

# Adaptation: The Time is Now

## 17<sup>th</sup> International Weather and Climate Forum

### Climate Change: Anticipating to Adapt

Cynthia Rosenzweig

NASA Goddard Institute for Space Studies and  
Columbia University



September 30, 2020



Photo credit: <https://naphnconference.com>

# Outline

- Mission and Activities of UCCRN and its Hubs
- Inclusion of Stakeholders and Communities
- Indicators and Monitoring
- Urban Planning and Design
- COVID and Climate Stresses
- World Adaptation Science Program

# The Urban Climate Change Research Network (UCCRN)

UCCRN's mission is to provide knowledge that enables cities\* to fulfill their climate change leadership potential in both mitigation and adaptation, with a focus on developing resiliency

- Over **1,000** scientists, scholars, and expert practitioners spanning a broad range of expertise
- More than **150** 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*



# 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

## UCCRN Regional Hubs



# UCCRN European Hub

University of Pisa, Department of Law  
GCRC: Governing Climate Resilient Cities. Challenges, Opportunities and Best Practices

<http://climate-change.jus.unipi.it>  
Summer School GCRC  
5 October - 9 October 2020

Launched in Paris during 'Our Common Future under Climate Change' Conference in July 2015

## European Hub Directors

- Chantal Pacteau, CNRS
- Luc Abbadie, UPMC

Current motivations are to bring science into environmental practice and politics at metropolitan, national, and international levels

Ongoing learning opportunities and collaborative workshops

GCRC 2020:  
Governing Climate  
Resilient Cities. Challenges,  
Opportunities and Best Practices

Director:  
**Prof. Alfredo Fioritto**  
Department of Law  
University of Pisa



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# UCCRN's *Third Assessment Report on Climate Change and Cities (ARC3.3)*

12 Special Reports, 6 will be published in 2021 and 6 in 2022  
by *Cambridge University Press* in their new Elements series

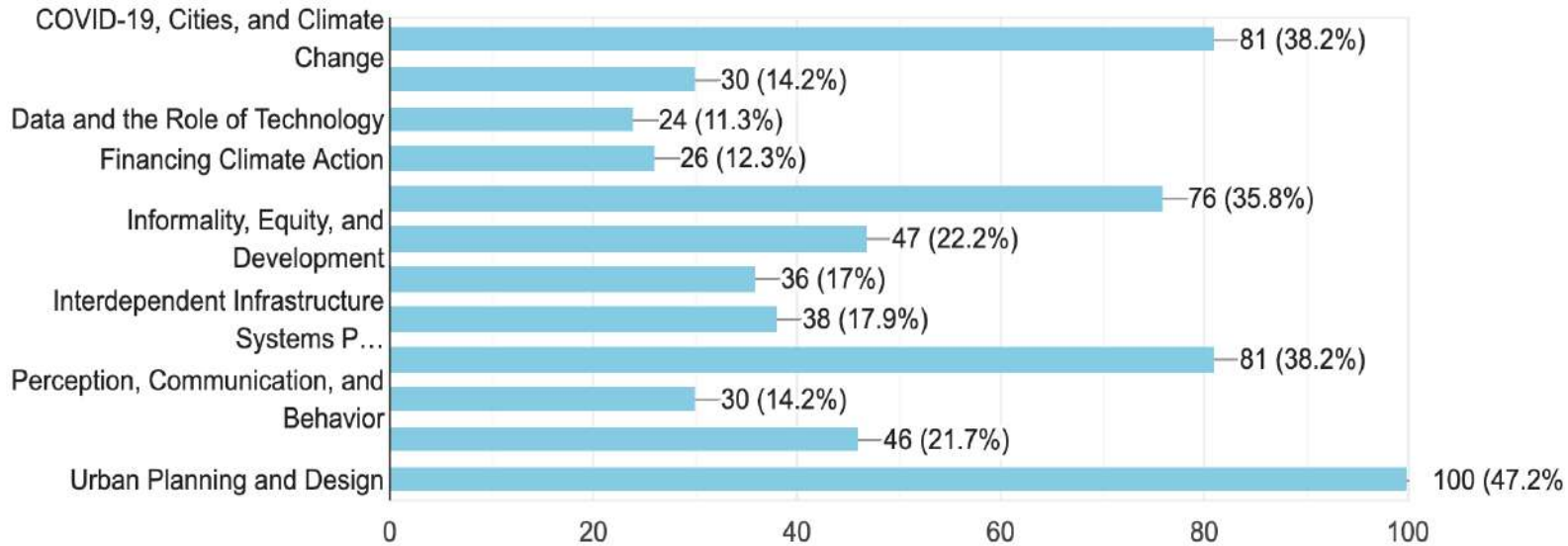


CAMBRIDGE  
UNIVERSITY PRESS

- COVID-19, Cities, and Climate Change
- Circular Economies for Cities
- Data and the Role of Technology
- Financing Climate Action
- Governance\*, Enabling Policy Environments, and Just Transitions
- Informality, Equity, and Development
- Interdependent Infrastructure Systems Part 1: Energy, Transport, and Buildings
- Interdependent Infrastructure Systems Part 2: Water and Waste
- Nature-based Solutions: Enhancing Capacity to Respond to Shocks and Stresses
- Perception, Communication, and Behavior
- Urban Climate Science
- Urban Planning and Design

