

# The Aftermath of Katrina: Recommendations for Real Estate Research

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## Abstract

*This paper provides an overview of government and independent research conducted in the wake of Hurricane Katrina in an effort to highlight additional areas in need of study. In addition to the overview of natural disasters and their impact on the United States, the aftermath of the San Francisco earthquake and the actions taken by the government, the local and private sector is also highlighted as providing some lessons learned but maybe forgotten in the wake of Hurricane Katrina.*

The literature is replete with studies on the impacts of natural disasters on real estate markets. Baen and Dermisi (2006) reviewed many of these in their study of federal policies and programs. Montz and Tobin (1998) examine property market disequilibrium following a flood event. Brookshire, Thayer, Tschirhart, and Schulze (1985) and Bernknopf, Brookshire, and Thayer (1990) examined the real estate market implications of natural disaster risks, and Murdoch, Singh, and Thayer (1993) discussed the real estate impacts of the actualization of such a risk following California's Loma Prieta Earthquake. Geotechnical risks also motivated Sanders (1996) and Kinnard and Dickey (1995).

In many perspectives, including economic, the Hurricane Katrina disaster in 2005 is thought to be the worst natural disaster to hit the United States in modern times. The Insurance Information Institute estimates the property coverage alone for Katrina topped \$38.1 billion, although as of this writing that was not finalized. Current thinking puts the total damage estimate, insured and uninsured, at between \$200 billion and \$300 billion. To put this in perspective, the next most severe natural disaster, Hurricane Andrew, generated \$15.5 billion in insurance claims in 1992. The combined 9/11 attacks totaled \$18.8 billion in insurance claims in 2001 dollars and an estimated \$67.3 billion in total costs.<sup>1</sup> The Great San Francisco Earthquake and Fire of 1906 caused an estimated \$500 million in property damages at the time, of which \$235 million was insured.

The purpose of this paper is twofold. First, the government's reevaluation strategies, the non-governmental agencies and researchers' suggestions for redevelopment of New Orleans, and the lessons learned from the San Francisco Earthquake and Fire are discussed. Second, and perhaps more importantly for the real estate research community, this paper hopes to offer suggestions for future research.

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## Hurricane Background and the Generation of Katrina

Hoyos, Agudelo, Webster, and Curry (2006) opined that global warming will lead to a significant increase in both the frequency and intensity of Category 4 and 5 hurricanes. If this is indeed true, and coupled with the estimate that roughly 60% of the population in the United States lives in coastal areas, then a significant revisit of public policies with respect to building, financing, and insuring properties in these areas may be in order. The areas for future research include, but are not limited to, policies for building on flood plain land, federal flood protection programs (levees, dams, and channelization), and public expenses for rebuilding in sensitive areas.

### *Hurricanes and the U.S. Mainland*

According to the National Oceanic and Atmospheric Administration (NOAA), hurricanes are rated on the Saffir-Simpson scale in Categories 1–5 (Exhibit 1). The official Atlantic hurricane season lasts from June 1 to November 30, with peak activity usually found between mid-August and mid-October. Typically, ten tropical storms develop annually in the Gulf of Mexico, the Caribbean, or the Atlantic, and six of these become hurricanes. The U.S. mainland is usually hit by about five hurricanes during a three-year span, of which two will be major hurricanes (Category 3, 4, or 5). Exhibit 2 identifies the worst hurricanes in U.S. history from 1900 through 2005 in terms of deaths and damages and how they measure in comparison to other natural disasters. From the seventeen worst natural disasters in the U.S., included in Exhibit 3, 82% are hurricanes. This indicates the need for additional research and examination of urbanization policies in high-risk areas. As Exhibit 3 suggests, there is significant fluctuation in the number of hurricanes on a decade basis but there is a clear and continuing increase in the damage sustained by the various areas impacted by a hurricane. Not all U.S. coastal states have suffered the direct impact of hurricanes. Florida, Texas, North Carolina, and Louisiana are the states most likely to be hit (Exhibit 4).<sup>2</sup>

