

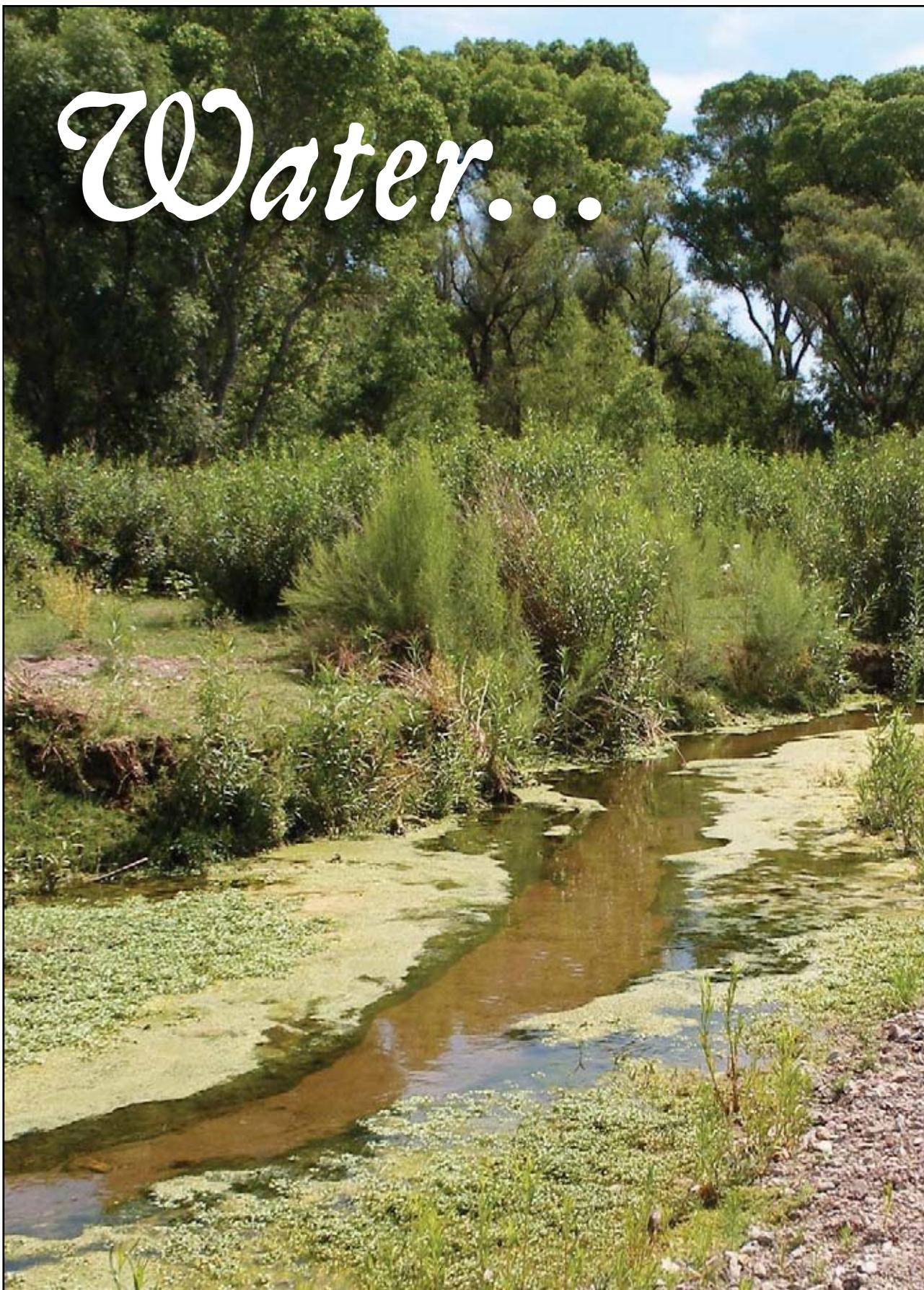


**SKY  
ISLAND  
ALLIANCE**  
Protecting our Mountain Islands  
and Desert Seas

# Restoring Connections

**Vol. 11 Issue 2 Summer 2008**

**Newsletter of the Sky Island Alliance**



*Water...*

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**Rio Saracachi at Rancho Agua Fria in Sonora.**



# From the Director's Desk: Swimming Holes and Groundwater

by Matt Skroch, Executive Director

Few experiences compare to the exhilaration of jumping into a swimming hole on a hot summer hike. You quickly leave the sweaty, heat-induced zombie state — which prompts a questioning of your mental stability for tromping through the desert this time of year — and you enter a cool, refreshing nirvana state within seconds of entering the water. The sun is suddenly transformed from a piercing menace above — whose only apparent wish is to burn a hole straight through your hat into your half-cooked brain — to that old friend you knew from the spring as it considerably evaporates the water off your skin, providing one of life's little treats.

