

Urban Climate Change Research Network and ARC3.2

Cynthia Rosenzweig, William Solecki,
Patricia Romero-Lankao, Somayya Ali Ibrahim
and ARC3.2 Authors

December 4, 2015
Climate Summit for Local Leaders
COP21 Paris



Assessment Report on Climate Change
and Cities ARC3.2 Report

UCCRN Mission

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

- Over **600** scientists, scholars, and expert practitioners spanning a broad range of expertise
- More than **100** developed and developing cities around the world
- Formed in **2007** at the time of the C40 Summit in New York



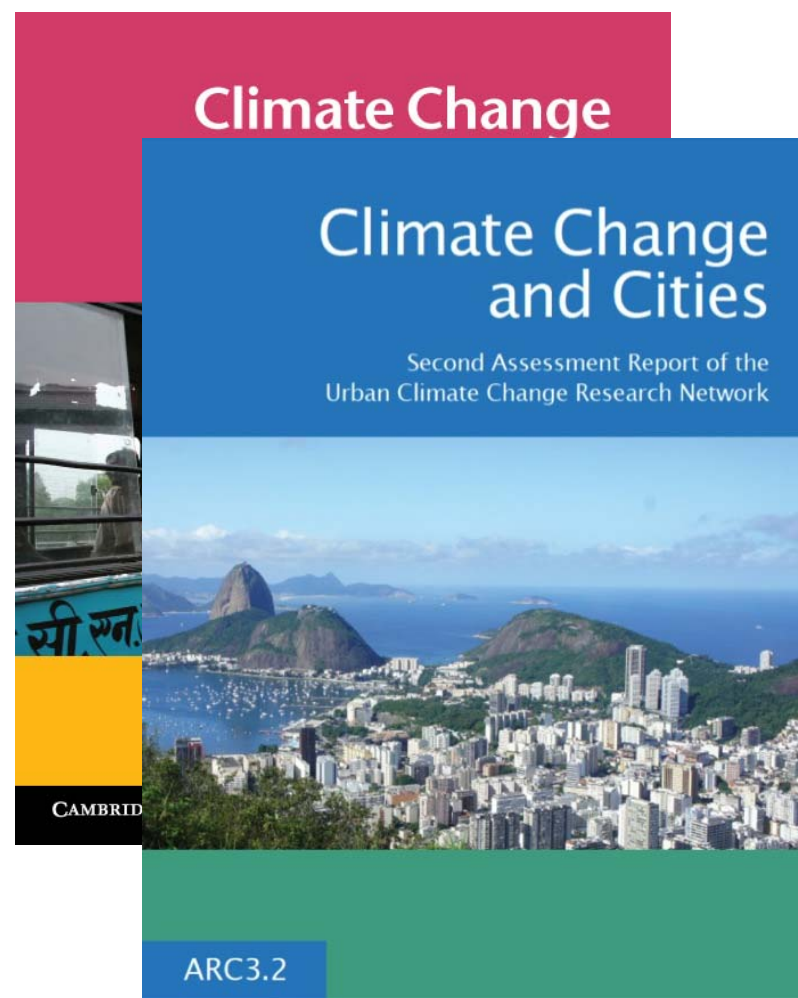
*UCCRN ARC3.2 Workshop.
Siemens, The Crystal, London, UK. 2014*

