FEELING THE BURN

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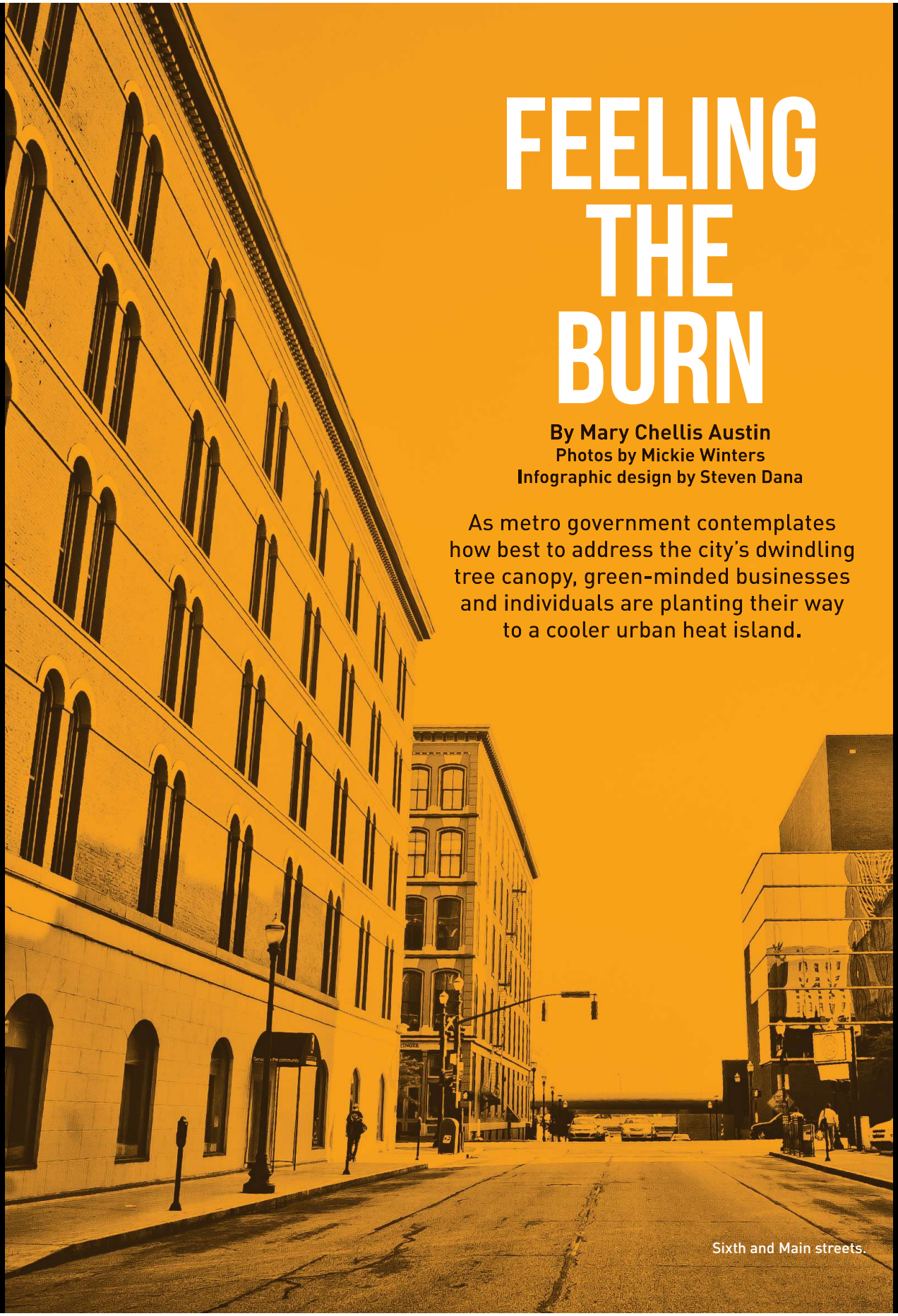
As metro government contemplates how best to address the city's dwindling tree canopy, green-minded businesses and individuals are planting their way to a cooler urban heat island.



Sixth and Main streets.

