Climate Adaptation Planning in Urban Environments

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Climate Change Adaptation for State and Local Governments: Achieving Buy-In for Adaptation
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New York City Adaptation Process
2008 - 2011

Leadership
Mayor

Coordination
City-wide Sustainability Office OLTPS

Implementation
Stakeholder Task Force CCATF
City Agencies
- Regional Authorities
- Private Stakeholders

Integration across Sector-specific Working Groups
- Energy (E) - Transportation (T)
- Policy (P) - Water & Waste (WW)
- Communications (C)

Expert Panel NPCC
University scholars and private sector experts
- Social, biological, and physical scientists
- Legal and insurance experts
- Risk management professionals

Climate Science
Source: NPCC, 2010
NPCC Approach

A risk management issue  Flexible Adaptation Pathways as the response

Acceptable risk
Status quo
Setting inflexible adaptation standard with mitigation
Flexible Adaptation Pathway without mitigation
Flexible Adaptation Pathway with mitigation

Risk
Time (decades)

Monitor & Reassess!

Source: NPCC, 2010
Information and Tools

- Foundation reports
  - Background expert knowledge
  - Best practices
  - Resource guide

- Workbooks for stakeholders
  - Climate Risk Information
  - Adaptation Assessment Guidebook
  - Climate Protection Levels

- Climate projections
  - Provided in ‘tear sheet’ format for stakeholders

<table>
<thead>
<tr>
<th>TABLE 1, Baseline Climate and Mean Annual Changes¹</th>
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<td>-----------------------------------------------</td>
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<tr>
<td><strong>Air temperature</strong></td>
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<tr>
<td>Central range²</td>
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<td><strong>Precipitation</strong></td>
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<td>Central range²</td>
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<td><strong>Sea level rise</strong></td>
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<td>Central range²</td>
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<td><strong>Rapid ice-melt scenario¹</strong></td>
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Source: Columbia University Center for Climate Systems Research

1. Data from National Oceanic and Atmospheric Administration (NOAA) and other sources.
Developing Climate Scenarios

Process used to develop climate risk factors for New York City

Global climate scenarios
- SRES greenhouse gas emissions pathway
- GCM simulations

Local climate change information
- Observed data
- Quantitative GCM-based projections
- Qualitative GCM-based projections

Climate risk factors
- Generalized climate hazards of most consequence to NYC infrastructure used to determine critical infrastructure at-risk.
  - Warmer temperatures
  - More frequent and intense heat waves
  - Sea level rise and coastal flooding
1. Identify current and future climate hazards
2. Conduct inventory of infrastructure and assets and begin to identify vulnerabilities
3. Characterize risk
4. Develop initial list of strategies
5. Identify opportunities for coordination
6. Prioritize strategies
7. Prepare and implement Resilience Plans
8. Monitor and reassess

Source: NPCC, 2010
Framing Adaptation

- Reduce the level of physical, social, and economic impacts of climate
- Take advantage of new opportunities

Types
- Management/operations
- Infrastructure – physical components of each sector
- Policy

Administrative Groups
- Private vs. public organizations
- Local/municipal, county, state, national

Level of Efforts
- Incremental action
- Large-scale shifts

Timing
- Short term <5 yrs; medium term 5-15 yrs; long term >15 years
- Abrupt Changes - tipping points/policy triggers
Hurricane Sandy
Forecasting the Storm

Lowest recorded central pressure north of Cape Hatteras, NC at 943 mb

Storm track forecasts

Exceptionally large wind field tropical storm force winds over ~500 miles from the center

Storm forecast well in advance
Hurricane Sandy
Forecasting the Impacts

Interdependent Critical Infrastructure Systems and Vulnerable Communities

South Ferry Subway Station

Beach erosion and boardwalk damage in the Rockaways

Extensive power outages

Many impacts forecast well in advance

Sources: CCSR, 2013, MTA, 2012
Hurricane Sandy
Links to Climate Risk Responses

• Actions already underway in New York City to mitigate the impacts of climate risks
  – Planting over 300 Greenstreets, vegetation that absorbs stormwater
  – Securing citywide high-resolution LiDAR elevation data, which helps to identify the most vulnerable area
  – Incorporating sea level rise into the City's Comprehensive Waterfront Plan
  – NYC Office of Emergency Management launched enhanced emergency response and preparedness programs

• Post Sandy intensifying efforts
Conclusions

• The climate adaptation process developed in New York City can be modified for use by other agencies and cities.

• Response actions are already underway in New York City and helped to reduce damages.

• Recommendations include climate risk management in operations and management, infrastructure planning, and policy.

• Implement both adaptation and mitigation to reduce the magnitude of risks.
Cities are emerging as first responders to climate change

Mitigation: Planned cuts in greenhouse gas emissions (percent below baseline year) for cities around the globe

Rosenzweig, *Scientific American*, 2011
URBAN CLIMATE CHANGE RESEARCH NETWORK

• UCCRN’s Climate Change and Cities program aims to
  – Institutionalize a sustained state-of-the-knowledge assessment process of climate change science tailored for urban needs
  – Draw on the experience of cities as they act to adapt to and mitigate the impacts of climate change.

• Objectives will be accomplished through
  – Development and publication of ARC3-2
  – Development of Regional Research Centers of Action
  – Workshops
  – Networking
  – City Strategies
References and Links

• Consortium for Climate Risk in the Urban Northeast (www.ccrun.org)

• NYSERDA ClimAID (www.nyserda.ny.gov/climaid)

• New York City Panel on Climate Change report available online at (www.nyas.org)

• Urban Climate Change Research Network (www.uccrn.org)

• ClimateYou (www.climateyou.org)
  – “Learn, Share, Act” about climate change