Sea level rise and coastal flooding threaten affordable housing

Maya Buchanan, **Scott Kulp**, Lara Cushing, Rachel Morello-Frosch, Todd Nedwick, and Benjamin Strauss

Climate Central
Program on Sea Level Rise
Princeton, NJ

sealevel.climatecentral.org

Sea Level Rise and Coastal Flooding

- Every inch of sea level rise adds an extra inch to every coastal flood event.
- This makes extreme floods more frequent, dangerous, and damaging to more people.

Affordable Housing

- Most past research on SLR and coastal flood impacts assess total populations or properties exposed.
- Here, we focus on those living in affordable housing -- people who are already the most vulnerable among us.
- Affordable housing considered include:
  - Federally subsidized affordable housing (Source: NHT)
  - Market-driven affordable housing – rent below market rates (Source: Costar)
- Each dataset includes the location (latitude + longitude) and the number of affordable housing units in each building.

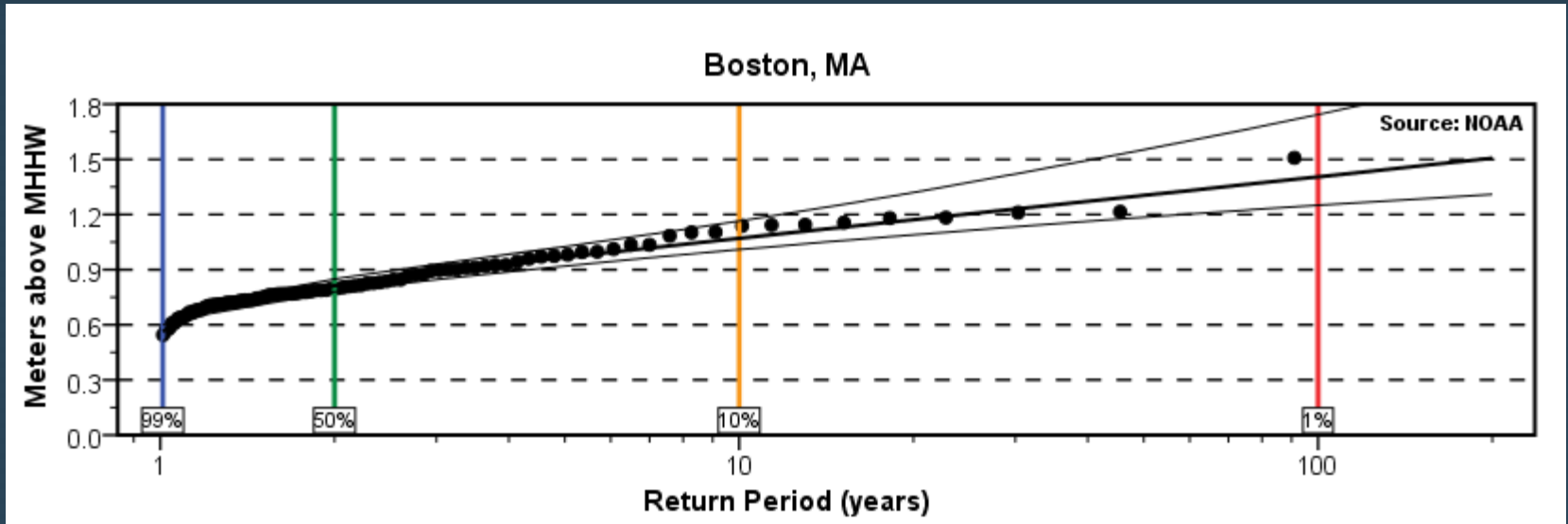
Building Footprints

- In 2018, Microsoft released a dataset of US building footprints.
- For each affordable housing building, we use its lat/lon to find and assign its closest building footprint.
- We treat a building (and all the housing units inside) as exposed to a flood if the flood touches any part of the footprint.

https://www.microsoft.com/en-us/maps/building-footprints

Flood Risk Analysis

- We use:
  - 30+ years of hourly NOAA tide station records (flood risk statistics)
  - Sea level rise projections (Kopp et. al, 2014)
  - High-accuracy lidar elevation from NOAA
- By integrating these together, we estimate the probability of each affordable housing building facing a potential flood event each year.



Results: State

State	Expected number of units exposed per year, 2000 baseline	Expected number of units exposed per year in 2050
New Jersey	1,640	6,825
New York	1,574	5,293
Massachusetts	1,530	4,817
Virginia	395	1,473
Florida	110	963
U.S.	**7,669**	**24,518**

Results: City

State	Expected number of units exposed per year in 2000	Expected number of units exposed per year in 2050
Norfolk, VA	114	710
Portsmouth, VA	31	220
Woodlawn, VA	168	204
Chesapeake, VA	19	132
Hampton, VA	17	120