On a sunny May morning at *Louisville Magazine*, my weather app tells me that the outside temperature is 80 degrees and rising. An office phone is wedged between my ear and shoulder as I jot down notes from a self-described "geeky academic." Glancing through the open blinds, I see a couple stroll by on Muhammad Ali Boulevard, carrying a black rain umbrella (their only respite from the sun, apart from the occasional building shadow). I'm almost envious of their warmth, as I've borrowed a sweater from a co-worker to fend off the AC's goose bump-inducing chill. A parking lot away, two measly trees hug the sides of a parking garage. They register a trace of breeze. Later, when I leave work, the corner of Muhammad Ali and Second Street is stifling. By the time I make it to my car, which has boxed in a workday's worth of heat, my thawed-to-sweltering bones crave another cool blast. The mercury has climbed to 86 degrees and we're not even in summer yet.

"It's brutal," says Patrick Piuma, director of downtown's Urban Design Studio, which works on solving real-world problems for the city. "It's a detriment to have people out on the street, doing things. A hundred degrees and it's beating down and you're in the concrete environment. Not everybody wants to walk around in that."

Brian Stone, the geeky academic and director of Georgia Tech's Urban Climate Lab, is familiar with this scorching scene. He studies the relationship between the urban heat-island effect (in which the city, with its concrete structures, stays hotter than its surrounding vegetative areas) and the city's tree canopy. Despite the handful of LEED-certified developments, despite TARC's electric, hybrid and clean-diesel buses, despite the promise of the 100-mile Louisville Loop trail system, despite those nifty, solar-powered, compactable trash and recycling bins downtown, Louisville has become less green in the most literal sense: Its tree canopy is at an embarrassingly sparse level, and not just downtown. According to Stone, who has written a book titled *The City and the Coming Climate: Climate Change in the Places We Live*, trees cover 27 percent of our metropolitan area (including our prided parks), as determined by satellite photography — about 13 points lower than the average for cities in our region. Downtown — resembling desert proportions in some spots — is a weak 10 percent. (A comparable area in Cincinnati is 20 percent; Atlanta, 45 percent.)

Of course, certain areas of town are leafier than others. Our parks are lush, and several neighborhoods maintain mature tree canopies. But Jack Wojciechowski, who's standing under an umbrella on the corner of Seventh and Main streets selling Italian ice on the first 94-degree day of the season, will tell you that where he is, natural shade's lacking. When I comment on the weather, he offers me a cup of the lemon flavor. He says his plugged-in Cyclone fan keeps him cool, but then adds, "I would love a big, giant oak tree here." The exchange leaves me with a pink forehead, a sweat-seeped shirt and a brain freeze. This roasting bit of Main Street isn't even the most offensive of treeless areas. Entire blocks of Jefferson Street, Fifth Street and Broadway (among others) are void of trees. Some strips display rows of flowerpots, which are cute at best.

Wojciechowski, who says he takes breaks in a shaded courtyard nearby, can tell you about trees' cooling effects. So can the research organizations that study urban climate. According to Stone's findings, among the 50 largest U.S. cities, we're heating up the fastest — 1.67 degrees every decade since 1961. "Louisville is not only number one; it's double the second, which is Phoenix," he says. The researcher first blames our heat waves on the oppressive air that comes through the Ohio River Valley. But his main concern is the heat pattern resulting from our meager tree canopy. The problem begins when we cut down trees and trade vegetation for development, with the I-264 corridor providing a good example. So not only are the trees and soil gone, but often they're replaced by dark roofs and asphalt roadbeds and parking lots that absorb solar radiation and cook up the city. We then find ourselves in a vicious cycle, cranking up air conditioners, which alone elevate outside temperatures through heat transfer. In the recently published book *Walkable City*, author Jeff Speck cites a U.S. Department of Agriculture finding that "the cooling impact of a single healthy tree is equivalent to 10 room-size air conditioners operating 24 hours a day." Tree-neglecting land use in the U.S., Stone says, accounts for 50 percent of the global warming that has occurred since 1950, and he says that Louisville's four-year-old climate action plan to reduce carbon emissions is critical, but won't fix the heat problem. "Right now, Louisville has a handful of days in the 100s, and those are very unpleasant. In 20 or 30 years, those will be half the summer."

Unpleasant doesn't begin to describe heat's dangers. "Heat-related deaths kill more people in the U.S. than all other catastrophic weather events combined," says Stone, who gave a presentation to the city's Tree Advisory Commission last summer. According to a Natural Resources Defense Council brief from May of last year, among the nation's 40 largest cities, Louisville will have the highest number of heat-related deaths through 2099, at about 19,000. (For comparison, it's estimated that Jacksonville, Fla., will reach 8,000; New Orleans, 1,500. This stark difference, Stone says, is a result of Louisville's rate of temperature increase combined with our inability to quickly acclimate to the warm season from cold winters.) "It's an underestimated threat," Stone says. "It's familiar; it happens slowly, mostly to older people. It tends to be discounted."