### *The Hurricane Season of 2005 and Katrina Chronology*

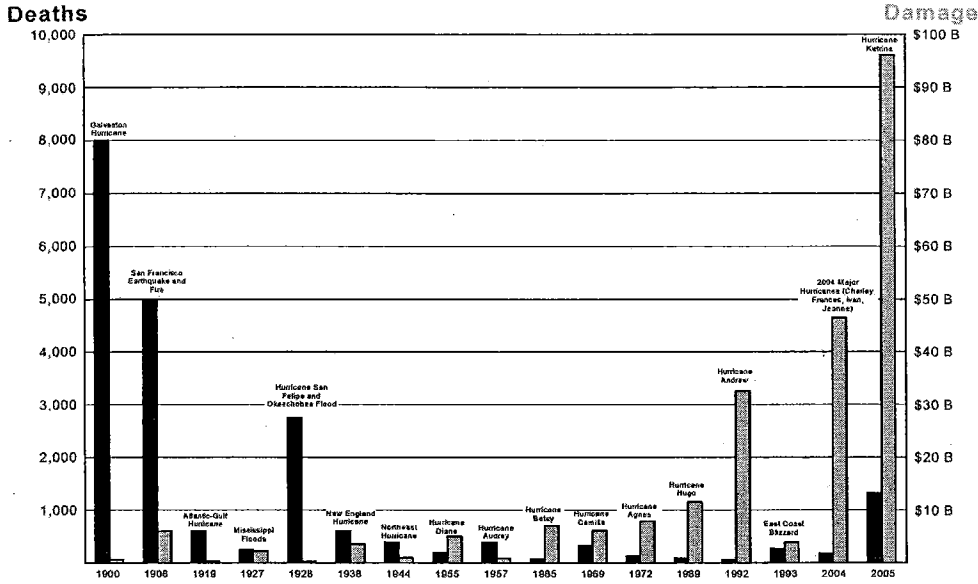
On May 16, 2005, NOAA and the National Weather Service (NWS) released the 2005 Atlantic Hurricane Outlook.<sup>3</sup> NOAA estimated a 70% chance of an above-average

**Exhibit 1**  
**Saffir-Simpson Hurricane Scale**

Category	Wind Velocity (mph)
Tropical Storm	39–73
1	74–85
2	96–110
3	111–130
4	131–155
5	> 155

**Exhibit 2**

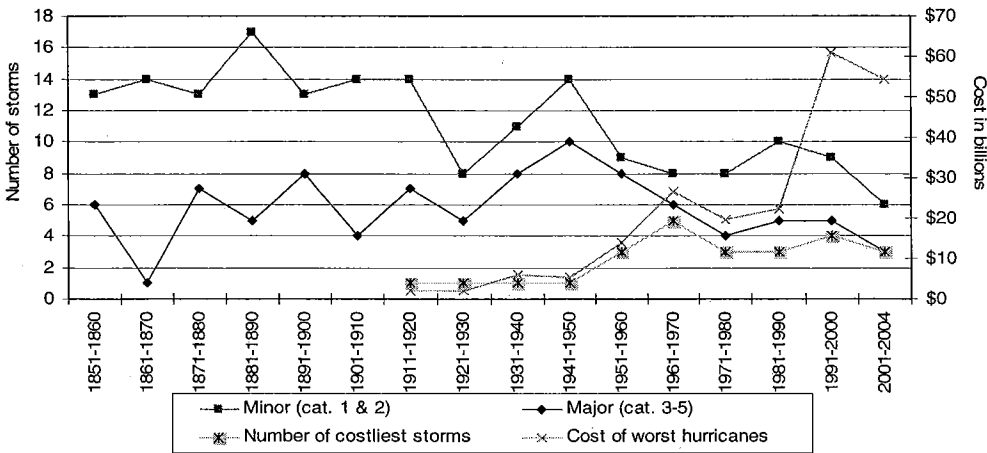
**U.S. Natural Disasters that Caused the Most Death and Damage to Property in Each Decade, 1900–2005, with 2004 Major Hurricanes Added Damage in Third Quarter 2005 Dollars**



The source is White House (2006).

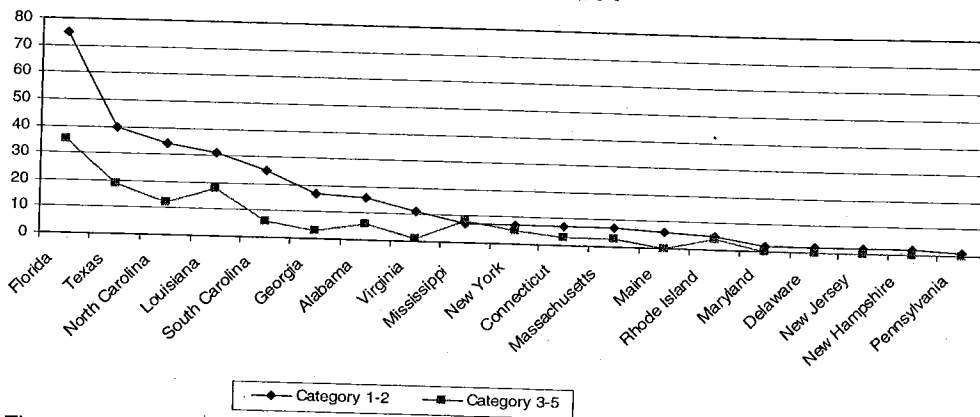
**Exhibit 3**

**Number and Cost Distribution of Hurricanes: 1851–2004**



The source is NOAA.

