URBAN CLIMATE CHANGE RESEARCH NETWORK

New Approaches to Climate Change, Water, and Cities

Cynthia Rosenzweig

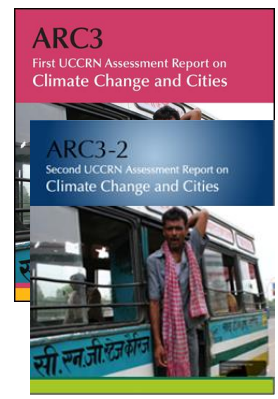
Deltas in Times of Climate Change II

Rotterdam, Netherlands
September 26, 2014

Urban Climate Change Research Network (UCCRN)

UCCRN Mission: *Enable cities to fulfill their climate change leadership potential in both mitigation and adaptation*

- A consortium of over **500+ scholars and practitioners** from over 100 developed and developing cities around the world
- First major publication – *First UCCRN Assessment Report on Climate Change and Cities (ARC3)*, a **four-year** effort by **100 authors** from **50+ cities** around the world
- In process of writing the *Second UCCRN Assessment Report on Climate Change and Cities (ARC3-2),* scheduled for publication by COP21 2015



(Cover TBD)

ARC3 Goal

To establish on-going, city-centered state-of-knowledge reports for urban decision-makers In order to help build capacity for city actions

ARC3-2 Outline

Front Matter: Co-Editor Bios, Pull-Out Quotes, Title Page, Table of Contents, Forewords, Preface

Summary for Urban Decision-Makers

Chapter 1 – Introduction

Section I: Cross-Cutting Themes for Climate Change and Sustainable Development

Chapter 2 – Urban Planning and Design

Chapter 3 – Mitigation and Adaptation: Barriers, Bridges, and Co-Benefits

Chapter 4 – Equity and Environmental Justice

Chapter 5 – Economics, Finance, and the Private Sector

Section II: Climate Science and Disaster Risk

Chapter 6 – Urban Climate Science

Chapter 7 – Disasters and Risk

Section III: Urban Sectors and Systems

Chapter 8 – Urban Energy

Chapter 9 – Water, Wastewater, and Sanitation

Chapter 10 – Urban Solid Waste Management

Chapter 11 – Urban Transportation

Chapter 12 – Housing and Informal Settlements

Chapter 13 – Urban Health

Section IV: Urban Ecosystems, Food, and Coastal Zones

Chapter 14 – Urban Ecology, Biodiversity, and Ecosystem Services

Chapter 15 – Urban Areas in Coastal Zones

Section V: Governance and Policy

Chapter 16 – Governing Carbon and Climate in Cities

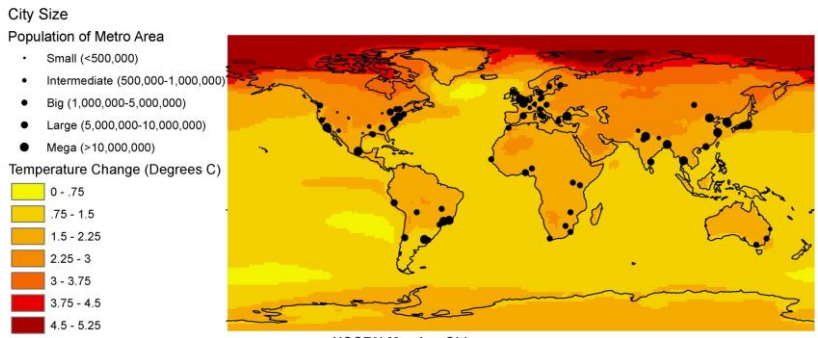
Conclusions and Moving Forward

Appendix 1 – UCCRN Case Study Docking Station

End Matter: Case Studies and Topics; Acronyms and Abbreviations; UCCRN Steering Group, ARC3-2 Authors, and Reviewers; Index

Highlights on:
- Urban Demographics
- Urban Food Systems
- Sustainable Production and Consumption
- Attitudes, Perception, and Behavior
- Information and Communications Technology

Temperature Change (2050s) and UCCRN Member Cities



UCCRN Member Cities

Africa
Abuja, Cape Town, Dakar, Durban, Harare, Johannesburg, Kampala, Nairobi, Rabat, Setif, Sfax, Lagos

Asia
Bangkok, Beijing, Chennai, Delhi, Dhaka, Eskisehir, Hong Kong, Jaipur, Kathmandu, Kyoto, Nagoya, Ningbo, Sargodha, Seoul, Shanghai, Tokyo, Ulaanbaatar

