



# DISMANTLING RACISM: EXPOSING CLIMATE INJUSTICE IN CITIES

THE  
NEW  
SCHOOL

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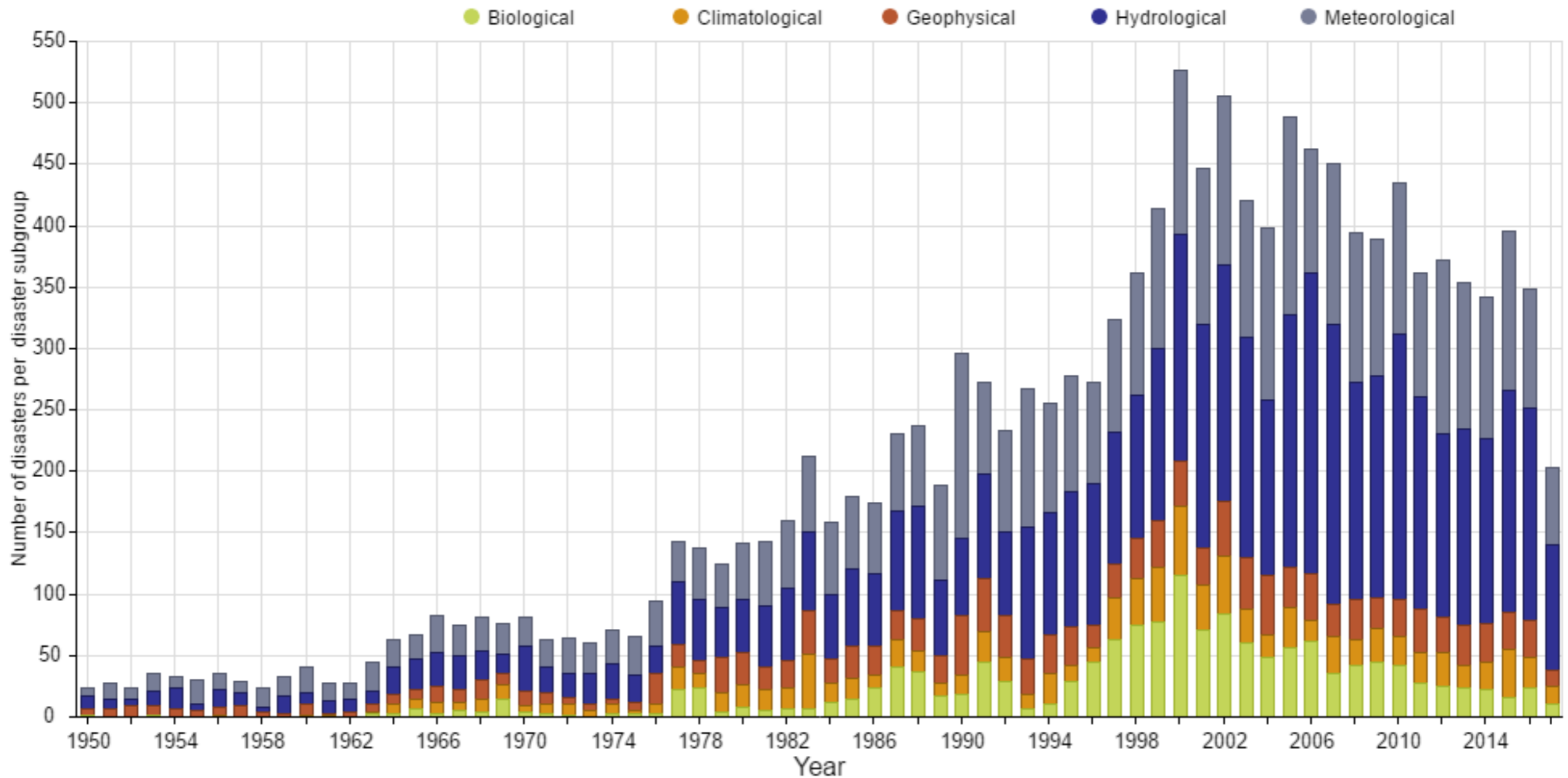
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# CLIMATE JUSTICE AND URBAN PLANNING

- ▶ Urban Planning is Spatial Planning
- ▶ Adaptive Planning Requires Data
- ▶ Multiple kinds of injustice: procedural, distributional, representational
- ▶ Climate change risk is an environmental justice issue

