

Annex 3

Case Study Docking Station: Overview and Methods

UCCRN Case Study Docking Station Team

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1 Introduction

The Urban Climate Change Research Network's (UCCRN) *First Assessment Report on Climate Change and Cities* (ARC3.1; Rosenzweig et al., 2011), included within its chapters 46 Case Studies on cities around the world and climate topics more generally, including vulnerability, hazards and impacts, extreme events, mitigation actions, and sector-specific themes such as health, transportation, energy, wastewater and flood management. While the cases presented provided concrete examples of the issues discussed within the particular chapters, the lack of an overarching research design, data collection protocol, and analytic matrices made cross-case comparisons difficult. This Annex describes the UCCRN contribution to addressing these issues and considering next steps. This Annex includes the following sections in addition to this Introduction: Section 2, ARC3.1 Background; Section 3, Guidelines for ARC3.2 Case Studies; Section 4, the ARC3.2 Case Study Docking Station; and Section 5, Conclusions.

One of the key strengths of the case study methodology is the ability to provide highly context-specific insights into contemporary phenomena (Yin, 2009; Gerring, 2010; Keskitalo, 2010). However, if case studies are uncoordinated, this benefit is to some extent a weakness if researchers are interested in understanding a broader view of the deeper causal mechanisms that drive urban climate change planning (Ford et al., 2010). Some of the existing literature on, and meta-analyses of, urban climate change issues documents that the study of climate change at the urban scale is characterized by a fragmented research environment where even many of the basic concepts employed remain indistinct and vague (Dupuis and Biesbroek, 2013). For example, in the field of climate adaptation, there are a variety of interpretations about what is baseline adaptation (normal hazard management) and what is climate-driven adaptation (in response to changes beyond the previous status quo), what is adaptation policy, what are suitable measures of success or failure, and what are some standard indicators to measure progress in adaptation strategies and measures (Doria et al., 2009).

To help address these issues, the UCCRN *Second Assessment Report on Climate Change and Cities* (ARC3.2) includes 117 city Case Studies, some placed within ARC3.2 chapters, some in Annex 5, and all incorporated into an online Case Study Docking Station (CSDS) that is under development, a searchable database designed to allow for further exploration and examination of cases. These Case Studies display empirical evidence on what cities are doing on the ground across a diverse set of urban challenges and opportunities. The aim is to develop a mechanism by which to organize the case studies by a variety of metrics and sectoral and content elements; this also provides for engaging a broader and more diverse set of authors for the ARC3.2 Case Studies than for those in the earlier volume.

The ARC3.2 CSDS is designed to inform both research and practice on climate change and cities by enabling initial

scientifically valid cross-case comparisons and analysis across a range of social, biophysical, cultural, economic, and political contexts. It is hoped that this first step will lead to new possibilities and pathways of case study research. The ARC3.2 Framework, within which the CSDS was developed, is shown in Figure 1.4 of this volume.

A common data collection protocol for the assembled cases serves as a guideline to achieving a higher level of consistency across the Case Studies. In the ARC3.2 CSDS, all data entries are sourced and traceable. In addition to the data inputs and reviews by expert practitioners, the Docking Station currently uses a straightforward data management program, Caspio Bridge (Version 8.5.5). The technology and software capability of the CSDS system can periodically be advanced as appropriate.

The fullest version of this information is online at the UCCRN CSDS, www.uccrn.org/casestudies. The online database will be available for data extraction and analysis for a variety of different research and practice needs under a creative commons license.

Case Studies in the CSDS provide references to source(s) for additional reading. These sources include both peer-reviewed and gray literature, including city reports and white papers published by international agencies.

2 ARC3.1 Background

2.1 Case Studies in ARC3.1

The role of the ARC3.1 Case Studies, as contributions to the overall objectives of the report, is stated in the ARC3.1 report as follows:

The ARC3.1 recognizes that there are both similarities and differences between developed and developing city responses to climate change. For example, there is a great deal of fundamental information on climate change projections, vulnerabilities, and risk assessment methods that has a common base in both types of cities. At the same time, there are great differences in the circumstances in developing country cities. These are discussed throughout the chapters, with key points brought forward as city Case Studies. The city Case Studies, which illustrate challenges, “best practices,” and available tools to facilitate actions in developing and developed cities, are presented throughout the text. The Case Studies cover the status and activities related to climate change on a city-by-city basis. There are several types of Case Studies included throughout ARC3: those developed by the chapter authors; those invited from others that apply entirely to the chapter topic; and a third category, “cross-cutting Case Studies” that touch on many different urban climate change topics that a particular city or organization is addressing. The Case Studies have been developed by authors drawn from both the research and practitioner

communities; such teams are helping to build a cadre of knowledge-providers to aid in implementation of climate change actions in cities around the world. (Rosenzweig et al., 2011: 6)