Australia/Oceania
Gold Coast, Melbourne, Parkville, Sydney, Townsville, Wellington, Wembley

Europe
Aalborg, Athens, Barcelona, Berlin, Bonn, Bristol, Brussels, Copenhagen, Enschede, Exeter, Freiburg, Geneva, Glasgow, Groningen, Helsinki, Istanbul, Kokkola, Leipzig, London, Luxembourg, Naples, Newcastle upon Tyne, Oxford, Paris, Peterborough, Planken, Potsdam, Rome, Stockholm, Stuttgart, Tallinn, Trieste, Venice, Vienna

North America
Amherst, Atlanta, Aurora, Baton Rouge, Boston, Boulder, Cambridge, College Park, College Station, East Lansing, Englewood, Eugene, Guelph, Hauppauge, Idaho Falls, Kingston, Los Altos, Los Angeles, Martinez, Mexico City, Montreal, Mountain View, New Haven, New Orleans, New York, Norfolk, North Little Rock, Nyack, Ottawa, Reno, Sacramento, Saint Catherines, San Diego, Seattle, Toronto, Tucson, Washington DC, Yardley

South America
Brasilia, Buenos Aires, Concón, Curitiba, Lima, Montevideo, Rio de Janeiro, Santa Cruz, Santiago, Sao Paulo

*colors represent mean annual temperature change for a mid-range scenario (RCP4.5) from CMIP5 models (2040-2069 average minus 1971-2000 average).

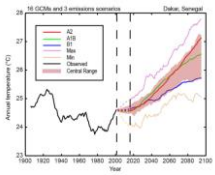
(35 CMIP5 models)

4

CLIMATE HAZARDS

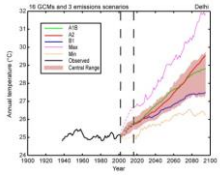
ARC3
First UCCRN Assessment Report on
Climate Change and Cities

Dakar



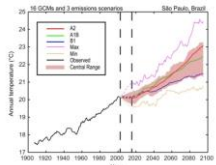
2050s Temperature Projection

Delhi



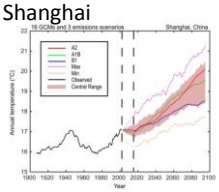
2050s Temperature Projection

Sao Paulo



2050s Temperature Projection

Shanghai



2050s Temperature Projection

Source: Center for Climate Systems Research
Columbia University 2009

12 Cities Analyzed

1. Athens
2. Dakar
3. Delhi
4. Harare
5. Kingston
6. London
7. Melbourne
8. New York
9. Sao Paulo
10. Shanghai
11. Tokyo
12. Toronto

2050s projected temperature increase between 1°C to 4°C

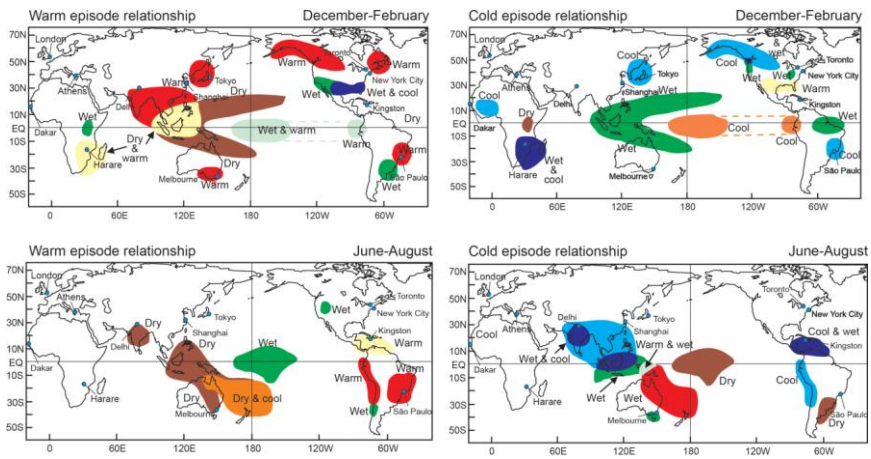
Key takeaway

1. More frequent/longer/hotter heat waves
2. More floods and droughts
3. Sea-level rise with enhanced coastal flooding

5

Urban Climate Teleconnections

El Nino-Southern Oscillation



Source: NOAA; ARC3

6

WATER

ARC3
First UCCRN Assessment Report on
Climate Change and Cities

Risks

1. Variance in precipitation significantly affects quantity and quality of water supply
2. Impervious city surfaces and increased precipitation intensity overwhelm current city drainage systems
3. Over 1/2 the people in large developing country cities rely on informal water supply vendors

