Climate Change : Adaptation is Urgent

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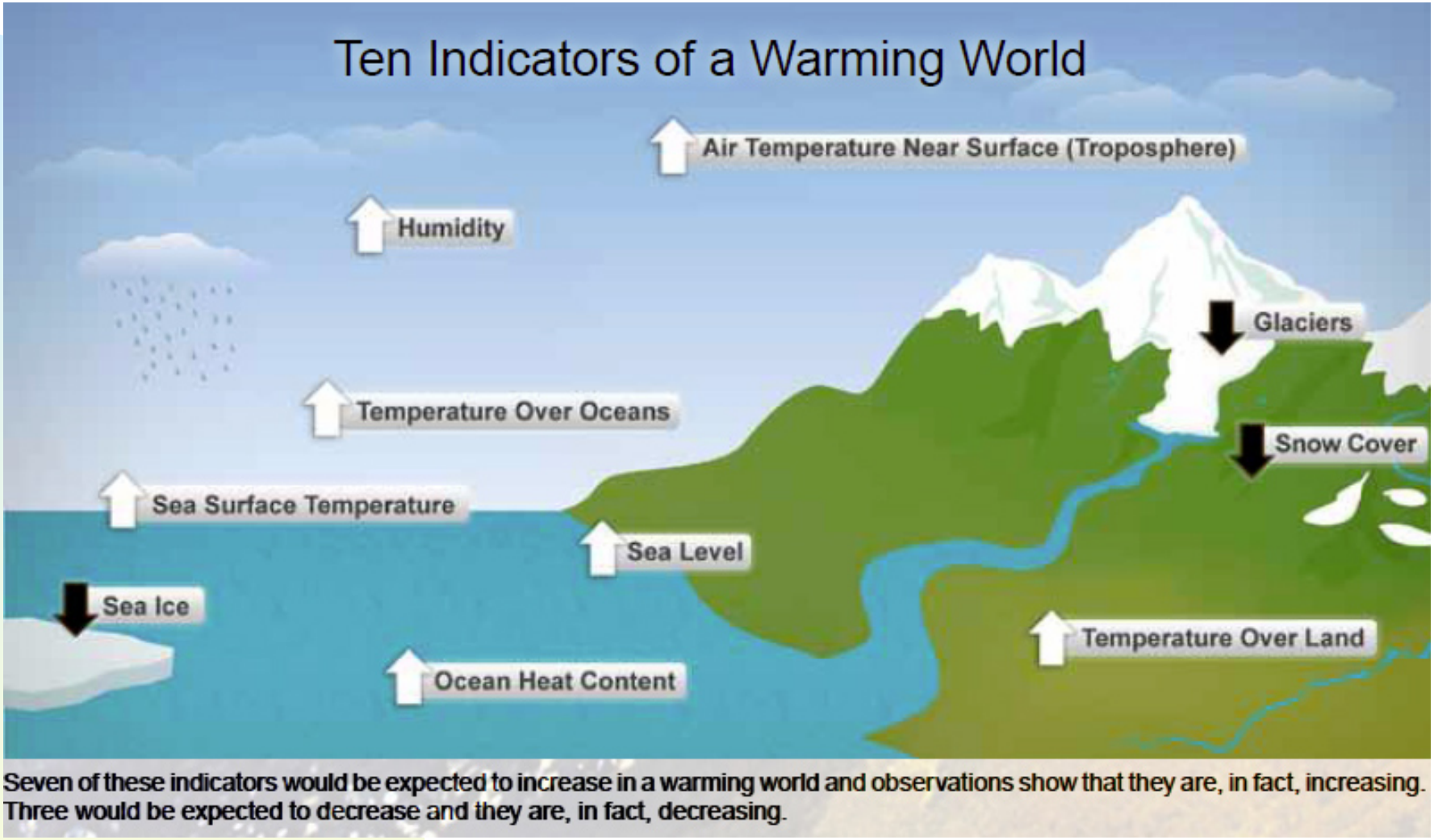
USGBC Greenbuild
Chicago, November 2010

