

Cities as First Responders

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November 15, 2017

Rutgers Climate Symposium

Rutgers University

Photo credit:
Somayya Ali
Ibrahim,
September 2013
ARC3.2 Initiating
Workshop



Cities and the Paris Climate Agreement

*“Agreeing to uphold and promote regional and international cooperation in order to mobilize stronger and more ambitious climate action by all **Parties** and non-Party stakeholders, including civil society, the private sector, financial institutions, **cities** and other subnational authorities, local communities and indigenous peoples . . .”*



United Nations



Framework Convention on
Climate Change

FC/CP/2015/L.9/Rev.1

Distr.: Limited
12 December 2015

Original: English

Conference of the Parties

Twenty-first session

Paris, 30 November to 11 December 2015

Agenda item 4(b)

Durban Platform for Enhanced Action (decision 1/CP.17)

Adoption of a protocol, another legal instrument, or an agreed outcome with legal force under the Convention applicable to all Parties

ADOPTION OF THE PARIS AGREEMENT

Proposal by the President

Draft decision -/CP.21



Cities Are First Responders: Mitigation



Singapore
Manila
Shanghai
Hong Kong
Shenzhen
Guangzhou
Beijing
Wuhan
Jakarta
Bangkok
Dhaka
Kolkata
Chennai



Established June 2016

"The largest global coalition of cities committed to climate leadership, building on the commitments of more than **7,100** cities from **119** countries and **six** continents, representing more than **600** million inhabitants, over **8%** of the world's population"

~600 Compact cities commit to reducing GHG emissions by nearly **1 billion tons** annually by **2030**, or **11.6 billion tons** between 2010 and 2030.

~6,000 cities of the EU Covenant of Mayors projected to have an estimated reduction of **240 Megatons of CO₂e**, a reduction of 27% by 2020.

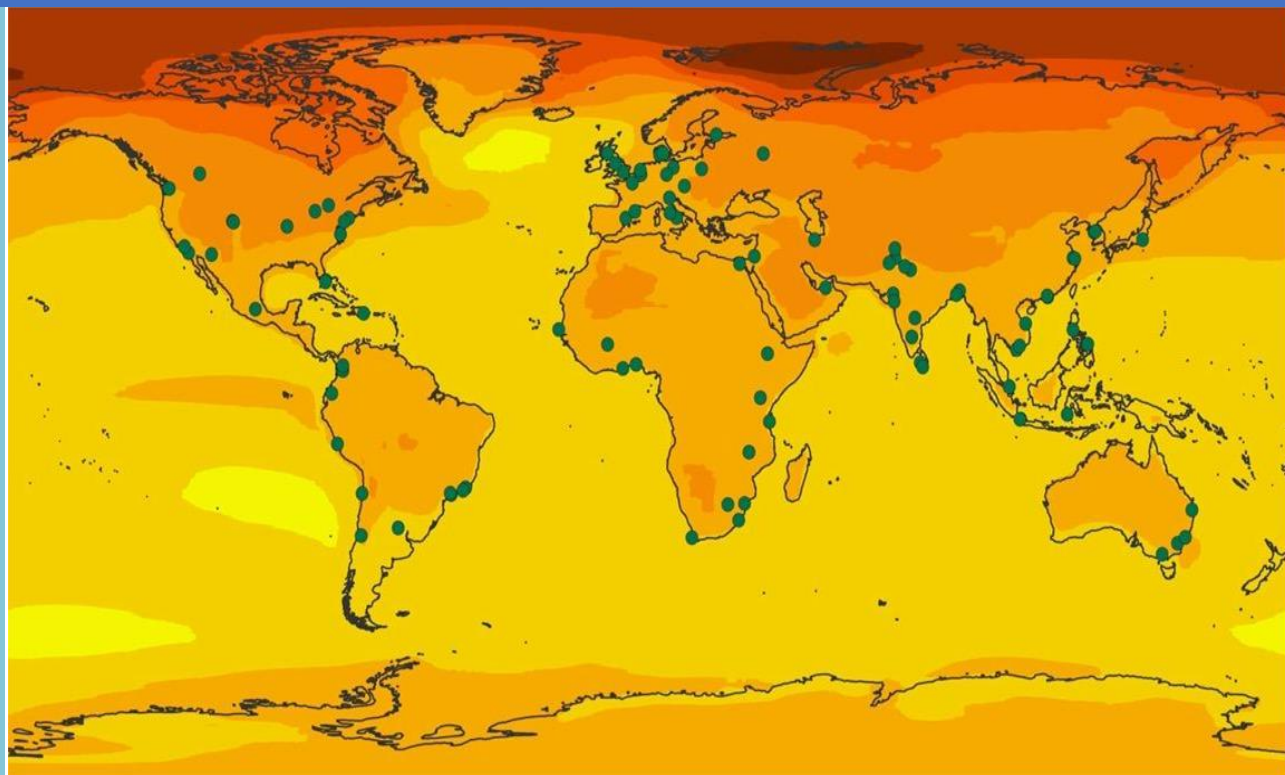
Cities Are First Responders: Adaptation

Climate Projections for UCCRN Cities: 2050s

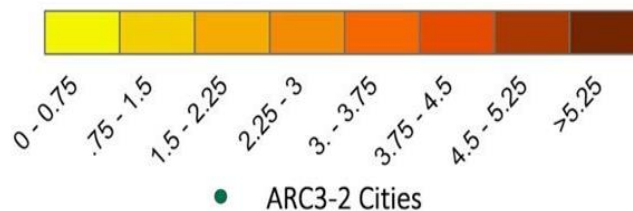
Temperatures to rise between 1°C and 4°C

Precipitation changes between -25% and +20%

Sea level rise projections 16 – 50 cm
Up to 147 cm in the 2080s



Temperature Change (°C)



