

Fall 2023



# A Watershed Moment

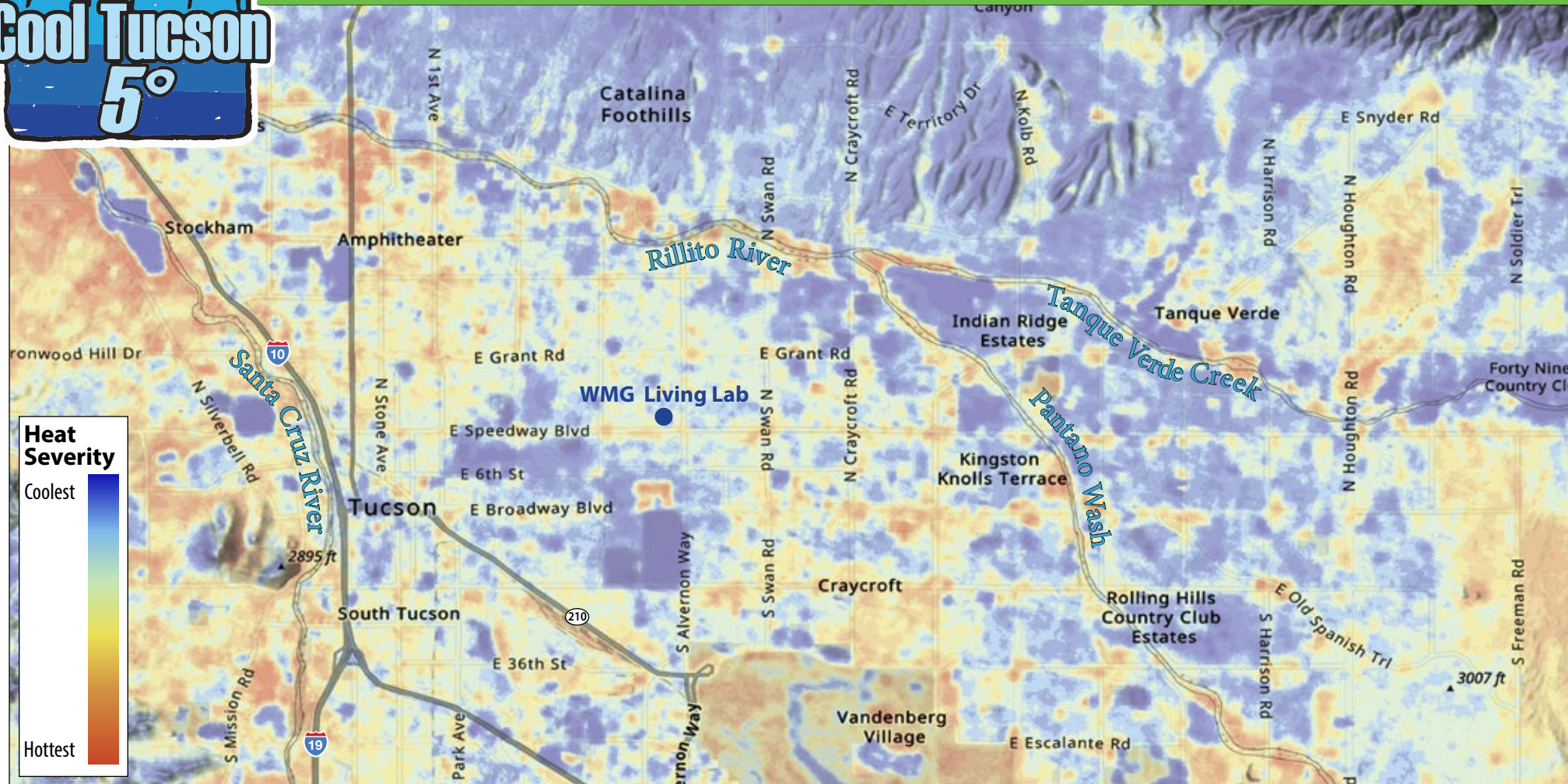
A NEWSLETTER OF WATERSHED MANAGEMENT GROUP

[watershedmg.org](http://watershedmg.org) 520-396-3266

A photograph of a person standing in a lush green forest, looking up at the tall trees. The person is wearing a light-colored t-shirt and dark pants. The forest is dense with green foliage and tall trees, with a person standing in the foreground looking up at the canopy.

## Cooling Our Cities the 5 degree goal





In addition to the warming climate, we have even hotter temperatures based on our city infrastructure and land use. This heat map shows the hotter areas in Tucson. What do you notice? These maps were developed by Pima Association of Governments based on 2013-2015 temperatures, using the average of three years of summer days. It is based on surface temperatures, not the temperature of surrounding air.

**Cover photo:** Cottonwood trees tower over us along Tanque Verde Creek in east Tucson. Cottonwoods are part of riparian forests in the Southwest that have severely diminished in the last 100 years.

#### Newsletter Credits

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## This Summer Was Too Hot How Do We Cool Our Cities by 5 Degrees?

I'm cooking up a plan to invite my siblings to retire in Tucson in 20 years. They live all over the U.S., and I like to daydream about us all living in the same place. I mentioned that scheme to one of WMG's docents, and she immediately said, "If it's not too hot." That got me thinking, in addition to a sustainable water future being the biggest threat we face, unbearable heat is right behind that. And these two issues are related.