Climate Institute

asbec
AUSTRALIAN SUSTAINABLE BUILT ENVIRONMENT COUNCIL

Discussion points

- How bad might it be?
- Mitigation or adaptation?
- What are the impacts?
- How can we adapt?
- International best practice
- The “buildings” contribution
- Our challenge



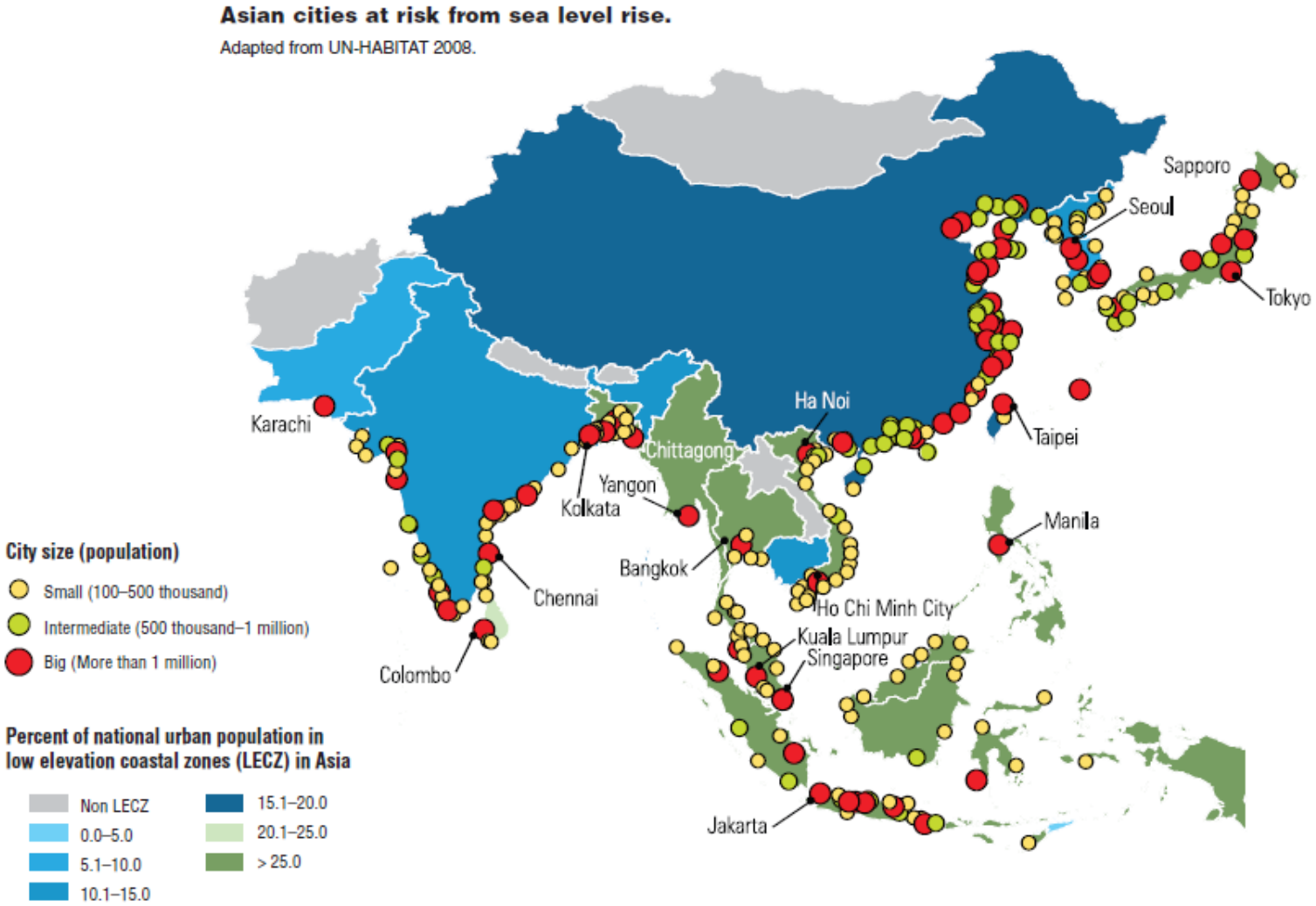
Seven of these indicators would be expected to increase in a warming world and observations show that they are, in fact, increasing. Three would be expected to decrease and they are, in fact, decreasing.

