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Retrospectives and Prospectives on Hurricane Katrina: Five Years and Counting

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Five Years after Katrina: A Special Follow-up Report

New Orleans' recovery from the damage caused by Hurricane Katrina in 2005 reflects a long, complex, contentious process that still is not complete. In this article, the authors explore the key factors that have supported and hindered recovery so far. Initial conditions within the city, the web of policy demands, as well as recent changes in law and procedures for the region are explored using a new model that may be applicable to other severe disasters. Any recovery, the authors conclude, must be anchored within a local context, but only with necessary administrative backing from the wider region and society. Recovery from disaster offers a rare opportunity to rebuild damaged communities into more resilient ones when energy and investment are immediately channeled into the stricken region and focused in a constructive redesign that acknowledges environmental risk. The recovery process then shifts to mitigation and reduction of risk. Hence, cities will be better prepared for the next extreme event, which will surely come.

August 29, 2010, marked the fifth anniversary of Hurricane Katrina's landfall. The massive storm, with winds clocked at more than 145 miles per hour as it approached land, struck just east of New Orleans on August 29, 2005. The damage that ensued from the storm and the subsequent flood of New Orleans, caused largely by the failure of its levee system,[1] has been well documented (Brookings Institution 2009; U.S. House 2006; Waugh 2006). We examine the process of recovery from the consequences of the storm, and the role of public agencies in facilitating or inhibiting that process.

Gulf Coast communities are still engaged in an extended recovery process. New Orleans, the central city in the metropolitan region of south Louisiana, continues to struggle with recovery issues. Bold promises made by federal, state, and local officials immediately after the storm to "bring New Orleans back" have proven far more difficult to keep and far more complex than policy makers anticipated. Why has the recovery process following Katrina failed to achieve a clear vision for the region and make the anticipated progress, amid multiple policy initiatives and billions of dollars in allocated funds? We argue that the policy and administrative processes of recovery from catastrophic events have not been well understood, and that the lack of a clear policy design supported by professional administrative practice across jurisdictional levels of authority and action has hindered the recovery of New Orleans. We offer a set of policy recommendations gleaned from this experience that may facilitate the complex process of recovery in future extreme events.

Recovery from disasters has received relatively little attention in administrative policy and practice. Yet for communities that have experienced disasters, the recovery process is critical to regaining the capacity to function and develop, albeit in an environment of continuing exposure to risk. How recovery is conceived, specified, implemented, and evaluated is fundamental to reducing risk and losses from subsequent disasters, which are virtually certain as society expands and changes in relation to its environment.

The tasks of recovery can be viewed as generating a complex system of interacting jurisdictions, public agencies, private and nonprofit organizations, and households that are engaged

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in a shared effort to rebuild a community following disaster. Yet public agencies have legal responsibilities that constrain their actions and shape the process. The process is dynamic, as interactions among actors at any one point may facilitate or hinder possible actions of other actors at the next point of decision. Three primary characteristics affect the patterns of interaction among actors participating in the disaster recovery system. These include (1) the severity of the triggering event, the capacity in place before the event, and the consequent degree of damage; (2) the scalability of recovery operations initiated at different jurisdictional levels of authority; and (3) the heterogeneity of participating actors and affected clientele groups.

Recovery in practice represents an interdependent process that involves multiple organizations with different capacities and needs interacting in response to a range of technical, social, and economic issues that produce effects of varying intensity on different groups in the population. The recovery process is long term, so establishing a framework for action that can also provide timely review and redesign by participating actors as conditions change is crucial. Given the degree of heterogeneity in actors, actions, and expected outcomes, a clear conception of the goal of recovery for the region is fundamental. Potential conflict among participating actors is not unusual (Sylves 2009), but if the governing dynamic is structured as a learning process (Hutchins 1995) and focused on a clear goal that is shared among diverse actors (Churchman 1971), recovery may indeed produce a resilient community that adapts to continuing risk.

Recovery in New Orleans: Vision, Plans, Processes, and Results

New Orleans and the surrounding region are still in active recovery, and no one is satisfied with what has been accomplished over the past five years. How do we account for the pervasive sense of disappointment, how do we explain what happened, and how can we, as a country, account for the billions of dollars in allocated funds that still lie unspent when so much need obviously remains? This snapshot of the ongoing process summarizes the local visions for recovery and the processes that have been put in place to accomplish those visions.

Planning the recovery from the consequences of Hurricane Katrina and the ensuing flood started immediately when the scale of the event became apparent. While displaced residents were engaged in day-to-day survival activities and paralyzed in their longer-term decisions because of the uncertainties associated with levee safety, basic urban services, resources, and access to their homes, an army of other actors started seriously thinking about what should be done. In strategy sessions held throughout the United States, elected officials, consulting companies, universities, large and small businesses, professional associations, philanthropic foundations, nongovernmental organizations, think tanks, and international actors began laying out their visions for the recovery. Slides and maps showed the degree of flooding in New Orleans neighborhoods, and participants were invited to engage with expert panelists on strategies that would be used to plan the recovery and prioritize actions. The strategy that emerged from

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many of these external sessions was to focus rebuilding in areas that were only slightly damaged and could be fixed in the short term.

