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Part II—The Responders: Official and Grassroots Actors in the Aftermath of the Hurricane

Managing Disasters: The Role of Local Government

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In major disasters, local communities are often on their own for several hours or days. Local governments can play a key role in taking the initiative to protect their citizens. This essay compares the experience of New Orleans before, during, and after the catastrophe of Hurricane Katrina with the performance of Qinglong County, China, during the Tangshan earthquake of 1976. Qinglong County exemplifies local government taking initiative in risk assessment, decision making, operations, information sharing, and communications.

Though all levels of government are generally involved in disaster management, the role and actions of local government are particularly critical. O'Leary writes, "Virtually all disasters are experienced at the local level, where many communities can expect to be 'on their own' for the first seventy-two hours after disaster impact" (2004, 1).

Drabek and Hoetmer (1991) set forth two key concepts that describe the role of local government with regard to disasters: comprehensive emergency management and integrated emergency management. A government acts comprehensively when it coordinates the four phases of emergency management: mitigation, preparedness, response, and recovery. A government acts in an integrated manner when it coordinates planning and strategy of hazard assessment, resource mobilization, and operations with other entities, both laterally and vertically.

This essay will compare and contrast the performance of the city of New Orleans at implementing comprehensive and integrated emergency management before, during, and after the catastrophe of Hurricane Katrina in August 2005 with the performance of Qinglong County, China, during the Tangshan earthquake, a devastating disaster that struck northeast China in 1976. Issues of information sharing, policy, implementation, and citizen participation will be illustrated for three of the four phases of emergency management: preparedness, mitigation, and response. Similarly, issues of strategic risk assessment, decision making, operations, and communications will be viewed through the lens of intergovernmental relationships from the local government perspective. Readiness to take initiative and differing cultures of "preparedness" will also be explored.

Comparison among situations that differ widely in time, location, and circumstances can be complicated. The disasters discussed in this essay are not parallel, but both can be used to illustrate a response to an overwhelming catastrophe that required timely action by local governments and cooperation among different levels of government.

Local Government in a Comparative Perspective

Countries distribute functional responsibilities between their central governments and subnational governments along various dimensions, including fiscal, administrative, and political. National responsibility exists whether the government is unitary or federal. For the emergency management function, the key government level is the one that has relevant equipment and adequate management capacity while still being close to the ground and in the midst of the emergency incident (Haddow and Bullock 2006, 78–79).

The role of local and other subnational governments differs across countries, as illustrated by the United States and China. In the United States, states are sovereign jurisdictions with specific and reserved responsibilities established in the U.S. Constitution. The functions of substate levels of government depend entirely on each state's constitution, with responsibilities differing among states. New Orleans is located in the state of Louisiana, whose constitution provides local governments—both municipalities and parishes[1]—with strong home-rule prerogatives[2] and generally prohibits state intervention in local matters unless specified. The city of New Orleans has a strong mayor-council form of government. In the case of strong "home-rule political culture," it would be

expected that the governor would defer to the mayor in decision making about disaster preparations and calling for a citywide mandatory evacuation.

With its large population and land area, China has historically been divided into several political subdivisions. Today, it has five levels of government below the national government level: provinces, prefectures, counties, townships, and villages, as shown in figure 1. At the third subnational level, there are close to 3,000 counties; at the fourth, more than 44,000 townships; and at the fifth, more than a million villages.

The "real" local level of government in China is the county. Outside the major cities, it is the county with which most residents self-identify. Historically, the county has existed as a level of government in China as far back as the Warring States period (475–221 BCE). Although China's townships and villages are "below" the county level of government and might therefore be considered "local" government, they do not have any independent authority and only follow orders from the county. Apart from China's four megacities, the counties have responsibility for delivering most services, such as health, education, emergency management, and economic development. The counties are also responsible for carrying out directives from higher levels of government to lower levels and transmitting information upward from lower to higher levels.

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In theory, China's government is highly centralized and is paralleled by the Communist Party of China, which is also hierarchical. In practice, however, because of its enormous population and land mass, China is inherently decentralized. Although there are elaborate directives from the center and intricate post facto reviews of local governments' activities by the central authority, physically remote units of government exercise great discretion over everyday matters of citizen interest.