What is the outcome we are trying to achieve with planting trees and climate resilience strategies? Don't we all want to cool Tucson, in a measurable way? How much can we cool Tucson by? Our cities are warming from climate change, but our cities are experiencing even more warming due to the urban heat island effect. We need to address both. According to the EPA, in the United States the heat island effect results in daytime temperatures in urban areas about 1–7°F higher and nighttime temperatures about 2–5°F higher than temperatures in outlying areas.

**For example, Tucson is 11 degrees warmer on average than it was 100 years ago. Half of that increase (5.5 degrees) is attributed to the urban heat island.** Why? Our built environment absorbs the sun's heat and then re-releases the heat at night. Nature on the other hand mitigates the heat and cools temperatures. So let's bring more nature back into the city, and fast!

**I challenge our community to really move the needle on this problem, with a measurable goal we're all working towards. What about setting a goal of cooling our city by 5 degrees, directly reversing the urban heat island effect while mitigating climate change.** With "cool infrastructure" like trees, green corridors, and nature-based solutions, research shows we can reduce our air temperatures by 5-7 degrees<sup>1</sup>.

To do this, we need less hot hardscape surfaces including pavement, car parking lots, gravel landscapes, and concreted and channelized drainages, creeks, and rivers. This is known as gray infrastructure, and it heats up our cities.

We need more trees, more urban forests, more flowing rivers with ample river floodplains filled with river forests, more native plants covering our landscapes, and more wood chip mulch. This is known as green infrastructure, and it cools down our cities.

Ultimately, this is a huge change in land use in our cities, and will also require us to shift from car-centric lifestyles to sustainable mobility. (see pg 6-9).

Like many revolutions, they start at the grassroots, so let's start this transformation at home and in our neighborhoods, where we have power to do so. I hope the rest of this newsletter gives you some tools to start your own 5 degree cooling journey.



Lisa Shipek, Executive Director

<sup>1</sup> <https://journals.ametsoc.org/view/journals/apme/57/2/jamc-d-17-0061.1.xml>





# Let's Start the 5 Degree Cooling Effort - Here's How!

## Cool Your Home & Conserve Water

1. Use wood chip mulch instead of gravel.
2. Use nature to cool your living spaces - native shade trees, vines, reed/ocotillo ribbing, etc. Shade your west facing walls! And grow this vegetation with harvested rain!
3. Cool the ground by having native plant understory - native grasses, wildflowers, shrubs etc. Grow this vegetation in basins with harvested rain!
4. Reduce the hardscapes around your home (extended patios, parking, etc) and then make sure they're shaded with native trees.
5. Replace your paved driveway with a mulch driveway or get rid of excess driveway area.

## Don't have a yard to cool? Focus your energies on the landscapes in your circle of influence - your neighborhood, school, business, or church.

1. Reduce excess parking and convert parking lots whenever possible to be with permeable paving solutions. Shade your parking lots with trees!
2. Ensure pedestrian and bike pathways are shaded, to encourage more people to walk and bike then drive.
3. Put in rainwater harvesting basins next to parking lots, pathways, and gathering areas, to collect runoff and grow shade trees.
4. Shift to native plants whenever possible and plant understory plants: grasses, shrubs, wildflowers, and ground covers, so often missing from commercial landscapes.
5. Engage with leadership and offer to help make the shift happen. Start a cool infrastructure garden committee to help plan and care for the new plants.

## Typical Tucson Neighborhood

### Urban Heat Island Landscape

Brick and concrete walkways

Concrete sidewalks

Concrete driveways

No understory plants

No bike lanes

No water harvesting

Minimal tree cover

No shaded bus access

Concrete gathering areas

Dirt or gravel yards



## Transformed with Cooling Infrastructure

### Cooling Infrastructure

Native shade trees everywhere, especially shading West, North and East sides of homes