The structure and content of the ARC3.1 report was based in part on feedback from selected city decision-makers from around the world. They were asked to express their information needs with regard to climate change hazards, vulnerability, adaptation, and mitigation in their city, addressing questions such as:

- What climate-related challenges does your city face?
- In what fields do you see potential for strong mitigation efforts in your city?
- What policy mechanisms is your city potentially or actually implementing?
- Where adaptation policies and actions are most urgently needed?
- What other special issues would you like this report to address?

The ARC3.1 report was composed of nine chapters to address these responses and broader considerations, including four sector-based topics – urban energy, water and wastewater, transportation, and health. In addition, as noted earlier, the ARC3.1 co-editors solicited Case Studies from urban climate change academics and practitioners from around the world, with the idea that such cases would cover a wide range of climate change mitigation and adaptation aspects in various sectors and cities so as to build a knowledge base of existing policies and actions to be shared worldwide. Case Study authors for ARC3.1 were encouraged to report current climate change conditions as well as future climate change scenarios (i.e., temperature, precipitation, and sea level changes; key vulnerabilities; and mitigation and adaptation programs and policies in place or planned for implementation in the near future).

2.2 Topics and Results of the Case Studies in ARC3.1

The results of this effort are shown in Rosenzweig et al. (2011, Appendix A), with case study topics in vulnerability, adaptation, and mitigation.

There were 46 Case Studies in the ARC3.1 report, inserted within the nine chapters in the volume, of which 35 can be defined as specifically city Case Studies. The other cases discuss selected topics more generally. Of these 35 cases in the ARC3.1 report, 28 were focused on a single city. These 28 single-city Case Studies were reviewed following the publication of ARC3.1 in order to help develop guidelines for the ARC3.2 Case Study Call for Submissions. These new guidelines, presented here, are designed to enable the consistency – insofar as this is

possible – of the Case Studies published in the ARC3.2 report and in the online CSDS.

Among the findings of this review of the ARC3.1 Case Studies were:

- There were wide variations in the data types, sources, and evidentiary standards among the 28 cases reviewed in detail, making comparative analysis difficult.
- The case cities were heavily weighted toward large cities (46% of the sample of 28), highlighting issues of transferability and learning potential, given that a majority of the coming growth of urbanized areas is likely to be concentrated within medium-sized and large cities in the developing world (Dobbs et al. 2012).¹
- There was no consistent sampling of the prevailing climatic conditions within the case cities; hence, variability, vulnerabilities, and projected or actual climate impacts could not be compared or evaluated.

The ARC3.2 Case Study guidelines presented in this Annex are an effort to deal with these and other problems of Case Study comparison and to provide a preliminary attempt to systemize the CSDS collection process.

3 Guidelines for ARC3.2 Case Studies

Based on the ARC3.1 experience and the objectives of ARC3.2, a Case Study Call for Submissions was sent to members of the UCCRN network and distributed more widely. In particular, the UCCRN sought Case Studies on climate change risks and vulnerabilities in cities, as well on as mitigation and adaptation planning and implementation, with a special emphasis on lessons learned and innovative approaches.

Following the publication of ARC3.1 and a series of scoping sessions held at international conferences on climate change and cities, the UCCRN noted several additional topics of interest from city decision-makers and stakeholders around the world, including climate disasters and risk; urban planning and design; co-benefits of mitigation and adaptation; equity and environmental justice; economics, finance, and the private sector; urban ecosystems and biodiversity; coastal zones; housing and informal settlements; and urban solid waste. As a result, the ARC3.2 volume has almost doubled in size to 16 chapters, and an effort was made to solicit case studies that include these important new topics during the development of the report.

Case Study authors were asked to submit a case study text of 700–1,000 words, not including references, figures, and tables; an abstract of a maximum of 100 words; a completed case study data collection protocol (see Annex 3 Table 1); and a list of data sources.

¹ In this analysis, large cities are defined as those with a population of 5–10 million and medium-sized, or intermediate, cities with a population of 500,000–1 million (UN-Habitat, 2008).