**Exhibit 4**  
**Hurricane Direct Hits on the Mainland U.S. Coastline and for Individual States: 1851–2004**

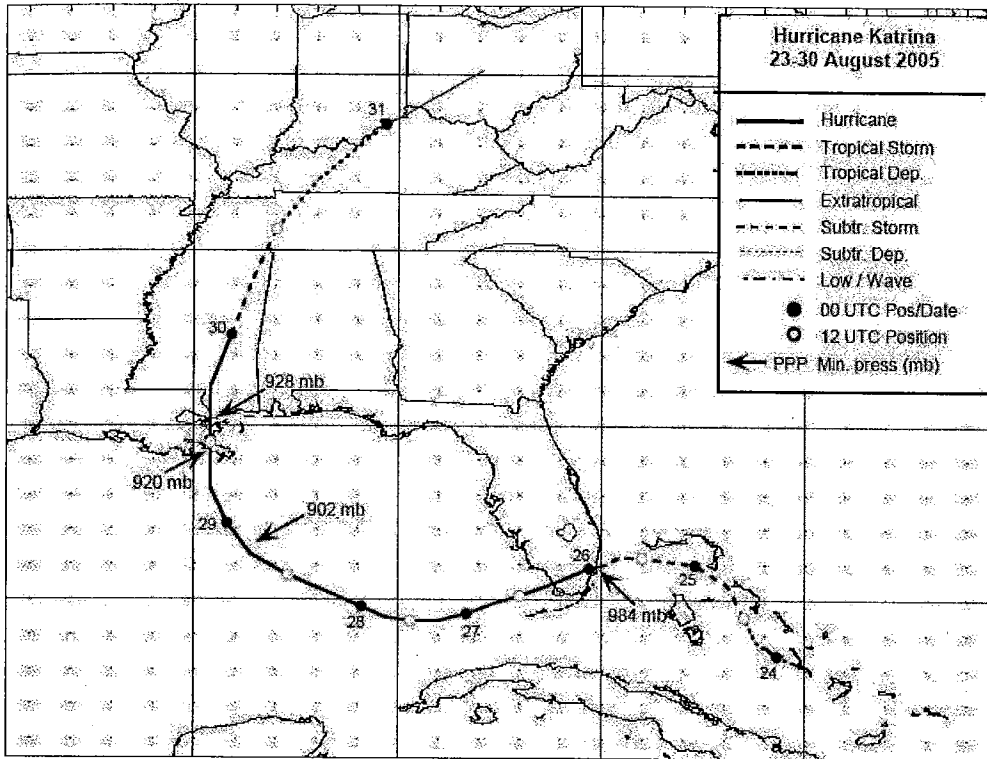


The source is NOAA.

hurricane season and predicted twelve to fifteen tropical storms, with seven to nine becoming hurricanes, and three to five of those being major storms. June and July confirmed NOAA's prediction, with a record seven Atlantic tropical storms and two hurricanes. One of these, Dennis, prompted mandatory evacuations in the lower Florida Keys and major disaster declarations in Alabama, Florida, and Mississippi. Louisiana's Governor Blanco declared a State of Emergency, and although the brunt of the storm hit Cuba, the U.S. did sustain an estimated \$2 billion in damage.<sup>4</sup> On August 2, 2005, NOAA released the Updated 2005 Atlantic Hurricane Outlook that projected an additional eleven to fourteen tropical storms in the remainder of the season, with seven to nine of those potentially turning into hurricanes.<sup>5</sup>

Hurricane Katrina initiated in the Bahamas on August 23 and was initially named Tropical Depression Twelve in the first of sixty-one advisories to be issued over the next seven days by the National Hurricane Center (NHC). On August 24, the depression strengthened and was named Tropical Storm Katrina, the eleventh named storm of the season, and on August 25 it became a Category 1 hurricane. The NWS and the NHC forecasted that Katrina would make landfall in Florida and enter the Gulf of New Mexico and head toward the Alabama–Florida panhandle. On August 26, Katrina weakened to a Tropical Storm as it passed over Florida, but was shortly re-upgraded to a hurricane. That afternoon, the NHC upgraded the hurricane to a Category 2 and released a forecast track projecting an August 29 landfall east of New Orleans. This forecast projected that Katrina would be a Category 4 or 5 by the time it reached this second landfall. On August 27, Katrina strengthened to a Category 3 storm, and the NHC predicted it would become a Category 4 before landfall. Also, during the day, the storm nearly doubled in size. On August 28, Katrina strengthened from a Category 4 to a 5 over a six-hour period but on August 29, Katrina made landfall in Plaquemines Parish, Louisiana as a Category 3 hurricane (Exhibit 5).