Intergovernmental Context

In an area that is prone to disasters, it is critical that intergovernmental responsibilities be delineated clearly and understood at all levels of government. In the case of emergency management, these responsibilities can be grouped into four phases: preparation, mitigation, response, and recovery (Haddow and Bullock 2006, 57, 77, 131, 157). Phase I, preparedness, is the state of readiness to respond to an emergency based on planning, training, and exercises. Phase II, mitigation, is a sustained action to reduce or eliminate risk to people and property. Phase III, response, comprises immediate actions to save lives, protect property, and meet basic human needs. Phase IV, recovery, involves decisions and actions related to replacing lost residential and business properties, rebuilding the economic base, and repairing and rebuilding infrastructure. Though these four phases are all necessary components of emergency management, in practice, they are not always clearly demarcated or linear. During an emergency, secondary disasters often shift action from recovery back to response, and preparedness and mitigation activities often take place in the same time frame. In this essay, I will focus on the first three phases. The fourth, recovery, is beyond the purview of this paper. The reconstruction of Qinglong County and Tangshan took approximately 10 years; the reconstruction of New Orleans may take just as long or longer.

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In the United States, state and local governments are generally responsible for all phases of disaster management. The U.S. Constitution implicitly assigns health and safety to the states rather than to the national government through the Tenth Amendment, which provides that all powers not specifically assigned to the national government are reserved to the states. Depending on the severity of the impending disaster or the extent of actual damage, higher levels of government may become involved when the local government is overwhelmed by challenges in one or more of the four phases of emergency management.

Since 1978, the Federal Emergency Management Agency (FEMA) has increasingly assumed the task of assisting when events overwhelm state and local governments. In the aftermath of the September 11, 2001, World Trade Center attack, the national government has worked to centralize responsibility for managing terrorist threats and natural disasters within the newly formed Department of Homeland Security, under which FEMA has been subsumed. This reorganization shifted disaster preparedness from the FEMA unit of the Department of Homeland Security to the information and

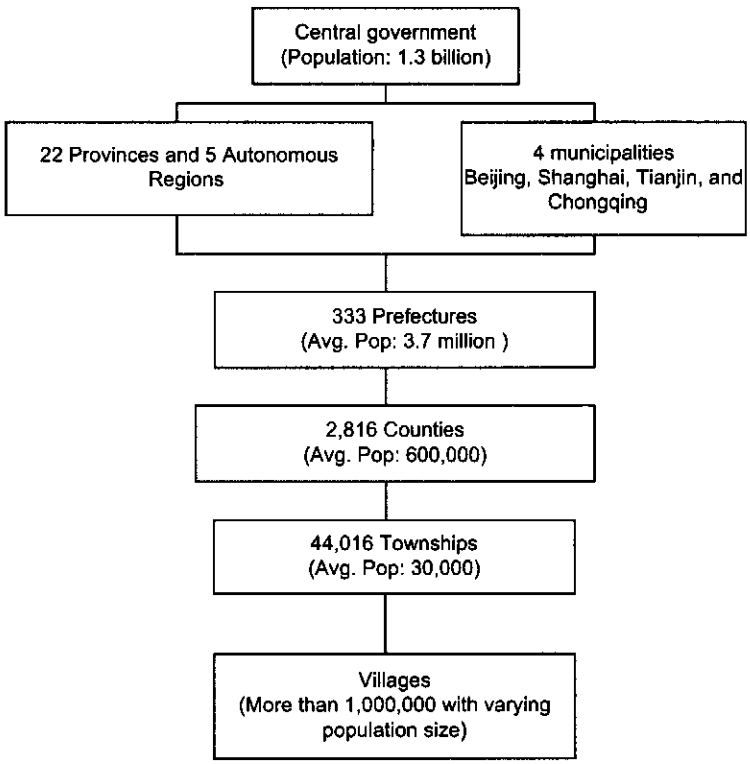

Figure 1 Structure of Government in China, 2003
Source: Adapted from Wong (2005).

analysis unit, thereby de-linking preparedness from response functions, which remained within FEMA. Since Hurricane Katrina, the preparedness function has been returned to FEMA.

In China, the central government's Ministry of Civil Affairs is the reporting unit for provincial and local governments. Within this ministry is the Division for Disaster Relief, which sends directives to provincial and local governments regarding oncoming disasters, suggests preparations, and coordinates general capacity building for disaster mitigation. This division prepositions personnel and supplies in areas where local authorities are likely to be overwhelmed by the catastrophe.

In the United States and China, there are scientific units on the national level of government that are positioned to alert local governments to dangers from impending natural disasters. In the case of hurricanes in the United States, it is the National Weather Service. In the case of earthquakes in China, it is the China Earthquake Agency. Furthermore, in China, scientists involve local communities in collecting data about physical changes in their environment that are associated with earthquakes. For disaster response to major catastrophes, U.S. local governments rely on FEMA, and Chinese local governments rely on the Ministry of Civil Affairs.

