Improving Urban Heat Planning and Media Coverage of Extreme Heat

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Extreme Heat

Impacts of extreme heat

- Public health
- Quality of life
- Economy
- Energy and water usage
- Infrastructure and urban systems
- Urban landscapes
- Agriculture
- Rural and natural lands

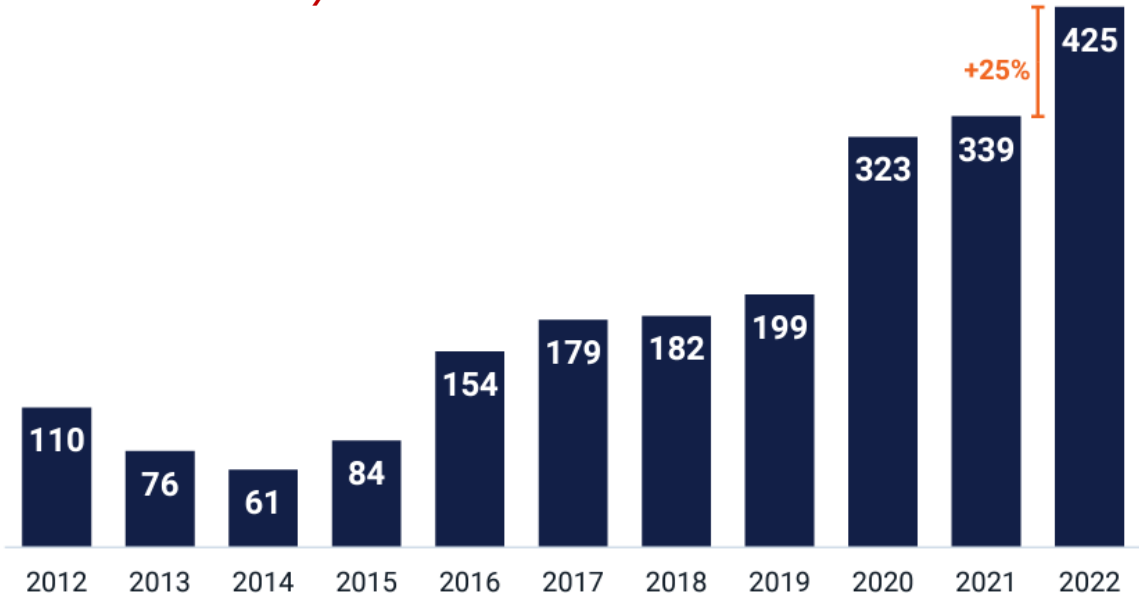
Extreme Heat

Public health impacts

- Heat is the #1 weather-related cause of death in the U.S.
- Heat illnesses and deaths are widely acknowledged to be underreported
- At least 3,200 heat deaths from heat exposure in Arizona from 2012-2022

Heat-Associated Deaths in Maricopa County

Already 469 confirmed deaths for 2023



(Maricopa County, 2023)

Extreme Heat

Pima County Heat-Related Deaths

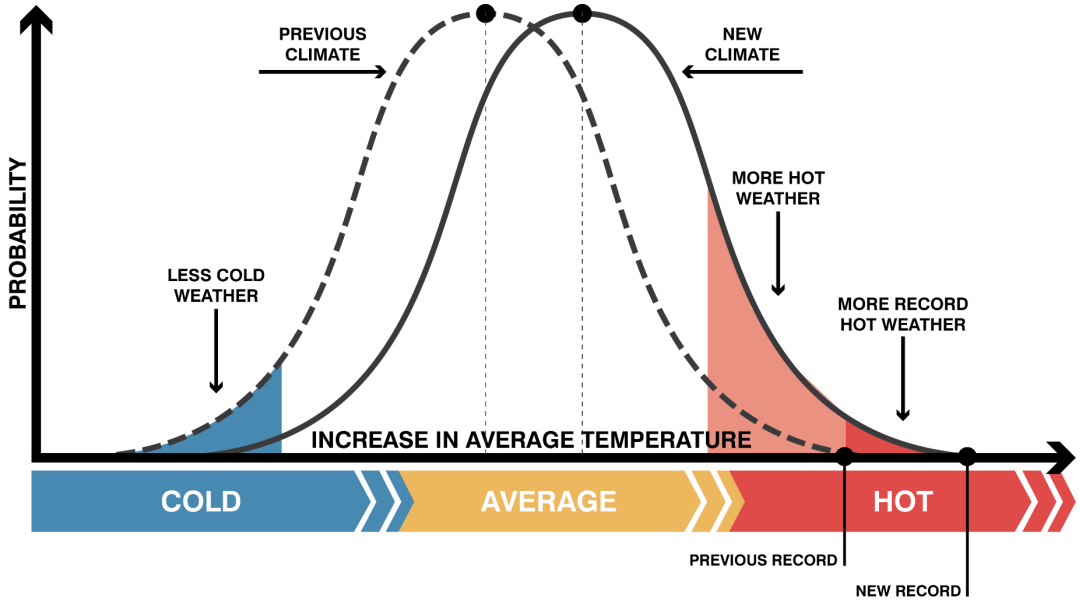
- 163 confirmed heat-related deaths to date for 2023
  - 44 were undocumented border crossers (UBCs)
  - Out of the 119 non-UBCs, 39% indoor and 61% outdoor
  - 40 of those 119 were people experiencing homelessness
- Pima County had 54 non-UBC heat-related deaths in 2022, which was the record-high
- ***Pima County has seen heat-related deaths more than double this year***