Understory plants

Mulched walkways

Neighborhood greenways

Street-shed basins with curb cuts

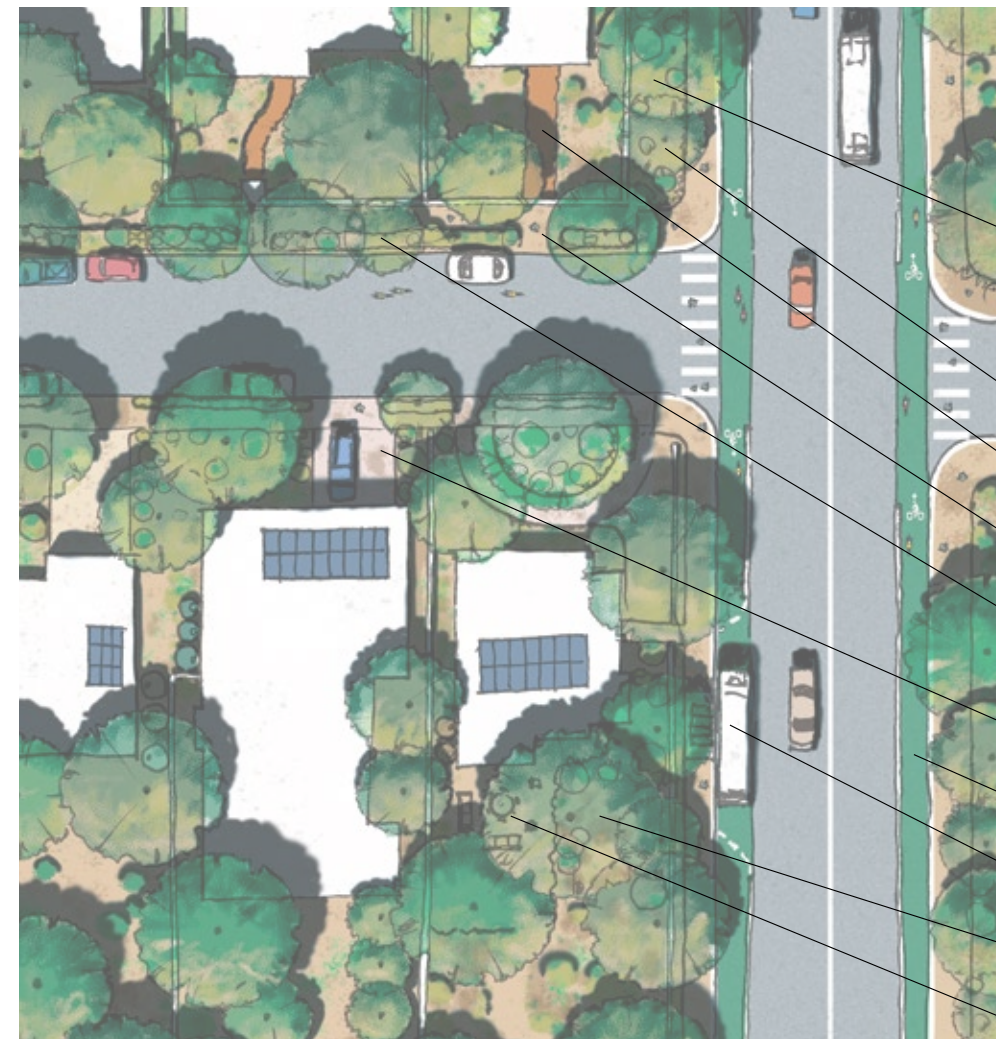
Mulched driveways

Separated bike lanes

Shaded bus access

Rain basins

Mulched gathering areas







## Cool Your Mobility - Sustainable Mobility

What is one of the biggest causes of our cities warming up? A car-centered culture and city design. Let's take our mobility back and make it sustainable, with public transportation, walking, and biking being the center of our mobility, not the fringe. Want to learn more? Check out what Amsterdam has done, what Paris is doing, Portland Oregon's "20-minute neighborhoods" launched in 2010, and Bogota's 2020-2050 Climate Action Plan and new Green Corridors.

### Here's some first steps:

1. Learn about the bus / train system in your city and start using it. Try it on the weekend or holidays when you have more time. Or go full throttle and take it to work.
2. Figure out what trips you do that are 1 mile or less in your car. Take a stroll instead.
3. Figure out what trips you do that are 3 miles or less in your car. Cruz on your bike instead. Daunted by biking? Consider an e-bike to boost your pedal power.

Did you know it costs between \$5,000-\$10,000 to construct a single surface parking spot? On the flip side, an individual can save a staggering \$10,000 per year on average by not owning a car and opting for public transport or biking.

Want to offset the carbon pollution from one year of driving your personal vehicle?

*You need to plant **546** trees!*

**If planting 1.5 trees a day doesn't seem doable, maybe walking, biking, and busing just got a bit more attractive.**



- Average American drives 37 miles/day.
- 89 lbs of carbon dioxide (CO<sub>2</sub>) is produced per car mile = 33 lbs of CO<sub>2</sub>/day = 12,045 lbs CO<sub>2</sub>/year.
- 1 tree absorbs 22 lbs of CO<sub>2</sub> in a year, so it would take 546 mature trees to offset 1 year of driving per person!







What's the best way to experience neighborhood green infrastructure? Take a bike tour! Interns and docents bond over biking through the Palo Verde neighborhood.

## What is Sustainable Mobility? And How Does it Support a Healthy Watershed?

Shifting gears from gas-guzzling cars to bikes, buses, or a pair of comfy sneakers isn't just a trendy choice; it's a leap toward sustainable mobility—a practice that ties directly into WMG's core mission. At its heart, sustainable mobility is about making transport greener and more inclusive, ensuring everyone has access to safe, affordable, and eco-friendly ways to get around.

The connection between how we move and the health of our watersheds might not be obvious at first glance. But take a moment to consider the vast swathes of urban land—about 40-60%—covered in concrete and asphalt to accommodate cars. This hard surface is more than just a platform for vehicles; it's a barrier that prevents rainwater from soaking into the ground. Instead, the water rushes over these surfaces, picking up pollutants along the way, and often rushes through our waterways rather than soaking in and replenishing our aquifers.

At WMG, we've intertwined the idea of sustainable mobility with our daily operations. Our Living Lab and Learning Center is outfitted with bike racks, a shower, and bike repair tools for those pedaling their way in. With limited parking spots, we're subtly encouraging alternative transportation options. Our annual month-long Mobility Challenge isn't just for kicks; it's a way to embody the change we advocate for, making sustainable transport a lively topic of discussion and action within our inner circle of staff, interns, and docents.

*"I thought at first I would not be able to participate in the Mobility Challenge because balance issues make walking difficult, I decided my best response to the mobility challenge was to get a bicycle - but at a wobbly age 82 that prospect was terrifying! So I bought a 7-speed trike - and use it to get to WMG meetings and other nearby events." - Ellen Sidor, WMG Docent*

Now, let's talk numbers. Did you know it costs between \$5,000-\$10,000 to construct a single surface parking spot? On the flip side, an individual can save a staggering \$10,000 per year on average by not owning a car and opting for public transport or biking. The environmental savings are hefty too; the average car spews out just shy of one pound (.89 lbs) of CO<sub>2</sub> every mile. In contrast, the average tree absorbs only 22lbs of CO<sub>2</sub> each year.