Adaptation and Mitigation Strategies

1. Adjustments in water-intake locations
2. Rainwater harvesting and water reuse
3. Demand management—public education, industrial process changes to reduce water intensity

Source: Ademolo Omojola

Water Scarcity and Vendors, Lagos

Key takeaway

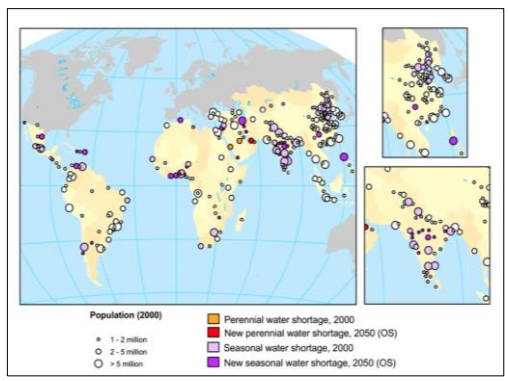
Formal and informal urban water supply services are highly vulnerable to drought, extreme precipitation, and sea level rise, and a range of adaptation measures will be required to ensure the safe functioning of water supplies, especially in cities in coastal regions

Water Case Studies
Lagos, Kulna, Santiago de Chile, Mexico City, Esmeraldas, New York 7

Key Vulnerabilities and Climate Hazards to Water and Wastewater in Cities

- Rising temperatures (with attendant changes in water demands, availability and quality)
- Changing precipitation regimes
- Burgeoning and changing extreme weather regimes
- Sea-level rise and storm surge
- Changing surface-water and groundwater availability and conditions

Omojola, A., Vicuña, S., et al. (*In preparation*), ARC3-2, Chapter 9: Water, Wastewater and Sanitation.

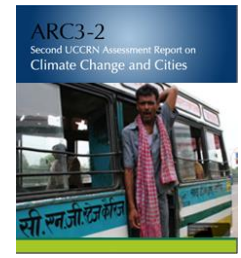


Distribution of large cities (>1 million population in 2000) from developing nations and their water shortage status in 2000 and 2050. Circle sizes reflect populations in 2000, colors indicate statuses; grey areas are outside the study area.
Source: McDonald et al. 2011.

8

Draft Recommendations for Water and Wastewater Systems in Cities

- Ensure adequate quantities to sustain livelihoods and ecosystems
- Reconsider "adequate" and identify different water needs (both quantity and quality) for different uses
- Ensure that there is adequate quantity and flow to dilute pollution factors
- Reduce the vulnerability of marginal communities
- Reduce the exposure of people and infrastructure to floods/related disasters



Omojola, A., Vicuña, S., et al. (*In preparation*), ARC3-2, Chapter 9: Water, Wastewater and Sanitation.

9

ARC3-2 Case Study Docking Station

1. Built upon 46 cases from ARC 3.1
2. Designed to be useful for both research and practice
3. Develop a robust methodology allowing for cross-case comparisons, using a range of methods
4. Build an extractable, open-source database based upon peer-validated data inputs

URBAN CLIMATE CHANGE RESEARCH NETWORK

ARC3-2 Case Study Docking Station

ARC3-2 Case Study Data Collection Protocol	
Case Study Title	
Author(s)	
Executive summary (the takeaway)	
Name of city	
Country	
Keywords (3-5 max.)	
Explanatory graphic (i.e. photograph, figure, chart, graph, or table) illustrating the main point of the case	
Area (in km^2) of municipality/Area (in km^2) of metro region	
Population (city, metro area, country)	
Density (city, metro area)	
Latitude and longitude	
Climate zone (Köppen-Gieger Climate Zones)	
Topography (description)	
GDP city and nation (Purchasing power parity)	
Human Development Index	
Mitigation strategies	
Adaptation strategies	
List of data sources (i.e. documents, interviews, surveys, direct and participant observation, grey literature, secondary sources)	

How to Interact with UCCRN

- Join the network
- Contribute a case study
- Be a reviewer
- Go on study visits
- Participate in UCCRN research teams
- Develop a UCCRN Regional Hub

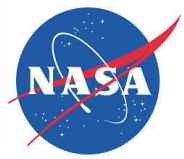
URBAN CLIMATE CHANGE RESEARCH NETWORK

www.uccrn.org

12

ARC3-2 Sponsors

THE EARTH INSTITUTE
COLUMBIA UNIVERSITY



SIEMENS