Building Blocks for Regional Resilience Portland, OR: Extreme Heat & Wildfire Smoke

Workshop #2

January 19, 2020

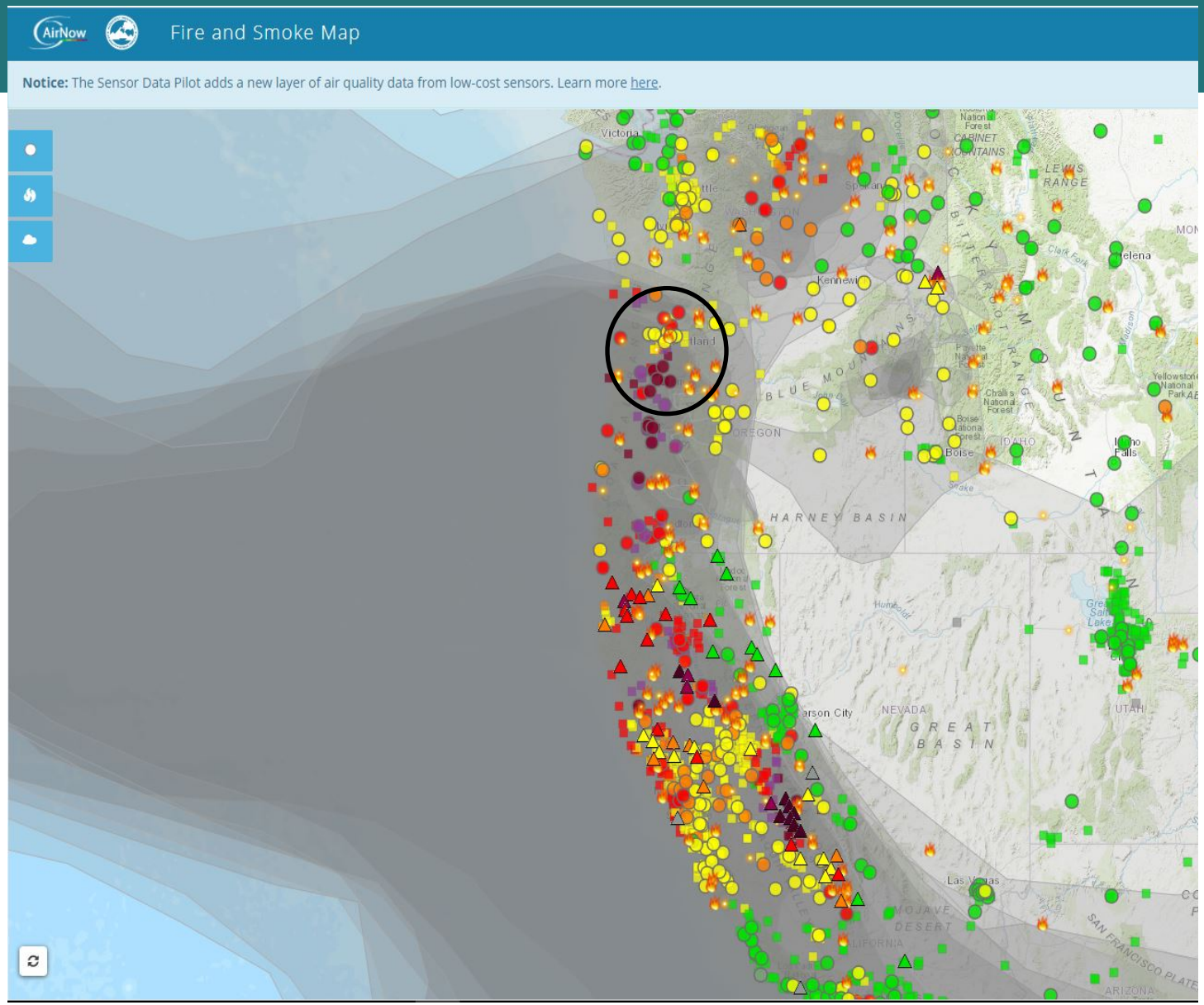
RDPO
Regional Disaster Preparedness Organization

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Metro

Agenda

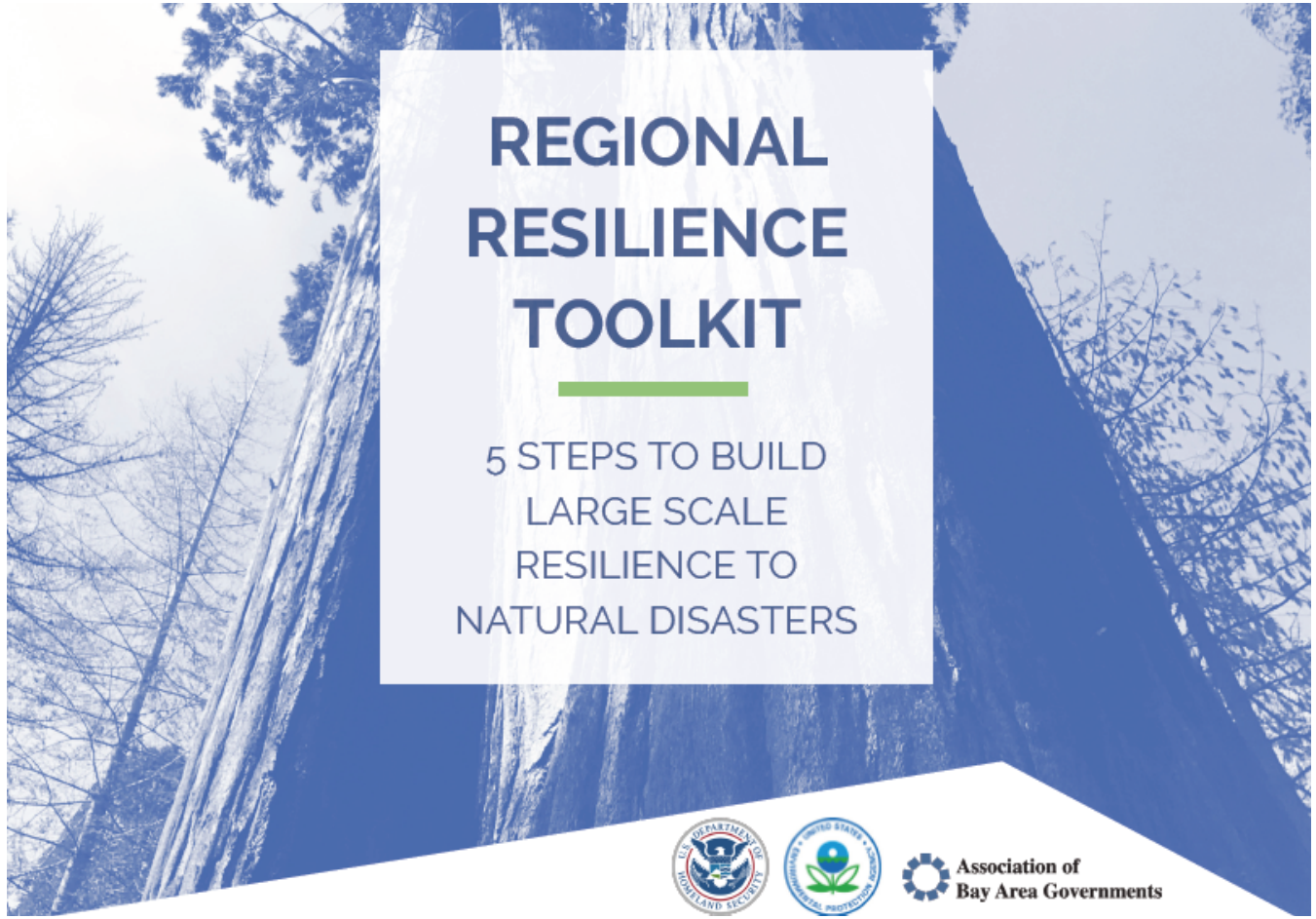
- Introductions
- Project Overview
- Extreme Heat Impacts
- Wildfire Smoke Impacts
- Discuss Risk & Vulnerability Assessment
- Wrap Up and Preview of Next Workshop



Project Overview

- EPA & FEMA Regional Resilience Toolkit

- Final Products
  1. Add Extreme Heat and Wildfire Smoke to Hazard Mitigation Plans
  2. Regional Priorities, Actions, and Funding Plan



Extreme Heat & Wildfire Smoke

Why These Two Hazards?

- Public health
- Equity
- Cascading impacts
- Limited air conditioning
- Climate change will bring more of these events

Current NHMP Hazard Rankings

1. Severe Weather
2. Earthquake
3. Flood
5. Volcanic Activity
4. Wildfire
6. Drought
7. Landslide
8. Extreme Heat
9. HazMat*
10. Dam Failure*

* from Portland MAP

Feedback So Far

- Community-Based Organization interviews
  - Asian Pacific American Network of Oregon (APANO)
  - Pineros y Campesinos Unidos del Noroeste (PCUN)
  - Home Forward & Joint Office of Homeless Services, Multnomah County

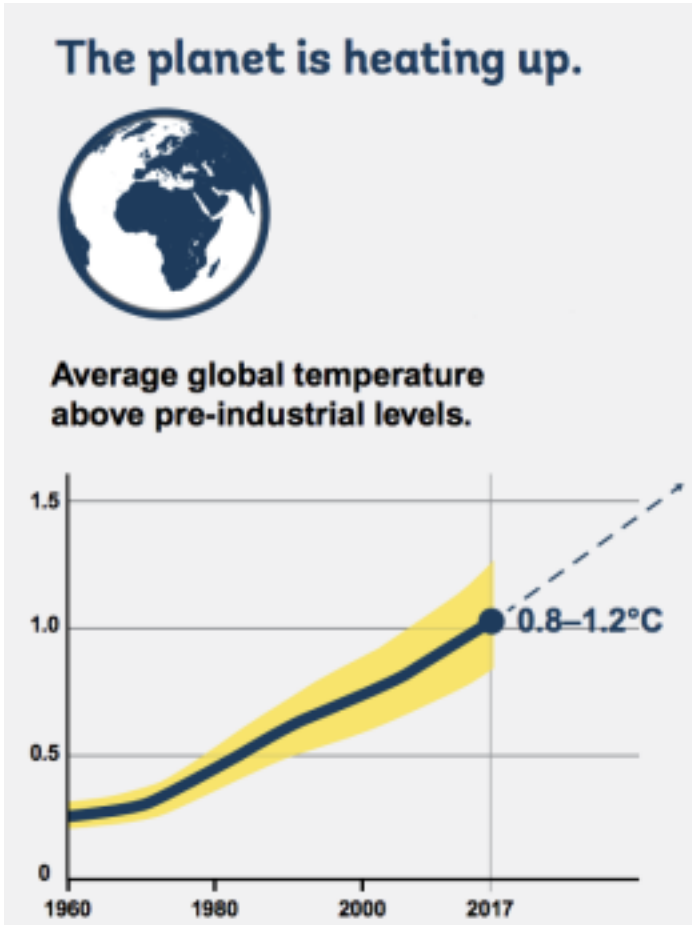
- Briefings for:
  - Regional Disaster Preparedness Organization Mitigation & Recovery Subcommittee
  - Metro Policy Advisory Committee & Metro Technical Advisory Committee
  - Clackamas County Coordinating Committee
  - Washington County Coordinating Committee
  - (Multnomah) East County Issue Forum
  - Workshop with elected officials and local leadership last week (Jan. 13)