City Leaders are at the Right Level of Governance to Take Action



Cairo



Phnom Penh

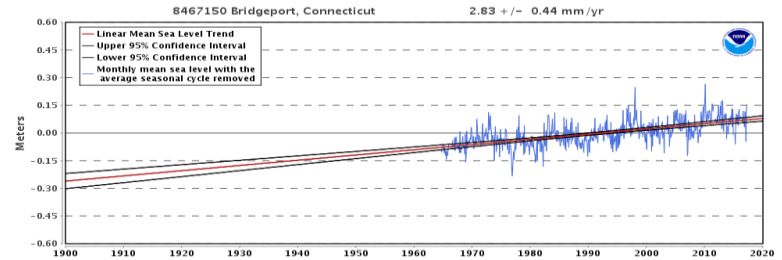


Sao Paulo

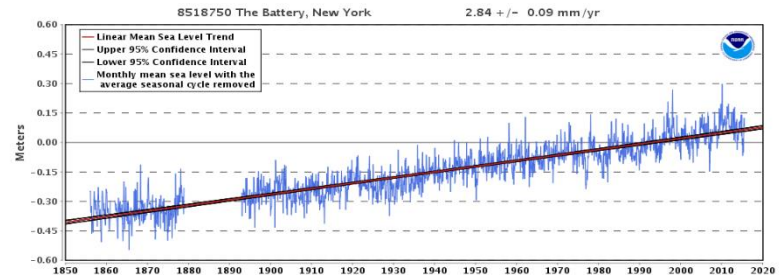
- More direct **contact with constituents**
- Involved in **day-to-day management**;
more practical
- Able to form **coordination networks**
with other cities

New York Metropolitan Region Approach

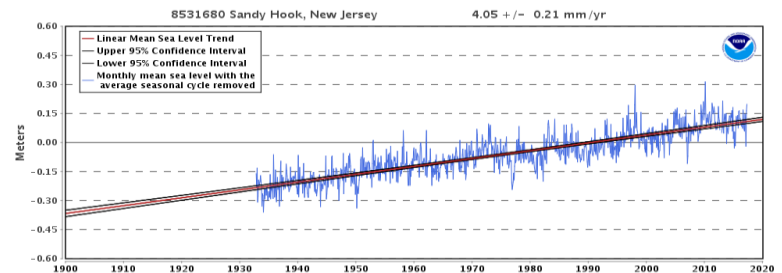
NPCC climate projections apply to **100-mile land radius** around Central Park



Bridgeport, Connecticut 2.83 +/- 0.44 mm/year



The Battery, New York 2.84 +/- 0.09 mm/year



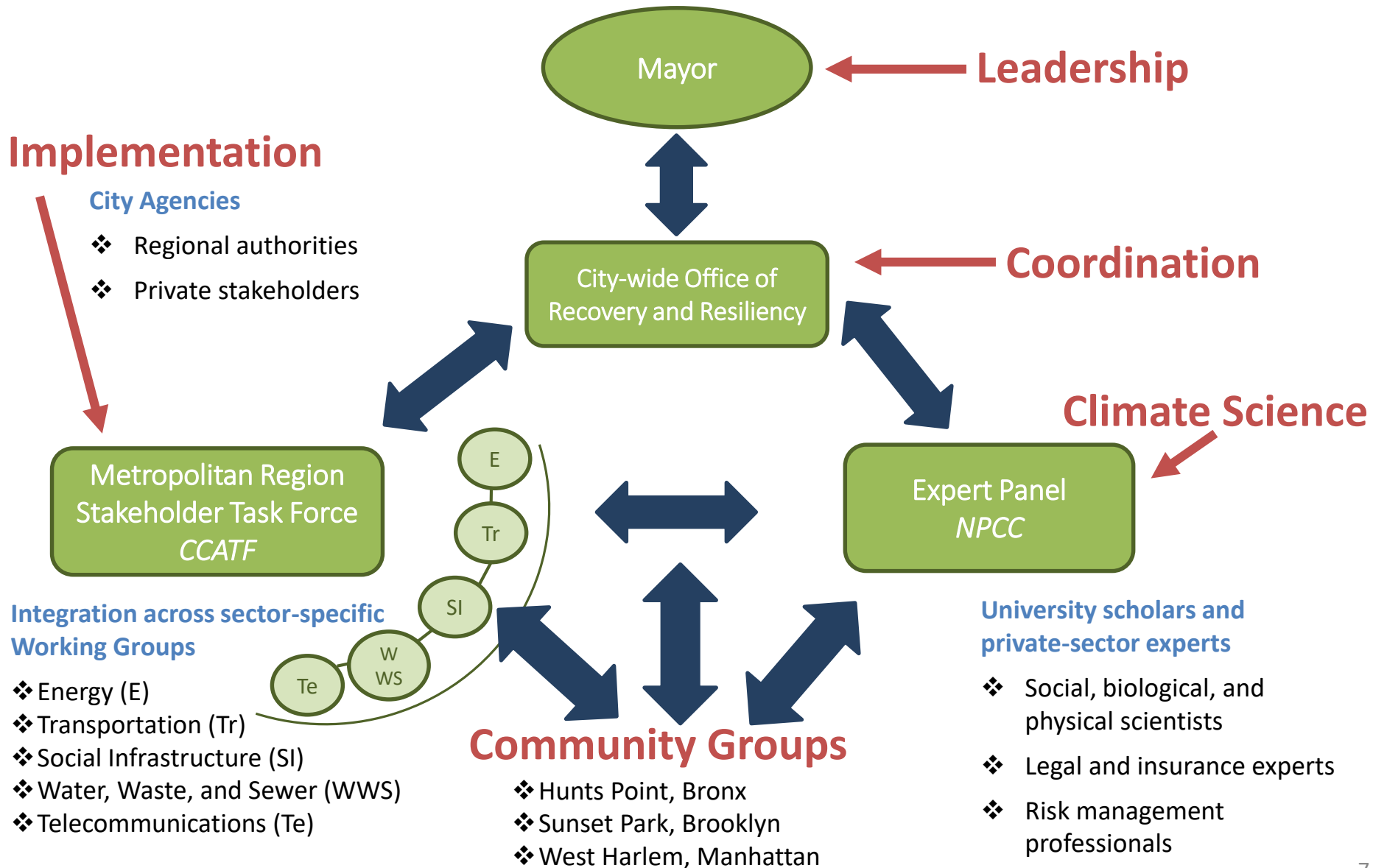
Sandy Hook, New Jersey 4.05 +/- 0.21 mm/year

Connecticut Institute for Resilience and Adaptation
University of Connecticut

NY Region Climate Adaptation Network
Regional Planning Association

New Jersey Climate Adaptation Alliance
Rutgers University

NYC Structuring Response



New York City Panel on Climate Change

- ❖ Panel of experts in climate science, social science, health, and risk management
- ❖ Formed in 2008 under Mayor Michael Bloomberg
- ❖ Provides regular climate risk information updates to City of New York under Local Law 42
- ❖ NPCC 2015 Report provides latest climate change projections and future coastal flood risk maps



Projecting Sea Level Rise in New York City

Antarctic Rapid Ice Melt Scenario

New York City sea-level rise projections relative to 2000-2004 (in).