In both countries, there are disagreements among the various levels of government about finances, responsibilities, and control. In the U.S. federal system, disputes between the states and the national government go to the U.S. Supreme Court. In disputes between cities and states, the state supreme courts have original jurisdiction. The media, looking for newsworthy items, report on intergovernmental disagreements more often than they report on effective coordination.

In China's Communist system, the single political party exercises great influence over the parallel government administrations and operates to reduce disagreement. While signs of disagreement have increased since the mid-1980s, political disagreement continues to be confined largely to party leadership meetings. At the same time, administrative disagreement is often curbed by self-censorship and reluctance of the media to exaggerate tensions. For example, during the 1990s, there was widespread discussion about the merits of building the Three Gorges Dam on the Yangtze River for flood control and electricity generation. The public discussion was open but restrained. Scientific

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experts proffered opinions that reached the newspapers, but construction continued. Similarly, experts and administrators discuss many issues concerning the likelihood and preparation for natural disasters.

The Hurricane Katrina Experience

Hurricane Katrina hit the U.S. Gulf Coast, particularly the states of Louisiana and Mississippi, in August 2005. It was the most destructive natural disaster in U.S. history (White House 2006). An estimated 1,330 people died as a result of the storm; more than 770,000 people were displaced; an estimated 300,000 homes were completely destroyed or made uninhabitable; and property damage was estimated at $96 billion (White House 2006). During and immediately after Katrina, most discussions focused on the slow response. Currently, focus is on the slow recovery. However, while these criticisms of the response are relevant, this essay will posit that it was inaction and missteps that occurred during the preparedness and mitigation phases that were most critical in leading to the eventual tragedy.

Phases I and II: Preparedness and Mitigation

An emergency plan with an annex on hurricanes was in place for the city of New Orleans prior to Hurricane Katrina (Palast 2006).[3] However, the plan did not adequately address what would prove to be the most serious problems associated with the storm. Most importantly, while the plan assumed that evacuation would be necessary, it failed to consider the needs of residents without access to private transportation. The plan assumed that residents would have access to private vehicles, even though New Orleans disaster planners had estimated that the city had between 100,000 and 130,000 people with no means of transportation (Wolshon 2002). Moreover, the requirements of "special needs" populations were not adequately considered. The plan assumed that school buses would be used to evacuate people with special needs and no other means of transportation, but there was no provision for contacting drivers to show up at the bus yards. Gaps in the preparedness plan led to serious inefficiencies and even fatalities.

Mitigation efforts were also envisaged by the levee districts, the city, the state, and the U.S. Army Corps of Engineers, but they were never realized. Most important was the strengthening of the levee system that protects New Orleans from being deluged by freshwater from the Mississippi River and seawater from the Gulf of Mexico. New Orleans is constructed on land below sea level and requires a system of levees and pumping stations to keep water out of the city. Because the levees had been built decades ago and only to a protection level adequate for a Category 3 storm, [4] hydrology engineers had been predicting that the levees would not stand up to an exceptionally strong storm surge that, although rare, was certain to occur at some time.

Although the city had continuously applied for federal funds to strengthen the levees, its requests were regularly answered by nominal levels of funding from the U.S. Congress. The process of levee improvement is further complicated by the existence of levee districts with boards and independent taxing authority and by the role of the U.S. Army Corps of Engineers in building and maintaining the entire Mississippi River levee system. Intergovernmental discussions about responsibility and funding created a complex and stalemated condition, increasing the chance that New Orleans' levees would not be able to withstand a large and strong hurricane like Katrina. Emergency managers often employ the concept of "acceptable risk" to indicate that further mitigation would be possible but not financially feasible. As illustrated during the Hurricane Pam exercise in July 2004, experts observed that the New Orleans levees would not withstand a powerful hurricane with a "storm surge that topped levees, as well as a massive evacuation" (Kiefer and Montjoy 2006). Representatives of New Orleans, 12 other parishes in southeastern Louisiana, and 43 state, federal, and nonprofit organizations, including the Red Cross (FEMA 2004), participated in this five-day exercise to practice what might happen during a Category 3 hurricane. By the summer of 2005, the lessons learned in the Hurricane Pam exercise were still in the discussion stage, and levee strengthening was not high on the budget agenda.

Phase III: Response

Government officials at all levels saw Hurricane Katrina approaching from the Gulf of Mexico but delayed taking decisive action concerning evacuation. Information on the approach of Hurricane Katrina was readily available in the week before landfall. The National Weather Service issued bulletins as the storm made landfall in eastern Florida on August 25, crossed the Florida peninsula, and gained strength as it traversed the Gulf of Mexico, with tropical storm force winds of up to 150 miles in the center of the storm and 12-foot waves hitting the Gulf Coast. Hurricane Katrina increased in size, as well as strength, as it crossed the Gulf of Mexico, thereby endangering a wider area of impact.