I've gotta say, swimming holes are hard to come by these days. My favorite spot is tucked way back in the Rincons, likely never to be discovered by more than a handful of people every year. It used to be that we could swim in the Santa Cruz, San Pedro, or middle Gila Rivers. That's not recommended anymore, perhaps most poignantly exemplified by the fact that one of them is now wholly fed by treated sewage (ironically keeping the riparian habitat alive, which is a good thing). The others are not far behind — where they still exist above ground that is.

Rivers and springs have been used to our agricultural advantage for 12,000 years here, though unsustainable groundwater mining is a relatively new phenomena. We've discovered other temporary ways around the problem of increasing water scarcity — billions of dollars spent to pump water uphill for 330 miles being one spectacular example. The good news? Well, those greenie Tucsonans have actually reduced their per capita water consumption by more than 20% since the 1970s. The bad news? All that savings is more than offset by a tripling of population.

We have choices. There is a path before us that includes a landscape twisted and wrenched of all its water. Cloud seeding, large-scale desalinization centers on the Gulf of California, and various possible pipelines from northern states are all options that are far beyond being a mere idea. The truth is, if we find ourselves going to those lengths to fuel growth, our Sky Islands and desert seas will be mere shadows of what they are today.

An alternative pathway leads us to a stabilizing population, draconian (but not impossibly difficult) water conservation measures, and phase-outs or sustainable transitions of the questionable industrial agriculture we employ throughout the Sonoran Desert. The local farms will stay — we will need them more than ever — but the flood-irrigated monocultures grown downstream of Marana will be retired, slowly allowing our water tables to recover. Within

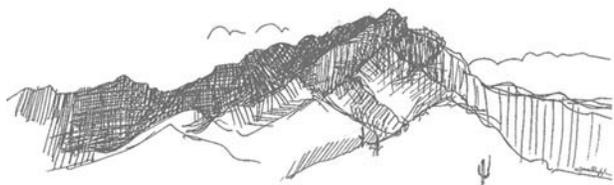
several decades, or centuries, the water table will once again seep upwards to ground level, and those low points on the landscape we call rivers will flow once again.

Either choice will eventually lead nature back to better days. The difference being that one choice — the former — will eventually result in our collapse and disappearance, while the other choice — the cheaper, more sustainable, and most logical — may teach our society, for the first time in more than a century, how to live within our means. It baffles me to think that the wrong choice may be more likely, considering it would require multitudes more money and infrastructure. The other — I remain optimistic — simply demands our will.

The willpower to improve our relationship with water is growing. This movement is not so much driven by policy, but rather by individual concern and action — it largely resides at a grassroots level today. This trend forms a foundation for affecting good water policy, which is ultimately necessary to achieve consistent and predictable trends in the right direction. We have yet to fully harness our collective concern and motivation for action, though the time to do so has arrived.

The State of Arizona must connect its policy on the use of groundwater to its relationship with above-surface flows, period. Water quality issues play in as well. The real benefactors of such a policy connection will be Arizona's wildlife, rivers, and watersheds. In turn, the human

*continued next page*



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*Sky Island Alliance is a non-profit membership organization dedicated to the protection and restoration of the rich natural heritage of native species and habitats in the Sky Island region of the southwestern United States and northwestern Mexico. Sky Island Alliance works with volunteers, scientists, land owners, public officials and government agencies to establish protected areas, restore healthy landscapes and promote public appreciation of the region's unique biological diversity.*

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## Swimming Holes and Groundwater

*continued*

element within the region will also benefit greatly from restored ecosystem services that provide us with an ecological resiliency we do not enjoy today.

When you see the flag being raised on statewide water policy reform, I hope you'll join the grassroots effort that will be required to succeed in charting a new course for the future of our region, and our own well-being.



## Transitions

We say *Que le vaya bien* to long-time board member Rurik List. He'll continue to be an important ally on conservation issues in the greater Janos area in Chihuahua and we look forward to working with him in that capacity.