ARC3 Report Series

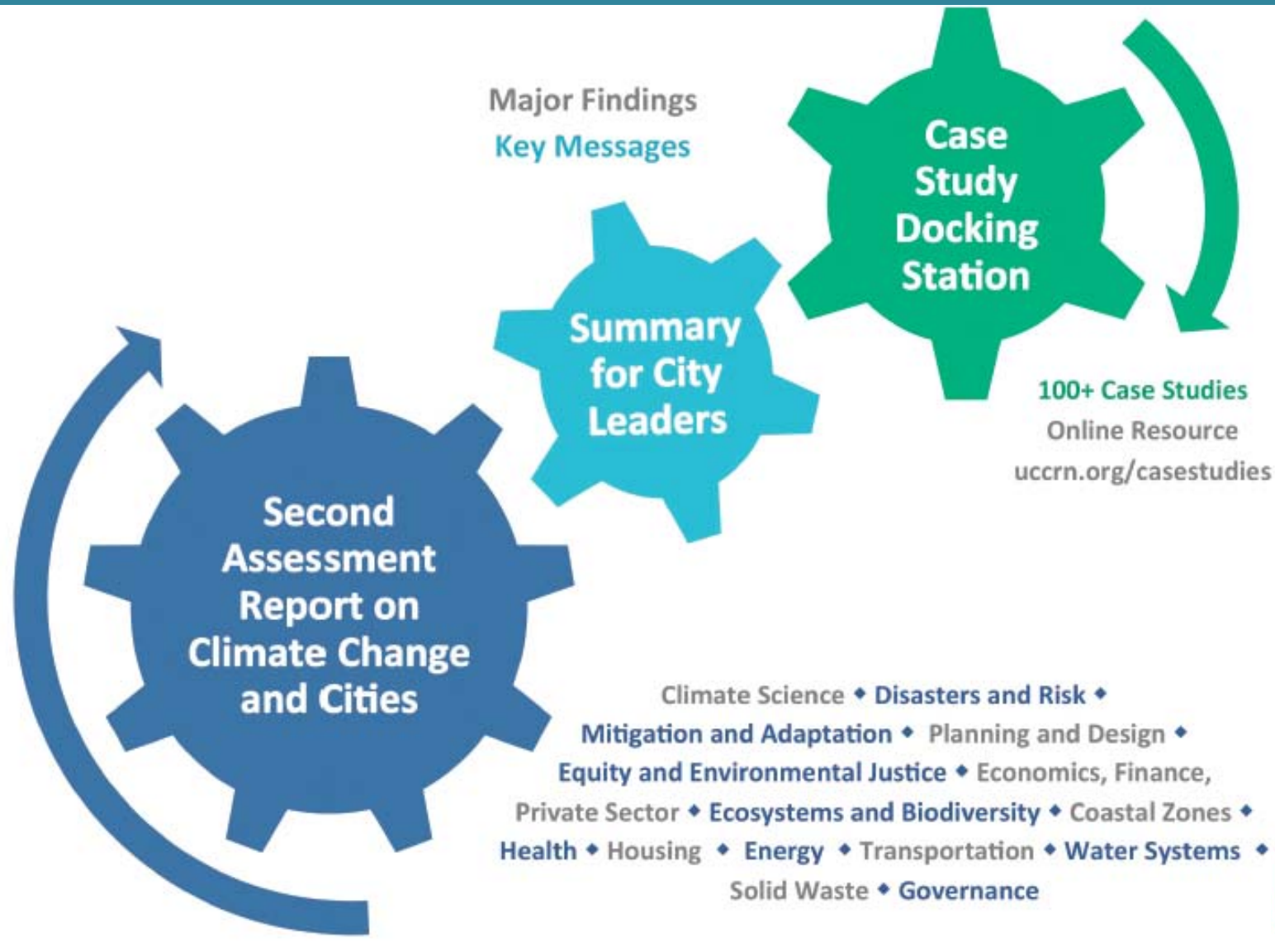
First major publication in 2011 –
*First UCCRN Assessment Report
on Climate Change and
Cities (ARC3)* **four-year** effort by
100 authors from **50+ cities**
around the world

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

- *To be published by Cambridge University Press in 2016*
- ***Summary for City Leaders
launched Dec 4 COP21 CSLL***