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Of course, the authors of the NRDC brief note, these predictions are made based on us doing "business as usual," and don't account for what we can do to cool the city down: increase reflective surfaces (green roofs or even white roofs — just not radiation-absorbing dark roofs) and plant trees. Besides the cooling that shade provides, evapotranspiration, in which trees emit water vapor into the atmosphere, reflects the sun's rays. According to the EPA website, the shade-evapotranspiration combination can reduce peak summer temperatures by 2 to 9 degrees. Stone says that a thriving tree canopy (for downtown Louisville that means 30 percent more coverage) is more influential than any other environmentally proactive measure that we have at our 21st-century fingertips.

I'm walking down Cherokee Road (thriving tree canopy, indeed) on a clear but muggy day in mid-June, looking for a crew of tree trimmers I'm supposed to meet. Pockets of sun and shade alternate as I follow the hum of yard work — a sound almost synonymous with the start of summer. Down an alley is a white utility truck, its deep bed filled with tree debris. Two men from Limbwalker, a local tree- and lawn-care company, are finishing up a job for longtime resident Sharon Hardy. Corey

Petry, the company's co-owner, dumps an armful of branches in the truck, greets me and leads me through a gate to Hardy's back yard. Wearing sunglasses, a hard hat and a CamelBak-looking hydration pack over his neon-orange T-shirt, Petry tells me he's just pruned the lilac and Japanese pagoda trees to allow the fig trees and other landscaping to soak up more sunlight. (Plenty of shade remains, encouraging mosquitoes to feast on my ankles.) Hardy steps outside to thank the guys and tell them she's headed out. When I explain why I — wearing sandals instead of hiking boots, and holding a pen and paper instead of a chain saw — am among the crew, she proudly says, "Well, I'm one of the tree advocates around here," as though her kelly-green T-shirt, stamped with a Cherokee Triangle logo and the words "Plant a Tree for Me," doesn't reveal her position. "It amazes me when a big, old tree comes down and nobody replaces it!" she says. "You know, downtown is where we need them."

Hardy is stating the obvious. A Google Maps aerial view has downtown and pieces of Phoenix Hill and west Louisville looking almost solidly gray. In August 2010, the National Weather Service's local office took a satellite image of the city's tree cover and superimposed temperatures over it, showing higher temps in areas with the least amount of vegetation. Where homeowners tend to have the disposable income to properly plant and care for trees, we see cooler temperatures. Like other community resources, healthy trees tend to grow wherever the dollar lies. According to the Arbor Day Foundation's website, landscaping, especially with mature trees, can add up to 20 percent more value to a property. Commercial areas with good tree coverage attract more customers who stay longer and spend more money, and apartments with trees have fewer tenant turnovers. Trees beget higher home values and business sales, which beget wealth, which begets trees.

Stone strongly advocates that our (and every) city have a heat-management plan, which requires taking inventory of current tree stock. The folks at the Urban Design Studio, which has been engaged with the city through Vision Louisville, Metro Parks and the Tree Advisory Commission, have been collecting tree map data for downtown streets. Though initial field-checking is finished, Piuma says that a number of trees were cut down for the Ohio River Bridges Project and that many others were taken down for unknown reasons, so an update is needed. The studio is working with the tech company Forest Giant to develop an app to make the process easier.

"I think it's going to answer a lot of questions," says Patrick Smith, a certified planner and digital mapmaker working with the studio. He sits at a long table in the studio's main room, his laptop open to the map work that he and his colleagues are close to completing. Their work answers several questions: Where are the trees? What species do we have? What are their sizes? How is their health? All of this, Smith says, will help the city develop a heat-management plan.

"The sorts of analyses that Brian Stone has done and that students at U of L have done, these have been sort of macro level, like thinking about the whole enchilada at one time," Smith says. "What we're trying to do is finer-grained: get real information about where trees are and what their sizes are." Maria Koetter, the director of the Office of Sustainability, which Mayor Fischer created last year, says that a tree-canopy assessment of the entire county is vital in addressing urban heat because the problem isn't just downtown.