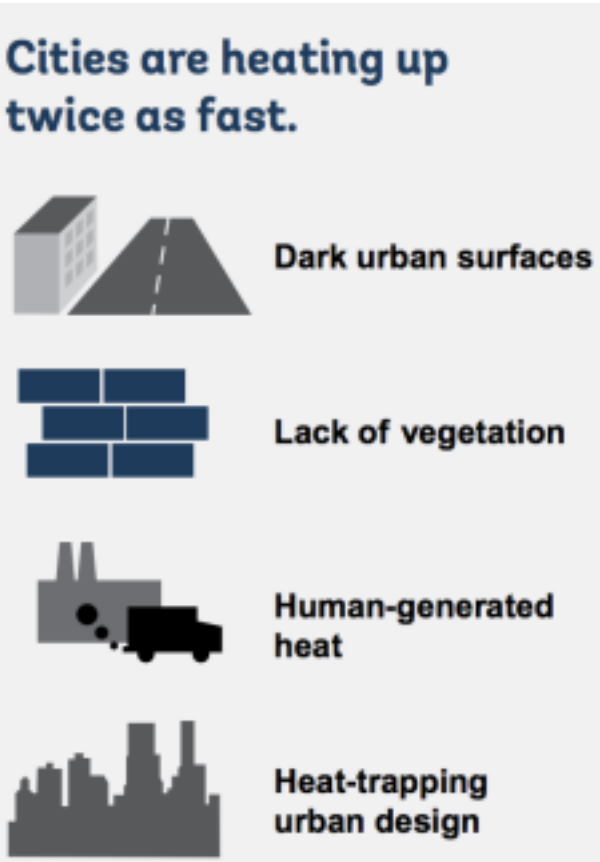
Urban Heat
From assessment to action

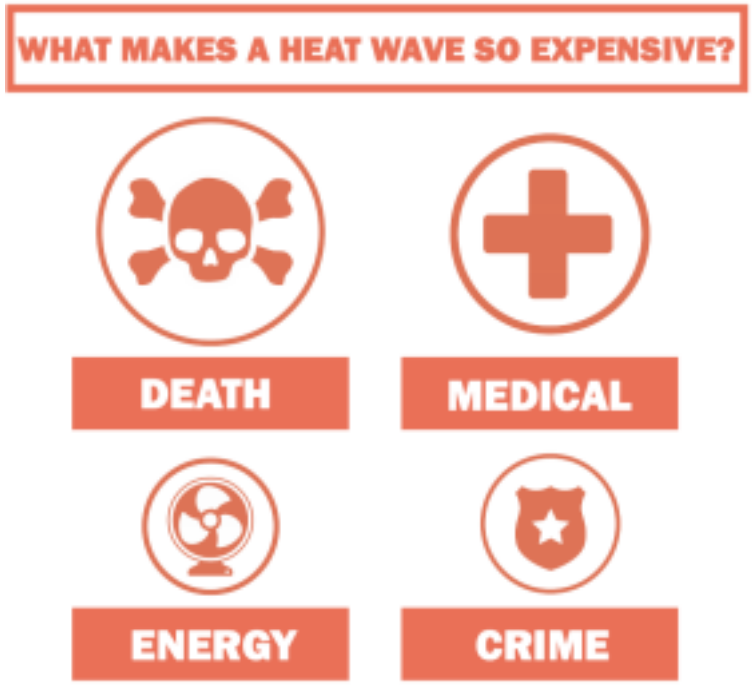
January 19, 2021

Vivek Shandas
Portland State University

Urban heat is a key urban policy challenge



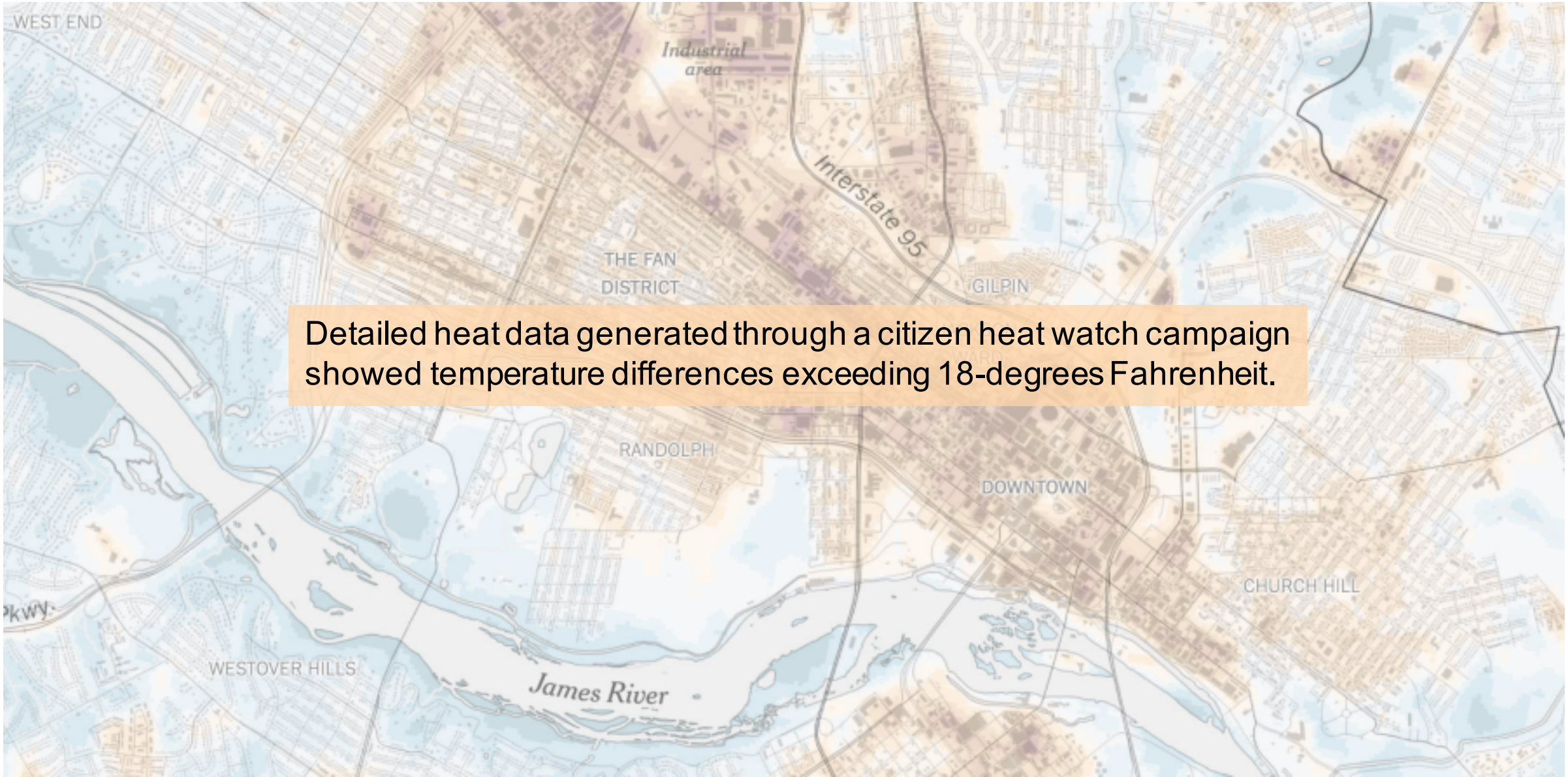




Policymakers often lack evidence on urban heat and its impacts.

Image source: ESMAP Cool Cities Primer

Case study: Richmond, Virginia (USA).

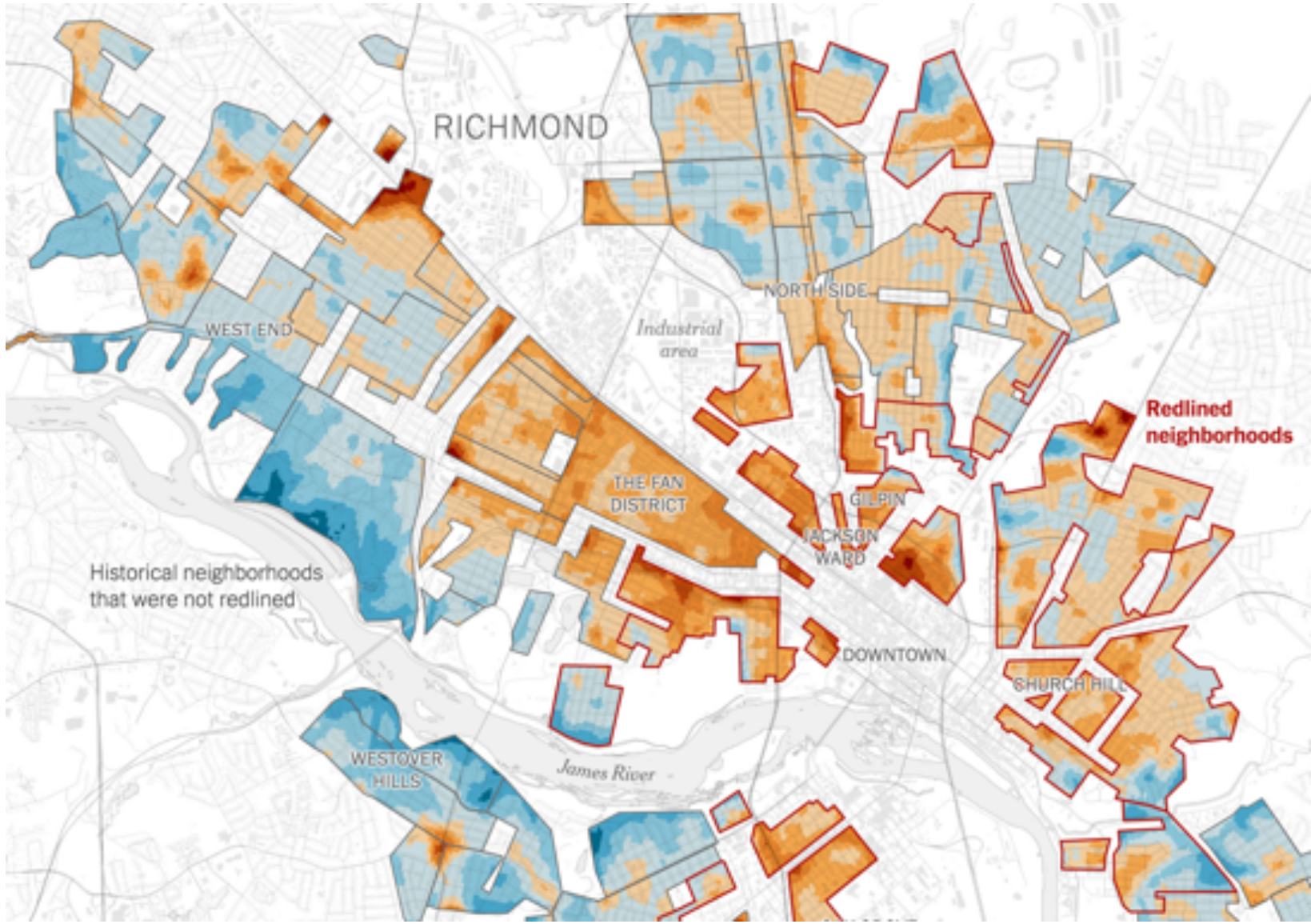


Detailed heat data generated through a citizen heat watch campaign showed temperature differences exceeding 18-degrees Fahrenheit.

Case study: Richmond, USA

Heat difference of up to 10C: low-income and minority neighborhoods most affected.

Detailed heat mapping pinpoints the influence of tree cover and impervious surfaces.



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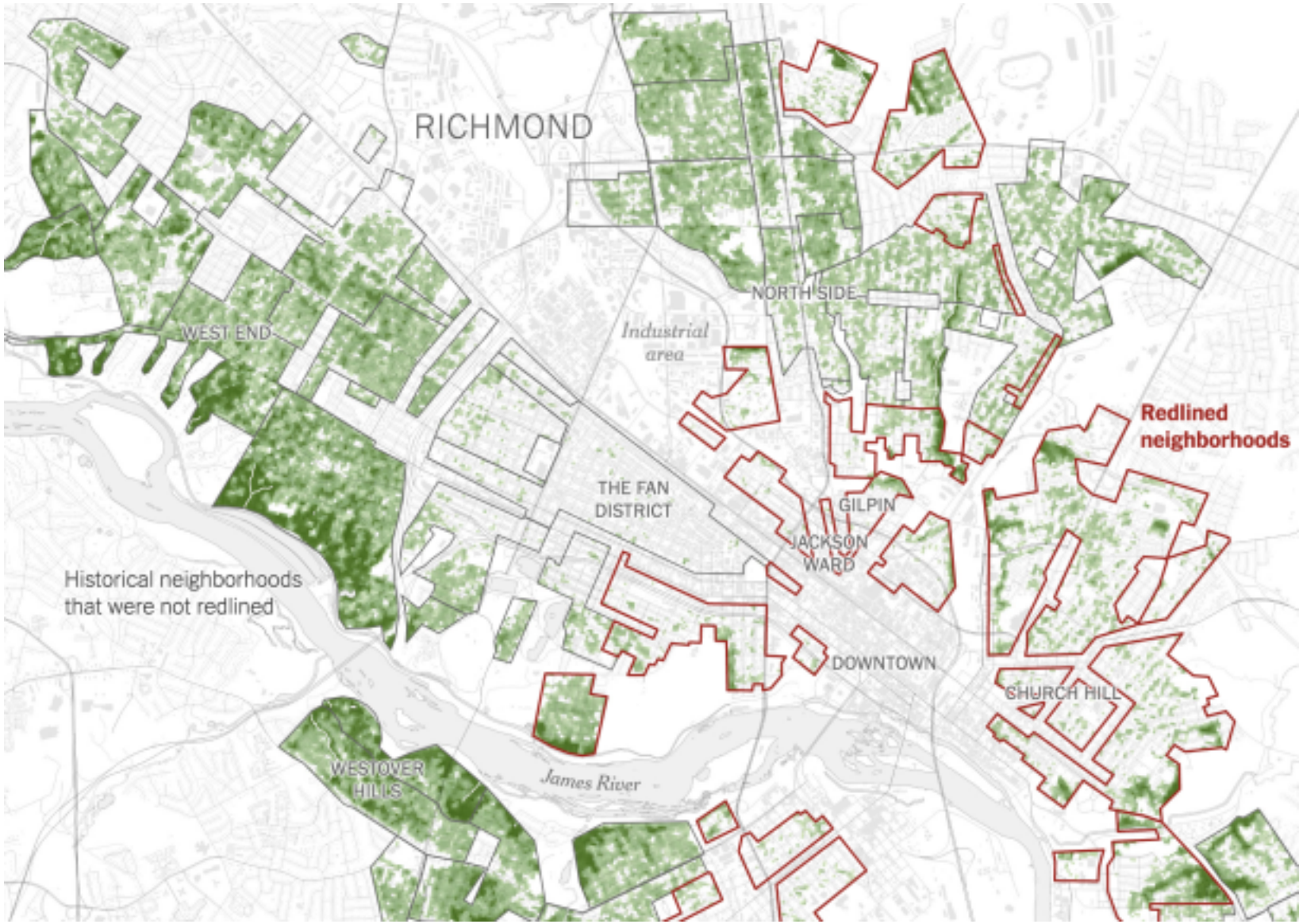

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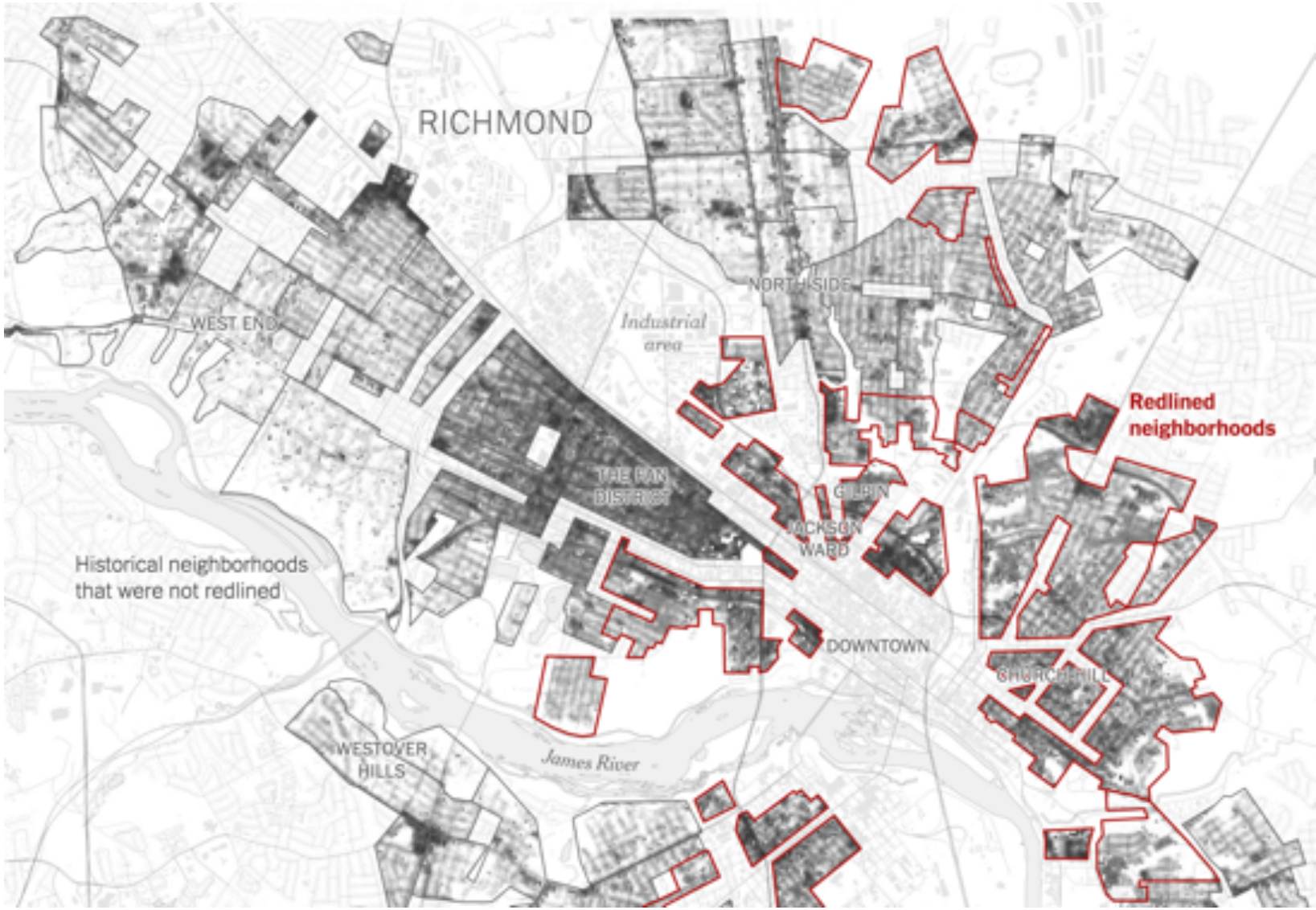


Case study: Richmond, USA

Gilpin: a low-income neighborhood with few trees and much paved area.

