Reconstruction of New Orleans Following Hurricane Katrina:
A Research Perspective

A bit about myself, a bit about hazard research, and a lot about New Orleans and Katrina

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Kennedy School of Government,
Harvard University
September 25, 2006
Research Traditions: Hazard, Disaster, Risk

• Natural hazards research
  – Lead discipline: Geography

• Disaster research
  – Lead discipline: Sociology

• Risk assessment
  – Lead disciplines: Engineering, Economics
Research Perspective Drawn From:

- Natural hazards research
- Reconstruction following Disaster
- Environmental history, urban and social geography of New Orleans
Natural hazards research


• Robert Kates (1962) *Hazard and Choice Perception in Flood Plain Management*

• Ian Burton, Robert, Kates, & Gilbert White. (1993) *The Environment as Hazard*


• National Research Council, Committee on Disaster Research in the Social Sciences: Future Challenges and Opportunities (2006) *Facing Hazards and Disasters: Understanding Human Dimensions*
Reconstruction Following Disaster

- Eugene Haas, Robert Kates, & Martyn Bowden, eds. (1977) *Reconstruction Following Disaster*
Environmental, Urban, Social History and Geography of New Orleans

• Craig Colten. (2005) *An Unnatural Metropolis: Wrestling New Orleans from Nature*
• Richard Campanella (2004) *Time and Place in New Orleans: Past Geographies in Present Day*
• John Barry (1997) *Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America*
1. Long-term reduction in consequences, Increase in catastrophic potential

- Reduce consequences to frequent events (<100 yrs.)
  - Mortality clearly reduced
  - Not clear for aggregate property losses
  - Individual property losses shared
- Increase vulnerability to major events (>100 yrs.)
  - Major events more hazardous, specify linkage
  - Forest fire suppression classic case
  - Levee effect: Protection induces development, inevitable failure
  - Burby”Safe development” paradox
2. Reconstruction follows a sequence, reflects initial emergency period, takes a long time
Reconstruction takes 100 times the length of the period of emergency
San Francisco Earthquake, Fire, 1906
3, Reconstruction is marked by conflicting goals and differential outcomes

- Conflicting goals in time, resources, values
  - *Rapidly recover* the familiar
  - Reconstruct *safer*
  - Rebuild *better*
  - More *equitably*

- Differential Outcomes
  - San Francisco 1907—Disappeared from area
    74% unskilled, 40% white collar
4. Disasters accelerate pre-disaster demographic, economic, social, political trajectories

• Accelerate growth for cities with growing populations and economies (Injection of capital, reconstruction activity, improved infrastructure)

• Accelerate decline for cities in economic and social decline (Loss of capital stock, hasten outmigration people and economy)
Research Propositions & FAQs

- Reduction in consequences, Increase in catastrophic potential
- Reconstruction follows a sequence, reflects initial emergency period, takes a long time
- Reconstruction is marked by conflicting goals and differential outcomes
- Disasters accelerate pre-disaster demographic, economic, social, political trajectories
- Was New Orleans a “catastrophe waiting to happen?”
- Will New Orleans Rebuild? How long will it take?
- Will the city be a better, safer, fairer place to live and work in?
- What is the likely future of New Orleans? Can it be different?
Was New Orleans a “catastrophe waiting to happen?”

- In 288 yrs—27 river floods/hurricanes (11 yrs.)
- Responses:
  - City rebuilt and often expanded
  - Levees rebuilt and often raised (1 ft, above last)
  - Well-to-do and poor locations created by small differences in elevation
The “safe” New Orleans: The “natural” levees
Expanded levee system following Betsy (1965) led to a doubling of the protected area.
Was there warning of a “catastrophe waiting to happen?”

- Fischetti M (2001) *Scientific American*
- Shirley Laska (2004) *Natural Hazards Observer*
Katrina: The Unnatural Catastrophe

- A bowl that deepened
- From category 5 to 1
- The levees that failed
- The drainage that failed
- The evacuation that failed
- The society that failed

- True costs never known
  - Deaths: 1100-1200
  - Property losses: ($20-22 b)
  - Economy losses ($4-8 b),
  - Emergency assistance ($16-20 billion)
  - Social disruption ??????
  - Migrants & Refugees (300K)
  - Environmental damage: less than expected
Bowl & Levee failures
Flood extent
Deceased reports: Still counting the dead
Evacuee dispersal: American refugees
Will New Orleans Rebuild? Should New Orleans Rebuild?