*"I've never had the chance to get to know my city, neighborhood, and my community the way I have by choosing "alternative" modes of transportation. It's nice to have the option to slow down and take in your surroundings, whether that be a bike ride through neighborhoods, or relaxing on a seat on the bus." - Luis Salgado, WMG Green Infrastructure Project Manager*

The adventurous spirit of our WMG community is a testament to the potential of sustainable mobility. Take Ellen Sidor who embraced triking at 82, or Luis Salgado who discovered beauty and serenity in his commute – their stories, like many others, sew a thread of possibility and hope.

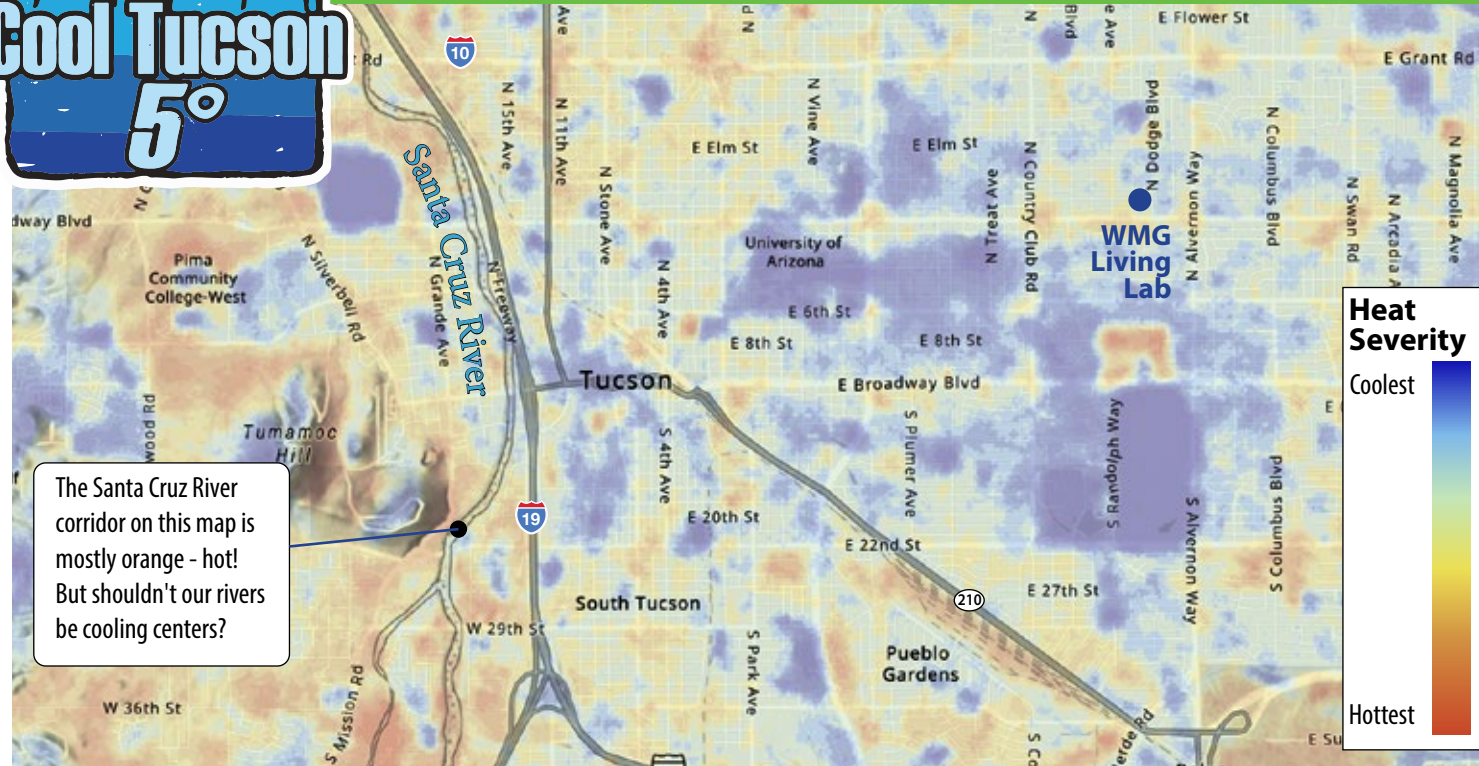
We at WMG are doing more than just pitching the idea of sustainable mobility; we're living it. And through each pedal, step, and bus ride, we're inviting others to join us in this journey. It's not just about reaching a destination; it's about enriching the voyage, and in the process, doing right by our community, our city, and our beloved watersheds.