# EXTREME EVENTS ON THE RISE GLOBALLY

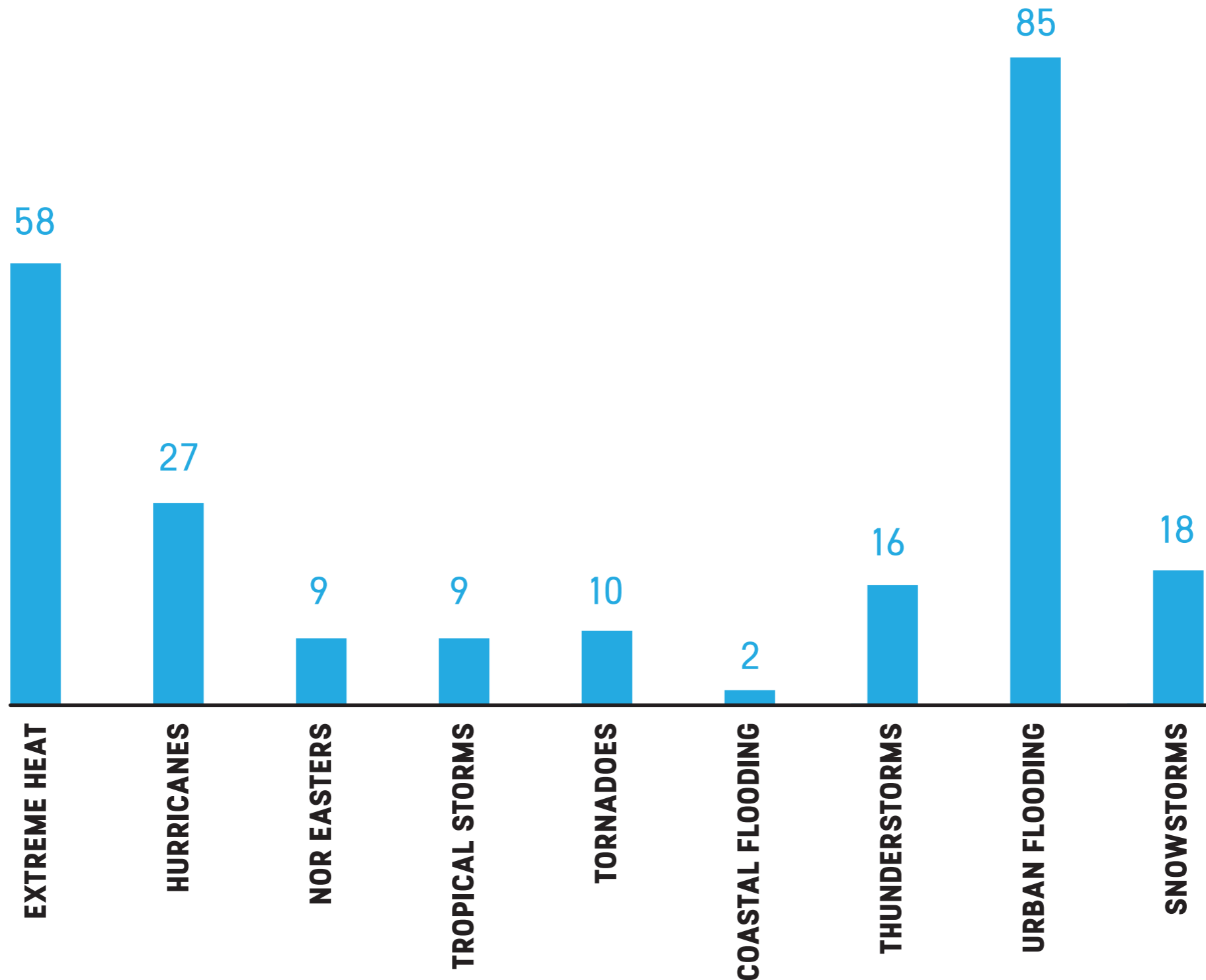


Total number of reported Natural Disasters from 1950 and 2017

(Source: EM-DAT CRED, [www.emdat.be](http://www.emdat.be))

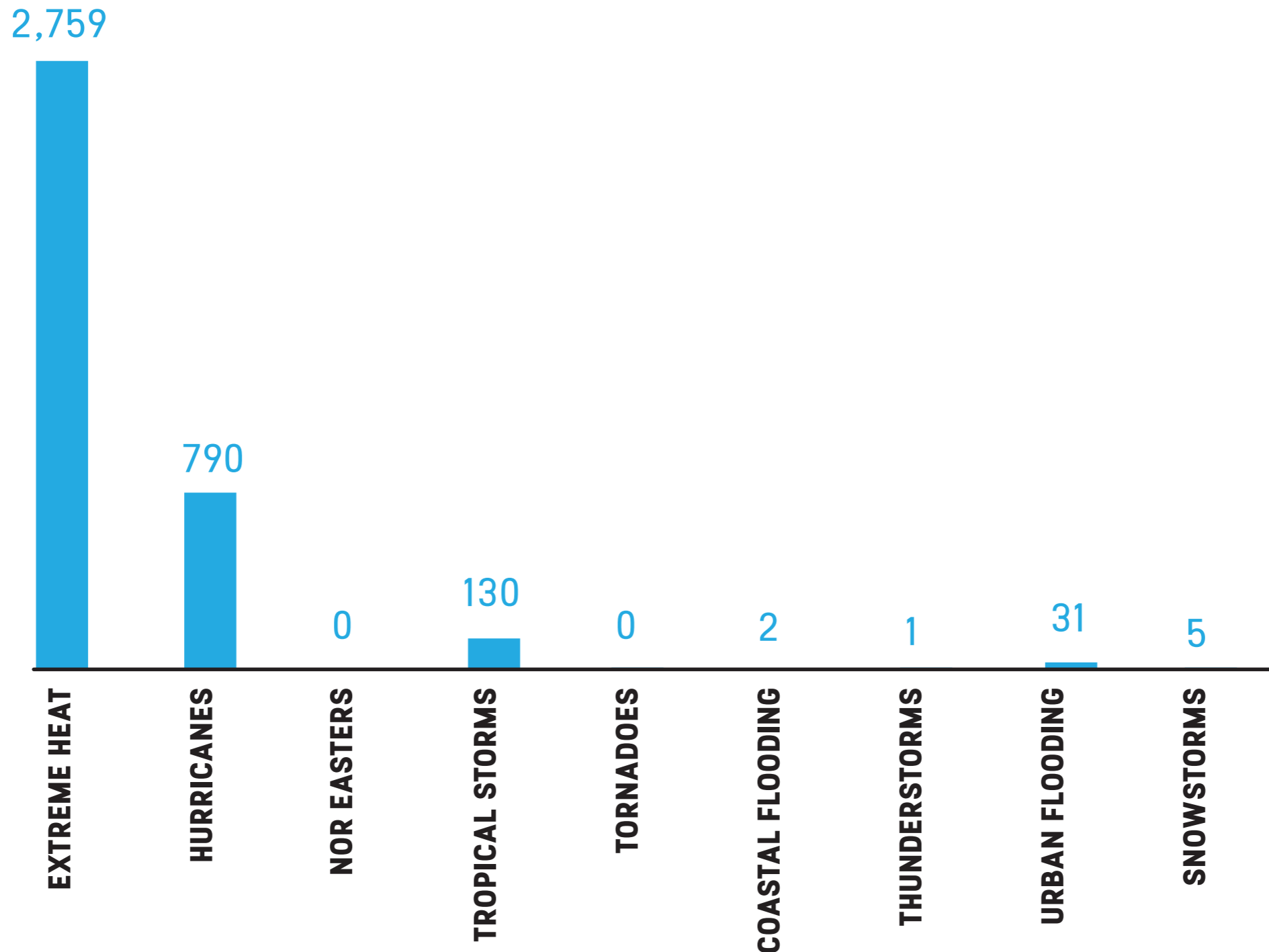
# 140 Years of Natural Disasters in New York City