And a hearty *Bienvenidos!* to our new staff, Sarah Williams, Field Associate & Volunteer Coordinator, and Jessica Lamberton, Wilderness Outreach Associate.

A native Tucsonan, Sarah's childhood experiences of hiking, camping, and backpacking helped form a deep appreciation for the unique natural surroundings of the Southwest and laid the foundations for her adult advocacy of its protection. After earning a Bachelor's degree in Geography from the University of Arizona in 1996, she migrated to the Florida Keys and began a career in public education as an elementary Spanish teacher. For the next four years, Sarah taught English and Science to middle school students in Florida and Virginia. Immersed in an emotional battle between her love for the sea, desert and mountains, she returned to Tucson, where she can continue to enjoy all three. Sarah began volunteering with SIA in 2007 and was hired as staff this April to expand activism and generate greater interest within the community by creating interactive, science-based opportunities for our volunteers and members.

Born and raised in the Sonoran Desert of Tucson, Arizona, Jessica developed a love for wild things at an early age, publishing her first article at the age of 9 on monsoons and raising toads. She has a strong commitment and enthusiasm for conservation outreach and education, and has been involved in wildlife and wild felid conservation at home and as far as Ireland and Mexico. Jessica holds a B.S. in Wildlife Conservation and Management from the University of Arizona, where she is working as a Research Technician studying urban bobcats and mountain lions in Tucson while she pursues her Master's degree. A long-time volunteer and supporter of Sky Island Alliance, Jessica's newest project is the preservation of the Tumacacori Highlands proposed wilderness.



## It's time to get our feet wet! *by Julie St. John, Editor*

When I asked staff about their book list for water, Sarah handed me a copy of Craig Child's *The Secret Knowledge of Water*. I couldn't put it down. The images from his discoveries of water in the desert burned on my retinas as surely as if I had been there, the steam they released as pure as the first raindrops on the baking landscape.

It took claiming the desert as my home for me to realize my passion for water. I wish I got out more to receive the baptismal blessings from my favorite pools... the waterslide at Romero, the polar bear lap pool in the Catalinas, floating with the fishes in Aravaipa or the Rio Cocospera, the resplendence of waters in Sycamore Canyon. It IS a religion for me... and I'm watching this summer. Watching the clouds build around the Tucson basin, but not over it anymore — am I remembering wrong? Have we converted too much of our basin into parking lots, ugly developments and gravel yards? At my friend's house in Sonoita earlier this month, the monsoon enveloped the landscape and doused us so extravagantly that the word "deluge" didn't seem powerful enough. Perhaps if I'd begun 17 years ago, when I first moved here, I could have come up with dozens, scores, maybe hundreds of words to describe the many experiences of water — it doesn't seem as if there are as many to describe any more.

Yes, I am concerned about the future of our desert. For all their prickly bravado, our desert flora exist in Slo-Time — *up to seventy-five years to grow an arm!* — and they are just green goo when the bulldozers come through. We face losing our last free-flowing river, the San Pedro, to the suction power of Sierra Vista. Two 54-mile segments of the Santa Cruz have just been declared unnavigable by the U.S. Army Corps of Engineers. This action, if made permanent, would leave the entire Tucson watershed without protection under the Clean Water Act — minimizing restrictions on growth near the river or its tributaries, lessening protections against contamination of those flows, and throwing the future of environmentally sensitive riparian area lands into question. And then there's the threat of a Rosemont Mine towering like a menacing genie over the upper Cienega Creek basin and Davidson Canyon, and a wall, *a wall*, being built across the midsection of the Sky Islands. THESE are the clouds building overhead. Clouds of our own seeding.

BUT I'm not giving up hope and you shouldn't either. I want you to get out there and make a difference. You can make a difference in just 15 minutes each day — join Sky Island Alliance and a few other organizations, sign up for action alerts... and respond! And if you can spare more than 15 minutes, it's not too late to comment on Rosemont ([www.scenicsantaritas.org](http://www.scenicsantaritas.org)). It's never too late to write or call your local, state and federal representatives and either put their feet to the fire or congratulate them for good decisions. Take part in a demonstration — *it's empowering!* And it's always, *always*, time to do something positive, something inspiring — get trained to adopt one of Janice's transects, restore a ciénega with Trevor and Sarah, plant trees and veggies, harvest rainwater, unplug yourself and take a hike... even if it's in your own neighborhood. There's a community out there — many communities, actually — and it's when we join forces and raise our voices that we can begin to be heard.



