United States Environmental Protection Agency

EPA Tools and Resources Webinar: Assessing Community Vulnerabilities to Potential Contaminant Releases from Extreme Events

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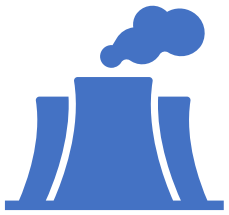
US EPA Office of Research and Development (ORD)

September 18, 2024

Presentation Outline



Problem

Indicator Approach

Case Study Results & Impacts

Take Home Messages

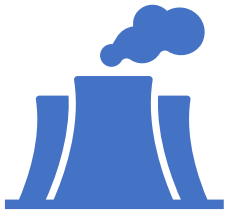
Problem

Communities across the world are experiencing impacts from intensifying heat, floods, droughts, and wildfires due to climate change.

Many contaminated sites and waste management facilities are located near communities that may be disproportionately impacted by climate change and potential contaminant releases.

For preparedness and adaptation planning, we developed an indicator screening approach for our partners to prioritize actions and target resources toward areas that may be impacted the most.

Presentation Outline



Problem

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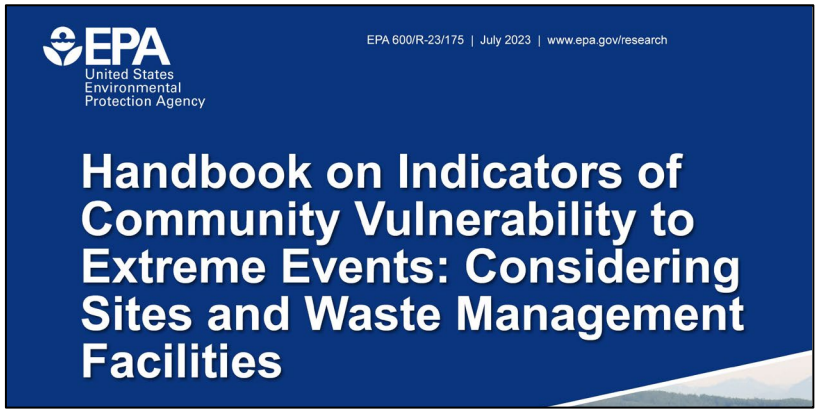
Indicator Approach

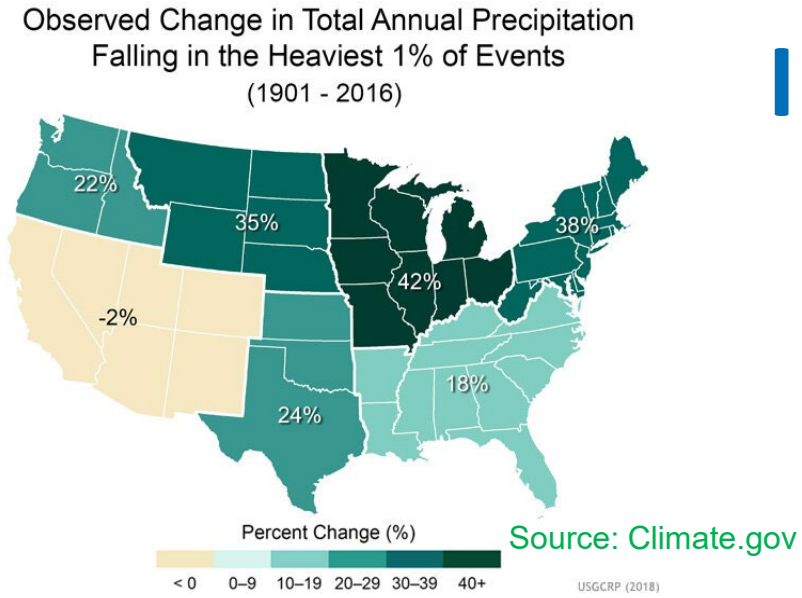
- Handbook
- Website demo

EPA Research website:
www.epa.gov/eco-research/community-vulnerabilities-contaminant-releases-extreme-events

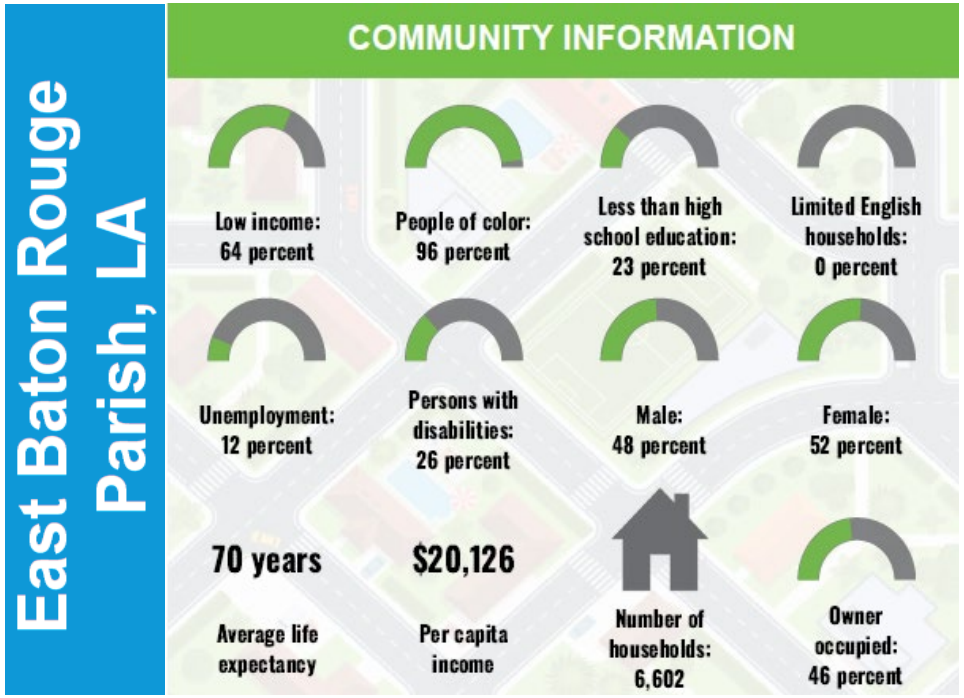


Handbook *includes Indicator framework, Steps for implementing, Flooding example, and 58 indicator checklists*

