

## Consortium for Climate Risk in the Urban Northeast (CCRUN)

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### I. Introduction

The Consortium on Climate Risk in the Urban Northeast, encompassing the Boston-to-Philadelphia corridor, serves stakeholder needs in assessing and managing risks from climate variability and change. The RISA is structured as a nodal network covering the relevant parts of Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania in order to serve local needs for targeted climate-risk information in a coordinated way, with partners from Columbia University, City College of the City University of New York, Stevens Institute of Technology, the University of Massachusetts, and Drexel University.

The Consortium for Climate Risk in the Urban Northeast (CCRUN) RISA addresses the complex challenges associated with densely populated, highly interconnected urban areas. Particular features of the region include: urban heat islands, poor air quality, intense coastal development, multifunctional settlement along inland waterways, integrated infrastructure systems, complex overlapping institutional jurisdictions, and highly diverse and in some cases fragile socio-economic communities. These challenges urgently require the stakeholder-driven, interdisciplinary approach of the RISA Program. The research accomplishments and stakeholder engagement will yield important lessons for managing climate risks in other urban areas in the U.S.

Initial projects for the CCRUN RISA are focused in three broad thematic areas: *Water*, *Coastal Zones*, and *Health*. Environmental justice and equity, which are contingent upon climate-resilient infrastructure and ecosystems, are addressed in an integral way in each of these thematic areas through stakeholder engagement and vulnerability assessments. The stakeholder-driven approach supports investigations of the impacts of a changing climate, population growth, and urban and economic policies on the social, racial and ethnic dimensions of livelihoods and of communities in the Northeast. Disadvantaged socio-economic groups have been particularly underserved in the area of climate change, and a focus of the Northeast Urban RISA is to build adaptive capacity among such groups to current and future climate extremes.

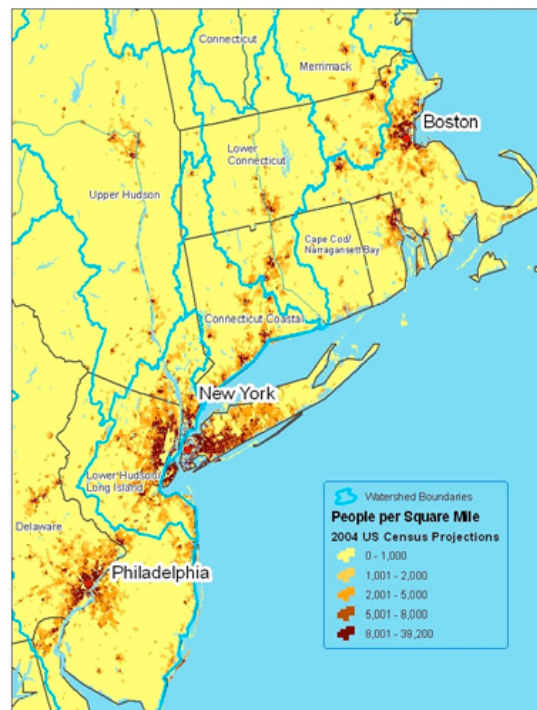


Figure 1. CCRUN's geographic focus.

*Risk assessment* requires integration of socio-economic and environmental information, institutional specificity and climate analyses at scales of interest to decision-makers, including relevant historical and remotely sensed data fields, weather prediction, and seasonal-to-multi-decadal climate projections. Biases and other errors in each type of data are carefully assessed and strategies to minimize the uncertainties for forecasts and projections are devised. Socioeconomic and environmental information derived from interactions with institutional partners is essential for defining *risk* in stakeholder-relevant terms. Such an approach is crucial for understanding the way that risks are networked, and for designing institutional *risk management* strategies for diverse communities. In the northeast urban corridor, transportation, energy, communications, water, and waste systems are highly integrated, so climate risk management needs to be integrated as well. Collaborations have already contributed to specific adaptations, including the raising of critical infrastructure in wastewater treatment plants in Boston and New York City.

