was completed by the Army Corps of Engineers, the Mississippi River–Gulf Outlet (MR–GO).[8] This canal-channel system was intended to facilitate shipping by reducing the distance to the Gulf (although the older part of the IHNC is evidently too small for modern vessels). Together, the natural and manmade channels from the Lake to the Gulf allow storm surges from tropical storms and hurricanes to reach the city, and the canals into the city itself provide new avenues for those storm surges to swamp New Orleans.

III. Dealing with Hypothetical, but Real, Risks in New Orleans

Together the natural, economic, and political history of New Orleans had created a setting where catastrophe was not only possible but likely. Commercial development in the Mississippi Basin had encouraged a prosperous port city to grow at the site of the old French trading post. The manmade levees created to defend the port city from floods allowed the city to avoid damages from many ordinary storms, but they also gradually caused much of

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Organization. (Department of Commerce, http://www.aoml.noaa.gov/general/lib/retiram.html)

[8] For the most part, this construction project involved dredging efforts. Lake Borgne is a shallow bay only a few miles East of Lake Pontchartrain, which opens directly to the Gulf. See: "Mississippi River - Gulf Outlet New Lock and Connecting Channels Evaluation Report," U.S. Army Corps of Engineers (March 1997).

the city to sink, exposing it to greater risk in the event that a levee ever failed. As the levees of New Orleans and those upriver grew ever higher, any levee failures that occurred would allow ever more water into the city. The new wider and deeper transport channel from Lake Pontchartrain to the Gulf shoreline allowed a shorter and easier path for ships, but also provided a clear channel through which storm surges could threaten New Orleans via its back door.[9]

These dangers were increased somewhat by levee-induced changes in the shape and extent of the Mississippi delta. New Orleans and other "protected" regions of the delta sink at a rate of a half inch or so per year. The outer reaches of the delta also began to disappear as its soil settled and as storms eroded its periphery without being replenished by river floods. The bayou buffer from Gulf storms has shrunk at an accelerating rate for the past century reflecting the success of the Mississippi flood control system. New Orleans, nonetheless, remains many miles from the Gulf, and thus is still protected from the most direct effects of major gulf storms, unlike many other port cities along the gulf coast. Other gulf cities, however, are not below sea level! Although the oldest parts of the city remain above sea level, contemporary New Orleans is on average six feet below sea level and completely dependent on its network of levees and pumps.

Past efforts at flood control have made storm-induced flooding far less frequent than it used to be, but also implies that floods will be more catastrophic when they occur. The city is lower, and the new levees are higher. Together, these imply that threatening storm waters are necessarily deeper and potentially far more deadly.

[9] Perhaps ironically, many steps have also been taken to assure that New Orleans has sufficient water for commerce. The river has been repeatedly dredged to make New Orleans a (relatively) deep water port. Moreover, shortly after World War II, geologists realized that the Mississippi River was about to select a new shorter path to the Gulf, as it does every few centuries, but this time it would leave New Orleans and the industry along the river high and dry. This led to a new series of dikes designed to prevent the Mississippi from changing its course, the massive Old River Control Structure.

Table 1 Number of Hurricanes Making Landfall in the U. S., By State and Wind Strength Category, 1851 - 2004					
State	**Cat 1**	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**
Florida	43	32	27	6	2
Texas	23	17	12	7	0
North Carolina	21	13	11	1	0
South Carolina	19	6	4	2	0
Louisiana	17	14	13	4	1
Georgia	12	5	2	1	0
Alabama	11	5	6	0	0
Virginia	9	2	1	0	0
Mississippi	2	5	7	0	1
Source: NOAA Technical Memorandum, 2005, NWS TPC-4, "The Deadliest, Costliest, and Most Intense United States Hurricanes from 1851-2004"					

The gradual increase in "worst case" risks did not pass entirely unnoticed, although surprisingly few steps were taken to address them by local, state, and national governments. As evident from table 1 above, hurricanes stronger than category 3 pass through Louisiana every generation or so. Studies were undertaken by the Army Corps of Engineers and others to determine the feasibility of reducing the threat from storm surges at New Orleans' back door, with sea gates along MR-GO and new, still higher and stronger surge levees along Lakes Borgne and Pontchartrain. The cost of a new generation of levees was estimated to be 2.5 billion dollars, and would take many years to complete. This proposed upgrade to the levee system was rejected by Congress, however, in part because of environmental concerns.

Given that political decision, it was clear that other methods of dealing with floods generated by severe storms would continue to be important for the foreseeable future.

Katrina, however, proved that little was actually done to address the problems that would predictably occur whenever a category 4 or 5 hurricane passed through town.[10]

A. Not a Complete Surprise: Federalism, Term Limits, and Catastrophe

To some extent the lack of preparation was an unfortunate consequence of political institutions. As noted above, levee externalities induced the national government to assume principal responsibility for flood control in the Mississippi basin more than a century ago. In the past half century, the national role in flood relief programs has also expanded. Such national efforts can be rationalized by a variety of normative theories of public economics and collective action. Interstate externalities from levee construction along the Mississippi River can be internalized, and broad voter interests can often be advanced through increased risk pooling. Economic and political theory, however, also suggest that complete centralization is unnecessary and counterproductive insofar as it reduces innovation, local competition, and voter oversight. Responsibility for constructing the flood control infrastructure was partly for this reason subcontracted to private firms, and day-to-day maintenance of the levee networks fell to levee boards appointed by the state and local governments.