Indicator Approach



Source: Climate.gov

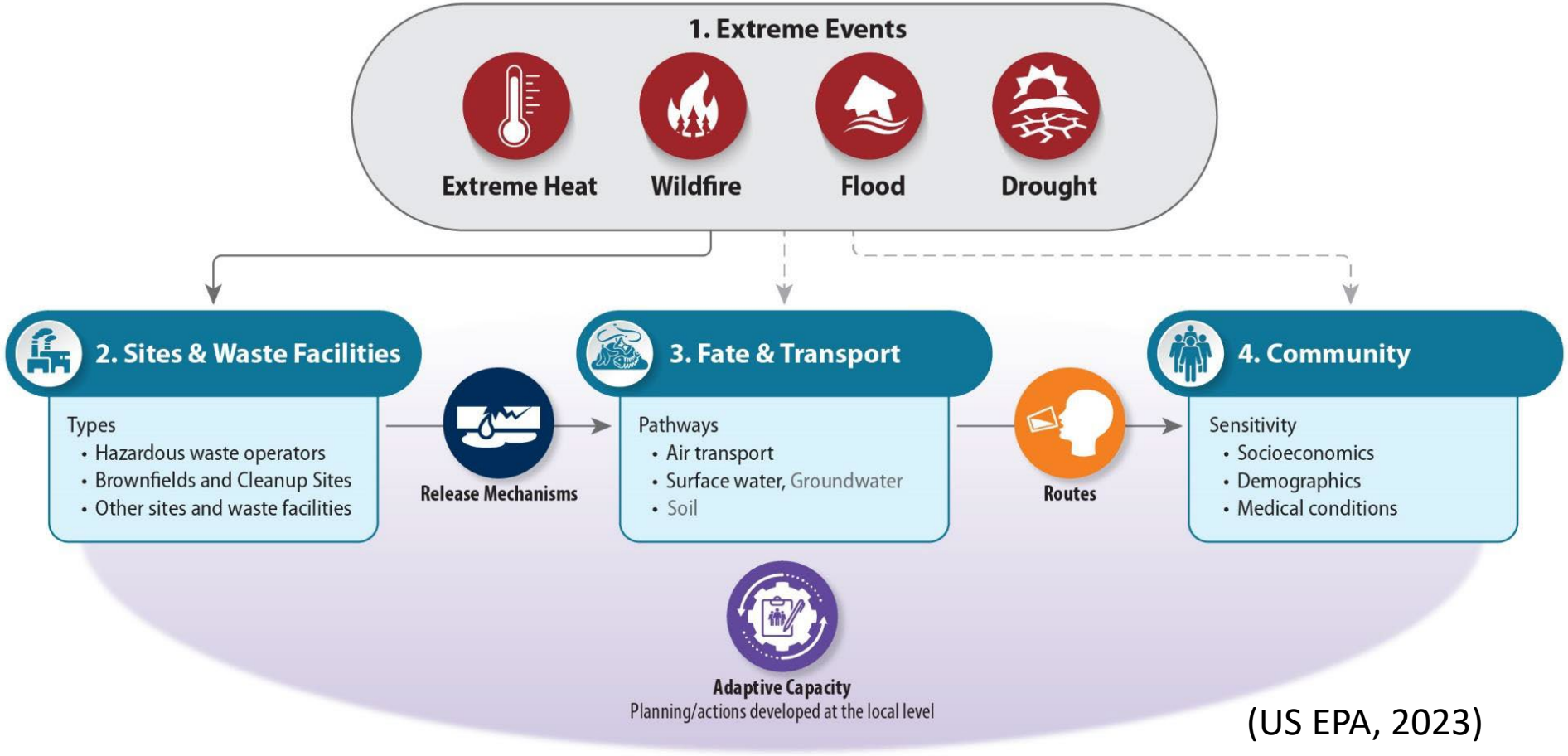


Source: EJScreen

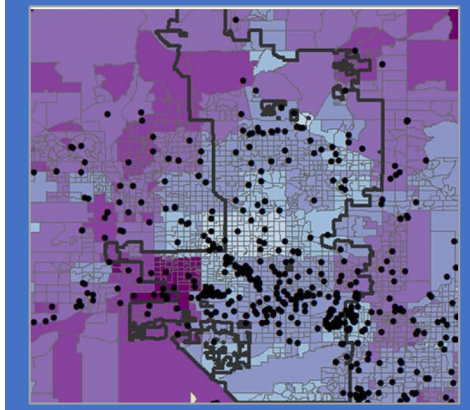
What is an indicator?

Reliable measure of past, present, or future condition

- Tracked over given **area** and **time** (US EPA, 2021)
- Used to **communicate** and **inform** decisions



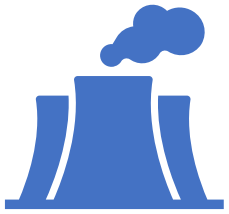
(US EPA, 2023)



Using geospatial indicators

- Screen for vulnerable areas
- Identify potential sources of vulnerability
- Visualize and communicate results
- Combine with other tools (flexible, interoperable)

Presentation Outline



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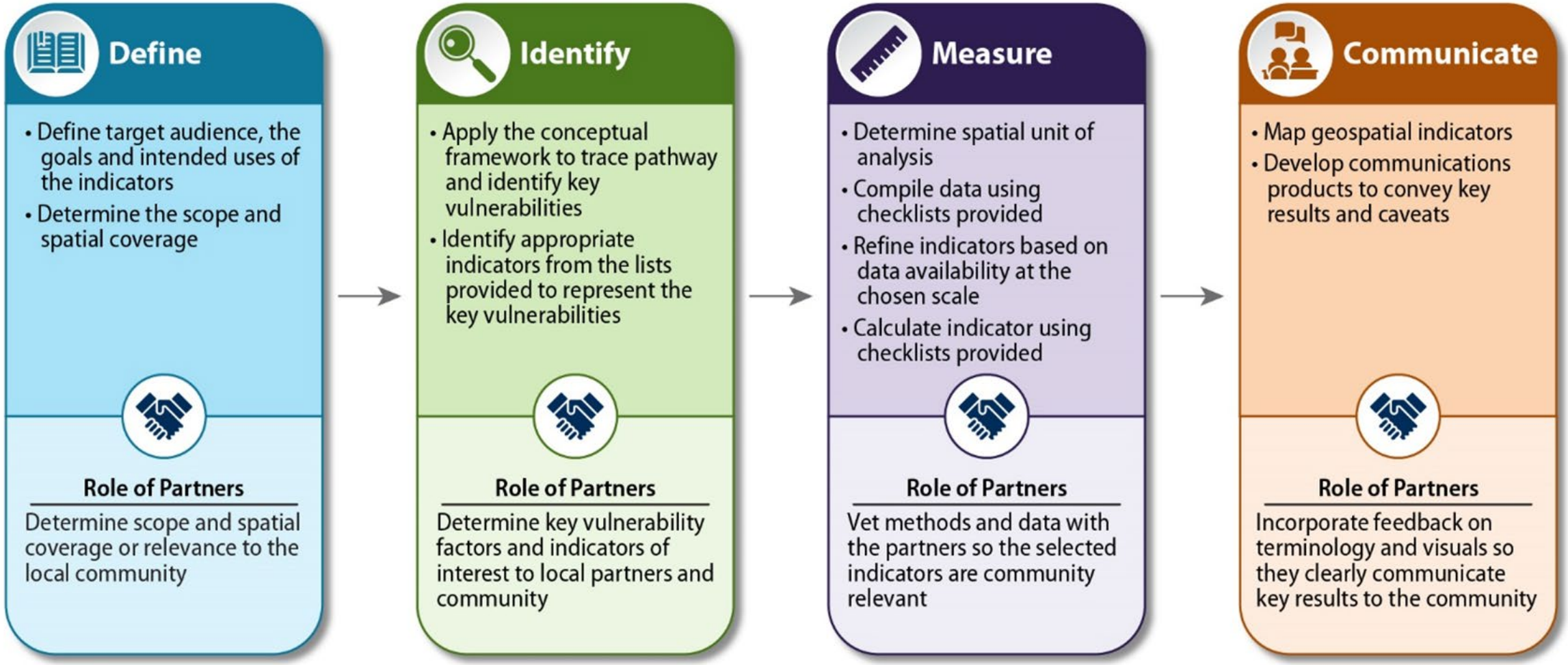
4-Step Process developed with partners for Handbook



(US EPA, 2023)

Case Study Results & Impacts

- **Case Study 1. Phoenix and Maricopa County, Arizona** (completed 2022)
  - **Goal**: Inform plans for preparedness, response, and recovery from extreme heat, drought, flooding, and wildfire on sites/facilities and nearby populations

US EPA ORD:
Meridith Fry, Susan Julius

RTI International:
Paramita Sinha, Robert Truesdale, James Cajka, Michele Eddy, Prakash Doraiswamy, Brian Lim, Jennifer Richkus, Maggie O'Neal

City of Phoenix:
Rosanne Albright, Julie Riemenschneider, Matthew Potzler

US EPA Region 9:
Laurie Amaro (retired)

US EPA Office of Land and Emergency Management (OLEM):
Ann Carroll (retired)

Arizona Department of Environmental Quality (DEQ):
Robin Thomas

Case Study 1. Selected Indicators

Exposure

Extreme Events [Historical; Projected (RCP 4.5 & RCP 8.5)]

1. Area burned
2. Maximum temperature
3. 100/500-year floodplain area; Precipitation/Physically-based flood
4. Drought months
5. Threshold-based indicators (extreme heat, flood, drought)

Site and Waste Facilities

1. Sites/facilities count
2. Sites/facilities density
3. Sites/facilities count [By type]
4. Waste tonnage
5. Waste tonnage [Hazard type]
6. Sites/facilities count [Hazard type]
7. Brownfield count with contaminant; cleanup unknown [Contaminant]
8. Superfund count w/ vulnerable remedy technology [Extreme event]
9. Count of specific type of tank [UST/AST]
10. Total tank capacity [UST for R9/AST for R1]

Fate and Transport
[By Air, By Season]

1. Shortest distance to a site/facility upwind
2. Count of sites/facilities upwind within a specific distance of community
3. Minimum response time
4. Count of sites/facilities that are within specific response time ranges

[By Water]

1. Count of sites/facilities in a floodplain [100-year and 500-year]
2. Shortest distance upstream to a site/facility
3. Count of sites/facilities within a specific hydrologic distance of a community
4. Count of sites/facilities within a specific hydrologic distance of a flowline

