

## Project A2-3

### Assessing the thermal comfort implications of water-supported urban infrastructure at the human scale

**R**educing the adverse health impacts of heat exposure in cities has emerged as a shared priority among researchers, practitioners, and policymakers involved in many aspects of urban systems.

Many of the strategies currently in place to reduce health risks related to heat exposure rely on water resources. UWIN project A2-3 investigates what will happen to the thermal comfort of urban residents, and risks of heat-related illness, in the face of changes to urban water systems driven by climatic variability and infrastructure modification.

The first project objective is to assess the microclimatic conditions experienced by urban dwellers through the course of their daily lives, integrating indoor, outdoor, and transit-based exposures into metrics oriented around people rather than places.

- To make this assessment, we use large-scale time-activity data sets and direct observations, combined with high-resolution information about urban microclimates.

The second project objective is to quantify how changes in urban infrastructure, especially infrastructure elements supported by water, as well as changes in the urban climate, will impact the thermal comfort and risk of heat-related illness of urban residents.

- This objective will be achieved by combining time-activity and exposure information with projections from other UWIN projects.

The project incorporates the perspectives of public health sector stakeholders gathered through a series of interviews across the UWIN study regions to ensure that research activities are aligned with public health priorities.

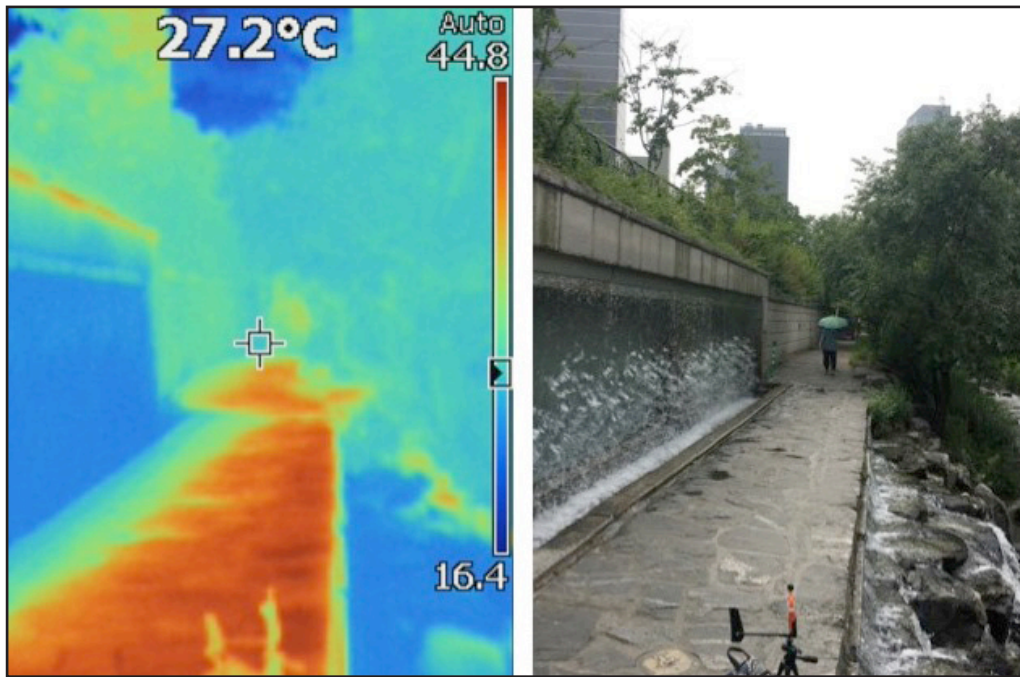
For example, a common strategy to improve thermal comfort in cities is the expansion of urban tree canopy and green space. Our project aims to support the decision-making process before deploying this intervention by capturing the impacts to human health and well-being.

### PROJECT OUTPUTS

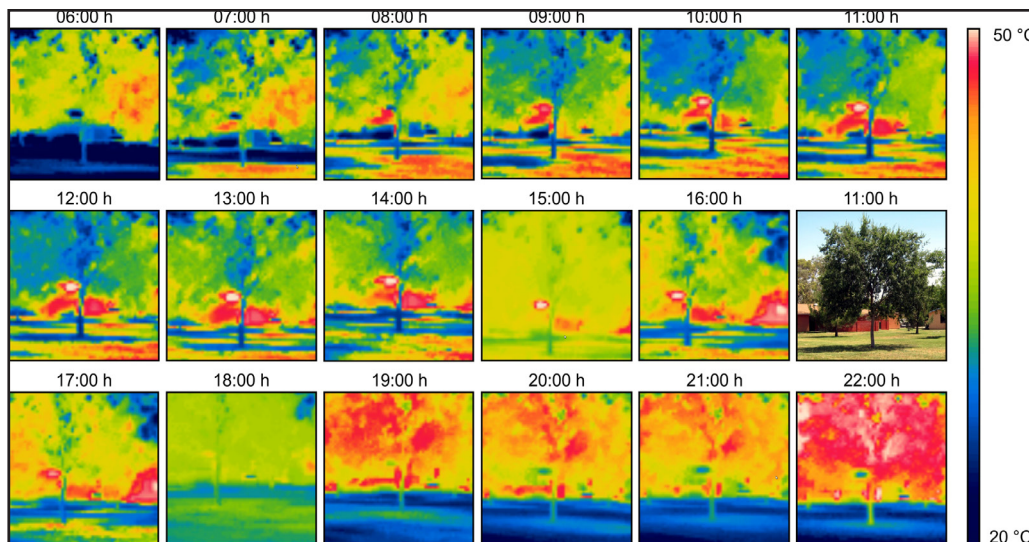
Project A2-3 is intended to benefit a wide range of decision-makers by providing more detailed information and a more comprehensive perspective regarding the implications of changes to the urban thermal environment and urban water systems for human health.

Project results will be of interest to those considering changes to urban infrastructure that have the potential to directly or indirectly impact the thermal experience of urban residents.





Thermal imagery of a decorative urban water feature in Seoul, Korea, highlights contrasts in surface temperatures between hardscapes and pavement and flowing water. Subsequent analysis of data collected by a portable weather station (right side of photo) will help determine the impact of the water features on air temperature and human comfort. Photo credit: Lexie Herdt, Texas Tech University.



Hourly thermal imagery of an elm tree over grass in the North Desert Village, Phoenix, AZ. The photographs reveal how surfaces around the tree, and the tree itself, heat and cool over the course of a sunny summer day. The impact of shade on grass surface temperatures is particularly evident in the late morning and early afternoon imagery. Photo credit: Ariane Middel, Arizona State University.

## DATA

Project A2-3 will generate four different types of data outputs:

1. Direct micrometeorological characterizations of environments utilized by urban dwellers;
2. Information about time-activity patterns of urban residents;
3. Modeled thermal stress of urban residents in current and modeled future conditions; and
4. Transcripts and analysis of health sector perspectives on urban water systems and implications for heat-related illness.

## PROJECT KEYWORDS

- Thermal Stress
- Microclimate/Urban Climate
- Human Health Impacts
- Urban Infrastructure
- Heat Exposure
- Public Health

## PROJECT CONTACT

David Hondula  
 Assistant Professor  
 Arizona State University  
 (480) 965-4794  
 david.hondula@asu.edu  
<https://erams.com/UWIN/a2-3/>