ARC3.2 Framework



ARC3.2 Case Study Docking Station

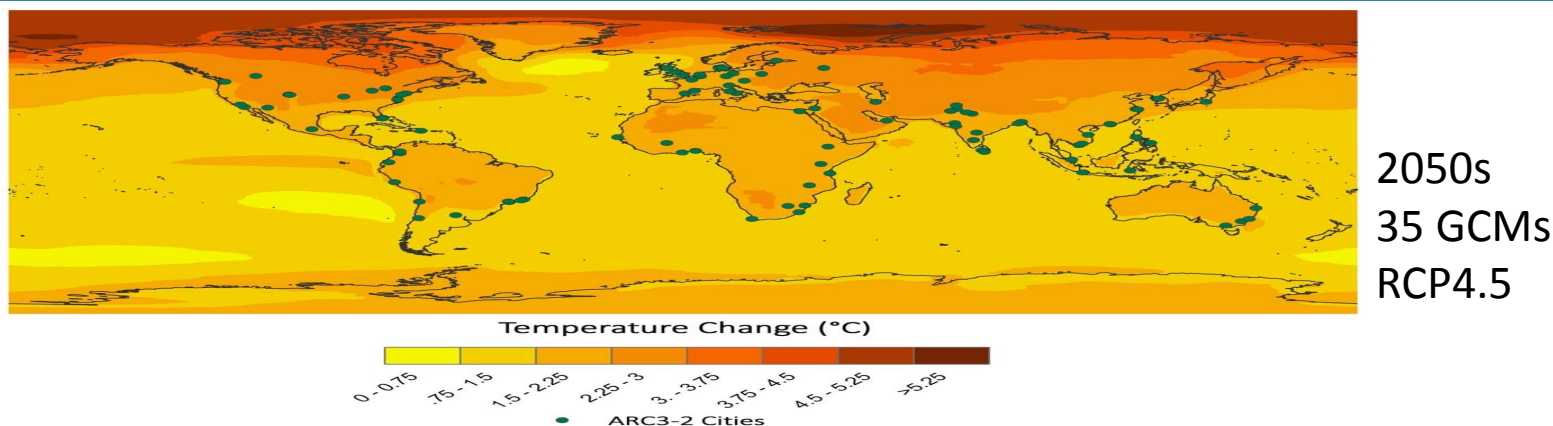
- Online, searchable, open-source database with peer-validated case studies
- Designed to be useful for both research and practice
- Use of systematic peer-validation and common data collection protocol to achieve higher level of scientific rigor
- Enable scientifically valid cross-case comparisons
- Inspire local climate action and disseminate information
→ Lessons learned
- CSDS link:
www.uccrn.org/casestudies