Sensitivity

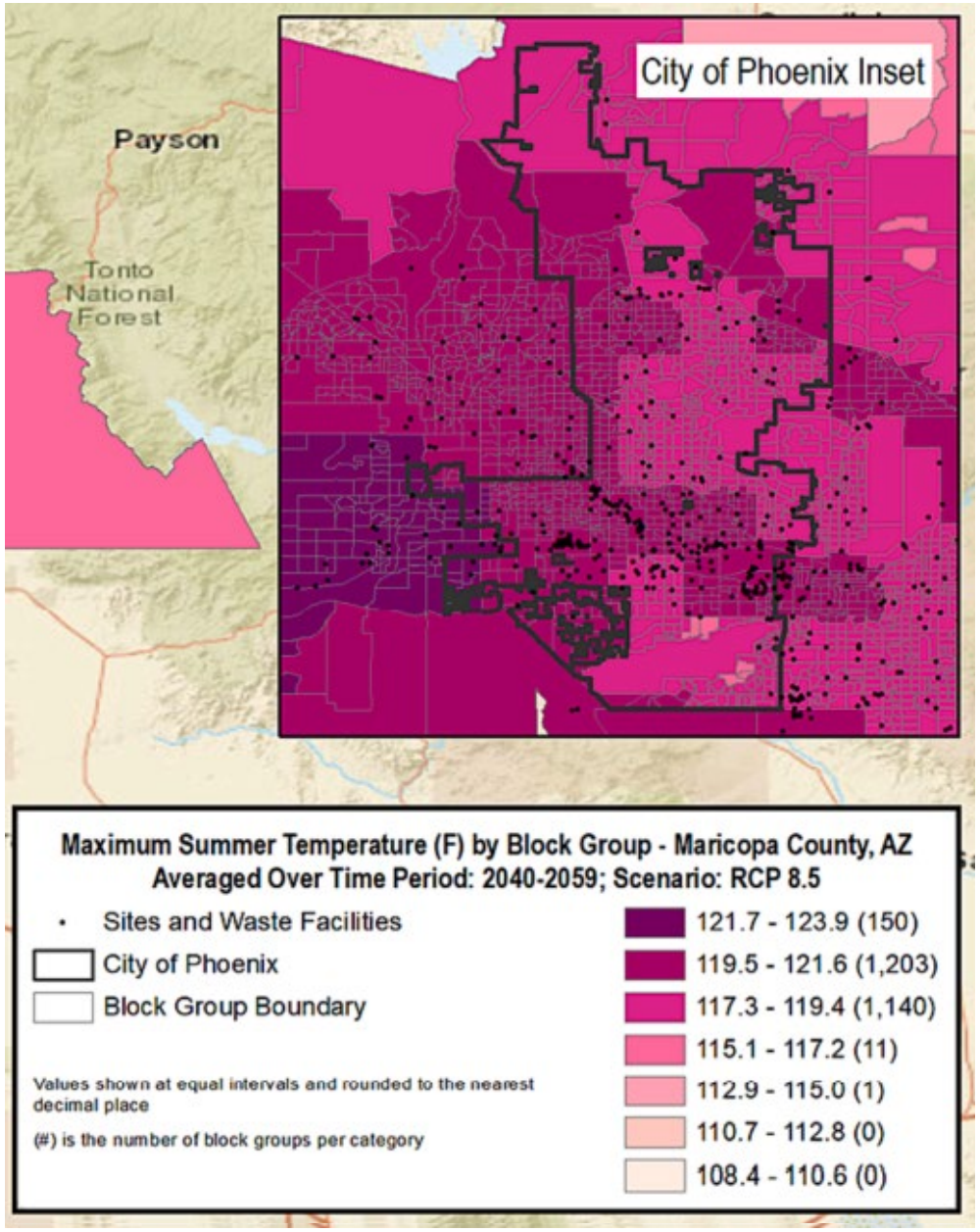
Community Sensitivity

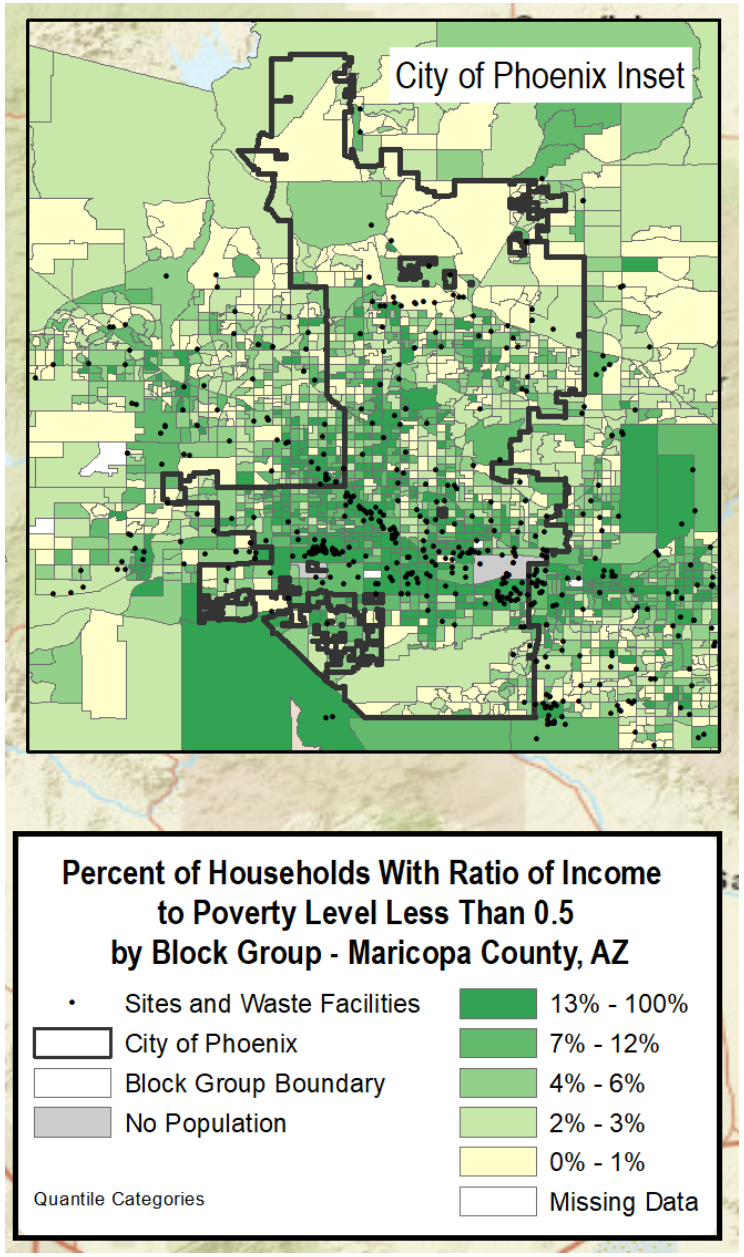
1. Total population
2. Household count
3. Median household Income
4. Highest levels of poverty
5. High levels poverty
6. Self-employment income
7. Work outdoors
8. Renters
9. Living in a mobile home/boat/RV/van
10. No telephone service
11. No Internet access
12. No vehicle
13. No high school degree
14. No health insurance
15. Disability
16. Children
17. Elderly
18. Elderly living alone
19. Female household heads
20. Black or African American
21. Native Hawaiian or Other Pacific Islander
22. American Indian or Alaska Native
23. Asian
24. Other non-White races
25. Hispanic or Latino
26. Limited English
27. Non-U.S. citizens
28. Recent migrants

*Indicators 4 -28 represent the percent of households/population

(Sinha et al., 2024)

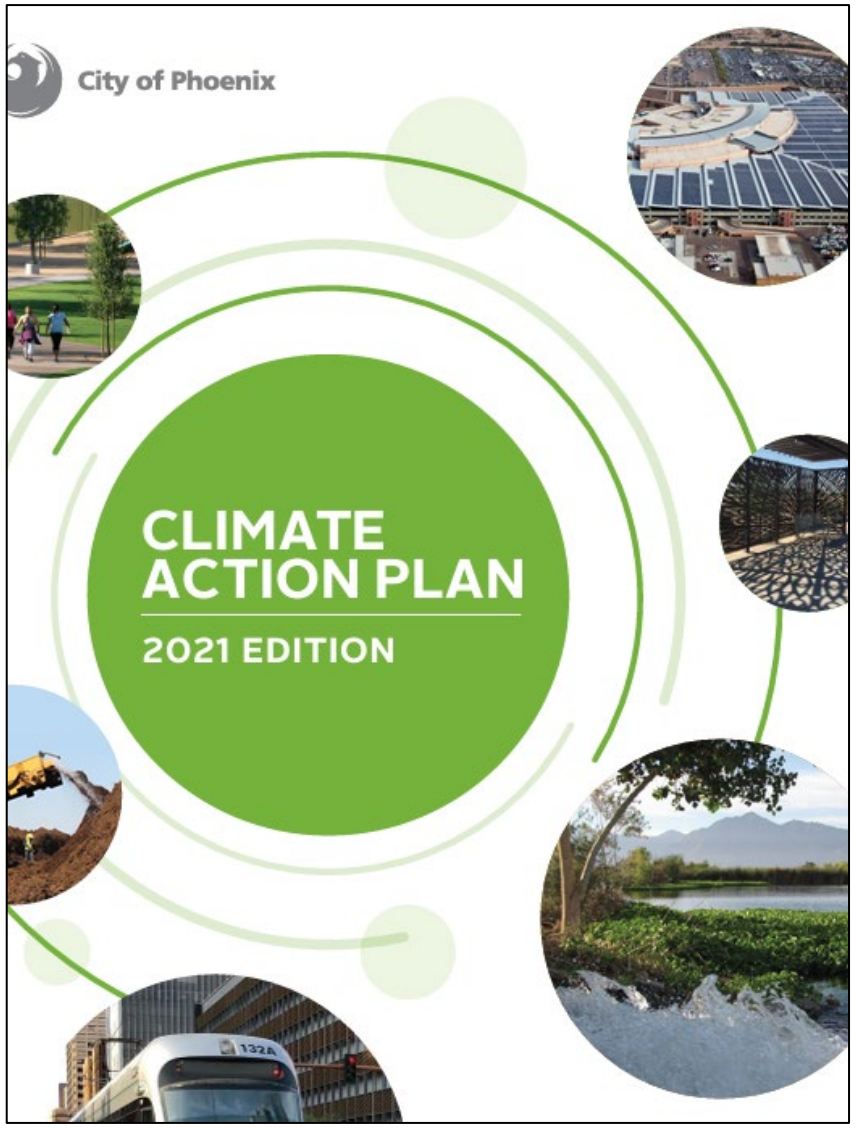
Case Study 1. Results





(US EPA, 2022)