**Exhibit 5  
Hurricane Katrina Track**



The source is Bryan Woods, [http://thestormtrack.com/archives/2005/12/hurricane\\_katri\\_1.html](http://thestormtrack.com/archives/2005/12/hurricane_katri_1.html).

**Katrina Urban Environmental Impacts**

*Katrina Events—Aftermath and Government Strategy Reevaluation*

Hurricane Katrina generated a massive storm surge as it hit the coastline, estimated as high as twenty-seven feet in some places and reaching six to twelve miles inland. As far east as Mobile Bay, Alabama, the storm surge was over eleven feet.<sup>6</sup> The storm surge, rain, and wind overwhelmed the New Orleans pumping stations and caused multiple breaches within the 350-mile levee system. About 228,000 housing units were flooded (45% of the area total), including 120,000 owner-occupied units (39%), and 108,000 rental units (56%). Minorities made up 58% of the flooded neighborhoods in the metropolitan area, and 80% of the neighborhoods within New Orleans itself. Thirty-eight of the area’s forty-nine “extreme poverty” neighborhoods were flooded (The Brookings Institution, 2005).

*Aftermath Strategy Re-evaluation*

*Urban Land Institute Study.* Soon after Hurricane Katrina, the Urban Land Institute (ULI) assembled an advisory panel working with the New Orleans government leadership to develop an agenda for redevelopment. Their initial findings, published

in early 2006, focused on five key areas: government effectiveness, economic development and culture, city and urban planning, infrastructure, and housing. All five of these areas pose various types of challenges for both redevelopment efforts and repopulation. Although, as ULI stated, their suggestions were an initial step in redeveloping New Orleans, there is need for additional and more in-depth research on such proposals as the ULI. For example, under the government effectiveness area, ULI calls for the "basic rights"<sup>7</sup> of current and future citizens of New Orleans for fair compensation for a property that cannot be rebuilt. This poses a particularly intriguing problem. After Hurricane Katrina, real estate appraisers in the area found that widespread loss of normally dependable public databases and other research sources were destroyed or otherwise rendered undependable.

In many areas, particularly those with the greatest physical damage, real estate markets were and continue to be totally disrupted, and market data for valuation is simply non-existent. Thus, even retrospective appraisals, with a pre-Katrina valuation, will be problematic. The city and urban planning recommendations are particularly ripe for real estate researchers, especially for those in urban planning because of the recommended zoning redevelopment agenda.<sup>8</sup> Other ideas also proposed by ULI, such as the formation of a conduit called the Crescent City Rebuilding Corporation, need to be further studied for their potential effectiveness and timely acquisition and disposition of land and funds. The coordination between this conduit and the New Orleans Housing Partnership, a proposed vehicle fostering low- to moderate-income housing, will be crucial in the balanced redevelopment of the city inclusive of all levels of income.

*Katrina Effects on Other Cities.* Hurricane Katrina resulted in an immediate displacement of about 1.3 million people; an estimated 723,000 of these relocated over 100 miles from their homes (Baen and Dermisi, 2006). While Baen and Dermisi suggest that the dispersion of urban poor among various areas around the country will allow them to be easily absorbed into other communities, this suggests at least a marginal change in poverty housing and other real estate resources devoted to low-to-moderate income families in those communities absorbing the larger numbers of urban poor. Many communities face the paradox of increasing numbers of displaced urban poor coupled with a heightened demand for real estate at all levels, thus bidding up marginal prices of available properties.<sup>9</sup> A 2006 report entitled "The State of Real Estate" highlights that housing demand in Baton Rouge and other unaffected areas has increased significantly, and many of these new residents are buyers rather than just temporary renters. Further anecdotal evidence suggests that there has been a commensurate crowding-out effect in many of these areas, as lower-valued property, often previously rental in nature, is being purchased at prices unaffordable by the current residents. Jones Lang LaSalle (JLL),<sup>10</sup> on the other hand, highlights that surrounding major cities, such as Atlanta, Dallas, and Memphis, would enjoy positive commercial real estate benefits as businesses relocated out of the New Orleans area concurring with earlier research conducted by the National Association of Realtors.<sup>11</sup> Notably, however, the JLL study suggests that the more important post-Katrina question is the impact on energy prices, particularly as the region struggles to bring back on-line the huge industrial infrastructure needed to support the refining capacity.

However, they also note that the U.S. economy as a whole is in a better position than it was in 2001 (after 9/11) to absorb the economic shocks to the real estate industry and other markets.

*Tenant Evictions and Speculation.* Another trend becoming more evident especially in the historic neighborhoods of New Orleans is the increase in the tenant eviction rate. These evictions are often on short notice so that landlords may sell residences to speculators. Fletcher and Efriti (2005) identified this trend by interviewing both speculators and brokers in New Orleans. They suggest that there is wide-spread speculation in the area.