Case Study submissions were encouraged to cover the following points:

- Clearly identify geography and topic addressed
- Clearly communicate relevance to climate change adaptation and mitigation in terms of action and strategy
- Include visual and textual content and show clarity in each
- Describe and discuss action/policy drivers (e.g., community as a driver, non-governmental organizations (NGOs) as drivers, local authorities or industry or businesses as a drivers of climate change adaptation)
- Describe impact and scale of potential climate changes
- Demonstrate clear lessons from which other cities and stakeholders can learn

Case Studies were submitted by scholars, city leaders and practitioners, stakeholders, and city organizations (see Appendix C) from around the world. The selection of Case Studies for the ARC3.2 report and the CSDS was based on attempting to build a collection that captures the range of socioeconomic,

demographic, and geographical conditions that affect cities' vulnerability and responses to climate change. The distribution of Case Studies across topic, geography, income level, climate zone, and city size can be seen in Annex 4, Tables A–E.

3.1 ARC3.2 Case Study Data Collection Protocol

The ARC3.2 Case Study data collection protocol (Annex 3 Table 1), developed in collaboration with the University of Aalborg, Denmark, consists of a table with selected key data. The data within the data collection protocol were selected to be useful in comparative analysis. It is intended that the inputs to the data table be consistent to the extent possible across all ARC3.2 Case Studies. The purpose of the protocol is to ensure a minimum standard of comparability and reliability of the essential data that informs the Case Studies, thereby increasing the validity of any subsequent comparative analysis.

Future cross-case analyses can be expanded and supplemented by additional information such as the items noted in Annex 3 Table 2, some of which are included in the Case Study texts, or from data derived from widely available datasets such as those listed in Annex 3 Table 4.

3.2 Validation of ARC3.2 Case Studies

The integration, review, and verification of the information within the Case Studies was undertaken at the UCCRN Secretariat at Columbia University. Case Studies submitted to the CSDS underwent review by the ARC3.2 co-editors and at least one additional reviewer. The data collection protocol information was verified and sources checked before being uploaded to the online CSDS.

Annex 3 Table 1 CSDS Data Collection Protocol Template: required information.

ARC3.2 Case Study Data Collection Template
Case Study Title
Author(s) + institutions
City
Country
Keywords
Abstract (max. 100 words)
Area of city [km ²]
Area of metropolitan region [km ²]
Population (city/metropolitan region)
Density (city) [/km ²]
Density (metropolitan region) [/km ²]
Latitude and Longitude
Climate zone (Köppen-Gieger Climate Zones)
Topography (description)
Gross National Income (GNI) per capita (Atlas method) (national) 2017 (World Bank, 2017)
Human Development Index (national) (UNDP, 2014a,b)
Adaptation strategies (max. 25 words)
Mitigation strategies (max. 25 words)

Note For consistency, the data for Gross National Income per capita and the HDI index were taken by the UCCRN from the following sources: GNI per capita (World Bank, 2017), HDI (UNDP, 2014b). These data are regularly updated, and the figures used were those in effect at the time of Annex preparation. This information was included in all the data tables for the Case Studies and it is merely indicative; the Case Study in hand may be referring to an urban area that may be richer or poorer than the national average.

Annex 3 Table 2 Possible additional data to expand Case Study Data Collection Protocol.

Gini co-efficient (national)
Governance typology
Projected population and economic growth
Biome
Environmental indicators
Hazards
Vulnerabilities (projected or actual)
Impacts (projected or actual)
Risk assessment
Vulnerability assessment
Ex-post monitoring and evaluation
Funding sources for mitigation and adaptation activities

4 ARC3.2 Case Study Docking Station

The ARC3.2 CSDS consists of an online, searchable database of the ARC3.2 Case Studies. The current Beta version can be accessed at www.uccrn.org/casestudies. In addition to the online search engine, the CSDS will also allow for the selection of Case Studies on an ArcGIS-generated world map.

The database software used for the CSDS is Caspio Bridge (Version 8.5.5), a global cloud platform that allows users to create various applications without the use of coding. By customizing specific search criteria, the user is presented with a relevant list of Case Studies. Case Studies can be searched by keywords, Case Study title, city, country, population size (based on metropolitan population), Gross National Income (GNI per capita), Human Development Index (HDI), and coastal classification (see Annex 3 Figure 1). The CSDS can be searched with up to three keywords as an “OR” search; all other search categories are based on the “AND” logic. Additional search categories may be added as required.