Impacts of Case Study 1



EPA ORD, OLEM and Region 9, Arizona DEQ, and the City of Phoenix:

- Phoenix Climate Action Plan 2021
- *Urban Climate* Publication on Extreme Heat in Phoenix
- C40 cities (global network of mayors taking climate action)
- CDP-ICLEI Track (climate reporting platform & progress tracker for cities)
- *Other impacts*: City presentations to public, proposed redevelopment plans, emergency response planning, community engagement

Case Study Results & Impacts

- **Case Study 2. North Carolina Department of Environmental Quality (NCDEQ)** (completed 2024)
  - **Goal**: Identify and prioritize climate vulnerable, historically overburdened and underserved areas for resilient Brownfields assessment and redevelopment

US EPA ORD:
Meridith Fry, Lauren Oliver, Susan Julius, Keely Maxwell, Brittany Kiessling, Emily Eisenhauer, Britta Bierwagen

RTI International:
Paramita Sinha, James Cajka, Chandler Cowell, Breanna Reingold, Emily Decker, Rohit Warrier, Michele Eddy, Sarah Bates, Rishi Dey

NCDEQ:
Joselyn Harriger, Jordan Thompson, Bruce Nicholson

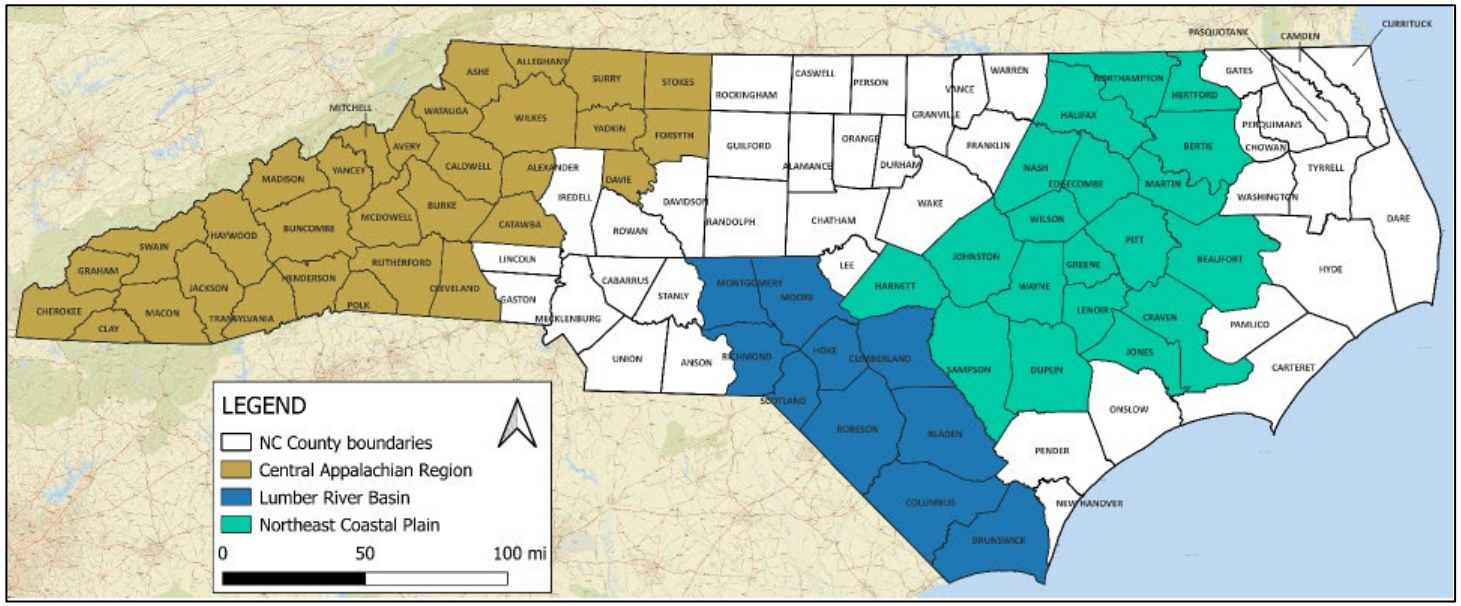
Lumber River Council of Governments (LRCOG):
David Richardson, Noor Shehata

US EPA Region 4:
Matthew Simone (Regional lead), Brian Gross, Sara Janovitz, Dawn Taylor, Brian Holtzclaw, Cindy Nolan (retired), Felicia Barnett

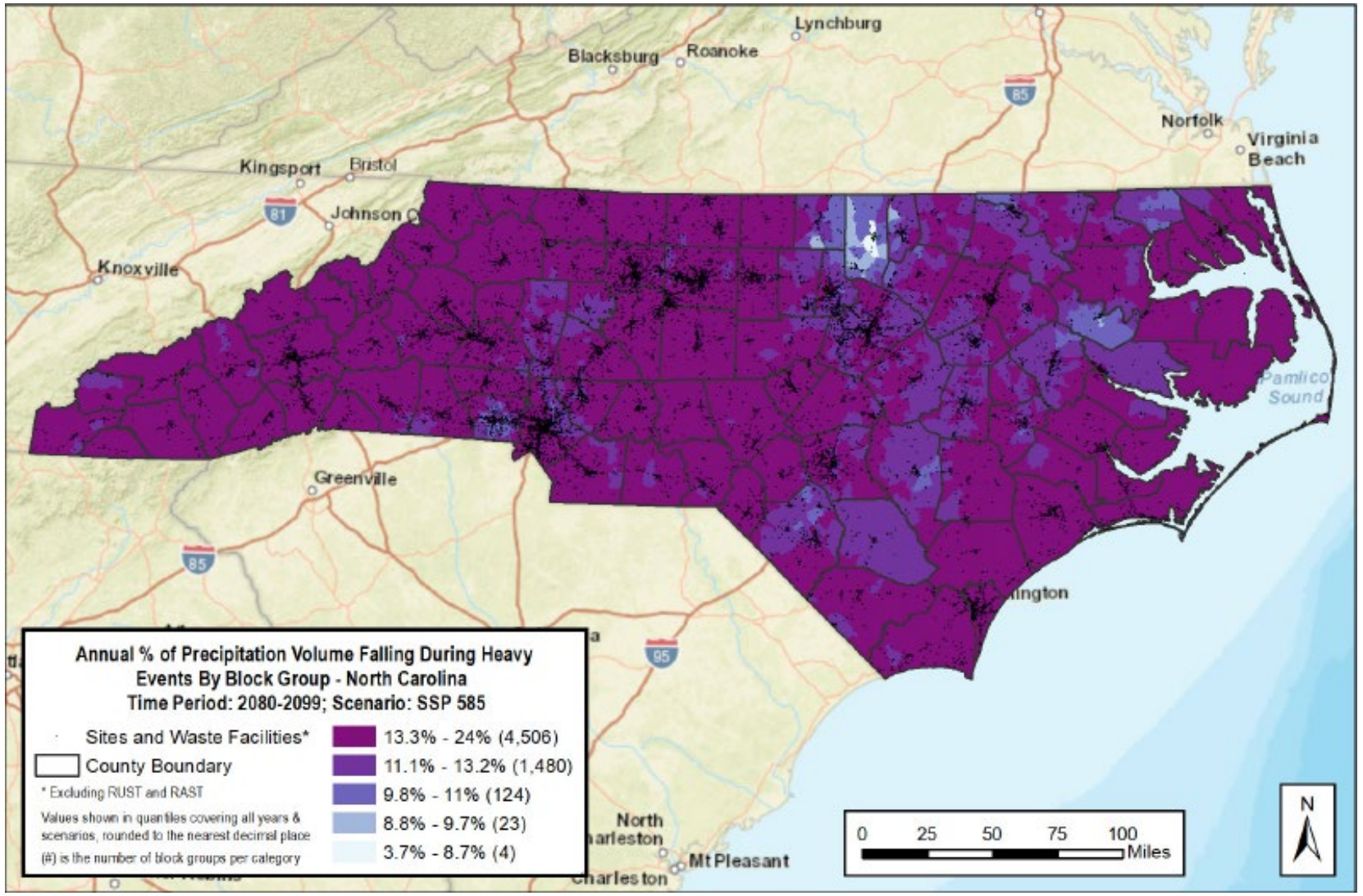
US EPA OLEM:
Ann Carroll (retired), Christina Barnes, Matt Wosje, Samuel Sigal, Elyse Salinas, Melissa Kaps, Anna Tschursin (retired), Lisa McArthur