One summer day I was hiking into Aravaipa with some friends and *dang!* it was hot. Around one bend, Aravaipa became a shallow stream with a current of leaves floating to a bathtub-sized pool. Richard was the first to lay down in the water and let the current take him to the tub. We did that a bunch of times, just like little kids, never getting enough. You can't hear a thing from the oxygen-breathing world because your ears are underwater and you're in a state of bliss — there's only you and the water. After Richard smiled and handed me his swimming goggles, I realized I had not actually been alone in the water after all... tiny fish were swimming alongside me the entire way. It's like that when we get into the momentum of being an active participant in our world... we find we are part of a larger movement and there's synergy and energy to get us over the gravelly places. So come join us in the current and bring your friends along. We've got a lot to do...

# A River Runs Beneath It

by Randy Serraglio, San Pedro Campaign Manager,  
Center for Biological Diversity

Who can say that the sight of a river flowing through the desert is not inspiring, or even downright miraculous? There is a surreal quality to the meeting of cactus scrub with a cottonwood canopy at the edge of a lush riparian corridor. It seems almost magical that such a dust-dry landscape could coexist with deciduous trees and flowing water, sometimes with as little as a few meters separating them.

This magic is brought to you by the mystery of hydrology, which is actually becoming less mysterious all the time. Indigenous peoples understood rivers as lynchpins of life in the desert. When settlers arrived, they probably took it as Providence that rivers such as the Santa Cruz and San Pedro flowed year-round for many miles through the desert, offering their life-giving water to all who needed it. After long years of research, we now understand that water flows perennially above the ground in the desert only because it rises from beneath the ground in the aquifer.

During the driest times of the year, rivers like the San Pedro in southern Arizona are sustained by water discharging directly from the aquifer to the surface. And now we know what happens when groundwater pumping lowers the water table enough to weaken or destroy this dynamic. Previously perennial streams like the Santa Cruz in Tucson decay into a dry ditch, mostly devoid of the trees and wildlife that once depended upon them for survival.

Too many of Arizona's desert rivers have gone the way of the Santa Cruz, compromised by overgrazing and erosion and then finished off by development. Yet, Arizona water law still does not recognize the hydrological magic that sustains those that remain. Like much of the West, Arizona was founded on simple concepts that facilitated exploitation of available resources. Prior appropriation, reasonable use—basically, if you got to surface water first, or put groundwater to use on overlying land, it was yours to use freely, with no limits.

In the 21st century, we are coming to grips with limits. But efforts at legal reform have either failed or dragged on for so long as to offer little hope of salvation for a river like the San Pedro, which faces the same sort of intense development pressures and groundwater pumping that ruined the Santa Cruz.

The Gila Adjudication is one such effort, an attempt to sort out competing claims on surface water in a situation where pumping groundwater may impact someone else's right to the surface water in a nearby river. The adjudication identifies what is called a "sub-flow zone"—an arbitrary delineation of the area of an aquifer beneath a river that is hydrologically connected to the surface flow—but it simply establishes it as part of the surface flow, subject to the same old rights of prior appropriation. And it does nothing to address other pumping that may be outside the legal boundary of the sub-flow zone but still impacts the river.

Don't hold your breath waiting for the completion of this process. After more than three decades of legal wrangling, underlying pre-trial issues have been settled, some settlements have been reached with Indian tribes, but not a single right has been adjudicated. Rivers such as the San Pedro may be long dead before the Gila Adjudication gets anywhere near a conclusion—one that will not save the river in any event.

The Groundwater Management Act (GMA) of 1980 was an attempt to balance water budgets in certain high-use locations. Tucson, Phoenix, Pinal County, Santa Cruz County, and Prescott were designated as Active Management Areas (AMA), which were mandated to reach "safe yield"—a balance between withdrawals and recharge—by the year 2025. A complicated system of credits and recharge schemes arose in its wake, including the creation of the Central Arizona Groundwater Replenishment District (CAGR), which provides a mechanism for moving water around to satisfy the Act's objectives. The CAGR facilitates pumping in excess of natural recharge by allowing replacement mechanisms to offset the deficit.

Unfortunately, the Groundwater Management Act will not preserve our rivers either. One problem is that it does not require that water pumped out of the aquifer be recharged in the same area of impact where it was withdrawn. Indeed, recharge projects have tended not to occur in the area of the pumping they were intended to mitigate, leaving (and exacerbating) localized deficits in the aquifer. Also, too many existing rights were grandfathered in under the Act, establishing the



San Pedro River. Courtesy Robin Silver.

status quo as a deficit situation. While the Act may establish "safe yield" in AMAs, it was not designed to achieve "sustainable yield"—an equation that eliminates the existing deficit in an aquifer and leaves it with enough water to support surface flows in a river.

