

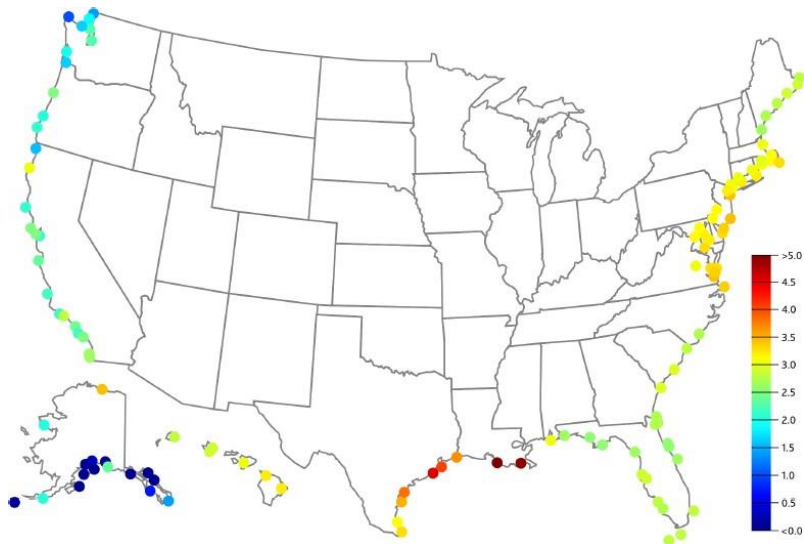
# Municipal Finance and Climate Change Adaptation

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# The Urban Infrastructure Challenge

- The urban capital stock is durable and long lived
- JFK airport, trains, water treatment plants, power plants
- Capital replacement cycle and “deferred maintenance”
- Climate change raises the likelihood of “fat tail” low probability shocks such as Monday July 8th 2019 DC flash flood.
- Mayors have a short run perspective
- Are Mayors rewarded for being forward looking and playing the “long game”?

## Projected Sea Level Rise (in feet) by 2100



Sources: Houser et al. (2015) *Economic Risks of Climate Change: An American Prospectus* New York: Columbia University Press;  
Moody's Investors Service Report (2017) "Environmental risks: Evaluating the impact of climate change on US state and local issuers"

## Costly Strategies for municipalities to respond to Sea Level Rise

- Detain stormwater surge
  - “Green” infrastructure to collect stormwater - replacing impervious surfaces with green space, green roofs, etc. ([Philadelphia](#))
  - “Living shorelines” ([Chesapeake Bay](#))
  - Deep stormwater retention tunnels ([Chicago](#))
- Improve water conveyance capacity
  - Expanding sewerage drainage and pumping capacity ([Miami](#))
  - Sea walls & levies ([NYC](#))
- Public Health Improvements
  - Improve drinking water treatment
  - Remove combined sewer outfalls ([Seattle](#))
- Re-zoning away from flood-prone areas ([Charleston](#))

## Local Financing of Infrastructure Upgrades

Over 95% of public spending on operations and capital improvements occur at the state and local level, not federal ([Brookings](#); [CBO](#))

Local financing options:

- Raising debt (bond issuance)
- Public-private partnerships
- State and federal grants (FEMA; HUD; State Revolving Fund)
- Raising fees and taxes on residents

## The Critical Role of Access to local finance in Shaping Adaptation

- Cutler D, Miller G. Water, water, everywhere: municipal finance and water supply in American cities. National Bureau of Economic Research; 2005 Jan 31.
- The Role of the Bond rating agencies
  - The “Adult in the Room” --- if mayors are “behavioral”, introducing market discipline.
  - Will the rating agencies “punish” cities who do not take adequate pre-cautions to reduce climate risk? Why?
  - Do the agencies have the expertise to evaluate this risk?
  - Could the bond risk of a city’s other outstanding debt be affected by severe climate shocks?

## Human Capital and Adaptation Specialization

- If financing for mega-projects increase, then the profit motive will nudge talent into the field of “urban resilience”
- Mega-Project Quality up

## Final Questions

- Moral Hazard concerns? --- Does expectations of ex-post Federal bailouts when rare disasters occur crowd out ex-ante self-protection investment?
- Do infrastructure upgrades get capitalized into local real estate values to generate a flow of higher property tax revenue?



## Our Research Agenda

- Which cities are investing in Sea level rise adaptation and why?
  - Is there spatial mismatch between cities with high predicted sea level rise and those undertaking adaptive investments?
  - What factors drive local adaptive investment in infrastructure?
    - Political incentives: are ex-post efforts rewarded more than ex-ante?
    - Scale economies: are only larger cities investing?
    - Credit constraints: are cities with poor credit ratings stuck in a vicious cycle?
    - Salience: prior exposure to sea level rise and spillovers from upstream neighbors