## II. Core CCRUN Activities and Structure for FY 10 and FY 11

CCRUN activities in the first two years will be focused on achieving the following three objectives:

1. Developing risk assessments of weather, climate variability, and climate change tailored to stakeholder needs in the Northeast urban corridor from Boston to Philadelphia
2. Integrating inter-disciplinary research with stakeholder management of climate risks in the areas of water, health, and coastal zone management
3. Creating and evaluating tools, training activities, and outreach efforts to enhance stakeholder capacity to understand climate risks and formulate adaptation strategies.

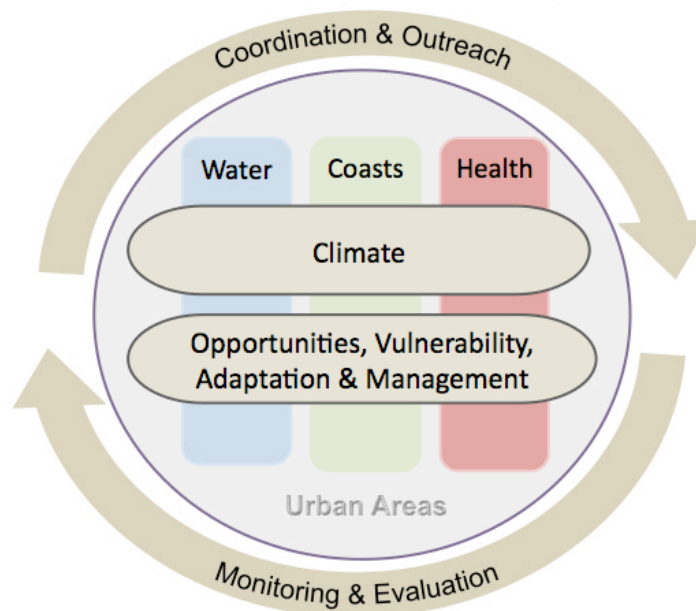


Figure 2. CCRUN Project Sphere

The following are key year 1 and 2 activities:

- Establish baseline information (including climate outputs, stakeholder mandates and key decisions) needed for the evaluation of CCRUN
- Design project evaluation methods to address:
  - CCRUN RISA overall
  - Individual prototype projects within CCRUN
- Create quarterly newsletters
- Launch and populate CCRUN websites (internal and external)
  - Climate impact / vulnerability maps
  - Indicator and monitoring database
  - Inventory of adaptation strategies with metrics for evaluation
  - Resource library for the sectors and region
- Produce specific research outcomes from each prototype project – by water, coastal and health-teams, with vulnerability and climate components
- Build stakeholder inventory, including record of interactions
- Hold two team meetings per year
- Develop initial publications
- Host workshops
  - Kickoff Stakeholder Workshop
  - Regional Assessment Workshop on indicators and monitoring and adaptation evaluation

### **III. Assessment Services Activities for FY10: Prioritization of Vulnerabilities and Adaptation Strategies in the Urban Northeast and Identification of Criteria for Nested Matrices**

CCRUN will host a two-day Assessment Services workshop focused on: 1) development of an urban indicator and monitoring network, and 2) presentation of adaptation strategies currently underway or in development in the urban corridor. The lessons learned will be described in a report and assorted web tools. A stakeholder capability list will be generated, and will serve as an input for vulnerability and adaptation-based prioritization tools (that use a ranking system based on multiple stakeholder-defined criteria to help identify which efforts and projects should be advanced first) developed for the regional assessment. The high-priority vulnerability/risks and adaptations identified can guide the selection of nested-matrix target efforts that could be shared and applied outside the northeast.

#### *Assessment Services Activities*

##### 1. Develop a template and core content for an indicator and monitoring network focused on the *impacts* of climate change

This objective is motivated by the need for long-term multi-disciplinary data sets to solve environmental problems. Climate indicators will likely include extremes of temperatures, precipitation, sea level and storm surge, as well as winds and other severe weather metrics such as lightning, hail, freezing precipitation, and coastal storms. Each stakeholder will determine additional variables, key thresholds in the distribution of these variables, as well as the most relevant temporal and spatial resolution and coverage.