Extreme Heat

An increasing hazard

Continued increases in the intensity, duration, and frequency of extreme heat events *and* continual rise in average temperatures

- Weather
- Climate change
- Urban heat island (UHI) effect

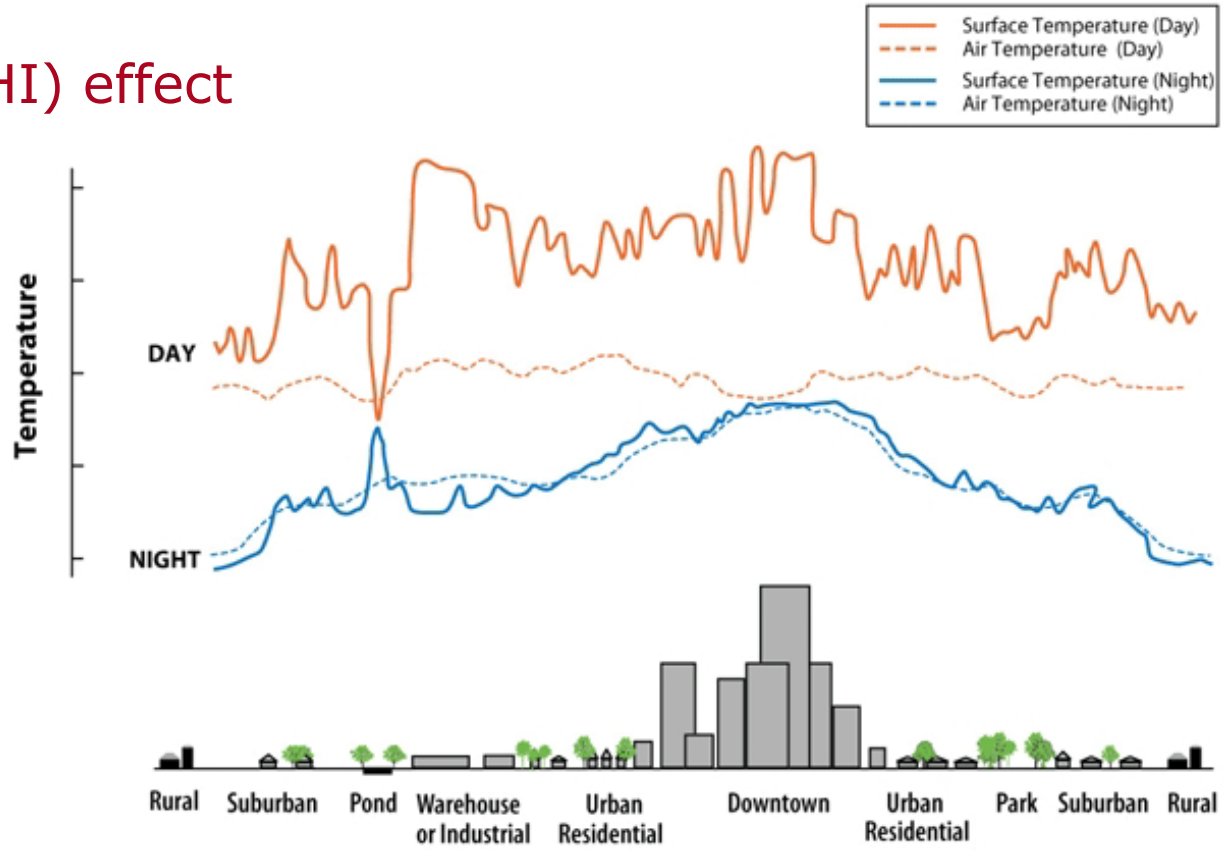


(Keith & Meerow, 2022, adapted from U.S. EPA)