Westover Hills, a middle-income neighborhood, is cooler on average on summer days.

Case study: Richmond, USA

Playground equipment in Gilpin Park.

Playground equipment in Lombardy Park.

Source for Richmond case study slides: NY Times [link]

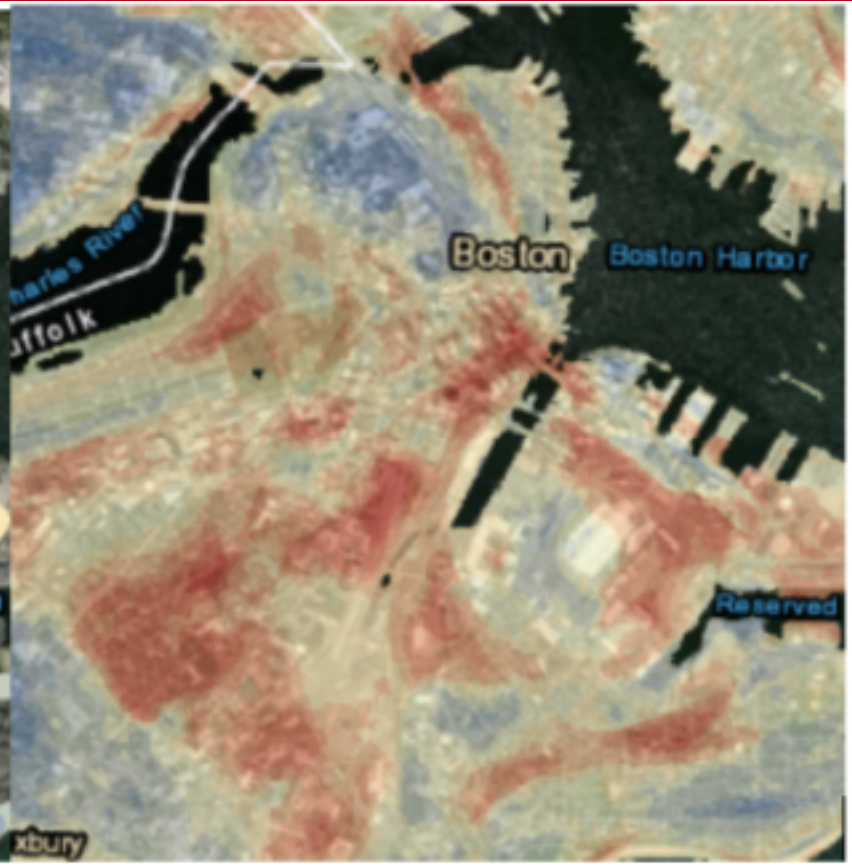
Measuring urban heat: three methods

Satellite-based

Ground stations

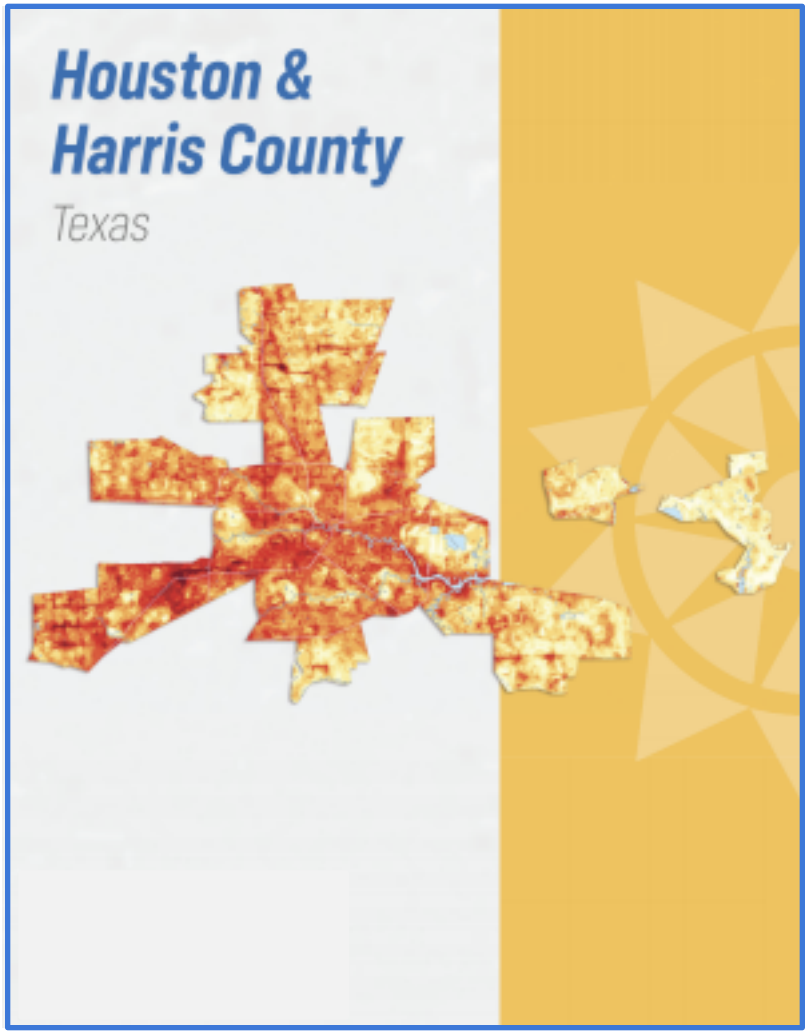
Vehicle traverse

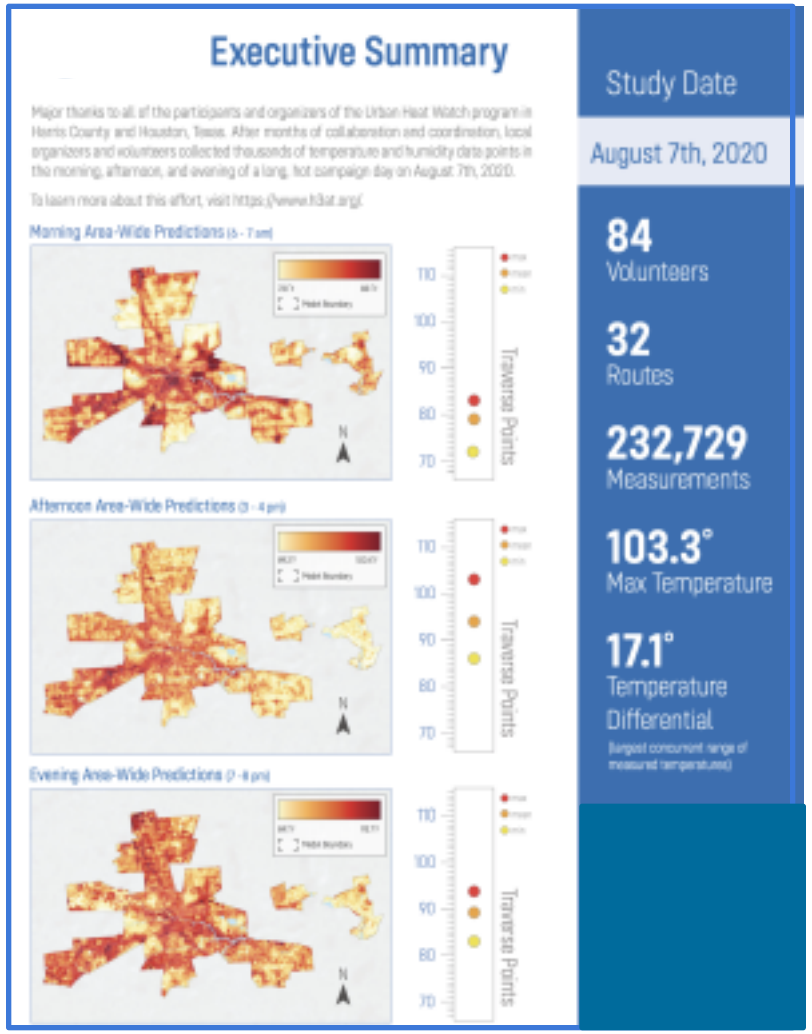
Vehicle Traverse through Community Engagement

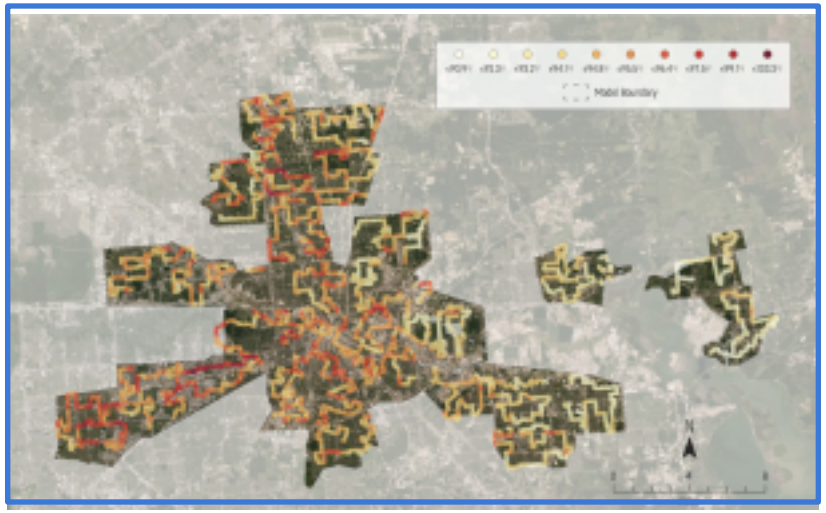


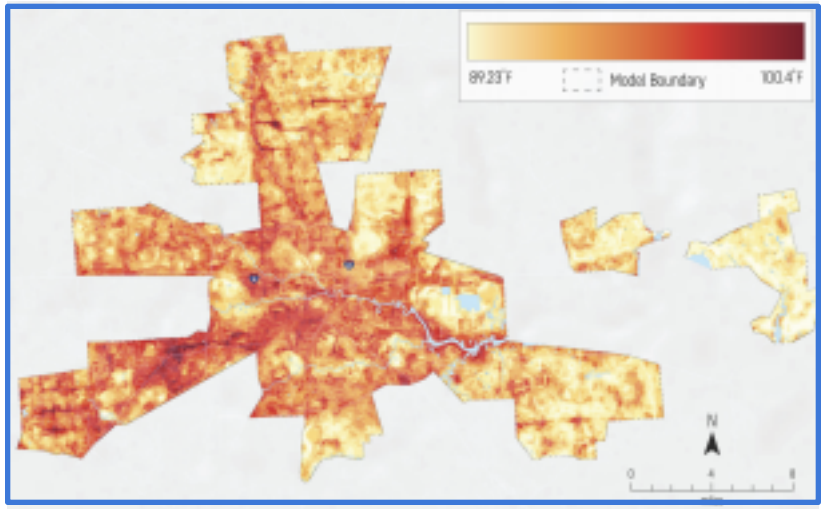
From left to right: (1) a volunteer installs a heat sensor on their car; (2) pre-planned routes are driven across the city to collect heat data along the way; (3) high-resolution air temperature maps identify difference in heat exposure between neighborhoods.

Report output

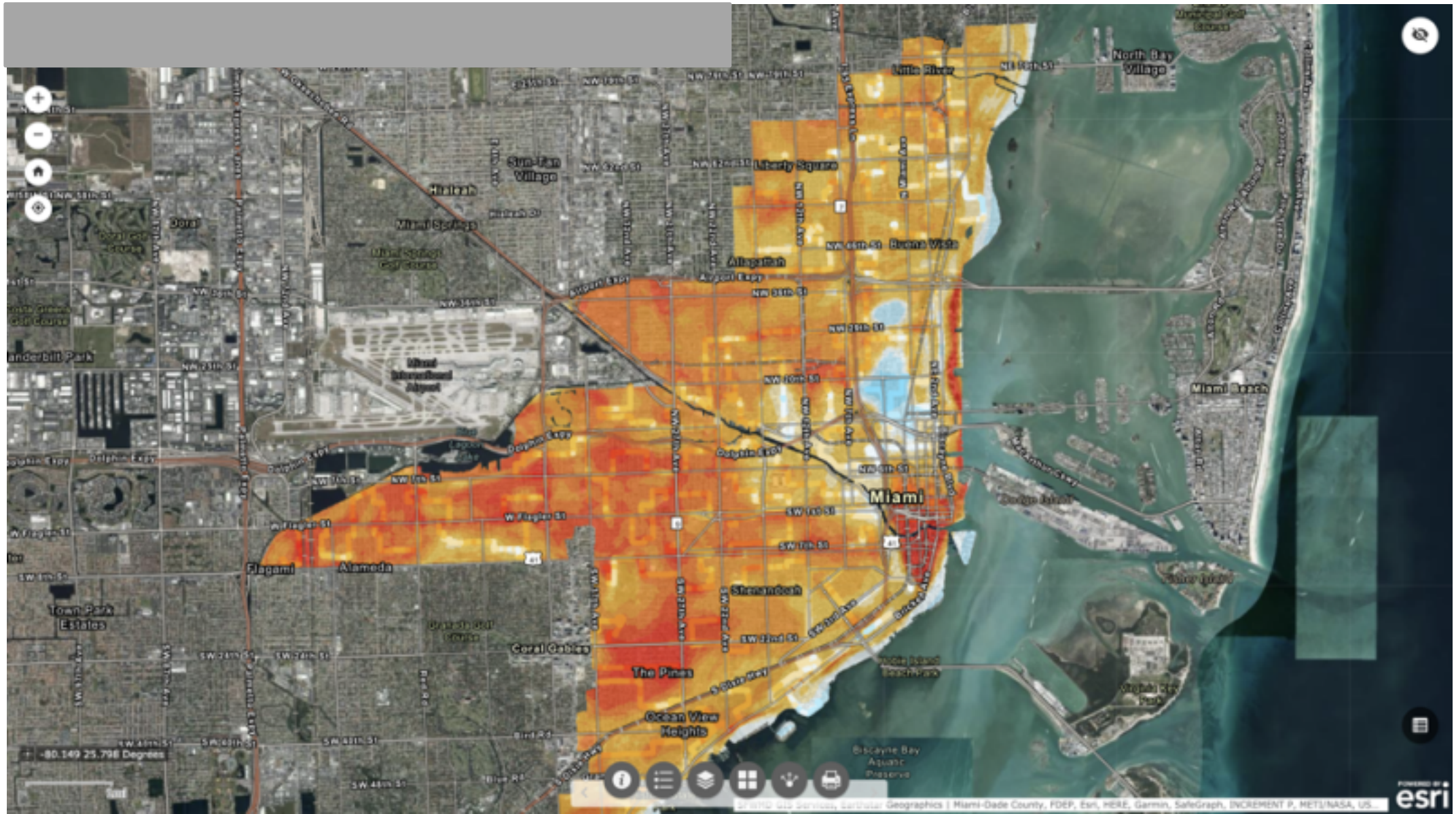




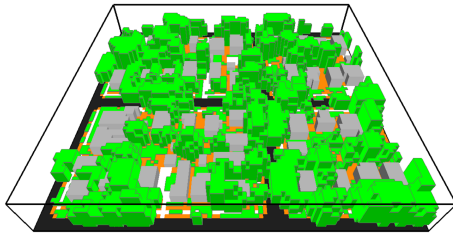




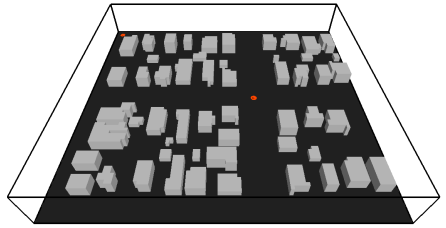
Web map output



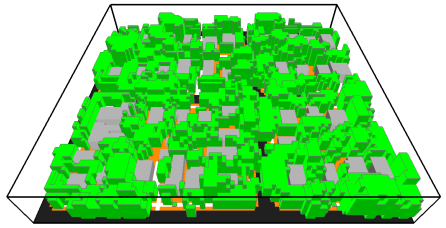
Changing the Landscape
Scenario1: High Canopy Neighborhood



