

Social Vulnerability to Climate Change in Greater Boston

Seleeke Flingai, PhD, MPA
Research Analyst II



BACKGROUND

Climate Vulnerability

A definition



“[Climate vulnerability is] the propensity or predisposition to be adversely affected by the impacts of climate change. Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.”

Intergovernmental Panel on Climate Change (IPCC),
Fifth Assessment Report (2014)

January 2018 Nor'easter

YIELD
TO
PEDESTRIANS
ON TURNS



AQUARIUM
← ELEVATOR → TO TRANS

AQUARIUM
→ TO TRANS

Dr

March 2018
East Boston flooding



July 2019
Hottest month on record
for the planet



Photo credit: Jean-Sebastien Evrard/AFP/Getty Images

**An elderly man sits outside
in hot weather**



Why are we interested in climate vulnerability?



Climate change impacts some populations more severely than others



Efforts to mitigate climate change and build resiliency through the built environment should prioritize communities most vulnerable to climate impacts



For solutions to tackle vulnerabilities at the root, those most impacted should be active leaders and participants in mitigation and resiliency efforts

BACKGROUND

How do we think about vulnerability?

Vulnerability is often characterized as encompassing **three** dimensions:

Exposure

How close is an individual or group to a hazard

Sensitivity

The pre-existing social, economic, and political conditions of a given community influence access to resources and exposure to hazards

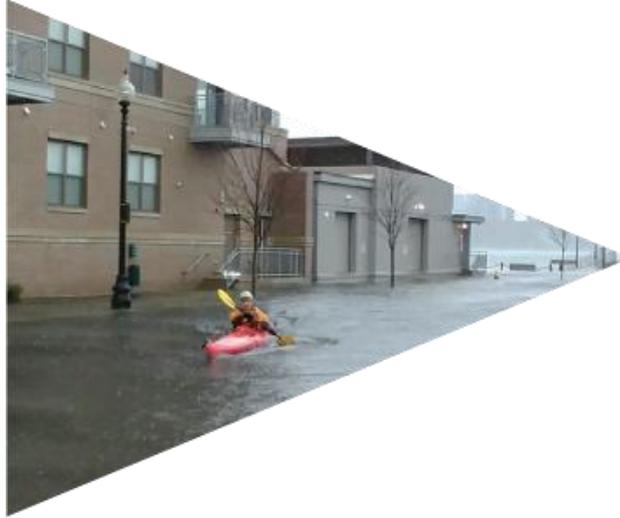
Adaptive Capacity

A group's ability to plan for and adapt to changing conditions

Climate Exposures



**Extreme
Heat**



Flood



**Future
Coastal Flood**

Climate Sensitivity



Age



Exposed Occupations



**Housing Features
& Demographics**



Health

**March 2010
Mystic River Flooding**



Workers Exposed to Extreme Heat



A photograph of a doctor in a white lab coat and purple stethoscope talking to a patient in a hospital bed. The doctor is on the left, gesturing with his right hand. The patient is on the right, wearing a white hospital gown with a small pattern. The background shows a hospital room with medical equipment and a clock on the wall.