Extreme Heat

Urban heat island (UHI) effect

- Land use and cover change
- Urban form
  Building height, density, and arrangement
- Building materials and reflectivity
- Vegetation and humidity
- Waste heat emissions
- Air pollution

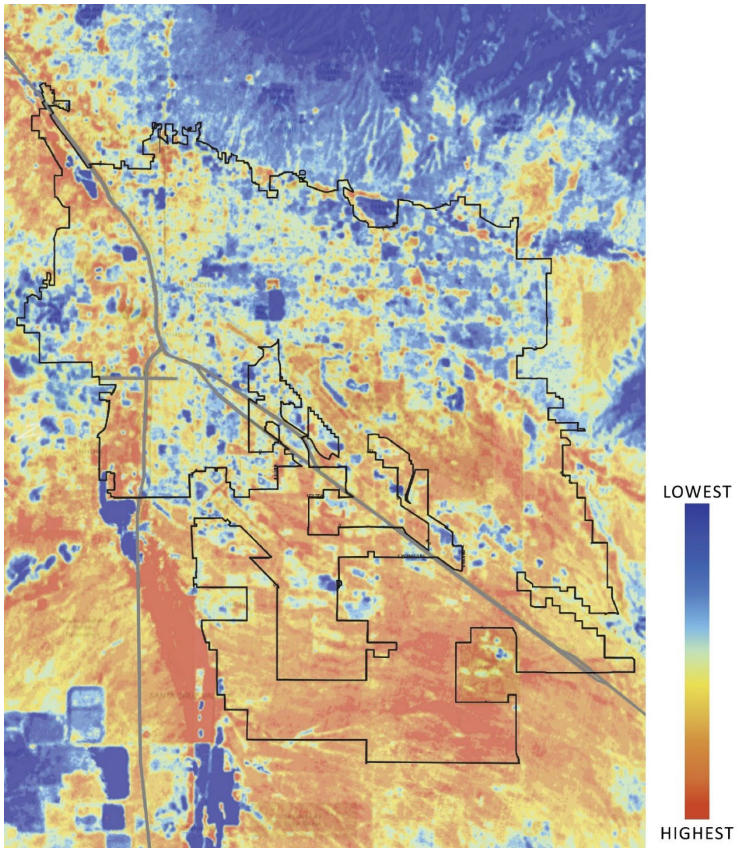


(U.S. EPA)

Extreme Heat

Pima Association of Governments' Resiliency Planning Maps

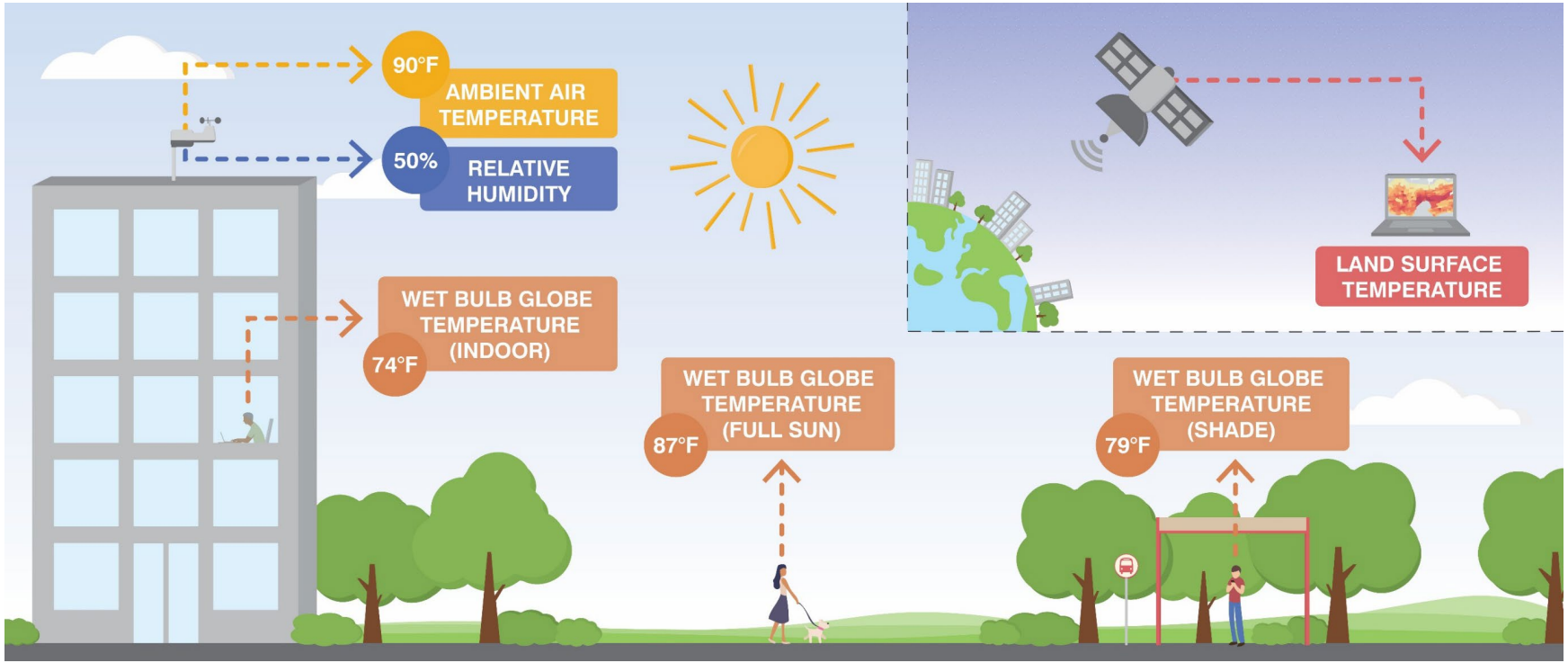
- Heat severity map
- CDC Social Vulnerability Index
- Cooling centers, hydration stations, and splash pads
- Urban forestry and green infrastructure priority areas