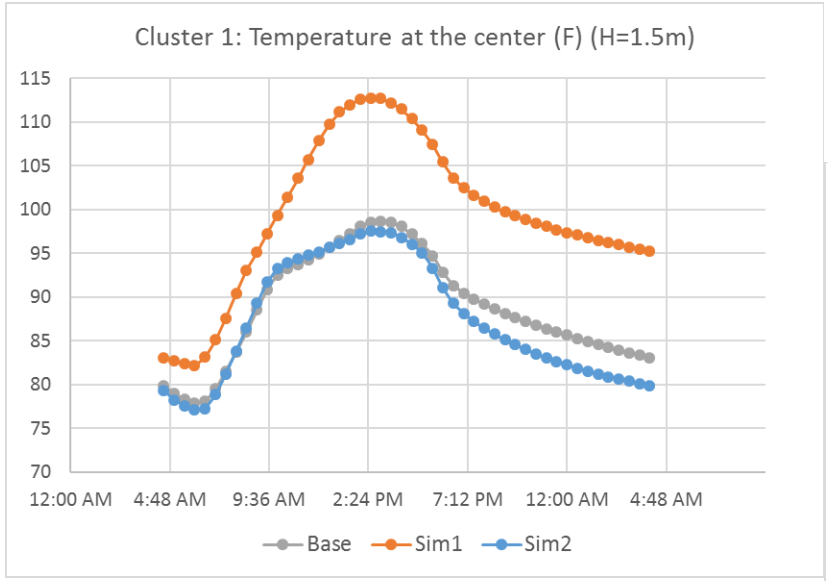
Base



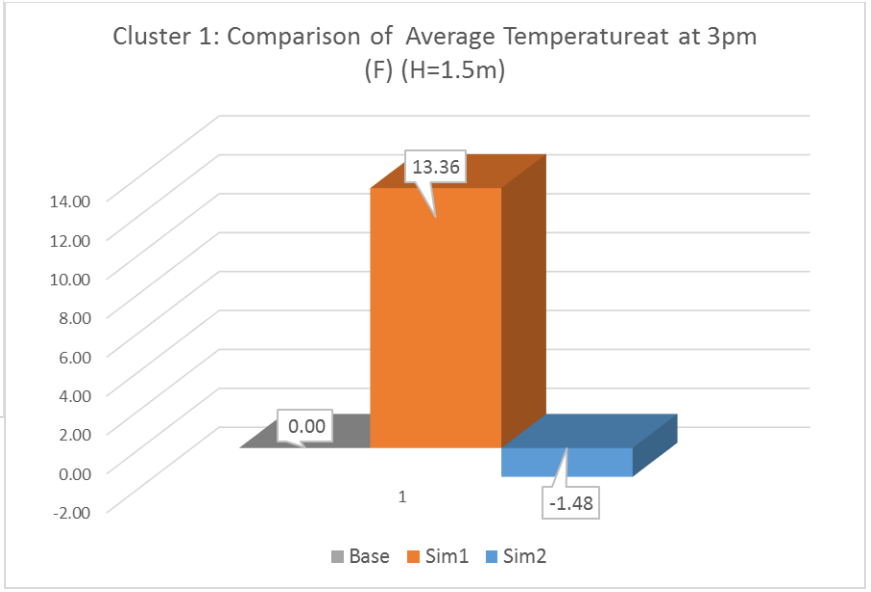
Sim1



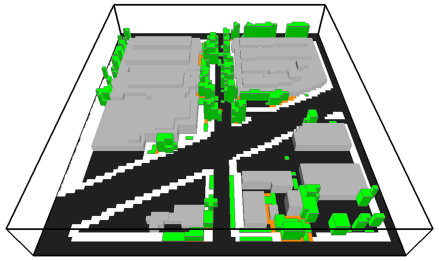
Sim2



- *Removal of trees increases temps more than 13^{0}F*



Changing the Landscape
Scenario2: Industrial District



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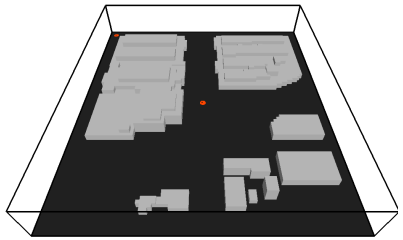

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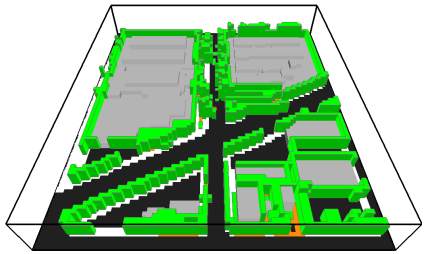

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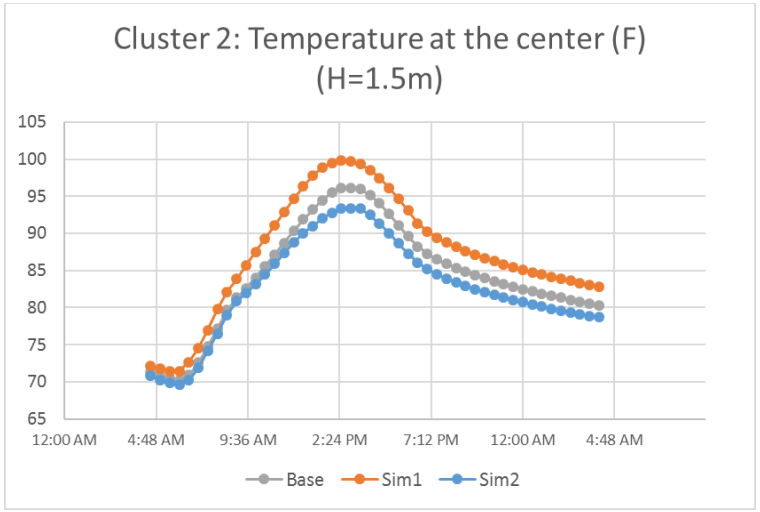
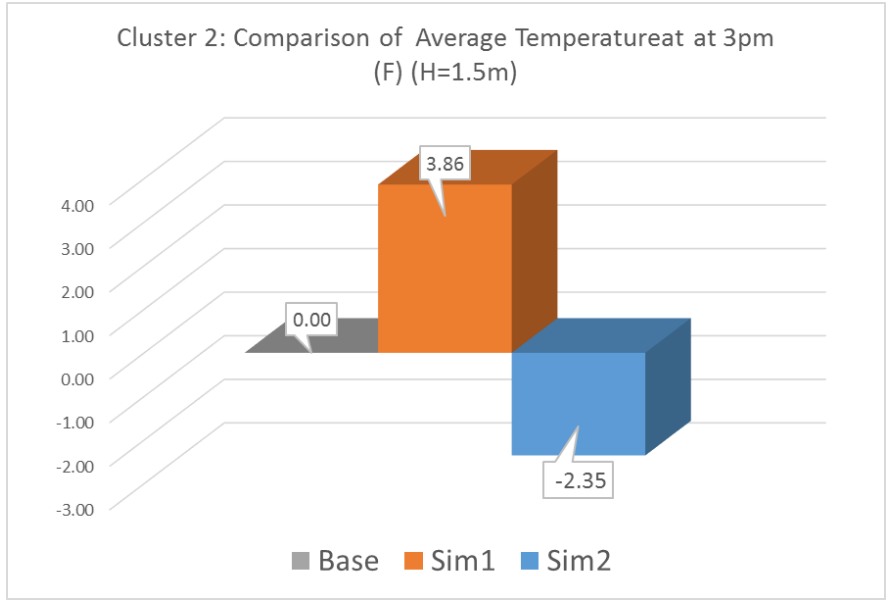




- *Increasing trees reduce temps by 2^0F*
- *Ecoroofs (not presented) reduce over 5^0F*

Heat-mitigating actions: a typology

Category	Policies and programs	Example city
Awareness raising	Guidelines, toolkits, design guides	Bogota, Melbourne
	Heat health alerts	Seoul, Paris, Athens
	Demonstrations in heat vulnerable areas	Nairobi, Pretoria, Hyderabad
	Media campaigns	Guadalajara
Urban planning actions	Heat action planning	Ahmedabad
	Tree planting and maintenance	Singapore, Karachi, Freetown
	Park development	Seoul
	Enhanced public transport access policy	Medellin
Incentives	Cool roof rebates	Austin, Athens
	Tree giveaways	Durban
	Increased FAR for green space provision	Seattle
	Property tax reduction	France, Mexico City, Portugal
Mandatory regulations	Urban cooling / passive design regulations	Paris, Tokyo, New Delhi, Chicago
	Vehicle access restrictions	London

Cities are adopting diverse measures to counter urban heat

Ahmedabad

Early warning system: color-coded heat alerts, actions for vulnerable groups.

Guadalajara

Plant 15,000 trees around 15 roads, 39 parks, 19 sports facilities, excess heat areas.

Paris

Urban oasis: retrofits schoolyards to demonstrate passive cooling options.

Heat data supports climate action planning

Richmond, Virginia

FIGURE 38. **Urban Heat Vulnerability, 2017**

Urban heat vulnerability is a term used to describe an area's conditions that make it heat sensitive using a combination of % tree canopy, % impervious surfaces, % families in poverty, and the amount of afternoon warming during a heat event.

Source: Hoffman et al., Science Museum of Virginia

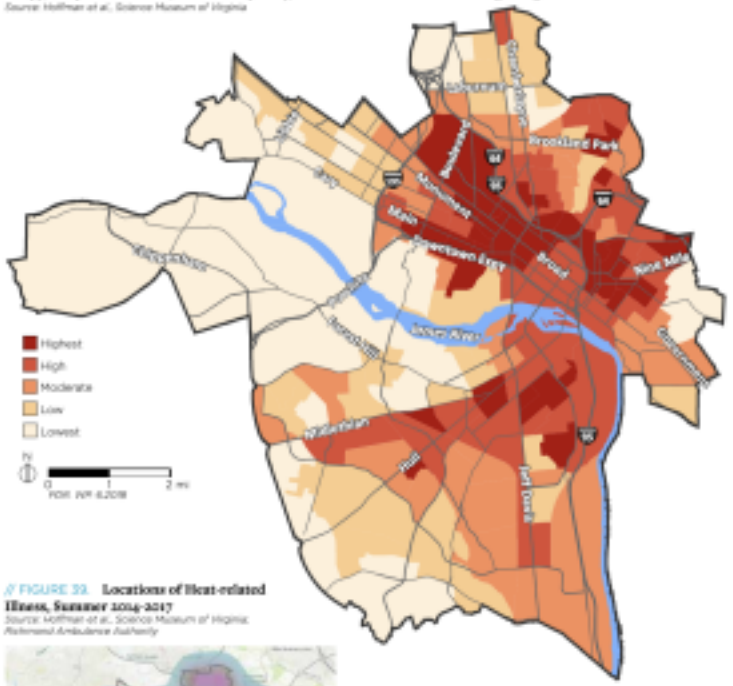
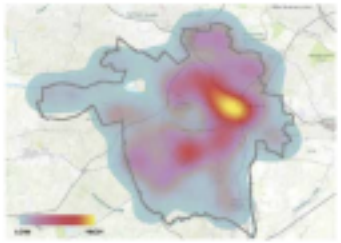


FIGURE 39. **Locations of Heat-related Illness, Summer 2014-2017**

Source: Hoffman et al., Science Museum of Virginia; Richmond Ambulance Authority

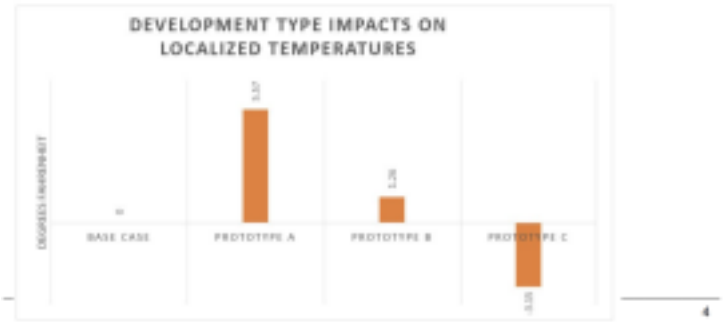


Consider this:

- How can we prepare for the impacts of climate change?
- How do we ensure the most vulnerable populations are included in creating solutions to mitigate the impacts of climate change?

Portland, Oregon

Base case	Prototype A	Prototype B	Prototype C
Existing conditions of a typical neighborhood block, with parking (white) and roads (black), vegetation (green), soil (brown) and buildings (gray).	Multifamily buildings (gray) with large amounts of asphalt paving and surface parking (black), and small amounts of vegetation (green).	Multifamily buildings (gray) with smaller amounts of surface parking (white) and increased vegetation (green).	Multifamily buildings (gray) with surface parking eliminated and vegetation maximized (green). Also, increased reflectivity (albedo) of roadway paving by use of concrete (blue gray).
Temperature: represents base case for comparisons.	Temperature: Increased 5.57 degrees Fahrenheit above the base case.	Temperature: Increased 1.26 degrees Fahrenheit above the base case.	Temperature: Decreased 3.15 degrees Fahrenheit below the base case.