**Chronic disease:
increased risk of medication and diet
interruptions, hospital visits and deaths**

Climate Adaptive Capacity



**Info Access, Social
Networks & Mobility**



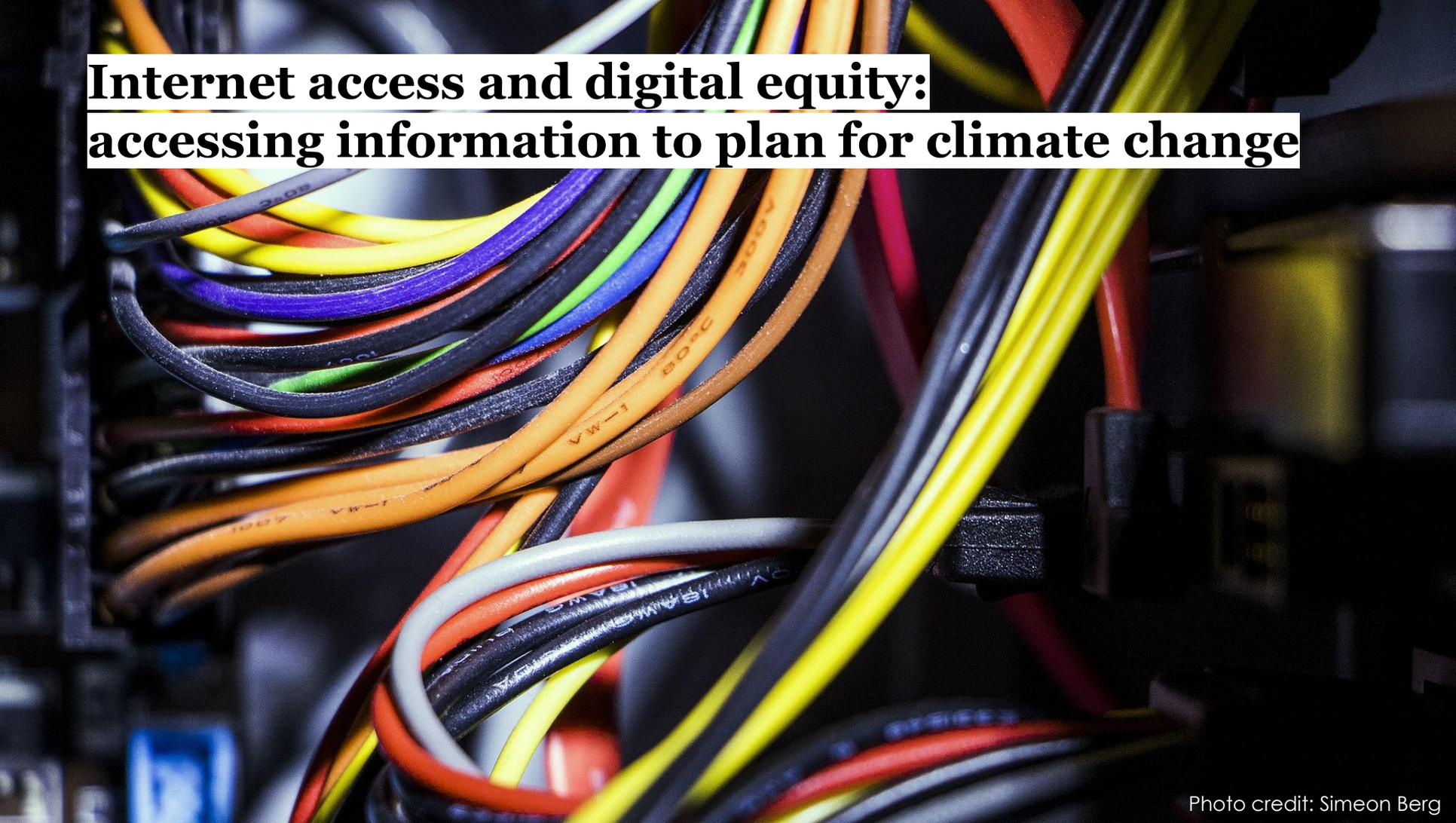
**Financial Resources
& Access**



**Race, Ethnicity,
and Language**



**Additional Housing
Demographics**



**Internet access and digital equity:
accessing information to plan for climate change**



Housing: can we build apartment complexes and affordable housing that are resilient enough to mitigate climate impacts for residents?