maps.pagregion.com/PAG-GIMap/

Extreme Heat

Complexities of urban heat



(Keith & Meerow, 2022)

Extreme Heat

Inequities of urban heat

- Urban heat is not equally distributed, lower-income and minority neighborhoods are often the hottest areas in cities
- Affordability and accessibility of:
  - Healthcare
  - Housing and quality housing
  - Energy for indoor cooling
  - Transportation

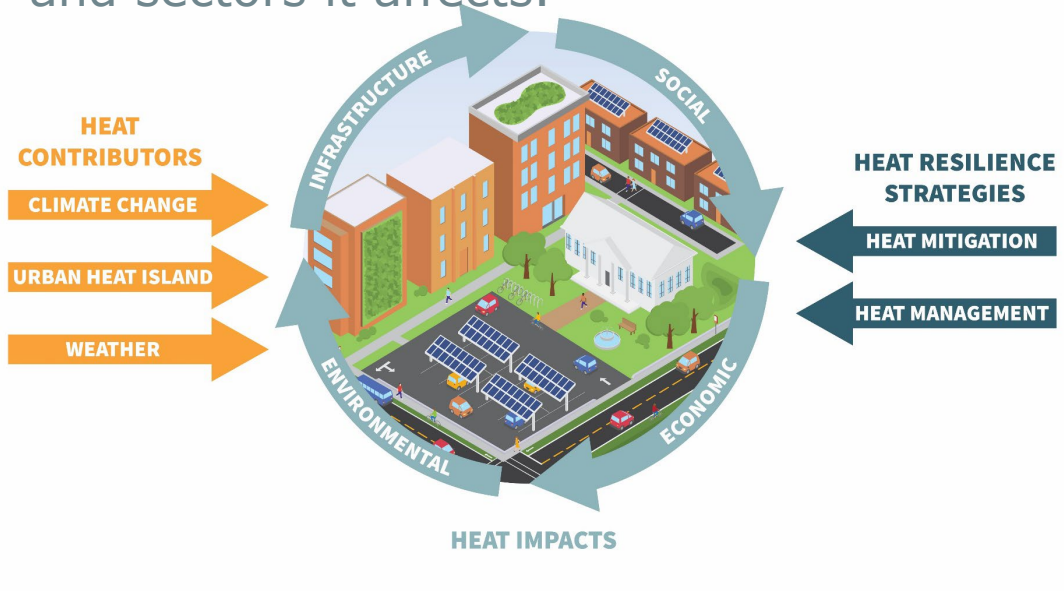
Top: Sam Hughes, Tucson, AZ
Bottom: Southside, Tucson, AZ

(Google)

Planning for Urban Heat Resilience

Urban heat resilience

"Proactively mitigating and managing urban heat across the many systems and sectors it affects."