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Does this mean we have to wait for the study results before planting? "I wouldn't go out tomorrow and plant 10,000 trees," says Piuma, "but at the same time, every tree you add is going to benefit the community. It would be better when you have a strategic plan for large-scale planting, but I would hate for people to be like, 'We can't plant until this is done.'"

Other efforts are beginning to sprout. Baby trees — still in diapers, or rather, those green irrigation bags at the base of their tiny trunks — are developing roots downtown. The bags are integral to the health of trees, Petry says, because the first year requires the most water. These saplings come from the business- and community-run Louisville Downtown Management District, which put 166 in the ground in December as part of a joint effort with the Downtown Development Corp. and with the help of a grant from the Metropolitan Sewer District. Wesley Sydnor, the senior technical services engineer at MSD, says that back in 2009, the quasi-governmental utility added an urban reforestation program with a goal of planting 1,000 trees per year for 14 years through partnerships, grants and incentives. Grant-receivers, including the Downtown Management District, U of L and the Olmsted Parks Conservancy, have planted more than 3,000 trees since the program started. In addition to the cooling, public health and aesthetic benefits of trees, Sydnor says, "There are also large stormwater benefits, especially in downtown, where we have the most combined sewage overflows, or CSOs." He says the district's overall cost to reduce the city's overflows is $850 million. (According to *Walkable City*'s Speck, larger urban areas such as New York have CSO budgets in the billions.) "Trees are a small part of that, but a valuable part of that," Sydnor says.

Planting is one thing, but what's the use if the trees aren't properly maintained. Ken Herndon, director of operations and communications for the Downtown Management District, says DMD has promised to maintain the trees that line the district's city rights-of-way for seven years, watering and pruning under the guidance of the Metro Arborist Mark White. With some of the older trees downtown, you'll see buckling bricks at tree wells that are clearly inadequate to handle their root systems. Herndon says that, while the recent plantings have been in larger, five-by-five-foot tree wells, adding wells or expanding old ones depends on certain factors, such as underground utility lines. A downtown-wide study, he says, would help planners avoid cutting into something underneath the sidewalk. It's also important to plant the right types of tree. City structures (sidewalks, power lines) can dictate which tree species should go where. Resistance to pests and disease is another factor. The emerald ash borer is making its way through Louisville and will kill a sixth of the already sparse tree coverage if we ignore the invasion. Insecticide treatments exist but must be repeated every two years, so tree owners — whether public or private — must weigh the costs and benefits of maintaining or replacing.

But tree ownership and responsibility gets confusing, even to Louisville native Chris O'Bryan, who co-owns Limbwalker with Petry. The 37-year-old graduated from the University of Kentucky and has a master of forest resources degree from Clemson University in South Carolina. He's been a certified arborist for more than a decade and is a five-time Kentucky tree-

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Hello, heat island: looking south on Armory Place at Muhammad Ali Boulevard.

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climbing champion. Our first meeting is at Ramsi's Cafe on the World, where, for the first hour, we do nothing but sip water and talk trees.

"We have a municipal, which takes care of city trees," he says. "Then we have the park system, which is sort of municipal but is very clearly defined with what they manage (Olmsted parkways and city parks). Then we have the private sector. And the private sector is not regulated at all. It's the Wild West." Because lack of responsibility can lead to tree neglect, O'Bryan says he would love to see regulation in his industry. "I'm in ornamental trees and shrub services," he says. "It has an SIC (standard industrial classification) code, 0783; it has a definition. My company files its taxes. In the private industry for tree work right now, the majority of work being done in this community is in the black market. That means it's not taxed; it's performed by companies that pay their workers under the table." O'Bryan tells me that inexperienced workers, with the approval of ill-informed residents, remove many trees in the city, often unnecessarily.

"The current city arborist doesn't have the authority to manage that and he doesn't have the resources," he says. "What we need is an urban forester who can take a big vision, something general and vague and say, 'What do we want this city to look like in 20 years? Do we want to be a city of trees or do we want to live in a desert? If you go to Greenville, S.C., or Charlotte, N.C., it is amazing. The downtowns are shaded, and the upkeep has been done by professionals." Unlike cities that have steadily maintained their tree canopies, Pittsburgh is an example of a community that has begun to turn things around. The city has estimated that for every $1 spent on street trees, it has received almost $3 in benefits — a value that has helped spur aggressive tree-planting campaigns. O'Bryan says that with the right structure, we can not only get more trees downtown, but save more trees from being removed elsewhere.