# ARC3.3 Author Selection Process

212 responses



**Started in September 2020**

**Author Teams will consist of**

- 2 Coordinating Lead Authors
- 8 Lead Authors
- Contributing Authors
- Case Study Authors

**Each Element will have  
"Co-Shepherds"**

# UCCRN ARC3.3 Case Study Docking Station – Initial ideas – Beyond Planning to Implementation

## Case Study Docking Station

Search ARC3.2 Case Studies by keyword, topic, location, city size, latitude range, and more below.

Creating an enhanced searchable base of knowledge

Using new data tools to bring value to the analyses

Building and learning from others to produce actionable information

Seeking a wide geographic range of studies

Search

Chapter

City

Country

Continent

Coastal

City Size (Population)

Latitude Range

Human Development Index (HDI)

Gross National Income (GNI)

Accra

Addis Ababa

Ahmedabad

Almada

Antofagasta

Antwerp

Bangalore

Bobo-Dioulasso

Boulder

Brisbane

Brussels

Cairo

Calgary

Can Tho

Canberra

Cape Town

Chula Vista

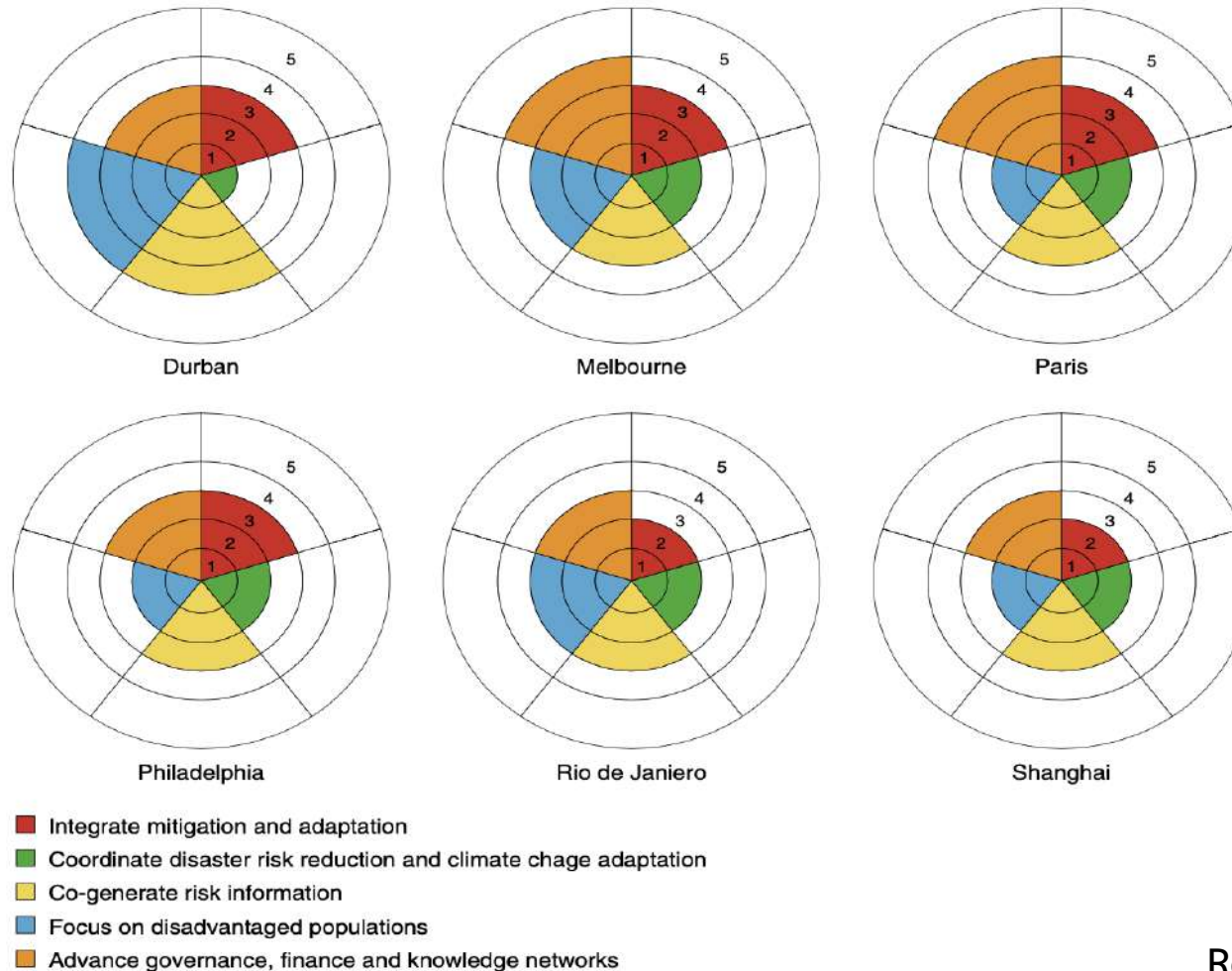
Colombo

Cubatão

Dakar



# UCCRN ARC3.3 Case Study Docking Station – Initial ideas – Beyond Planning to Implementation

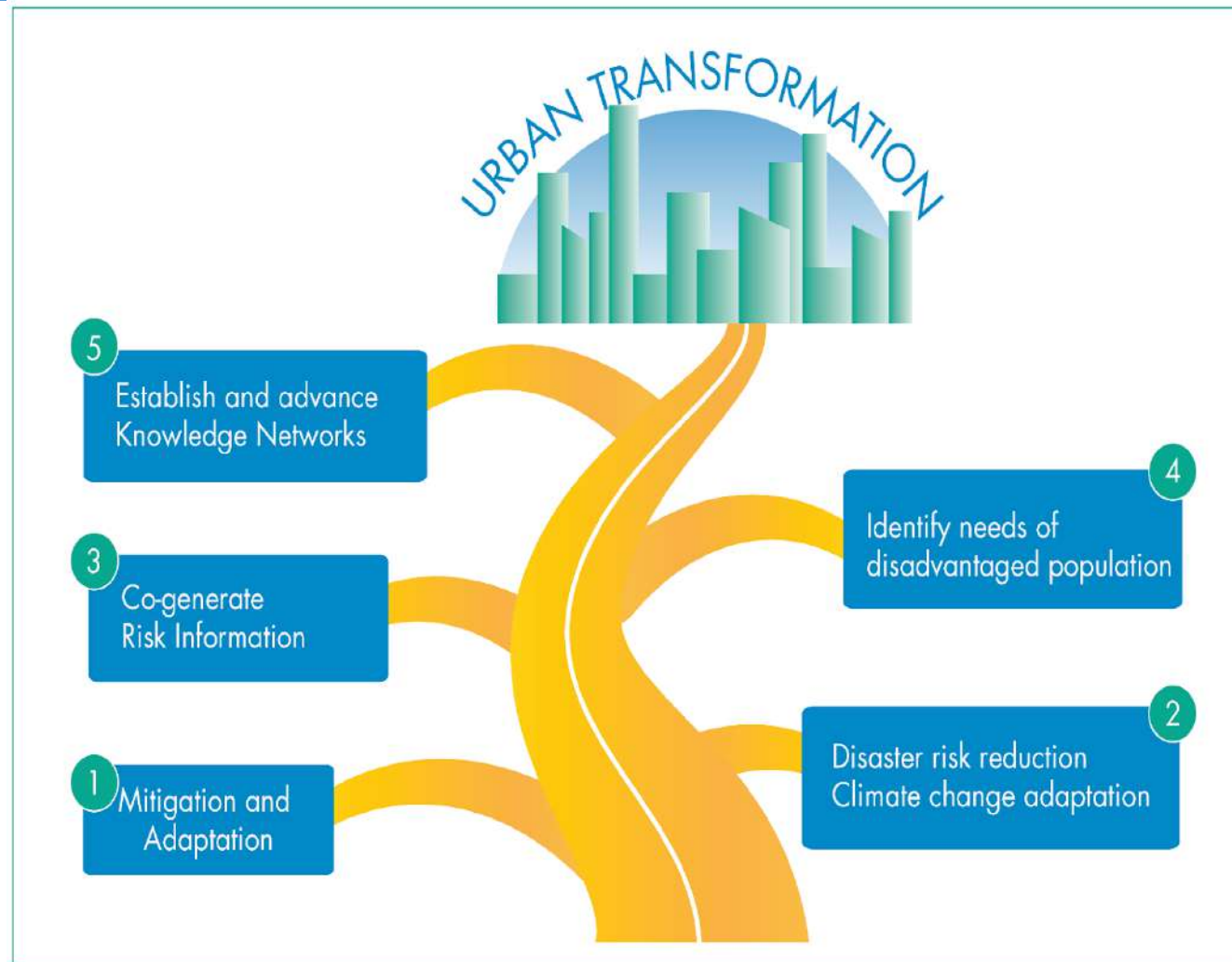


**Fig. 2 | Urban transformation scorecard examples for six UCCRN Hub cities.** The scorecards are designed to be self-implemented by city policymakers, practitioners and researchers, using expert judgement. See Supplementary Tables 1–6 for inputs to scores and sources.