tinyurl.com/urbanheatresilience

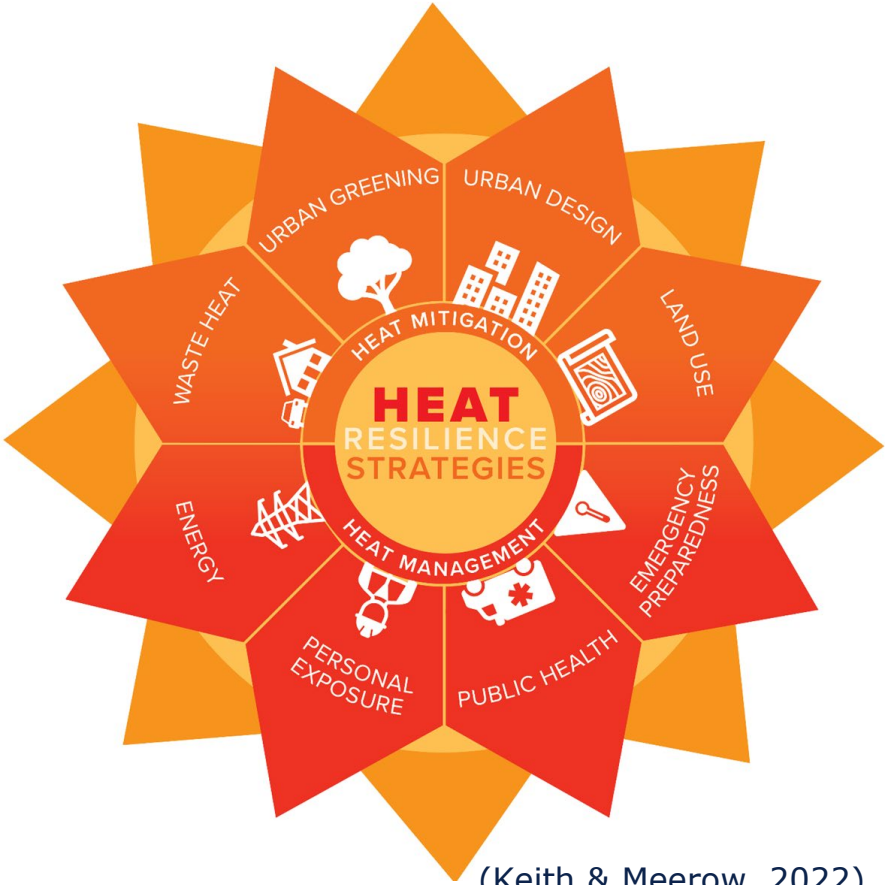
Planning for Urban Heat Resilience

Heat mitigation

Strategies that reduce the built environment's contribution to urban heat.

Heat management

Strategies that prepare and respond to chronic and acute heat risk.



(Keith & Meerow, 2022)

Planning for Urban Heat Resilience

Heat mitigation

- Land use (urban development, land conservation, transportation)
- Urban design (shade structures, cool materials)
- Urban greening (urban forestry, parks, green infrastructure)
- Waste heat (buildings, vehicles)

(Keith & Meerow, 2022)

Planning for Urban Heat Resilience

Heat management

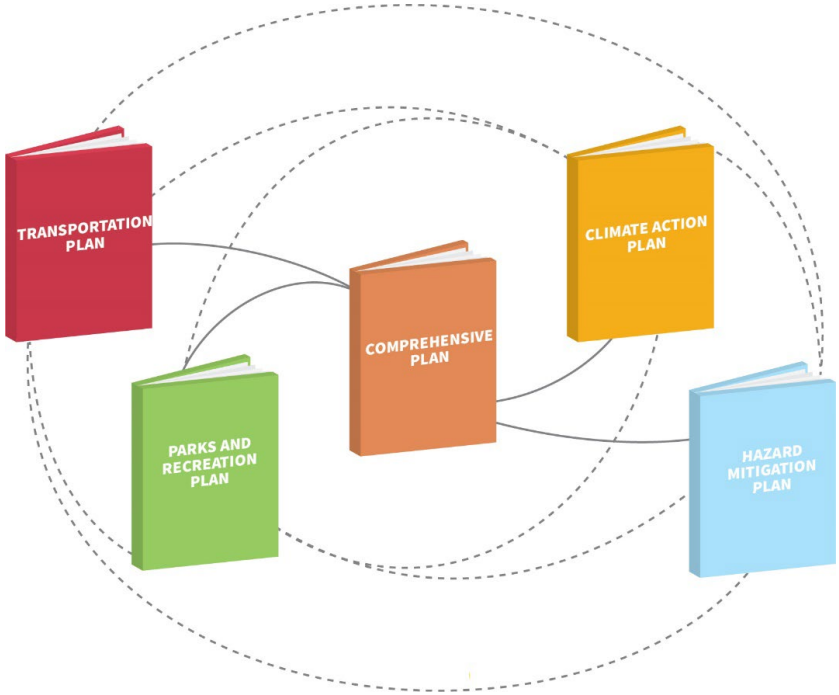
- Cooling centers / resilience hubs
- Weatherization and energy assistance programs
- Early warning systems
- Heat education and awareness campaigns
- Occupational safety guidance and regulations
- Energy grid resilience