Baseline (2000-2004) 0"	Low estimate (10 th percentile)	Middle range (25 th to 75 th percentile)	High estimate (90 th percentile)	ARIM scenario
2020s	2"	4-8"	10"	*
2050s	8"	11-21"	30"	*
2080s	13"	18-39"	58"	80"
2100	15"	22-50"	75"	113"

Source: New York City Panel on Climate Change preliminary results, 2017

The 10th, 25th-75th and 90th percentile projections are from NPCC (2015). The ARIM scenario is based on DeConto and Pollard (2016), Kopp et al. (2014; 2017) and informed expert judgments with regard to maximum plausible ice loss rates from Antarctica (see above).

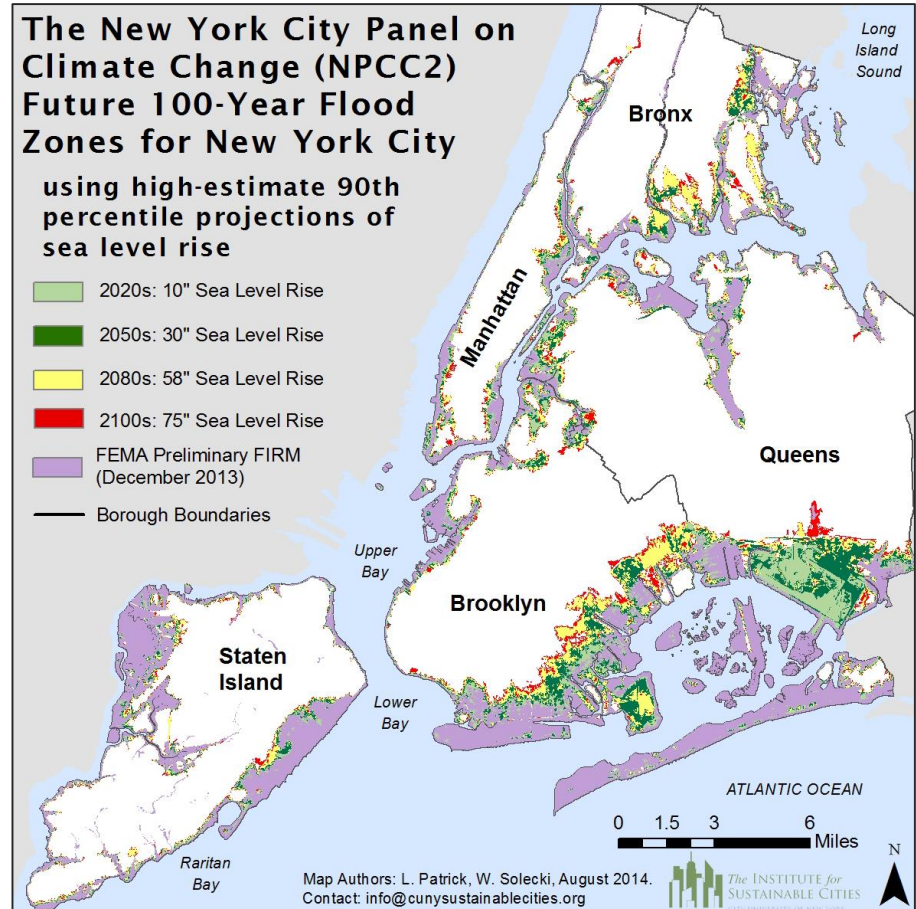
Future Coastal Flood Risk* Maps

Coastal flooding very likely to increase in frequency, extent, and height due to SLR

By 2100, roughly doubles affected area of 100-year flood compared to December 2013 FEMA Preliminary Flood Insurance Rate Maps (FIRMs)

Queens is borough with the most land area at risk of future coastal flooding

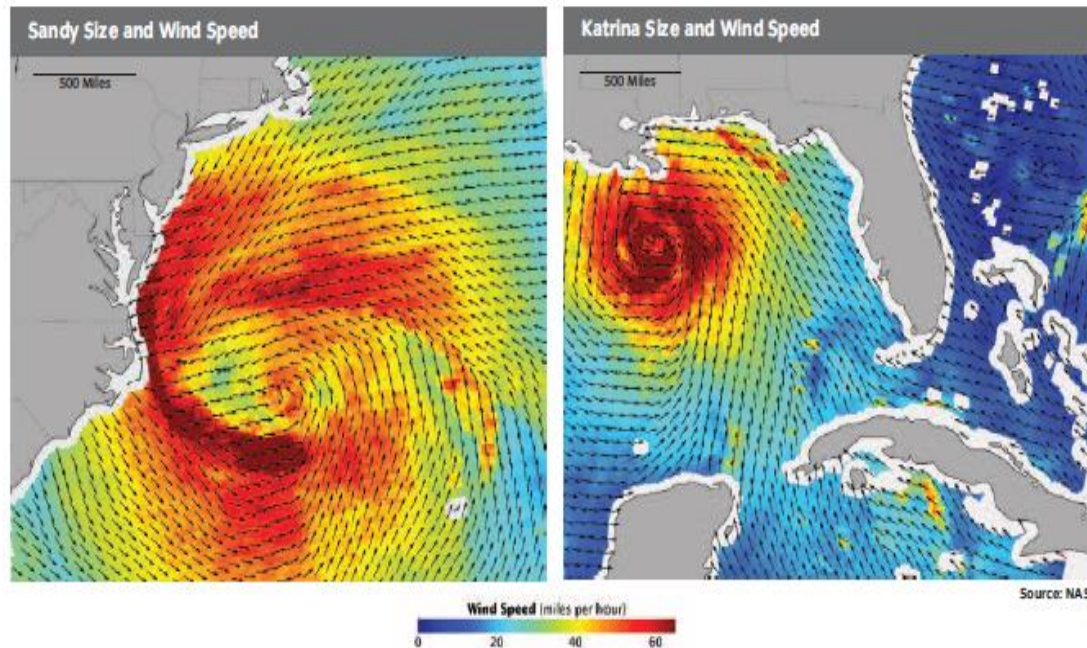
Dynamic coastal flood model shows similar results to static method