*Insurance Issues.* The insurance industry is reevaluating their policies and procedures in the wake of Hurricane Katrina and some changes are already visible. For example, certain insurance companies are not insuring owners from natural disasters (e.g., hurricane, flood, or earthquake) in certain areas (e.g., Florida, Long Island) because of the significant risk identified by a combination of scientific predictions and more sophisticated insurance modeling. Indeed, current risk-sharing structures may prove inadequate for future disasters. Some suggest simply not rebuilding in hurricane-prone areas, while others propose insurance structures similar to the way California handles earthquake risks. Considering that insurance companies usually base their scenario developments on worst cases and the increasing number of scientists who believe that global warming will further intensify weather-related phenomena spurring more disasters in the years to come, further research is needed in disaster preparedness and prevention in densely populated urban areas.

*Financing Issues.* Looming on the horizon are significant and severe financing problems of sufficient magnitude to have real impacts on underwriting agencies. According to news reports, mortgage delinquencies in Katrina-affected areas have skyrocketed, with nearly 12% of all mortgages over 90 days overdue just four months after Katrina. Not surprisingly, FHA and sub-prime mortgages are fairing much worse, reporting 21% and 24% delinquency rates, respectively, according to the Mortgage Bankers Association. As of yet, the foreclosure rate is still low because lenders are taking a wait-and-see attitude. However, eventually this will need to be revised. Further, it is likely that these delinquency rates vary widely across neighborhoods, with highly affected areas suffering the worst. As a result, large swaths of New Orleans neighborhoods may face foreclosures in the near future, opening the door to the same sort of "ghost town" effect seen in parts of Houston during the oil crisis of the early 1980s. In response, the HUD Office of Housing urged lenders to provide forbearance to FHA borrowers displaced by the storm and unable to make regular monthly payments. HUD took the lead in providing the first 90-day foreclosure relief for FHA borrowers in presidential-declared Major Disaster Areas affected by Hurricanes Katrina, Rita, and Wilma. On November 22, 2005, HUD extended foreclosure moratoriums in those counties declared eligible for individual assistance as a result of Hurricanes Katrina and Rita for an additional 90 days to February 28, 2006. Recognizing that many FHA-insured families needed more time to recover, HUD extended FHA's foreclosure moratorium yet again on February 27, 2006. On December 1, 2005, HUD announced an additional homeownership retention initiative to help homeowners with FHA-insured mortgages who are unable to maintain their

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payment obligations due to hurricane-related property damage, curtailment of income, or increased living expenses. The FHA will advance mortgage payments for up to 12 months for eligible borrowers who are committed to continued occupancy of their homes as a principal residence and are expected to have the financial capacity to repair storm damage and resume making full mortgage payments within a 12-month period.

*Environmental Issues.* Other studies, including the ULI report and the DHS report, note the very real potential for damage to the environment. South Louisiana contains an almost unique combination of highly sensitive ecosystem and a significant percentage of the oil and chemical refinery capacity for North America. In the aftermath of Hurricane Katrina, there were numerous oil and chemical spills, including a 1.05 million gallon crude oil spill from a refinery in St. Bernard's Parish, located to the east of New Orleans. Public policy researchers will find post-Katrina to be a rare laboratory, both for governmental decision-making and for market solutions. Empiricists will also be busy, particularly studying valuation impacts of contamination.

*Native-American Issues.* The Chitimacha Tribe of Chareton, Louisiana and the Tunica-Biloxi Tribe of Marksville, Louisiana, provided housing for displaced tribal families evacuated from New Orleans and coastal Mississippi. HUD provided up to \$2.4 million for emergency tribal assistance, up to \$425,000 per tribe on a first-come-first-served basis. As of this writing, little is known of the nature of tribal displacement, the future of housing for these tribal families, or the adequacy of tribal federal assistance.

*Suggestions for the Federal Government.* The extensive overtopping and several breaches in critical places resulted in catastrophic failure for certain areas of the levee system. In addition to the levee breaches, the miscommunication<sup>12</sup> among federal, state, and local agencies along with the devastated effects of Hurricane Katrina prompted DHS to look at the critical challenges faced by the federal government before, during, and after devastating natural disasters. The White House report (2006) written by DHS identified seventeen critical challenges before and during Hurricane Katrina (Exhibit 6).

Within these seventeen challenges in Exhibit 6, the DHS outlined 125 specific recommendations for federal action in the wake of Hurricane Katrina. The five recommendations under "Mass Care and Housing" (numbered 68-72 in DHS's overall listing) have specific implications for the real estate research community:

68. The American Red Cross (ARC) and DHS should retain the mass care and sheltering responsibilities during disasters.
69. Designate Housing and Urban Development (HUD) as the lead federal agency for the provision of temporary housing.
70. Assist states and municipalities in developing mass relocation plans for each major metropolitan area and inventories of existing shelters and shelter sites.



