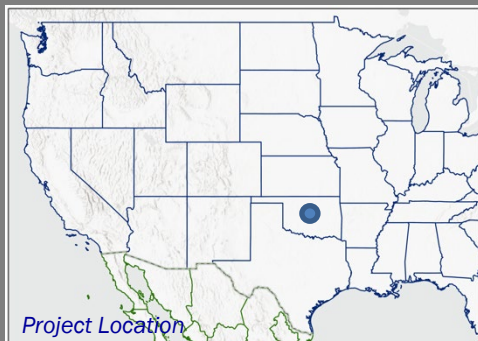


COLLABORATION AND COMMUNITY ENGAGEMENT

Mapping the Urban Heat Island in Oklahoma City



Urban Heat Islands (UHIs) are urban areas that are warmer than surrounding rural areas, largely due to differences in land cover. High temperatures are especially dangerous for those with pre-existing health conditions and limited access to air conditioning. Poor air quality is another urban phenomenon that poses a threat to human health. While cities are aware of these hazards, it has been difficult to take meaningful action without measurements of temperature and air quality taken near the earth's surface at neighborhood-scale. With guidance from CAPA Strategies, the Oklahoma City Office of Sustainability launched a UHI mapping campaign to gather high-resolution measurements of air temperature and air quality.



Volunteers Showing Ambient Air Temperature/City of Oklahoma City

KEY ISSUES ADDRESSED

Currently, neighborhood-scale measurements of temperature and air quality are unavailable, and satellite measurements of surface temperature cannot sufficiently represent UHIs. Projections suggest Central Oklahoma will experience higher summer temperatures and additional heat wave events by mid-century (SC CASC, 2020).

Oklahoma City needs a network of local agencies and individuals focused on heat and heat mitigation. Air pollution tends to increase during extreme heat events, and warm temperatures promote the formation of ground-level ozone. In recent years, the Oklahoma City area has nearly exceeded the Environmental Protection Agency's ozone standard.

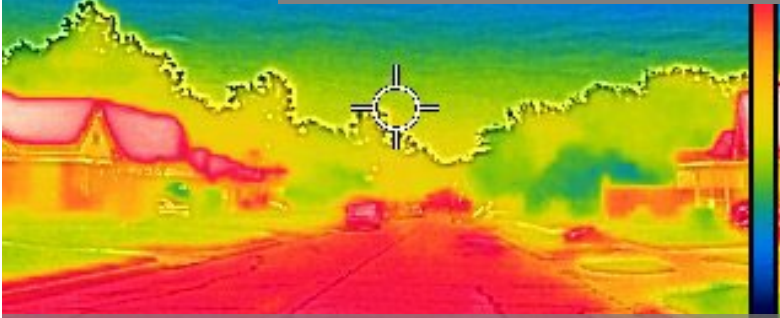
PROJECT GOALS

- Quantify temperature and air quality variability across Oklahoma City and identify areas of greatest need for mitigation strategies
- Produce meaningful representations of urban heat for policymakers and the public
- Foster a network focused on heat and heat mitigation
- Initiate a heat mitigation action plan

89.4 °F

VISUALIZING THE URBAN HEAT ISLAND

Partner organizations used drones and thermal cameras to compare the heating effect of neighborhoods, city parks, and dark pavement.



A Thermal Image Demonstrates Streets and Roofs can be Much Warmer than the Ambient Air Temperature/Shu Sun/University of Oklahoma

PROJECT HIGHLIGHTS

Confirming the Date: In the weeks leading up to the campaign, the National Weather Service issued a tailored forecast designed to help organizers decide whether to proceed with the proposed campaign date.

Campaign Execution: The organizers recruited a diverse group of citizen scientists through local news outlets and organizations. On August 12, 2023, 252 citizen scientists attached sensors to their team's vehicle and collected temperature, humidity, and air quality data at 263 points of interest over the 350-square-mile study area.

Education Efforts: Organizers collaborated with University of Oklahoma researchers to share heat safety tips, cooling techniques, and energy-saving practices at a public workshop. During a pre-campaign training session, volunteers learned what a UHI is and how environmental characteristics can influence temperatures across a city.

Data Analysis and Products: Following the campaign, CAPA Strategies incorporated the data into a machine learning model to produce maps of air temperature, heat indices, and air quality for the study area. CAPA developed a summary report presenting these maps alongside explanations of methods that can be shared with policymakers and the public.

Collaborators

- Oklahoma City Office of Sustainability
- CAPA Strategies
- See online for full list of partners

CART Author: Jack Carter, University of Oklahoma, December 2023.

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Visit CART:



LESSONS LEARNED

On-the-ground support from local partner organizations, such as the Association of Central Oklahoma Governments, Oklahoma Department of Environmental Quality, and the Medical Reserve Corps, was essential to a successful and safe campaign in Oklahoma City.

Preparing volunteers, assigning routes, and facilitating group communications was time-intensive for campaign organizers. An automated volunteer onboarding process could have reduced the time devoted to administrative tasks and increased the organizers' capacity to conduct outreach in vulnerable neighborhoods and enhance volunteers' experience at equipment distribution locations.

UHI mapping campaigns ideally take place on or around the hottest day of the year to capture the extent of urban heat. Unfortunately, unexpected and persistent rain showers during Oklahoma City's campaign kept temperatures lower than expected. Nevertheless, the campaign provided hundreds of thousands of air quality and air temperature measurements that will help officials identify areas of the city that are most impacted by extreme heat.

NEXT STEPS

- Develop an Intervention Guidebook that includes a Heat Perception Survey and analyze existing heat mitigation policies
- Create cost estimates for implementing recommended policies from the Intervention Guidebook
- Explore federal grants and public-private partnerships to fund these projects

For more information on this project, contact T.O. Bowman:

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A Heat Hub Captain and Volunteers/Kelly Dillow/Heat Watch Volunteer