Keywords assigned to the Case Studies may include (1) the key hazard (e.g., flood, heat wave, drought), (2) the type of adaptation or mitigation (policy, infrastructure, ecosystem-based, community-based, etc.), (3) the ARC3.2 topic/chapter in which the Case Study is found or to which it relates (e.g., Coastal Zones, Urban Health, Governance), and (4) additional keywords selected by the Case Study authors that make the Case Study easily searchable in the database.

Annex 3 Table 3 shows the city classification of the CSDS for population size (adapted from UN-Habitat, 2008), GNI per capita (Atlas method, 2016 US\$; World Bank, 2017), and national HDI (UNDP, 2014a,b). For climate zones, the Köppen-Geiger classification is used (Kottek et al., 2006; Peel et al., 2007). (For projections of how the Köppen-Geiger climate zones might change under different IPCC scenarios, see Rubel and Kottek [2010]).

After a search is run in the Docking Station, Case Studies fitting the search criteria are displayed with their abstract and keywords. Details of the Case Study and a full download of the Case Study text and data collection protocol can then be accessed. Search criteria and results are still under revision.

One consistency issue should be noted: definitions of city and metro population levels are not consistent from country to country, so that these rankings used as search criteria may not yield completely equivalent results. This is an example of cross-study data collection that requires more detailed work.

Due to space constraints, the presentation of the Case Studies differs between the ARC3.2 volume and the online ARC3.2 CSDS. First, the online version of each Case Study includes the full data protocol table (Annex 3 Table 1), whereas the versions

The screenshot displays the search interface for the UCCRN ARC3.2 Case Study Docking Station. It features a search bar at the top, followed by several dropdown menus for filtering results. The categories and their options are as follows:

- Search:** A text input field.
- City:** Accra, Addis Ababa, Almada.
- Country:** Argentina, Australia, Austria.
- Continent:** Africa, Asia, Australia, Europe, North America.
- City Population Size:** Big (1,000,000 - 5,000,000 inhabitants), Intermediate (500,000 - 1,000,000 inhabitants), Large (5,000,000 - 10,000,000 inhabitants), Mega (more than 10,000,000 inhabitants), Small (100,000 - 500,000 inhabitants), Very small (Less than 100,000 inhabitants).
- Coastal Region:** No, Yes.
- HDI:** High (0.7-0.799), Low (less than 0.55), Medium (0.55-0.699), Very High (0.8 and higher).
- GNI:** High Income (\$12,736 or more), Higher Middle Income (\$4,125 to \$12,735), Low Income (\$1,045 or less), Lower Middle Income (\$1,046 to \$4,124).

A large blue button labeled "SEARCH" is positioned at the bottom of the menu.

Annex 3 Figure 1 UCCRN ARC3.2 Case Study Docking Station online search menu.

