

Urban Canopies to Mitigate Heat



Problem Setting

Cities can face dramatic differences in temperature compared to surrounding areas due to increased heat absorption by the built environment. Urban heat presents acute human health impacts and has long-term implications for well-being, equity and ecosystem resilience in cities. Trees can be a powerful tool for cooling urban environments. This panel brings together innovators from academia, city government and the nonprofit space to share insights on unique interventions that mitigate urban heat while providing other benefits.

Speakers: Ariane Middel, Arizona State University; Matthew Browning, Clemson University; Sharon Danks, Green Schoolyards America; Brian Knox, City of Tampa, Florida.

Moderated by Jordana Vasquez.

Key Takeaways

1. HOW WE MEASURE URBAN HEAT MATTERS

Historically, surface temperature and air temperature have been the primary measurements used for evaluating urban heat. However, both Ariane Middel and Matthew Browning highlighted that there can be dramatic differences between these metrics and the realities experienced by pedestrians, who may face additional exposure due to direct solar radiation and surfaces radiating heat around them. Traditionally, these sources of urban heat have been ignored in measurements. New methodologies, such as mean radiant temperature, should be adopted to better capture how populations experience heat throughout a city.

2. INCREASE URBAN CANOPY TO IMPROVE WELLBEING

Increasing urban canopy is a key intervention for catalyzing changes in well-being and inequality in communities. Matthew Browning cited a range of research on the connections between urban canopy and increases in community safety and individual financial security. Similarly, Sharon Danks emphasized that “green schoolyards” can present new opportunities for learning and play.

3. CANOPY COVER STRATEGIES ARE DIVERSE

Each city has its own unique climate conditions and built environment. The sensitivity of trees to local conditions means that canopy cover targets and implementation strategies need to be tailored to the city’s specific locality. While 30% canopy cover is a widely accepted threshold for realizing the benefits of urban trees, each panelist noted the importance of ongoing monitoring to understand context-specific limits and possibilities. Ariane Middel shared the City of Phoenix as an example, highlighting how urban forestry efforts must respond to the dual threats of microstorms and water shortages.

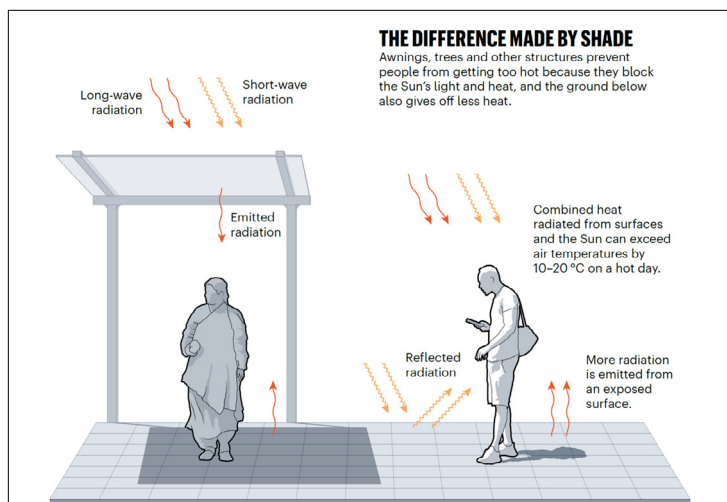
4. COMMUNITY ENGAGEMENT IS CRITICAL

Recent technological advancements make it possible to map urban heat in better resolution and on larger scales than ever before. However, panelists emphasized the importance of remaining connected to voices on the ground. Sharing his work as an urban forester, Brian Knox outlined efforts to engage more than 1,000 community members during Tampa’s most recent assessment of current and future canopy cover. Collectively, the panelists’ work makes it clear that centering local knowledge is critical to mobilizing long-term support for urban forestry campaigns.

Implementation Examples

ARIZONA STATE UNIVERSITY'S MARTY CART

Ariane Middel shared information about one of her lab's most recent innovations: the MaRTy Cart. Middel's team developed the Mean Radiant Temperature (MaRTy) Cart to track pedestrians' experience of urban heat. Measuring mean radiant temperature can shed light on which urban cooling strategies are most effective, such as increasing shade versus prioritizing reflective surfaces. So far, MaRTy has been deployed to more than 150 locations throughout Phoenix to improve understandings of the city's heat.

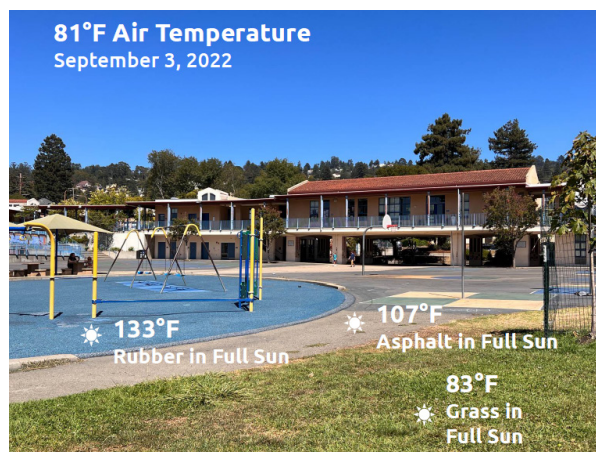
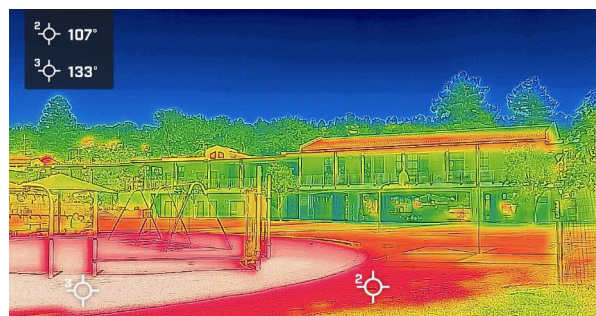


Shade is more effective for cooling than reflective surfaces.

Source: Turner, Middel, Vanos (2023) in Middel Conference Presentation.

GREEN SCHOOLYARDS AMERICA

Sharon Danks's "green schoolyards" initiative envisions a paradigm shift in the design of our educational facilities. The most common materials on playgrounds today - plastic grass, rubber, and asphalt - absorb heat quickly, exacerbating the threats of heat. Danks and her team are working toward nationwide implementation of schoolyard forests as green infrastructure to promote better health, engagement, and happiness outcomes among students.



Surfaces used in playgrounds differ greatly in temperature.

Image Sources: GSA in Danks Conference Presentation 2023.

PRIORITY ACTION: INCREASE MONITORING OF URBAN CANOPY COVER

All panelists stressed the importance of generating and maintaining high quality data. Brian Knox specifically highlighted the ongoing fight to retain funding for 5-year assessments of urban canopy in Tampa. This data is critical for making sound urban forestry investments, especially since the last assessment revealed that the city is dangerously close to its 30% minimum canopy cover threshold, which is critical for human and ecosystem wellbeing.

NEXT STEPS:

FOLLOW MaRTy on social media @ASUMaRTy.

EXPLORE urban accessibility to green space across the US through the Trust for Public Land's ParkServe database: <https://www.tpl.org/parkserve/about>.

LEARN more about Green Schoolyards America's National Schoolyard Forest SystemSM initiative: greenschoolyards.org

Watch the entire conference panel [online here](#).

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