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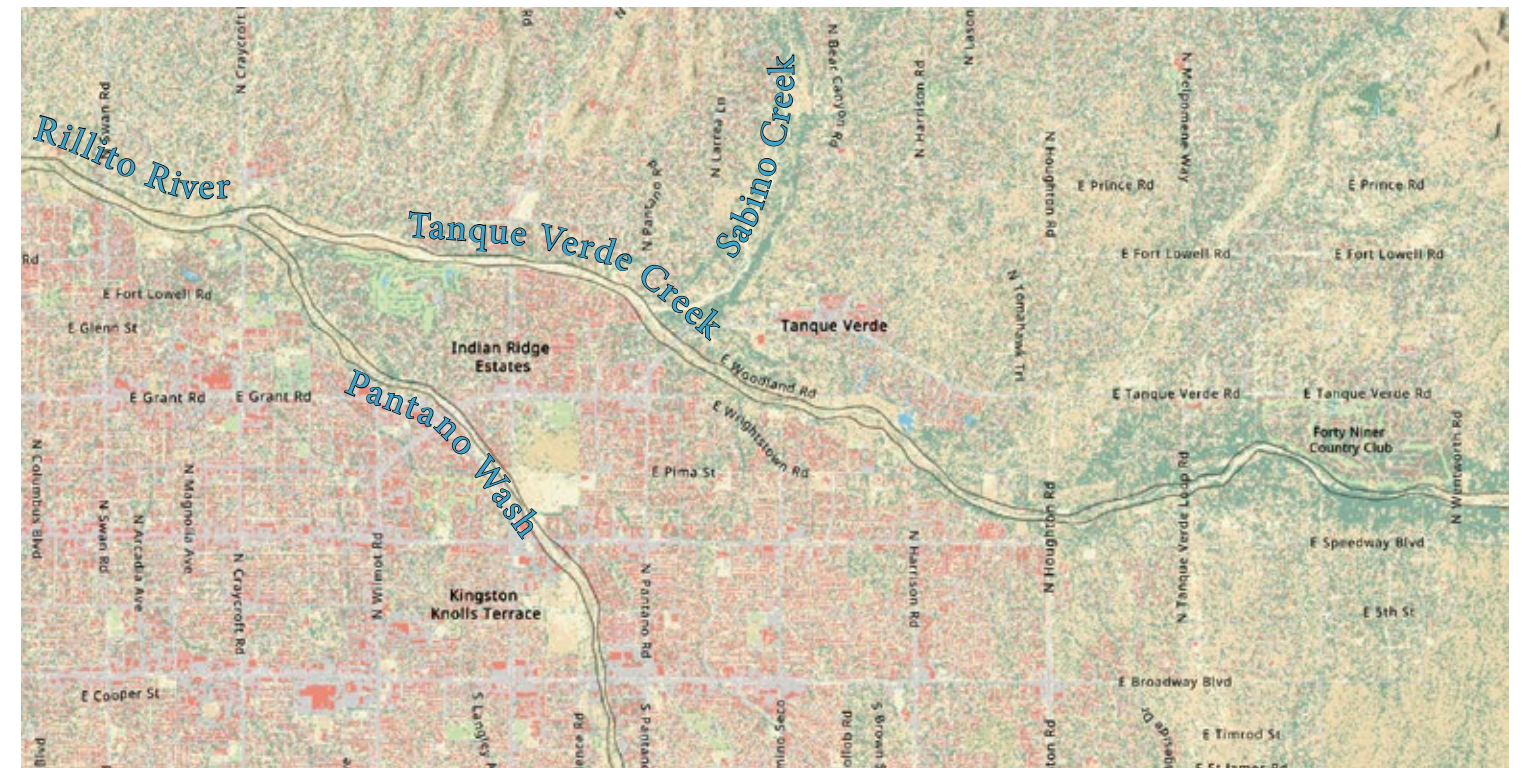
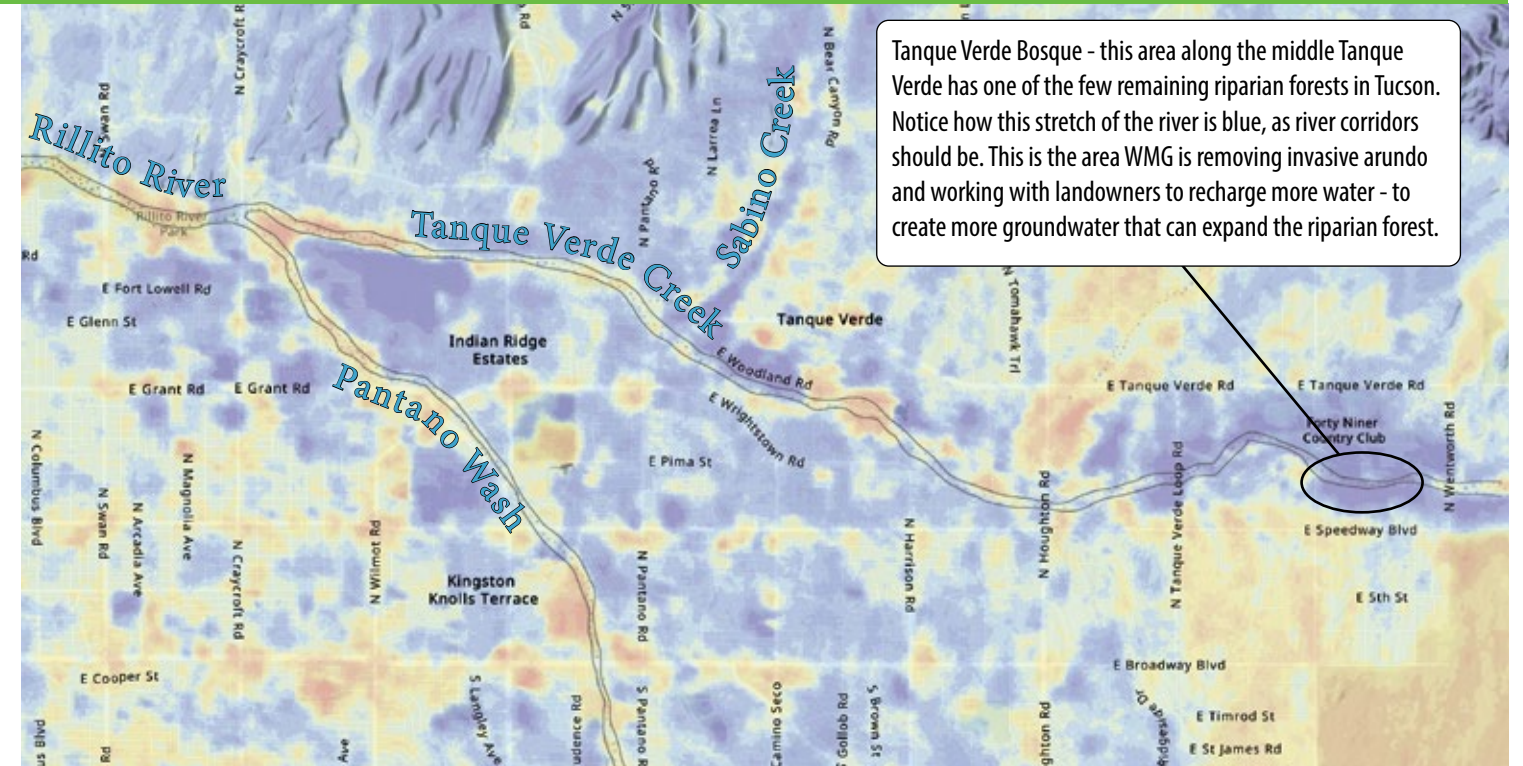