Houston, Texas

16 MAKE HOUSTON NEIGHBORHOODS GREENER AND COOLER TO COMBAT EXTREME HEAT.

Prepare for rising temperatures through neighborhood-based interventions that combat extreme heat and the urban heat island effect.

We can address escalating temperatures and extreme heat waves through a neighborhood-based approach. By mapping urban heat island concentrations and identifying areas at greatest risk and with the most vulnerability, the City can work with communities to strategically mitigate urban and extreme heat through proven tactics, such as light-colored cool roofs and pavement, green roofs, shade trees, and evaporative cooling from plants and vegetation. Trees and vegetation not only provide shade and reduce heat—they also contribute to stormwater mitigation, improved air quality, and enhanced open spaces. By focusing on planting trees and vegetation in areas with minimal green space and improving shade in areas without it, Houston can also address environmental injustice and improve neighborhood equity.

SHOCKS/STRESSES

TIMEFRAME

Short Term (2025)

IMPLEMENTATION THEMES

IMPLEMENTATION PARTNERS

CDM / TNC / HARC / NOAA / Trees for Houston / Houston Wilderness / SPARK / METRO Academic Institutions / School Districts / Philanthropy / Professional Associations / Developers / Neighborhoods

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

16.1 Launch an urban heat island mapping campaign.

We will conduct an urban heat island mapping campaign to engage and educate the general public about Houston's urban heat islands and heat-health safety. Houstonians will be empowered as "citizen scientists," collecting data that will help us understand how the built environment affects perceived temperatures across different neighborhoods. This initiative can be modeled after similar efforts successfully executed in other cities, including Richmond, Washington, D.C.; and Baltimore, in coordination with the National Oceanic and Atmospheric Administration (NOAA).

native trees—replacing the canopy first in places of greatest need. Partners will focus efforts in areas with the strongest urban heat island effects, air pollution issues, environmental injustice, inequitable tree canopy cover, and a high concentration of pedestrians and bicyclists who would benefit from shade. The City will also reduce barriers to tree planting along streets and sidewalks and will encourage tree planting on private properties.

16.3 Expand cool and green roofs.

In hot climates, dark-colored roofs and roof materials that absorb heat can increase the total cost of cooling homes and other buildings. Retrofitting roofs is a cost savings strategy that is both

pavement with a light-colored slurry seal to reduce its temperature during the day. Reducing the temperature of asphalt on streets and surface parking lots can have a dramatic impact on neighborhoods.

16.5 Develop innovative shade structures.

Innovative shade structures can provide not just shade, but also other cooling techniques such as fans or misters to enable more outdoor activities in the summer months. These structures can be placed in a variety of public spaces, including at schools, libraries, community centers, METRO stops, parking areas, and pedestrian walkways. One example of a collaborative public-use shade project

Discussion

Technical clarifications?

Q&A. Suggested starter questions:

- Is urban heat a major issue for your city?
- What initiatives or strategies may be promising for reducing vulnerability to heat, including communications, data, policies, land use planning, etc. ?

Contact

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Professor

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Annex slides:

Logistics

Time

Plan 6 months ahead for campaign.

Project partners

- City agency (project sponsor)
- NGO or university department (volunteer management)
- Technical partner (equipment, campaign design, analysis)

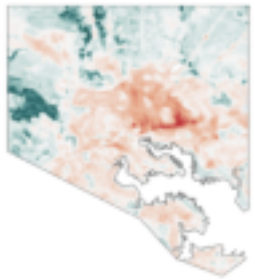
Outputs

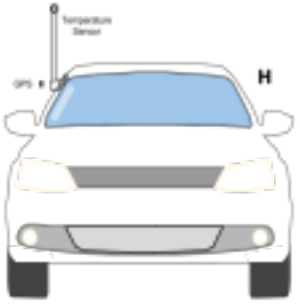
1. High resolution heat data
2. Report and web map
3. Workshop on policy applications

COVID safety

Sterilized equipment pick-up and installation. One volunteer per vehicle.

Vehicle traverse method





(1) Set-up
- Identify project lead within City government
- Identify implementation partner: eg. university or NGO
- Recruit community volunteers with their own vehicle

(2) Campaign launch
- Heat sensor equipment shipped
- Date for campaign launched determined

(3) Data collection
- Volunteers drive their designated route
- Thousands of data points acquired over variety of land covers

(4) Data processing
- The data is used to produce an accurate, area-wide heat map

(5) Analysis and visualization
- Heat data is integrated with income, tree cover, impervious surface and demographic data – visualized on an interactive map.

(6) Implementation
- Workshop to formulate city-level action plans
- Build consensus and prioritize interventions based on the data

ENGAGEMENT

Strengths and weaknesses

Satellite imagery

(+) Uses freely available imagery
(+) Cover wide date range and seasons

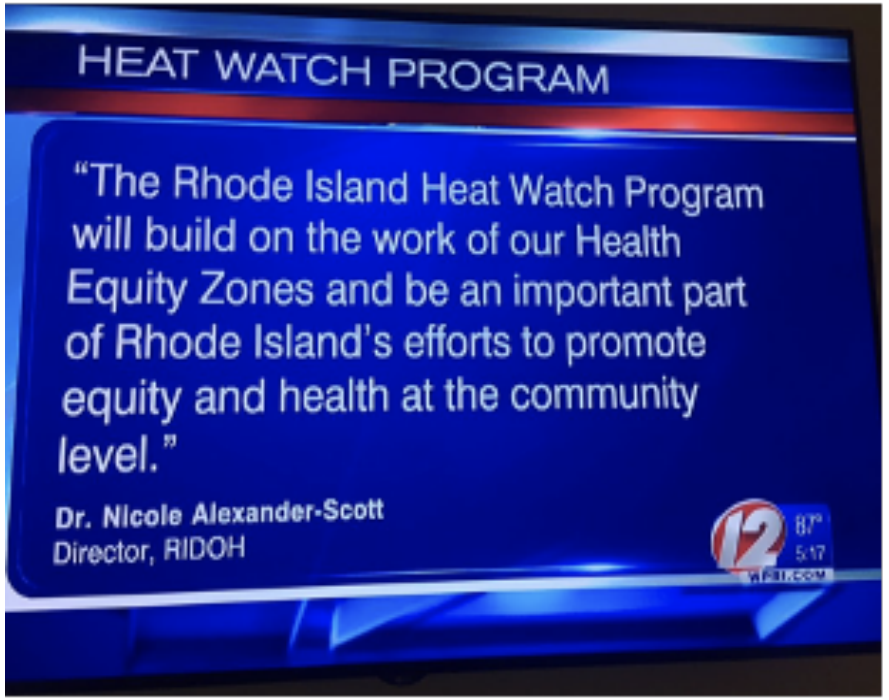
(-) Coarse scale (30m, 90m)
(-) Exaggerates temp. ranges
(-) Surface temperature including roof and treetops.

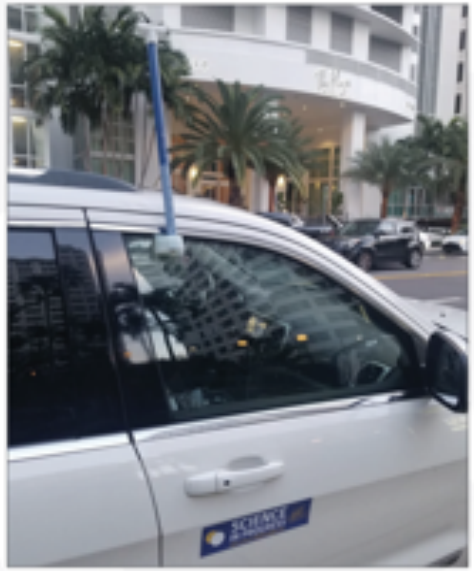
Vehicle traverse

(+) Higher spatial resolution (1m, 10m)
(+) Ambient air temperature and humidity
(+) Process builds ‘civic legitimacy.’

(-) Higher time and effort
(-) Clouds or rains can cause delays

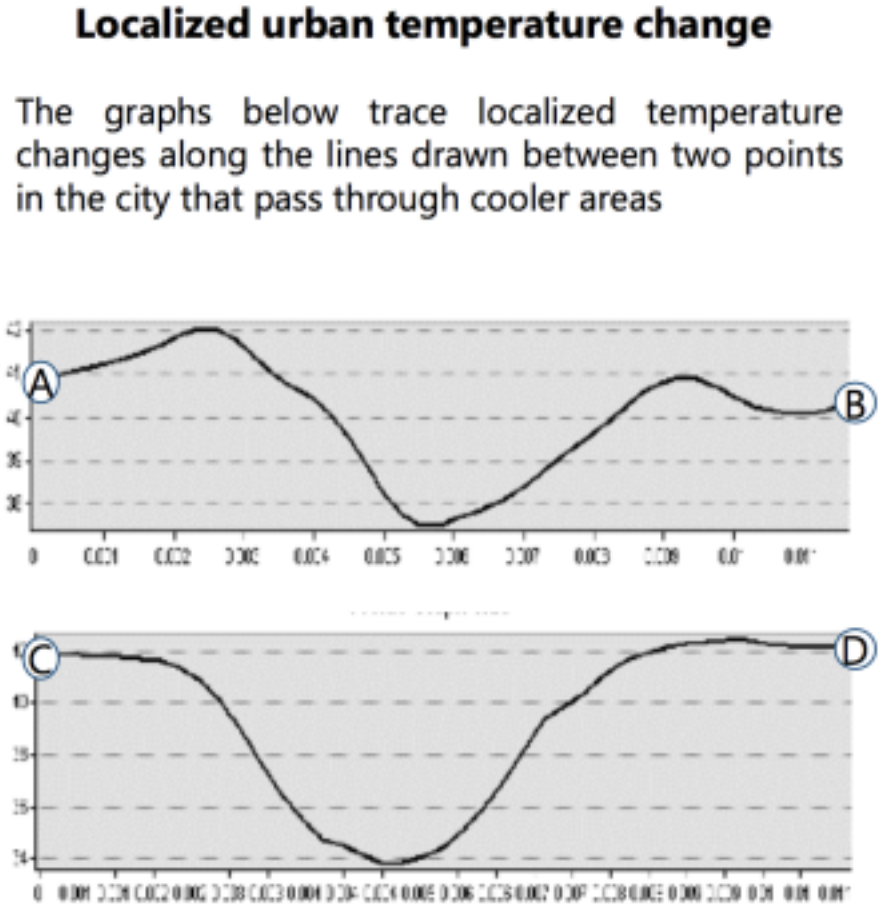
Implementing a vehicle-based urban heat assessment

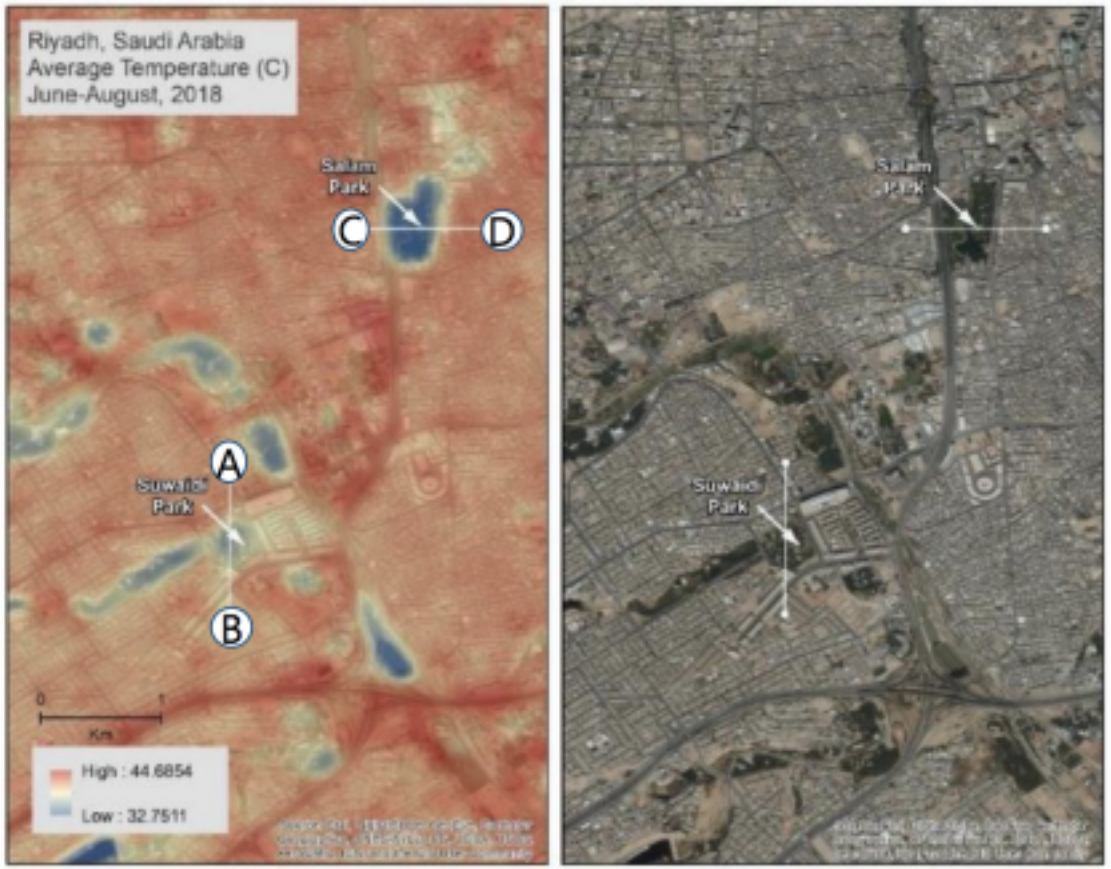




Satellite imagery method

Surface temperature measurements are derived from an appropriate imagery source (typically LandSat), and can be validated against ground measurements.





Source: Analysis by GFDRR / New Light Technologies utilizing LandSat.

Vehicle traverse method

Participants drive pre-planned routes across the city with heat sensors attached to their vehicles. The readings are used to create area-wide heat and humidity maps (+/- 0.1C).

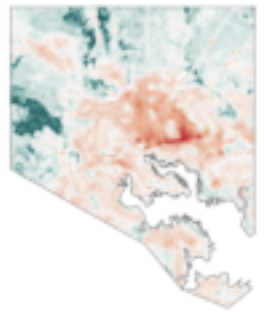
1. Set up: Partnership established with NGO or university; volunteers recruited.

2. Planning. Set date for campaign; routes planned and equipment shipped.

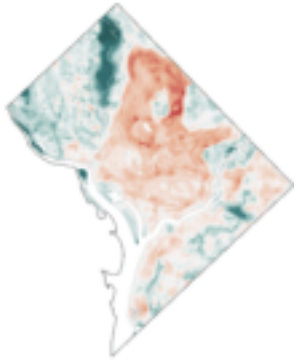
3. Campaign. Volunteers drive their designated route, collecting thousands of data points across city.