Case Study 2. Selected Indicators

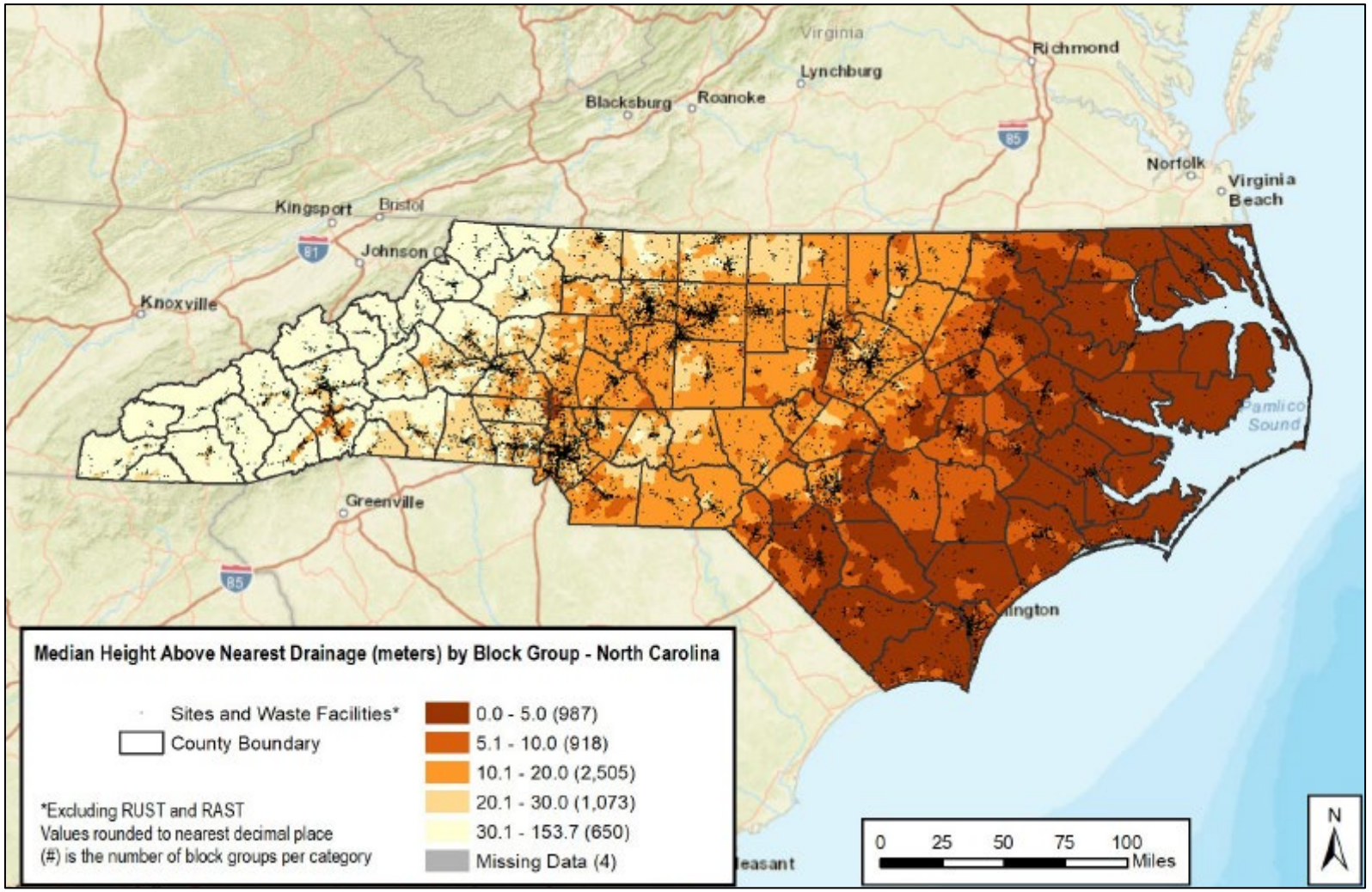
- Heavy precipitation
- Height above nearest drainage
- Sites & waste facilities
- Fate & transport (surface water)
- Community sensitivity – 15 total



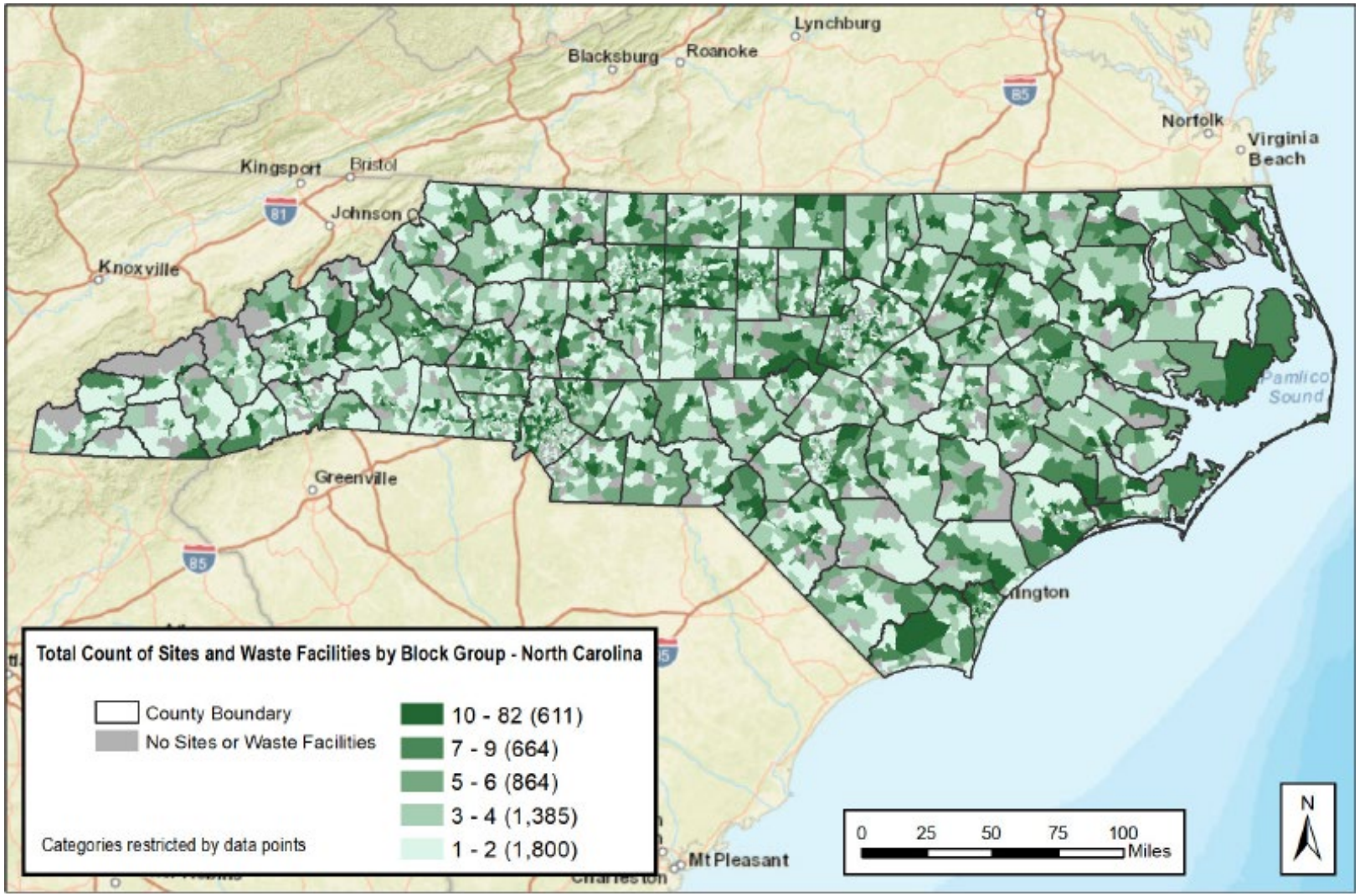
Case Study 2. Heavy Precipitation – Historical & Projected