Emergency responses after flood control failures are also jointly produced by all three levels of government—as well as by private organizations and individuals. Police, fire, rescue, and emergency medical services have long been provided by local governments, as well as by volunteer groups and private individuals (who are often neglected in newspaper accounts of Katrina). When a storm initially overcomes a network of levees, spillways, and pumps, the provision of emergency services is, thus, mainly a local matter. These "first responders" are backed up in extraordinary cases by a state's national guard, which for intrastate purposes are controlled by the state governor.[11] With such problems in mind, the

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[10] A 1990 risk assessment for New Orleans estimated the probability of a category 4 hurricane to be 20% and risk of levee failure 50% with property damages as high as 200 billion dollars and fatalities as high as 1500. *A Civil Engineered World*, vol 21, issue 4, ASCE.

[11] The *Posse Comitatus Act* of 1878 prevents the national government from calling out the army (or national guard under Army control) in order to take over local law enforcement except in times of insurrection. "Whoever, except in cases and under circumstances expressly authorized by the

Louisiana Office of Emergency Preparedness (LOHSEP) was created by the Civil Act of 1950 within the State's Military Department.

The national government's responsibility after a flood or other disaster is mainly that of a (taxpayer-subsidized) insurance company, and has been since the Great Depression. It provides both in-kind and financial support to communities, business, and families affected by floods and other catastrophes. In 1934 the Reconstruction Finance Corporation began providing subsidized loans for repair of public facilities after disasters. In 1968 the Congress established the National Flood Insurance Program.[12] To these insurance responsibilities, other coordination, planning, and warning duties were added in the 1970s. In 1974 the Disaster Relief Act provided for the national declaration of "disasters." In 1979, the Federal Emergency Management Agency (FEMA) was created to centralize authority over the various national disaster relief programs authorized by Congress.

Fiscal responsibilities in these policy areas are also intertwined. Funds for flood control projects flow from national to state and local providers and from state programs to local programs. For example, both first and second responders are supported by a variety of intergovernmental grants from the national treasury to state national guards and to state emergency response agencies such as LOHSEP and from state agencies to parish and city emergency agencies. These intergovernmental grants supplement funds provided directly by the taxpayers of state and local governments.[13] In Oates' (1972) terms, federalism in the

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Constitution or Act of Congress, willfully uses any part of the Army or Air Force as a *posse comitatus* or otherwise to execute the laws shall be fined under this title or imprisoned not more than two years."

[12] This insurance program also tends to increase the damages associated with flooding, because of its tax payer support and lack of actuarial foundations. Flood insurance in effect subsidizes living in the flood plains of rivers and along the sea coasts threatened by repeated hurricanes.

[13] Since the terrorist attack on the World Trade Center and Pentagon in 2001, the national government has shifted resources and attention away from natural disasters toward terrorist attacks. In 2002, Army Corps of Engineer budgets fell by a third, from 6 billion to 4 billion a year. FEMA was moved into the Department of Homeland Security in 2003. Construction expenditure in New Orleans fell from 147 million in 2001 to 82 million in 2005 in part because of changes in the national govenment's change in priorities.
(http://www.govexec.com/dailyfed/0905/090105jv1.htm)

areas of flood control, emergency planning, and response are all "marble cakes," rather than "layer cakes."

Federalism has many advantages, but it also has costs (Mueller 2006). In the case of interest, federalism implies that "flood protection services" are jointly produced by a group of more or less independent "team members," each with their own economic and political interests. In principle, conditional intergovernmental grants can be used to encourage coordination among the various levels of government, but it is clear that in practice the overlapping fiscal and production responsibilities of national, state, and local agencies *also create* new coordination and free-rider problems within the flood control and emergency response systems as a whole. These political coordination problems are difficult to solve, because fiscal and service interdependencies also make it difficult for voters to reward specific politicians and government agencies for success or to punish them for failure.

This is not to say that inter- and intra-governmental coordination problems cannot be monitored or addressed. The various agencies may, for example, conduct face-to-face meetings and agree to detailed plans for various kinds of emergencies.

Such meetings have recently occurred in Louisiana. In 2004, 250 emergency officials from 50 parish, state, national, and volunteer organizations spent eight days analyzing possible responses to a hypothetical class 3 hurricane named Pam with 120 mph winds. The participants developed fairly extensive plans for dealing with a million displaced persons following the destruction of a half million buildings. They also recognized that a substantial number of persons would not evacuate the impacted area, in part because many residents lacked vehicles for doing so and in part because individuals differ in their assessment and response to risks. As a consequence, the Pam study acknowledged that casualties from a class 3 hurricane might well be at levels "not seen in the United States in the last century" in the words of a FEMA spokesman at the conference. A spokesman for the Red Cross estimated that 25,000–100,000 persons would die in a major levee failure.[14]

Plans for another analysis and planning session for the following summer were nonetheless unfunded, and, thus, the proposed 2005 meeting did not take place. The federal

[14] "Hurricane Pam," http://www.globalsecurity.org/security/ops/hurricane-pam.htm

response to a major hurricane remained a brief paper and pencil exercise. Fortunately, if more or less correct in their assessment of flooding risk, evacuation problems, and economic damages, the Pam group's casualty estimates were far too high.

Doubtless free-rider problems associated with diffuse responsibilities partially account for lack of funding for the subsequent meeting, and thereby for the poor evacuation planning by the city and state governments, the traffic problems along exit routes and the dearth of low cost–temporary housing in public facilities along those routes.[15] However, it is clear that both private and local government interests in such preparations are substantial. And with this in mind, the normal assignment of emergency response rests first and foremost with local governments.