## NUMBER OF IMPACTFUL EVENTS



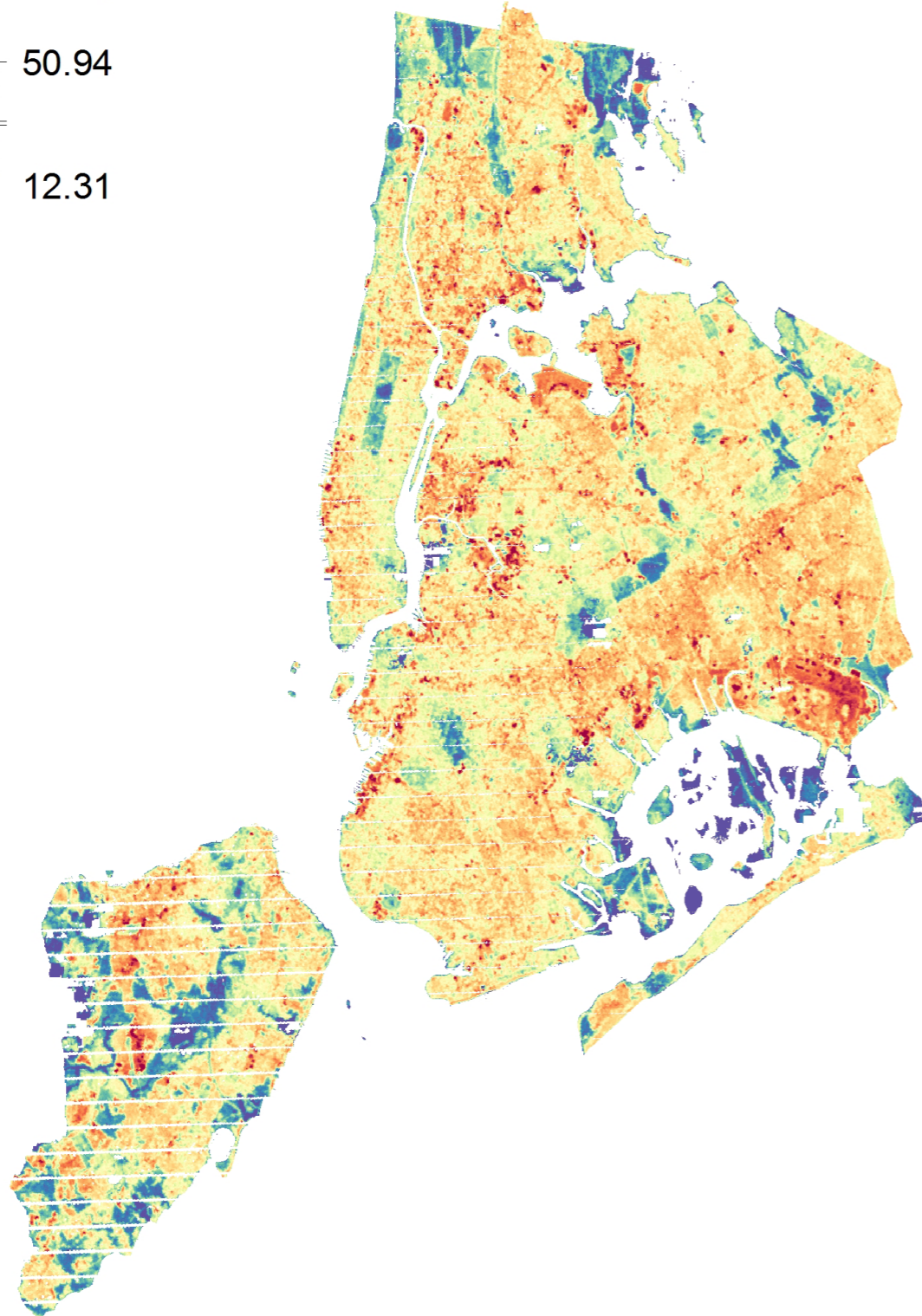
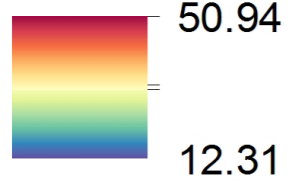
# 140 Years of Natural Disasters in New York City