• Will New Orleans Rebuild?
  – YES
  – (Almost) All cities do

• Should New Orleans Rebuild?
  – YES
  – Unique role in African-American politics, culture, and education
  – Failures of emergency response
  – Failures of protection
  – Failures of society

• BUT possible next catastrophe waiting to happen
How long will it take?

Indicators

• **Emergency**
  – Dewatering 6wks
  – Shelter end 14 weeks

• **Restoration**
  – Restoring levees 40 wks
  – Restoring services (population dependent)

• **Reconstruction 8-11 yrs**
  – Sufficient for returned population
  – Sufficient for predisaster population

• **Commemorative**
  – Not yet contemplated

• **Complicating factors**
  – Magnitude of the damage (80% flooded)
  – Failures in response (Longest emergency period, SF 4 weeks)
  – Massive forced outmigration (Unprecedented)
  – External aid (Levee restoration)
How long will it take?
New Orleans Restoration at One Year

- Population 41%
- Work Force (Metro) 70%
- Public Schools 29%
- Child care centers 23%
- Electric Service 60%
- Hospitals 50%
- Food Outlets 33%
- Operational Transport 17%
- Levee Restoration 90-100%

### Services and Infrastructure

<table>
<thead>
<tr>
<th>Service</th>
<th>Pre-Katrina</th>
<th>6 months after</th>
<th>1 year after</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational bus and streetcar nodes (%)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Operational loaves and street-cater (%)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Former customers using electric service (%)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Former customers using gas service (%)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Open schools (%)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Open libraries (%)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Open hospitals (%)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Open child care centers (%)</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Notes: Data are current through the month of July with the exception of the open schools figure, which represents the proportion that will open for the school year in August 2006. September school openings are uncertain not included and will be counted in next month's index. Sources: New Orleans Regional Transportation Authority, Emergènè New Orleans, Louisiana Department of Education, New Orleans Public Library, Louisiana Department of Social Services, Louisiana Restaurant Association, Louisiana Department of Health and Hospitals.
Reconstruction Is Always Conflicted
Four Competing Goals

• **New Orleans is seeking to:**
  – recover *faster* its familiar economy, communities, culture,
  – be *safer* and more resilient to hurricanes, subsidence, and human-induced climate change:
  – become *better* and more sustainable in urban functions and infrastructure or more attractive for both residents and tourists;
  – be *just*, providing greater equity for the poor and powerless.

• **Goals compete for time, resources, values** (e.g. fast vs.... safe; better vs... fairer)

• **Conflict arises between groups or institutions and within individuals**

• **Differential outcomes for groups, neighborhoods**
Will the city be a better place to live and work in?

- **New urbanism**
  - Smaller, planned, walking city, along light rail
- **Improved city**
  - Advanced school system, honest city gov’t, more multiracial, less crime
- **Investment city**
  - Public/private funds in tourism, culture, medicine, education, and ports

- **To date:**
  - Multiple plan efforts, similar plans
  - “High ground first—damaged areas maybe” approach rejected
  - Strong neighborhood involvement just beginning now (8 months late)
  - Small, very small gains for each approach
Building better

Building Back Better
Creating a Sustainable Community After Disaster

It is time for an evolutionary microshift in the approach we are taking to coping with natural and technological hazards by more broadly adopting goals that are broader than just risk reduction. By using a risk-based framework that links natural hazards to their global context, to environmental con- strainsthere, and to social resilience, and by scaling hazard mitigation efforts so that they are core parallel with that new view.