(Keith & Meerow, 2022)

Planning for Urban Heat Resilience

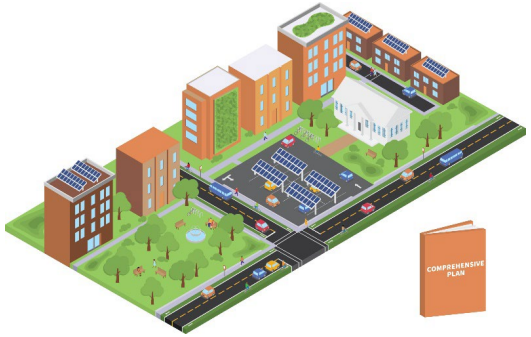
Network of plans

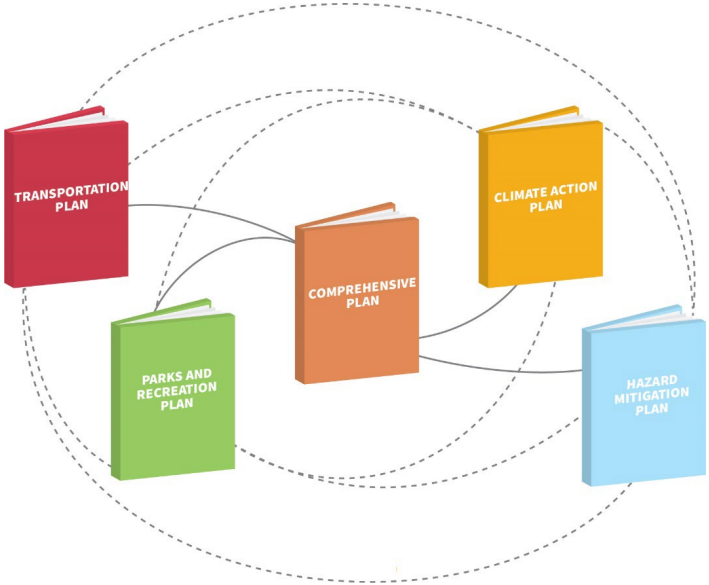
- Collection of community plans that shape the built environment (Berke et al., 2006)
- These plans are rarely coordinated (Berke et al., 2019; Woodruff et al., 2022):
  - Missed opportunities to reduce conflicting priorities
  - Reduced or even negative effects on hazard planning outcomes



(Keith & Meerow, 2022)

Network of plans

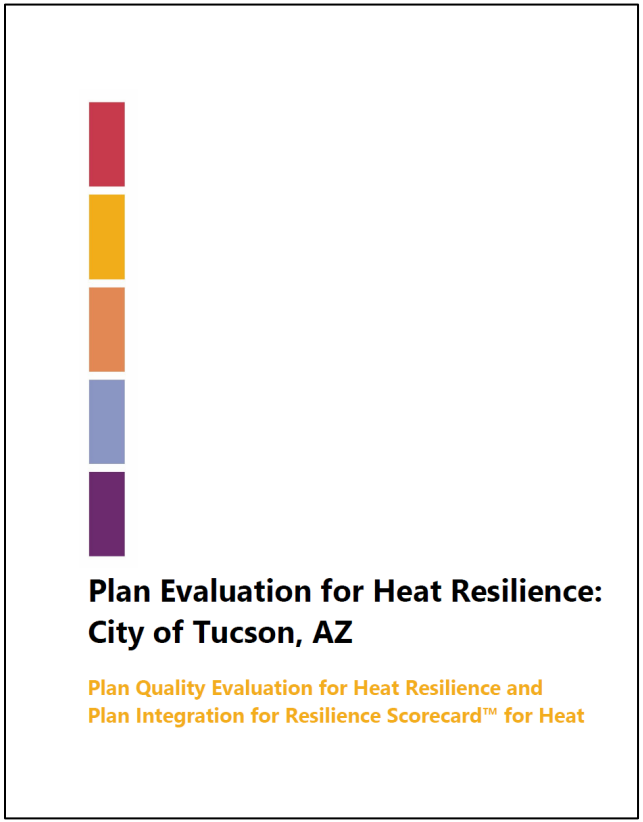




(Keith & Meerow, 2022)