Sample impact indicators in the water sector are likely to include:

- Combined Sewer Overflow events
- Shut downs of wastewater treatment plants
- Temperature, turbidity, and dissolved nutrient content of waters
- Groundwater quality and salinity
- Relationship between streamflow and area flooded

Sample impact indicators in the coastal sector are likely to include:

- Coastal water temperatures
- Red tides and other blooms
- Area affected by storm surge
- Wetland area and health
- Coastal geomorphology, including dune heights and beach width

Sample impact indicators in the health sector are likely to include:

- Daily emergency room visits
- Epidemiological data on vector and water borne disease
- Weather and air quality advisories/indices (e.g., heat and ozone)
- Electricity brownouts/outages, and other public health-relevant infrastructure failures

The effort will advance the stakeholder-driven science of climate impacts and lead to the development and benchmarking of metrics that can be used to test the success of climate services and adaptation strategies. An important function is to strengthen collaboration among stakeholders and knowledge practitioners.

## 2. Conduct an inventory of adaptation strategies in the urban corridor

In the urban northeast, a range of adaptation strategies have been implemented, are in the process of being implemented, or are being evaluated. These adaptations relate to a range of sectors, geographic scales and political boundaries, and are being adopted by both public and private institutions. The CCRUN inventory of stakeholder adaptation capabilities and strategies is critically needed to address this complex adaptation ‘space’ in the region. For example, adaptation strategies being developed by regional associations that span state boundaries (such as the New York Metropolitan Transit Authority) and the private sector (such as higher elevation electric supply plants) demonstrate the complex decision-making environment in the region. At the municipal level, examples include higher wastewater/sewage treatment plants (e.g., Deer Island, Boston) to account for higher sea levels, and increased storm water recovery at the street level to account for the possibility of more intense precipitation events. At the state level, adaptation plans are now being developed throughout the region, including the New York State Climate Action Plan.

The CCRUN adaptation strategy inventory will focus on institutions in the urban northeast, but will include strategies being adopted elsewhere where appropriate due to geographical interdependencies. It will also include a compilation of the best urban climate adaptation practices nationally in the context of differences in climate, degree of urbanization, background vulnerability, and other factors. This will include a literature review of adaptation assessment work done by the other RISAs and other entities on urban-related issues to insure that best practices and lessons learned from other regions are made available to urban stakeholders in the northeast.

Other activities include using the results of these assessment services activities to prioritize vulnerabilities and adaptations for nested-matrix case studies, and to advance decision support for greenhouse gas mitigation based on consideration of climate change risk and adaptation strategies.

#### *Description of Workshop and Associated Products*

A large, 2-day workshop is envisioned. Stakeholders from the water, coastal, health, ecosystems and infrastructure sectors will be joined by regional providers of climate services including state climatologists, the Northeast Regional Climate Center, NOAA Coastal Services and members of USGS DOI. Other leaders in the development of indicators (e.g. CARRI, ICLEI, and EPA) will be invited as well.

The central products will be disseminated in the form of web tools and a report and will include a stakeholder database, documenting climate-related decisions, climate information used or requested, and capacity to utilize climate information. This product will provide the foundation for the prioritization of vulnerability/risks and adaptation strategies for nested matrices. The assessment services process and activities of the CCRUN team will be documented in a project log, describing the stakeholder engagement process and input from stakeholders on what approaches and content were most and least effective. Methods of stakeholder identification will also be described, as will the climate information presented, meeting participants, number of publications generated, and interactions with other RISA, NOAA, and federal teams.

#### **IV. The Decision-Making Context**

CCRUN will support the following five long-range planning decisions/strategies:

1. Optimization of water usage given competing demands such as flood prevention, base flow requirements, fisheries and aquatic needs, recreational uses, water compacts, etc.
2. Minimization of urban flood damage and maximization of water treatment efficacy.
3. Reduced coastal flood damage to the infrastructure that supports urban populations; these strategies include coastal land use planning and protection.
4. Reduction of mortality and morbidity associated with heat and poor air quality events.
5. Municipal, state, and sector/agency adaptation plans.

Several local decisions scale up to regional significance at short timescales, including:

1. Water releases during times of flooding and drought.
2. Evacuation orders during coastal storms.
3. Infrastructure operation decisions during extreme events (e.g. speed reductions during heat waves, suspension of service in advance of storms).
4. Power supply restrictions during heat waves.