4. Analysis. Area-wide map of heat and humidity developed.

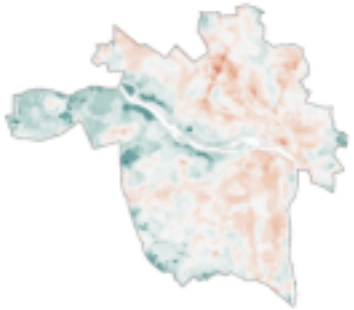
5. Engagement. Workshop to prioritize actions.



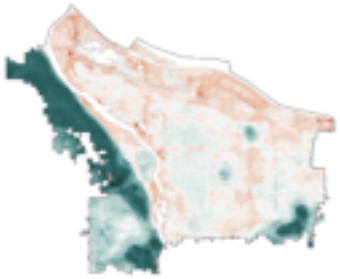
Baltimore



Washington

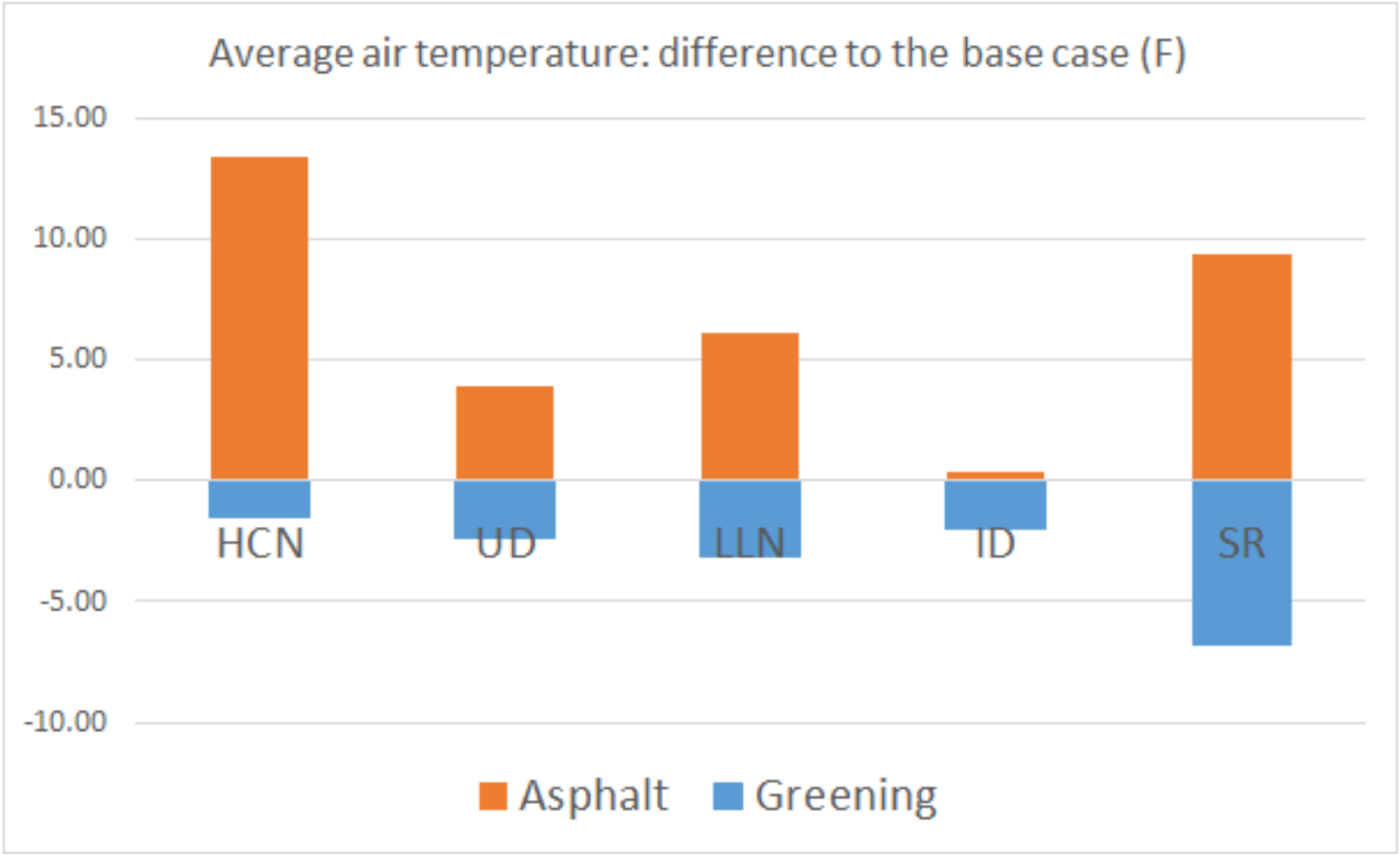


Richmond, Va.



Portland, Ore.

Summary: Development Scenarios & Changes in Temperatures



From initial awareness to action: policy roadmap

Taking stock

- What is the evidence of urban heat islands in the city?
- How can heat mitigation contribute to my city's existing strategies and plans?

Gather and analyze data

- How does heat exposure differ within my city?
- Where do vulnerable people live and work?
- Are there already urban cooling measures in place? How are they performing?

Stakeholder engagement

- Which groups can serve as effective champions? What support or resources do they need?
- Which organizations/ groups should be part of policy design?

Design policies and investments

- What mix of cooling strategies offers the most immediate, high-impact results?

Source: adapted from ESMAP Cool Cities Primer

Portland Regional Resilience Project

Wildfire Smoke

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Office of Research & Development, US EPA
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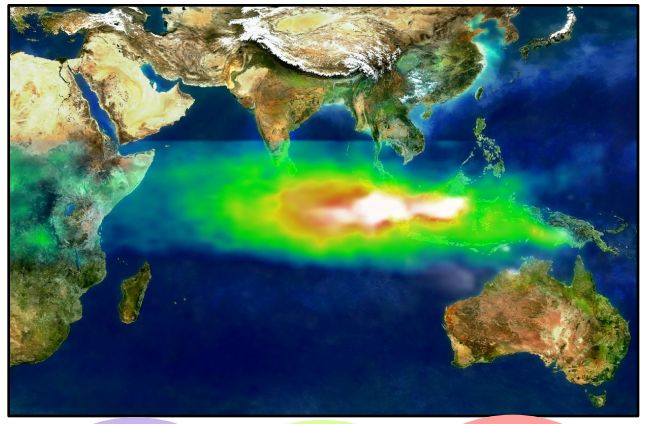
January 2021

Understanding Fire Smoke as a Hazard

Constituents of wildfire smoke:

- Particulate matter
- Trace gases
- VOCs
- Ozone
- CO
- Air toxics
- Hg



Russia 2010

Victoria Australia 2009

Californ 2007

Canada 2003

Canada 2015

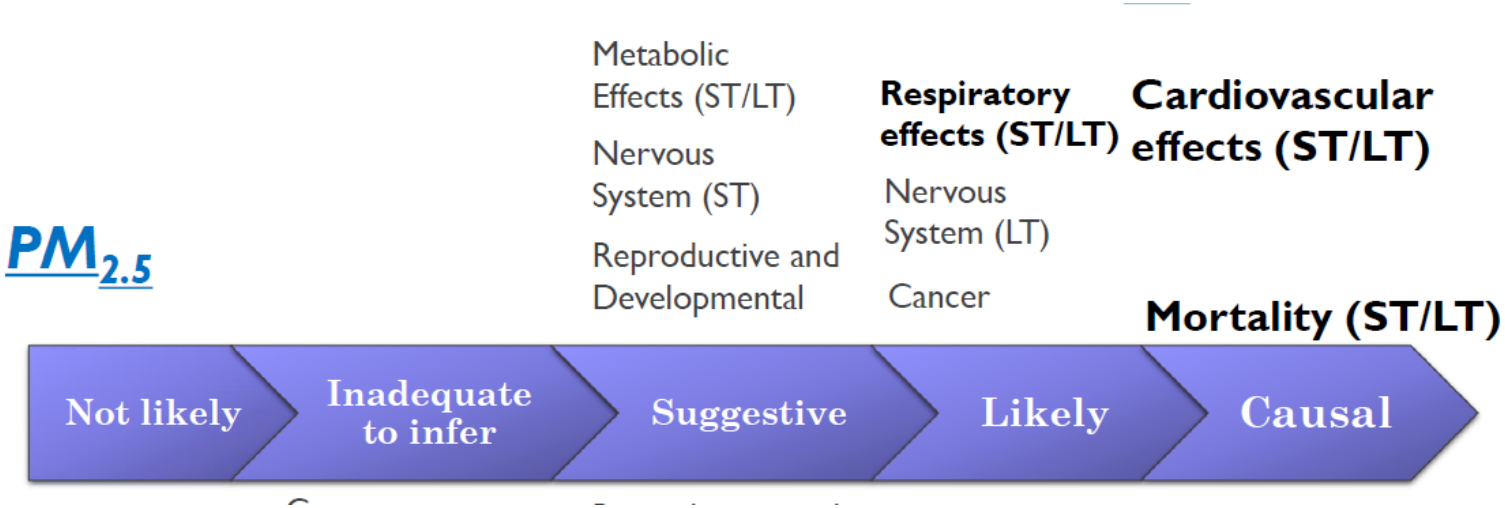
Californi 2015

Washingt on 2015

donesia 1997

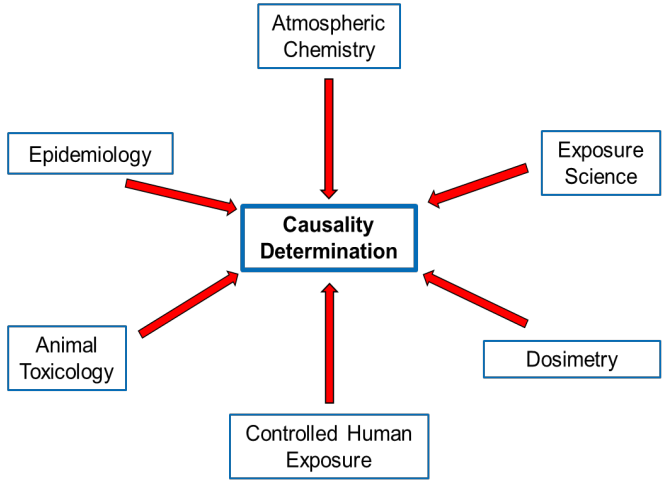
Sydney ustralia 1994

Fine Particulate Matter ($PM_{2.5}$) Causal Determinations Integrated Science Assessment



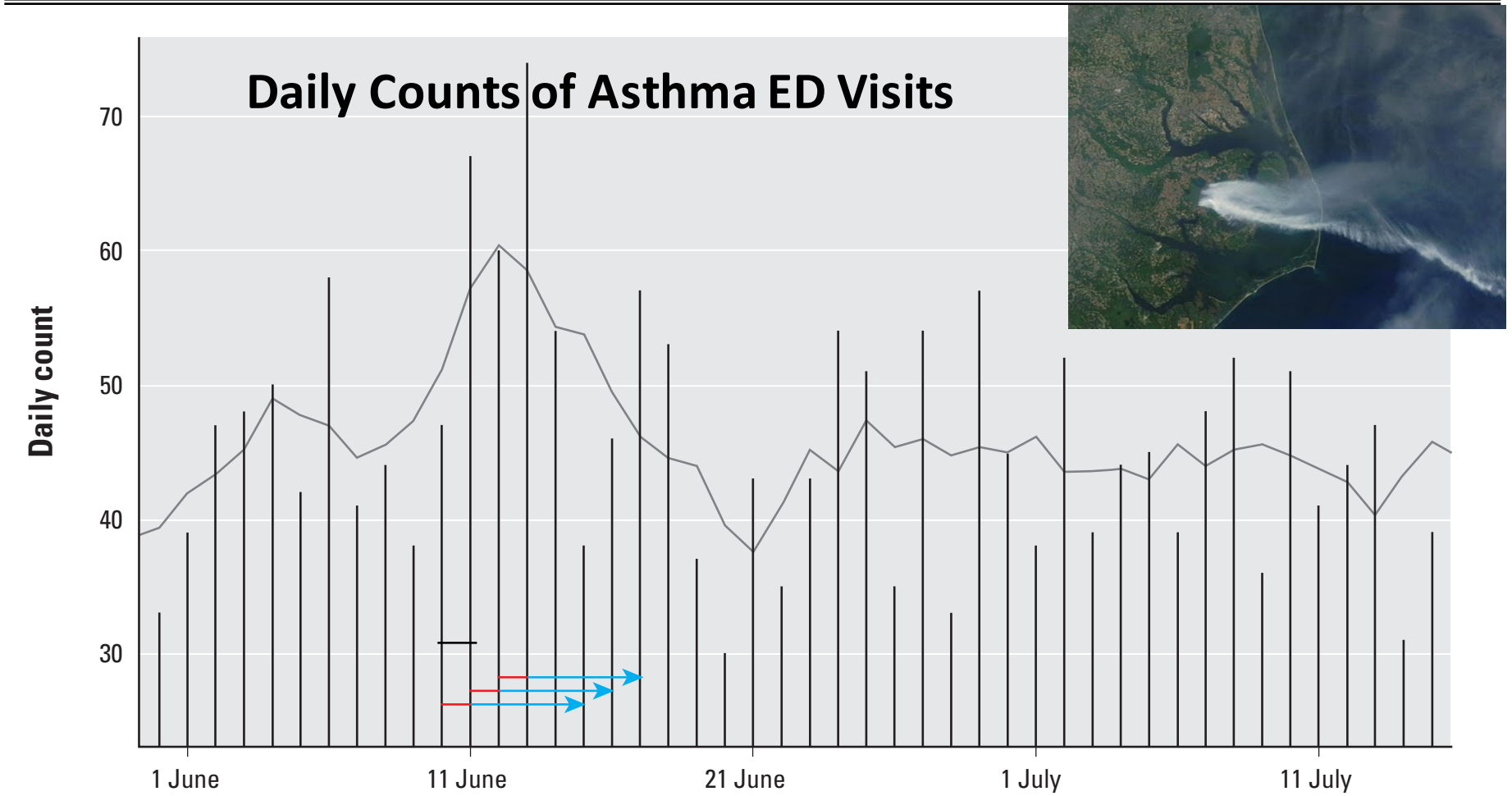
Causality Determinations:

- Weight-of-evidence approach
- Integration of evidence across scientific disciplines for broad health outcome categories