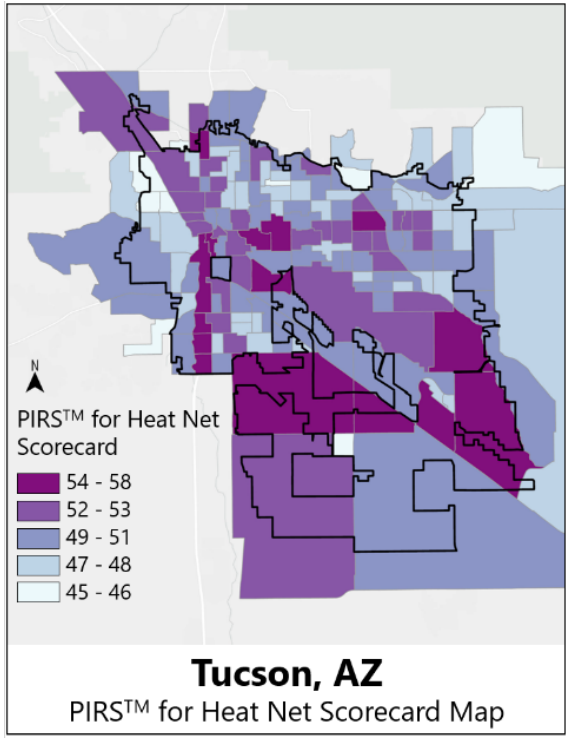
Plan Evaluation for Heat Resilience: City of Tucson, AZ

- Project of the Southwest Urban Corridor Integrated Field Laboratory (SW-IFL)
- Completing plan analysis for heat resilience for cities across the Arizona urban corridor
- Assessing plans now and again in five years to see change over time
- Analyzing plans for both *plan integration, plan quality,* and *heat resilience strategies*