Within the New Orleans area, where the risks from a major hurricane are direct and among the greatest in the country, because so much of its dense population lives below sea level, one might have anticipated more substantial planning than elsewhere in the state, whether assisted by the national and state governments or not. After all, the residents of New Orleans were personally at risk! But little planning and preparation were evident. No flood-proof New Orleans command center on high ground was established, no secure communication systems were purchased, and no operational plans for evacuating those without vehicles or requiring intensive medical care were adopted.[16]

There is a possible rational choice explanation for this policy lacuna: mayors in New Orleans are limited to two four-year terms of office. Although term limits address other significant problems, they imply that even a forward-looking mayor would not expect to be

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[15] It is clear that those evacuating a threatened area can benefit from early warnings, information about possible exit routes and housing, and coordination along escape routes; and it is clear that such services can be provided by parish, city, and state governments. The sixty-mile traffic jams en route to Baton Rouge suggest that such services were not well provided. Such service failures increase the cost of leaving the city, and elementary economics implies that such higher costs induce more residents to ride out the storm at home.

[16] An interview in the *Wall Street Journal* (9-9-05) describes how top city officials checked into a hotel on high ground (the Hyatt) and used its facilities to coordinate emergency relief. When land line and cellular telephone communications failed, they established an Internet telephone system using equipment commandeered from a nearby Office Depot. The city owned satellite telephones, but these could not be used, because their batteries were found to be useless. Other communications were provided by the Louisiana national guard stationed at the Superdome.

confronted personally with a “Pam-like” disaster. The current levee system implies that serious storm threats to New Orleans occur only once a generation, rather than every few years as in the past. Consequently, allocating city resources to address such catastrophes, would tend to benefit future governments, who would look well prepared, rather than current city officials, who would have fewer resources available for other shorter term projects.

The current mayor of New Orleans, an experienced manager from private industry (Nagin), had been in office for about three years when Katrina struck. The potential hurricane induced flooding problems that he faced had, of course, been present for nearly three decades. Relatively elaborate plans for bussing people from the city and moving large portable pumps upstream out of harm's way to drain the city after a storm swept through town existed on paper, but were not implemented by city officials.

The official plan of the City of New Orleans was for its residents and visitors to pack up and evacuate the city. This simple and relatively inexpensive emergency plan is not as silly as many newspaper, state, and national accounts make it sound. After all, it is individuals and families that have the most at risk and have the best knowledge of their own particular circumstances and opportunities. A vast supermajority of New Orleans citizens (more than 80 percent) heard the advice offered by national, state, and local officials—which was widely disseminated by newspapers, television interviews, and weathermen—and evacuated the city as Katrina approached. Interviews conducted after the flood suggest that most of those who chose to stay behind did so after a rational assessment of their own circumstances, and it should be added that most such decisions looked very reasonable on midday Monday after Katrina left town, just as the city’s evacuation plan did.

However, among those that stayed in town were many persons who were not in a position to take independent action or to make rational risk-cost calculations, because they were incapable of leaving the city without considerable support or lacked relevant information—as is often true of elderly persons and others with physical or mental handicaps. Deaths in New Orleans were disproportionately from this group.[17]

[17] The December 16, 2005 report of the St. Gabriel Morgue identifies 705 of 902 bodies from the

B. Katrina and the "Superdome Plan"

Prior to Katrina's landfall, the federal emergency planning and response system worked more or less as "designed." FEMA members consulted with state and local officials, and warned them that a major hurricane was headed their way. Emergency supplies and personnel were prepositioned along the edges of the anticipated hurricane impact zone, although these turned out to be far less than needed and too far away to be of immediate help after Katrina ran its course.[18] After much encouragement from the national government, a "mandatory" evacuation order was given for New Orleans on Sunday morning, August 28, albeit less than 24 hours before Katrina made landfall. An emergency center was established at the Superdome with emergency supplies, medical support, and police for those who chose to ignore city instructions regarding evacuation, but feared for their safety. The Superdome was staffed by local police and emergency staff, the Louisiana National Guard, and federal FEMA personnel who provided security and medical services.

It is clear that the "Superdome plan" assumed, at least implicitly, that the levees would hold and that wind damage would be fairly modest, in spite of the fact that Katrina was a category 5 hurricane on Sunday morning (August 28) that would swamp the city if it reached the city at that strength. It was known (or at least predicted) that about 100,000 persons would choose to remain in the city, even if "ordered" to leave, yet the preparations

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New Orleans area. Of those identified, 65 percent were older than 61, with 39 percent over the age of 75. Only 13 percent were between the ages of 16 and 30. Only 23 cases were classified as "not storm related."
http://www.dhh.louisiana.gov/offices/publications/pubs-145/Deceased%20Victims_12-16_information.pdf

[18] Formally, FEMA's "prepositioning activities" require a federal declaration of emergency. On Friday August 26, Governor Blanco declared a state of emergency for the state of Louisiana and asked for federal support. In response to governor Blanco's request, on Saturday, President Bush declared a Federal state of emergency for much of Louisiana—although its list of counties (parishes) did not include the Orleans or Jefferson Parishes, the two most damaged counties. Indeed, nearly all of southern Louisiana was left out of the initial Federal declaration, although they were included in Governor Blanco's request for support.