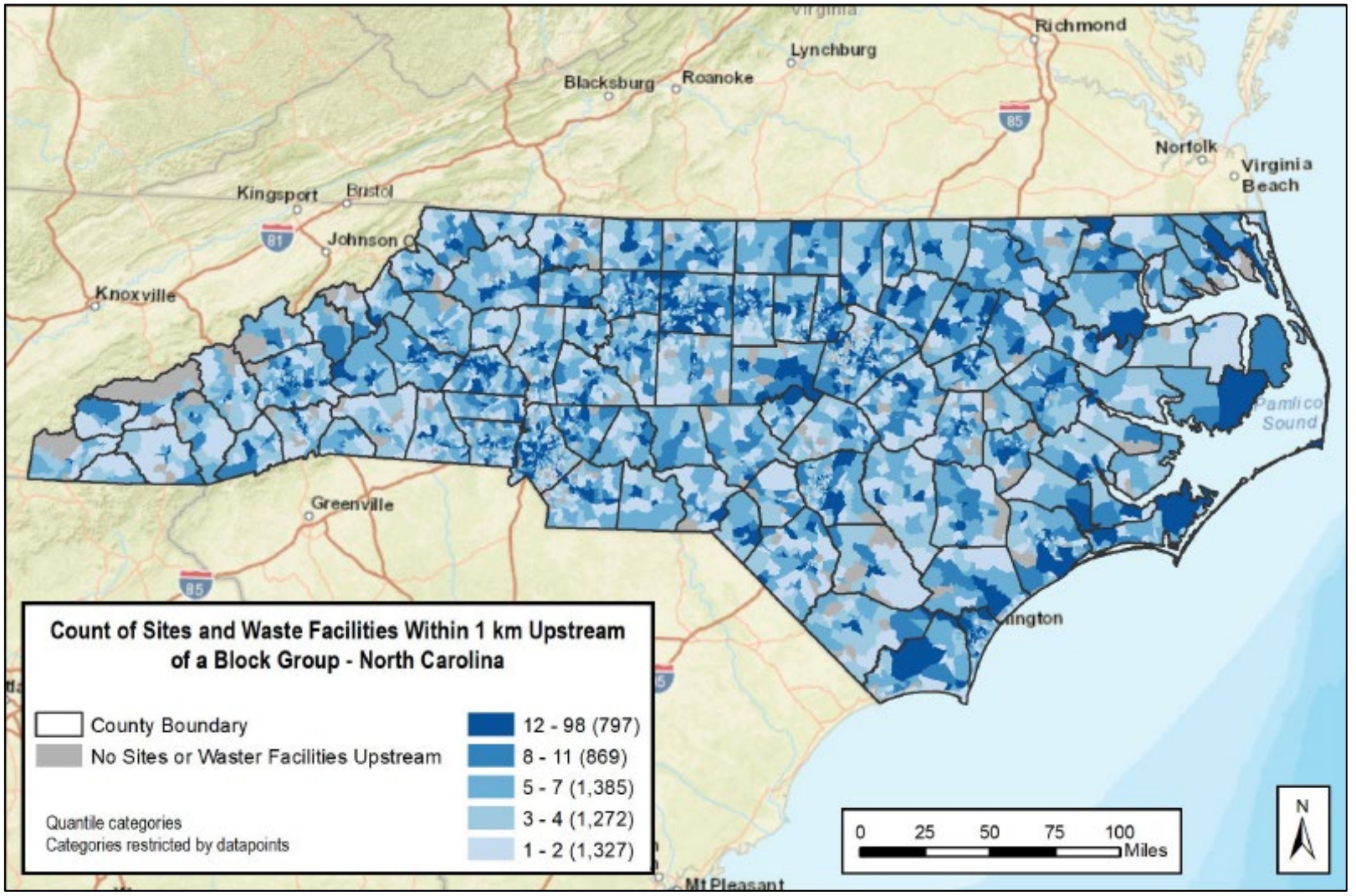
Case Study 2. Median Height Above Nearest Drainage



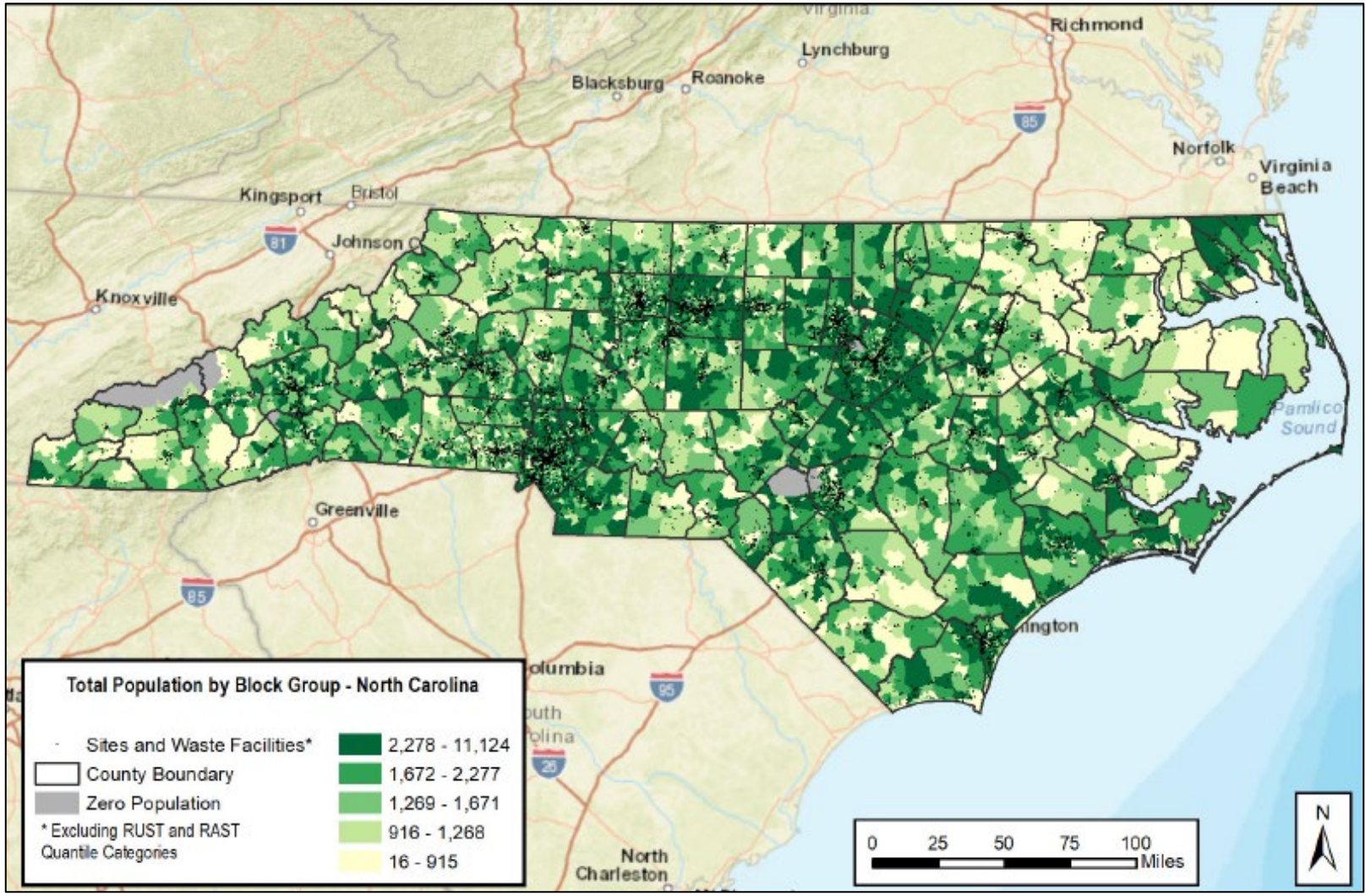
Case Study 2. Sites and Waste Facilities



