

# Cities Preparing for Climate Change

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# Cities Preparing for Climate Change

- Case studies of six cities/urban regions designed to:
  - Identify lessons from the experience of early adapters and
  - Develop a framework for adaptation by urban governments

## Cities Preparing for Climate Change

A Study of Six Urban Regions

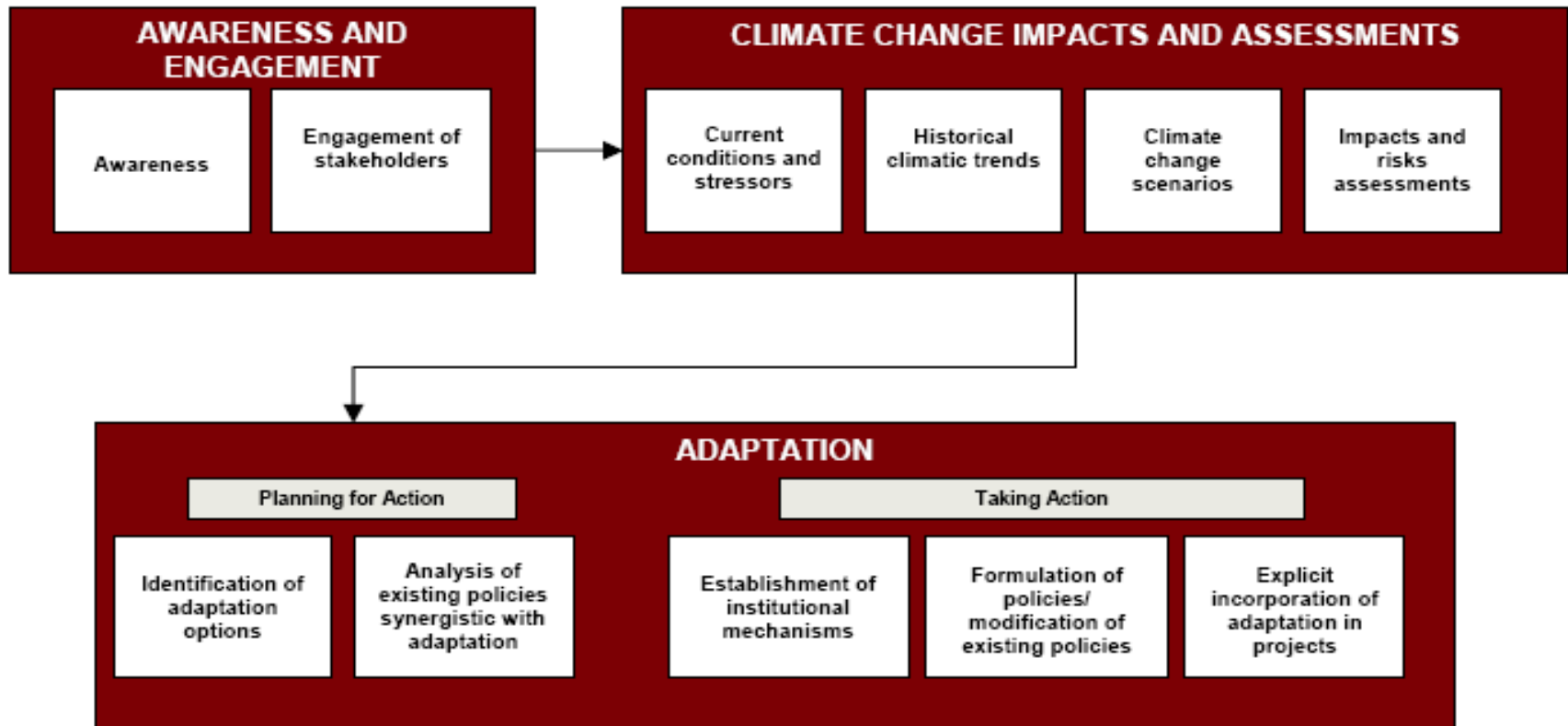
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# Cities/Regions Studied

- London, UK
- New York City
- Metropolitan Boston Area
- Halifax Regional Municipality
- Greater Vancouver Regional District
- Seattle/King County