(It is possible that politics play a role in this, although simple error cannot be ruled out. President Bush carried Louisiana easily in 2004, and won majorities in both northern and southern parishes (57), although he did lose more southern parishes (6) than northern ones (1). Louisiana's two northern Congressional districts, the fourth and fifth districts, were won easily by Republicans. The southeastern-most second and third districts most affected by Katrina, however, are held by Democrats.)

at the Superdome were only sufficient for about a fifth of the group that was likely to stay behind.[19] Those who stayed behind were advised to have a three-day supply of food and water on hand, whether at home or at the Superdome. This proved to be only about half what was actually needed.

City officials were clearly hoping to be lucky once again, as they had been in 2004 when hurricane Ivan weakened and veered east at the last moment, sparing the city. The Superdome plan was adopted in spite of the existence of better plans on city shelves, the last reported strength of the storm, the category 3 design parameters of the levees, the numerous warnings from hurricane experts and FEMA, the hurricane Pam analysis conducted just the year before, and extensive local new coverage of these risks in previous years. Of course, experts often "cry wolf." Hurricanes always diminish in strength as they cross over land. The most recent generation of levees had never been overcome—perhaps New Orleans was finally safe from floods.[20]

As hurricane Katrina left town late on Monday morning, the Superdome plan must have looked very reasonable to all involved. Katrina hit New Orleans as a category 3 storm rather than as a 4 or 5, as had been forecast by the National Weather Service. Wind damage and rain damage were substantial in New Orleans as power and communications failed, and numerous buildings were deroofed and defenestrated. The direct effects of wind and rain, however, were far greater in Mississippi where Katrina spent most of its short life on land, and where its storm surge demolished communities along the Gulf Coast. By noon, surely those in New Orleans must have quite reasonably thought that the worst was over. Damage

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[19] Telephone surveys conducted by Professors J. Hurlbert and J. J. Beggsafter of Louisiana State University shortly after Hurricane Ivan passed through the region in 2004 revealed that "21.4 percent of the respondents would remain in their homes" if a category 4 hurricane were approaching (van Heerden and Streva 2004). The same surveys suggest that relatively more persons in good health (73 percent) would evacuate than those in poor health (43 percent).

[20] As Katrina approached the border of Mississippi and Louisiana along the outer reaches of the Bayou, it predictably diminished in strength. According to some experts the winds of the category 3 storm that arrived in New Orleans on Monday morning and its storm surge were not sufficient to threaten the current generation of levees, yet the levees broke in several places. As this paper is being written, the cause of levee failure is not clear, but design and construction problems seem likely for at least one of the two major breaches.

was substantial, but the levees had evidently held, the pumps continued to work; the worst case had not yet materialized. Unfortunately, the levee system did not last out the day.

Even a single major breach can lead to catastrophe in New Orleans under contemporary conditions. In this case, there were two major failures. Katrina and its storm surge had increased the volume of water in Lake Pontchartrain, and hurricane winds along the western side of Katrina increased the pressure produced by that water. Lake Pontchartrain rose several feet and water flowed into its various inlets, outlets, and canals. Several levee leaks emerged on Monday morning, and two major failures occurred. The breaches along the IHNC (called the industrial canal in most news accounts) and the 17th street drainage canal worsened and allowed huge amounts of water to pour into the earthen bowl containing most of the city of New Orleans.[21]

It is always good to be lucky in one's bad luck. The major levee failures along the canals opened gradually, and, thus, flooding took place over many hours rather than in a few minutes. It was this "good fortune" together with many large and small heroic efforts by the residents of the lowest parishes, themselves, that allowed so many of the thousands who had stayed behind to survive the flood. In addition to these truly local efforts, noteworthy rescue efforts were also undertaken that day and in the days that followed by all three levels of government and by volunteer groups.

The levee breaches were sufficient to place 80 percent of the city under water. The higher ground of the old "crescent city" along the Mississippi remained above water, but little else. Residents of the lowest portions of the city found their homes under 20 feet of water.

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[21] The breach along the 17th street canal evidently was the result of "cheating" on design standards. Pilings that were supposed to be driven 17 feet below sea level were only driven ten feet below sea level, reducing the levee's ability to resist water pressures. The most detailed account of the levee failures that I have found is not at the Army Corp of Engineer website, as might have been expected, but rather at Wikipedia. Not all of its details are consistent with other published accounts or Congressional testimony, but most are very well documented at http://en.wikipedia.org/wiki/Civil_engineering_and_infrastructure_repair_in_New_Orleans_after_Hurricane_Katrina.

C. Chaos on Tuesday

The Monday afternoon and Tuesday night "eviction by flood" of thousands of able bodied persons who had ignored the mandatory evacuation order (but successfully weathered the storm itself) almost immediately overwhelmed the Superdome plan, a plan that had looked very reasonable just a few hours before. Tens of thousands of distraught but hopeful residents converged on the Superdome, where they had been told to go in case of emergency. Police and the Louisiana National Guards turned most of them away as the Superdome's capacity was soon reached. Thousands of distraught and now angry persons wandered off in search of shelter and emergency supplies. Many headed toward the convention center, which was a public space on high ground near the river; still others wandered off seeking refuge and supplies in other unflooded areas of the city. Many stayed near the Superdome, however, in angry disbelief, threatening the guard and the police.