A fundamental question that persisted throughout the recovery process was whether all of the affected areas of the city should be rebuilt. New Orleans and the Gulf Coast are still grappling with this question five years later. While the New Orleans population is now at 80 percent of its prehurricane level, approximately 29 percent of its residential structures remain blighted,[2] representing the highest concentration of blight in any U.S. city.[3]

The first official attempt at a local recovery plan for New Orleans was offered by a national think tank, the Urban Land Institute, under the auspices of Mayor Ray Nagin's Bring New Orleans Back Commission, just three months after the flood. The plan called for selective rebuilding, whereby building permits would not be issued for the most damaged areas, but areas that had received little damage would be eligible for immediate public assistance and investment. Residents of areas between these two extremes would have a limited time in which to demonstrate their communities' viability (by preparing neighborhood development plans) before receiving any investment. The areas with the most damage also housed most of the city's poor and working-class people of color.[4] These areas would be bought out and the lands converted to green space. This plan was met with public outrage and rejected.

A few months later, the Bring New Orleans Back Commission issued its own plan, which toned down the notion of turning highly damaged areas into green space, while at the same maintaining the essential framework of the Urban Land Institute plan. The commission's plan proposed "immediate opportunity areas" where rebuilding would begin immediately, as well as "neighborhood planning areas" where no rebuilding permits would be issued until at least 50 percent of residents returned within a four-month period (Reardon 2006). Yet this plan prevented rebuilding in some areas, and, viewed as another land grab or forced gentrification design, it was widely rejected by the public.

These first two attempts to plan the recovery in a top-down manner fueled a groundswell of neighborhood organizing and two major community-based planning efforts: the Neighborhood Rebuilding Plans (also known as the Lambert Plans) and the Unified New Orleans Plan (UNOP). While the Lambert Plans and the UNOP covered all New Orleans neighborhoods, other plans covered only a single neighborhood (e.g., the ACORN Plan) or the entire region affected by the storm (i.e., the Louisiana Speaks Plan). Several neighborhoods effectively organized themselves and established partnerships with universities and nonprofit organizations to help them plan their own recoveries (e.g., the neighborhoods of Broadmoor, Lakeview, and the Lower Ninth Ward). Philanthropic organizations established neighborhood-based recovery projects, such as Brad Pitt's Make It Right Foundation in the Lower Ninth Ward, Leonard Riggio's Project Home Again in the Gentilly neighborhood, Wendell Pierce's Pontchartrain Park neighborhood project, and Global Green's Holy Cross neighborhood project.

The UNOP was funded by a grant from the Rockefeller Foundation to develop community-driven recovery strategies and to bring together neighborhood planning efforts into a single comprehensive recovery plan for the city. The resulting recommendations were published in 16 district plans and one overarching plan, known simply as the Unified New Orleans Plan. Hundreds of community meetings, guided by a dozen professional planning firms, resulted in a list of prioritized recovery projects covering all New Orleans neighborhoods. Like most plans, the UNOP did not include funding for these projects. To qualify for postdisaster Hazard Mitigation Grant Program (HMGP) funds after Hurricanes Katrina and Rita, the city hurriedly prepared a hazard mitigation plan that subsequently was approved by the Federal Emergency Management Agency (FEMA). The plan was submitted to FEMA in December 2005 and approved in March 2006. Having this plan allowed the city to qualify for $57 million in immediate HMGP funds and additional mitigation funds, but the plan was not well integrated with the UNOP or other planning efforts.

The mayor's Office of Recovery Management, established in December 2006, also prepared a citywide Recovery Implementation Plan, which combined the results of the UNOP with a selection of 17 target recovery areas that covered all parts of New Orleans. Maps of the target areas, which identified where recovery funds would be spent first, were made publicly available and were widely accepted. The Louisiana Recovery Authority (LRA), established in October 2005,[5] allocated special disaster funds from U.S. Department of Housing and Urban Affairs' (HUD) Community Development Block Grants (CDBG) to fund the target area recovery projects. Initially, $117 million in disaster CDBG funds were allocated, and later, an additional $294 million were added, for a total of $411 million for New Orleans. A plan for spending these funds was developed by the Office of Recovery Management, and on June 25, 2007, the LRA approved New Orleans' Long-Term Community Recovery Plan. Although approved, this plan was not widely distributed to the public as previous plans had been.

A summary of the major planning efforts that were undertaken in New Orleans is presented in table 1, in chronological order. This list

Table 1 Formal Post-Katrina Planning Efforts in New Orleans and the Gulf Coast

Urban Land Institute's Strategy for Rebuilding New Orleans (2005)
Mayor Ray Nagin's Bring New Orleans Back Commission Plan (2006)
City Council's New Orleans Neighborhoods Rebuilding (Lambert) Plans (2006)
FEMA's ESF-14 Plan (2006)
New Orleans City-Assisted Evacuation Plan (2006)
Orleans Parish Hazard Mitigation Plan (2006)
Redevelopment Plan for Broadmoor (2006)
ACORN People's Plan for Rebuilding the Lower Ninth Ward (2007)
Louisiana Speaks Regional Plan (2007)
Unified New Orleans Plan (2007)
Office of Recovery Management's Citywide Recovery Implementation Strategy (2007)
New Orleans Strategic Recovery and Redevelopment Plan (2007)
GreeNOLA Strategy for a Sustainable New Orleans (2008)
Louisiana Comprehensive Plan for a Sustainable Coast (2007)
New Orleans Long-Term Community Recovery Plan (2007)
Army Corps Interagency Performance Evaluation Task Force Report (2008)
Army Corps Louisiana Coastal Protection and Restoration Plan (2008)
New Orleans Master Plan (2008–present)
New Orleans Multi-Hazard Mitigation Plan Update (2009–present)