Source: noaa

Climate change impacts

- Sea level rise – inundation, erosion, damage
- Increase in extreme events – hurricanes, storm surges, flooding, mud slides
- Higher temperatures – 2 to 5 degrees celsius, heat waves, heat islands, bushfires
- Rainfall, droughts, loss of habitat and species
- Economic, social and health impacts
- Insurability

Asian cities – coastal flooding

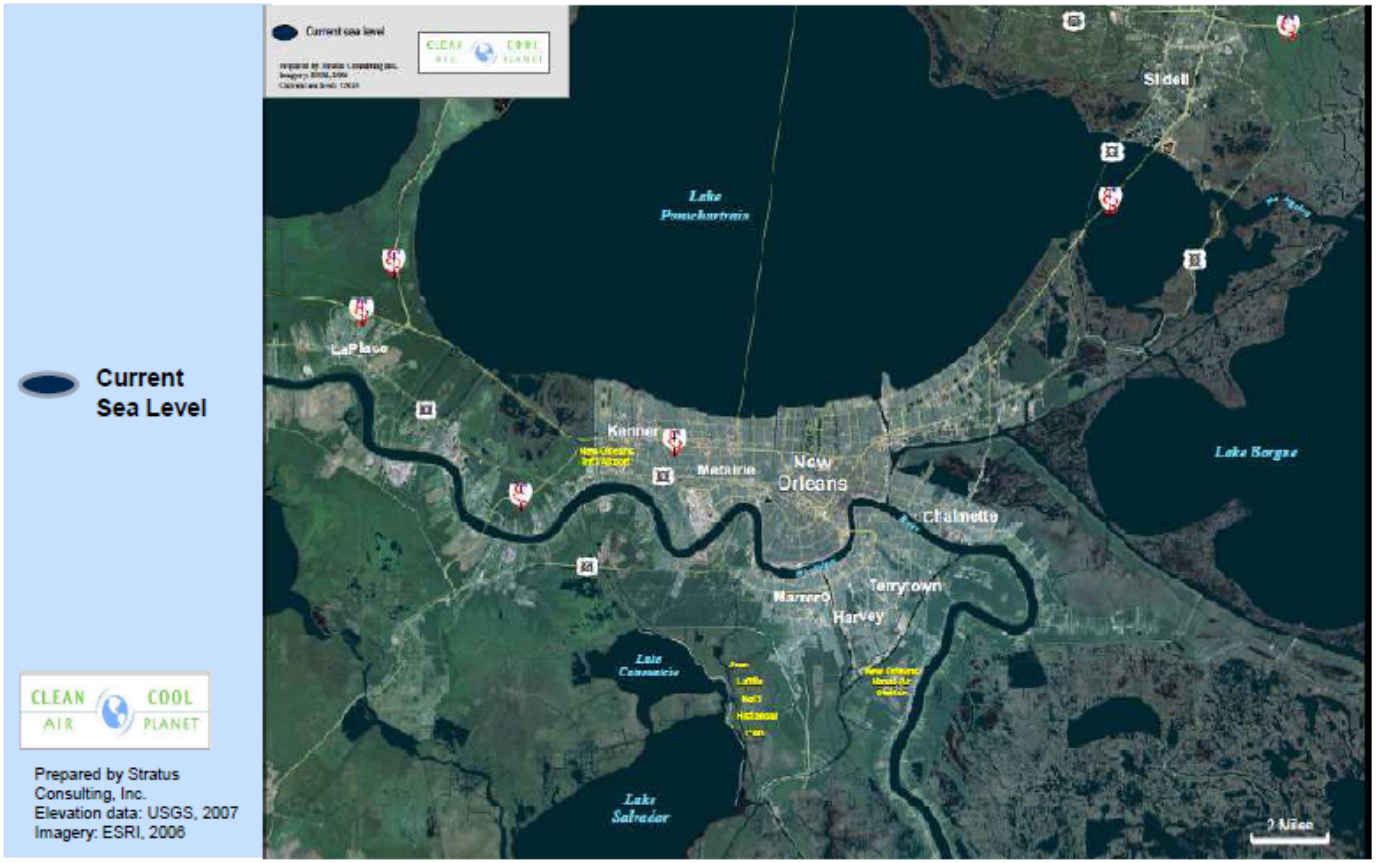


Source: East West Center, Asia Pacific Issues, No 96

Cities at risk

New Orleans has large water bodies surrounding it today

New Orleans as it is today



By 2100, New Orleans may potentially be surrounded by water

Area at risk of inundation from 1-meter (3.3 ft) rise in sea level with 1-meter (3.2 ft) relative sea level rise

People and Property Exposure

- Large city populations exposed to coastal flooding to increase threefold to 150m by 2070