**NPCC provides qualitative information about how storms and storm tracks may change*

Hurricane Sandy

A tipping point for New York City



Hurricane Sandy (left)
October, 2012
Hurricane Katrina (right)
August, 2005
Source: NASA



11 Days

without telecommunications in
areas with critical facilities



2 Million

people lost power at some point



All Train Tunnels

into Manhattan were flooded
(MTA, LIRR, PATH, Amtrak)

5.4 Million

weekday riders were displaced
from subway shut down



6 Hospitals

had to close due to the storm

2000 Patients

had to be evacuated

Resilience

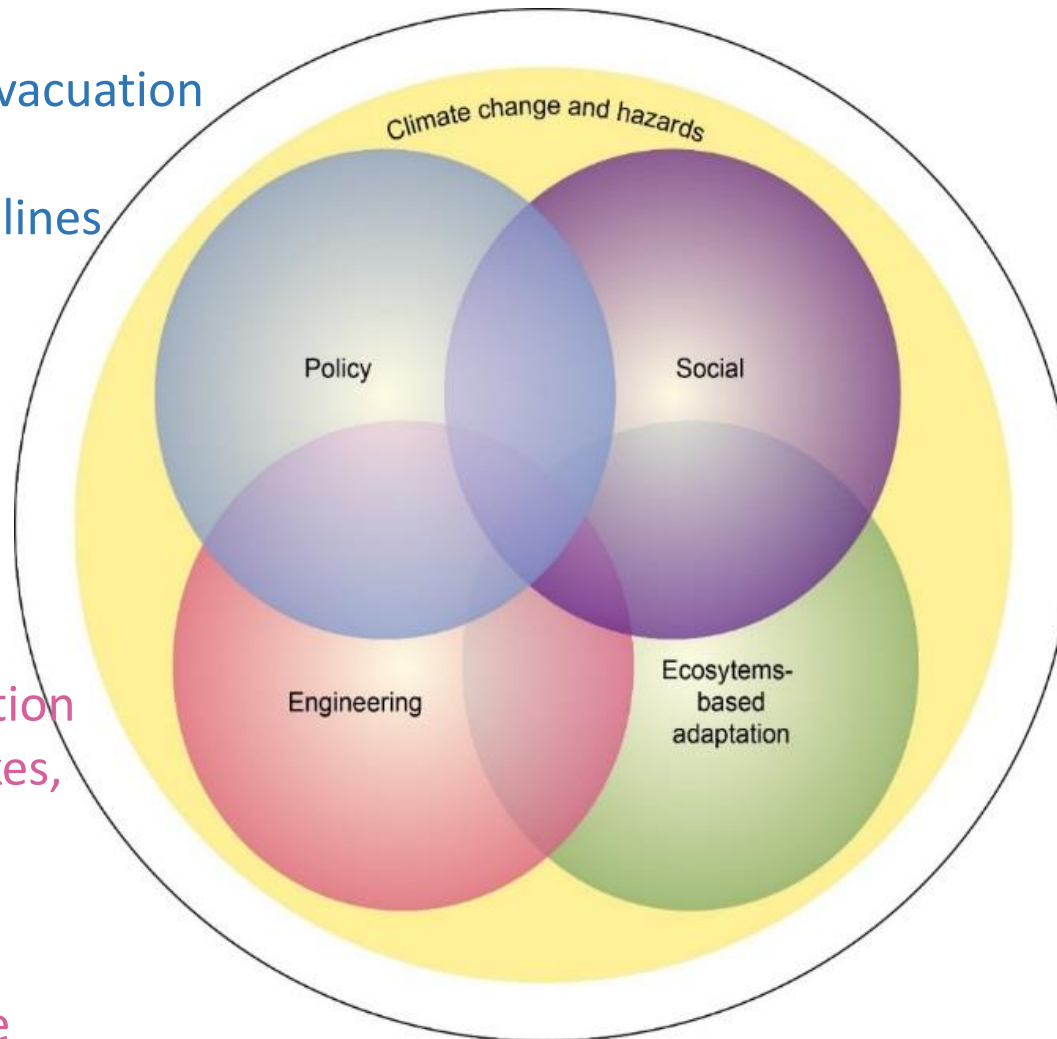
Portfolio Approach

Policy

- ❖ Emergency evacuation plans
- ❖ Design Guidelines
- ❖ Insurance

Engineering

- ❖ Flood protection
- ❖ Sea walls, dikes, and levees
- ❖ Elevation of critical infrastructure



Social Programs

- ❖ Neighborhood watch programs
- ❖ Digital alerts
- ❖ Cooling centers
- ❖ Volunteer coastal rehabilitation projects

Ecosystem-based adaptation

- ❖ Green roofs
- ❖ Bio-swales, porous pavement
- ❖ Oyster beds
- ❖ Wetland restoration

Preliminary NYC Climate Resiliency Design Guidelines

- ❖ **Science-informed policy** based on NPCC 2015 projections
- ❖ Incorporate **forward-looking climate data** into the design of all New York City capital projects
- ❖ Provides **consistent methodology** for engineers, architects, and planners to design resilient facilities

A facility safe from tidal inundation in the 2020s (left) compared to the same facility inundated by high tides and sea level rise in the 2080s (right).