<p>Participatory Integrated Assessment of Flood Protection Measures for Climate Adaptation in Dhaka By Anika Hossain Haque and Stelios Grafakos</p> <p>Dhaka, the capital of Bangladesh, is one of the largest megacities growing rapidly. Due to its location on a deltaic plain, the city is flooding. Moreover, being located in the active river tidal zone, the city is affected by high tides. Risks associated with these are expected to increase in the future due to global climate change impacts as well as the high rate of urbanization. The government is planning several adaptive measures to protect the city from flooding. This study aims to develop a systematic framework to evaluate and assess them.</p> <p>Traditionally, the water-retention areas in Dhaka have efficiently reduced high intensity rainfall and the canals, which are connected to the river situation is changing. The population of Dhaka is increasing and encroachment of these water-retention areas, which mostly lie in the rural areas, has not improved with the pace of rapid urbanization; on the contrary, it has increased. Dhaka East was almost completely inundated in 1988, 1998 and 2004, and it was inundated for longer than the other parts of the city. Prolonged inundation caused severe damage to urban agriculture and housing, and piped services. Disruption of communications had severe consequences as contaminated water led to health hazards.</p> <p>The study identifies, analyzes, and prioritizes adaptation measures to while applying a Multi-Criteria Analysis (MCA) framework. The study participants process to an informed decision-making in formulating Developed Country (LDC) at a city level. Furthermore, it provides decision support to national policy-makers regarding the selection of adaptation measures considering budget, institutional and technical capacity. The framework involved both stakeholders eliciting their views and valuations (judgments) and experts (technical expertise). Adaptation assessment in Bangladesh is limited, as the level of vulnerability to climate change is very high and resources are very limited. The study explores the development of a platform for knowledge generation and sharing that can be used during the MCA process as an important element for enhancing the institutional capacity during the decision-making process.</p> <p>Data has been collected from both primary sources (in-depth interviews, Questionnaire survey, Direct observation) and secondary sources (official reports, relevant case studies, relevant literature in peer-reviewed journals).</p> <p>The assessment involved the following steps:</p> <p>Selection of adaptation options: The adaptation options for the city government (flood embankment, pumping stations, regulators, regrading of the road network, flood walls, and canal improvement). Additional adaptation options (emergency response mechanism) were selected for assessment based on case studies. The present study finds that Dhaka is found to be significantly poor. This option is expected to damage since during the in-depth interviews, it was found that the city has a good idea about what they would have done given an early warning system.</p>																													
<p>Participatory Integrated Assessment of Flood Protection Measures for Climate Adaptation in Dhaka Anika Hossain Haque Department of Geography, University of Cambridge Stelios Grafakos Institute for Housing and Urban Development Studies, Erasmus University Rotterdam</p> <p>City: Dhaka Country: Bangladesh Keywords: Climate adaptation, flood protection, multi-criteria analysis, prioritization, participatory approach, urban. Executive summary: The study emphasizes the importance of participatory process to an informed decision-making in formulating policy in the context of a Least Developed Country at a city level. Furthermore, it provides decision support to both local and national policy-makers regarding the selection of adaptation measures that meet multiple local objectives considering budget, institutional and technical capacity constraints. The assessment framework involved both stakeholders eliciting their views and valuations (judgments) and experts (technical expertise). Adaptation assessment in Bangladesh is limited, as the level of vulnerability to climate change is very high and resources are very limited. The study explores the development of a platform for knowledge generation and sharing that can be used during the MCA process as an important element for enhancing the institutional capacity during the decision-making process.