Rosenzweig, C. Solecki, W. (2018). Action pathways for transforming cities. *Nature Climate Change*.

# Stakeholders and Communities

## The 5 Pathways to Urban Transformation



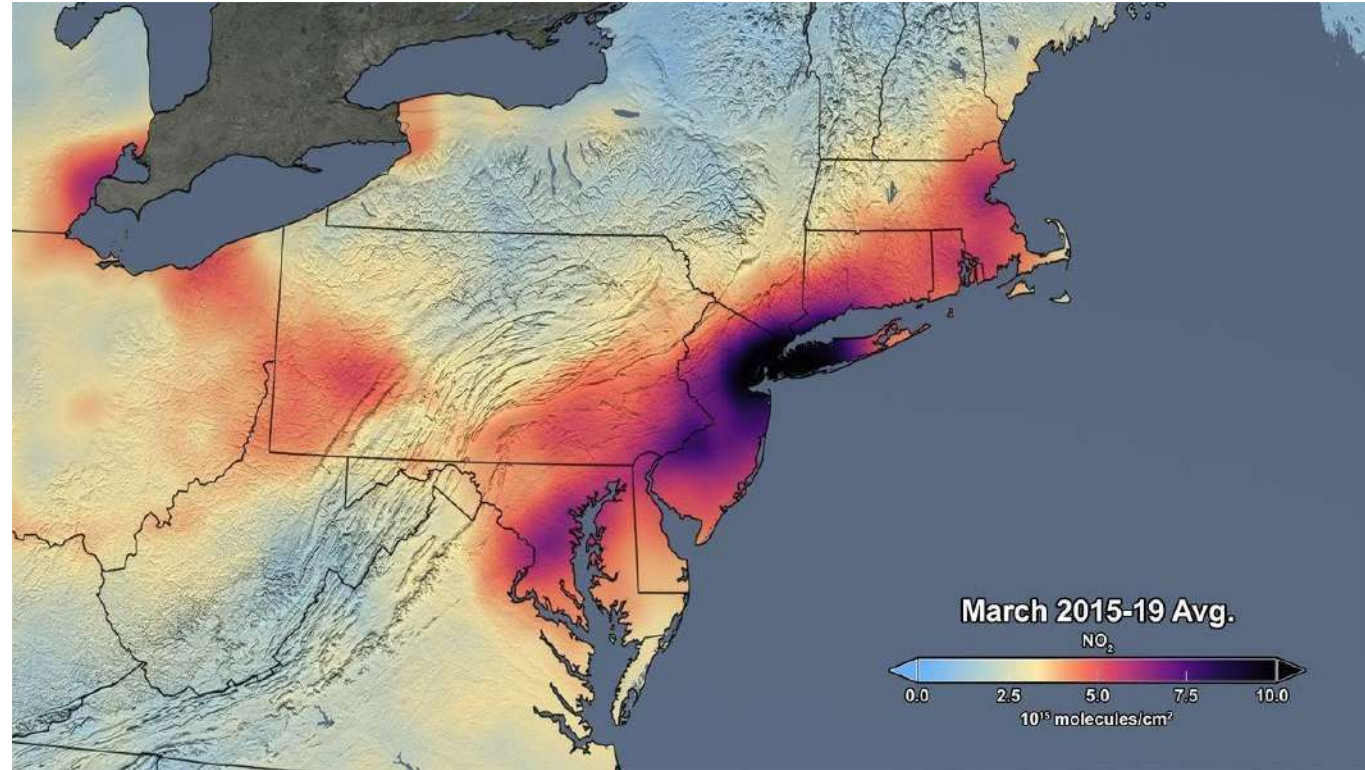
Source: UCCRN ARC3.2 Pathways to Urban Transformation Chapter,  
Rosenzweig et al, 2017

# Using Remote Sensing to Track Emissions Sustainable Development Solutions Network



**Roadmap to Achieving Net Zero Emissions by 2050**

Remote sensing allows us to monitor changes in air pollution and track the progress towards zero carbon goals



