



Can Cities Keep Their Cool?

Research bioclimatologists with the Miller School's Synoptic Climatology Lab counsel cities on how to manage rising temperatures



Miami sunset.

Record-challenging temperatures baked the U.S. mid-Atlantic and Northeast in past weeks, causing roads to buckle, drawbridges to sizzle and get stuck with heat, and a spike in heat-related fatalities and health conditions. The heat dome then moved to the West Coast. Around the globe, thermometers have peaked at all-time highs from Montreal to Northern Siberia along the Arctic Ocean. A coastal city in Oman posted, at 109 degrees Fahrenheit, the world's hottest low temperature over a 24-hour period.

Sure, it's summer, but these conditions seem extreme.

Laurence S. Kalkstein, Ph.D., a bioclimatologist and voluntary faculty member with the Miller School of Medicine's Department of Public Health Sciences, has spent the past 30 years studying the impact of weather on human health. He's the director of the Synoptic Climatology Laboratory, whose



research ranges from exploring climate change, to counseling urban stakeholders on how to keep their cities cool, to a vast array of weather and environmental factors on plants, animals, humans and disease.

Kalkstein has collaborated with research teams from around the world – in South Korea and Russia – and together with other lead authors on the United Nations Intergovernmental Panel on Climate Change (IPCC), was honored when the IPCC was awarded the Nobel Peace Prize in 2007.

Kalkstein doesn't underestimate the impact of high hot temperatures, especially when sustained, but his research is more concerned with the variability of summer temperatures, which contributes more to heat-related health problems.

We asked Kalkstein to share his insights on the current heat waves, and their impact on health and healthy cities.

We had a week-plus of record-challenging temperatures across our mid-Atlantic and Northeast and record-breaking temperatures at many spots around the globe. How do you interpret these extreme temperatures?

The recent heat wave in the U.S. has been severe but nothing strangely out of the ordinary – remember it's July. Even as the heat dome moved toward the West Coast, it wasn't untypical – a high-pressure system that makes air sink, which warms the air. The record-breaking temperatures in Los Angeles were caused by the hot air coming across the desert that descended and grew warmer as it settled across the Los Angeles Basin.

It would be foolish to take this heat wave or every other one and say they're caused by climate change. To do that simply



emboldens the climate change skeptics so they can say, “You see, they’re grasping at anything they can.”

Now around the world there have been some very hot periods that are abnormal. Still, they don’t reach the levels of 2003 – 70,000 dead; hottest summer on record in Europe since at least 1540.

Even these are not too aberrant in terms of their magnitude, so we can’t make the mistake to say that there’s widespread evidence of human-induced climate change. Let’s assume there is climate change – and there is. I’m a firm believer that the climate is getting warmer. But there are two types: the kind that is human-induced and the change that is not. How do you tease out the part that is caused by human beings? It’s very, very difficult to do.

To help make the distinction we’ve been taking an air mass approach. There are many different kinds of air masses and each will be affected differently by rising temperatures. So the question becomes, which will be affected the most by warming temperatures: the hot dangerous air masses or the cooler more pleasant ones?

The earth is getting hotter, a seemingly clear outcome of the impact of climate change. You recently participated as a lead author on a United Nations Intergovernmental Panel on Climate Change (IPCC). What was the focus of your participation and what were some of your major takeaways?

Part of the problem of the panel is that, like me, the vast majority is in an advocacy position – we’re worried about climate change as a human-induced problem. So skeptics say that the outcomes are pre-determined.



The way the IPCC works is that there are three working groups. The first studies the climate modeling science; the second group – my group – evaluates the environmental impacts of the warming temperatures and tries to quantify them; and the third group builds on the first two and tries to develop policies for decision-makers.

Your team has been participating in the Los Angeles Urban Cooling Collaborative. What's the nature of this partnership? Is it exclusively with Los Angeles? How does the group counsel the city?

We are working on “cool cities solutions.” This collaborative, funded by a federal grant from the U.S. Forest Service, tries to physically modify urban areas to make them cooler. Our work transcends the question of climate change, in that we look at the urban heat island effect – how urban centers generate heat because of their dense populations.

We work with stakeholders and decision-makers and look at how to find ways to keep less energy from being absorbed during hot weather and have more reflected back into space – through highly reflective roofs, windows, and signs, by planting trees. We're working with the 3M Corporation to help them understand how their reflective shingle products and window films can help cool the cities enough to potentially save lives during heat waves.

With heat waves, it's not about comfortability – two to three degrees can make the difference between someone living or dying.

This seems to be more preventive oriented. What advice do you have for a city engulfed in a heat wave? What can be done once



temps are already soaring?

Number one is awareness – most people do not believe they're vulnerable. Heat is the only weather-related killer where there's no physical evidence, yet more people die of heat than any other weather-related cause in the U.S. After a hurricane blows through, the whole landscape is devastated. I show students photos of Chicago before and after the horrific heat wave that killed hundreds in 1993, and there's no difference.

The stakeholders need to emphasize that heat is a problem that everyone needs to be aware of. Even supposedly healthy people go out and play tennis and can succumb to heat illness.

After that, it's simple: drink a lot of water, if you're not able to be in an air-conditioned structure, then take a cool shower, pour water over your head and – do not – sit in front of a fan in a hot room. A fan is like a convection oven – the blowing air evaporates the sweat, which removes heat rapidly from the body, and you can quickly become dehydrated. If you are obese, alcoholic, or on medication, you are more vulnerable. If you're over 65 or an infant, you're more vulnerable. Many of those who die are socially isolated, so if you have an elderly aunt or uncle, then check in on them. It's easy and self-evident that you should do these things.

What are some of the major contributions/findings your team has made recently or helped to reveal?

We've worked with the Environmental Protection Agency to help them produce a heat-health guide for decision-makers. We're doing considerable work on determining how much hotter the hottest air masses are getting due to potential climate change.



The Union of Concerned Scientists and the Natural Resources Defense Council, two of the biggest non-profits dealing with the environment, have funded our research to identify whether heat deaths will increase in the future. We are also interested in knowing whether deaths during heat waves are caused by heat or pollution. When temperatures get warmer, more people are dying, and some of these deaths may be the result of poorer air quality during excessive heat events rather than the heat itself.