# River Corridors Should Be Cool. Why Are There So Many Hot Spots?



## Santa Cruz River Corridor, Midtown to Southern Tucson

By channelizing the river, concreting its banks, building in the floodplain, and overpumping groundwater, we have not only lost river flow, but we have lost the floodplain and river forests along the Santa Cruz River. Up until the early 1900s, there were extensive forests of cottonwood, willow, and mesquite trees. But it's not too late to reverse course. We can invest in river restoration efforts that include restoring shallow groundwater areas, restoring the river floodplain, and bringing back our riparian forests.



## Tanque Verde Creek, Middle Stretch to Rillito Confluence

Compare the heat maps and the land use maps of the same areas. What do you notice? How does land use drive the cool blue zones and the hot orange zones?

These heat maps were developed by Pima Association of Governments based on 2013-2015 temperatures, using the average of three years of summer days. It is based on surface temperatures, not the temperature of surrounding air.





## Keep River Corridors Cool: Join WMG in Restoring Flows, Removing Invasive Arundo, and Expanding the Riparian Forest

In Tucson, our river corridors were once a cooling ribbon of green, and have the potential to be again, if we can restore the riparian forests, and the floodplains and groundwater that supports them. One crucial step in this effort is to remove the invasive *Arundo donax* (giant reed) that is crowding out riparian trees and consuming much more water than native plants, sucking up surface flows and groundwater. WMG is at the forefront of reversing this adverse impact through the River Run Network, focusing on Tanque Verde Creek.

Arundo is a thirsty invader, sipping up to 3-4 times more water than native desert plants, and choking the life out of our local ecosystems. The collective effort of our River Run Network volunteers and WMG staff is making a notable dent in this invasive problem. Since we began this project in 2021, we've removed a remarkable 54 tons of Arundo from Tanque Verde Creek. This has not only cleared the way for native vegetation to thrive but also contributed to the resurgence of surface flows, a hallmark of a healthy riparian ecosystem.

One of our dedicated volunteers, Yelena Fomenko, shared her thoughts:

*"When I look at all this, it's overwhelming, and I think 'is there hope?' But being out here and seeing the change we make gives me hope. We can do this! And if we can do this, we can do other things."*

Her words echo the sentiments of many who have joined us in this endeavor, finding hope and camaraderie in action.

As we look towards 2024, we are excited about the next phase: replanting native riparian trees and shrubs in the areas cleared of Arundo. Fortunately nature is doing the work as well; we are seeing many native plants, from cottonwood trees, to seep willow, to wildflowers repopulating where Arundo has been removed.



**Yelena Fomenka and Nitesh Shah pose for the photo booth at WMG's volunteer appreciation event last August. They are excited to be Arundo Eradicators, volunteering with the River Run Network.**

Our actions extend an open invitation to the community.

**Join the River Run Network, participate in upcoming workshops, and be part of a collective effort to restore and cool our river corridors.**

As Yelena found, there's a unique kind of hope and satisfaction in working together to remove stands of Arundo, and witnessing the positive change we can make. Next year we'll also be expanding our efforts to remove Arundo in other areas, including the Rillito River, so keep an eye out for a workshop near you.

The path ahead is promising, with every removed stalk of Arundo and every native plant that takes its place, we step closer to a cooler, hydrated, and ecologically balanced Tucson.

Become a part of the solution! Learn more about ongoing efforts to restore our river flow and riparian forests by visiting

**[Watershedmg.org/Arundo](https://watershedmg.org/Arundo).**



# Planting Trees & Building Basins to Cool Neighborhoods



As our cities' concrete expanses soak up the sun's heat, the temperatures skyrocket, creating a cascade of challenges, most notably, the intensified urban heat island effect. After yet another summer with record-breaking heat, the call to action is loud and clear – we need to cool down our neighborhoods. To that end, WMG has been spearheading an inspiring, grassroots initiative – the Build Your Own Basin (BYOB) program. This initiative is kindling a community-cooling movement, giving people the know-how and resources to build basins that capture rainwater and plant native trees in their yards.