Social networks and community building



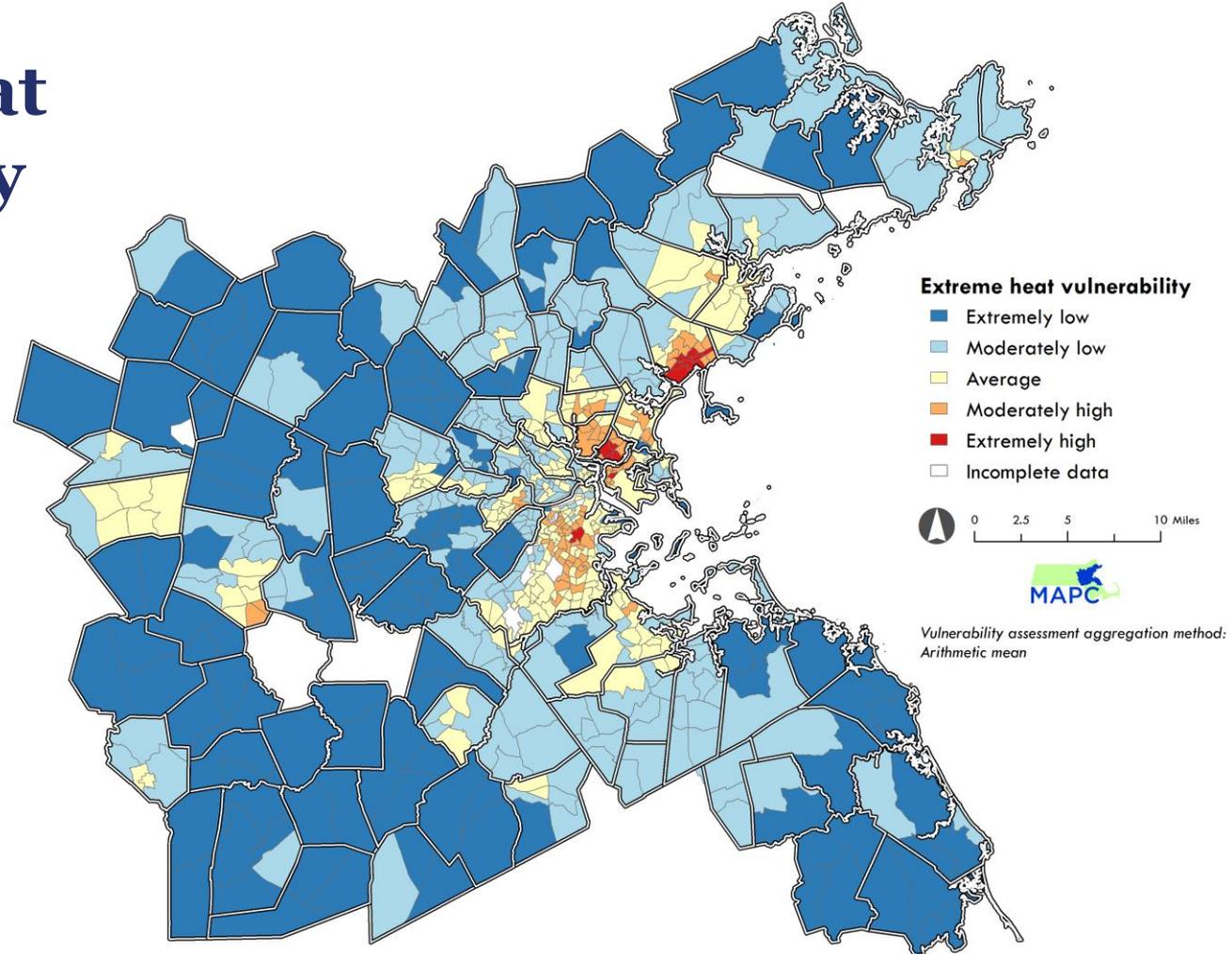
METHODS AND RESULTS

Extreme Heat Vulnerability



Extreme Heat Vulnerability

13% of the region's residents live in heat-vulnerable tracts

