MITRE | SOLVING PROBLEMS FOR A SAFER WORLD®

BUILDING EQUITABLE HEAT RESILIENCE: INTEGRATING SOCIAL SCIENCE & COMMUNITY-BASED ASSESSMENTS & POLICIES

Geospatial intelligence, including analyses and visualizations, can provide data-driven insights to inform effective and equitable policies and practices to mitigate the impact of extreme heat exposure on people and their health.

AUTHORS

Kha-Ai Tran[1], Ryan Hollins[1], Ferdouz Cochran[3], Danyelle Mannix[1], Susan Boa[1], Kristy Weber[2], Ethan Robinson[1], Joshua Habib[1]

AFFILIATION

The MITRE Corporation
[1] McLean, VA
[2] San Diego, CA
[3] Raleigh, NC

INTRODUCTION

Urban centers are highly vulnerable to extreme heat due to factors like limited green spaces, dense infrastructure, and impervious surfaces, which intensify the urban heat island effect. This exacerbates health issues, particularly for vulnerable groups. Urban cooling centers provide relief but face challenges in ensuring equitable access for all populations. Addressing barriers and identifying at-risk groups is crucial for creating effective, inclusive heat mitigation strategies.

OBJECTIVE

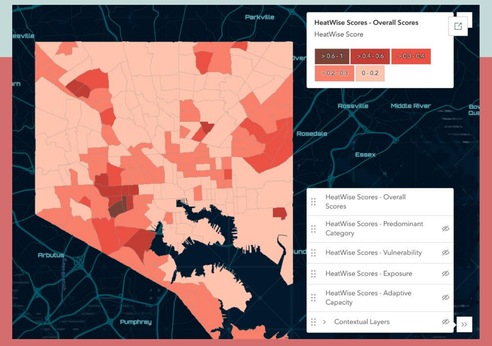
Develop a geospatially-informed framework that:

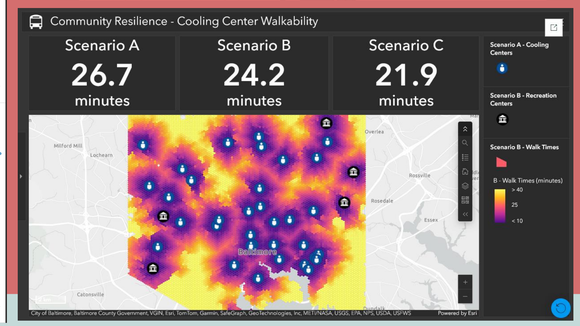
1) Adequately represents the geospatial dynamics of communities and the individuals and populations within these communities
2) Provides data-driven validation method for community-level interventions to ensure that the metrics used to inform policy and practice are appropriate and applicable at the right scale

ANALYSIS

Census Tract Heat Wise Score = Exposure Score * (Vulnerability Score * (Inverse Adaptive Capacity))







- census tracts that lack access to vehicles also are highly exposed and highly vulnerable
- converting additional facilities into cooling centers both increases access to cooling centers *and* decreases walk times for more populations

METHODOLOGY

Develop a technical approach based on the construct of risk indices and illustrate outcomes using data from Baltimore City as our study area.

1. Identify meaningful and comparable spatial areas for exploration
2. Define initial set of measures and indices for hazard, exposure, vulnerability, and adaptive capacity.
3. Aggregate scores from each of the four risk determinants into a composite score.
4. Visually explore variation in factors contributing to each risk determinant to identify potential courses of action that improve community resilience to heat.

RESULTS

- Identified specific census tracts with the highest overall heat risk scores
- Characterized populations living in these high-heat risk census tracts that increase their vulnerability and reduce their resilience during extreme heat
- Characterized compound risk: census tracts with populations lacking access to vehicles are also highly exposed and highly vulnerable
- Quantified improvement of access to cooling centers (via walk time) with three scenarios that implement additional cooling facilities

© 2025 THE MITRE CORPORATION. ALL RIGHTS RESERVED. **Approved for Public Release; Distribution Unlimited. Public Release Case Number 25-0009**