- Property and infrastructure exposure predicted to increase from US$3 trillion (5% global GDP) to US$35 trillion (9%)
- By 2070 Kolkata the most vulnerable with 14 million people (7 fold)
- Miami will have the most exposed assets with US $3.5 trillion (8 fold)

Source: OECD: 4/12/2007

Insurance & valuation impacts

- Withdrawal of insurance cover
- Loss of assets
- Devaluation – the NSW Valuer General has cut land values in parts of Byron Bay by 50%
- Land development forbidden

Victoria – January 2009 Heatwave

- Excess deaths – 347
- 25% increase in ambulance metropolitan case load
- 34 fold increase in cases with direct heat conditions
- 12% increase in emergency departments presentations
- 8 fold increase in direct heat related presentations
- Major breakdown of a/c in hospitals

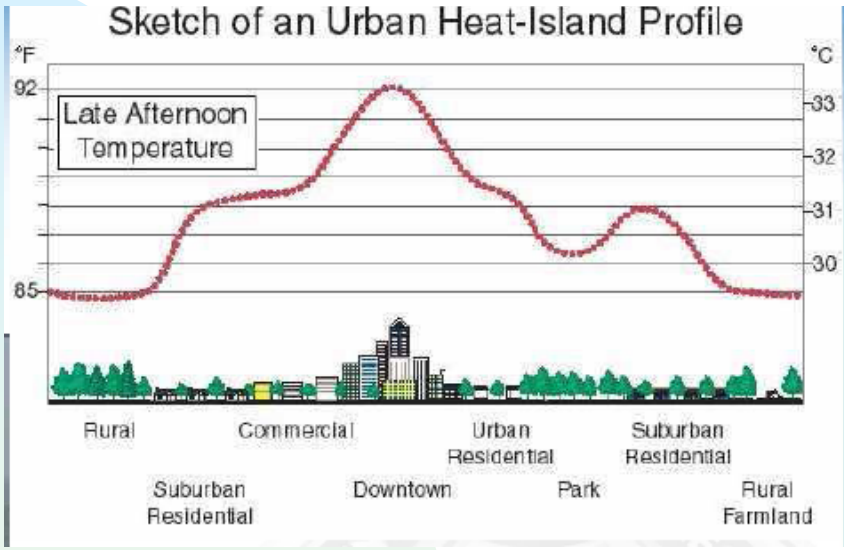
Source: Dept of Human Services, Victoria