There are times when crime pays, as Becker's (1968) classic work on the economics of crime demonstrates. When the marginal benefit of theft increases and expected marginal cost falls, Becker's model predicts that theft increases, as it did in New Orleans. Those who were forced out of their homes on Tuesday morning were not well supplied, as they had in most cases left everything behind to escape the rising water. Much of the New Orleans' police force had left town during the emergency, most likely to assure the safety of their families. Others abandoned their posts in the face of the angry "mobs" produced by flooding and inadequate preparations at the Superdome. New Orleans' legal system was largely unstaffed and underwater. The probability of being punished for crimes such as looting fell on Tuesday to nearly zero. (Shop owners who had stayed behind to protect their inventories from vandals continued to "top up" city efforts even after conventional police protection had largely evaporated.) The marginal benefit of a bit of theft for honest folk who had been forced out of their homes clearly increased. Potable water and food were needed, and needed "now." It was not available from official emergency services, and moreover, the "safe harbor" provisions of common law imply that "borrowing" supplies in times of emergency is not necessarily a crime.

Looting, especially in this latter sense, was widespread as stores were invaded and basic supplies commandeered by ordinary citizens, volunteer groups, and city government officials. Truckloads of "borrowed" supplies were delivered to the hungry and thirsty refugees at the convention center, and the center's doors were broken down so that its roofs could shelter the newly homeless from the fading remnants of the Katrina storm system. Of course, some of the looting went beyond necessities, as widely reported, but most evidently did not.

This "entrepreneurial" resupply was not only unavoidable in the circumstances, but also completely understandable and predictable. The federal plans for dealing with a major hurricane did not include provisions for major levee failures. Tens of thousands of people sought water, food, and shelter in conditions of near anarchy. Although the news accounts implied that New Orleans had reverted to the Hobbesian jungle, the reality was closer to that predicted by Montesquieu than Hobbes. Those evicted by floods feared for their lives and rapidly formed emergency communities that informally solved problems of law and order and secured the necessities of life. In spite of nearly universal news accounts of murder and mayhem at the time, subsequent reports conclude that there were very few cases of murder, rape, dehydration, or starvation at the convention center or in the city as a whole. The fact that crimes against persons were so low suggests that mutual fear can induce high levels of cooperation and rapid development of laws (informal codes of conduct), as Montesquieu (1748) argued—not complete peace, but clearly not a war of every man against every other.[22]

[22] "Next to a sense of his weakness man would soon find that of his wants. Hence another law of nature would prompt him to seek for nourishment. Fear, I have observed, would induce men to shun one another; but the marks of this fear being reciprocal, would soon engage them to associate. Besides, this association would quickly follow from the very pleasure one animal feels at the approach of another of the same species. Again, the attraction arising from the difference of sexes would enhance this pleasure, and the natural inclination they have for each other would form a third law."

D. Crisis Management and Mistakes in a Federal System

Every crisis combines surprise and urgency. At the same time that the dislocated residents of New Orleans were busy solving resupply problems themselves, national, state, local, and private groups were attempting to deal with contingencies beyond those which they had planned for. Although the risks had long been acknowledged and some paper and pencil exercises had been conducted that included consideration of the flooding of New Orleans together with great areas of wind damage, plans to address both catastrophes at the same time had not really been worked out. On Tuesday (December 30), new more extensive plans had to be devised on the fly without the benefit of experience or careful analysis. In such circumstances knowledge problems abound and, thus, error and mistakes are unavoidable (Congleton 2005). The policy adjustments made by all levels of governments in the next few days certainly affirmed that prediction.

Emergency supplies from FEMA and the Red Cross failed to reach persons in need for several days, failed to move at all, or were lost at supply depots. In other cases, emergency supplies provided by private disaster relief groups and altruistic entrepreneurs were turned away by state officials—who evidently sought to control the distribution of supplies and services that never arrived. Supplies and medical services were reportedly blocked from delivery into New Orleans by state officials (who evidently feared that the folks receiving them would not leave the city) at the same time that local police were preventing able-bodied folks from leaving the city on foot. Calls from New Orleans to state officials for more help produced no new help, while the state and national personnel already present at the Superdome fled (via helicopter) in the face of angry mobs denied of "promised" emergency support. Emergency food supplies sent by allies abroad remained trapped at major airports, because of disorganization and restrictions on food from countries tainted by mad cow disease.

Of course, nearly every government official could claim with some justification that "someone else" had the responsibility for delivering the "promised" support. Officially, the duty of providing post-emergency support was divided among local, state, and national

governments—and even the Red Cross, which was designated as the national government's "first responder" for food and shelter by the Department of Homeland Security. Communication among government officials was very limited because of widespread damage to private telephone, cable, and radio networks. Transport of those supplies that were available was slow, partly because of resultant coordination problems, but also because many roads and harbors were impassible.

Difficulties in responding to the flooding of New Orleans were further amplified by worldwide "live and (almost) on site" misreports of looting, rioting, and violence throughout the city. National and international reporters evidently assumed that the worst fears and rumors of those running from the flood were realities, that dozens had been murdered at the Superdome and Convention Center, that thousands of persons were drowned, and that "crazy folks" were shooting at rescue personnel and rescue helicopters! Such amazing headlines and leaders increase newspaper sales and TV audiences, but nearly all of the original reporting from New Orleans turned out to be greatly exaggerated or false.

Communications breakdowns *(not interoperability)* allowed these exaggerated reports to persist as facts, and FEMA dutifully responded by sending along thousands of body bags and establishing very large morgues to receive all the bodies. Fortunately, the early reports of casualties, perhaps colored by the predictions of the Pam study, turned out to be wrong by a factor of ten or more.

After several days of confusion and gross error, disaster relief gradually began to function up to normal standards toward the end of the week. The displaced were cared for, as supplies and shelters were established. Some were established through "official" channels, while many, perhaps most, came from the spontaneous efforts of survivors, friends, families, and generous strangers throughout the country, indeed the world.