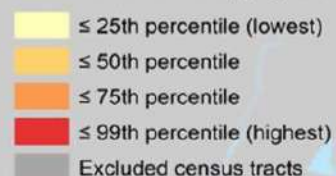
Average nitrogen dioxide (NO<sub>2</sub>) concentration from  
March 2015 to 2019



# NPCC Social Vulnerability Map

## Social Vulnerability Index (SVI) for New York City

### Percentile ranking by census tract



Northern Manhattan

Hunts Point

Sunset Park

Data Source: 2012-2016 American Community Survey 5-Year Estimates,  
Center for Disease Control Agency for Toxic Substances  
& Disease Registry

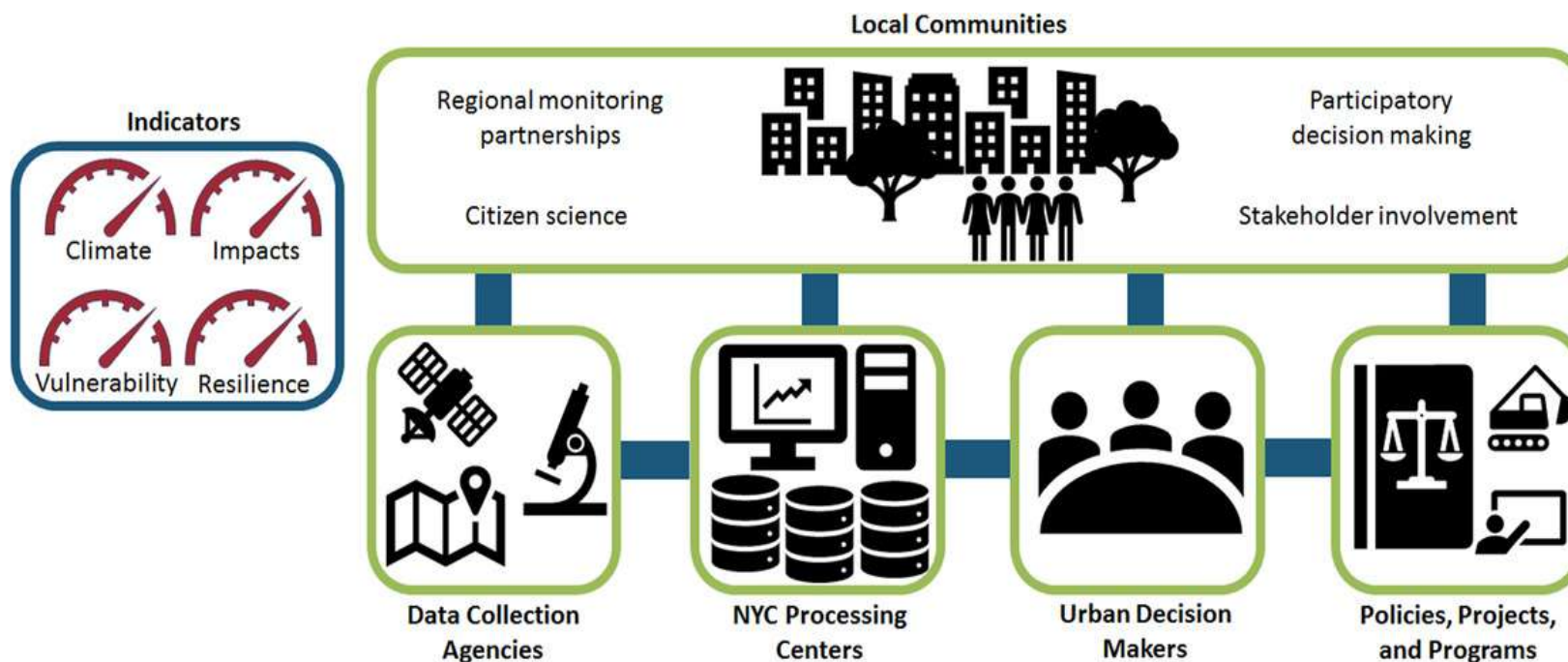
Vulnerability to climate change in NYC varies across social groups, economic levels, and neighborhoods

Spatial analysis of vulnerability can aid in the targeting of adaptation resources



# Indicators and Monitoring

New York City Panel on Climate Change 2019 Report Executive Summary



Source: Annals of the New York Academy of Sciences, <sup>13</sup>  
Volume: 1439, Issue: 1, Pages: 11-21, 15 March 2019.

