

Resilient Cities:

Environment | Economy | Equity

**Storm Surges, Disaster Planning, and
Vulnerable Populations at the Urban
Periphery: Imagining a Resilient New York
After Super Storm Sandy**

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Sandy' s statistics

- Struck on the evening of October 29, 2012
 - Approximately 3 times as wide as Hurricane Katrina
 - Confluence of unusual weather occurrences:
 - high tide (full moon)
 - unexpected leftward hook of storm (high winds)
- Result: storm surge and high waves inundated waterfront (including Rockaways, Coney Island, South Street Seaport and Battery (Manhattan), Midland Beach (Staten Island))

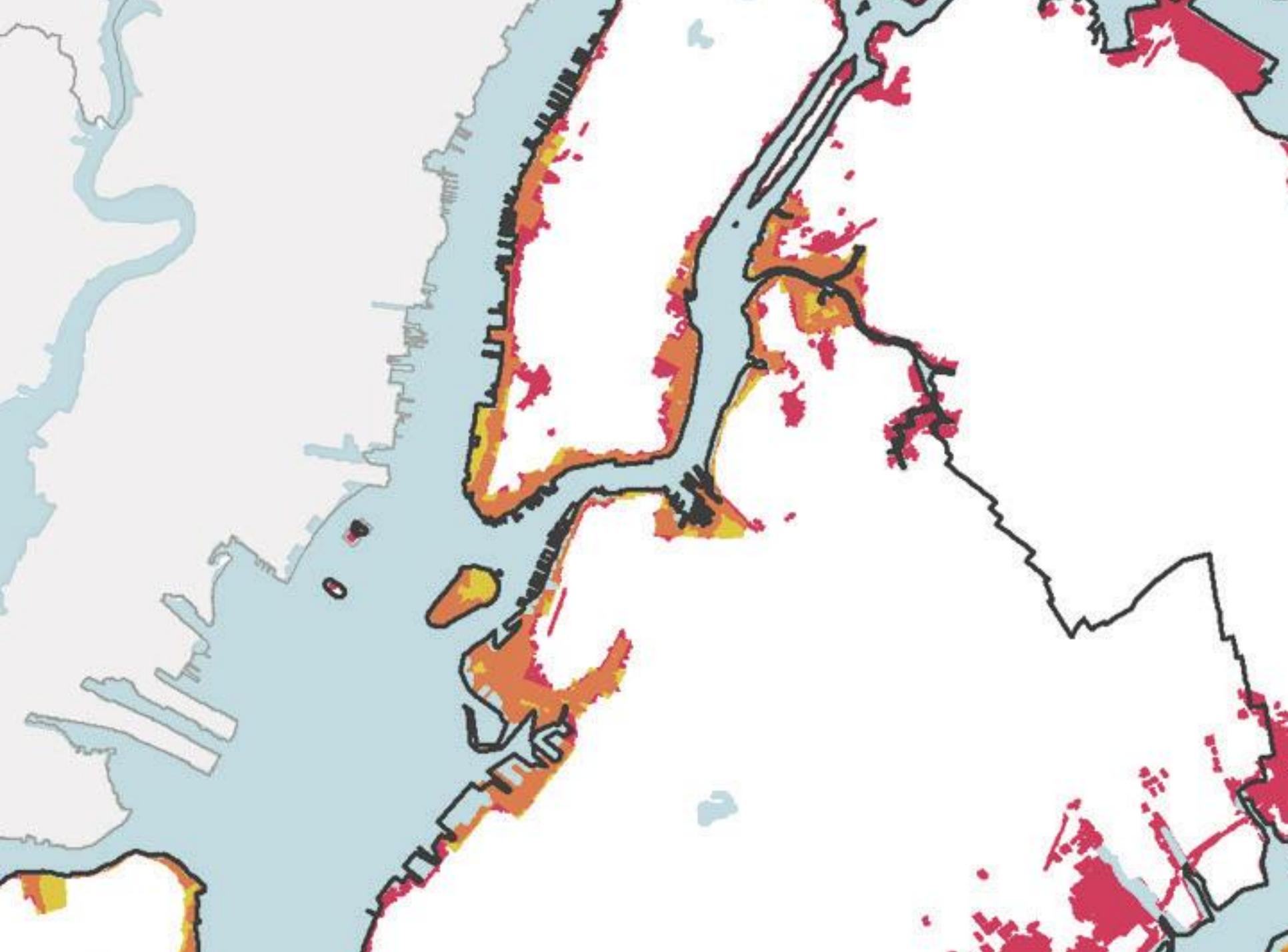
NYC's waterfront

- NYC has 520 miles of waterfront
- 375,000 New Yorkers live in “Evacuation Zone A” and were ordered to evacuate but not all complied
- Evacuation Zone A includes 7 hospitals, 22 nursing homes, and 18 adult care facilities
- Flooding extended beyond Zone A
- Extensive damage to boardwalk and waterfront structures, more than 3 million cubic yards of sand from city beaches lost

Hurricane Sandy Surge Area and Evacuation Zone A

- (Brown) Surge Area and Evacuation Zone A Overlap, (Red) Surge Area Beyond Evacuation Zone A, (Yellow) Evacuation Zone A Not in Surge Area
- *Sources: FEMA Modeling Task Force, New York City Department of City Planning, New York City Office of Emergency Management*
- *Reprinted in Furman Center for Real Estate and Urban Policy Sandy's Effects on Housing in New York City (Fact Brief, March 2013)*