Table 2 List of Acronyms

Acronym	Name of Organization
ACORN	Association of Community Organizations for Reform Now
BNOB	Bring New Orleans Back Commission
CDBG	Community Development Block Grant
CPRA	Coastal Protection and Restoration Authority
DHS	U.S. Department of Homeland Security
DMA	Disaster Mitigation Act of 2000
ESF	Emergency Support Function
FEMA	Federal Emergency Management Agency
HMGP	Hazard Mitigation Grant Program
HUD	U.S. Department of Housing and Urban Development
LACPR	Louisiana Coastal Protection and Restoration Technical Report
LACPRA	Coastal Protection and Restoration Authority of Louisiana
LRA	Louisiana Recovery Authority[6]
LTCRP	Long-Term Community Recovery Plan
MCIP	Mississippi Coastal Improvements Program
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NRF	National Response Framework
PA	Public Assistance Program
QHSR	Quadrennial Homeland Security Review
SBA	Small Business Administration
SRRP	Strategic Recovery and Redevelopment Plan
ULI	Urban Land Institute
UNOP	Unified New Orleans Plan

is impressive, but it does not reflect the frustrations experienced by New Orleanians, many of whom were displaced by the hurricane and levee failures, insulted by the inadequate government response, and then obliged to participate in a torrent of officially sanctioned participation meetings and public hearings regarding the city's recovery. All of these efforts occurred while residents grappled with complex, disaster-related paperwork, slow-moving insurance companies and government agencies, and sometimes fraudulent contractors hired to rebuild homes and businesses. This set of demands does not include attending participation meetings administered by the U.S. Army Corps of Engineers, keeping up with state decisions related to the Road Home and Hazard Mitigation programs, or keeping up with Small Business Administration loans, building code changes, and the complexities of the National Flood Insurance Program.

These planning and recovery efforts engaged residents intensely for four solid years, and many people remain involved. The recovery was also interrupted by Hurricanes Gustav and Ike in 2008, which required evacuation of the region. The New Orleans recovery process, in practice, has stretched the limits of community participation, planning, and personal resilience.

New Orleans has 73 neighborhoods and nearly 400 community-based organizations.[7] As with the planning process, there are many actors involved in the recovery; a partial list of key actors is presented in table 2. The federal actor with the strongest role in New Orleans' recovery has been FEMA, which is responsible for providing disaster assistance to affected communities. The key state actor is the Louisiana Recovery Association, which receives CDBG funding from the Department of Housing and Urban Development and controls and allocates these funds to local entities. Locally, the city of New Orleans municipal government, the Sewerage and Water Board, and the New Orleans Redevelopment Authority have been key recovery actors.

Hurricane Katrina has cost approximately $157 billion to date,[8] categorized as follows:

- $75 billion (48 percent)—federal spending on emergency (includes $800.5 million in levee repairs[9])
- $45.5 billion (29 percent)—federal spending on recovery (includes $14.45 billion in levee improvements,[10] $16 billion in flood insurance claims,[11] and $8.65 billion for the Road Home Program[12])
- $30 billion (19 percent)—private insurance
- $6.5 billion (4 percent)—philanthropic giving

Despite the extraordinary amount of voluntary action and philanthropic giving associated with Hurricane Katrina, philanthropy has amounted to only 4 percent of total disaster spending. Private insurance covered a modest 19 percent, but federal sources account for the vast majority of Katrina-related spending (77 percent). Most federal spending is disbursed to states through the Public Assistance, Hazard Mitigation Grant, and National Flood Insurance programs, all of which are managed by FEMA and administered by state agencies. The federal component also includes the state-managed, federally funded HUD disaster CDBG and Road Home programs. Businesses and residents also receive aid from FEMA's Individual Assistance Program and Small Business Administration loans.

To access FEMA's Public Assistance and Hazard Mitigation Grant program funding, local jurisdictions must prepare and submit (through their states) project worksheets for each structure that was damaged in the event, such as a pump station, a public building, or a house. Funding is approved first by the state and then by the federal government. However, the state of Louisiana directly administered the disaster CDBG and Road Home programs,[13] and later the HMGP. Local jurisdictions and individual homeowners applied directly to the state for these programs. Funded by HUD, the Road Home Program was originally conceived as a homeowner compensation program, but in practice, the program covered only a fraction of uninsured losses. Road Home grants to homeowners were limited to $150,000 per damaged home, with an average grant of $66,138.

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The public breakdown of federal, state, and local government performance during the emergency response to Hurricane Katrina is well documented. Less understood is the fact that governmental failure—in terms of profound coordination problems that caused massive delays across every major program—continued well into the recovery period. New Orleans' experience in implementing disaster programs involving federal, state, and local governments offers insight into the dilemmas that communities face in a catastrophe, the range of local practical knowledge generated to deal with these tensions, and the value that this knowledge may bring to policy reform and adaptive program implementation.