# Urban Planning and Design Workshops

## UDCWs – Overview

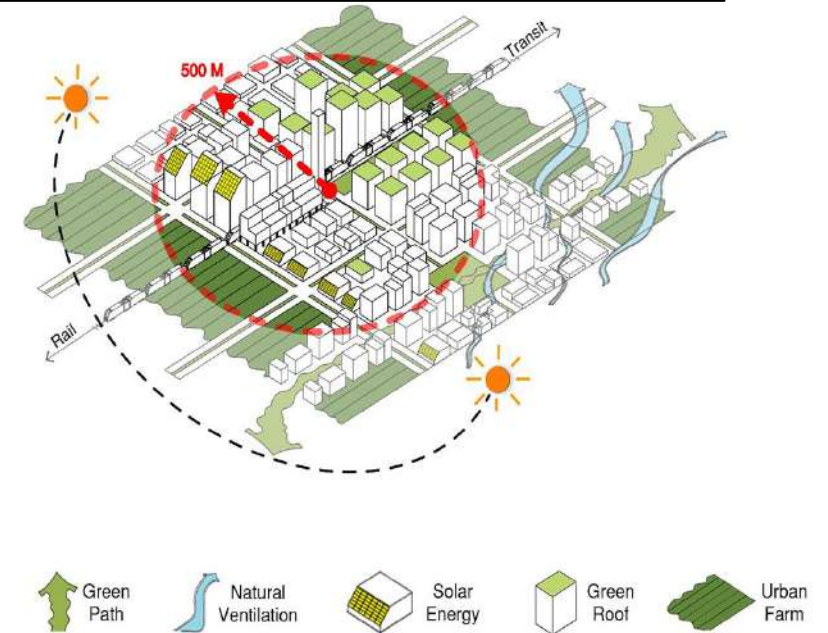
UDCWs aim to integrate and scale-up climate change mitigation and adaptation in cities through knowledge sharing, collaboration, and action planning

Sessions bring together urban designers, urban planners, climatologists, policymakers, stakeholders, and graduate students

Topics of urban resilience, energy efficiency, and enhancing livelihoods

UDCWs have taken place in New York, Paris, Naples, Durban, and most recently Gowanus

### Efficiency of Urban Systems

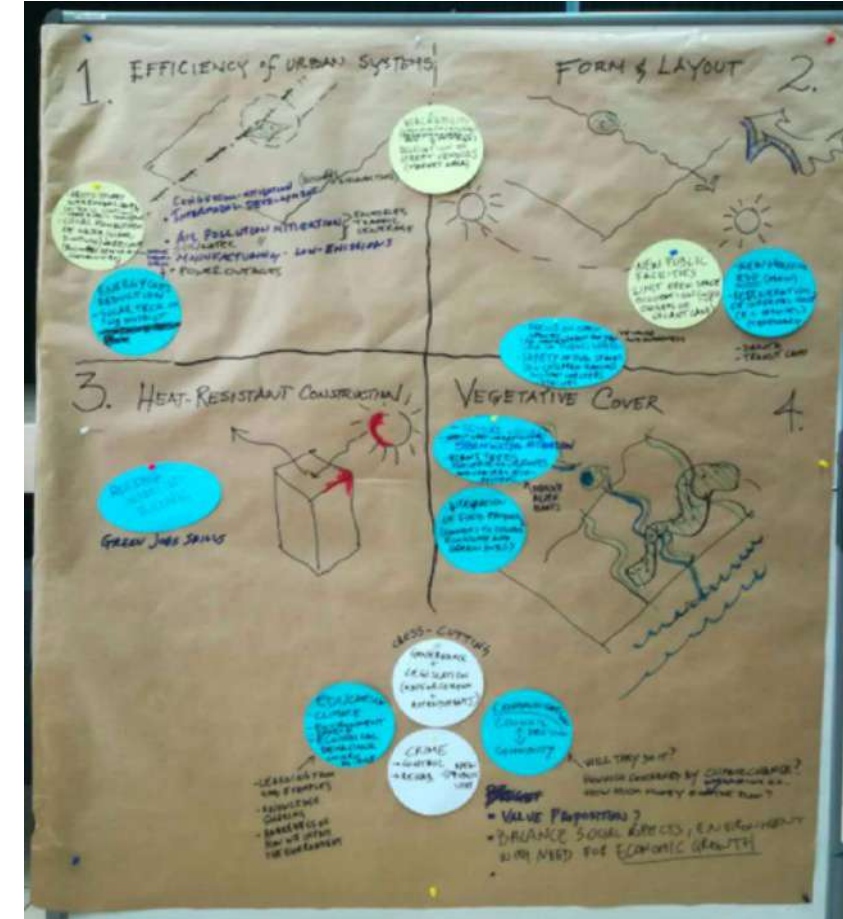


# UDCW in Durban, South Africa



Engaged representatives from Durban to incorporate and enhance mitigation and adaptation principles