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As Katrina approached the Gulf Coast with stronger winds, the governor of Louisiana declared a state of emergency on August 26. This declaration activated emergency plan activities, mobilizing first responders, such as police, fire, and emergency medical personnel, opening shelters, and preparing supplies. The governor's declaration also alerted the National Guard of Louisiana that it should prepare to deploy to the affected areas. According to Louisiana State Law (Rev. St. sec. 766), this declaration gave the governor broad powers to "direct and compel the evacuation of all or part of the population from any stricken or threatened areas within the state." The same day, the mayor of New Orleans declared a state of emergency but did not yet refer to an evacuation of the city. In the matter of a mandatory evacuation, the governor chose to defer to local officials, particularly the mayor of New Orleans.

The city's emergency response plan for hurricanes specifies an evacuation timetable whereby coastal zones should be evacuated at the onset of tropical storm force winds, with inland areas evacuated as needed. "New Orleans was supposed to start evacuating 30 hours before landfall. The Mayor called for a voluntary evacuation 27 hours before but waited until 10 hours before to order a mandatory evacuation" (Kiefer and Montjoy 2006, 126). The city's emergency plan stipulated that buses would be used to evacuate those without transport or with special needs. However, by the time the mayor called for a mandatory evacuation, it was too late to organize public transportation to take people out of the storm's way. With a few buses operating, the city managed to round up people on street corners and take them to the Superdome and the convention center, both located on higher ground in downtown New Orleans.

During the voluntary and mandatory evacuation periods, both officials and residents sought information about the predicted strength of the hurricane in order to take appropriate action. It appears that first responders followed their plans, but their actions were not predicated on the levees breaking. They had no plans for a catastrophic situation. However, even if they had, any action short of repairing and extending the levees, which would have taken years and was long overdue, would have been inconsequential under the extreme conditions of Katrina. Given that the levees were inadequate, the only solution left was early and complete evacuation. Sadly, by the time officials realized the magnitude of the event, it was too late to mobilize sufficient resources to properly evacuate the city.

Although the president declared the Gulf states of Louisiana, Mississippi, and Alabama national emergency areas as early as August 27, little federal assistance flowed to New Orleans initially. Orders went out for supplies and human resources through multistate compacts and FEMA directives. Unfortunately, trucks bringing supplies were turned away at roadblocks, and volunteers from fire departments from around the country were held in Atlanta for customer service training when they might have been involved in search and rescue operations on the ground in New Orleans.

With the city's first responders, such as police, firefighters, and medical teams, overwhelmed and external reinforcements delayed, the media continued to report conflicting conditions, including denials of intergovernmental cooperation that fueled the negative impression of confusion at all levels of government. With few reporters on the ground to check the facts, ad hoc incidents fueled generalizations about lawlessness throughout neighborhoods and violence at the convention center. In the aftermath, it became known that these incidents had been isolated, but their exaggerated reporting kept first responders looking for violence instead of rescuing people. Heads of nursing and assisted living facilities in the city, helpless in their efforts to locate transportation for patients and elderly persons, watched the water rise and cut them off from assistance. The overwhelming reality seen throughout the world was people stranded on roofs, looking for helicopters to rescue them, as well as hospitals trying to function without electricity, food, or water.

For several days, emergency personnel from all levels of government were attempting to rescue and help people, but in a disjointed and improvised manner. These responders included local police, fire, and emergency medical personnel, as well as the National Guard and the U.S. Coast Guard. Although emergency managers agree that implementing emergency plans in real time involves flexible improvisation (Harrard 2006, 256), planning and exercises are supposed to take into account most surprises. Unfortunately, although the lessons learned earlier—especially in the Hurricane Pam exercises—were well known, they led to neither adequate adjustment in preparedness nor adequate investments in mitigation.

The Tangshan Earthquake

The Qinglong County response to the Tangshan earthquake stands in stark contrast to that of the local government in New Orleans. On July 28, 1976, an earthquake of magnitude 7.8 hit the Tangshan City region in northeastern China (Chen et al. 1998; Col and Chu 1999; Li and Mervis 1996; Ma et al. 1989; Qian 1986, 1989).[5] Northeastern China is composed of four provinces (Hebei, Liaoning, Shanxi, and Shandong), one autonomous region (Inner Mongolia), and two special municipalities (Beijing and Tianjin). Within these jurisdictions, there are 431 counties. The area directly affected by the Tangshan earthquake is shown in figure 2.