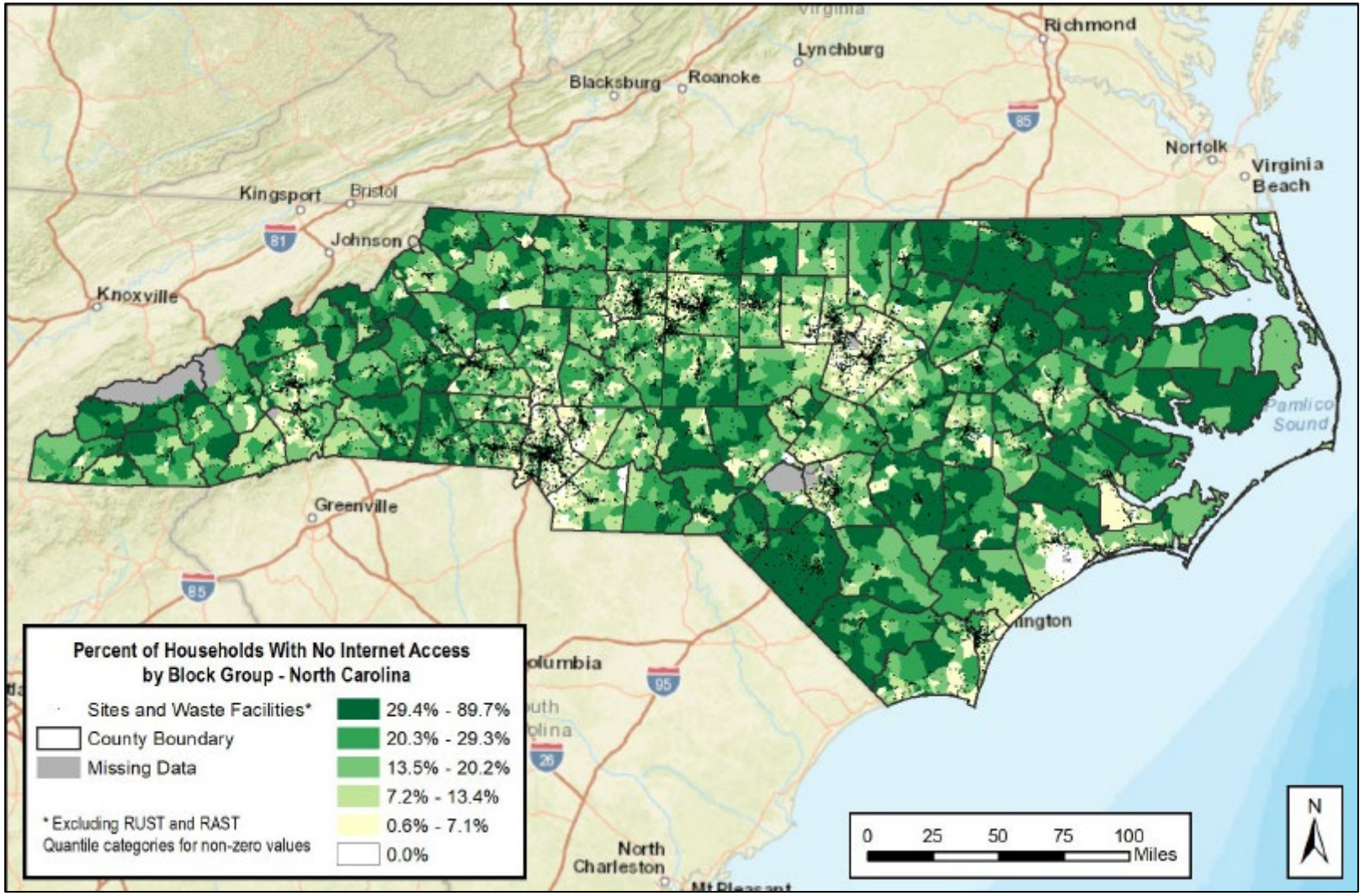
Case Study 2. Fate and Transport (Surface Water)



Case Study 2. Total Population



Case Study 2. Households with No Internet Access



Impacts of Case Study 2

EPA ORD, OLEM & Region 4, NCDEQ, and Lumber River Council of Governments:

NCDEQ plans to use the indicators + community survey for prioritizing areas for assessment in the implementation of Multipurpose, Assessment, RLF, and Cleanup (MARC) grant funding

Next steps include NCDEQ Brownfields Program awarding MARC grants and sharing indicators with other programs

Case Study Results & Impacts

- **Case Study 3. Nationwide Indicators for EPA Office of Land and Emergency Management (OLEM) and Regions** (ongoing)
  - **Goal**: Build consistent screening approach to identify sites/facilities most vulnerable to extreme climate events

EPA ORD:
Meridith Fry, Lauren Oliver, Susan Julius

RTI International:
Paramita Sinha, James Cajka, Emily Decker, Rohit Warrier, Michele Eddy, Sarah Bates, Rishi Dey