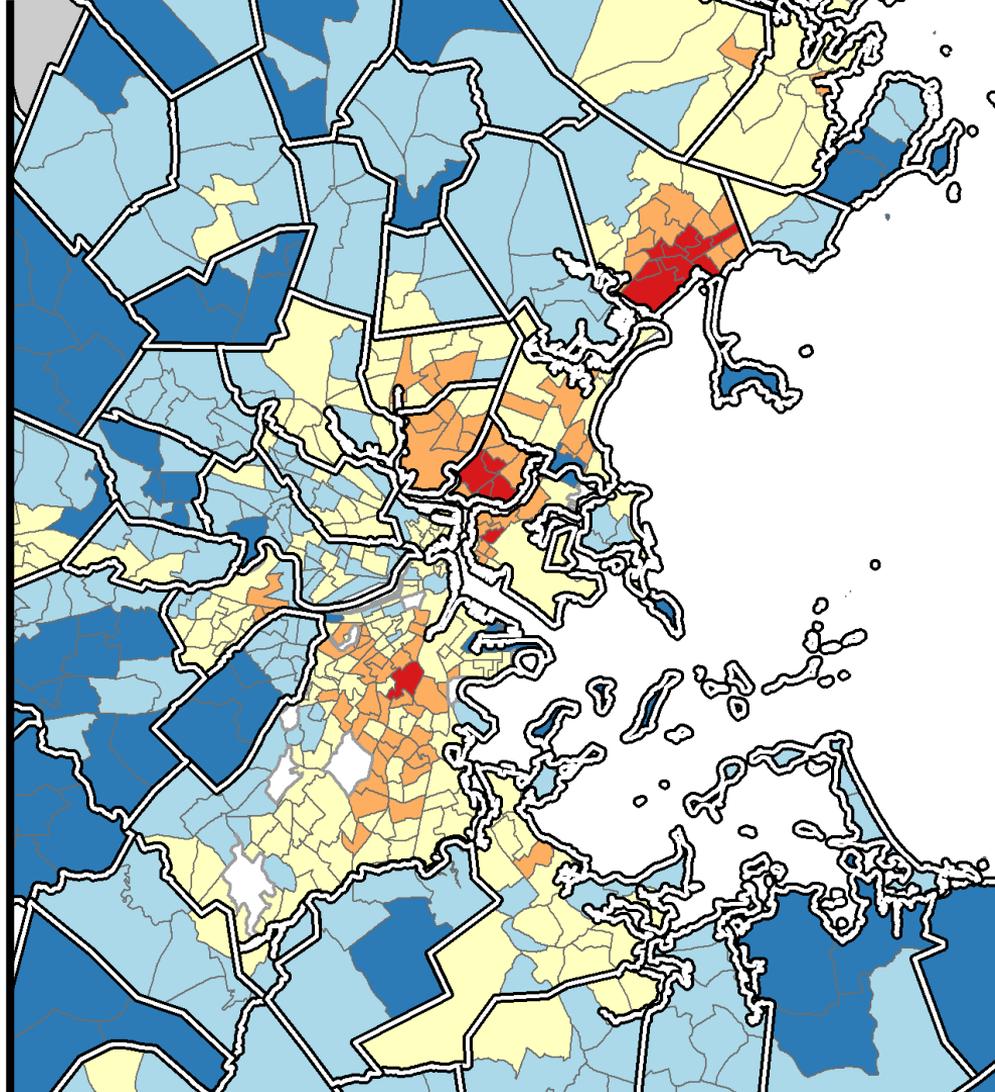


METHODS AND RESULTS

Extreme Heat Vulnerability

Highly concentrated in the urbanized inner core

Highest heat vulnerability in 7 of 101 MAPC municipalities:
Chelsea, Everett, Lynn, Revere,
Boston, Malden, Framingham