The difficulty of disaster program implementation in New Orleans was further compounded by the fact that few funders were willing to give money directly to citizens or to local governments in Louisiana because of the state's reputation for corruption and mismanagement of funds. Many convoluted processes were created to prevent direct transfers of money to citizens and local governments in a form of "bureaucratic risk," in which funders faced a high degree of uncertainty about delivering disaster funds to local bureaucracies. High levels of bureaucratic risk exist not only in New Orleans, but also in other cities in the United States and around the world. With high uncertainty, our scientific knowledge of hazards, engineering knowledge of solutions, and policy knowledge of strategies for action cannot ensure reasonable policy outcomes.

A substantial lack of coordination among local, state, and federal levels of government contributed to ongoing confusion about disaster programs in general, and about program requirements in particular. The cumulative effect of multiple inefficiencies resulted in excessive waste and unnecessary costs, much of which could have been prevented. On June 21, 2007, the New Orleans City Council passed motion M-07-271 adopting New Orleans' Strategic Recovery and Redevelopment Plan (also known as the Citywide Strategic Recovery and Redevelopment Plan or the Orleans Parish Strategic Recovery and Redevelopment Plan). This motion requested that the LRA release recovery funds allocated to Orleans Parish under its Long-Term Community Recovery Program. Just days later, on June 25, the LRA passed a resolution officially accepting the UNOP as the foundation for the city's recovery, and officially approving the Strategic Recovery and Redevelopment Plan as the recovery plan for Orleans Parish.[14] The Long-Term Community Recovery Plan established a unified set of priorities for the recovery of New Orleans and incorporated all of the previous planning processes that had been conducted. This plan also assigned dollars to the priorities identified in the community's planning process. In theory, this series of community-based, participatory planning efforts, culminating in an official recovery plan approved by all parties at both the local and state levels, should have facilitated recovery implementation. Five years after the event and three years after the approved recovery plan, many agree that the recovery has faltered. What went wrong?

There is no objective measure for how fast New Orleans should be recovering from the largest catastrophe in U.S. history. Despite a well-funded participatory planning process (the UNOP) through which environmental concerns were identified and prioritized, despite the formal inclusion of citizen concerns into the Long-Term Community Recovery Plan that was approved by the state and the city council, despite the allocation and availability of funds to pay for the plan, and despite the development of eligible projects and programs and official requests for funding, it has taken years just to get started. According to the city's recovery progress report, only two out of 676 recovery projects had completed construction as of June 30, 2009 (LRA 2007). This outcome reflects the failure of operating a recovery program based on funding that is available to local communities only on a cost reimbursement basis.

A second problem is the marked difference in perspectives regarding the use of land and property acquisition as a mitigation technique. Questions about the acquisition of at-risk properties and the right of displaced residents to return were hotly debated in New Orleans, and still are not fully resolved. The third problem is bureaucratic risk, and the degree to which controls established to reduce

bureaucratic risk have led to delay in recovery, causing further harm to disaster victims. These normative questions remain unanswered. The status of the New Orleans recovery is still a work in progress.

Recovery in Policy and Practice Following Hurricane Katrina

Recovery from catastrophe is particularly challenging. A catastrophe strikes across a broader spatial scale, lasts longer in the immediate response and in short- and long-term recovery phases, and does more intensive damage—including near-total destruction of entire communities and neighboring communities (Quarantelli 2005)—than more "routine" disasters. The Stafford Act and its amendments are designed to address routine disasters—those that affect only one or a few jurisdictions and that can be addressed through state action and state and local mutual aid agreements. The federal government serves as an overall coordinator in routine disasters, but not as the sole resource. During a catastrophe, the federal government may be the sole resource for organizing response, at least for a while.

After a catastrophe, it may take months or even years for a local government to rebuild its capacity for basic functions and to create a vision for postdisaster redevelopment of the community. Current federal policy does not consider this need. It fails to recognize that local capacity for facilitating community decisions about rebuilding and planning is extremely diminished after a catastrophe (Olshansky and Johnson 2008). It underestimates the extent and severity of damage done to citizens, who need statutorily legitimate assistance very quickly. And it fails to understand that local governments struck by a catastrophe also need rapid funding to return to their role in redevelopment. As we have noted, federal disaster policy fails to take into account simple matters such as the difficulty that local governments have in paying for recovery projects—such as public facilities restoration—on a reimbursement basis, when these communities' treasuries are depleted by immediate emergency response needs and the collapse of the tax base.

These policy problems reflect central issues in the recovery after Katrina. The first issue involves the poorly understood social processes of recovery (Smith, forthcoming; Smith and Wenger 2006). Recovery is a remarkably complex process with a wide range of actors, particularly in catastrophes, where the scale and scope of the event are so great that many actors are drawn in. Research is only now beginning to understand these processes, but has not greatly influenced practice. Second, recovery is not an emergency management function—other agencies, such as housing agencies, planners, public works, and related functions have a greater role in recovery than do emergency managers, who usually address the most acute aspects of a disaster. A third issue is the importance of effective hazard mitigation that does not rely on engineered systems that can and often do fail, such as levees. But hazard mitigation is not a priority for the federal government. To the extent that progress was made in creating a "mitigation culture" during the Bill Clinton administration, it was lost when the George W. Bush administration deemphasized mitigation. Even then, local governments often resist strong mitigation measures that impede land development.