EPA OLEM:
Lisa McArthur, Rebecca Kane

Ten EPA Regions

Case Study 3. Selected Indicators

- Heavy precipitation
- Height above nearest drainage

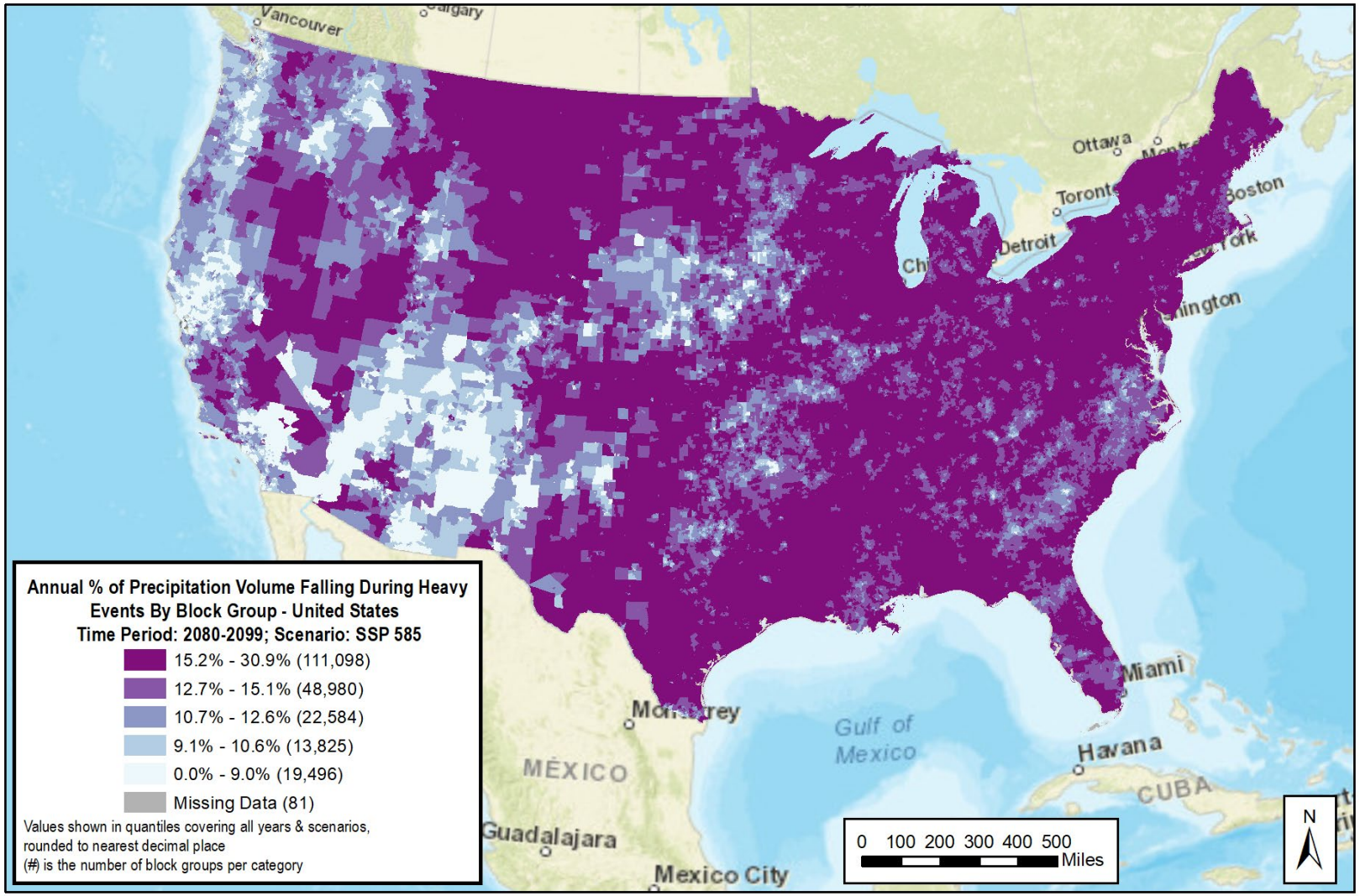
} Flooding

- Drought*
- Extreme Heat*
- Wildfire*
- Sites & waste facilities*

**Being calculated presently*

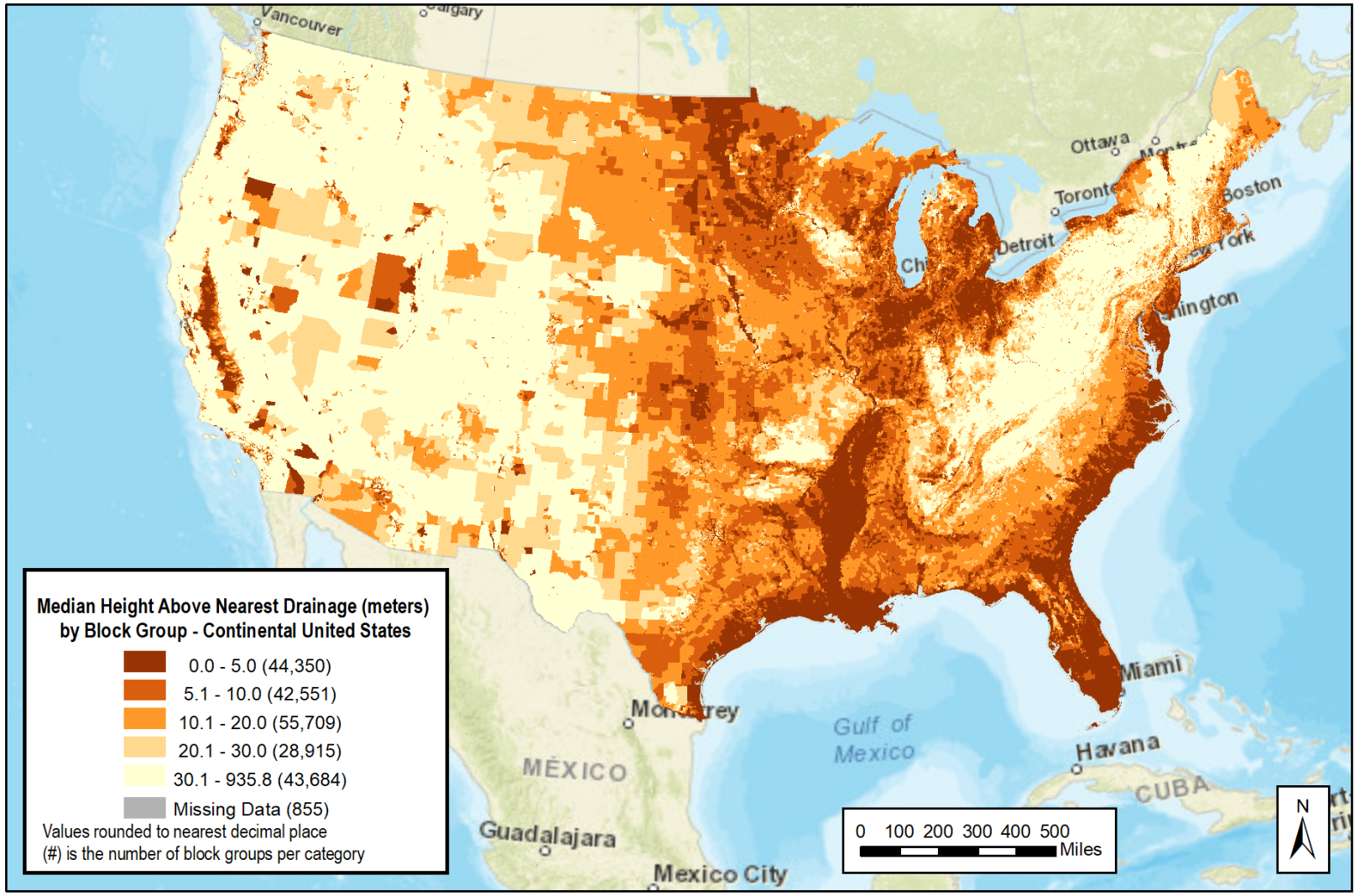
Flooding from Hurricane Harvey at border of Highlands Acid Pit, a Superfund site (photo credit: Associated Press)

Case Study 3. Heavy Precipitation



Available on EPA GeoPlatform: [Nationwide Heavy Precipitation]

Case Study 3. Height Above Nearest Drainage

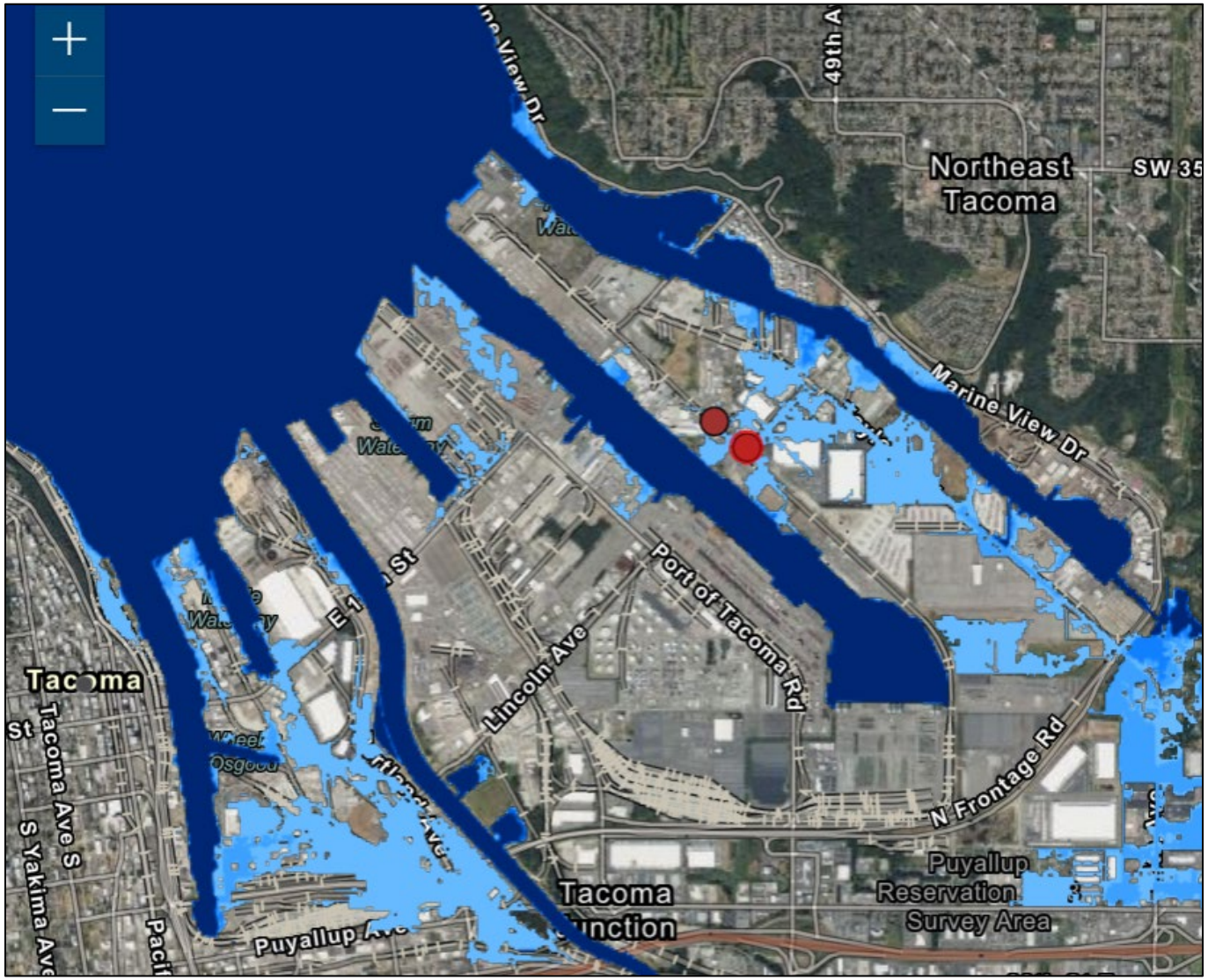


Available on EPA GeoPlatform: [Nationwide Height Above Nearest Drainage]

Impacts of Case Study 3

EPA's Office of Resource Conservation and Recovery (ORCR) plans to use the nationwide indicators in a climate vulnerability screening tool for the **Resource Conservation and Recovery Act (RCRA)** and **polychlorinated biphenyls (PCB)** programs.

EPA Regions and other program offices are planning to conduct similar screenings.



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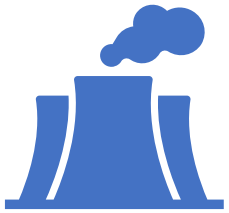

Problem

Indicator Approach

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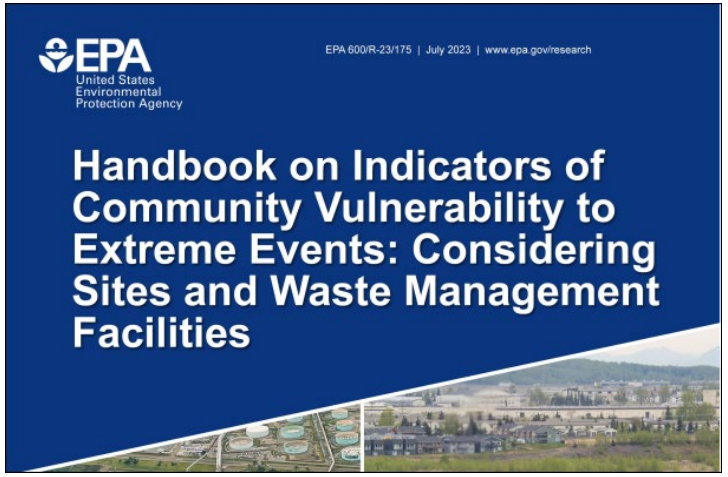
Take Home Messages

Take Home Messages

- The Handbook on Indicators of Community Vulnerability to Extreme Events: Considering Sites and Waste Management Facilities (EPA, 2023) provides a conceptual framework and geospatial indicators approach.

- Through case studies, we demonstrate that this research can assist with:
  - Prioritizing resources
  - Building climate resilience
  - Addressing environmental justice/equity issues
  - Preparing and responding to disasters



www.epa.gov/eco-research/community-vulnerabilities-contaminant-releases-extreme-events

Contacts

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Thank you!

QUESTIONS?