DEATHS PER HAZARD

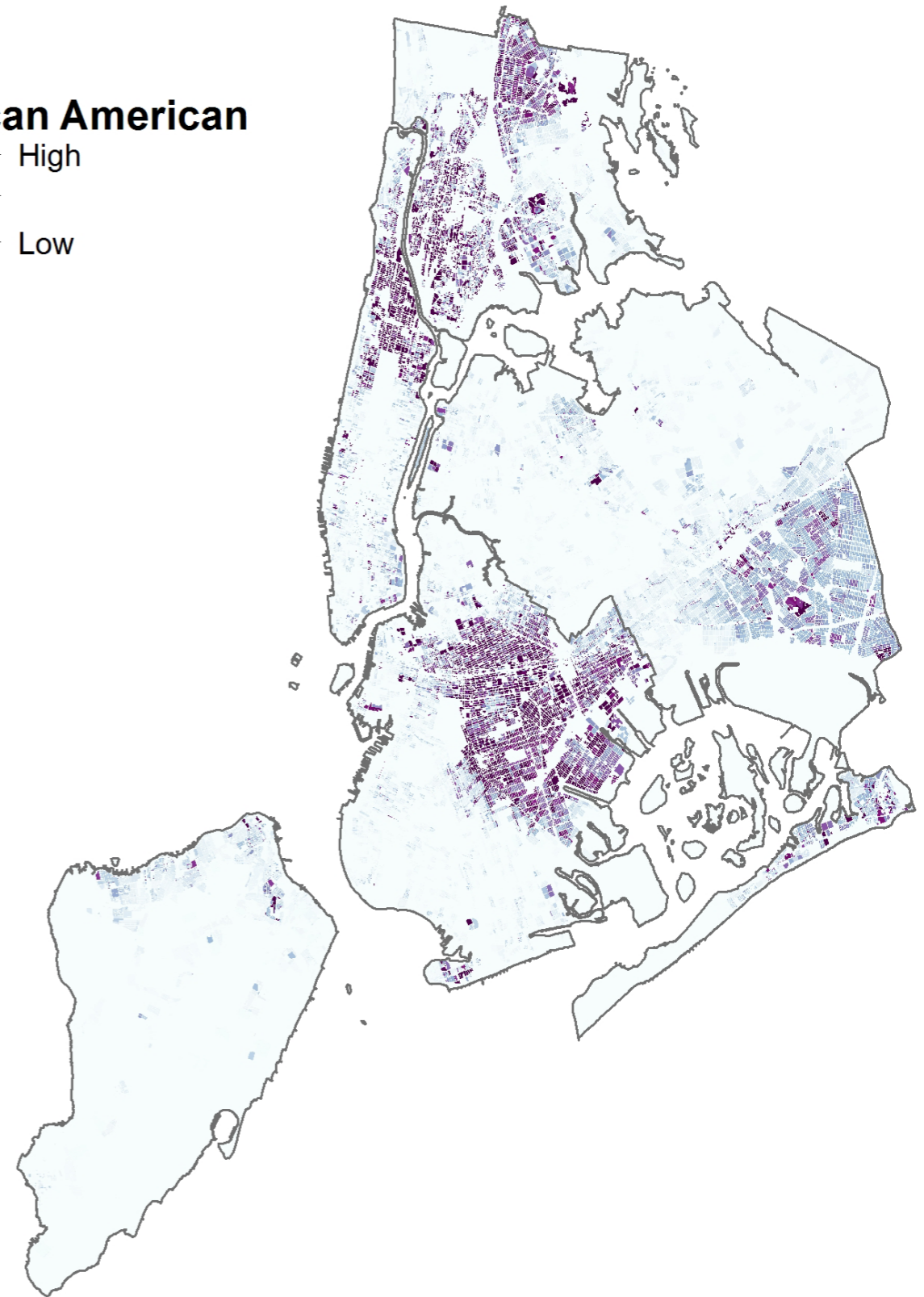
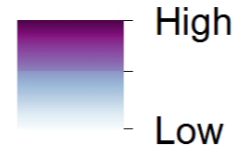


# HEAT IN NEW YORK CITY

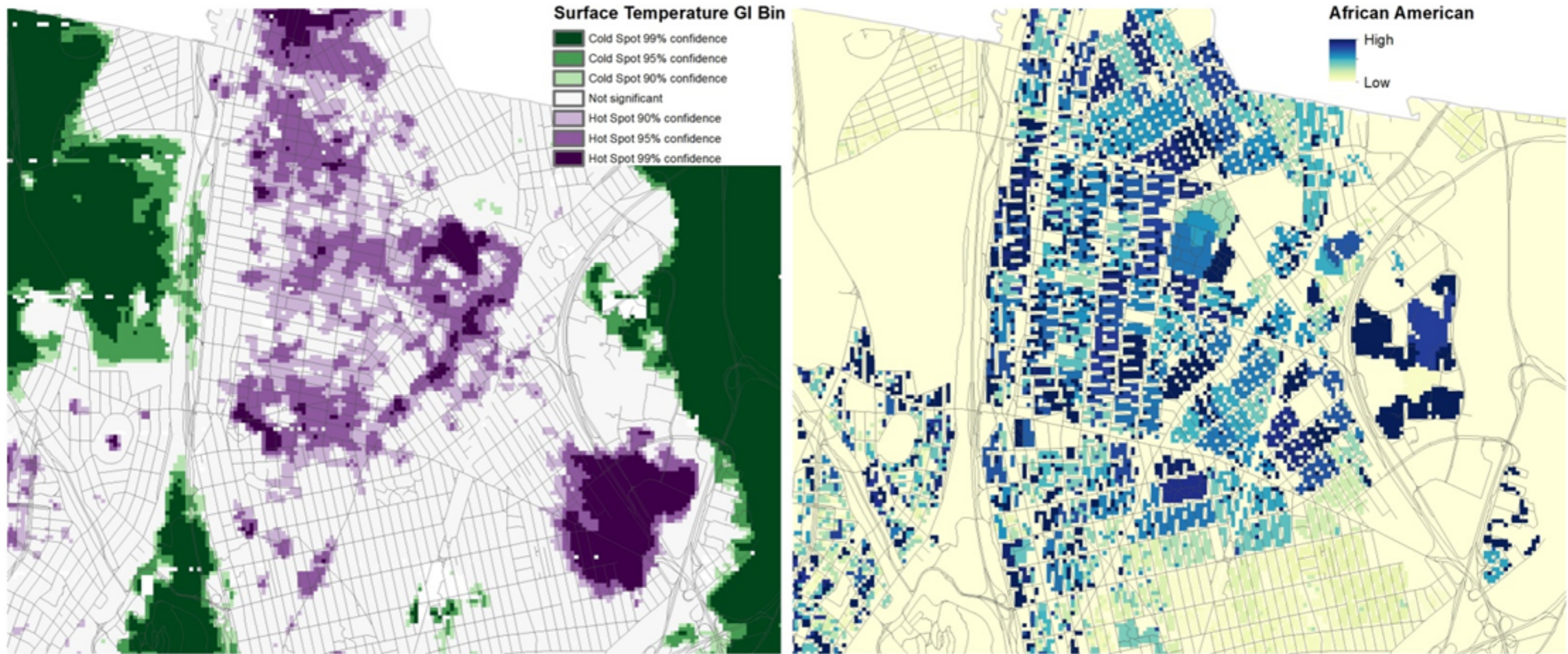
Surface temperature  
(°C)