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A fourth Katrina-related issue is the contested division of intergovernmental responsibilities in disasters and catastrophes (Birkland and Waterman 2008; Scavo, Kearney, and Kilroy 2008). The governing concept in intergovernmental disaster policy is that local and state governments start the process, and seek assistance as needed. In practice, states seek federal assistance in nearly every event. This relief seeking has been encouraged by generous federal aid, which may reduce individuals' and local governments' incentives to plan for routine disasters (Platt 1999). At the same time, adherence to the "all disasters are local" mantra has inhibited creative thinking to address the federal role in catastrophes with national consequences, particularly with respect to postrecovery management. This doctrine holds that action *always* should be shared, and action initiated locally, even when local and state governments are incapacitated.

Major changes to law are less important than changes in attitudes, management, and performance. An amendment to the law could allow for the declaration of a "catastrophic disaster," which would signal that an event is more significant than a "routine" disaster. Such a declaration would not require that potentially overwhelmed state and local governments act first to access federal relief. Existing programs could then address catastrophes with relatively minor changes to the law and regulation. For example, cost sharing for the Public Assistance and Individual Assistance programs could be waived immediately, rather than later in the process or retroactively.

The catastrophic designation would also signal that recovery will be more challenging, and that the federal government should step up its efforts. Emergency Support Function 14, Long-Term Community Recovery, initially specified in the National Response Plan, December 2004 and activated in response to Hurricane Katrina in September 2005, was incorporated into the National Response Framework in 2008. ESF 14 reflects continued confusion and disjointedness in federal action, which is why it was largely ignored during the Katrina recovery (Horne and Nee 2006). Recovery may be better led by HUD than by FEMA, because recovery is more a community development process than it is disaster response (Olshansky and Johnson 2008). Agencies such as HUD could then offer the sort of assistance that goes well beyond the vague and unstructured list of agencies and activities included, with little explanation, under Emergency Support Function 14. These agencies can often be entrepreneurial in providing assistance, such as HUD's assistance to North Dakota after floods in 1997 (Olshansky and Johnson 2008), but recovery policy should not be based on potential agency entrepreneurs.

The underlying managerial and policy design principles of disaster recovery policy are economic recovery, equity, and effectiveness. Recovery policy should be focused on encouraging the recovery of economic activity to the greatest extent possible, even if the mix of activities is changed by the nature of the catastrophe and by the shape of the community that emerges from it. A major brake on economic recovery after Katrina was labor shortage, which was exacerbated by the ongoing lack of affordable housing for workers in key industries (Brookings Institution 2009, 12). At the same time, the majority of federal housing resources, such as the

nearly $8 billion allocated to the Road Home Program, was devoted to homeowners' recovery, even as the industries with labor shortages generally employed renters.

Broad-based community planning based on a shared vision and norms of equity involves local facilitation and accounting for local needs (Olshansky and Johnson 2008). While New Orleans and the Gulf Coast became a living laboratory for many urban planning ideas, these ideas need to reflect community culture, preferences, and needs. Catastrophes cripple local recovery planning efforts, so communities need experts in urban design, socioeconomic analysis, and geospatial mapping to assist (not control) the development of recovery plans. Federal policy needs to provide long-term support for community efforts to plan, not simply as a matter of largesse, but as appropriate support for community planning that can increase resilience, improve mitigation, and reduce vulnerability in the face of the next storm (Berke, Kartez, and Wenger 1993). Absent these activities, the scale of catastrophic losses may induce greater haste in recovery, paradoxically recreating the very sort of vulnerability that contributes to catastrophic losses (Burby and Dalton 1993; Mileti 1999, 23).

The Post-Katrina Emergency Management Reform Act of 2006 contained major fixes to the failures of post–September 11 emergency management, but did not engage fundamental questions about disasters. Fortunately, the nation has begun to discuss the value and importance of resilience as an organizing principle. But to focus on resilience, we first must consider vulnerability, which, in turn, relates to equity concerns. Some people, communities, and regions are more vulnerable than are others (Cutter 1996; Cutter and Emrich 2006; Weichselgartner 2001), and government policies often exacerbate risk and vulnerability. Reducing vulnerability would yield overall community resilience while reducing inequities in recovery that are considerably pronounced in catastrophes, such as the focus on owner-occupied housing, because resilience would help avoid catastrophe by definition.

To move toward resilience, the federal government should, first, review its broad range of policies to understand how disjointed federal policies contribute to vulnerability by subsidizing risks (Birkland et al. 2003; Burby 2006). Congress could require that any federally funded capital project must not create or promote additional risk. Federal subsidies for infrastructure expansion and improvement in the most hazardous areas should be banned outright. Those who wish to build on such land should be required to assume all risks.

Second, the federal government should balance its commitments to disaster relief with an equivalent emphasis on mitigation and recovery. Losses would be lessened, and taxpayers' money would be saved. FEMA allocated $1.47 billion for the Katrina/Rita Hazard Mitigation Grant Program, the largest amount in history, but limited in comparison to the scale of the disaster and the $157 billion spent on response and recovery. Predisaster funds allocated under the Disaster Mitigation Act of 2000 involve paltry sums that are distributed to high-capacity communities. This shift away from relief to other aspects of the cycle does not require that more money be spent—it requires that existing relief spending be spent more intelligently to prevent the need for relief in the first place. The Obama Administration's draft Disaster Recovery Strategy reflects movement toward this position, but it has no authority for compelling action.