Understanding Fire Smoke as a Health Risk

North Carolina: 2008 Pocosin Lakes National Wildlife Refuge Peat Fire

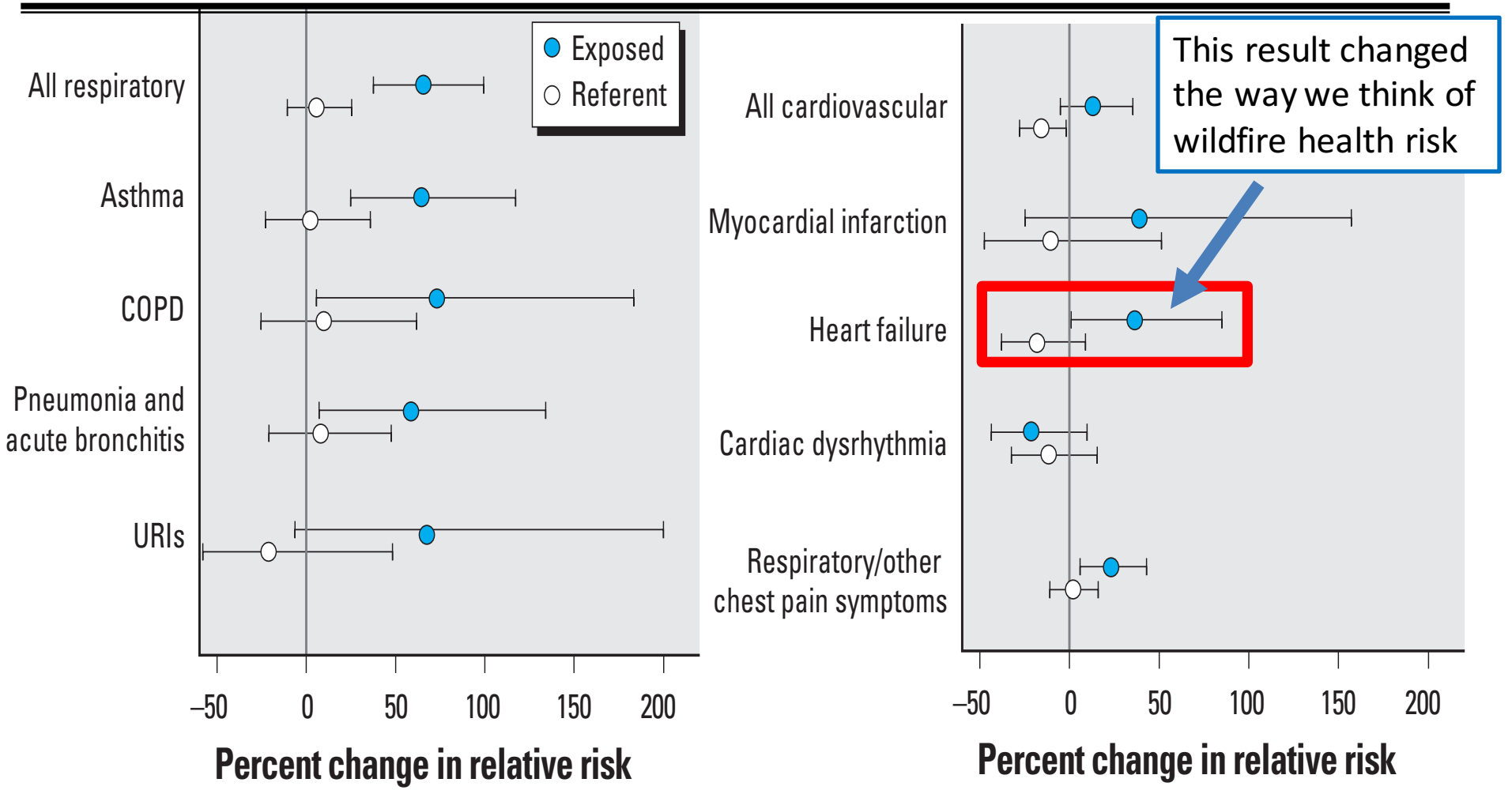


Arrows represent the 3 day of high exposure (red) and the subsequent 5 lag days (blue)

Rappold AG et al. Environ. Health Perspectives 2011

Understanding Fire Smoke as a Health Risk

2008 Pocosin Lakes National Wildlife Refuge Peat Fire



Over 50% increase in Emergency Department visits for Respiratory outcomes, Asthma, COPD, Pneumonia and acute bronchitis. Over 37% increase for Heart failure related visits.

Rappold AG et al. Environ. Health Perspectives 2011

Understanding Fire Smoke as a Health Risk: Assets

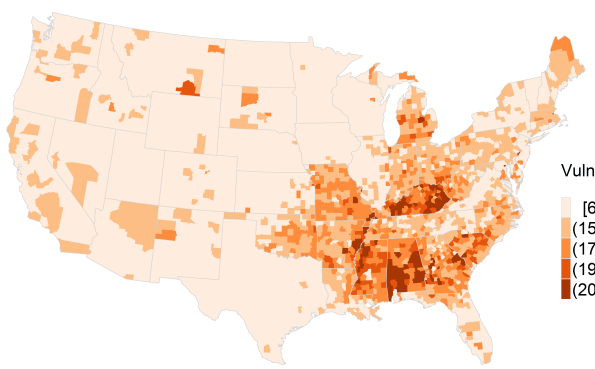
Outcomes:

- All-cause mortality
- Asthma & COPD exacerbations
- Bronchitis & pneumonia
- Childhood respiratory disease
- Cardiovascular outcomes
- Adverse birth outcomes
- Anxiety
- Symptoms such as: eye irritation, sore throat, wheeze and cough

Susceptible populations include

- Populations with pre-existing cardiovascular and respiratory disease
- Adults 65 years of age and older
- Children
- Populations with lower socio-economic status
- Pregnant women and their fetuses
- Populations with chronic inflammatory diseases (e.g., diabetes, obesity)

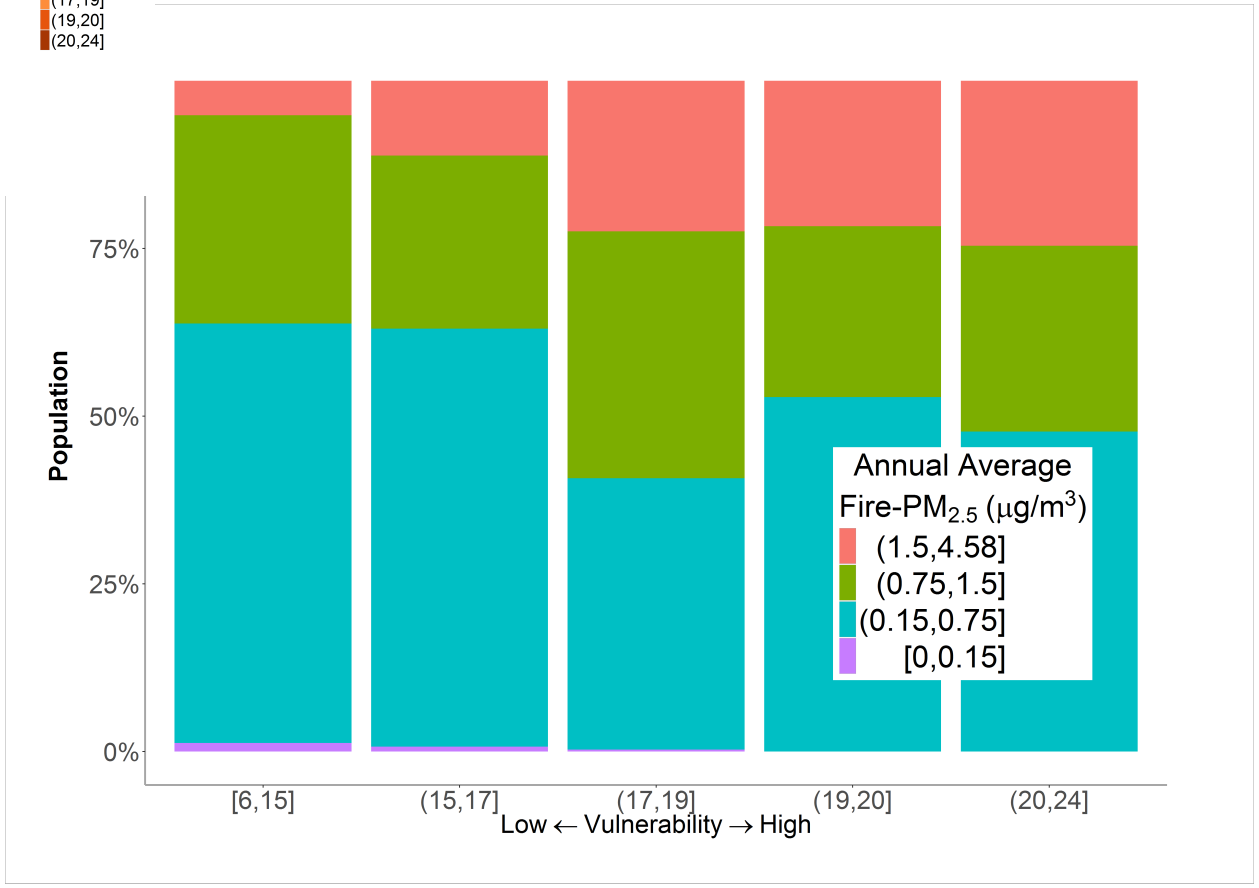
Indexing Community Health Vulnerability



Community Vulnerability to Health Impacts of Wildland Fire Smoke Exposure.
Rappold et al. 2017 ES&T.

Factors of Vulnerability

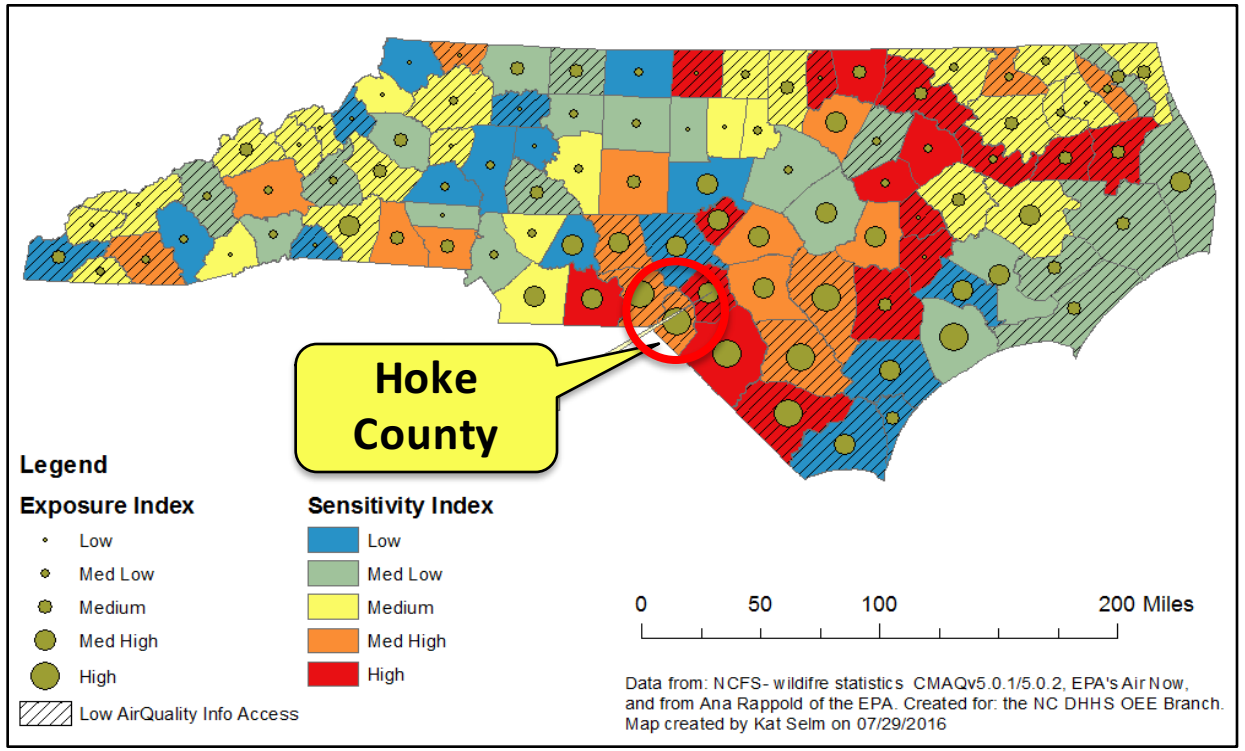
- Peds & Adult Asthma
- COPD
- Obesity
- Diabetes
- Hypertension
- % population age 65+
- Income, education, poverty, unemployment



Community-Health Vulnerability Index Use in North Carolina

CDC-funded North Carolina Health Program

- ***Community-Health Vulnerability Index was adapted for use in North Carolina***
- ***Utilized CHVI to identify an at risk NC community***
- ***Added NC-specific layers (e.g., NC Forestry data)***
- ***Engaged Hoke County stakeholders (e.g., local fire departments) to discuss vulnerability to smoke health impacts***

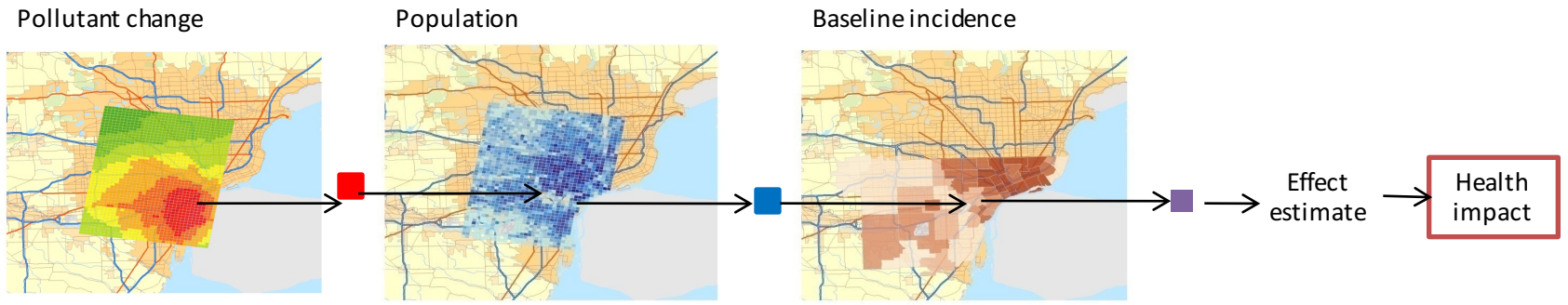


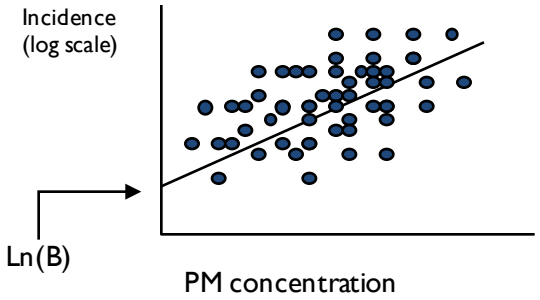
- ***CHVI discussion has given way to implementing prevention efforts, e.g. Smoke Sense***

Courtesy of Lauren Thie NC Department of Public Health

Health Impacts can be Calculated and Projected

Health impact function: $\Delta Y = Yo\ (1-e^{-\beta\ \Delta PM}) * Pop$





We use effect estimates identified in the ISA to be causally related to short-term exposure to PM2.5: Premature mortality and cardiovascular outcomes.