African American



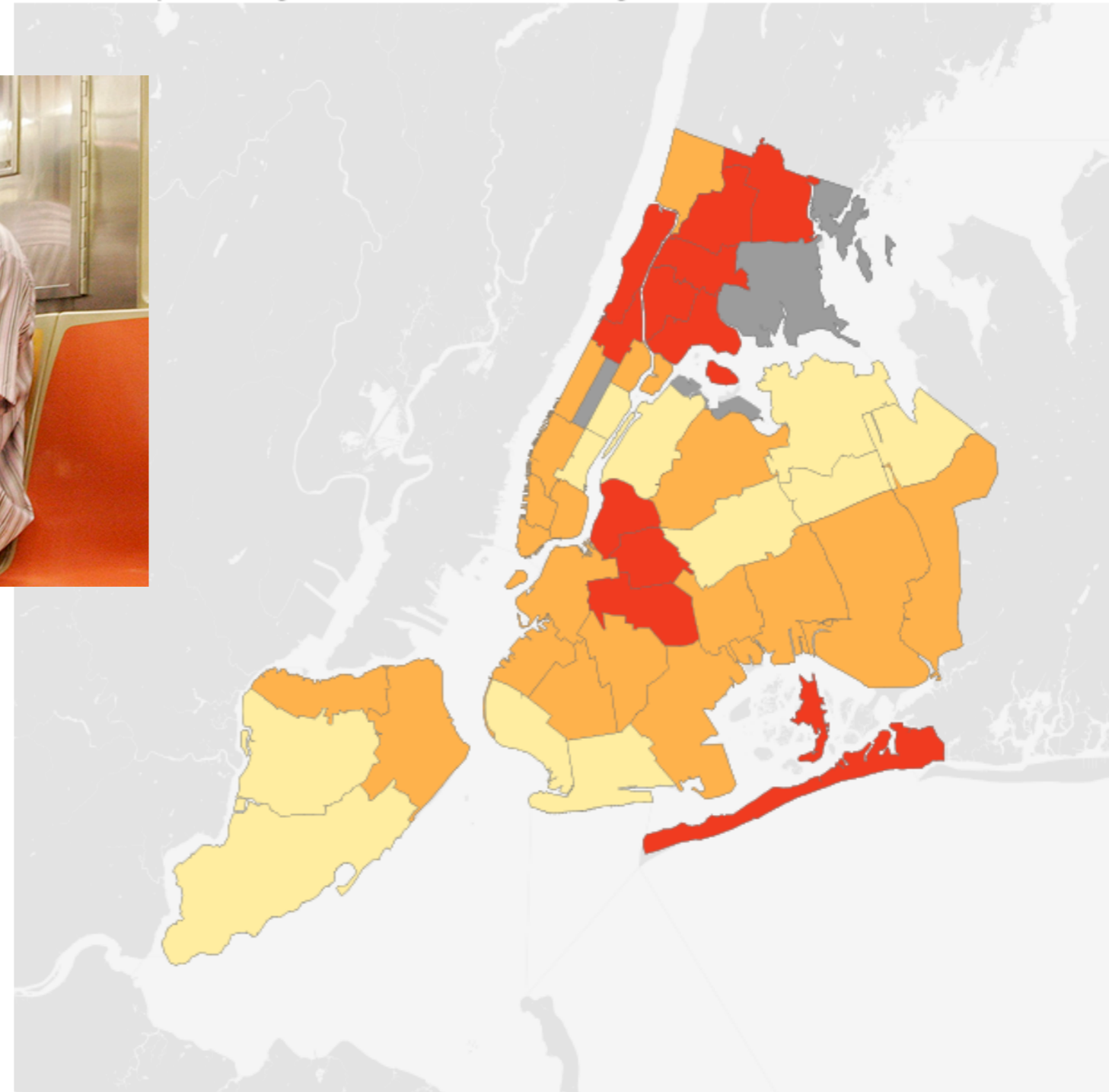
# HEAT IN THE BRONX



Hamstead, Farmer and McPhearson 2018, *Journal of Extreme Events*

# LACK OF AIR CONDITIONING

New York City seniors age 65+ without air conditioning



2007

Percent without air-conditioning (%)

no data	5 - 14	14 - 25	25 - 43
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NOAA Climate.gov