The US Transportation Study

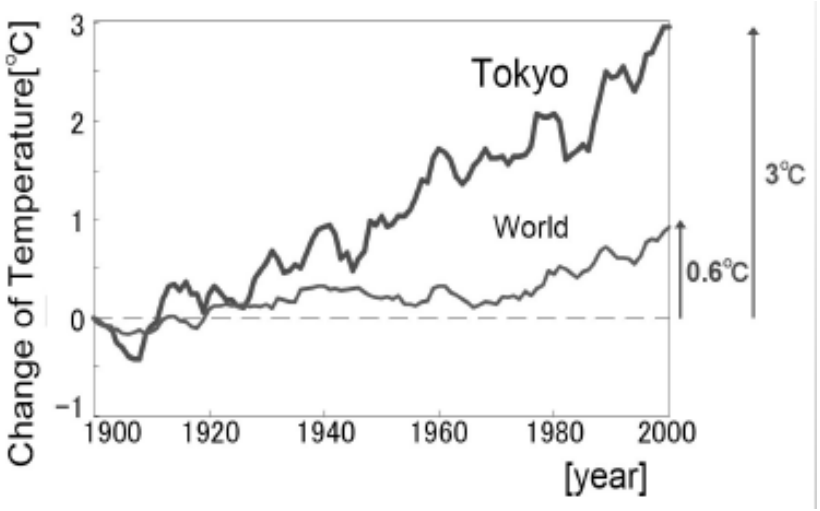
- Flooding of low lying infrastructure including tunnels
- Inundation of roads, rail lines and runways
- Damage to roads and bridges
- Threats to harbours, ports and airports