Fann et al, 2017 STOTEN

Wildland fire Related Premature Deaths and Hospital Admissions in 2008, 2009, 2010, 2011 & 2012 (95% confidence intervals)

	Year				
	2008	2009	2010	2011	2012
Respiratory Hospital Admissions					
Delfino et al. (2009)	8,500 (4,400—12,000)	5,200 (2,700—7,700)	6,200 (3,200—9,100)	6,300 (3,300—9,300)	6,400 (3,300—9,400)
Pooled hospital admission estimates	4,200 (1,900—6,500)	2,600 (1,100—4,000)	3,000 (1,300—4,700)	3,100 (1,300—4,900)	3,200 (1,400—5,000)
Zanobetti et al. (2009)	6,300 (3,600—9,000)	3,900 (2,300—5,500)	4,600 (2,600—6,500)	4,700 (2,700—6,700)	4,800 (2,800—6,800)
Cardiovascular Hospital Admissions					
Delfino et al. (2009)	2,800 (-500—6,000)	1,700 (-320—3,700)	2,100 (-380—4,400)	2,100 (-380—4,500)	2,100 (-390—4,600)
Mortality from short-term exposure					
Zanobetti & Schwartz (2009)	2,500 (1,900—3,000)	1,500 (1,100—1,800)	1,700 (1,300—2,100)	1,900 (1,400—2,200)	1,800 (1,400—2,200)
Values rounded to two significant figures					

Fann et al. STOTEN 2017

Calculating Health Burden

Dollar Value of Wildland fire Related Premature Deaths and Hospital Admissions (Billions of 2010$)

	Year					
	2008	*2009*	*2010*	*2011*	*2012*	**Present Value**
Value of premature deaths and hospital admissions	$20 ($2—$53)	$12 ($1—$31)	$14 ($1—$37)	$11 ($1—$30)	$12 ($1—$31)	$63 ($6—$170)
Values rounded to two significant figures						

Risk Mitigation

Has been largely focused on controlling the exposure rate within susceptible populations during smoke events

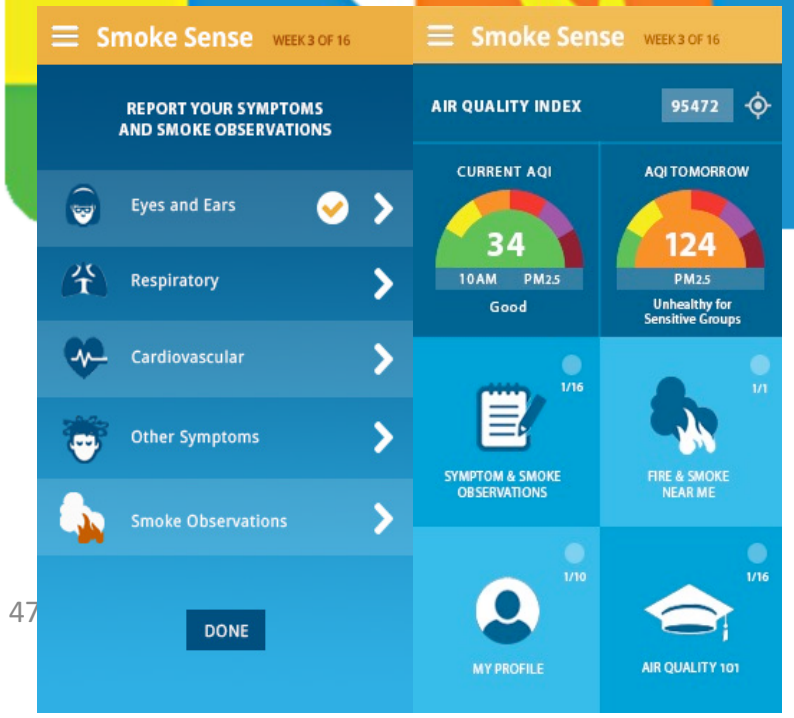
-- Identifying susceptible populations

- At the level of an individual
  - HEPA filters, Clean room, masks, reducing time outdoors
  - Interpreting forecasts
- At the level of the community
  - Hospital surge planning – stroke centers, cardiac catheterization facilities
  - Interventions – controlling Air Filtration rates at high receptor areas, organizing Clean Air Centers, HEPA filters to the vulnerable populations
  - Preparedness- Smoke Plans
  - Interpreting forecasts
  - Smoke blogs

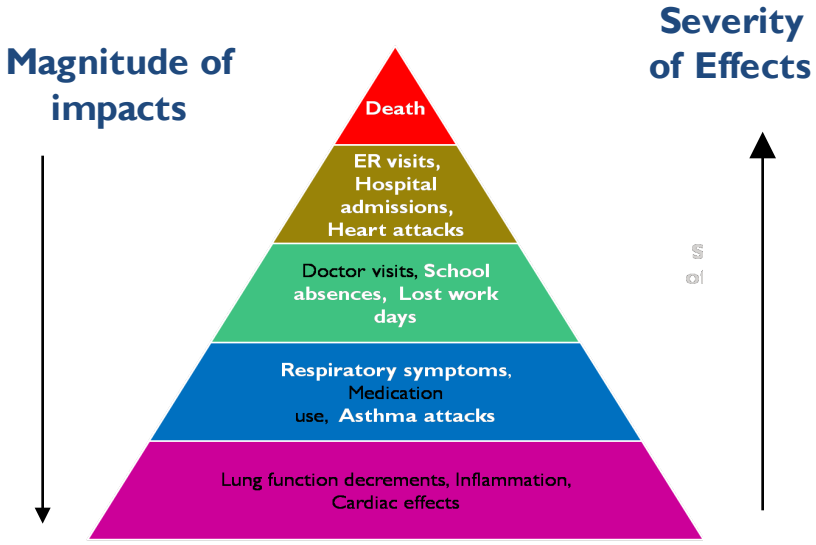
Reducing fuel loads and education related to prescribed burning, acceptance of smoke and similar

Developing and delivering salient and consistent health risk messages

Smoke Sense Citizen Scientist Engagement and Education



- Addressing the gap between the recommended actions and the actions that individuals take to protect their health during wildfire.
- Smoke Sense is a citizen science initiative that brings wildfire smoke and health resources to the palm of your hand.
- Personal connection with environmental exposure and raising personal consciousness about health risks.
- Just-in-time information and salience of changing behavior.



Smoke Ready Toolbox for Wildfires

epa.gov/air-research/smoke-ready-toolbox-wildfi

Airnow.gov: Current Fire Conditions
Get current air quality conditions and learn what to do to protect your health from air pollution, including smoke from wildland fires. Airnow.gov provides local air quality forecasts using EPA's science-based air quality index. https://airnow.gov/index.cfm?action=topics.smoke_wildfires

How Smoke From Fires Can Affect Your Health
Learn who is more at risk from smoke, how to tell if it is affecting you, and steps you can take to protect your health. Learn what to do before, during and after a wildfire. https://airnow.gov/index.cfm?action=smoke.index

Wildfire Smoke: A Guide for Public Health Officials
The guide is an easy-to-use resource that outlines whose health is most affected by wildfire smoke, how to reduce exposure to smoke, what public health actions are recommended, and how to communicate air quality to the public. The recommendations are based on science conducted by EPA and others. https://www3.epa.gov/airnow/wildfire_may2016.pdf

Wildfire Smoke Exposure Infographics
Two infographics provide information on actions to take to reduce health risks from smoke exposure in areas with wildfire smoke and what respirator (mask) to wear if you have to go outside and how to wear it properly. https://www3.epa.gov/airnow/smoke_fires/reduce-health-risks-with-wildfire-smoke.pdf and https://airnow.gov/static/topics/images/epa-infographic-respirator.jpg

Smoke Sense App
The Smoke Sense mobile app, developed by EPA researchers, enables you to get information on air quality and learn how to protect your health from wildland fire smoke. The app is being used in a citizen science study to determine how smoke from fires impacts public health. The app is available for anyone to use and can be downloaded on Android or iOS. www.epa.gov/air-research/smoke-sense

Particle Pollution and Your Patients' Health Course
Particle pollution, also known as particulate matter or PM, is the main component of haze, smoke, and dust. This course provides health professionals with knowledge they can share with patients to help reduce overall risk of PM-related health effects, particularly in individuals with heart and lung disease. www.epa.gov/pmcourse

Online Healthy Heart Toolkit
Breathing in fine particulate matter ($PM_{2.5}$) can trigger heart attacks, ischemic stroke, abnormal heart rhythms and worsen heart failure in people with cardiovascular disease or older adults with medical conditions that put them at risk. Particle pollution is a main component of smoke. Use the toolkit to protect your heart. https://www.epa.gov/air-research/healthy-heart-toolkit-and-research

Smoke Ready Toolbox for Wildfires

- **Resources health officials can use to educate the public about risks of smoke exposure and actions people can take to protect their health**

https://www.epa.gov/sites/production/files/2018-04/documents/smoke_ready_toolbox_for_wildfires_tagged.pdf

Conflict of Interest Statement

Ana G. Rappold, PhD

- *No conflicts of interest*
- *The presentation represents the opinions of the speaker and does not necessarily represent the policies of the US EPA*

Thank you

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Adding Extreme Heat and Wildfire Smoke to Hazard Mitigation Plans

1. Hazard Impact Statements
2. Identify Assets and Data Sources
3. Screening Tool for Exposure Analysis
4. Initial Problem Statements
5. Mitigation Action List
6. Funding Options

Expected Annual Loss

is a likelihood and consequence component of risk that measures the expected loss of building value, population, and agricultural value each year due to natural hazards

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Social Vulnerability

is a consequence enhancing component of risk that measures the susceptibility of social groups to the adverse impacts of natural hazards

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Community Resilience

is a consequence reduction component of risk that measures the ability of a community to prepare and plan for, absorb, recover from, and more successfully adapt to the impacts of natural hazards

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Risk Index

represents the potential for negative impacts resulting from natural hazards

FEMA's
National Risk Index (NRI)

1. Hazard Impact Statements

1. Develop Hazard Impact Statements

Adapted from FEMA Worksheet 5.1, Hazards Summary Worksheet

Hazard 1.	Extreme Heat
Area impacted *(Negligible, Limited, Significant, Extensive)*	Counties will likely differ. Some rural areas will likely have less-significant impacts. More extensive in urban areas.
Maximum probable extent *(Weak, Moderate, Severe, Extreme)*	Moderate, resulting in some damage and loss of services for days
Probability of future events *(Unlikely, Occasional, Likely, Highly Likely)*	Highly Likely: Almost certain chance of recurrence.
Overall significance ranking *(Low, Medium High)*	Medium: The criteria fall mostly in the middle ranges and the impacts are noticeable but not devastating.

2. Identify Assets and Data Sources

Community Asset (Asset Class)	Asset Type	Priority (for vulnerability or as a resilience asset)	Function - May include resilience value or vulnerability
Public health - total population	Community/ People	Low vulnerability	
Public health - sensitive populations	Community/ People	High vulnerability	
Hospitals	Critical Infrastructure	Asset	Proximity to vulnerable populations
Cooling Centers	Critical Infrastructure	Asset	Both short-term and longer-term cooling centers during extreme heat events.
Clean Air Centers	Critical Infrastructure	Asset	Short-term/daytime use of clean air centers in community spaces (libraries, schools, etc.)
Clean Air Shelters	Critical Infrastructure	Asset	Multi-day/overnight shelters for people displaced by wildfires or houseless people.
Parks	Natural Environment	Asset	Mitigate extreme heat.
Street Trees	Natural Environment	Asset	Mitigate extreme heat.
Transportation	Critical Infrastructure	Asset	Communities who need help getting to cooling or clean air centers.

3. Community Asset Data Identification

Asset Class: People	Data Sources
☐ Total population – current and future	☐ U.S. Census ☐ American community survey ☐ Regional Association of Governments (ie. ABAG, SCAG) ☐ Priority development areas ☐ County quick facts ☐ Local general plan or specific plans ☐ Local housing element ☐ Local zoning code
Population with access or functional needs, including: ☐ Age dependent, children and seniors ☐ Medically or mobility dependent ☐ Language constraints ☐ Low income ☐ Lack of education ☐ Culture or ethnicity ☐ Cost burdened (housing and/or transportation) ☐ Transit dependent (no car) ☐ Housing tenure (renters)	☐ U.S. Census ☐ American community survey ☐ County health department status reports ☐ Local general plan or specific plans ☐ Local studies ☐ Local housing element ☐ Local hazard mitigation plan ☐ Nonprofit or community based organizations
Population with vulnerabilities to wildfire smoke, including: ▪ A ▪ B ▪ C ▪ D ▪ E ▪ F ▪ G	☐ U.S. Census ☐ American community survey ☐ County health department status reports ☐ Local general plan or specific plans ☐ Local studies
Population with vulnerabilities to extreme heat, including: ▪ A ▪ B ▪ C ▪ D	☐ U.S. Census ☐ American community survey ☐ County health department status reports ☐ Local general plan or specific plans ☐ Local studies

3. Community Asset Data Identification

Asset: Critical Response Facilities	Data Sources
☐ Public health infrastructure, e.g., hospitals and medical facilities	☐ County tax assessor parcel data ☐ Local safety element ☐ Local Emergency Operations Plans ☐ Local area formation commission municipal service reviews
☐ Police stations	☐ County tax assessor parcel data, department annual reports
☐ Cooling Centers and Clean Air Centers	☐ County tax assessor parcel data
☐ Public schools	☐ County tax assessor parcel data

Asset: Community Services	Data Sources
☐ Community facilities, e.g., day cares, food banks, senior centers,	☐ County tax assessor parcel data ☐ City licensing and regulating authorities ☐ Local general and specific plans ☐ Local zoning ☐ Google
☐ Places of worship	☐ (Same as above)
☐ Education and research institutions, e.g., schools, colleges, universities	☐ (Same as above)

Asset: Utilities Infrastructure	Data Sources
☐ Water systems, including reservoirs and dams	☐ Urban water management plans ☐ Local integrated regional watershed management plan
☐ Wastewater, e.g., industrial and sanitary sewer systems)	☐ Urban water management plans ☐ Local integrated regional watershed management plan ☐ Local water utility
☐	☐

5. Develop Initial Problem Statements

Asset:	Public health
Hazard:	Wildfire smoke and extreme heat

Summarize impact:

Level of urgency/importance:

Problem statement:

Example Problem Statement

“Five of the eight neighborhoods in this city include populations that are at high risk from impacts of both wildfire smoke and extreme heat. The city has 75% tree cover, though three neighborhoods have only 50% tree cover. Every block in the city is within a 1-mile radius of a hospital. There are no known cooling centers or clean air centers in the city.”

Discussion

- How fine-grained do the data and assessment need to be?
- Or more guidance or screening tool to do county-level or block-level analysis? (We assume this is preferable and the likely approach)
- What do we plan for? Worst-case scenario or more annual planning that includes pre-disaster and response?

Next Steps

- **Workshop #3: THURSDAY 2-4pm** will focus on local and regional actions and funding options.
- Final report by March
- EPA *Greening America's Communities* design assistance in the summer
- Send ideas to **hall.abby@epa.gov**