**Exhibit 6**  
**Hurricane Katrina Critical Challenges**

Critical Challenges

1	National Preparedness
2	Integrated Use of Military Capabilities
3	Communications
4	Logistics and Evacuation
5	Search and Rescue
6	Public Safety and Security
7	Public Health and Medical Support
8	Human Services
9	Mass Care and Housing
10	Public Communications
11	Critical Infrastructure and Impact Assessment
12	Environmental Hazards and Debris Removal
13	Foreign Assistance
14	Non-Governmental Aid
15	Training, Exercises, and Lessons Learned
16	Homeland Security Professional Development and Education
17	Citizen and Community Preparedness

Note: The source is White House (2006).

71. DHS should develop a system to maintain awareness of the movement of shelter and temporary housing residents.

72. DHS should review and revise the federal regulations under the Stafford Act to emphasize “location-independent” housing assistance.

While all of these have potential research implications for the real estate community, numbers 69 and 72 merit particular examination. Referring to the first of these, anecdotal and news reports after Hurricane Katrina indicated that FEMA attempts at providing temporary housing (“FEMA Trailers”) were widely considered to be a failure.<sup>13</sup> DHS recognizes in their report that HUD has extensive experience providing housing resources and an extensive network of regional offices and state and local housing agencies. Therefore, DHS recommends that HUD devote resources to developing competencies in this area.

In the second case, recommendation 72, current regulations allow payment of rental subsidies but not routine payments of security deposits or utility fees. Additionally, regulations do not authorize payment for repairs to existing and available housing units, effectively precluding the use of housing that may need only minor repairs—often at less expense—in order to be occupied. As a result, many people are pushed

into less desirable and often more expensive manufactured housing (the famous "FEMA Trailers") while more efficient solutions are left vacant.

Finally, all of these recommendations suggest a refreshing level of "outside of the box" thinking at DHS in response to Hurricane Katrina. Researchers could take advantage of this window of opportunity to take a fresh look at other options to deal with housing and other infrastructure needs after future disasters.

Baen and Dermisi (2006) provided an overview of the past and present federal policies encouraging urban growth in areas with high risk of recurring natural disasters and highlighted the need for federal policy reform in these areas. Specific recommendations were offered for seven areas of government agencies with direct or indirect influence on urban growth: Federal Flood Insurance Programs and FEMA, FHA-VA-SBA and Federal Bank Loans, General Services Administration, the Justice Department, U.S. Department of Transportation, U.S. Department of Health and Human Services, and the Department of Defense. Some of the recommendations include updating of federal flood maps, cancellation of flood insurance offerings in areas the private insurance industry has not priced the flood risk, and removal of GSA and prison facilities from high-risk areas.

### **Impact of the San Francisco Earthquake and Lessons Learned**

The impact of Hurricane Katrina may be unique to modern experience, but its scope and scale are not unique. Various cities around the world have faced both manmade and natural disasters [e.g., London (the great fire of 1666) and Lisbon (the great earthquake of 1755)]. Chicago and Atlanta suffered devastating fires in 1871 and 1917, respectively. While San Francisco experienced both a destructive earthquake and a firestorm in 1906, the city experienced a period of extensive growth in the aftermath. Grossi and Muir-Wood (2006) draw comparisons between Hurricane Katrina and the San Francisco Earthquake in a centennial review of the earlier disaster and the implications for risk management.<sup>14</sup> Though separated by half a continent and a century, and with widely different resource sets and topography, these two very different natural disasters have many things in common. For one, both were actually two separate disasters: in the case of Katrina, a hurricane and subsequent flooding; in San Francisco, an earthquake and a resultant fire.<sup>15</sup> In both cases, the consequential disaster did more damage than the initial peril by a factor of three to four. San Francisco was the largest American city west of the Mississippi River with the fastest growing economy in the country. Damage in 1906 dollars was approximately \$500 million, of which \$235 million was insured loss (this translates to a \$10 billion loss in 2006 values using the CPI inflator). The city population was about 450,000 at the time, and recent studies have indicated that about 3,000 people died as a result of the disaster.<sup>16</sup> Fires continued for three days, eventually destroying 2,830 acres and 28,000 properties. Two weeks later, there were fewer than 200,000 people living in the city. Immediately after the San Francisco disaster, the city took steps to facilitate rebuilding. Characteristic is the formation of the Relief Committee the afternoon of the quake, which focused on the rebuilding process through fire prevention. New, stringent fire codes were put in place; and by 1909, 25,000 new buildings had been constructed to

meet the new stringent requirements. By 1910, the rateable value of the city's properties (60% of market value) was \$492 million, only \$10 shy of the 1905 value. Within a year, 60 miles of streets and 200 miles of street railways were cleared of earthquake and fire debris. About \$75 million was spent on rebuilding in the first year, and by April, 1907, the population was back up to an estimated 435,000. Recovery was considered to be complete by 1911, when the city beat out, ironically, New Orleans for the right to host the 1915 World's Fair.