Planting trees and building basins are not just aesthetic pursuits; they are a necessity for cooling our neighborhoods and fostering ecological resilience. Trees provide shade, reduce reflected heat, and through a process called transpiration, release moisture into the air, naturally cooling the surrounding area. Similarly, basins, when thoughtfully designed and planted with native vegetation, capture and infiltrate stormwater to irrigate these plants, promoting a cooler, moister, and more vibrant urban landscape.

The BYOB program has been empowering residents to take the helm of this transformation. In late September, WMG staff led a bilingual basin building workshop at the House of Neighborly Services in Southern Tucson. 25 women who are enrolled in a GED program learned the ins and outs of passively harvesting rainwater, creating natural shade with native plants, and building rain gardens. All 25 women then received a BYOB kit, with native trees, shrubs, and organic mulch, to continue the work on their own time and in their own neighborhoods.

The ripple effect of the BYOB initiative is palpable as it extends beyond individual efforts. The Neighborhood Leaders program is about building a community of practice and knowledge. Under this program, local residents are trained on the nitty-gritty of basin building and native vegetation planting. Post-training, these newly minted neighborhood leaders host workshops, spreading the knowledge, and distributing more BYOB kits, fostering a culture of shared learning and action.

Andrea, the Community Restoration Project Manager, puts it this way:

*"A lot of this work is just a perspective shift. It's easy to get discouraged and despair. We're trying to remind people that they can help too."*

To illustrate, the Palo Verde Neighborhood Workshop that took place on August 26th of this year, epitomized this community-centric approach. Under the tutelage of WMG instructors, neighbors came together, tools in hand, to learn, build, and share. The casual potluck lunch that followed was not just about breaking bread; it was about fostering connections and seeding a community of eco-stewards.

The ingenuity of the BYOB program lies in its simplicity and the powerful ripple effect it creates. Every basin dug, every tree planted, and every neighbor educated is a step towards a cooler, greener, and more resilient Tucson.

*"We're creating the culture," says Luis Salgado, the Green Infrastructure Project Manager. "We intend for this work to continue with or without our organization."*

WMG is galvanizing change from the ground up, literally. Take a moment to envision a cooler Tucson. Then, grab a shovel, rally your neighbors, and be part of the burgeoning movement to cool our neighborhoods.

Learn how you can build your own basins with our handy illustrated zine and videos, available in English and Spanish at [Watershedmg.org/BYOB](https://Watershedmg.org/BYOB).

**Top: The Palo Verde neighborhood in midtown Tucson is becoming a hub for rain garden action through seasonal Neighborhood Leaders trainings led by WMG. Left: Folks build a basin as part of their training in the yard of one of the neighborhood leaders. Right: Andrea Salazar hands out BYOB kits with native plants to participants.**







Rancho de Enmedio, at the origins of water for the Río San Pedro and Río Sonora.  
Rancho de Enmedio, en los orígenes del agua del Río San Pedro y Río Sonora.



Riding horses along the Aribabi Ranch, origins of water for the Cocosepra River in Sonora.  
Cabalgando en el Rancho El Aribabi, los orígenes del agua del Río Cocóspera en Sonora.



## The Binational San Pedro River: Origins & Care of our Desert Waters

The San Pedro River, which flows across the US-Mexico border, is a small but mighty lifeline for the communities and critters living around it. It starts its journey from the mountains in Sonora, Mexico and travels north into Arizona, bringing with it a vital supply of water that sustains a rich mix of life along its path.

What makes this river tick? It's all thanks to the neighboring Sky Islands. These are not islands in the traditional sense, but isolated mountain ranges that rise above the desert plains. When moist clouds drift in, these "islands" catch the moisture, turning it into rain that feeds the San Pedro River and its underground reserves. It's nature's own water collection system that keeps the river flowing, even in the dry desert surroundings.

Yet this natural cycle is facing threats from climate change and the growing demands of nearby towns and cities. So how do we protect this precious river and build a healthier relationship between the river and the communities it sustains?

This is where WMG steps in. Led by Joaquín Murrieta, our Cultural Ecologist Director, we've been rolling up our sleeves alongside local ranchers to improve the health of the river and the land around it. Together, we've embarked on a journey of collaborative rockworks projects. By arranging

rocks in a way that helps slow down and spread out the water, we're giving the river a helping hand. This simple yet effective technique helps to restore eroded areas, allowing water to seep into the ground and replenish the aquifers below. And the results are visibly apparent—an explosion of growth in vegetation and an amazing increase in water flow.

These collaborative efforts are not just about placing rocks; they're about building bridges between communities on both sides of the border. It's about learning from each other, sharing knowledge, and working towards a common goal of ensuring the San Pedro River continues to flow for generations to come.

*"We need to create a culture of conservation," Joaquín says. "We're trying to make and maintain a presence in the community which is long-lasting."*

The story of the San Pedro River and the Sky Islands is a nudge for all of us to appreciate and take care of the natural systems that sustain us all, plants, animals, and people. And with groups like WMG and the proactive ranchers, there's a glimmer of hope that we can build synergy between humans and nature, ensuring that the cool waters of the San Pedro keep flowing through the desert.