# Elements of a Successful Adaptation Process



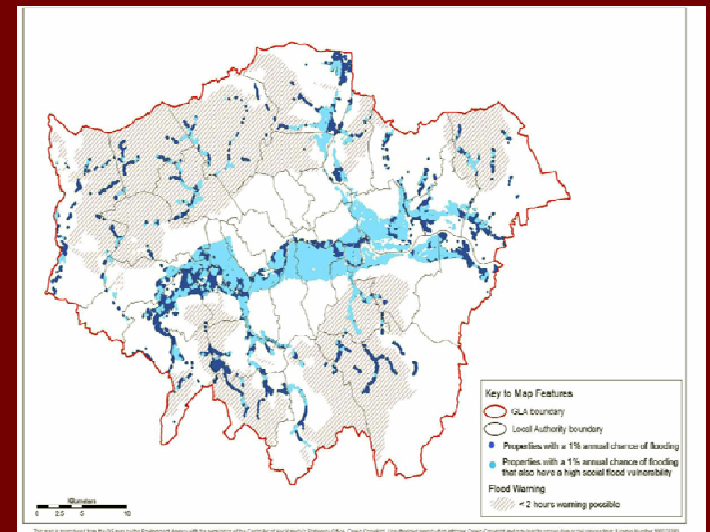
# Phase 1: Awareness & Engagement

- Study informants identified this as a critical step
- Though need for mitigation widely understood, adaptation not
- Several cities developed initial package of impacts information & used a multi-pronged approach to communicate it



# In the six case studies Awareness Raised by:

- Workshops, conferences (London, NYC, Boston, King County)
- Fact sheets (NYC, Halifax)
- Dedicated websites (Halifax, London, NYC)
- Newsletters (Halifax)
- Press conferences & media (London, King County)
- Maps, video animations (NYC, Boston, London)



# Beyond Awareness: Stakeholder Engagement

## ■ Why?

- Stakeholders understand history & vulnerabilities of existing urban systems
- Have critical knowledge for impacts & options assessment
- Adaptation has to be integrated into most long-term planning

## ■ Who?

- Local government departments
- Utilities
- Conservation agencies
- Transportation authorities
- Public health
- Climate scientists
- Sectoral researchers

# Workshops to Kick Off Engagement Processes



- London

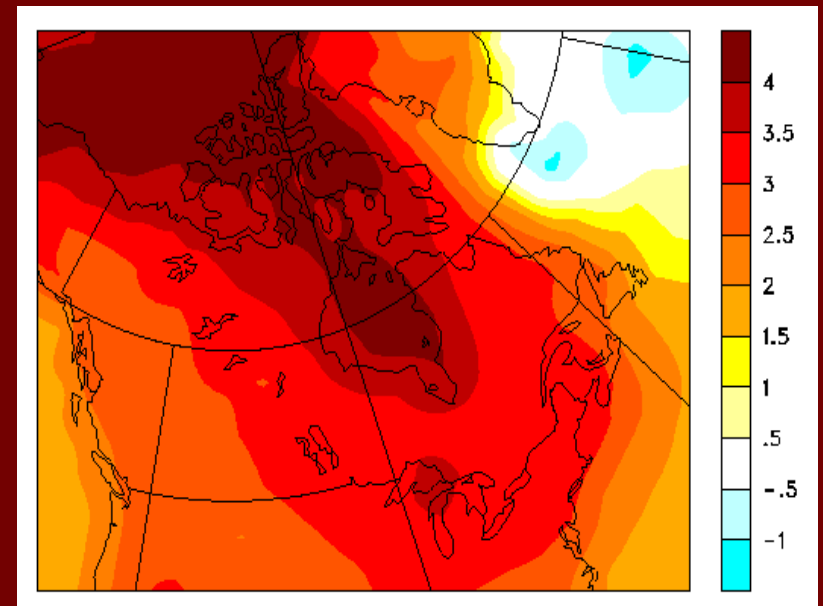
- 100+ presentations & interactive workshops with departments, agencies expected to be affected

- New York Department of Environmental Protection

- Workshops with 7 divisions responsible for water & wastewater management

# Typical Workshop

- The science of climate change
- Regional projections
- Potential impacts (interactive)
- Initial discussion of adaptation options & strategies



# Stakeholder Engagement Processes

- Ongoing, multi-government, multi-agency (London)
- Ongoing, high-level interdepartmental team (King County)
- Time-limited, multi-agency research project involvement (New York MEC Assessment)
- Time-limited research project with multi-government stakeholder advisory group (Boston)
- Consultant-led, multi-government involvement (Halifax)
- No formal process on adaptation (Vancouver)

# Status of Engagement Now

- London & King County processes continuing & initializing comprehensive adaptation plans & programs
- New York process ended but new process established for water/wastewater services
- Halifax process uncertain
- Boston & Vancouver processes ended (though there are signs of reactivation)

# Lessons from the Case Studies

- A structured process & regular communications & meetings needed for sustained engagement
- Mid-level staff are the workhorses
- Processes focused on technical modeling reduce engagement
- Researcher-led processes often end when funding ceases