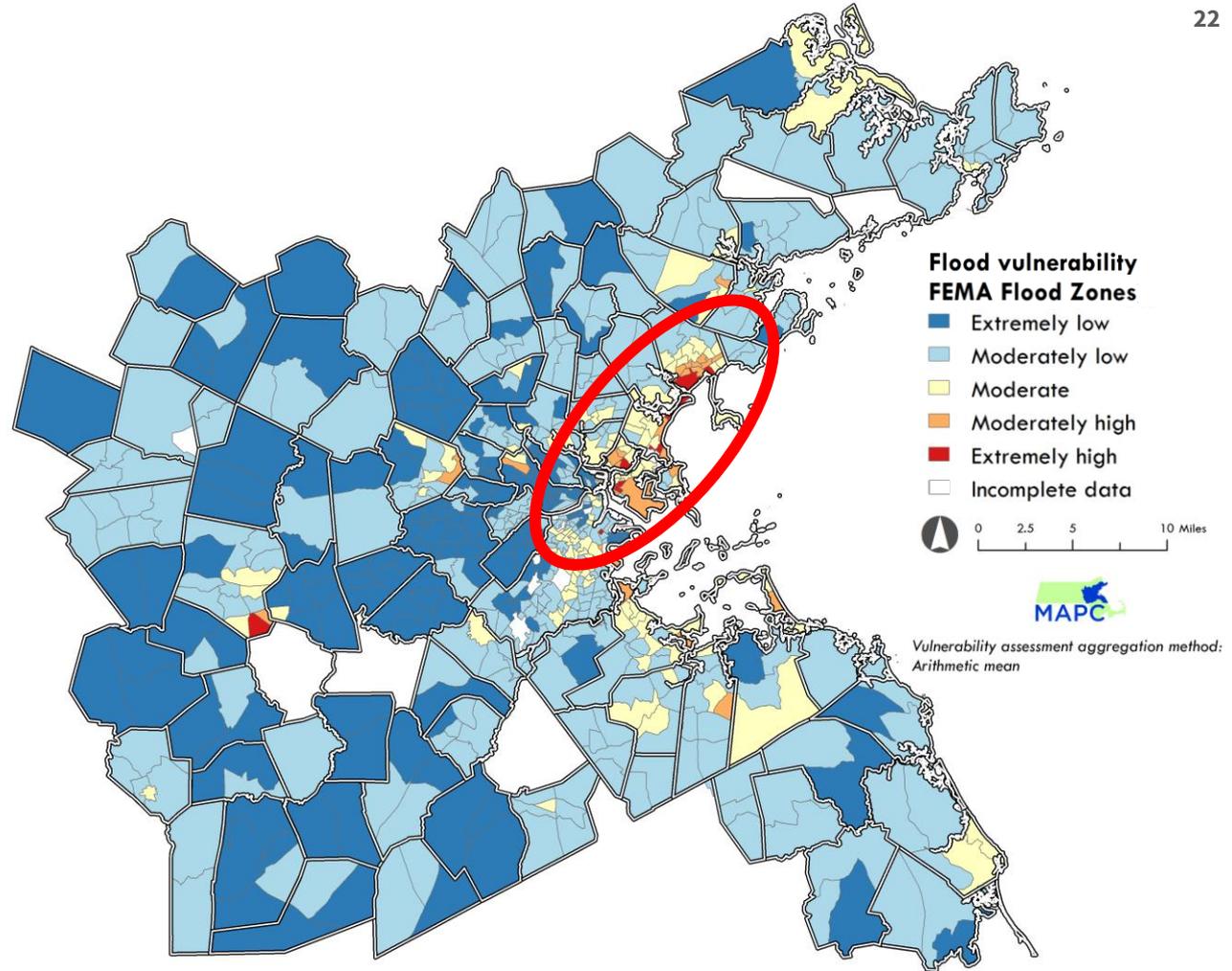
METHODS AND RESULTS

Flood Vulnerability



Flood Vulnerability

High adaptive capacity of many suburban communities reduces vulnerability to flood zone risks