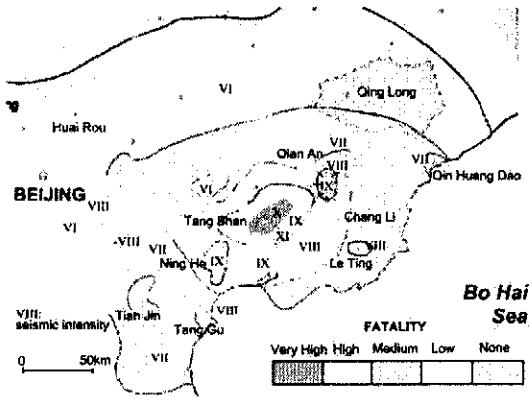

Figure 2 Qinglong County in Relationship to the Epicenter of the Tangshan Earthquake

More than 246,000 persons in the region died as a result of the earthquake and its aftershocks. However, no one in Qinglong County was included in this statistic (Col, forthcoming; Jinfang Li 1991; J. Wang 1991; Y. Wang 1998). Several factors account for this seeming miracle.[6] The most important were effective preparedness, involving continuous monitoring, mitigation, and exercises; the local government's quick decision to declare a disaster alert; its thorough implementation of the local emergency plan; and the immediate call for a mandatory evacuation four days before the earthquake hit. Other factors included plans that addressed mitigation and special needs populations, open communications networks with other units of government, and the involvement of citizens in all phases of the emergency management process.

Qinglong County officials took seriously the creation of a "culture of preparedness," believing that if people thought about the possibility of large natural events, they would not be surprised if one occurred and they might remember what to do.

Phases I and II: Preparedness and Mitigation

In 1974, two years before the Tangshan earthquake, the State Council (China's national cabinet) issued what was referred to as "Document 69," in which officials in the northeast region of China were warned about the increased risk of seismic activity in the coming decade (Col and Chu 1999).[7] Document 69, which illustrates a long-term prediction of the China Earthquake Agency,[8] notified provincial and local governments in northeast China to prepare for the possibility of earthquakes.

In the case of an earthquake, evacuation does not mean leaving the area but refers to moving people outside and away from buildings and other structures. Though not as extreme as the evacuation involved with a hurricane, it still disrupted ordinary life, parted people from their homes, and had the potential to panic residents, perhaps leading to chaos.

Document 69 contained suggestions for both preparedness and mitigation.

Document 69 called for increased local monitoring, public education, and strengthening of infrastructure, including buildings in the area. It also encouraged monitoring by citizens, that is, "lay monitoring" in factories, mines, and schools by local volunteers. By 1976, Qinglong County had established an earthquake office and launched a variety of preparedness and mitigation activities.

In response to Document 69, the administrative leaders of Qinglong County, who were also leaders of the county's Communist Party, established an earthquake office and hired a mitigation officer. The mitigation officer intensified public education throughout the county by distributing thousands of booklets and posters and presenting slide shows and movies in villages, towns, and cities, including a short earthquake preparedness film that was presented in movie theaters before each main feature. He also increased the number of county earthquake monitoring stations from 6 to 16, with nine of them under the supervision of local middle schools and high schools. Qinglong County officials took seriously the creation of a "culture of preparedness," believing that if people thought about the possibility of large natural events, they would not be surprised if one occurred and they might remember what to do.

The Tangshan earthquake struck on July 28, 1976. However, the Qinglong County Committee (the local government council) had been informed of the pending disaster on the morning of July 24. Based on the data presented by the earthquake officer, committee members weighed the advantages and disadvantages of announcing an earthquake alert and, deciding to err on the side of caution, ordered an immediate evacuation of all buildings and other dangerous zones. In the case of an earthquake, evacuation does not mean leaving the area but refers to moving people outside and away from buildings and other structures. Though not as extreme as the evacuation involved with a hurricane, it still disrupted ordinary life, parted people from their homes, and had the potential to panic residents, perhaps leading to chaos. A two-year

community awareness campaign in the county had prepared people to respond calmly to the earthquake alert and evacuation order.

Although the county committee members knew that they could be blamed for a false alarm, they decided that the safety of the community was more important than their reputations (United Nations 1998). Speaking 20 years later, they proudly reported their courageous decision but admitted that, had they been wrong, they might have been jailed or worse (United Nations 1998).

Phase III: Response

In the four days before the earthquake hit, committee members were able to check and reinforce vulnerable structures, and they circulated volunteers around neighborhoods to keep people away from their homes. Residents did not panic because they were aware of the possibility of danger, essential commodities were available, and many normal activities, such as the schooling of children, were maintained, albeit outdoors.[9]

In Qinglong County, officials actively sought and utilized information from all sources and supplied information to neighboring counties and national authorities. Qinglong County was and continues to be a participating local government in the data-gathering network of the China Earthquake Agency.