### *Parallels and Lessons Learned from the San Francisco Experience*

Hindsight focused on the San Francisco re-build provides a number of lessons for real estate research post-Hurricane Katrina. For example:

1. The decision to focus on fire prevention rather than earthquake-proofing new structures may have been the only possible course of action, given the technology of 1906, but it continued to haunt the city many years after. For example, the 1915 World's Fair was held on a site containing 635 acres of landfill rubble from the disaster, and this area was subsequently developed to be 76 city blocks of what is now the Marina District. As Grossi and Muir-Wood (2006) note, "one disaster has the tendency to lay the foundations for the next." The poor soil conditions in this area led to liquefaction, structural damage, and subsequent fires in 1989 during and subsequent to the Loma Prieta Earthquake. Only later did building codes begin adopting seismic guidelines, such as those proffered by the American Technology Council in 1992.
2. Rents in surrounding towns surged out of control in the aftermath of the San Francisco earthquake, with Oakland reporting immediate rent increases of as much as 500%. However, this demand surge set in motion a supply response, and by April, 1907, there were an estimated 50,000 workers engaged in rebuilding at a daily wage rate of \$4—reportedly the highest construction laborer pay rate in the world. By 1909, masons were being paid \$12 per day. Demand for lumber and other building materials stimulated an economic boom for surrounding cities.
3. Delays in repairs led to further damage, particularly from several rainstorms that occurred during the month after the quake. Researchers have never been able to separate the actual quake and fire damage cost estimates from those resulting from such subsequent and consequential damage.
4. Both homeowners and insurance companies lost records and other paperwork, but were faced with a 60-day rule for submitting claims. Even at the time, it was recognized that many claims were exaggerated, albeit innocently, in the haste to file. About 90% of San Francisco homeowners held fire insurance policies, a much higher proportion than today.<sup>17</sup> Total fire insurance premiums for San Francisco were \$2.6 million on \$350 million of coverage limits. This coverage was shared by 80 domestic and 50 foreign insurance companies. The total surplus-in-excess for domestic insurers was \$100 million, with an additional \$49 million in paid-in-

capital. Foreign insurers had a surplus of about \$150 million. Most policies had a "fallen building" clause, which denied coverage if a building collapsed (i.e., due to earthquake) prior to a fire. Many insurers attempted to deny claims on this basis, but strong political pressure was brought to bear to pay. Insurers met in New York City in May, 1906, to coordinate strategy.<sup>18</sup> The outcome of this meeting was an agreement to pay a fire claim unless it could be determined that the building was totally destroyed as a result of the earthquake prior to being consumed by fire. Not surprisingly, of the first 2,000 claims submitted, none noted earthquake damage preceding the fire. Not all insurers agreed to this, and some insurance companies used their full-limit-settlement practices as a powerful marketing ploy. Eventually about 100,000 claims were settled, a settlement rate of about 80%. Of the \$235 million paid, about \$100 million came from British insurers.

5. Immediately after the disaster, urban planners came forward with important suggestions for improving the city and providing more of a comprehensive master plan. Many of these were outlined in an article in the *San Francisco Chronicle*<sup>19</sup> one month after the quake.

## Conclusion

The principle goal of this paper was to outline potential areas of real estate research implied by Hurricane Katrina. It is already apparent that there will not be any "quick fix" solutions to the devastation and economic disruption faced by the citizens of southern Louisiana. As government leaders, financial intermediaries, engineers, and others seek to implement solutions in the near- and long-term, it is critical that the research community support them with fundamental theoretical models and empirical analysis, both to estimate the efficacy solutions put in place in the near-term but also to provide lessons learned for other cities, from a real estate perspective, as those other cities prepare for other natural disasters that will certainly be faced in coming years.

In addition, real estate researchers, particularly those engaged in government and applied research, are faced with a host of potential research areas, including, but certainly not limited to, the following areas.

- **Mortgage Lending Experience and Strategies:** How does a disaster of this magnitude impact mortgage failure and/or prepayment rates? Were lender and government responses after Katrina adequate? What are the best-practices learned from this experience?
- **Urban Planning:** While many disaster-prone locales (e.g., earthquake prone areas of California) have rigid comprehensive plans; many others, such as New Orleans, have no such plans. What sort of public policy issues are implied for these non-planned or non-regulated areas? What are the implications for mortgage lending and other financing issues of non-planning? What defines sustainability in these non-planned regions?

- **Real Estate Valuation:** When markets are thrown into complete disequilibrium, how do appraisers and others accomplish their work? What sort of wholesale pricing and value shifts are experienced by real estate in the area? What are the implications for lenders, insurers, and others?

