

Maximizing the benefits of green infrastructure

Associate professor studies how cities can strategically plan to get the most out of sustainability projects

By Dolores Tropiano, ASU News
May 13, 2025

Cities across the country and around the world have been going green — literally — in an effort to reduce the impacts of climate change.

Lush parks, rain gardens, green roofs and other nature-based solutions are cropping up in urban areas as a leading strategy for combating two major climate threats: extreme heat and flooding, while also providing other potential co-benefits.

But is it really addressing all of these challenges?

That's what [Sara Meerow](#), an associate professor in the [School of Geographical Sciences and Urban Planning](#) at Arizona State University, wanted to know.

"This was one of the leading strategies that, again and again, cities seem to be promoting as a virtual 'panacea' to address resilience and enhance sustainability," Meerow said. "The late [Elinor Ostrom](#) (a Nobel Prize-winning political scientist and former ASU professor) always questioned panaceas, and so I wanted to dig into these green infrastructure plans and understand them a little bit better."

That curiosity began a decade of research into how cities can optimize the use of green infrastructure.

"I was both interested and also concerned — is green infrastructure really providing all these benefits that they're saying it does?" she said. "And how are cities making decisions about what type of GI to develop where? I wanted to dig in deeper. That was what originally motivated me to start working on green infrastructure — my initial interest in resilience."

Building for benefits

Nature-based infrastructure can offer benefits like improved air quality, recreation opportunities, animal habitats and even improved mental health.

Meerow cited the Indian Bend Wash Greenbelt in Scottsdale, Arizona, as an example of a well-planned green infrastructure. The 11-mile path connects parks, lakes, golf courses, libraries and

more while providing flood protection for the area.

Another example Meerow pointed to was ASU's [Orange Mall Green Infrastructure Project](#). Located in front of the Memorial Union on the Tempe campus, it has seating and a shaded palm court for social gatherings while also managing wet-weather impacts.

"These multiple benefits of green infrastructure are often called ecosystem services," Meerow said. "There is a huge body of research that aims to quantify the ecosystem services of different nature-based solutions — from mental health benefits for nearby residents to climate change mitigation through carbon sequestration."

"But what our research has shown over a number of studies of different cities is that they are not strategically planning, designing and evaluating this green infrastructure to attain these multiple benefits," she said.

"My work in this area is really focused on how cities can plan and implement green infrastructure in order to maximize the resilience benefits."

One of Meerow's first contributions in this area was the [Green Infrastructure of Spatial Planning model](#), which she developed as part of her dissertation.

"It is essentially a spatial, multi-criteria model," she said. "It has different layers that represent different kinds of benefit priorities. You might have a layer showing which neighborhoods across the city would be a priority for green infrastructure based on mitigating heat. Other areas may have a need for stormwater management or additional green space. These could be the same areas, or they could be entirely different. And with this model you can layer those together, add them up and identify hot spots of need for green infrastructure."

"So ultimately this helps cities plan green investments more effectively."

Barriers to green infrastructure plans

Meerow's current research, [published](#) this month, builds on this earlier work.

The paper is part of a two-year project led by Meerow that is funded by the National Science Foundation National Center for Atmospheric Research and focuses on stormwater and heat-related green infrastructure — the most costly and deadly climate hazards.

"Cities have limited resources," Meerow said. "So it's about allocating limited resources for green infrastructure most effectively in order to address multiple challenges and try to maximize multiple benefits."

Meerow's past research suggests that the primary reason why cities do not better coordinate their green infrastructure is because their "governments tend to be siloed."

"You have one department that deals with stormwater and another that may deal with heat," she said. "Then you have the parks department dealing with parks, and they all don't necessarily talk to each other. They have different budget lines. It's actually really complex."

"And trying to get them to all work together — to actually merge their different streams of funding — is really challenging. And I still see that as a major barrier to multifunctional green infrastructure planning."

Another obstacle might be the lack of legal purview to take into account these other benefits.

"It would be beneficial to just start these conversations," Meerow said. "Obviously, then, if it comes to actually implementing a more multifunctional approach to decision-making, that's going to require collaboration and breaking down some of these government silos."

Learn more about green infrastructure projects happening at ASU

Shade canopies

[Jennifer Clifton](#) is working to equitably expand the tree and shade canopy in Phoenix, Tempe, Guadalupe and Mesa neighborhoods while creating skilled jobs in the process. Clifton, assistant director of community economic development with the [Walton Sustainability Solutions Service](#), is the co-principal investigator and project lead for [Urban Nature](#) — a collaboration with 18 community, municipal and industry partners in Phoenix.

Funded by a \$5 million grant from the USDA Forest Service's Urban and Community Forestry Program, Urban Nature is working to strategically cool low-canopy, high-heat neighborhoods where people walk, wait and gather, while also expanding a skilled workforce for the long-term health of metro Phoenix's urban forest. ASU researchers have monitored how these systems work to capture stormwater, improve water quality and mitigate heat.

Designing for the heat

[Paul Coseo](#) is an assistant professor and sustainability scientist at [The Design School](#) who specializes in urban design that can withstand the impacts of climate change — particularly extreme heat.

With expertise in meteorology, urban planning and landscape architecture, he investigates both the causes of rising urban temperatures and the solutions to reduce them. His work focuses on creating urban environments that are not only cooler but also more equitable, ensuring that vulnerable communities are not left behind. He champions the idea of "urban climate design," which emphasizes inclusive, just and environmentally responsive approaches to shaping cities that support the health and well-being of all residents.

Community impact

[Kelli Larson](#) is a researcher who studies how neighborhoods and cities are designed and managed, and how residents' choices and government decisions affect environmental outcomes, human well-being and urban sustainability.

The professor in both the [School of Geographical Sciences and Urban Planning](#) and the [School of Sustainability](#) also explores how people think about the benefits and downsides of natural and built environments — like trees, water bodies and parks. Larson has led several major projects funded

by the National Science Foundation, including serving as the lead social scientist for a long-term study on the environment in the Phoenix area.

This story originally appeared on [ASU News](#).

1

Main image



ASU's Orange Mall Green Infrastructure Project, located in front of the Memorial Union on the Tempe campus, has seating and a shaded palm court for social gatherings while also managing wet-weather impacts. Photo by Charlie Leight/ASU News

Text image(s)



Sara Meerow