Source: US National Research Council, Transportation Research Board, March 2008

Cities as heat islands

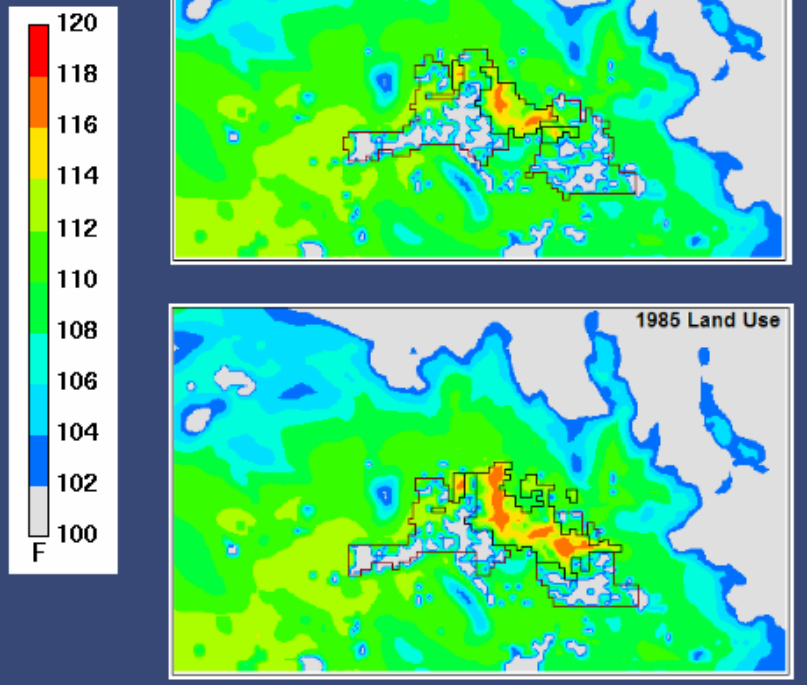


Source: Rebekkah Brown



Source: Katzscher Sasbe 2009

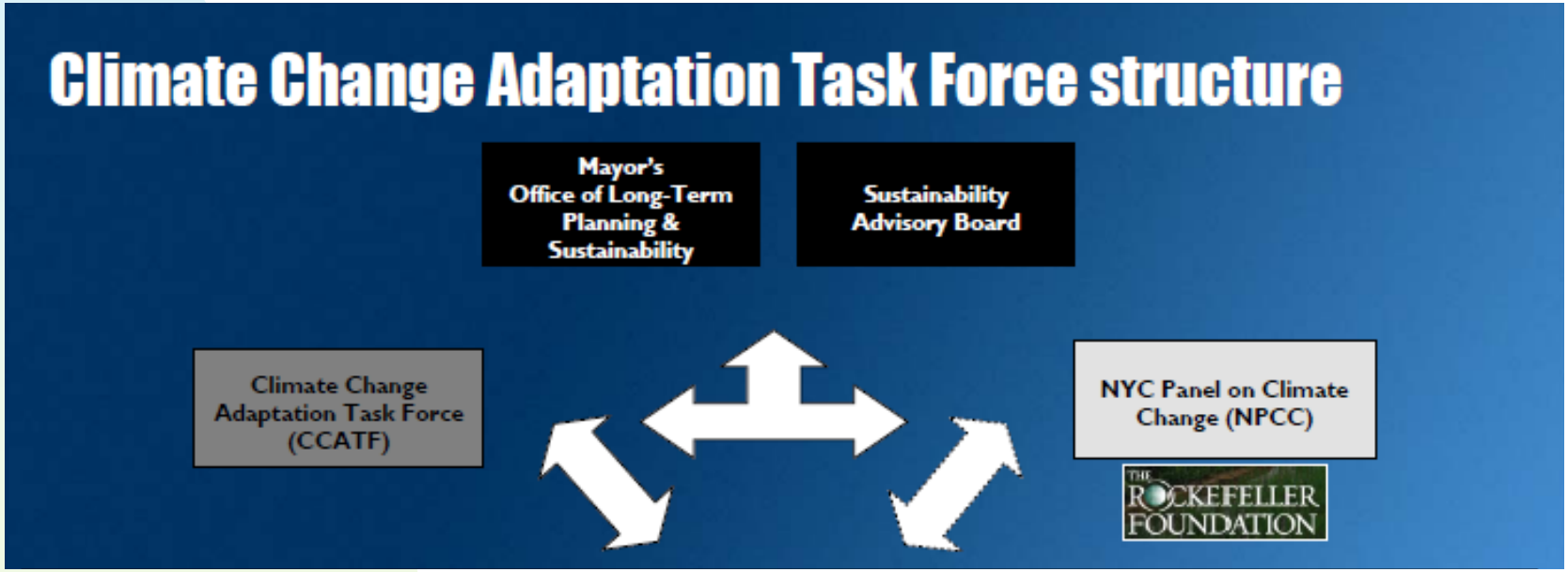
The urban heat island affects local climate, even without climate change.



2 m Air Temperature Simulations
Spatial resolution = 2 km

Source: Susanne Grossman-Clarke

The New York example



Source: plaNYC

NPCC climate protection levels

TABLE 1. Baseline Climate and Mean Annual Changes[1]

	Baseline 1971-2000	2020s	2050s	2080s
Air temperature Central range[2]	55° F	+ 1.5 to 3.0° F	+ 3.0 to 5.0° F	+ 4.0 to 7.5° F
Precipitation Central range[2]	46.5 in[3]	+ 0 to 5 %	+ 0 to 10 %	+ 5 to 10 %
Sea level rise[3] Central range[2]	NA	+ 2 to 5 in	+ 7 to 12 in	+ 12 to 23 in
Rapid ice-melt scenario[4]	NA	~ 5 to 10 in	~ 19 to 29 in	~ 41 to 55 in

Source: Columbia University Center for Climate Systems Research

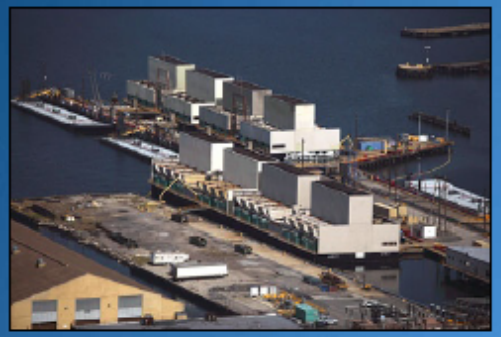
Source: Annals of the New York Academy of Science
www3.interscience.wiley.com/journal/123443047/issue

NPCC climate risk information

TABLE 5.C. Potential Impacts of Sea Level Rise-related Climate Changes in New York City and the Surrounding Region