Qinglong County citizens participated in preparation, mitigation efforts, and the response to the pending earthquake. Most importantly, they participated in the data-collection process that generated understanding of the natural geological processes of the area.[10] Because they regularly observed and reported on natural conditions, they did not perceive nature as an antagonist. Thus, although they were well aware of the potential damage that could be caused by large earthquakes, they did not panic when they heard about the possibility of a coming earthquake. Instead, they engaged in community teach-ins and discussions about identifying and sharing responsibilities in a disaster situation. When the earthquake alert was announced, officials and volunteers met to discuss the probability of an event and elements of preparedness, and they accepted responsibility for taking mitigation actions in their communities. Residents did not hear an announcement "out of the blue" and wonder whether it was serious. They participated in a dialogue evaluating the county's prediction against "macro-precursors" that they were able to perceive in their communities.[11] They circulated through their neighborhoods to spread the word and to help implement community emergency plans and set up temporary tent sites. To set a good example, the county leader himself set up a tent in the town square and slept in it at night.

Katrina and Tangshan: Why the Difference in Local Government Performance?

It might be expected that a hurricane would provide earlier and more obvious signals of an approaching disaster than would an earthquake. By the standard of adequate timely information, Katrina stormed across Florida and the Gulf of Mexico for a week, heading for the U.S. Gulf Coast. The National Weather Service could not be sure exactly where it would make landfall, but the storm was very large, and tropical storm strength winds began to hit New Orleans four days before landfall. New Orleans is a major U.S. city with central economic importance to more than one-third of the country, and the United States is generally considered to be the most technologically advanced and the richest country in the world. What, then, accounts for the failure of the government of New Orleans to adequately prepare, mitigate, and respond to Hurricane Katrina, and what differentiates New Orleans from the Qinglong County experience?

Qinglong County operated comprehensively to integrate preparation and mitigation. Furthermore, the area's emergency plan addressed what had to be done and it was adhered to, especially with regard to the evacuation of buildings and the care taken to make sure that special needs populations were moved to safety. There was no loss of life in Qinglong County, despite the complete or partial destruction of 180,000 buildings. In contrast, the plan of the city of New Orleans was imprecise and lacked detailed strategies for finding reliable means to move residents without their own transport, as well as those with special needs.

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Qinglong County also acted in an integrated manner. Officials absorbed national aggregate data and compared it to locally generated data to assess risks and to make decisions. They contributed to the upward flow of information and integrated the top-down information into their local calculations. National policy, outlined in Document 69, provided administrative cover for local decisions, although this document would not have provided sufficient cover from the wrath of the central government if no earthquake had occurred. During this period, known as the Cultural Revolution, communities were expected to contribute

to national productivity without interruption. The county officials expected to be severely penalized if they were in error. They risked censure and worse, but still they took initiatives to launch the emergency plan and evacuate people from buildings. They understood their roles and their responsibilities and made use of all forms of communication to increase their knowledge and decision-making ability. They did not panic; they did not ignore; they acted. Knowledge and procedures of all levels of government were integrated into their local government actions.

In contrast, the city of New Orleans acted neither comprehensively nor in an integrated manner. When the city called for a state of emergency, it suggested a voluntary evacuation. The city waited three days longer to impose a mandatory evacuation notice as the winds became stronger and the rain more persistent. When the mandatory evacuation was finally ordered, the city had to evacuate people with special needs under the worst conditions rather than the relatively better conditions of a few days earlier. This delay worsened evacuation problems for the city and increased the tragic consequences for many residents who were poor, isolated, or required special services. If a local government calculates that its resources are barely adequate to evacuate people, it makes sense to begin the evacuation as early as possible, before the weather becomes a major hindrance.

Furthermore, New Orleans officials knew of the possibility of a breach in the levee system and the difficulty that such a breach would pose for moving special needs residents when the area could be flooded by water pouring into the city from Lake Pontchartrain. By any cost–benefit analysis, the city should have erred on the side of caution and removed special needs people before the hurricane arrived and threatened to destabilize the levees and flood low-lying parts of the city, where the poorer and less mobile special needs people lived.