NYC PLANNING NYC Flood Hazard Mapper **BETA**

NYC Flood Hazard Mapper, a tool within the Guidelines, helps determine tidal inundation risk to facilities during their useful life due to sea level rise

Resilience Projects in NYC

Rebuilt Park
East Side, Manhattan



Soft-Edge
Brooklyn Bridge Park



Big U Berm and Park
Lower East Side, Manhattan



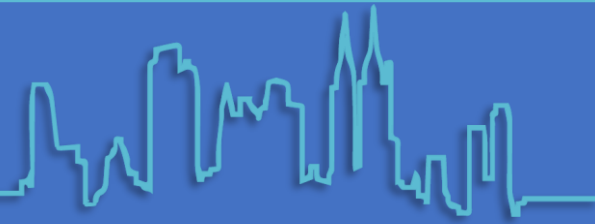
Future Berm and Sea Wall
West Side, Manhattan

Cross-Jurisdictional Cooperation

- City, State/Province, Nation, Multi-Country Region, International
- Sandy Recovery Map Tools developed by NOAA, US Army Corps of Engineers, and NPCC
- Discussions ongoing to incorporate both **current and future flood risks** as a result of sea level rise into FEMA map products
- **Financing of resilience projects**, e.g., national funding, Green Climate Fund
- **New York/New Jersey cooperation**



Future 100-year floodplain boundaries with sea level rise for New York & New Jersey (above) and New York City (below)



Provide knowledge that enables cities* to fulfill their climate change leadership potential in both mitigation and adaptation, with a focus on developing resiliency

Over **800** scientists, scholars, and expert practitioners spanning urban systems

More than **100** developed and developing cities around the world

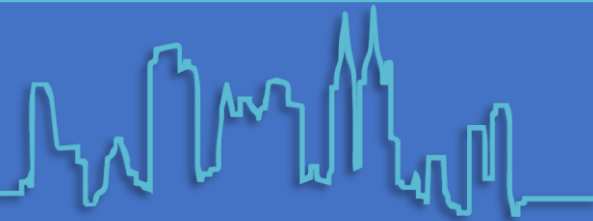
Formed in **2007** at the time of the C40 Summit in New York



*UCCRN ARC3.2 Workshop.
Siemens, The Crystal, London, UK. 2014*

**and their metropolitan regions*

ARC3 Report Series



First major publication in 2011 – **First UCCRN Assessment Report on Climate Change and Cities (ARC3)** 100 authors from 50+ cities around the world and 45+ Case Studies

Launched at the ICLEI Resilient Cities Congress in Bonn, Germany in June 2011

Second UCCRN Assessment Report on Climate Change and Cities (ARC3.2)

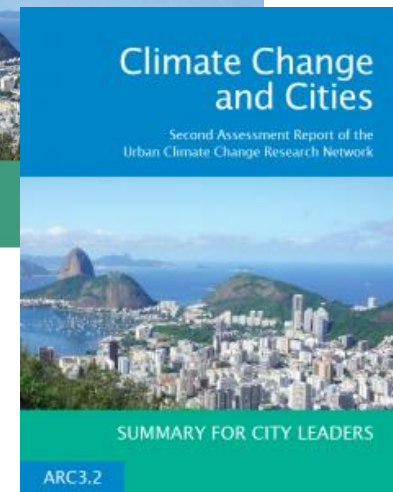
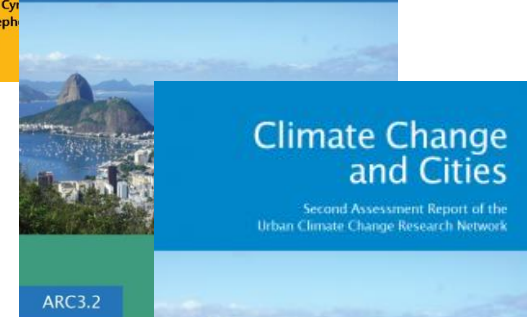
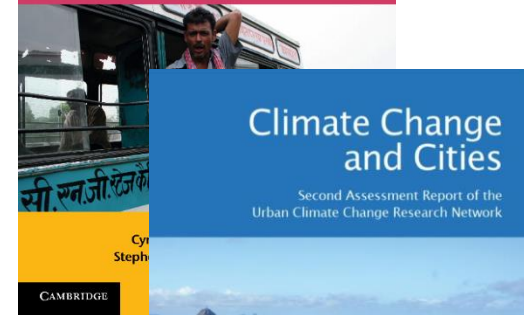
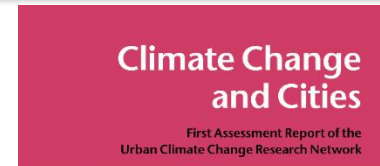
350+ authors from over 100 cities