# Phase 2: Impact Assessments



- Comprehensive assessments included:
  - Analysis of current conditions & stressors
  - Review of historical climate trends
  - Regional climate change projections
  - Analysis of likely impacts by sector
  - Initial identification of adaptation options

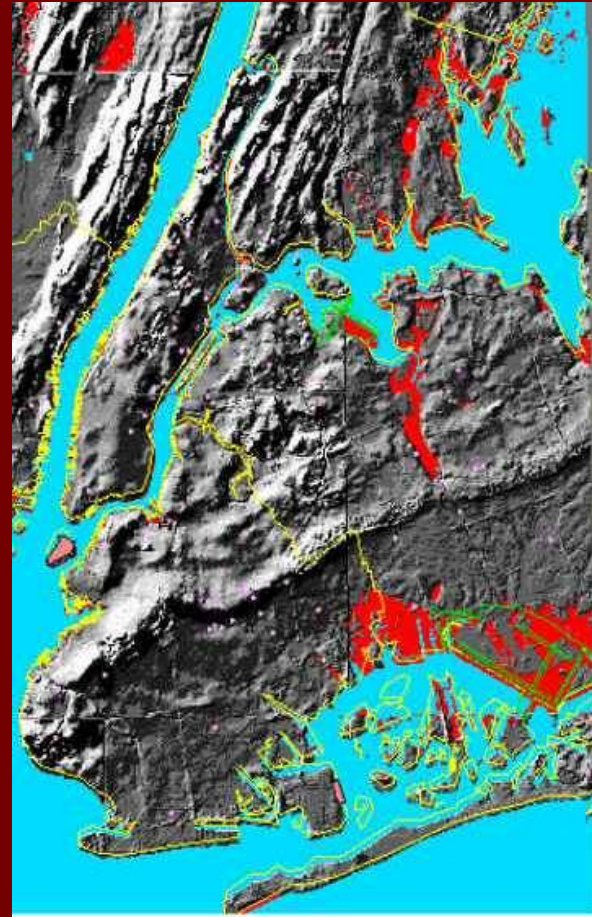
# Typical Sectoral Divisions for Identifying Impacts

- Coastal systems
- Water & wastewater
- Energy
- Transportation
- Buildings
- Ecosystems
- Health (heat, air quality, infectious diseases)
- Social impacts



# Impacts Assessment: New York

- Metropolitan East Coast Assessment led by Columbia researchers (part of the National Assessment)
- Seven teams undertook in-depth studies of vulnerable sectors, with involvement of stakeholder agencies in each sector



# Impacts Assessment: Metropolitan Boston Area

- Led by university researchers with EPA funding
- Cost estimates of three scenarios for different sectors:
  - “Ride it out” – business as usual, repair damage as it occurs
  - “Build your way out” – fortification of existing systems to reduce damage
  - “Green” adaptation – sustainable alteration of the organization & structure of urban systems to make them less vulnerable

# Impacts Assessment: Halifax

- Led by consultants
- Classic risk assessment approach

	PROBABILITY			
IMPACT SEVERITY		LOW	MEDIUM	HIGH
HIGH		M	H	H
MEDIUM		L	M	H
LOW		L	L	M

# Lessons from the Case Studies

- Several valid approaches to analyzing impacts
- Experienced climate scientists help identify historical climate trends & interpret regional implications of climate projections
- Sectoral researchers (e.g. health, transportation, energy specialists) best positioned to assess how climate change can impact specific sectors
- Costs for local governments & city economies can be estimated from case studies of extreme events

# Phase 3: Identifying Adaptation Options

- Preliminary menu of adaptation options included in the assessments studied
- Many adaptation options are enhanced responses to existing problems, e.g.
  - Stormwater management
  - Urban heat island reduction
  - Protection against storm surges
  - Control of insect vectors
- Many adaptation options have “co-benefits”, e.g.
  - Energy conservation reduces peak loads on transmission systems during heat waves and the risk of blackouts, but also reduces ghg emissions and costs

# Adaptation Options: Building Capacity for Adaptation

- Education, e.g.
  - Education for the general public on the risks of building in coastal areas vulnerable to sea level rise (New York MEC Assessment)
- Research and monitoring, e.g.
  - High resolution topographical mapping to better identify areas at risk from flooding (Halifax)
  - Expanding network of sensors for real-time data on precipitation (Seattle Public Utilities)

# Adaptation Options: Reduce Pressures on Vulnerable Systems:



- Energy conservation programs to reduce peak loads & limit risk of blackouts (London)
- Water conservation programs to safeguard dwindling water supplies (Seattle)