A third change in attitudes and policies involves shifting the planning process for catastrophic disaster recovery to one that addresses the most likely *and* the most consequential risks in a community (Nance 2009). Planning across the disaster cycle should proceed, from the beginning, from an all-hazards framework that is adjusted for regional risk differences, rather than focused on one or "all" hazards. A sound catastrophic recovery plan *for the most likely hazard* would likely build capacity for recovering from any other hazard agent that may strike a community.

Finally, important changes need to be made in regulations or statutes to support immediate recovery from catastrophes. The federal government must provide for more rapid and realistic damage assessments of public facilities so that rebuilding can begin quickly in order to regain community capacity. Currently, such assessments are slow and often disputed. The federal government should also be prepared to advance local governments their expected cost share amounts up front, so that repair or rebuilding projects can begin immediately. If local cost sharing is required later (it is often waived in catastrophes), it can be recouped when local cash flow improves. These are examples of minor changes in practice that would yield great benefits for the victims of catastrophes at almost no cost to the federal government, but would produce substantial savings.

None of these ideas is new or sweeping. Instead, these ideas simply adopt sound risk management and recovery management practices that have long been advocated in earlier and current research and technical literature, but have not yet been implemented. Catastrophes can be avoided when the federal government does not create risk as it tries to reduce it, and when the federal government actively supports effective recovery actions that do not simply replicate or exacerbate the immediate catastrophe, or recreate the conditions under which it can be repeated. These ideas must suffuse the entire range of disaster policies.

Long-Term Recovery for New Orleans and the Gulf Coast

State and local governments traditionally have been center stage in all phases of emergency management. "First response" comes from survivors, those nearby, and local police, fire, and emergency medical personnel. Most emergencies are small in scale and the recovery is short term. Mitigation, especially of risks from natural hazards, is primarily a state and local responsibility requiring integration with many aspects of community planning, collaborative practices, and public participation. Typically, the role of the federal government has been as a facilitator. The September 11 terrorist attacks shifted attention to large-scale global terrorism and away from natural disasters, while Hurricane Katrina focused attention on large-scale catastrophes resulting from the intersection of natural hazards and human actions (Cigler 2007). Both increased the federal role in emergency management.

Current U.S. disaster management laws and regulations, along with implementing agencies, are the result of piecemeal decisions. Needed revisions to existing laws have not been made, the integration of laws with one another has not occurred, and a traditional focus on small-scale disasters has not been transformed

to deal with new threats and catastrophic events of the magnitude of Katrina. Enacted in 1988 and significantly amended in 2000, the Robert T. Stafford Disaster Relief and Emergency Assistance Act is the centerpiece of disaster law; it defines how federal disasters are declared, determines the types of assistance provided by the national government, and establishes cost-sharing arrangements among governments. FEMA is responsible for coordinating and disseminating relief under the Stafford Act, which has undergone changes since Hurricane Katrina. Examples are the development of a national disaster housing strategy, the provision of additional funds for pre-disaster mitigation, and the creation of programs to facilitate family reunions and locate displaced children.

The Homeland Security Act of 2002 created the U.S. Department of Homeland Security (DHS) after September 11 and brought FEMA into that department. After Hurricane Katrina, the DHS was the object of scrutiny surrounding issues related to its and FEMA's mission and culture, leadership and structure, capabilities, resources, and accountability (Cigler 2009a). The Post-Katrina Emergency Management Reform Act of 2006 was enacted to address shortcomings identified in the preparation for and response to Hurricane Katrina. That act retained FEMA within the DHS, but made it a distinct agency within the department and placed restrictions on the secretary of homeland security's authority to reorganize FEMA. It also reintegrated preparedness, response, and recovery within FEMA.

The Post-Katrina Act created a National Integration Center within FEMA, which is responsible for the ongoing management and maintenance of the National Incident Management System adopted in 2006 and the National Response Framework (previously called the National Response Plan). There is still uncertainty whether the National Response Framework, which became effective in March 2008, provides a workable operational plan for coordinating a disaster response of any type. Despite agreement that building an agency strategy and organization based on the principles and concepts of National Incident Management System is what is needed and that the DHS's incident management responsibilities are best met through proximity to FEMA's critical preparedness and response mission, the implementation of changes in the Post-Katrina Act is not proceeding at an adequate pace.

The Post-Katrina Act has 300 distinct management provisions in such areas as emergency communications, evacuations, logistics, mass care, planning and training, and human capital. A new Office of Communications focuses on stakeholder outreach, technical assistance, coordination of regional communications, and establishment of a National Response Capability. Evacuation plans focus on relocating displaced individuals, helping states with their evacuation plans, and providing technical assistance. Special needs populations, beginning with a position of disability coordinator and including model plans and electronic family and child locator systems, are central. The Quadrennial Homeland Security Review, released by the DHS in February 2010, dovetails with Post-Katrina Act provisions and makes individual and community preparedness a key emergency management goal at all levels, although it remains focused primarily on terrorism.

The Post-Katrina Act does not focus on long-term recovery and rebuilding issues, however. The Obama Administration has acted to rejuvenate the rebuilding process for New Orleans by creating a new decision process for financing and making a concerted effort at better working relations among and between federal agencies such as FEMA and the Department of Housing and Urban Development, and with Louisiana and New Orleans.