16 Chapters; 115+ Case Studies

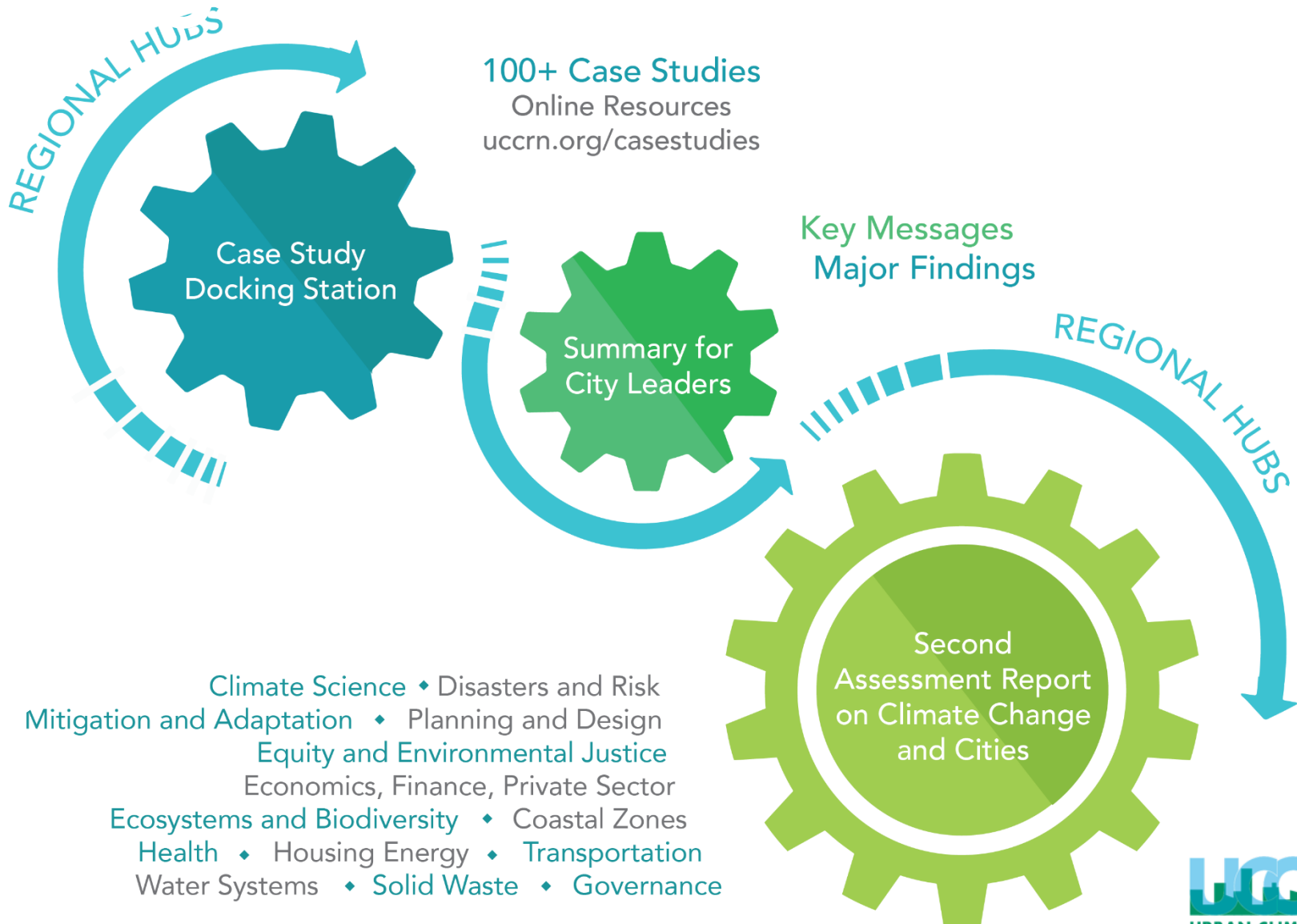
Launched at Habitat III in Quito, Ecuador

Summary for City Leaders

Launched at COP21 Climate Summit for Local Leaders, Paris



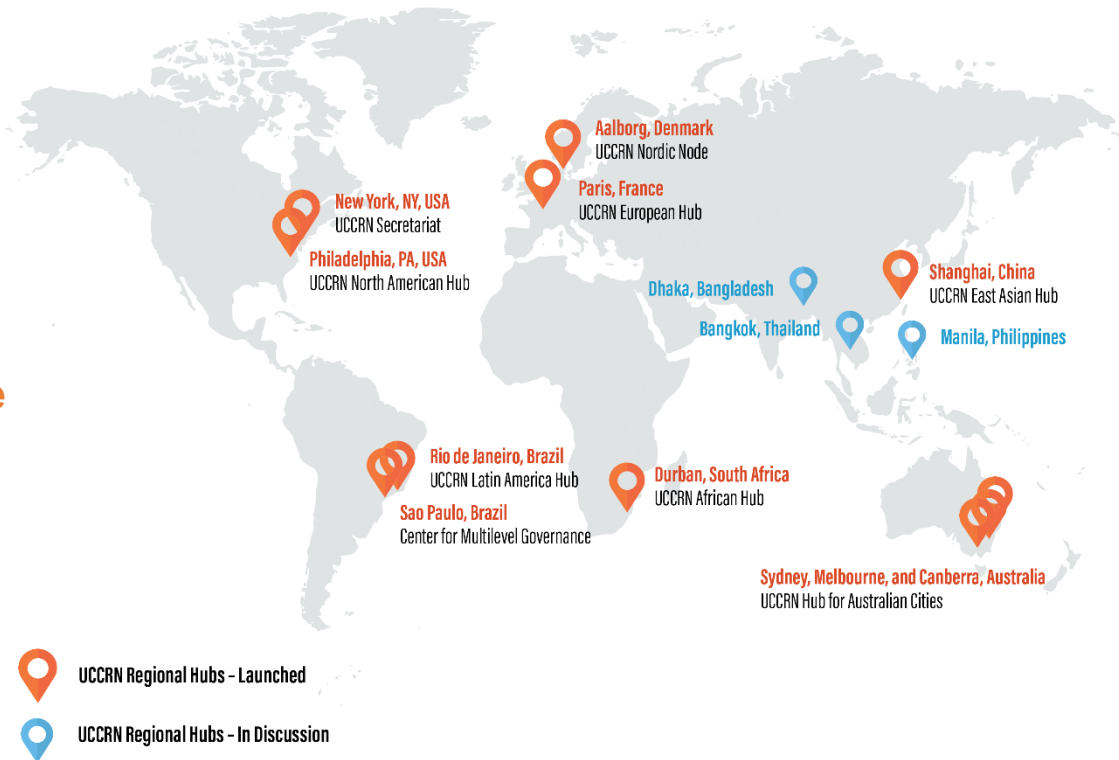
ARC3.2 Framework



Climate Science ♦ Disasters and Risk
Mitigation and Adaptation ♦ Planning and Design
Equity and Environmental Justice
Economics, Finance, Private Sector
Ecosystems and Biodiversity ♦ Coastal Zones
Health ♦ Housing Energy ♦ Transportation
Water Systems ♦ Solid Waste ♦ Governance

UCCRN Regional Hubs

- 1 Conduct direct outreach to city decision-makers at the regional level, based on their needs
- 2 Develop relationships with regional researchers so as to build capacity for knowledge partnerships with city stakeholders
- 3 Generate region-specific climate change knowledge
- 4 Link regional knowledge partnerships to global UCCRN networks
- 5 UCCRN New York Secretariat serves to coordinate international network and provide guidance



ARC3 Case Study Docking Station

A world map with a light blue background and a grid of latitude and longitude lines. Numerous red location pins are scattered across the map, indicating the locations of 100 reviewed case studies. The pins are concentrated in North America, Europe, and Asia, with a few in South America, Africa, and Australia. The map includes labels for major countries and regions, such as Canada, the United States, Mexico, Europe, Africa, Asia, and Australia. The text "An online, searchable, open-source database with 100 reviewed case studies" is overlaid in the center of the map in a bold, red and black font.