Sandy's Impact in NYC

- 43 deaths
- 300 properties totally destroyed
- 800,000 residents and businesses without power
- 5 hospitals and 30 residential facilities evacuated
- 6800 evacuees assigned to 73 city shelters

Impact on NYC Housing Authority (NYCHA) buildings

- 45% of NYCHA high-rise buildings in evacuation zones near waterfront
- 402 public housing buildings covering 35,000 units damaged
- City still using temporary boilers rented at \$3 million per month to replace flooded boilers at NYCHA buildings
- Water-resistant replacements to be built at higher elevations slated to arrive in Fall 2014

Impact on NYCHA residents

- 80,000 residents of NYCHA-owned high-rise buildings stranded without essential services for more than two weeks
- NYCHA Resident Associations and autonomous community-based groups (e.g., Occupy Sandy and People's Relief) supplement government relief efforts
- Heat, hot water, and electric power fully returned to all NYCHA buildings on November 18, 2012

Post-Sandy recovery: embracing resilience

- Special Initiative on Rebuilding and Resiliency
- Rebuilding and planning for climate change
- Headed by President of NYC Economic Development Corp
- Report issued in June 2013: A Stronger, More Resilient New York
- Touted as a “road map for comprehensive resiliency planning” for NYC and cites globally

Deconstructing Resilience: Interdisciplinary Dimensions

1. **Psychological**: a dynamic process of adaptation in context of adversity
2. **Social-ecological** (impact of human activity on ecosystems, human capacity to realize “ecological identity”)
3. **International aid** (capacity of a nation, community, or household unit to resist and recover from a disaster)
4. **Climate change** (adaptation and recovery strategies and “systems [that] build redundancies of resources, multiple response paths, and safety nets”) [Rockefeller Foundation, Building Climate Change Resilience \(August 2009\)](#)

Resilience: Defining Terms

Social –ecological:

“ability of a social or ecological system to
--absorb disturbances
while retaining
--the same basic structure and ways of
functioning, the
--capacity for self-organisation, and the
--capacity to adapt to stress and
change.”

(The Intergovernmental Panel on Climate
Change. cited in the Department for
International Aid, Defining Disaster
Resilience: A DFID Approach Paper at 6.)

Resilience: Defining Terms

- In the context of climate change:
- “the **capacity of an individual, community, or institution to dynamically and effectively respond to shifting climate impact circumstances** while continuing to function at an acceptable level. Simply put, it is the **ability to survive and recover from the effects of climate change**. It includes the **ability to understand potential impacts and to take appropriate action before, during, and after a particular consequence** to minimize negative effects and maintain the ability to respond to changing conditions”
- **Rockefeller Foundation White Paper, Building Climate Change Resilience at 1 (August 4, 2009).**
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Attributes of Resilient Systems

- Spare capacity (redundancy)
- Flexibility
- Safe failure (resistance to domino effects)
- Capacity to recover quickly and evolve over time
- Integrating ongoing learning from experience

New York State 2100 Commission, Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure (January 11, 2013)

NYC's Post-Sandy Discourse of Resilience

- Resilient city: "protected by effective defenses and adapted to mitigate most climate impacts . . . Able to bounce back more quickly when defenses are breached . ." [A Stronger, More Resilient New York at 5 \(June 2013\)](#)
- Close rhetorical associate of sustainability
- Popularizes psychological and international aid definitions: resilience=toughness
- "A *can-do, must-do, will-do* plan"
- Part motivational, part urban boosterism, tied to waterfront development

Resilience Strategies: What NYC Can Do

1. Protection:

Hard armoring (sea walls, bulkheads, revetments)

Soft armoring (wetlands, dunes as natural buffers, wetlands mitigation bank)

2. Accommodation (amend building and zoning code to improve resilience to sea level rise)

3. Retreat (government buyouts, conservation easements, rolling development)

NYC's resistance to retreat mechanisms

(pre-Sandy): cites density, difficulty of moving infrastructure, displacing residents, incompatibility with coastal development goals

Vision 2020: NYC Comprehensive Waterfront Plan (March 2011)

“We can embrace our coastline. . . . We can fight for and rebuild what was lost, fortify the shoreline, and develop waterfront areas for the benefit of all New Yorkers. The city cannot, and will not , retreat.”

A Stronger, More Resilient New York at 7 (June 2013)
(Bold in original)

Social Dimensions of Weather Disaster: What NYC Should Do

- In resilience planning, attend to social factors that can affect vulnerability and capacity for resilience

Axes of inequality (Tierney)

--Social class

--race and ethnicity

--gender

Impact of age and isolation (Klinenberg)

Effect of disability (*Brooklyn Center for Independence of the Disabled v. Bloomberg, 2013 WL 5943995*)

NYC failed to develop adequate evacuation plans for disabled in high-rise buildings

failed to afford access to public transportation, shelter system
failed to plan appropriately for communicating with disabled people during emergencies

Social Dimensions of Weather Disaster: What NYC Should Do

Draw upon resources of other levels of government and private and non-profit sectors

Mobilize community-based initiative that builds and reinforces informal community networks

Reconsider resilience strategies that rely principally on rebuilding the coastline and recognize relationship between hard coastal armoring and social infrastructure at the urban periphery (Klinenberg)