Despite changes in disaster management law, a continuing problem is that current laws use competing definitions and criteria for determining when to respond to a major event, resulting in confusion about which regulations apply. A disaster can simultaneously be declared a "major disaster" under the Stafford Act and a "catastrophic incident" under the Post-Katrina Act. The catastrophic incident provisions of the Post-Katrina Act were not included in Stafford Act changes; instead, they appear in sections of law that deal with national emergency management and add a new layer of regulation terminology.

In 2005, the U.S. Army Corps of Engineers began two comprehensive planning efforts, the Mississippi Coastal Improvements Program and the Louisiana Coastal Protection and Restoration effort, to develop systemwide solutions to assist in Gulf Coast recovery and to provide greater resiliency for future storm events. The Coastal Protection and Restoration Authority of Louisiana was restructured in 2006 to form the Coastal Protection and Restoration Authority of Louisiana, a state entity with authority to focus development and implementation efforts for comprehensive coastal protection and restoration and to coordinate with the Corps (see Cigler 2009b; LACPRA 2007, 2009; U.S. Army Corps of Engineers 2006). Coastal planning in Louisiana previously was conducted by natural resource agencies unrelated to structural flood protection. After Katrina, an attempt was made to merge the management and science/engineering issues of coastal restoration with flood protection. This is a rare attempt to coordinate relationships across agency types and disciplines, horizontally and vertically.

The Corps' initiative is guided by four themes: (1) a comprehensive systems approach, (2) the use of risk-informed decision making, (3) communication of risk to the public, and (4) the use of professional and technical expertise (LACPRA 2009). Even the strongest levees and flood walls cannot promise to save New Orleans from a major hurricane (National Research Council 2009), so a complex "multiple lines of defense" strategy is being forged (Cigler 2009; Lopez 2009; Nance 2009). It includes three very broad sets of strategies:

- Coastal restoration alternatives, such as barrier island and shoreline restoration, bank and shoreline stabilization, and marsh creation
- Structural alternatives, such as engineered floodwalls, seawalls, floodgates, and levees
- Nonstructural alternatives, such as elevated structures, property buyouts and permanent relocation, and sound zoning and building codes

Since Hurricane Katrina, the Louisiana legislature has consolidated the many parish levee districts into two districts, one on each side of the Mississippi River. The LRA was created to oversee regional recovery planning, given the prior errors in levee management and maintenance. It will take at least six years to rebuild a stronger levee system in New Orleans with protection against a modest 100-year

storm (Colten, Kates, and Laska 2008). The LACPRA has instituted two programs for integrating ecosystem restoration and hurricane protection with Louisiana's Comprehensive Master Plan for a Sustainable Coast and the LRA's Louisiana Speaks Regional Plan, both created in 2007. In April 2008, Louisiana updated and adopted its State Hazard Mitigation Plan, which is required by the Post-Katrina Act. Many local governments now have mitigation plans, with some attempting to integrate hazards mitigation planning with comprehensive or master plans. Efforts have been made at the regional level to work across the Mississippi Coastal Improvements Program and the Coastal Protection and Restoration Authority.

Louisiana and New Orleans have also taken steps to combine structural and nonstructural mitigation options beyond the strengthening of levees and levee supports. FEMA has three mitigation grant programs: the Hazards Mitigation Grant Program, Pre-Disaster Mitigation Program, and the Flood Mitigation Assistance Program, although Congress passed emergency appropriations of $110 billion after Hurricanes Katrina and Rita to provide additional assistance and to establish temporary programs going beyond the scope of the Stafford Act. The postdisaster HMGP and predisaster mitigation funding, both administered by FEMA, offer some help. Yet this help falls far short of current needs, as the amount of funding and attention paid to mitigation is far less today than it was 10 years ago. While Louisiana and its local governments bear financial repercussions of the U.S. recession, their own funding for mitigation is lessened, although New Orleans has committed to hardening levees and flood walls, wetlands protection, and barrier islands restoration.

Whether new zoning and building codes will be implemented is not yet clear, but the Louisiana State Uniform Construction Code, based on international standards, was adopted in 2007. It replaced local codes, but local governments may adopt more stringent provisions. In June 2008, New Orleans committed to developing a master plan and comprehensive zoning ordinance. Still under review, the 2030 Master Plan, with its "green" and sustainable approaches, integrates traditional and performance-based development standards into all aspects of development.

Louisiana has instituted a program to provide reductions in insurance premiums, tax exclusions, and deductions for residents who voluntarily retrofit existing structures in compliance with the new state construction code or show that a technique reduces wind or hurricane losses. The Gulf Coast still faces significant obstacles in obtaining private insurance, with controversy over wind versus water damage leading companies to stop or decrease the writing of new policies or to drastically increase premiums on existing policies. Insurance issues, as well as efforts to revise the National Flood Insurance Program, are on the policy agenda.

New Orleans as a Resilient Community: Review, Reflection, and Redesign

Reviewing the past five years and the experience of recovery in New Orleans and other Gulf Coast communities, we offer five

> Reviewing the past five years and the experience of recovery in New Orleans and other Gulf Coast communities, we offer five observations that may be instructive to other regions that are exposed to continuing risk.

observations that may be instructive to other regions that are exposed to continuing risk. First, the lack of action in response to the severe consequences of the storm represented an asymmetry of information among the multiple actors responsible for recognizing and reducing the risk that is endemic to coastal communities. Building a common knowledge base to support shared decision making among intergovernmental authorities with joint responsibilities would reduce this asymmetry in practice and greatly facilitate timely, collaborative action. Further, a common knowledge base would enable responsible actors to check their interpretation of a threat against a wider base of expertise, and enable them to update their actions in reciprocal adaptation to an evolving risk. This task, rarely done before a disaster, could be incorporated directly into the recovery process. Increasing the capacity for timely assessment of dynamic conditions and mutual exchange of valid information would improve risk management across the intergovernmental system.