How did we, a city that prides itself on its parks and parkways, let things get this bad? A combination of factors exists. For one, we were hit with huge wind storms in September 2008 and August 2011 and a massive ice storm in January 2009, all uprooting big trees and damaging branches. "Just looking at Tyler Park when I drive by — they lost a ton of full, mature trees, and it takes 100 years to grow those things again," Piuma says. O'Bryan says he thinks that natural disasters leave people feeling that trees are a nuisance and expensive to take care of, so trees often aren't replaced. "It's a cyclical thing where we think we have a lot of trees. It swindles us," he says. "We've been practicing for a long time not caring for trees."

Tree management is not a new struggle among urban areas. In *The City in Mind*, author James Howard Kunstler says that in 19th-century Paris, "greenery had to be a disciplined part of the urban order." Look at old sketches in local author John Findling's *Louisville Postcard History Series* and you'll see that the town didn't seem to have given downtown street trees much thought. Cities across the U.S. now realize the unfavorable effects of urban development and have worked to not only plant but also to preserve. New York, Philadelphia and Los Angeles each have goals to plant a million trees throughout the next decade. Louisville's sustainability plan aims to have a hundredth of that — 10,000 new trees — planted by 2018, with alleviating the heat island being the main intention.

Some laws work to protect trees from a service standpoint. In Maryland, only licensed tree experts can perform tree services, cutting out a lot of the black market that frustrates O'Bryan. Another way to protect trees is through ordinances. Washington, D.C., requires a special tree removal permit for any tree larger than 55 inches in circumference on public or private property. Louisville does have an ordinance requiring a permit for tree removal on public rights-of-way, but the measure does not extend to private property. The exceptions to this are suburban cities such as Anchorage, Middletown and Prospect. Metro Louisville's landscape architect, Sherie Long, says, "In Anchorage, you can't touch a tree without a permit, even on private property." She says that Louisville's land development code does not currently protect trees as much as it could. "If you have a 100 percent tree site and you come develop it, there's nothing in the land development code that makes you mitigate the loss," she says. The code states that on a formerly tree-filled site, the minimum developers are required to replace is 30 percent. "And that 30 percent is based on putting a stick in the ground and waiting 30 years for it to have any impact," Long says. "An ordinance would go a long way. It could talk about preservation; it could make special requirement for larger trees, maybe require some kind of compensation that developers have to pay if they remove certain trees."

Apart from what businesses and the city can do, an undefined but much-needed branch of tree service is volunteer-run, which Piuma says has been the main tree-tracking method. Petry serves on a subcommittee of the Tree Advisory Commission, which is also comprised of volunteers. "Advisory being the key word. It's like a dog with no teeth," he says of the commission's lack of power. O'Bryan says he and his crew are also working to start a community tree-planting program, in which residents can request trees, donate their time to help plant, and the tree experts will help keep the trees alive and educate the homeowners on tree care. Even though we may lack some of these structural elements, Piuma says, based on his observations there are more trees downtown now than there were three years ago. Still, he says, we have a long way to go.

Before taking summer break in late June, the Metro Council voted on July's annual budget. Included were funds for an urban forester, a countywide tree-canopy study and the planting of more trees. Metro Council President Jim King says the tree provisions were funded "to acknowledge the importance of maintaining and building our tree canopy in concert with the critical work of the Tree Commission to inventory our trees and plan for ways to reduce our heat island." The Office of Sustainability's Koetter says the city is still fine-tuning the forester's job description, but that he or she will implement the canopy study and act as a liaison between the arborist, the parks department and the community. Unlike the arborist, the forester will engage in a general, more comprehensive survey of the tree canopy. "We're looking for someone with technical expertise, with experience and education in horticulture and arboriculture," Koetter says.

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Even though changes in structure, ordinances, education and money are all needed to amplify the metro tree canopy and ease the heat problems we face, O'Bryan says that the most important thing is for us to do it correctly, which can be frustrating and time-consuming. We can pave potholes and enjoy the benefits immediately. Trees, living organisms that they are, require nurturing and often decades of maturing before we can hide under their leaves and catch a breeze. Trees are infinitely valuable, but they take a lot of work. The Limbwalker crew, the Urban Design folks, the Climate Lab geeks, they might be making small steps every day, but it's these small steps that become good habits. ■