



Urban Heat + Urban Forestry Accelerator Sequence Module 1: Urban Heat Syllabus

Online Zoom Webinar
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Module 1 Description

Extreme heat is a rising threat to public health as heat waves are projected to intensify in a warming climate. Rising temperatures driven by the urban heat island effect place cities at the forefront of responding to extreme heat and protect those at disproportionate risk of heat exposure. To enhance resilience to extreme heat in cities, urban planners and public health practitioners are beginning to turn to data-driven decision support frameworks to design efficient, effective, and equitable response strategies. In Module 1, we will discuss diverse methods to measure and monitor heat in the urban environment at multiple scales and examine the effectiveness of heat mitigation strategies. There is no one-size-fits-all solution to heat resilience practices and adequate response necessitates infrastructural, behavioral, and social strategies as diverse as the climates and communities of each city.

Urban Heat Module Learning Objectives

After successful completion of module 1, you will be able to:

1. Explain the drivers of urban heat island and impacts on public health
2. Describe advantages and disadvantages of different heat risk measures in the urban environment
3. Draft heat risk goals in your local context
4. Evaluate relevant options for heat risk assessment in your community to meet your goals
5. Apply principles of heat risk assessment in your local context

Module Format & Materials

Session 1: Introduction to Heat and Health

Learning Objectives

1. Characterize the drivers of urban heat islands and the relationship between global and local climate change

2. Explain the impacts of extreme heat on public health and infrastructure
3. Describe the dimensions of heat vulnerability in the urban environment
4. Identify different methods of urban heat measurement

Resource Materials

Understanding Urban Heat: All measurements are not the same

- Global Land Surface Temps and Air Temps (2011): <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2010JG001486>
- US example (2023): <https://www.mdpi.com/2073-445X/12/3/562>
- Methodology for Advancing Heat Assessments: <https://www.mdpi.com/2225-1154/5/2/41>

Reasons for Differences in Heat

- National Study (2020): <https://www.mdpi.com/2225-1154/8/1/12>
- Critical Heat Studies (2019): <https://www.worldscientific.com/doi/epdf/10.1142/S2345737620030013>

Implications of Heat on Vulnerability Populations

- Portland Case: <https://www.mdpi.com/1660-4601/15/4/640>
- Los Angeles Case: <https://cphd.ph.ucla.edu/sites/default/files/downloads/extreme%20heat.4..pdf>
- Chicago Case: <https://press.uchicago.edu/Misc/Chicago/443213in.html>

Advancing Heat Mitigation Strategies

- Overview: <https://www.nature.com/articles/s43017-020-00129-5>
- Nature Based Solutions Case Study: <https://www.mdpi.com/2073-4433/10/5/282/htm>
- Urban Heat Management in Louisville, Kentucky: [A Framework for Climate Adaptation Planning](#)
- Compound Climate and Infrastructure Events: [How Electrical Grid Failure Alters Heat Wave Risk](#)
- Policy Nook: [Heat Waves as Hurricanes: A Comment](#)

Homework

Action: Before next session, consider the following:

- What specific challenges does your community face regarding extreme heat? How do you expect this to change in the next decade?
- What heat-related goals (if any) have you identified in your community?
- What elements of a heat risk assessment discussed today have you or partners already conducted?
- What locally-relevant data do you already have on hand?
- How have you used this information to advance planning goals or initiatives?

Session 2: Data-Driven Heat Resilience

Learning Objectives

1. Describe urban heat data collection techniques at multiple scales
2. Explain direct and indirect measures of heat vulnerability in the urban environment
3. Compare various heat vulnerability mapping techniques and considerations in practice
4. Evaluate advantages and disadvantages of different heat risk measures in the urban environment
5. Draft heat mitigation goals in your community

Resource Materials

Conlon, K. C., Mallen, E., Gronlund, C. J., Berrocal, V. J., Larsen, L., & O'Neill, M. S. (2020). [Mapping human vulnerability to extreme heat: A critical assessment of heat vulnerability indices created using principal components analysis](https://doi.org/10.1289/EHP4030). *Environmental Health Perspectives*, 128(9), 1–14. <https://doi.org/10.1289/EHP4030>

Mallen, E., Bakin, J., Stone, B., Sivakumar, R., & Lanza, K. (2020). [Thermal impacts of built and vegetated environments on local microclimates in an urban university campus](https://doi.org/10.1016/j.uclim.2020.100640). *Urban Climate*, 32, 100640–. <https://doi.org/10.1016/j.uclim.2020.100640>

Kelly Turner, V., Rogers, M. L., Zhang, Y., Middel, A., Schneider, F. A., Ocón, J. P., Seeley, M., & Dialesandro, J. (2022). [More than surface temperature: mitigating thermal exposure in hyper-local land system](https://doi.org/10.1080/1747423X.2021.2015003). *Journal of Land Use Science*, 17(1), 79–99. <https://doi.org/10.1080/1747423X.2021.2015003>

Homework

Action: Revisit and revise your reflections on the questions posed during Session 1. If possible, meet with your core Accelerator team to discuss. We will discuss initial findings during Session 3 with partner cities.

Session 3: Peer Learning and Applying Concepts in the Local Context

Learning Objectives

1. Explain and compare co-benefits of various urban heat mitigation strategies
2. Develop heat risk goals in your local context
3. Discuss heat mitigation planning efforts and initiatives with peers in multiple contexts
4. Apply the principles of heat risk assessment in your local context
5. Argue for heat considerations in urban forestry planning

Resource Materials

Keith, L., Meerow, S. (2022). Planning for Urban Heat Resilience. PAS Report 600. American Planning Association. <https://www.planning.org/publications/report/9245695/>

Meerow, S., Newell, J. P., & Stults, M. (2016). Defining urban resilience: A review. Landscape and Urban Planning, 147, 38–49. <https://doi.org/10.1016/j.landurbplan.2015.11.011>

Homework

Handoff: Meet with your Module 2: Urban Forestry Accelerator delegate to discuss your main takeaways from the Urban Heat Module with a focus on how it applies to urban forestry.

Module Schedule

Note: All session dates are listed in Mountain Time Zone.

Date(s)	Session/Topic	Homework	Due Date
March 30 th (1-2:30pm MST)	Session 1: Introduction to Heat and Health	Review: Recommended resources Action: See guiding questions above, brainstorm on your own before Session 2.	April 6 th
April 6 th (11-12:30pm MST)	Session 2: Data-Driven Heat Resilience	Review: Recommended resources Action: Meet with your core team to discuss/revise your reflections from Session 1.	April 20 th
April 20 th (11-12:30pm MST)	Session 3: Peer Learning and Applying Concepts in the Local Context	Review: Recommended resources Handoff: Meet with your Module 2 Accelerator delegate to discuss main takeaways from Module 1.	April 27 th