Second, recovery from a catastrophic event requires a substantive reallocation of roles, responsibilities, and resources, not only for the devastated community, but also for supporting agencies at regional, state, and national levels of operation. The destruction caused by a catastrophic event exceeds the coping capacity of organizations established to perform routine administrative tasks. The situation may require new skills, different expertise, and innovative management strategies that fit the scale and scope of the recovery process. Managing the information required to support the complex set of recovery actions being carried out simultaneously by different actors at different levels of operation represents a distinct task from maintaining a daily account of single-agency operations. Cross-organizational and cross-jurisdictional interactions require the development of a distinctive action system for recovery that will also reduce future risk. The parameters for such a system are, in important respects, defined by the magnitude and complexity of the event, but require continual monitoring and updating to ensure effective performance.

Third, mutual adaptation to changing risk among households, organizations, and jurisdictions depends on readily accessible means of communication and capacity for information exchange. Hidden barriers to communication that stem from cultural biases, established organizational protocols, and lack of technical skills often hinder the free flow of information among a widely varying group of households, organizations, and jurisdictions. Facilitating this flow of communication through the complex process of planning, action, and evaluation of performance is central to achieving the collective vision of the recovering region.

Fourth, recovery requires the establishment of a sociotechnical system. The instruments used to assess and document damage, the models developed to analyze data, and the technologies used to support the communication and exchange of information among the many actors affect the quality and content of the decisions that are made and the actions taken. Engaging members of the community in a timely, informed, responsible, but productive dialogue contributes to their investment of attention and constructive effort in achieving recovery. Given the extended period of recovery following

a catastrophic event, designing a sociotechnical system to support individual and organizational decision making on the range of issues involved would facilitate an informed, transparent, efficient process.

Finally, the cumulative effect of these recommended steps will create a learning environment not only for the community, but also for the surrounding region. Each step is essential to recovery and creates the basis for action at the next. The sequence of steps—building a common knowledge base, reallocating responsibilities and resources among a wider set of actors in the region, fostering mutual adaptation among actors engaged in recovery operations and their changing physical and social environment, and designing an appropriate set of instruments, technologies, and protocols to support informed, timely decision and action—is interdependent. This cumulative process creates a collective mental model[15] that restructures social action. Guiding this process is a public responsibility, and one in which public agencies at each level of action can make a substantive difference in rebuilding a resilient community. Recovery emerges haltingly in a sociotechnical process as communities learn to manage risk and adapt to recurring threats.

Notes

1. Hurricane Katrina produced storm surge of 28 feet with waves of 55 feet, breaching more than 50 major levees in the region and flooding New Orleans up to 15 feet (see http://www.mvn.usace.army.mil/hps2/hps_background.asp).

2. This amounted to 61,000 residential addresses as of September 2009 (see http://www.gnocdc.org).

3. New Orleans had high levels of blighted properties even before the levee failures of 2005.

4. Logan (2006) reports that damaged areas of the city were 75 percent African American, while undamaged areas were predominantly white.

5. The Louisiana Recovery Authority was established by Governor Kathleen Babineaux Blanco under Executive Order no. 63, and again by statute in 2006 under Act 5 of the First Extraordinary Session of the Louisiana Legislature (see http://lra.louisiana.gov/assets/docs/searchable/LRAEstablishingAct.pdf).

6. The Louisiana Recovery Authority sunset on June 30, 2010. The recovery work continues through the state Office of Community Development's Disaster Recovery Unit.

7. This does not include social aid and pleasure clubs, Mardi Gras krewes, fraternal organizations, private clubs, and other types of civic or private organizations that abound in New Orleans.

8. See http://www.gnocdc.org/Factsforfeatures/HurricaneKatrinaImpact/HurricaneKatrinaImpact.pdf.

9. See http://www.mvn.usace.army.mil/hps2/hps_reports.asp.

10. See http://www.mvn.usace.army.mil/hps2/pdf/Facts_percent20Figures_Web_12_08_09.pdf.

11. See http://www.fema.gov/business/nfip/statistics/sign1000.shtm.

12. See http://www.road21a.org/newsroom/stats.htm.

13. Louisiana's Road Home Program is the largest housing redevelopment program in U.S. history. To date, the program has awarded grants to 127,159 homeowners out of 229,417 total applicants (see http://www.road21a.org/newsroom/stats.htm). To put this in perspective, the storms and levee failures of 2005 resulted in 515,000 damaged homes throughout Louisiana (320,000 in the New Orleans metropolitan area) (see Plyer 2008).

14. See http://www.neworleansrecoveryeffort.com/doc/recovery_june09.pdf.

15. Gary Klein, cognitive scientist, uses the term "mental model" to characterize an individual's perception of a complex operational environment as a basis for action. See Gary Klein et al., 1993. Extending Klein's concept of an individual

mental model to a community mental model creates the basis for collective action that is essential to mobilize effective response to a major threat.

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