PAS
QUICKNOTES

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Urban Heat Resilience

Heat is the deadliest weather-related hazard in the United States, posing a growing and inequitable threat to human health, infrastructure, economic, and ecological systems. Communities across the country are getting hotter due to climate change and the urban heat island (UHI) effect. Planners are well positioned to tackle this challenge and enhance urban heat resilience for their communities through planning and implementing heat mitigation and management strategies.

BACKGROUND

Heat kills more people in the United States than all other weather hazards combined. In addition, many more people are treated for heat-related illnesses. Heat also reduces economic productivity, increases energy and water use, strains infrastructure and ecosystems, and affects the quality of life.

Heat risks are increasing in cities worldwide due to the combination of climate change and the UHI effect (when urban areas experience higher temperatures than surrounding rural and natural areas). Climate change, primarily caused by greenhouse gas emissions, is increasing global average temperatures and the frequency, intensity, and duration of heatwaves. Cities experience the UHI effect due to the heat absorbed and released by the built environment, along with waste heat from sources such as cars, air conditioning, and industrial processes.

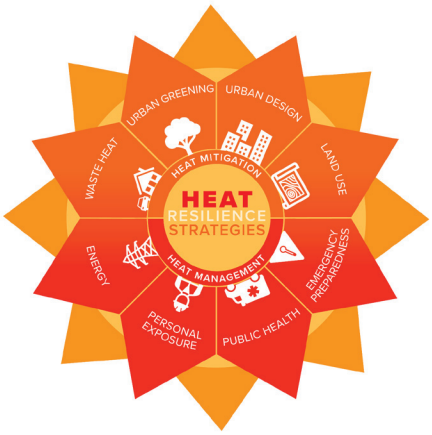
Hotter temperatures are impacting communities of all sizes and in all regions of the country. Increases in both chronic and acute heat risks are compounding dangers for cities in historically hotter regions and can pose new threats for cities in historically more temperate and colder climates. Cities in historically colder regions are often less prepared for and less able to adapt to heat, as they have lower adoption rates of indoor cooling and less experience managing extreme heat events. In areas with higher humidity, smaller increases in temperature can be more dangerous to human health.

While communities everywhere are getting hotter, heat risks are unevenly and inequitably distributed. Some neighborhoods are consistently hotter than others, including districts with a history of redlining or communities of mostly low-income or minority residents. Past planning decisions played a role in creating and furthering these disparities. Certain populations are also more vulnerable to heat-related illness or death; these include children and the elderly, people with chronic health conditions or lower incomes, people experiencing homelessness, and people who are institutionalized. Cities across the United States must prepare for unprecedented heat and address systemic inequities in heat risk. Planners are well suited to take a leading role in their communities to advance urban heat resilience efforts.

PLANNING FOR URBAN HEAT RESILIENCE

Planners considering urban heat resilience should work to help their communities equitably prepare for and adapt to both chronic and acute heat risk through heat mitigation and management. *Heat mitigation* includes design and planning strategies that aim to reduce the built environment's contribution to urban heat, whereas *heat management* strategies prepare for and respond to heat.

Heat resilience requires effective coordination between different disciplines and sectors, such as hazard mitigation planning, public health, emergency management, the energy sector, and various levels of government. Planners should develop a diverse portfolio of heat mitigation and management strategies. These heat resilience strategies should be prioritized to maximize co-benefits, minimize tradeoffs, and avoid maladaptive strategies that provide short-term relief but worsen the problem in the long run (e.g., highly inefficient air conditioners that increase electricity demand and greenhouse gas emissions). Heat resilience strategies will likely be needed across a variety of community plans, so



Heat resilience strategies address heat mitigation and management. Credit: Ladd Keith, Sara Meerow, and Erika Lynn Schmidt

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it is important for planners to coordinate and integrate all plans and policies to advance the community's vision for heat resilience.

HEAT MITIGATION STRATEGIES

Heat mitigation strategies aim to cool cities, neighborhoods, and heat-vulnerable locations through land-use planning, urban design, urban greening, and waste heat reduction.

- Because the built environment affects local climates, **land-use planning** can be an effective heat mitigation strategy. Large-scale land-use considerations include conserving natural areas, developing ventilation corridors, and arranging urban geometry (e.g., the dimensions and spacing between buildings) to maximize cooling benefits. The overall reduction of heat-trapping surfaces associated with the transportation system can also help reduce the UHI effect.
- Site-level design also impacts microclimates and affects heat at the human scale. **Urban design** strategies include orienting buildings and streets for shade, adding shade structures, and using cool pavements, walls, and roofs.
- Vegetation cools surrounding areas through evapotranspiration and can provide shade. **Urban greening** strategies such as urban forestry, green stormwater infrastructure, green roofs, parks, and greenways can help mitigate heat. These strategies also have the co-benefit of helping to reduce urban flood risk and provide the psychological benefits associated with access to nature.
- **Waste heat reduction** is important to reduce the UHI effect. Strategies such as increasing building energy efficiency through weatherization and the use of "cool" surfaces can reduce waste heat generated by indoor cooling and mechanical systems. Decreasing vehicle use through the planning of transit and active transportation modes is another waste heat reduction strategy. These strategies also have the co-benefit of reducing greenhouse gas emissions and local contributions to climate change.

HEAT MANAGEMENT STRATEGIES

Heat management strategies are critical to help prepare for and respond to extreme heat events.

- Increasing **access to indoor cooling** is important for reducing heat-related illnesses and deaths. Regulations and assistance programs should be considered to help make cooling accessible and affordable to all. Energy grid resilience is critical here because electricity use to support indoor cooling increases during extreme heat events, making "brownouts" and power outages especially dangerous.
- **Reducing individual exposure** to dangerous levels of heat may require changes in public infrastructure such as transit stops and hiking trails, facilities such as playgrounds, and regulations for indoor and outdoor worker safety.
- As heat risks increase, it is important to educate and inform the public about the dangers of heat and how to avoid them. **Public information and awareness campaigns**, as well as information distributed to health providers, can help in this area.
- Communities should ensure their **emergency management systems** are prepared for unprecedented extreme heat events by developing early warning systems, planning coordinated responses for emergencies, and establishing cooling centers or resilience hubs across the community where people can go for shelter and assistance.

CONCLUSIONS

Heat poses a growing and inequitable threat. Cities across the United States must plan now to increase urban heat resilience in the face of climate change and the UHI effect. Planners are well poised to use existing regulatory tools and plans to mitigate the inequitably distributed risk associated with the UHI effect, reduce greenhouse gas emissions contributing to climate change, and help prepare for extreme heat events. By working with colleagues across agencies and sectors to help coordinate comprehensive approaches to heat mitigation and management, planners can help their communities become more resilient to extreme heat.

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FURTHER READING

Published by the American Planning Association

Keith, Ladd, and Sara Meerow. Forthcoming, 2022. *Planning for Urban Heat Resilience.* PAS Report.

Sherman, Amy. 2020. "The Heat Is On." *Planning*, August.

Smith, Laier-Rayshon. 2021. "Urban Heat Management and the Legacy of Redlining." *APA Blog: JAPA Takeaways*, February 18.

Other Resources

Centers for Disease Control and Prevention and the National Oceanic and Atmospheric Administration. 2021. National Integrated Heat Health Information System.

Keith, Ladd, Sara Meerow, and Tess Wagner. 2020. "Planning for Extreme Heat: A Review." *Journal of Extreme Events* 6(2): 1–27.

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