Although Katrina demonstrates how much can go wrong as a consequence of poor planning and error, it also demonstrates that a good deal of disaster relief can be produced without central coordination. Local volunteers and local governments established relief centers at churches, schools, and community centers; others were established in private homes and motels throughout the affected states, in neighboring state, and across the United

States as a whole. Both in-kind and cash contributions poured into the region from private firms, NGOs, private persons, and foreign governments.

IV. Politics as Usual during and after the Flood

Katrina also demonstrated that democracy is in many ways more robust than some of our models suggest. News coverage during and after the levee failures in New Orleans clearly demonstrated that ordinary democratic politics continues to operate during and after major catastrophes. Graphic television and newspaper accounts showed undeniable public policy failures, and fear of electoral retribution for those failures was evident from the first day of the New Orleans catastrophe. From the very first press conferences in Louisiana and Washington D. C., virtually every government official with responsibility for planning for emergencies or providing emergency services pointed to the failures of others. The Mayor of New Orleans wondered where the state national guard and FEMA were. State officials noted the city's lack of local preparation and FEMA's failure to deliver promised supplies. FEMA officials described the state and local governments as "disfunctional," failing to take FEMA's advice. The national government "offered" to step in and take control of the Louisiana National Guard, which of course was simply another way of suggesting that the Louisiana State Government was totally incompetent. (Governor Blanco refused this particular offer of "help," but no others that I am aware of.)

Of course, being robust is not the same thing as being effective or efficient. Officials at every level denied that anyone could have predicted a catastrophe like Katrina, despite the fact that professionals from all levels of government had participated in a planning exercise for just such a catastrophe only a year earlier! Officials proclaimed that storms like Katrina had never happened before, despite the fact that Louisiana faces hurricanes every few years, major hurricanes every twenty years or so, and that equally powerful storms had threatened the same region just the year before! Many creative methods of shedding responsibility are possible in federal systems and many were reported in the media, largely without comment.[23]

[23] Such cases demonstrate the odd profit incentives of the news industry. Although the most

Lobbying to induce the national government to send large amounts of aid to New Orleans (and to Mississippi and Alabama) also began on the same day that the levees failed. This was initially done on camera as elected representatives from the affected areas (mayors, senators, representatives, and governors) appealed to the public, and thereby to their elected representatives in Congress, for emergency support. The President's rapidly falling approval numbers in the polls led him to join the quest for new Katrina funding after a few days of hesitation. Within a month, seven emergency relief bills were passed by both chambers of the Congress and signed by the President. These included two major appropriation bills, the first for $10.5 billion and the second for $51.8 billion of new spending, three smaller bills for additional relief for needy families and students, a $2 billion increase in the borrowing limits for the National Flood Insurance Program, and a tax relief bill that reduces taxes by $6 billion in the 2006-10 period.[24] Several other smaller bills were passed in following months.

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public displays of ignorance or lies could have been checked in a few minutes online, the most pithy comments were reported without comment or fact checking. As businesses, newspapers and other media exist to sell advertising space, rather than to provide balanced and accurate news—except insofar as this is demanded by those reading or watching the advertising. Drama and exaggeration evidently increase sales of papers and audiences among marginal readers and viewers and, thereby, allow higher charges for advertising. As a consequence, the often rather drab realities of even spectacular events like Katrina are relegated to late night news shows, hidden in the center of newspapers, or obscure official websites where they may be found by determined readers who actually want to understand events in some detail. The stories are usually quite thoroughly covered in the end, but almost secretly, because the high profile (easily found) sources of news are reserved for marginal readers and viewers.

[24] See the *Budget and Economic Monitor* (September 20, 2005) and the Congressional Budget Office's estimate of the cost of tax relief (September 26, 2005).

Table 2
Hurricane Katrina Disaster Relief Funding
($ in billions)

	First Supp.	Second Supp.	Total
FEMA	**10.7**	**50**	**60.7**
Manufactured Housing	3.3	1.6	4.9
Supplies/Materials	0.4	1.9	2.3
Temporary Financial Assistance	0.8	23.2	24
FEMA logistics	0.5	2.6	3.1
Infrastructure Repair	0.1	7.7	7.8
Damage Inspections	0.1	0.3	0.4
Urban Search/Rescue	0.1	0.1	0.2
Army Corps of Engineers	2.4	3	5.4
Department of Defense	2.1	2.5	4.6
Other	1	7.2	8.2
Army Corps of Engineers		0.4	0.4
Department of Defense	0.5	1.4	1.9
Total	**11.3**	**51.9**	**63.2**

Source: *Budget Bulletin*, Senate Budget Committee, September 12, 2005. (The totals include small rounding errors.)

Most of the new spending, $60 billion, was directed to the Department of Homeland Security, which includes FEMA and several other disaster relief programs. Table 2 shows, however, that not all of the emergency appropriations are aimed at persons damaged by the hurricane, nor are they entirely directed to the states in which the damages occurred. Only about half of the emergency appropriations goes directly to Katrina's victims. (Some of this "temporary financial assistance" also goes to states and cities that are housing displaced persons. The unaffected states receiving the most are Texas, Tennessee, Georgia, Arkansas, and Minnesota.) Most of the other half is for public infrastructure repair throughout the

affected region, although a substantial amount is also reserved for military assistance and the repair of military bases in the region.