An online, searchable, open-source database with 100 reviewed case studies

ARC3.2 Case Study Cities



Small,
medium, and
large cities
are all **critical**

**Population of
Metropolitan Area**



Mega (more than 10,000,000 inhabitants)



Large (5,000,000 to 10,000,000 inhabitants)



Big (1,000,000 to 5,000,000 inhabitants)



Intermediate (500,000 to 1,000,000 inhabitants)



Small (100,000 to 500,000 inhabitants)



Very Small (Less Than 100,000 inhabitants)

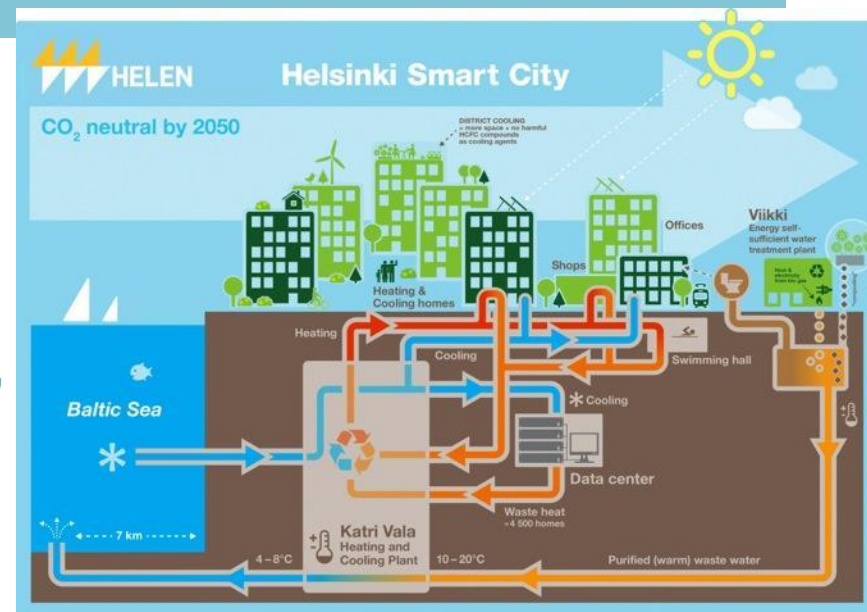
Pathway 1: Integrate Mitigation and Adaptation

Actions that reduce greenhouse gas emissions while increasing resilience are a win-win

Integrating mitigation and adaptation deserves high priority in urban planning, design, and architecture

Portfolio of approaches includes engineering, ecosystem-based adaptation, policies, and social programs

Taking the local context of each city into account is necessary in order to choose actions that result in the greatest benefits



District heating and cooling (DHC) system in Helsinki provided by Helen Oy. © Kirmo

Pathway 2: Coordinate Disaster Risk Reduction and Climate Change Adaptation

Disaster risk reduction and climate change adaptation are the cornerstones of resilient cities



Effects of Hurricane Sandy in Staten Island, NYC. Photo, Somayya Ali Ibrahim, 2012

This requires a new, **systems-oriented, multi-timescale approach** to risk assessments and planning that accounts for emerging conditions within more-vulnerable communities and sectors, as well as **across entire metropolitan areas**

Pathway 3: Co-generate Risk Information

Risk assessments and climate action plans co-generated with stakeholders and scientists are most effective

Processes that are **inclusive, transparent, participatory, multi-sectoral, multi-jurisdictional, and interdisciplinary** are robust

They **enhance relevance, flexibility, and legitimacy**



*Stakeholders visualize climate risks in Bash Kaiyndy, Kyrgyzstan.
Photo by Shaun Martin, WWF*

Pathway 4: Focus on Disadvantaged Populations

Urban poor, the elderly, women, minority, recent immigrants and other marginal populations often face greatest risks due to climate change

Fostering greater equity and justice within climate action increases a **city's capacity** to respond to climate change

This improves human well-being, social capital, and opportunities for **sustainable development**

*People's Climate March in New York City on September 21, 2014.
Photo by Annel Hernandez*



Needs of most disadvantaged and vulnerable citizens should be addressed in climate change planning and action

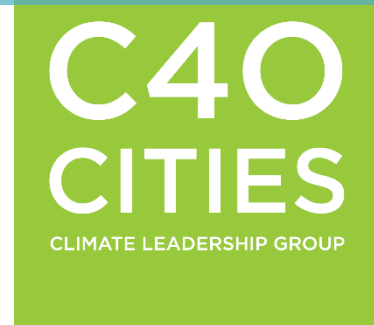
Pathway 5: Governance, Finance, and Knowledge Networks

Sound urban climate governance requires **longer planning horizons, effective implementation mechanisms, and coordination**

Access to **municipal and outside financial resources** is needed to fund climate change solutions

Connecting with **national and international networks** advances city-level climate planning and implementation

Advancing city creditworthiness, developing robust city institutions, and participating in city networks enable climate action