METHODS AND RESULTS

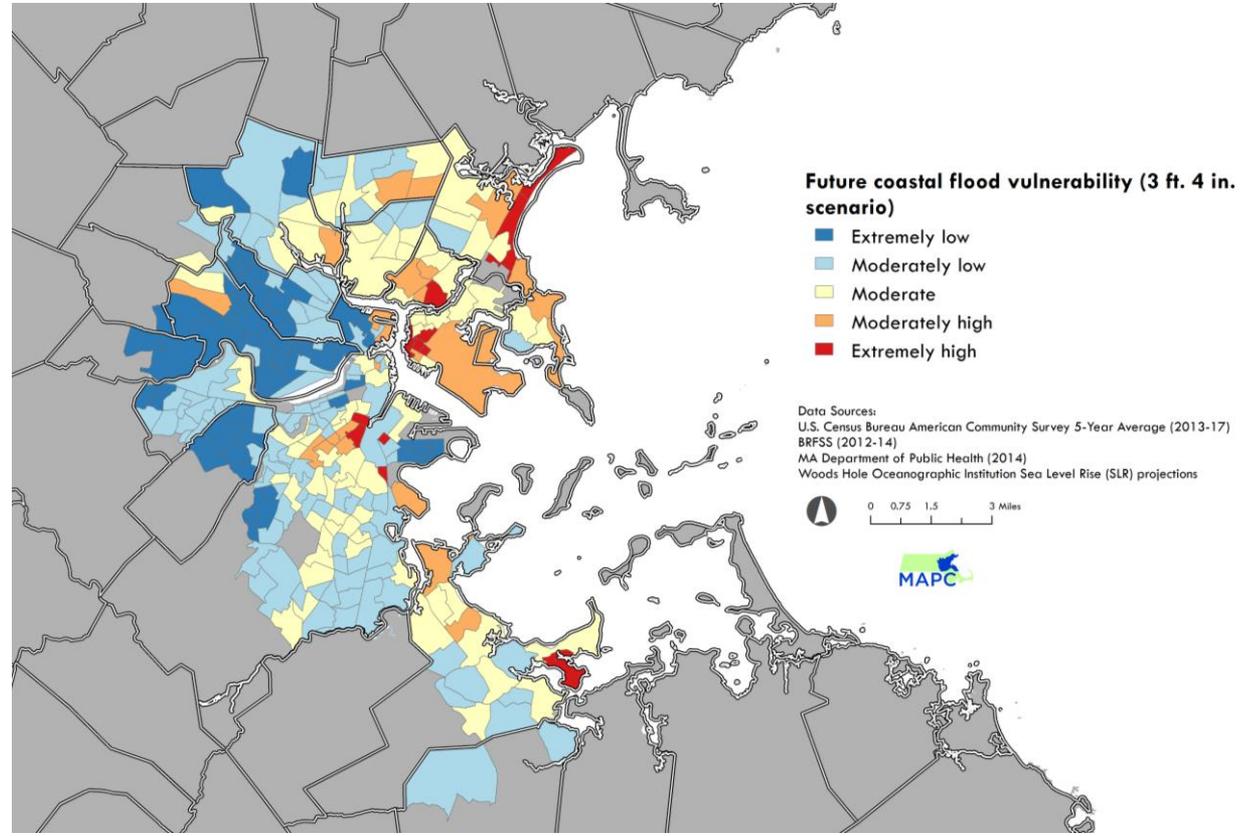
Future Coastal Flood Vulnerability



METHODS AND RESULTS

Future Coastal Flood Vulnerability

Highest relative social vulnerability to future coastal flooding (sea level rise + storm surge) in Boston Harbor region may be in Revere, Winthrop, Chelsea, East Boston and Quincy.



MAJOR TAKEAWAYS

Climate vulnerability is more than exposure. All three dimensions are important.

Socially vulnerable populations can be found in every city and town.

Making the built environment more resilient is key. Investing in social infrastructure is just as critical.

Next steps



Inform our MetroCommon 2050 process



Use the analysis to inform MAPC's climate work



Work with cities and towns for more local vulnerability analyses



Help us take action:

Explore the maps and download the data at
climate-vulnerability.mapc.org

Thank you!

MetroCommon × 2050

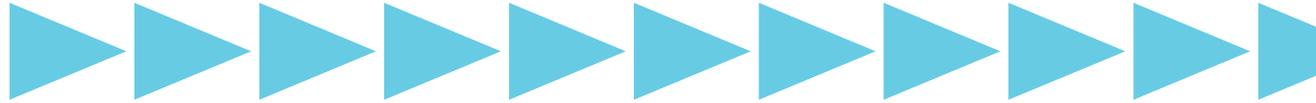
Seleeke Flingai, PhD, MPA
Research Analyst II
sflingai@mapc.org
617-933-0758

Caitlin Spence, PhD
GIS and Planning Analyst II
cspence@mapc.org
617-933-0723

Jessie Partridge Guerrero
Research Manager
jpartridge@mapc.org
617-933-0726



References



Dow, K. (1992). Exploring differences in our common future(s): The meaning of vulnerability to global environmental change. *Geoforum*, 23(3), 417-436. doi:10.1016/0016-7185(92)90052-6

Tonmoy, F. N., El-Zein, A., & Hinkel, J. (2014). Assessment of vulnerability to climate change using indicators: a meta-analysis of the literature. *WIREs Climate Change*, 5, 775-792. doi:10.1002/wcc.314

Füssel, H.-M., & Klein, R. J. (2006). Climate change vulnerability assessments: An evolution of conceptual thinking. *Climatic Change*, 75, 301-329. doi:10.1007/s10584-006-0329-3

Menezes, J. A., et al. (2018). Mapping human vulnerability to climate change in the Brazilian Amazon: The construction of a municipal vulnerability index. *PLoS One* 13(2): e0190808. <https://doi.org/10.1371/journal.pone.0190808>