ISLANDS IN THE SUN

by WENDEE HOLTCAMP

PHOTO BY ERIC LO

ANYONE WHO HAS RELAXED UNDER AN OAK TREE on a hot summer day understands the cooling effect of vegetation. Trees do more than provide shade; they literally cool the air through the process of evapotranspiration. According to the U.S. Department of Agriculture, a single tree equals the cooling effect of 10 air conditioners running 20 hours a day.

But when a region's natural vegetation gets replaced with urban expanses of heat-radiating roadway, parking lots and rooftops, cities become concrete islands measuring 5 to 10 degrees hotter than the surrounding countryside. Scientists call them urban heat islands, and they can be killers. As climate warms, scientists expect more heat waves. Those in cities will suffer the effects even more than the rest.

"We have found most large cities of the U.S. to be warming at more than twice the rate of the planet as a whole," says Georgia Institute of Technology city and regional planning expert Brian Stone, who has studied heat islands for more than a decade.

During the 1990s, Stone and other scientists studied the heat island effect in megacities such as Los Angeles, Houston and Atlanta—mainly because higher temperatures increase smog formation. But then interest in heat islands waned.

"With so much emphasis on global climate change, many atmospheric scientists have focused on the impacts of increasing concentrations of greenhouse gases, while neglecting smaller-scale issues such as urban heat islands," says University of Minnesota climate scientist Peter Snyder, who recently received an Institute on the Environment Discovery Grant to study 100 of the world's biggest "Islands in the Sun" along with colleague Tracy Twine. Snyder and Twine are faculty in the College of Food, Agricultural and Natural Resource Sciences' Department of Soil, Water and Climate.

In the first heat island study of this scale, Snyder and Twine will explore what human and natural factors contribute to each city's heat island, as well as what each city may be doing to mitigate it. Besides vegetation, the color and reflectivity of surfaces affect urban temperature. Dark colors absorb the sun's energy and release it into the air as heat, while white or light colors reflect solar radiation, keeping a city cooler.

"The key is to determine what manageable things cities are doing to reduce their temperature footprint, and then investigate the feasibility of applying them to cities in the U.S.," says Snyder. Using a computer model, the researchers will toy with various "what if" scenarios to determine how they alter local, regional and global climate. "By discovering what factors most influence urban heat islands, citizens and politicians can make informed decisions that will cool their cities—whether that means planting more trees, changing up landscaping, or offering economic incentives for reflective white or vegetated rooftops."

Award-winning freelance writer and photographer **WENDEE HOLTCAMP** has published in magazines such as *Scientific American*, *National Wildlife*, *Nature*, *Smithsonian* and *Texas Parks & Wildlife*.