## Endnotes

1. New York City attacks, only.
  2. Much of this chronology is adopted from the U.S. Department of Homeland Security's report to the president, February, 2006.
  3. National Oceanic and Atmospheric Survey, May 16, 2005.
  4. NOAA Satellite and Information Service, <http://lwf.ncdc.noaa.gov/oa/reports/billionz.html>.
  5. NOAA, August 2, 2005.
  6. [www.srh.noaa.gov/mobile/0805katrina/](http://www.srh.noaa.gov/mobile/0805katrina/).
  7. Basic rights:
    1. Restore public utility service and levees so that all residents can return to the city;
    2. Immediate and equitable redevelopment;
    3. Efficient and effective government;
    4. Integrity and transparency in government;
    5. Stronger, empowered neighborhoods; and
    6. Fair compensation for property on which owners cannot rebuild.
  8. The ULI recommends a zoned redevelopment agenda, taking into account traditional land-use patterns including historic district designation, topography, proximity to open space, current building conditions and occupancy patterns, storm sewer capacity, and other factors. **Zone A** includes those areas most severely affected by Hurricane Katrina, by environmental contamination, by high repair costs, and other recovery constraints. It is anticipated that block-by-block and even parcel-by-parcel analysis will be required, and great care must be taken to work with the residents to determine appropriate patterns of reinvestment. In many cases, parcel or even block reconfiguration may be needed. **Zone B** properties have borne a more varied impact. Some parcels will require either repair or urban infill redevelopment, while other neighborhoods will require larger scale redevelopment. However, these areas will likely not require broad conversion of entire blocks. The appropriate strategy in this zone will probably be focused on rehabilitation of existing land uses. **Zone C** was the least affected by Hurricane Katrina, and will require mostly a parcel-by-parcel analysis. Much of the damage in Zone C resulted from consequential actions, such as abandonment. Many usable but unoccupied structures remain in Zone C, which could potentially be adapted for temporary housing while Zones C and B are being rehabilitated.
  9. Personal interviews by author with residents of Baton Rouge, Alexandria, and New Orleans, Louisiana, Autumn, 2005 and Spring, 2006.
  10. International Facilities Management Association report, [www.ifma.org/daily\\_articles/2005/sept/09\\_14.cfm](http://www.ifma.org/daily_articles/2005/sept/09_14.cfm).
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11. National Association of Realtors press release, "Hurricane Katrina Impact Mixed for Economy and Housing," September 13, 2005.
12. Characteristic example of the miscommunication is that at 8:12 AM CDT, the NWS received a report of a levee breach along the Industrial Canal at Tennessee Street and issued a flash flood warning. However, as late as 6:00 PM EDT in Washington, D.C., DHS and White House authorities were receiving reports from the Homeland Security Operations Center that the levees had not been breached.
13. A Failure of Initiative, The Final Report of the Select Bipartisan Committee to Investigate the reparation for and Response to Hurricane Katrina, February 16, 2006, <http://katrina.house.gov>.
14. Much of this section is taken from the Grossi and Muir-Wood review and a timeline prepared by Gladys Hansen, Curator of the Virtual Museum of San Francisco.
15. Hurricane Katrina was also accompanied by other issues, including environmental contamination and levy failure, which are discussed elsewhere in this study.
16. Grossi and Muir-Wood (2006) note that casualties probably stayed low as a result of the time of day. Most residents were home, and most residences were wood-frame structures, which were less susceptible to life-threatening collapse.
17. Recent disastrous fires, such as the Baltimore fire of 1904, led to a popular wave of fire insurance policies.
18. Notably, U.S. anti-trust laws were not nearly as significant in 1906.
19. ■ W.W. Goodrich, an engineer from Portland, Oregon and a former professor at the University of California, had made an extensive geological survey of the area and recommended seismic-proofing techniques for new or reconstructed buildings. George Stratton of Johns Hopkins University also stressed the need for both fireproofing and earthquake-proofing, and recommended wide-open spaces as protection and for firebreaks.
  - Callaghan Byrne, described by the *Chronicle* as a local "capitalist," recommended specific grade changes in certain streets and the purchase of land for a park around City Hall. He also suggested a committee of architects, representing property owners, who would agree on a more harmonious style of building fronts and elevations. I.W. Goldman also suggested re-grading, particularly Telegraph Hill.
  - One anonymous writer suggested double-decker streets, with one deck reserved for freight and the other for pedestrians and streetcars. City plumbing and gas mains could be under the sidewalk of the lower deck, exposed for easy repairs.
  - W.R. Schott suggested two parks that would divide the city into three districts (manufacturing, wholesale/retail, and residential) and also provide firebreaks.

## References

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