# Adaptation Options: Increase Resiliency

- Diversified local sources of electricity to reduce dependence on centralized generation & vulnerable transmission lines (Vancouver)
- Interconnecting regional systems of water supply to provide backup (MEC Assessment & King County)

# Adaptation Options: Relocate or Fortify Vulnerable Systems

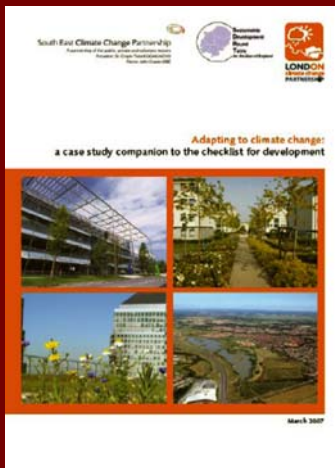
- Buffer zones or relocation
  - Green zones/parks in flood-prone areas (London)
  - Relocation of vulnerable coastal road & rail infrastructure (Halifax)
- Fortification of vulnerable structures & systems,
  - More onerous requirements for bridges, stormwater infrastructure (Boston)

# Adaptation options: Reduce Harm

- Forecasting and early warning systems, e.g.
  - Public warnings about how to protect against vector-borne diseases (**Halifax**)
  - Heat health alert systems
- Strengthening emergency response systems, e.g.
  - Alternative transportation route planning (**Boston**)

# Systematic Analyses of Adaptation Options Needed

- Systematic reviews of options and strategies for high risk impacts beginning to be done, e.g.



- *Adapting to Climate Change: Lessons for London* investigated strategies of more than 20 cities to cope with heat, flooding & water shortages
  - Greater Vancouver Regional District Stormwater Management Plan
- Technical study & pilots needed for assessing effectiveness of options in specific urban regions

# Phase 4: Taking Action

- Establish “institutional mechanisms” (building on engagement processes)
- Formulate high-level adaptation policies
- Implement adaptation by incorporating into projects & programs

# Institutional Mechanisms

- Standing committees, partnership organizations or task forces that bring together stakeholders in local government & related organizations to learn, plan & implement
- Guides & checklists for integrating climate impacts & adaptation into decision-making
- Dedicated staff & resources
- Formal relationship with climate change researchers

# Examples of Institutional Mechanisms

- Broad-based adaptation-specific stakeholder group (London)
- Internal mitigation-adaptation action team (King County)
- Combined team of outside researchers & internal departmental team (NYC DEP)
- Private network of adaptation consultants working with environmental staff (Halifax)

# Institutional Mechanisms London

- London Climate Change Partnership, 2001
  - 15-20 agencies
  - Chaired by high-profile businessman
  - Produces in-depth reports
  - Comments on government plans
  - Engages the media
- Also appointed full time-officer to do “inreach” & develop London Adaptation Plan



# Formulation of Policies

- Include adaptation in overarching policies (London, King County, New York)
- Develop broad-scale adaptation plans – similar to mitigation planning (London, King County)
- Integrate adaptation into individual departmental & agency plans (New York Department of Environment, Seattle Public Utilities, Greater Vancouver)

# The London Plan

- Mitigation & adaptation both explicitly integrated in the London Plan (2006)



*"The Mayor will and other agencies should promote the most effective adaptation to climate change, including:*

- minimizing overheating and contribution to heat island effects*
- minimizing solar gain in summer*
- contributing to reducing flood risk including applying principles of sustainable urban drainage."*

# Getting Down to Action

- Water treatment plant in Boston Harbor relocated to account for sea-level rise
- King County's Flood Buyout & Home Elevation Programs
- London Transport's Tunnel Cooling Program
- New York's Greening the Bronx Quickstart Program



# Barriers to Adaptation Action

- Uncertainty about timing & extent of impacts
- Use of past conditions to guide decisions
- Focus on short-term costs of adaptation rather than long-term costs of business as usual
- Difficulty getting attention of politicians
- Difficulties getting some stakeholders to the table
- Problems coordinating across departments and levels of government
- Inadequate & one-off resources

# Supports for Adaptation

- Knowledgeable & committed political or executive champions
- Stakeholder communications & engagement
- Dedicated interagency or interdepartmental organization
- Collaboration of strong community of researchers
- Allocation of resources



# Lessons from Early Adopters

- High-cost, preventive adaptation strategies take time to develop
- Unlikely to be implemented unless the need is clear, effectiveness established & the costs understood
- Climate change will continue for the foreseeable future & adaptation will be a moving target
- Cities benefit from sharing experiences & learning from each other

For Full Report

[www.cleanairpartnership.org](http://www.cleanairpartnership.org)