Hixon Center for Urban Sustainability

FACT SHEET

Predicting Urban Warming

Climate Ready City

Climate Issue: Urban Surface Warming

Climate change is causing warming everywhere, but the degree of warming differs between urban and rural areas.

- Both climate change and urban expansion cause temperatures to increase
- Urban areas are heating much faster than rural areas due to the Urban Heat Island effect
- Materials used to build cities absorb energy from the sun, which leads to a warmer urban climate
- Extreme heat can cause mortality, illness, loss of worker productivity and damage to urban infrastructure.

Urban Versus Rural: Different Warming Scenarios

- Most predictions of temperature increase assume that cities will warm at an equal rate as rural areas
- However, the science shows that cities will be 29% warmer than rural areas as surfaces warm
- Urban residents will experience more frequent and severe heatwaves with climate change.

It is essential for urban climate **adaptation plans** to be based off temperature **data** collected within the **urban core**, rather than by nearby rural weather stations.

Megacities: Vulnerable to Extreme Heat

- Surface warming generally increases with city size
- Megacities are particularly vulnerable to warming
- Studies show the **warming of megacities** will be **47% greater** than surrounding rural areas
- Around 1.7 billion people live in megacities
- As urbanization increases, so to will the number of megacities and the global urban population
- Cities must implement urban cooling strategies to protect this substantial population.

WHAT CAN YOUR CITY DO?

Measure Temperature Accurately

PARTNER with universities or other institutions to implement temperature measurement initiatives

ENSURE temperature predictions for your city are based off of readings from within the city rather than surrounding rural weather stations

TRACK urban temperature changes, to help predict future scenarios

IDENTIFY the location of vulnerable populations and prioritize cooling strategies in these areas.

Implement Urban Cooling Strategies

PROTECT existing urban greenery

PLANT more urban greenery, including vegetated landscapes, shrubs and shade-providing trees

DECREASE impervious surfaces

INSTALL shade infrastructure, such as tree canopy cover, awnings, and vertical panels

IMPLEMENT reflectivity strategies, such as painting road and roof surfaces white to reflect sunlight

DESIGNATE libraries and other air-conditioned public buildings as cooling centers for use by citizens during extreme heat waves.

To find out more information on this fact sheet, contact **Professor Xuhui Lee** at **xuhui.lee@yale.edu**. Fact sheet is based off of Liu, Z. et al.., (2022) Surface Warming in Global Cities is Substantially More Rapid Than in Rural Background Areas. Communications Earth & Environment 3:219 | https://doi.org/10.1038/s43247-022-00539-x | www.nature.com/commsenv