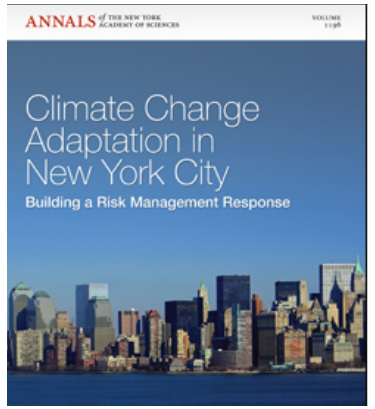
Climate Risk Factor	Likelihood[1]	Potential Implications for NYC infrastructure[2,3]
Higher average sea levels	Extremely likely	Encroachment of saltwater on freshwater sources and ecosystems, increasing damage to infrastructure not manufactured to withstand saltwater exposure Increase in pollution released from brownfields and other unprotected waste sites Inundation of low-lying areas and wetlands, and higher rates of beach and salt marsh erosion Increase of inflow of seawater to sewers and Wastewater Pollution Control Plants (WPCP) and reduced ability of discharging CSO and WPCP effluent by gravity Increase of salt front up the Hudson and Delaware Rivers, leading to reduced supply of drinking water

- **US PowerGen South Pier Improvement Project**
  - Consulted Mayor's Office and climate change scientists
  - Designed facility to withstand climate change impacts over 30-year horizon (4 ft. sea level rise)



Source: plaNYC

Flexible adaptation pathways



The 8 steps of adaptation assessment:

- Identify current and future climate hazards
- Conduct inventory of infrastructure and assets
- Characterize risk of climate change on infrastructure
- Develop initial adaptation strategies
- Identify opportunities for coordination
- Link strategies to capital and rehabilitation cycles
- Prepare and implement adaptation plans
- Monitor and reassess

Chicago Climate Action Plan

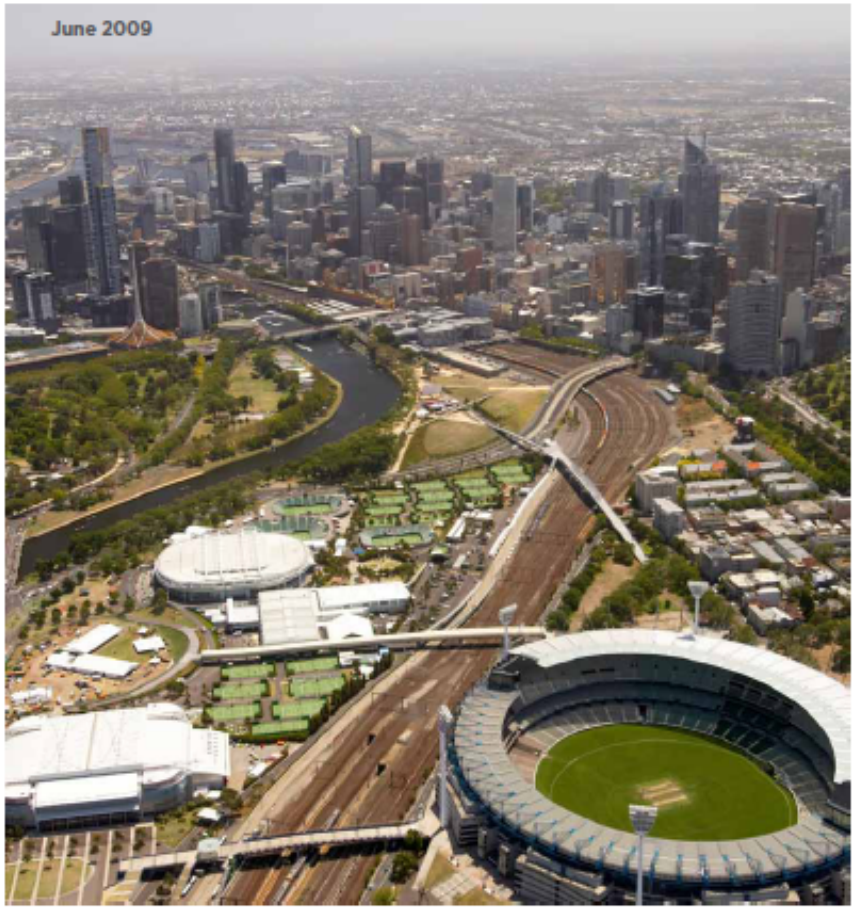
- "Adding green to urban design 2008" : 21 key actions including roofs, facades, landscaping around buildings
- 4 million sq. ft of green roofs, planned or completed since 2008
- 9,000 acres of tree canopy added since 1993
- Managing stormwater, including 120 green alleys