</p> <table border="1"> <tr><td>Area of municipality (km²)</td><td>139</td></tr> <tr><td>Area of metropolitan region (km²)</td><td>560</td></tr> <tr><td>Population (city)</td><td>4,972,000 (1991, 2011)¹</td></tr> <tr><td>Population (metropolitan area)</td><td>14,171,562 (2001, 2011)</td></tr> <tr><td>Density (city) (/km²)</td><td>43,179 (1991, 2011)</td></tr> <tr><td>Density (metropolitan area) (/km²)</td><td>26,000</td></tr> <tr><td>Latitude and longitude</td><td>23°42' and 23°54' N and 90°22' and 90°28' E</td></tr> <tr><td>Climate zone (Köppen climate)</td><td>Aw (tropical monsoon climate)</td></tr> <tr><td>Topography (description)</td><td>Flat with slight undulations. Elevation ranges from 0.5m to 3.2m, with 70% of the total area within 0.5-2m (Dhaka, 2000).</td></tr> <tr><td>GDP nation (Purchasing power parity)</td><td>\$ 14.792 trillion (World Bank, 2015)</td></tr> <tr><td>GDP nation (Nominal)</td><td>\$ 1090 (World Bank, 2015)</td></tr> <tr><td>Human Development Index (national)</td><td>0.685 (UNDP, 2014)</td></tr> <tr><td>Adaptation strategies</td><td>Management of urban waste, sewage treatment, improvement of energy consumption patterns in transport sector etc.</td></tr> <tr><td>Mitigation strategies</td><td>Strategies adopted by the public sector: Flood walls, embankment, pumping station, regulators/dikes, canal improvement, elevating road etc.</td></tr> </table>		Area of municipality (km ²)	139	Area of metropolitan region (km ²)	560	Population (city)	4,972,000 (1991, 2011) ¹	Population (metropolitan area)	14,171,562 (2001, 2011)	Density (city) (/km ²)	43,179 (1991, 2011)	Density (metropolitan area) (/km ²)	26,000	Latitude and longitude	23°42' and 23°54' N and 90°22' and 90°28' E	Climate zone (Köppen climate)	Aw (tropical monsoon climate)	Topography (description)	Flat with slight undulations. Elevation ranges from 0.5m to 3.2m, with 70% of the total area within 0.5-2m (Dhaka, 2000).	GDP nation (Purchasing power parity)	\$ 14.792 trillion (World Bank, 2015)	GDP nation (Nominal)	\$ 1090 (World Bank, 2015)	Human Development Index (national)	0.685 (UNDP, 2014)	Adaptation strategies	Management of urban waste, sewage treatment, improvement of energy consumption patterns in transport sector etc.	Mitigation strategies	Strategies adopted by the public sector: Flood walls, embankment, pumping station, regulators/dikes, canal improvement, elevating road etc.
Area of municipality (km ²)	139																												
Area of metropolitan region (km ²)	560																												
Population (city)	4,972,000 (1991, 2011) ¹																												
Population (metropolitan area)	14,171,562 (2001, 2011)																												
Density (city) (/km ²)	43,179 (1991, 2011)																												
Density (metropolitan area) (/km ²)	26,000																												
Latitude and longitude	23°42' and 23°54' N and 90°22' and 90°28' E																												
Climate zone (Köppen climate)	Aw (tropical monsoon climate)																												
Topography (description)	Flat with slight undulations. Elevation ranges from 0.5m to 3.2m, with 70% of the total area within 0.5-2m (Dhaka, 2000).																												
GDP nation (Purchasing power parity)	\$ 14.792 trillion (World Bank, 2015)																												
GDP nation (Nominal)	\$ 1090 (World Bank, 2015)																												
Human Development Index (national)	0.685 (UNDP, 2014)																												
Adaptation strategies	Management of urban waste, sewage treatment, improvement of energy consumption patterns in transport sector etc.																												
Mitigation strategies	Strategies adopted by the public sector: Flood walls, embankment, pumping station, regulators/dikes, canal improvement, elevating road etc.																												