Economics implies that emergency relief necessarily produces profits for contracting firms, because previously committed resources have to be drawn to new purposes by those contracts, which clearly requires higher than normal rates of return. With this in mind, many large firms have departments and/or subcontractors whose main responsibility is to pursue such contract opportunities as they arise, and many are very good at it. For example, on September 1, less than a week after Katrina made landfall, the *Houston Chronicle* reported that Halliburton had already received a half-billion-dollar contract for emergency repairs of navy facilities damaged by Katrina. Several newspapers also noted that local companies were having a difficult time getting through to national contracting agencies so that they could obtain a share of the recovery rents. Smaller regional firms evidently lack the specialized governmental relations departments and knowledge of "well-connected" firms.[25] The lobbying efforts of those firms with ongoing governmental relationships doubtless also affected the magnitude as well as the distribution of the initial emergency appropriations.

V. Overview and Lessons from Katrina

It can be argued that government policies substantially determine the economic and human risk associated with natural disasters insofar as governmental rules determine private rates of return at the margin, and private decisionmakers abide by those rules. For this reason, public choice analysis can shed very useful light on losses associated with repeated natural catastrophes in general, such as hurricanes and floods, and on Katrina in particular. Most of the deaths from Katrina were concentrated in one place, New Orleans, and those losses arose in large part from its peculiar location in combination with a three century–long effort to "manage" the flood risks associated with that location.

[25] The previous director of FEMA under the Bush administration is presently an employee of a Halliburton subsidiary.

A. Public Policy and Hurricane Katrina

The proximate cause of the catastrophe that followed Katrina can be attributed to nature insofar as the wind, rain, and storm surge directly caused death and destruction, and indirectly caused the failure of the New Orleans levee system. The storm was not caused by recent manmade global warming.[26] Hurricanes as strong as Katrina have crossed Louisiana many times in the past century and a half. The magnitude of the damages caused by nature was, however, substantially the result of political and economic decisions. A major city grew on the banks of the Mississippi River with Mississippi mud foundations. Levees were built to protect the city as it grew, and became larger, stronger, and more extensive, but also caused the ground supporting the city to settle and shrink. The current generations of levees were designed to survive a relatively strong hurricane of category 3 strength and failed in part because they were not up to that standard.

Because hurricanes always lose strength as they pass over land and New Orleans is sixty or more miles from the Gulf, the category 3 design parameters of the present levee system are not totally unreasonable. However, given that category 4 and 5 storms strike land in Louisiana every twenty years or so, the estimated flood damages (100-200 billion dollars), and the reported cost of levee upgrades necessary to resist larger storm surges (reported as low as 2-3 billion dollars), cost benefit–analysis implies that new storm flood levees would have made good economic sense, although they evidently did not make political sense at the times they were proposed in the past.

Evacuation Decisions

Of course, it was not just the levee failure that caused so much death and destruction in New Orleans. Buildings were built in low areas of the city, as if those areas were perfectly safe. Risk-tolerant, poor, and handicapped persons chose to ride out the storm at home rather than risk the inconveniences of traffic and housing in safer locations. Early warning

[26] NOAA attributes the recent increase in hurricane activity to a recurring 20-30 year cycle of hurricane activity in the Atlantic. The cycle is evidently generated by lower wind shear and "favorable" winds from Africa which allow larger storm systems to form (*NOAA Magazine Online*, Story 184, http://www.magazine.noaa.gov/stories/mag184.htm).

systems for levee failures evidently did not exist or did not work. Thus, a large number of persons living below sea level had to cope with rapidly rising water as water appeared at their below-sea-level doorsteps or in their living rooms. Most of the families that stayed behind were able to deal with that crisis, although several hundred persons were not, often because of infirmities of age or illness. Many others died because they were already in ill health and their medical support ended with the storm. Only a handful were killed in the ordered anarchy that emerged after normal city governance broke down.

The number of persons who chose to "ride out the storm" at home was partly a consequence of public policies that affected the cost of evacuation. Urban persons use mass transit routinely and are less likely to own cars than persons in non-urban parts of the country. Elementary economics predicts that this would be especially true among the infirm and persons on very tight budgets. A mandatory evacuation was declared less than 24 hours before the storm arrived, but it was not supported by mass transit to low-cost emergency shelters in safer places, and it left little time for new private plans to be devised by those already inclined to ride out the storm at home. Together with the usual (and understandable) tendency of many to discount warnings from government officials, the absence of such evacuation services induced many persons to stay behind, who might otherwise have left. (It bears noting, however, that the first persons whose deaths are attributed to Katrina were infirm persons who died while being transported to facilities in Baton Rouge the day before Katrina made landfall.)

Policy Failure, Racism, Anarchy, and Spontaneous Order

The death toll in New Orleans was not the result of racism, as has often been alleged. The city has long had substantial black representation in city government and has had black mayors for most of its recent history. The evacuation plans adopted were chosen by the city government, not imposed from outside, and its emergency facilities reflected past decisions of such city governments. Blacks are not disproportionately represented among the dead.[27]

[27] The December 16, 2005 report of the St. Gabriel Morgue identifies 705 of 902 bodies from the New Orleans area. Of those identified, 51 percent were male and 48 percent female; 48 percent were black and 42 percent were Caucasion. The U.S. Census Bureau reports that the city of New

The chaos that followed the flood was not especially deadly (except for those whose life depended on continuous medical support), although it was dangerous for those involved, and ugly and embarrassing for those viewing it on television. The chaos clearly reflected poor planning and coordination at all levels of government. A good deal of the local police force had evidently left town with their families. Many local, state, and national officials abandoned the city as danger increased (and the need for their services increased). Emergency supplies were inadequate for the flood (although more or less adequate for the hurricane itself), and government efforts to provide additional supplies on short order failed miserably. The immediate failings of government policies were solved for the most part by the affected individuals themselves (albeit through legally questionable means), local volunteers, and NGOs, whose first efforts were often impeded rather than assisted by government agencies. A few days after the crisis, the federal emergency response system as a whole began to operate within the norms of such large-scale enterprises, and relief flowed rapidly into the affected areas through both official and unofficial channels.