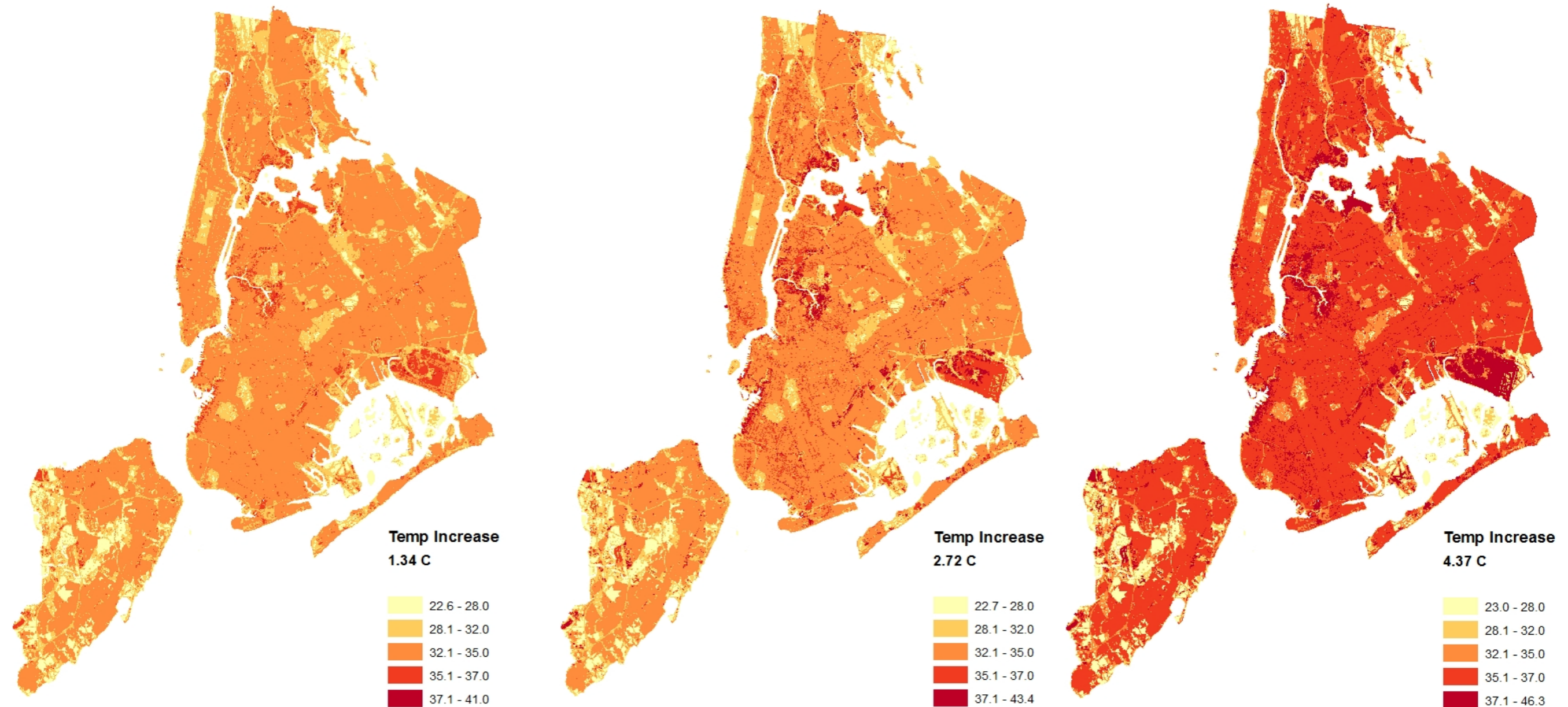


# A Hot Urban Future

2020s

2050s

2080s



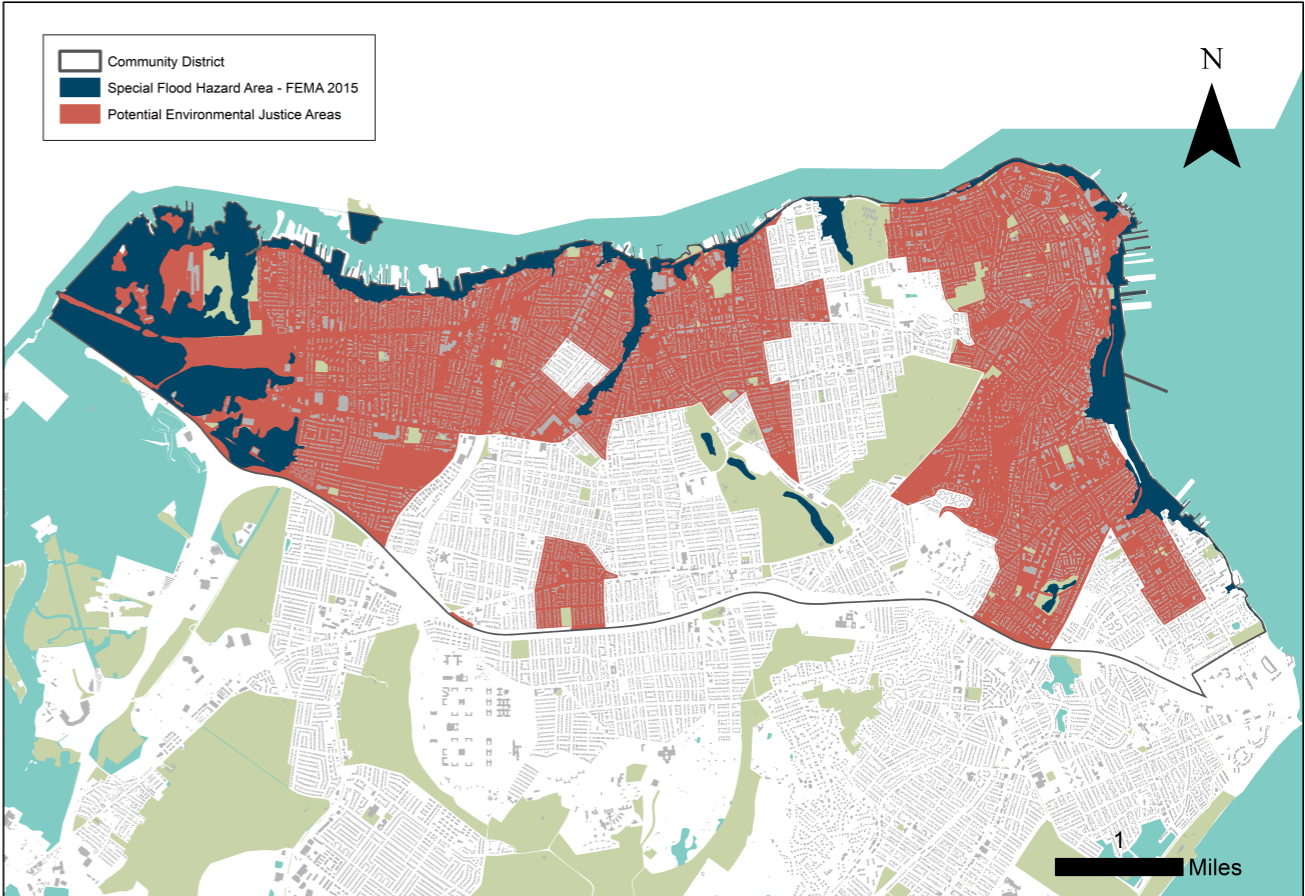
New York City Temperature Projections °C

# ENVIRONMENTAL JUSTICE AND COASTAL FLOOD RISK



800,000 PEOPLE IN PEJAS LIVING BELOW THE 100YR FLOOD PLAIN

# ENVIRONMENTAL JUSTICE AND COASTAL FLOOD RISK



# Houston, Texas 2017



# STORM SCENARIOS

## 1. Extreme event analysis

What happened in the past in similar landscapes?

Stats to show possibilities



## 2. Rain Modeling



Long Island tends to have more extreme + intense storm events

Islip event in Long Island

## 3. Storm Scenarios

Currently 204!

### Common/Chronic

64 events

Well shoot. Not again!



Happen multiple times/year

### Extreme

104 events



Rare events i.e. 100 or 1,000 year flood

### Compound

36 events



Storm surge + Sea level rise

# HYDROLOGIC and HYDRAULIC MODELING

Used to inform

To Start...



What's already out there?

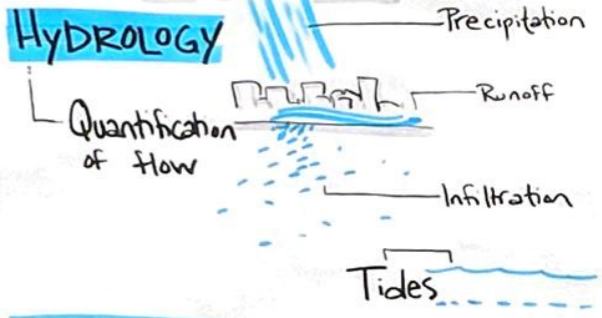
## H+H MODELING BASICS

Surface (2D)



Subsurface (1D)

## HYDROLOGY



## HYDRAULICS



Validating

Testing  
Refining



We need  
YOUR HELP!