Urban Climate Science

Climate Projections for ARC3.2 Cities



- Temperatures are already rising in cities around the world due to both climate change and the urban heat island effect. Mean annual temperatures in 39 ARC3.2 cities **have increased at a rate of 0.12 to 0.45°C per decade from 1961 to 2010.**
- Mean annual temperatures in 100 ARC3.2 cities are projected **to increase by 0.7 to 1.5°C by the 2020s, 1.3 to 3.0°C by the 2050s, and 1.7 to 4.9°C by the 2080s.**
- Mean annual precipitation in 100 ARC3.2 cities is projected **to change by -7 to +10% by the 2020s, -9 to +15% by the 2050s, and -11 to +21% by the 2080s.**
- Sea level in the 52 ARC3.2 coastal cities is projected **to rise 4 to 19 cm by the 2020s; 15 to 60 cm by the 2050s, and 22 to 124 cm by the 2080s.**

Bader, Blake Grimm, et al., ARC3.2 Chapter 2

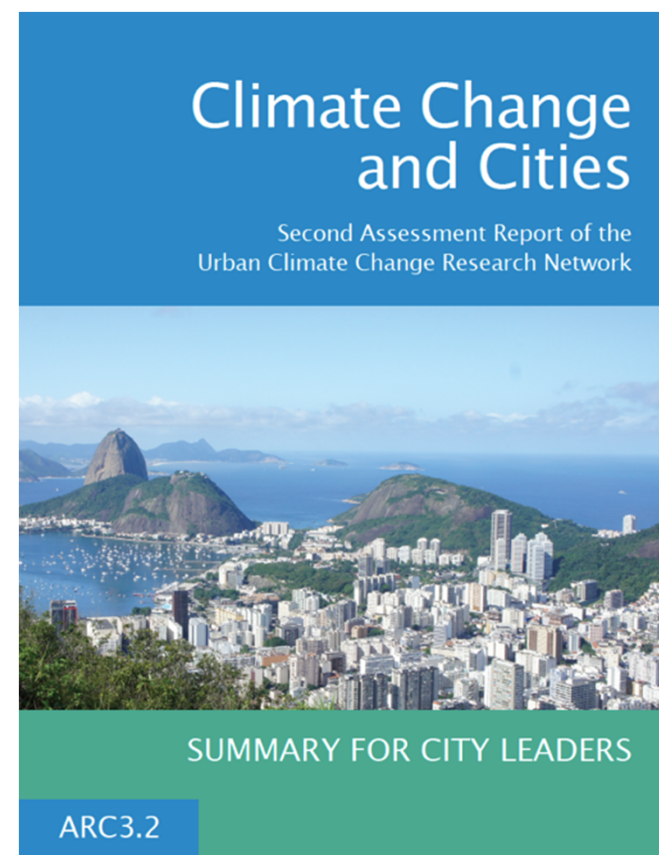
ARC3.2 Summary for City Leaders

Overarching Finding

Transformation is essential for cities to excel in their role as climate-change leaders.

Profound changes will be required in urban energy, transportation, water use, land use, ecosystems, growth patterns, consumption, and lifestyles.

Five pathways to urban transformation emerge throughout ARC3.2. These provide a fundamental framework for the successful development and implementation of climate actions.



ARC3.2 Summary for City Leaders

The Five-Fold Path

Pathway 1: Disaster risk reduction and climate change adaptation are the cornerstones of resilient cities/Gestion des risques de catastrophes et adaptation au changement climatique comme pierres angulaires de la ville résiliente.

Pathway 2: Actions that reduce greenhouse gas emissions while increasing resilience are a win-win/Synergies entre atténuation des émissions et résilience.

Pathway 3: Risk assessments and climate action plans co-generated with the full range of stakeholders and scientists are most effective/Evaluation des risques et co-construction de plans d'actions avec les parties prenantes du territoire et les scientifiques.

ARC3.2 Summary for City Leaders

The Five-Fold Path

Pathway 4: Needs of the most disadvantaged and vulnerable citizens should be addressed in climate change planning and action/Prise en compte des besoins des plus pauvres et des plus vulnérables.

Pathway 5: Advancing city creditworthiness, developing robust city institutions, and participating in city networks enable climate action/Développement de capacités , de solvabilité, d'institutions robustes et des réseaux permettant aux villes d'avoir accès aux moyens pour agir.

European hub: french partners

Urban Climate Change Research network (UCCRN)

<http://uccrn.org>

Pierre et Marie Curie University (UPMC-Sorbonne universités)

<http://www.upmc.fr>

Paris City Hall, Research Deputy Mayor

<http://www.paris.fr>

Institute of Ecology and Environmental Sciences – Paris

<http://ieesparis.ufr918.upmc.fr>

Paris research consortium Climate-Environment-Society

<http://www.gisclimat.fr>

European hub: french partners

Atelier international du Grand Paris (AIGP).

<http://www.ateliergrandparis.fr>

Paris Climate Agency

<http://www.apc-paris.com/>

French National Research Center (CNRS)

<http://www.cnrs.fr/>

Regional Agency for Nature and Biodiversity

<http://www.natureparif.fr/>

Institute for Climate Economics – CDC & AFD (I4CE)

<http://www.i4ce.org/>

Project of activities for 2016

Translation in different european languages of the
« Summary for city leaders », ARC3-2

Four workshops in different cities, in relation to major
events such as 4th International Climate Change
Adaptation Conference, Rotterdam...

... to set up a concrete agenda (research projects,
multiple stakeholders summer school, fund raising...).

For more information, please visit:

www.uccrn.org

@UCCRN