Lessons Learned

While additional research will undoubtedly provide more empirical evidence relating to the successes of local government in disasters, the lessons learned from the Katrina and Qinglong County experiences can begin to inform future efforts to improve local government

Lesson 1: Local government must be able to act decisively and as early as possible in preparation for disasters. In 1976 in China, although the national government had not delegated responsibility for earthquake prediction to the local levels, Qinglong County officials declared a countywide alert based on data collected and analyzed at the local level. Even within Qinglong County, top officials delegated authority to lower-level officials as much as two weeks before the event, when the prediction was anything but certain. In the case of Hurricane Katrina, national, state, and local officials argued publicly about who was responsible for tasks and which organization was responsible for delays and malfeasance. These arguments continued from the first hint that Katrina would be a devastating storm until after the storm had passed.

Until 1995, when the United Nations began its research on Qinglong County, the successful mitigation of loss of lives during the Tangshan earthquake had been unrecognized. It is now known that public administrators in Qinglong County stayed at their posts day and night in the days before the expected earthquake and that because of their diligence, their citizens were safe and able to provide first assistance to victims in areas that were not prepared for the earthquake. In contrast, during Hurricane Katrina and its immediate aftermath, it was reported that nearly 400 officers of the 1,750-strong New Orleans Police Department left their posts, leaving local citizens vulnerable and without assistance.

Lesson 2: The local level of government must be supported in its disaster preparation and mitigation efforts by higher levels of government. National policies could not have been more different in the Tangshan earthquake and Hurricane Katrina. In China in 1976, Qinglong County officials were operating under a specific and targeted national policy. Document 69 was not only clear in its intent but also elaborate in its detailed implementation steps. The national China Earthquake Agency worked diligently to increase its forecasting ability, and Qinglong County increased its public education, lay monitoring, and disaster mitigation efforts, in addition to setting up a special office and hiring required staff to implement Document 69 at the county level. Regular interaction between China Earthquake Agency national-level professional scientists and local government officials and citizens who volunteered to monitor their local environment helped focus attention on the threat of an earthquake disaster.

In the United States, the Department of Homeland Security's 600-page National Response Plan was in place when Hurricane Katrina hit the Gulf Coast, but "many government officials were not familiar with it" (White House 2006):

> Katrina was the first large-scale test of the NRP [National Response Plan] and NIMS [National Incident Management System]. Although many individuals performed skillfully under the worst conditions, as President Bush stated, "the system, at every level of government was not well-coordinated, and was overwhelmed in the first few

days." Organizational problems related to planning, incident management and the management of inter-governmental relations were experienced during the response to Katrina. (Wise 2006)

Lesson 3: Citizens must participate in all phases of preparation and execution of emergency management measures. Citizen participation is a major distinguishing feature between the Qinglong case and the Katrina case. In Qinglong County, citizens were not only involved in the preparation, mitigation, and response phases, but also they were involved in the prediction of the earthquake. By building citizen participation into the monitoring for earthquake precursor signals, citizens were cognizant of the possibility of an earthquake and mentally ready to act quickly in order to avoid disaster. Government officials were able to mobilize all citizens in just a few days.

Once the earthquake struck and the shock of the event had passed, Qinglong County was able to send the first rescue teams and the first supplies into the epicenter area. During Katrina, residents were confused by conflicting information and many of the poorest and weakest, who were also the most vulnerable, waited for government services that arrived very late—too late for some victims.

In the case of Katrina, neighbors did help neighbors in an ad hoc manner and as the opportunity arose. There were many reports of residents with small boats floating around their neighborhoods and rescuing people stranded on their roofs. These and other acts of kindness are common in a disaster situation in which people self-organize into teams for self-help (Comfort 1999). However, these citizen efforts are more effective if they are integrated into community-wide strategies, and mistakes are reduced if there are practice exercises.

In the aftermath of Katrina, there has been increased pressure to develop citizen capacity to handle a disaster. This is not the first time that the need for improved citizen participation has been recognized. As long ago as 1975, California developed the Citizens' Emergency Response Team concept to help communities to organize and train for self-reliance until professional first responders are able to arrive on the scene of the disaster.

After the September 11, 2001, terrorist attacks, the Federal Emergency Management Agency urged local communities to adopt the California's model by providing seed money for training. Furthermore, in 2002, the Suburban Emergency Management Program was established in the Chicago area to coordinate local institutions that were neither urban nor rural. Margaret O'Leary (2004), the founder of the program, writes that "one of the most difficult challenges confronting American's local communities today is dealing with the potential calamity created by ignorance, inexperience and lack of initiative regarding disaster."