Source: Progress Report First Two Years

CITY OF MELBOURNE

City of Melbourne
Climate Change Adaptation Strategy

June 2009



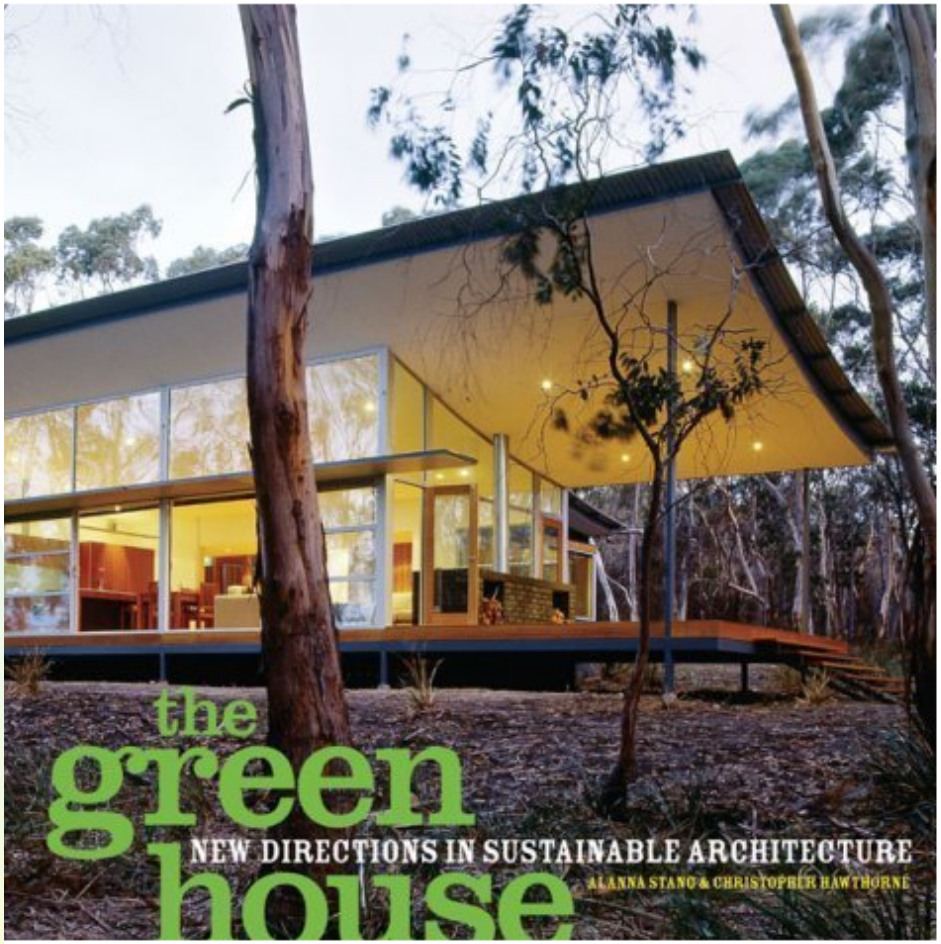
The built environment

Designing for the future

- Buildings designed today will need to operate through a period of significant climate change
- CIBSE's "future weather years" enable designers to assess the impact of climate change using building energy and thermal simulation models
- Takes into account future climate scenarios for the UK over the 21st century
- The tool applies a morphing technique to the data based on anticipated climate changes

Source: The Chartered Institute of Buildings Services Engineers – TM48:2009

CIBSE


the
green
house
NEW DIRECTIONS IN SUSTAINABLE ARCHITECTURE
ALANNA STANO & CHRISTOPHER HAWTHORNE

Towards sustainable cities : Curitiba, Brazil

Our challenge

- We can no longer rely on using the past to predict the future
- No reason for panic nor for complacency
- A careful assessment of risks
- Avoid vulnerable development
- Design and build infrastructure for future climates and retrofit what we have
- Develop strategies to build resilience to current variability and future uncertainties