## HOW DO WE VALIDATE?

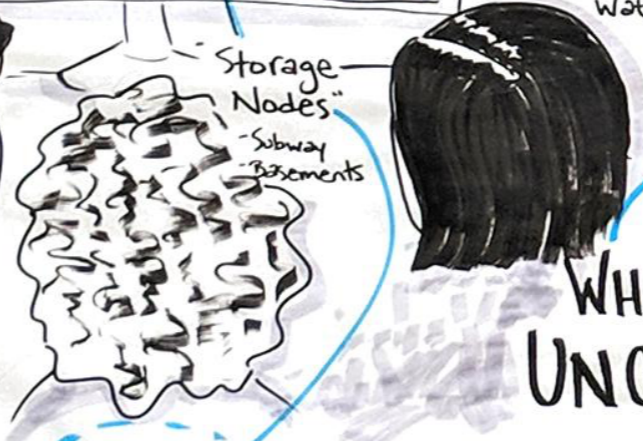
aka  
Is the simulation aligned with what's happening on the ground?



Social media maps



Traffic maps during events



Storage Nodes  
- Subway  
- Basements

Unintentional storage... not a positive thing.

## WHAT ABOUT UNCERTAINTY?

Rainfall      Addressing it via Ground-truth Validation      Structural

# NYC STORMWATER RESILIENCY PROJECT



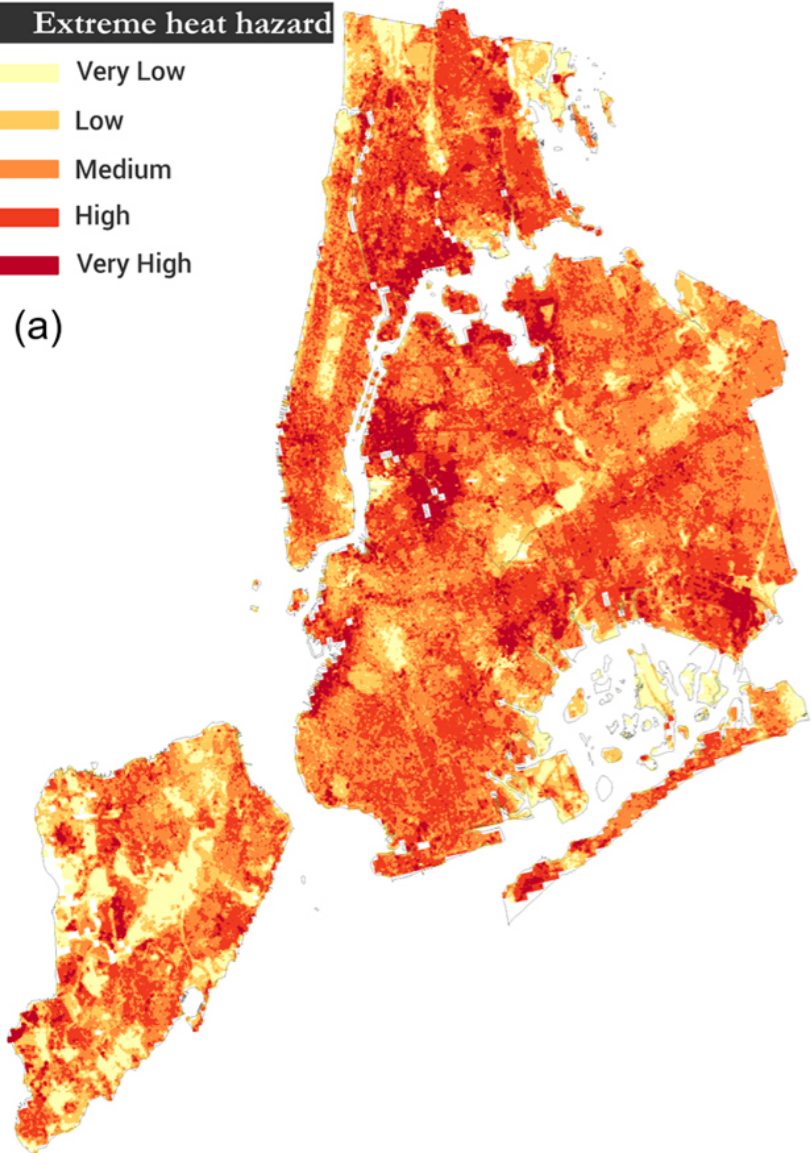
# MULTI-HAZARD RISK IN NEW YORK CITY

## Heat

### Extreme heat hazard

- Very Low
- Low
- Medium
- High
- Very High

(a)