Focused on improving urban climate resiliency, reducing energy consumption, and enhancing quality of life



Christian Braneon, UDCW Co-Lead (left) and Sean O'Donoghue, Africa Hub Director (right)



# UDCW in Gowanus, New York City

## Scenario Modeling

### Current Condition *Baseline*

Site as it is today  
District's population 17,462 (28 ppl/acre)

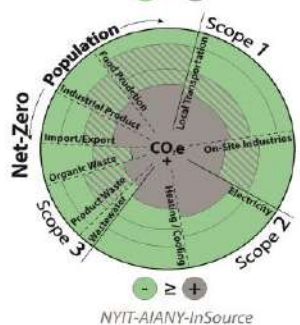
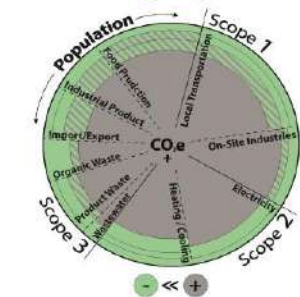
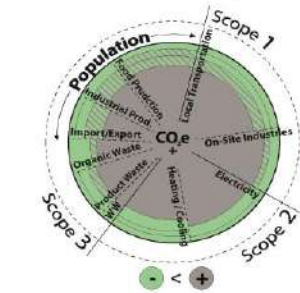
### 2050 Baseline *Business as Usual*

Hypothetical scenario based on  
NYC DCP Rezoning Plan and "market  
driven" full build-out assumptions  
District's population 65,804 (105 ppl/acre)

### 2050 Prototype *Best Practice*

Based on climate adaptive  
development considering  
evidence-based "best-practice"  
urban climate factors  
District's population 65,804 (105 ppl/acre)

## Carbon Footprint



## Scenarios

2019 - Current 17,400 Residents



2050 - Business as Usual (BAU) 65,804 Residents



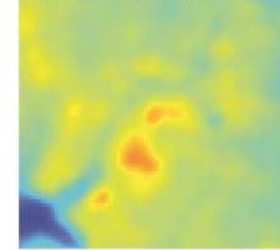
2050 - Best Practice (BP) 65,804 Residents



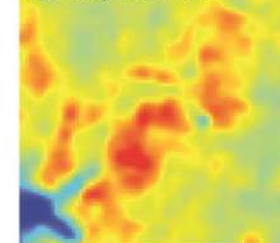
Urban Design Climate Lab- NYIT (2019-2020)

## Urban Heat Island

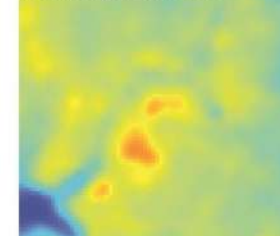
LST Range: 29.1-30.2



LST Range: 30.4-32.3



LST Range: 29.1-30.2



NYIT-UCCRN / GISS-ULI

The UDCW focused on how innovative land use and adaptive strategies might improve quality of life by reducing the negative impacts of extreme heat and better managing stormwater-induced flooding and sea level rise



# Coastal Flooding

## CTs with High Covid & Flood but Low Evac Priority

### Legend

CT\_HIGHflood\_Covid\_lowEPZs

EPZ\_HIGHCovid\_Dissolve

### HURRI\_DISS

#### Evacuation Priority Zones

1- Evacuated First OR Safest Zone

2- Evacuated Second OR very safe but less than 1

3- Evacuated Third OR safe but less than 2

4- Evacuated Fourth OR less safe than 3

5- Evacuated Fifth OR not very safe

6- Evacuated Last OR least Safe

Hurricane\_Evacuation\_Centers

### covid\_final

#### Case100K\_1

1 - 2 (670-1730 cases / 100k)