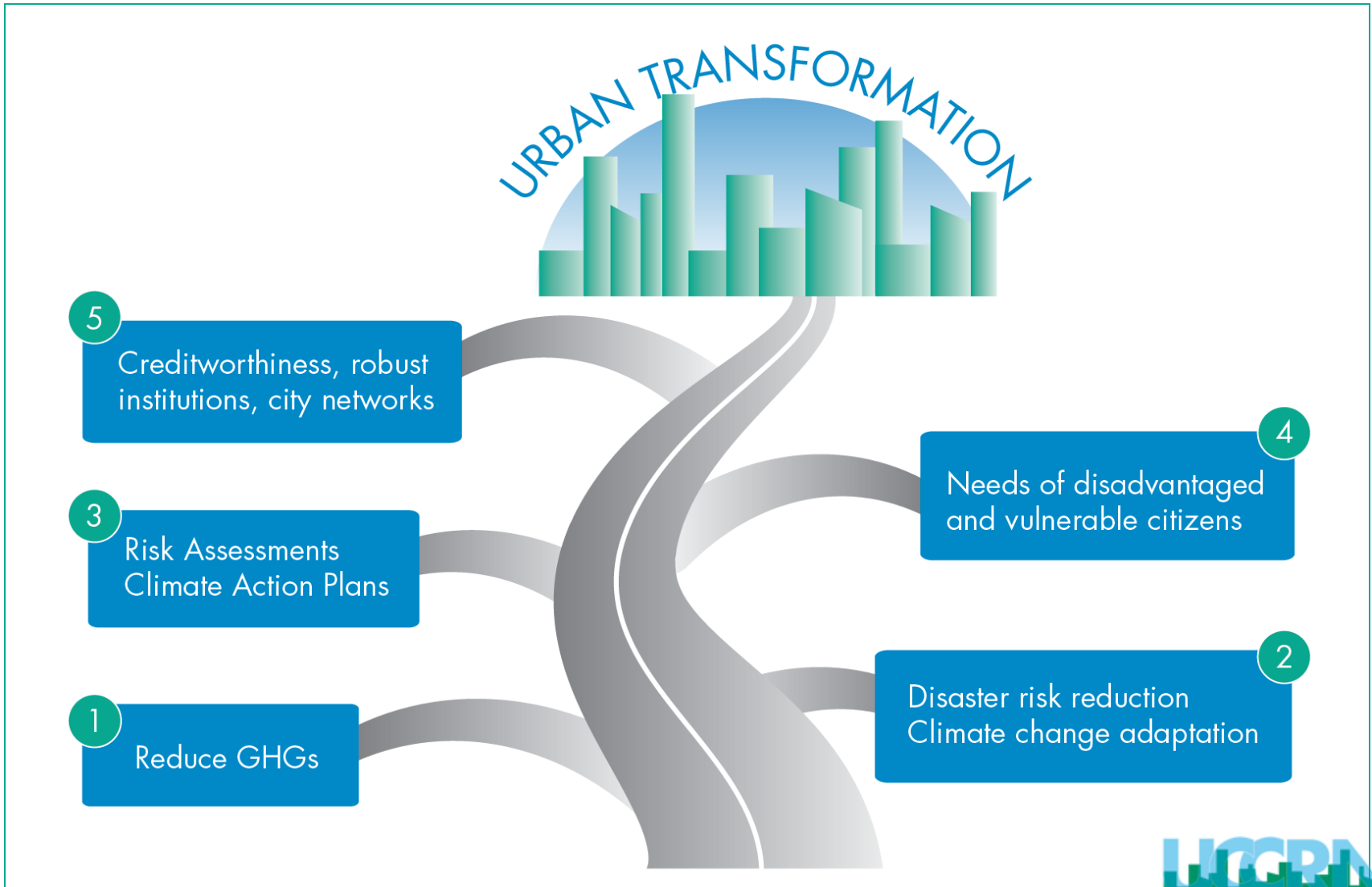
Cities Alliance

Cities Without Slums

I.C.L.E.I Local Governments for Sustainability



The 5 Pathways to Urban Transformation



Inputs to the IPCC*

- **IPCC Special Report on Climate Change and Cities** will be included in the AR7 cycle (2023-2028).
- **International Scientific Conference on Climate Change and Cities** will take place early in the AR6 cycle, in March 2018, in Edmonton, Canada.
 - Supported by a diverse group of organizations identified as **#CitiesIPCC** - C40, Cities Alliance, ICLEI, Future Earth, SDSN, UCLG, UN-Habitat, UN Environment and WCRP.
 - Half of Cities and Climate Change Science Conference Steering Group are members of UCCRN.

CITIES
2018 CONFERENCE
IPCC

ABOUT ▾ CONFERENCE PROGRAMME ▾ GET INVOLVED ▾ HOST CITY: EDMONTON ▾ BEYOND THE CONFERENCE ▾
MEDIA ▾

**And next
ARC3.3 Report*



Cities & Climate Change Science Conference

MARCH 5 - 7, 2018
EDMONTON, ALBERTA, CANADA



Representatives of IPCC Cities and Climate Change Science Conference Steering Group at ICLEI Resilient Cities 2017, Bonn, Germany

For more information, visit:

Urban Climate Change Research Network (UCCRN)
www.uccrn.org/join

New York City Panel on Climate Change (NPCC) -
<http://onlinelibrary.wiley.com/doi/10.1111/nyas.2015.1336.issue-1/issuetoc>

Consortium for Climate Risk in the Urban Northeast (CCRUN)
<http://www.ccrun.org/>

Columbia University Center for Climate Systems Research (CCSR)
<http://ccsr.columbia.edu/>



Future Coastal Flood Heights in NYC

	Low estimate (10 th percentile)	Middle range (25 th to 75 th percentile)	High estimate (90 th percentile)
2020s			
Annual chance of today's 100-year flood (1%)	1.1%	1.1-1.4%	1.5%
Flood heights associated with 100-year flood (11.3 ft)	11.5 ft	11.6-12.0 ft	12.1 ft
2050s			
Annual chance of today's 100-year flood (1%)	1.4%	1.6-2.4 ft	3.6%
Flood heights associated with 100-year flood (11.3 ft)	12.0 ft	12.2-13.1 ft	13.8 ft
2080s			
Annual chance of today's 100-year flood (1%)	1.7%	2.0-5.4%	12.7%
Flood heights associated with 100-year flood (11.3 ft)	12.4 ft	12.8-14.6 ft	16.1 ft