## El Binacional Río San Pedro: Orígenes y Cuidado de Nuestras Aguas Desérticas

El Río San Pedro, que atraviesa la frontera entre Estados Unidos y México, es un pequeño pero poderoso salvavidas para las comunidades y la Naturaleza que viven a su alrededor. Comienza su viaje desde las montañas de Sonora, México y viaja hacia el norte hasta Arizona, trayendo consigo un suministro vital de agua que sustenta una rica mezcla de vida a lo largo de su camino.

¿Qué hace que este río exista? Todo gracias a las vecinas Islas del Cielo. No se trata de islas en el sentido tradicional, sino de cadenas montañosas aisladas que se elevan sobre las llanuras desérticas. Cuando las nubes húmedas llegan, estas "islas" atrapan la humedad y la convierten en lluvia que alimenta el Río San Pedro y sus reservas subterráneas. Es el propio sistema de recolección de agua de la Naturaleza el que mantiene la fluidez del río, incluso en los alrededores áridos del desierto.

Sin embargo, este ciclo natural enfrenta amenazas del cambio climático y las crecientes demandas de los pueblos y ciudades cercanas. Entonces, ¿cómo protegemos este precioso río y construimos una relación más saludable entre el río y las comunidades que sustenta?

Aquí es donde contribuye WMG. Conducido por Joaquín Murrieta, nos hemos ocupado junto con la comunidad ganadera para mejorar la salud del río y las colinas que lo rodean. Juntos, nos hemos embarcado en proyectos de restauración

con trabajos de piedra. Al colocar las rocas de tal manera que ayudan a frenar y esparcir el agua, ayudamos al río. Esta técnica simple pero efectiva ayuda a restaurar áreas erosionadas, permitiendo que el agua se filtre en el suelo y reponga los acuíferos que se encuentran debajo. Y los resultados son visiblemente evidentes: una explosión de crecimiento de la vegetación y un aumento sorprendente del flujo de agua.

Estos esfuerzos de colaboración no consisten sólo en colocar piedras; se trata de construir puentes entre comunidades en ambos lados de la frontera. Se trata de aprender unos de otros, compartir conocimientos y trabajar hacia el objetivo común de garantizar que el Río San Pedro siga fluyendo para las generaciones venideras.

*"Necesitamos crear una cultura de conservación", dice Joaquín. "Estamos tratando de crear y mantener una presencia duradera en la comunidad".*

La historia del Río San Pedro y las Islas del Cielo es un empujoncito para que todos apreciemos y cuidemos los sistemas naturales que nos sustentan a todos, plantas, animales y personas. Y con grupos como WMG y los ganaderos proactivos, hay una chispa de esperanza de que podemos construir una sinergia entre los humanos y la naturaleza, asegurando que las frescas aguas del San Pedro sigan fluyendo a través del desierto.





## Creating a Cool Space, WMG's Living Lab & Learning Center



Families pack in under the shady trellis at our Living Lab, to learn about building rain gardens.

On our ½ acre in midtown Tucson, WMG has been creating a demonstration of hydro-local living. Every inch of landscape at our Living Lab was turned into a rain garden, so we can grow native shade trees and cooling understory, all watered by rainfall and stormwater.

There are fantastic shade trees native to the Sonoran Desert, trees that can grow on local rainfall and withstand the heat. **Ten years ago we started planting trees at the Living Lab; now we have 31 desert trees including ironwoods, velvet mesquites, blue palo verde, foothills palo verde, canyon hackberry, desert willow, white thorn acacia, screwbean mesquite, and kidneywood trees.** These are all trees you can plant in your yard here in the Sonoran Desert, and we highly recommend velvet mesquite, desert ironwood, and blue palo verde trees—all low water users that provide great shade.

**But we're moving beyond the trees to create a forest, right here in our urban setting, to create a cooling microclimate with a variety of understory plants, including native shrubs, grasses, cactus, groundcovers, and vines.**

There's a wonderful diversity of native understory plants that provide food for wildlife and people, in addition to cooling our environment. Our understory shrubs include: creosote, jojoba, hopseed bush, mugwort, and dalea. And our food bearing plants include desert hackberry, chiltepin, oreganillo, prickly pear, and barrel cactus. Native bunch grasses are a key ingredient in rain gardens, providing a ground cover and dense root masses to infiltrate and soak in water into the soil.

Another way we're cooling our Living Lab landscape is the use of organic mulch wherever possible, which also helps infiltrate and retain water. Rock gravel can add heat to a landscape, so we only use that in areas with stormwater flows.

**The micro-climates plants create around our buildings are utilized for cooling our buildings as well as heating them up in the winter.** We've strategically planted shade trees on the east, north, and west sides of our buildings, and where that's not possible due to space constraints, we've added shade trellises to grow dense vines like queens wreath (native) and catclaw vine (nonnative, low water use).

**With all of our buildings, we can open up the doors and windows to create cross-breezes, which we do on a daily basis in the fall and spring, to have natural cooling instead of using energy-intensive air conditioning.**

Come visit us at the Living Lab during the week on one of our Saturday tours, to get ideas for your own cooling infrastructure right at home. Learn more at [Watershedmg.org/Tours](https://Watershedmg.org/Tours)





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## Give to WMG and Help Cool Our Cities

Help us create a hydro-local future, cooling our cities with green infrastructure, restored river flow, and renewed urban forests. Advance these efforts by making a donation to WMG or becoming a monthly donor.

**[Watershedmg.org/Give](https://watershedmg.org/Give)**