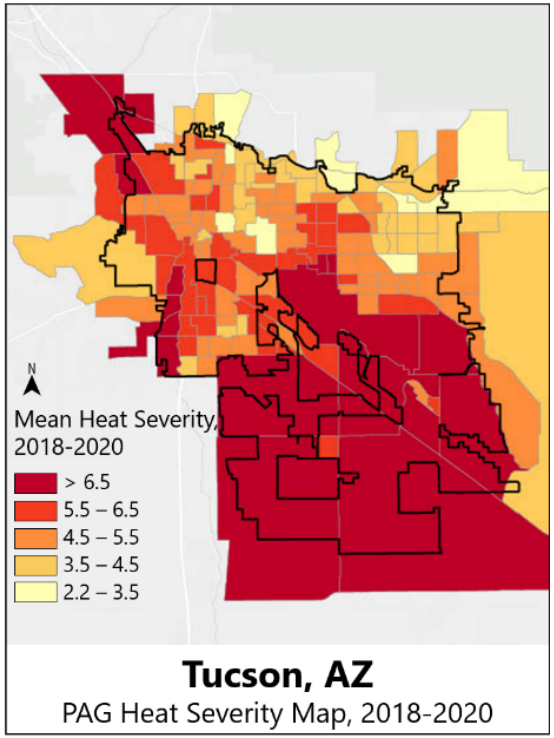


tinyurl.com/tucsonheatplanning

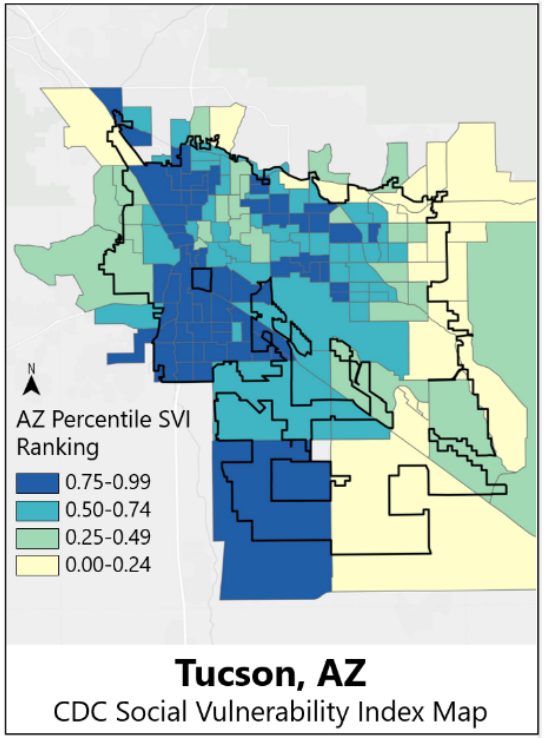
Plan Integration Results



Tucson, AZ
PIRS™ for Heat Net Scorecard Map



Tucson, AZ
PAG Heat Severity Map, 2018-2020



Tucson, AZ
CDC Social Vulnerability Index Map

Found a correlation between PIRS™ for Heat net score and heat severity, not for vulnerability (although vulnerability and heat are correlated)

Plan Quality Results

Criteria	City of Tucson General & Sustainability Plan	Pima County Multi-Jurisdictional Hazard Mitigation Plan	Tucson Resilient Together Climate Action and Adaptation Plan
Goals	50%	67%	100%
Fact Base	50%	67%	75%
Strategy Identification	40%	40%	60%
Implementation and Monitoring	64%	100%	91%
Coordination	88%	63%	63%
Public Participation	100%	57%	100%
Uncertainty	0%	57%	43%
Overall Plan Quality	**57%**	**68%**	**77%**

Newer plans are generally increasing in quality (not just in Tucson!)

Heat Strategies Evaluation

	Criteria	City of Tucson General & Sustainability Plan	Pima County Multi-Jurisdictional Hazard Mitigation Plan	Tucson Resilient Together Climate Action and Adaptation Plan
Mitigation Strategies	***Land Use***			
	Ventilation corridors			
	Land conservation	✓ ✓	✓ ✓	✓
	Urban Development Patterns	✓ ✓		
	Roadways and parking lots	✓ ✓		✓ ✓
	Urban Design			
	Built shade structures			✓ ✓
	Cool pavements		✓ ✓	✓ ✓
	Building shape and massing			✓
	Building and street orientation			
	Urban Greening			
	Vegetated parks and open spaces	✓	✓ ✓	✓
	Green roofs and walls			✓ ✓
	Urban forestry	✓ ✓	✓ ✓	✓ ✓
	Water features			✓ ✓
	Green stormwater infrastructure	✓ ✓	✓ ✓	✓ ✓
	Waste Heat			
	Building waste heat reduction programs	✓ ✓		✓ ✓
	Vehicle waste heat reduction	✓		✓ ✓
	Cool roofs and walls			✓ ✓

Heat Strategies Evaluation

	Criteria	City of Tucson General & Sustainability Plan	Pima County Multi-Jurisdictional Hazard Mitigation Plan	Tucson Resilient Together Climate Action and Adaptation Plan
Management Strategies	***Emergency Preparedness***			
	Early warning systems			
	Heat response plan			✓ ✓
	Cooling centers and resilience		✓ ✓	✓
	Public Health			
	Education and awareness	✓ ✓	✓ ✓	✓
	Personal Heat Exposure			
	Transit systems operations			✓ ✓
	Parks and trails operations			
	School operations			
	Occupational safety regulations		✓ ✓	✓ ✓
	Energy			
	Indoor cooling			✓ ✓
	Grid resilience			✓
	Accessible and affordable energy			

Reporting on Heatwaves and the Health Impacts of Heat

Key Considerations

- Frame heat in the context of climate change
- Highlight actions and solutions
- Acknowledge the unequal impacts of heat
- Give attention to the indirect health impacts of heat

ghhin.org/press

Reporting on Heatwaves and the Health Impacts of Heat

Practical recommendations, such as:

- Instead of waiting for an extreme heat event to begin or end before publishing coverage, create awareness in advance – both seasonally and before a projected heat event.
- Instead of focusing on heat only in outdoor settings, remember that indoors can be hotter than outdoors, and excess indoor heat is deadly.
- Instead of showing scenes of crowded beaches, swimming pools or fountains, show people struggling in the heat, and its negative and dangerous impacts.

State of Arizona's Extreme Heat Preparedness

Your participation is needed!

- On August 11, 2023, Governor Hobbs declared a State of Emergency due to the record heat and impacts
- The goal is to have a heat plan for the state to implement before next summer
- State is collecting input through a Request for Information on Extreme Heat Preparedness survey
- resilience.asu.edu/rfi-heat

Thank you

Current research programs

Building Resilience Against Climate Effects (BRACE)

Climate Assessment for the Southwest (CLIMAS)

Southwest Urban Corridor Integrated Field Laboratory (SW-IFL)

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