Annex 3 Table 3 *City classification by population, GNI, and HDI.*

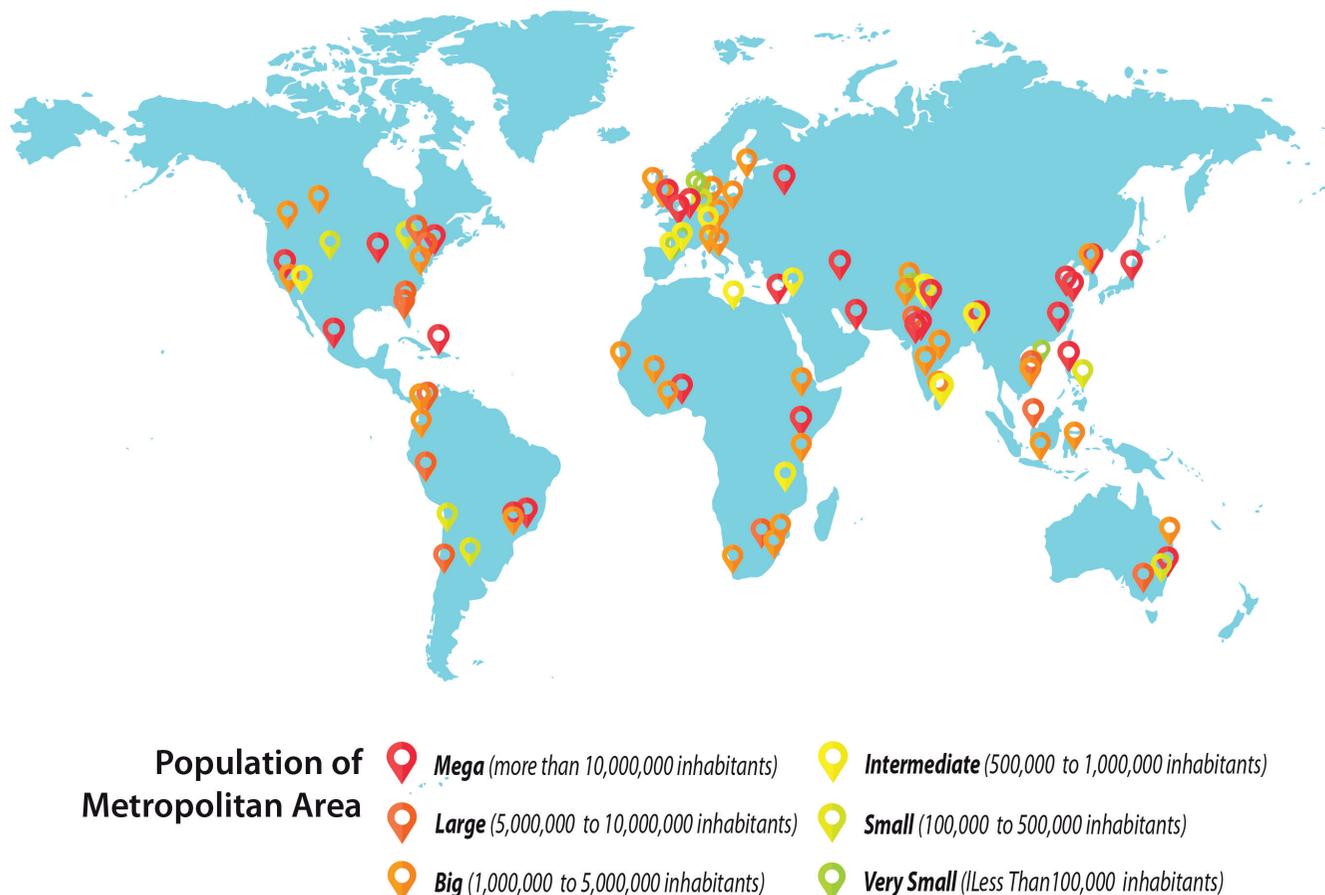
Criteria	Data Range	Classification
Population of Metropolitan Region	Less than 100,000	Very Small
	100,000–500,000	Small
	500,000–1 million	Intermediate
	1–5 million	Big
	5–10 million	Large
	10 million	Mega
Gross National Income per Capita	US\$1,005 or less	Low Income
	US\$1,006 to \$3,955	Lower Middle Income
	US\$3,956 to \$12,235	Upper Middle Income
	US\$12,236 or more	High Income
Human Development Index	0.550	Low
	0.550–0.699	Medium
	0.700–0.799	High
	0.800	Very High

Source: Adapted from UN-Habitat (2008); Gross National Income per Capita (World Bank, 2017); national Human Development Index (UNDP, 2014a)

published in this volume do not include the full data table, but do include a concise data table box with selected key data (this is also included in the online version for convenience). Second, a brief Case Study executive summary is included in the online version but not the version in printed form.

Case Studies published within the ARC3.2 report itself are distributed within the book in two ways: either placed within a chapter or appended in the back of the report in Annex 5, for reasons of space. Forty-six of the ARC3.2 Case Studies are included in the Case Study Annex of ARC3.2 (Annex 5); these, together with the 71 Case Studies in the chapters, comprise the total of 117 Case Studies in the volume.

Annex 3 Figure 2 shows the geographical distribution of Case Studies within the ARC3.2 report. Case Studies in the CSDS can be selected as described earlier, and it will also be possible to navigate an online ArcGIS world map (beta) and choose a city. A pop-up will appear with a short description of the Case Study, after which the user will be redirected to the full details, including the complete text, the abstract, and the data collection protocol.



Annex 3 Figure 2 *Geographical distribution of cities (by population) in the ARC3.2 Case Study Docking Station.*

Annex 3 Table 4 Selected additional data sources for future research.