Disasters by Design, p. 18

Many hazards specialists in academia, all levels of government, and the private sector have recognized the need to prevent disaster, and to prepare the country for the consequences of potential losses from natural and technological hazards. To a gratifying extent, these efforts have been rewarded. We now have more widespread acceptance—across a broad spectrum of stakeholders, including policy makers, specialists, and the general public—that reducing losses before they happen is preferable to recovering from losses and over again. We must continue avoiding all the disruptions and expenses they entail. We have at our disposal an ever-increasing array of mitigation techniques, ranging from engineering projects to construction techniques to insurance to compensation to mapping. To an extent we would not have dreamed of a decade ago, the idea of mitigating hazards is now standard practice.
ULI plan

AN ADVISORY SERVICES PROGRAM REPORT

New Orleans
Louisiana

Urban Land Institute
Better, Sustainable, Attractive

Imagine the Best City in the World

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downtown</td>
<td>bustling with people who want to live, work, eat, shop, experience culture and art, bring their children, and stay.</td>
</tr>
<tr>
<td>Neighborhoods</td>
<td>the heart of activity and services, celebrating unique heritage and welcoming the new.</td>
</tr>
<tr>
<td>Parks and Open Space</td>
<td>sustainable nature in every neighborhood, linking every part of the city.</td>
</tr>
<tr>
<td>Educational / Medical Institutions</td>
<td>employment powerhouses supporting their neighborhoods and energizing the economy.</td>
</tr>
<tr>
<td>Connections</td>
<td>beautifully landscaped connections throughout the city and region for pedestrians, bikes, cars, and transit.</td>
</tr>
</tbody>
</table>
New Orleans Neighborhoods
Will the city be a safer place to live and work in?

- Rebuilding of levees
- Make buildings flood and wind resistant
- New evacuation plan
- Change land use to reduce vulnerability
- Restore wetlands to slow storm surges
- Current levee system rebuilt and improved
- Gates and storm water pumps not yet installed
- Elevation of structures minimal or rejected
- Complete evacuation plan. No shelters of last resort. Many questions
- No action to change land use or restore wetlands
- Greater, more threatening storms, sea level & subsidence increase
Protection Improvements

Improvements to New Orleans' Hurricane Protection System

On low-lying, surrounded by water on all sides, New Orleans depends on an ever-evolving, man-made system to protect it from floods, hurricanes, and storms.

On low ground, surrounded by water on all sides, New Orleans depends on an ever-evolving, man-made system to protect it from floods, hurricanes, and storms.

Protection Stationary Structure with Suction Lift Pumping

Temporary Structure with Suction Lift Pumping

Three major outfall canals drain water from the center of the city north to the lake. More than 14 miles of levees and floodwalls bordering these canals form part of the region's Hurricane Protection System.

The 17th Street Canal, the Orleans Avenue Canal, and the London Avenue Canal provide vulnerable to Hurricane Katrina's massive storm surge.

Adding a structure at the mouth of each canal is key to better protection. These new structures will keep storm surge out and permit existing pump stations to continue operation.

The Inner Harbor Navigation Canal (IHNC), reliant on floodwalls and levees on the east and west banks to prevent storm surge from entering populated areas, also proved to be vulnerable to Katrina. Two proposed navigable floodgates would keep storm surge waters from Lake Pontchartrain to the north and Lake Borgne to the east out of the Industrial Canal area.

Additional proposed measures would also increase regional hurricane protection. These proposed measures would raise and armor portions of area levees and restore Southeast Louisiana's wetlands to withstand future hurricanes. Proposed measures would also include floodgates that can be raised to protect the industrial area from storm surge.

For more information on the project and its progress, please visit the USACE website.
But what about Climate Change?
Will the city be a fairer place to live and work in?

- Extreme events reveal extreme differences
- African-American city (68%)
- Prime victims in coping: no transport, botched evacuation, inadequate shelter, little temporary or rental housing

- But Damaged area: 74% African-American, 29% poor
- Undamaged area: 46% African-American, 25% poor
- Deaths: Mostly infirmed, aged, and only 52% African-American
- Public housing not rebuilt
- Limited ability to participate in planning
The Struggle for Equity

In the Wake of the Storm
Environment, Disaster, and Race After Katrina

Manuel Pastor
Robert D. Bullard
James K. Boyce
Alice Foote greater
Rachel Morello-Frosch
and
Beverly Wright
Meanwhile, the facts on the ground!!