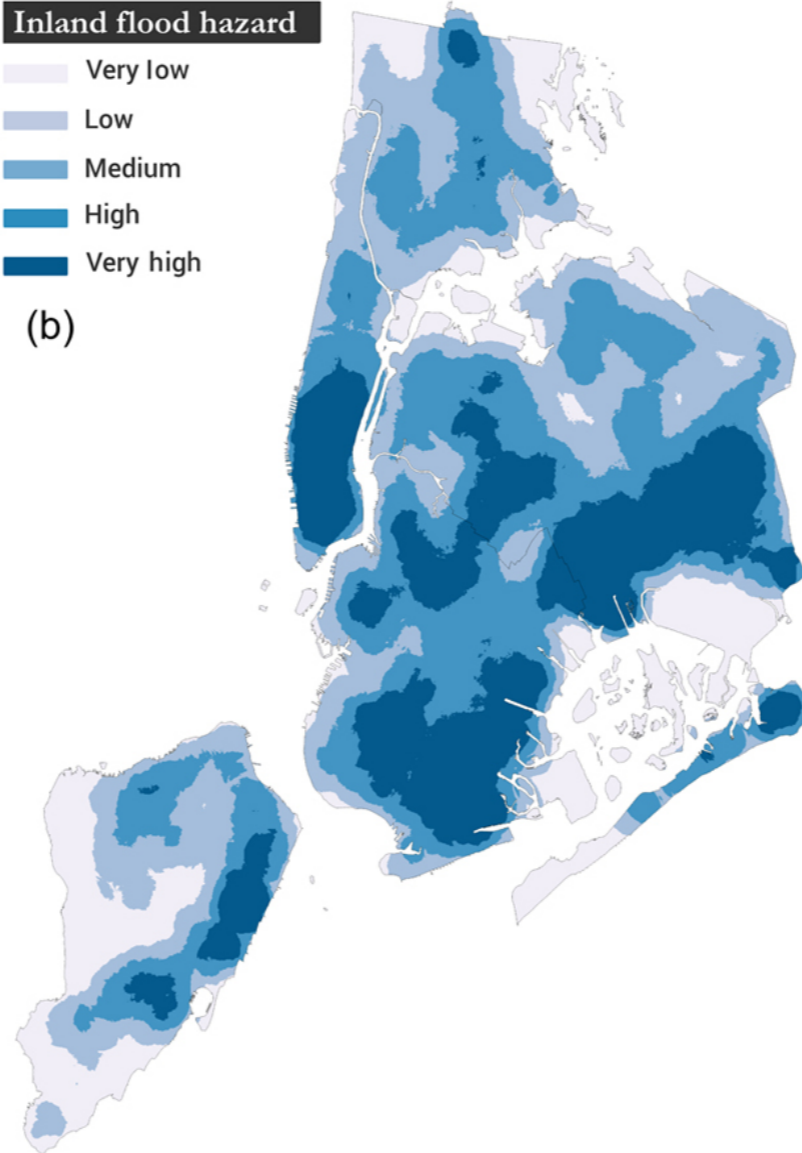


## Inland Flooding

### Inland flood hazard

- Very low
- Low
- Medium
- High
- Very high

(b)

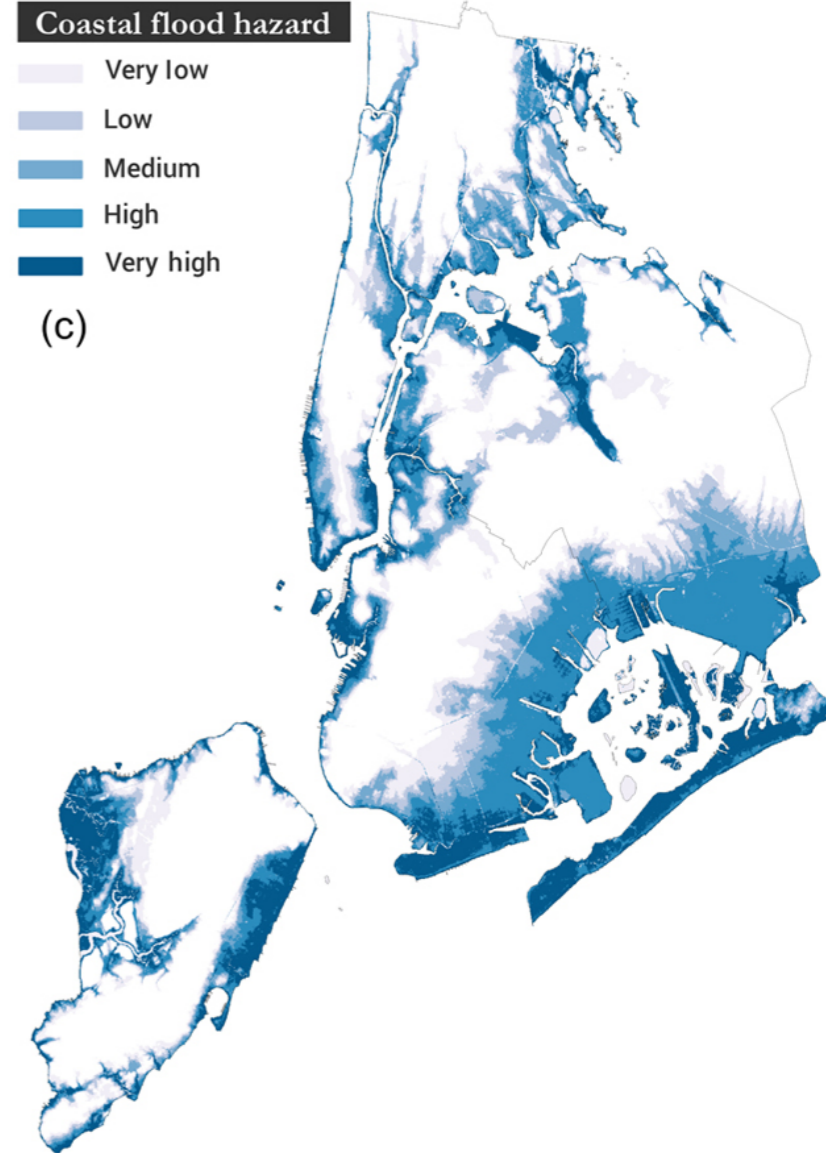


## Coastal Flooding

### Coastal flood hazard

- Very low
- Low
- Medium
- High
- Very high

(c)





# CO-DESIGNING RESILIENT FUTURES WITH STAKEHOLDERS





**VISUALIZING INJUSTICE**

# VISUALIZING INJUSTICE PATTERNS IN NYC



# GREEN INFRASTRUCTURE AND EQUITY IN PLANNING

- ▶ Analysis of over 100 city planning documents in 20 cities
- ▶ 70% of cities refer to equity in GI planning, but inconsistently
- ▶ Six apply equity 'lenses' (Atlanta, Austin, Baltimore, NYC, Philadelphia, Portland)
- ▶ Over 50% of plans have engagement mechanisms, but efficacy is uncertain

# GREEN INFRASTRUCTURE AND EQUITY IN PLANNING

- ▶ How (if) equity and justice are defined by planners
- ▶ Procedural Equity: who plans, designs, implements, and evaluates?
- ▶ Spatial Equity: impacts of programs targeting different areas
- ▶ Social Equity: distribution of risks, benefits, and costs of GI