	Data Source	Web Link
1	African Development Bank	http://www.afdb.org/en/knowledge/statistics/open-data-for-africa/
2	Asian Development Bank Open Database	https://sdfs.adb.org/sdfs/index.jsp
3	C40 Cities	http://www.c40cities.org/
4	Carbon Disclosure Project Cities (data is free to extract, but requires a user account)	https://www.cdproject.net/en-U.S./Pages/cities-open-data.html
5	Carbon Disclosure Project data collection	https://www.cdp.net/en-U.S./Pages/cities-open-data.html
6	CASES [U.S., Adaptation]	http://cses.washington.edu/cig/cases
7	CIRCLE 2 [EU] Climate Adaptation Case Study Database	http://infobase.circle-era.eu/
8	City Forward	http://cityforward.org/wps/wcm/connect/CityForward_en_U.S./City+Forward/Home
9	Climate data	http://www.realclimate.org/index.php/data-sources/
10	Convention on Biodiversity (Adaptation)	http://adaptation.cbd.int/activities.shtml#sec1
11	CSIRO Open Data	https://datanet.csiro.au/dap/home?execution=e1s1
12	DataGov-Global Governance Indicators (IADB/DFID/ADB/UNDP)	http://www.iadb.org/datagob/index.html
13	EU Open Data	http://open-data.europa.eu/en/
14	European Environment Agency Climate Adaptation Database	http://climate-adapt.eea.europa.eu/web/guest/data-and-downloads#
15	Eurostat	http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/
16	Gapminder [data visualization]	http://www.gapminder.org/
17	Georgetown Climate Center [U.S., Mitigation and Adaptation]	http://www.georgetownclimate.org/
18	Global Cities Indicators Facility	http://www.cityindicators.org/
19	Global City Indicators Facility	www.cityindicators.org
20	IPCC data	http://www.ipcc-data.org/maps/
21	OECD	http://stats.oecd.org/
22	Open Street Map	http://www.openstreetmap.org/#map=5/51.500/-0.100
23	UKCIP [UK] Case Study Database	http://www.ukcip.org.uk/case-studies/
24	UNDP 2014. Human Development Statistical Tables	http://hdr.undp.org/en/data
25	UNFCCC GHG data	http://unfccc.int/ghg_data/items/3800.php
26	UNFCCC Private Sector Initiative	http://unfccc.int/adaptation/workstreams/nairobi_work_programme/items/6547.php
27	UN-HABITAT	http://open.unhabitat.org/
28	United Nations Statistics Division	http://unstats.un.org/unsd/databases.htm
29	U.S. Data.gov	http://www.data.gov/opendatasites
30	weADAPT	http://weadapt.org/
31	World Bank Open Data Initiative	http://data.worldbank.org/

Annex 3 Table 4 (continued)

	Data Source	Web Link
32	World Bank GDP (purchasing power parity) (national)	http://data.worldbank.org/indicator/NY.GDP.MKTP.CD
33	World Bank GDP ranking table	http://data.worldbank.org/data-catalog/GDP-ranking-table
34	World Bank GNI per capita, Atlas Method (current US\$)	http://data.worldbank.org/indicator/NY.GNP.PCAP.CD
35	World Health Organization	http://www.euro.who.int/en/data-and-evidence/databases

5 Conclusions

The ARC3.2 CSDS is a first step in characterizing the rich diversity in cities' responses to the increasing risks of climate change. The overall goals are to provide a platform for sharing lessons learned, inspire climate action in other cities, and enable new possibilities for research through cross-case comparison and analysis.

The ARC3.2 CSDS will be an ongoing effort to enable city stakeholders and researchers from around the world to share their experience and expertise as response pathways develop over time. The data collection protocol is not static, but represents a learning process that will become more robust as the UCCRN obtains feedback from users.

The Case Studies in the CSDS can be supplemented by additional completed Case Studies drawn from city practitioners, academics, and stakeholders from around the world and submitted to UCCRN. The establishment of the UCCRN Regional Hubs on each continent (see Annex 1) will serve to promote enhanced opportunities for geographically targeted urban climate change knowledge, analysis and information transfer via the solicitation of Case Studies on local climate hazards, vulnerabilities, and adaptation and mitigation projects and programs.

The UCCRN Case Study team recommends that climate change researchers more extensively undertake further systematic reviews and meta-analyses to help establish standard baselines of knowledge within this rapidly advancing field of research. A comprehensive systematic review will be important to better frame the basic questions that continue to arise in relation to urban climate change planning.

Case Study analyses and methodology have limitations and caveats, including questions about overall reliability of data sources, possible biases, replicability/transferability, and other methodological shortfalls. These have begun to be addressed during the course of the ARC3.2 project and constitute important continuing challenges for the future.

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