B. Political and Institutional Lessons

By providing unusual stresses on political institutions, crises often reveal political behavior more clearly than ordinary times. Katrina, thus, provides very useful information about existing political institutions and also powerful tests of existing theories of public policy formation. Although more error prone than in less urgent times, "politics as usual" was clearly in evidence. Politicians continued to respond to reelection pressures. Interest groups continued to lobby and receive rents. Coordination among levels of government remained problematic in areas of overlapping responsibilities, whatever might have been claimed beforehand.[28]

Orleans is 67.3 percent black, 28.1 percent white, and 3 percent Hispanic.

[28] Examples of pre-Katrina assurances can be taken from many official sources. Consider this passage from a speech of Homeland Security Secretary Ridge to the American Red Cross on May 21, 2004. "So this Department is determined to forge operational capacity when it comes to emergency preparedness. Our goal is to ensure that when and if disaster strikes—our governors, mayors, police, firefighters, hospital staff, Red Cross volunteers—all have the tools and resources they need to respond. I am pleased to say that we are *already making great progress* in this area. At Homeland Security we have worked to provide a framework for emergency preparedness planning

It can also be said, however, that the new political economy models that presume complete information or sophisticated planning by governments and citizens did not work as well the older core models that allow for voter ignorance, shortsightedness, and systematic error. The newer more "sophisticated" models could only be applied tautologically after the mud settled. It is clearly doubtful that the levee failures were contrived to maximize rents for recovery firms or that voters in Mississippi, Louisiana, and New Orleans currently regard the emergency plans adopted by their current and past leaders without complaint. Mistakes are predictable consequences of rational choice models, however, when information costs, ignorance, and urgency are taken into account.

Many of the institutional lessons of Katrina also follow from mainstream public choice analysis. Katrina affirms that competition within Federal systems exists, but suggests that it is less rigorous than postulated in Tiebout models. Both above- and below-average governments evidently coexist at both state and local levels of government. Consequently, miscalculations will be larger in some states than others for reasons only indirectly connected to federalism. In the case of Louisiana, a more complex and difficult public policy problem had to be addressed by below-average state and local governments, and the result was less than might be hoped for.[29] On the other hand, above-average state governments deal with similar storms with fewer failures and far lower damages. Florida, for example, responds to similar emergencies with far greater success within more or less similar institutions. Indeed, help from Florida was among the first to arrive in the Gulf region after Katrina departed.

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that will guide and coordinate the integration of our national response capabilities."

[29] The Statistical Abstract of the United States reports that Mississippi and Louisiana are the first and seventh lowest in per capita incomes, and their citizens are the second and eighth least likely to have graduated from college. Mississippi and Lousiana are the first and third most corrupt states (*Corporate Crime Reporter*, January 2004). Prior to Katrina's landfall, the U.S. Attorney's office had indicted 16 officials in Louisiana for misuse of FEMA funds, including 3 of Louisiana's top emergency officials (*Scripps Howard News Service*, 5-02-05).

The U.S. Bureau of the Census *(Historical Population Counts, 1900 to 1990)* reports that the city of New Orleans (Orleans Parish) has been continually losing population since 1960, when its population was 627,525. By 2000, its population had fallen to 462,269. The population of the metropolitan area, however, has increased from 1.26 in 1990 to 1.31 million in 2000.

Federalism's strengths and weaknesses are also in evidence. On the one hand, national risk pooling allowed resources gathered at the national level to be directed to regional catastrophes, increasing support levels for those affected by natural disaster. On the other, numerous coordination problems arose because responsibilities are shared among several levels of government. Public policies before, during, and after a crisis are affected by free riding and discoordination, at the same time that yardstick competition, efficiency, and innovation are encouraged. The greater effectiveness of Florida's hurricane policies allows voters (and researchers) to determine that the failures of Louisiana and Mississippi are not simply bad luck.

Public choice research has also long stressed that long-term and intergenerational externalities are difficult for democracies to solve. Both politicians and rent-seeking firms tend to focus on policies that most directly affect their next reckoning with the polls and accountants. Voters and consumers tend to care more (rather than less) about the future consequences of public policies than persons operating in environments in which short-term results are used as measures of productivity that determine personal wealth, power, and prestige. However, voters do not have the information, time, or imagination to analyze every long-term policy problem that exists, nor to easily monitor how well their agents advance that subset of their long term goals addressed through public policy.

Many policy problems, thus, fall between the cracks of modern political systems. Katrina, clearly demonstrated the existence of such fault lines. Levees were underbuilt, emergency plans were poorly worked out, and provisions for once-a-generation natural disasters were not in evidence. In this case, the institutional failures were graphically revealed by physical cracks in levees and by the breakdown of law and order. In other cases, the gaps in long-term policies may be less concrete, but they may also produce results that are far from optimal. Katrina demonstrates that such hidden institutional fault lines are clearly worthy of analysis, because institutional weaknesses can and do produce catastrophes when placed under unusual stress.

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[Dozens of articles from regional and national newspapers, C-span interviews, and governmental websites were also used to assemble the facts used in the analysis developed above. The most important are listed in footnotes.]