- Building moratorium rejected
- “High ground first—damaged areas maybe” rejected
- Reversal of damage estimates (<50% damage)
- 38,000 building permits
- Significant rebuilding funds
- Minimal elevation required
Fast, Familiar, Rebuild

Post-Katrina Rebuilders Hug Ground, Trust Levees
Some Say They Don't Have the Time or Money to Elevate Houses

By Peter Whoriskey
Washington Post Staff Writer
Sunday, February 26, 2006; Page A03

NEW ORLEANS -- Hurricane Katrina revealed fatal flaws in the way this city is built. But as thousands of New Orleanians seek construction permits, many are planning to rebuild their homes in the same place, at the same elevation, without any guarantee that the levees will hold in the next big storm.

While residents say they have neither the time nor the money to elevate the homes they are rebuilding, experts say the rush of reconstruction could lead to a repeat of the disaster. Officials at the Federal Emergency Management Agency are studying safe building elevations for the city, but the agency has yet to adopt new guidelines.
FEMA (Lack of) Guidance
Disasters accelerate pre-existing environmental, social, and economic trends

New Orleans Population 1950-2006

<table>
<thead>
<tr>
<th>Year</th>
<th>Pop. '000s</th>
</tr>
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<tbody>
<tr>
<td>1950</td>
<td>570</td>
</tr>
<tr>
<td>1960</td>
<td>628</td>
</tr>
<tr>
<td>1970</td>
<td>593</td>
</tr>
<tr>
<td>1980</td>
<td>557</td>
</tr>
<tr>
<td>1990</td>
<td>499</td>
</tr>
<tr>
<td>2000</td>
<td>485</td>
</tr>
<tr>
<td>Pre Kat</td>
<td>462</td>
</tr>
<tr>
<td>Kat + 6 mos</td>
<td>189</td>
</tr>
</tbody>
</table>
What is the likely future of New Orleans?

- Smaller, struggling community
- Very long period of rebuilding
- Loss of a third to a half of population
- Shift in racial, ethnic mix
- Loss or fragmentation of some major neighborhoods
- Significant losses in economy, education, and medicine
## Projected Population: New Orleans

### How many people will return short term?
*(Lack of housing will be the biggest constraint to return.)*

<table>
<thead>
<tr>
<th>Estimates of population in New Orleans:</th>
<th></th>
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<tbody>
<tr>
<td>January 2006:</td>
<td>144,000</td>
</tr>
<tr>
<td>September 2006:</td>
<td>181,000</td>
</tr>
<tr>
<td>September 2008:</td>
<td>247,000</td>
</tr>
</tbody>
</table>

Source: RAND Corporation, GCR
Can it be different?

- Larger contextual changes:
  - Very large external aid (Friuli, Italy)
  - Spillover effects from a larger region (Tangshen, China, 1976; Homestead, FL, 1992)
  - Spillover effects from the disaster itself (US droughts 1890s, 1930s, Floods 1927; Managua 1972, Mexico City 1985 earthquakes)

- New Orleans contextual changes:
  - Extraordinary national effort to rebuild
  - Category 4/5 protection system
  - Fortuitous and rapid growth in culture, health, education, or port economy
  - Possible (but remote) major political change to address race and poverty
Disasters and Political Unrest: An Empirical Investigation

A. Cooper Dury* and Richard Stuart Olson**

A relationship between disasters and political change has often been suggested, but only one study to our knowledge has been offered as evidence. In test statistically for a disaster-political unrest relationship, a causal model is developed that permits a direct and positive linkage to be established between such occurrences. The model endogenizes the dependent variable, that increased levels of development, income inequality, and regime cooperation among post-disaster political parties. Using data from the 1980s and 1990s, Pearson and other non-parametric methods are employed to model the data. The dependent variable, income stability, has the opposite of the originally hypothesized effect.

Disasters and Political Change
Can we do better?

- A better balance between goals:
  - Needs of renters and public housing residents
  - Redundant safety system to include secondary protection (elevation, inner levees, neighborhood sanctuaries)
  - Energy efficiency, green rebuilding
  - Give all evacuees a choice to return by voucher supported housing, reconstructed public housing, new developments, or reconstituted neighborhoods
Can New Orleans Recover?

• Yes, if it means New Orleans will be rebuilt
• No, if it means New Orleans will recover its previous population, housing, services, and culture.
• Peut-être, if it means New Orleans can achieve a better balance in its reconstruction efforts among the four goals of recovery, safety, betterment, and social justice