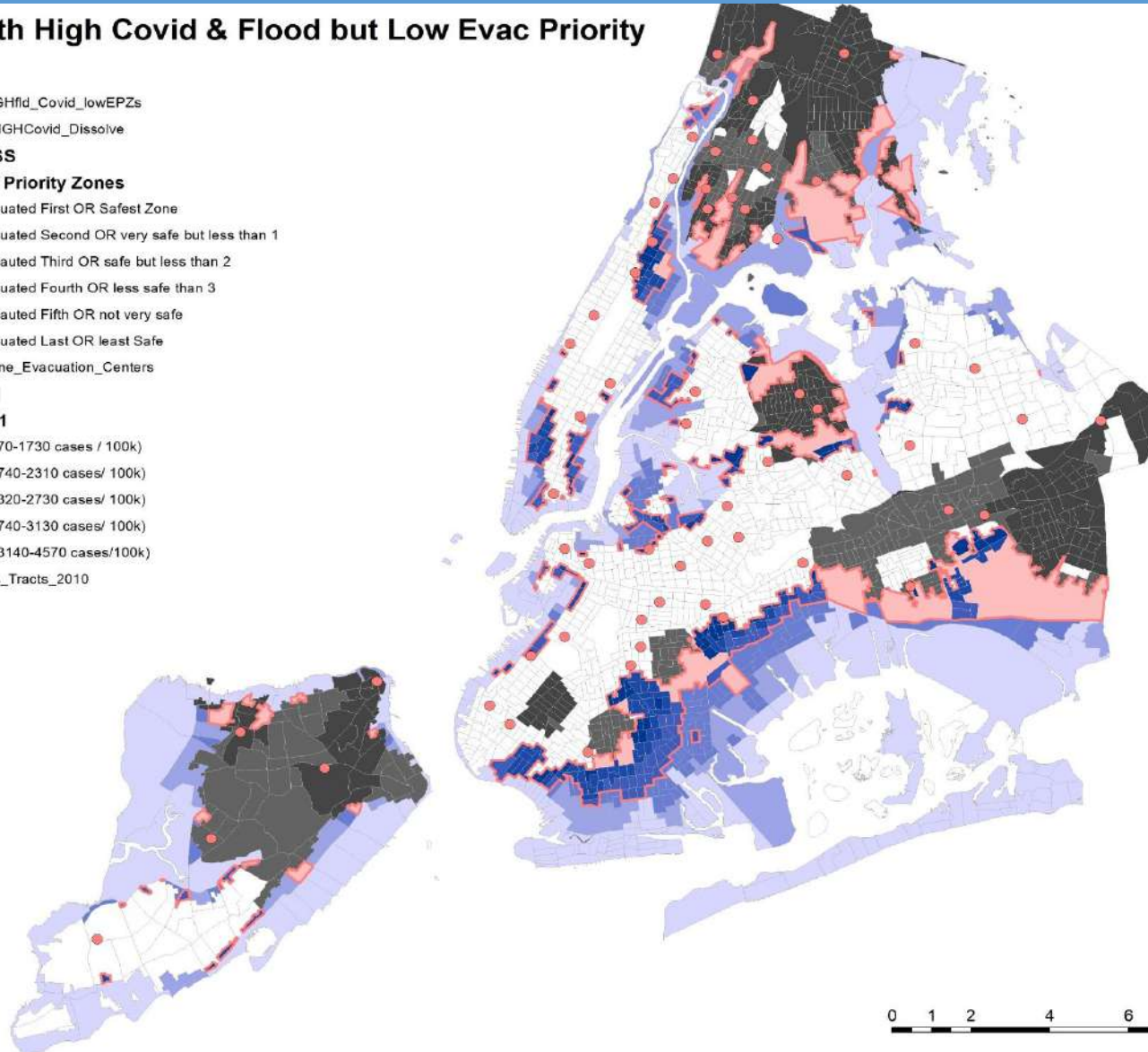
3 - 4 (1740-2310 cases/ 100k)

5 - 6 (2320-2730 cases/ 100k)

7 - 8 (2740-3130 cases/ 100k)

9 - 10 (3140-4570 cases/100k)

Census\_Tracts\_2010



There are 75 neighborhoods in NYC affected by high rates of COVID cases, sea level rise, and lie in the low evacuation priority zones

Around 17% of the total hurricane evacuation centers lie in census tracts that have had the highest number of COVID cases per 100k

Source: Compound Risks of COVID-19 & Coastal Flooding: Current & Future Challenges in NYC, Joshi, S. Dombrov, M.

# WASP

## World Adaptation Science Programme

The overall aim of the World Adaptation Science Programme is to promote science for climate change adaptation policy and action by:

- Providing scientific data and knowledge on climate change vulnerabilities and impacts in conjunction with the consequences and risks of response actions versus inaction;
- Facilitating knowledge transfer and sharing, and
- Better linking the science to the policy, finance and actions.





# CONCLUSIONS

## Adaptation for Cities The Time is Now

**Compound risks of COVID-19  
and climate stresses need to be  
assessed and responded to at  
the same time**

- UCCRN, Hubs, and ARC3.3 are in full swing.
- Co-generation with stakeholders is more essential than ever.
- Key role for science is Indicators and Monitoring.

# To learn more about



Visit the UCCRN website at  
<https://uccrn.ei.columbia.edu/>

Become a UCCRN member at  
<https://uccrn.ei.columbia.edu/join-uccrn>

Find the UCCRN Case Study Docking Station at  
<https://environmentalsolutions.mit.edu/research/climate-change-and-cities-uccrn-collaboration/>

Follow us @UCCRN on