Lesson 4: Linking scientific information to public administration action in disaster management is critical. Especially during natural disasters, there is a clear linkage between action and relevant knowledge of the environment, its many possible dangers, and the probabilities associated with those risks. In both Hurricane Katrina and the Tangshan earthquake, the natural processes of hurricanes and earthquakes were studied, although currently hurricanes are more predictable than earthquakes. One important point is to use scientific data to inform public administration actions. In Qinglong County, the county leader, upon receiving notice in 1974 that an earthquake was likely in the near future, purchased an academic book and read about the theory of earthquakes and the natural signals that are associated with earthquakes. With this knowledge, in 1976, he was able to interpret the scientific data that was brought to the county committee and help interpret its practical meaning for their decision making. This led to the effective preparation and mitigation for the Tangshan earthquake in Qinglong County, where no one was killed by the earthquake, despite the fact that more than 240,000 people were killed in the earthquake zone of which Qinglong was a part.

The second important point is to involve citizens in the scientific process. Volunteers staffed many precursor monitoring stations and made reports about their observations in their community environments. Several monitoring stations were located in schools so that students could learn about geologic processes and participate in the application of science to policy. Indeed, students at one school, noticing the increasing strength of some precursor signals, took the initiative to urge the leadership to speed up the public dialogue process, thereby getting the message out to additional audiences.

In New Orleans, offers from the Louisiana State University Center for the Study of Hurricanes to contribute their research-based evacuation plan were refused by a private contractor who was paid $500,000 to draw up an emergency plan for New Orleans (Palast 2006).

The 1975 National Assessment of Natural Hazards (White and Hass 1975) predicted three scenarios that closely resemble "the impacts and consequences of Hurricane Andrew in 1992, the catastrophic 1993 Midwest floods, and the 1989 Loma Prieta and 1994 Northridge earthquakes, which together have cost the nation some $100 billion" (Mileti 1999, 41). Birkland notes that despite significant experience of earthquakes,

"Washington [the state] has not learned from the accumulation of earthquake experience the way California has" (2006, 138). Leadership and initiative are necessary to bring science to bear on the public policy agenda and public administration practice.

Conclusion

Major disasters always present us with surprises. Though we can plan for every possible eventuality, there is usually some evolving condition that deviates from expectations and challenges emergency managers to adjust their plans. We start with plans and then adapt them to evolving conditions, providing an opportunity for sociotechnical design and organizational learning (Comfort and Haase 2006). The lessons of Qinglong County contribute to learning, adaptive response and evolving sociotechnical design.

Much work remains to sort out the failures in Hurricane Katrina and to design frameworks that are robust but flexible by encouraging the sharing of information and collaborating in action. Fortunately, we have a few good examples of disaster mitigation, even a largely forgotten successful prediction and mitigation in Qinglong County, China, in 1976.

Much work remains to sort out the failures in Hurricane Katrina and to design frameworks that are robust but flexible by encouraging the sharing of information and collaborating in action. Fortunately, we have a few good examples of disaster mitigation, even a largely forgotten successful prediction and mitigation in Qinglong County, China, in 1976.

Notes

1. Louisiana divides its territories into parishes, which are similar to cities and counties in other states. In the case of New Orleans, parishes chose to consolidate with the city of New Orleans as early as 1805, and this structure is maintained in the most recent City Charter of 1974.
2. The home-rule provision in the Louisiana state constitution provides wide authority to localities.
3. New Orleans' Comprehensive Emergency Management Plan (and its Annex I: Hurricanes) had been prepared by a contractor, Innovative Emergency Management, for $500,000. The Louisiana State University Center for the Study of Hurricanes had an evacuation model, but the Innovative Emergency Management and FEMA refused to use it, as reported in an interview with Hurricane Center deputy director Ivor van Heerden (Palast 2006).
4. The Saffir-Simpson scale of hurricane strength ranges from 1 (wind speeds of 74–95 miles per hour) to 5 (wind speed of more than 155 mph).
5. The Richter scale measures the amount of ground motion resulting from an earthquake. It is a geometric scale, with each magnitude representing an amount of motion squared at the next level. A magnitude of 7.8 is a completely destructive earthquake; stronger earthquakes occur, on average, once every five years.
6. For a full analytic chronology of Qinglong County's actions during the Tangshan earthquake of 1976, see http://www.globalwatch.org/ungp/qc-chrono.htm.
7. For an English translation of Document 69, see http://globalwatch.org/ungp/doc69-tr.htm.
8. Earthquake prediction in China is categorized as follows: "long term" refers to more than two years; "medium term" to one to two years; "short term" to a few months; and "imminent" to 1–14 days.
9. See the photographs at www.globalwatch.org/ungp/.
10. Methods of measuring signals associated with earthquakes (precursors) include geoelectricity, geomagnetism, earth tides, astrophysical data, and water/drought cycles.
11. Macro-precursors are visible to the human eye and include temperature, odor, viscosity of water, animal behavior, and earthquake lights.

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