In any event, the Active Management Areas established under the Act are largely irrelevant to the problem of disappearing rivers, as the streams located within them have already gone dry. In order to protect Arizona's remaining streams from growth and pumping, it will be necessary to establish a system that maintains groundwater at high enough levels to support surface flows, one that requires offsets and recharge for pumping in areas of hydrologic impact outside of existing AMAs, while avoiding the loopholes that plague the Groundwater Management Act.

It is likely that enacting such a scheme will engender the creation of more effective groundwater replenishment districts or other large-scale implementation mechanisms, as well as jump-starting a water market that more accurately reflects water's value as a finite and critical resource. Such developments will be welcome steps toward more mature and foresighted management of our precious water resources in Arizona. For too long we have taken water for granted, assuming an infinite and always accessible supply. Rampant growth and ongoing drought and climate change promise a rude awakening if we do not make a change soon.

For Arizona's few remaining flowing rivers, the miraculous "ribbons of green" that a sustain myriad of aquatic and terrestrial species along with millions of migratory birds (and more than a few humans) change cannot come soon enough.



Randy Serraglio is a longtime SIA supporter and volunteer. His partner, Louise Misztal, is a Conservation Associate and GIS Technician on Sky Island Alliance staff.

# Time and the Aquifer: Models and Long-Term Thinking by Julia Fonseca

A recent news article showcased dueling hydrological opinions about whether increased pumping for a new development would threaten flows of the Babocomari River, a tributary of the San Pedro River. The well, the Babocomari and the San Pedro River all draw from the same aquifer, warn government hydrologists (see “Babbitt development role draws flak”, *Arizona Daily Star*, 06.22.2008, by Tony Davis). The developer’s hydrologists say the pumping won’t lower the aquifer enough to have a noticeable effect on rivers or on neighbors’ wells for a century. Can all of these hydrologists be right?

Yes. If the aquifer were a bathtub, pumping would cause the level of the aquifer (the water table) to go down immediately and at the same rate everywhere. But aquifers are not bathtubs; they consist of water-filled pore spaces within sediment or rock, so the effects of withdrawing water are mediated by how fast groundwater trickles from pore to pore. Keep in mind the image of the “cone of depression” that forms around a given well or wellfield (see figure). At first, the pumping alters the flow of water around it only locally, then its effects spread gradually outward.

A cone of depression can divert groundwater for springs and streams even before a change in water levels is noticed. Pumping can cause a stream and any aquatic vegetation to go dry in droughts long before anyone may be able to say with confidence that the effects in a well are “noticeable”. The lag between the time that water is pumped and the time when streams are depleted is called the “lag effect.”

The effects of drawing down the water table (drawdown) can take time to manifest, and seldom do hydrologists run the analysis long enough to understand the full effects of a given pumping scenario. Pima County recently commissioned a model of the effects of an unusual type of well that examined a time period thousands of years long. In this case, the well would be a hole in an aquifer 2000 feet deep and about a mile wide: the proposed Rosemont open pit copper mine.

The pit would be excavated in an area that provides recharge to the upper Cienega Creek basin and Davidson Canyon. Large open pits tend to affect both ground and surface water in a variety of ways, but this model looked only at the effects of digging a hole in the aquifer. Even if the groundwater inflows are not substantial enough to require a large system of

dewatering wells, the proposed pit would lower the water table and cause a giant cone of depression, similar to pumping a well. The proposed open pit would lower the regional aquifer water table by up to 2000 feet and cause groundwater to flow toward the pit, instead of toward Davidson or Cienega Creek.

Near the pit of course, the water table would go down quickly. By Year 20, areas as distant as a mile away would see at least 20 feet in drawdown in the layers of the aquifer most relevant to plants and local people. Some areas beyond that would not see any change at all due to the pit at Year 20. By then, Augusta Corporation says it would be done with mining this particular ore body. But the worst is yet to come. The cone of depression would keep spreading for *thousands of years* until it draws down the water table beneath the most distant parts of Davidson Canyon and even the water table under upper Cienega Creek in Las Ciénegas National Conservation Area. In all, it would take 8000 years for the effects to run to completion.

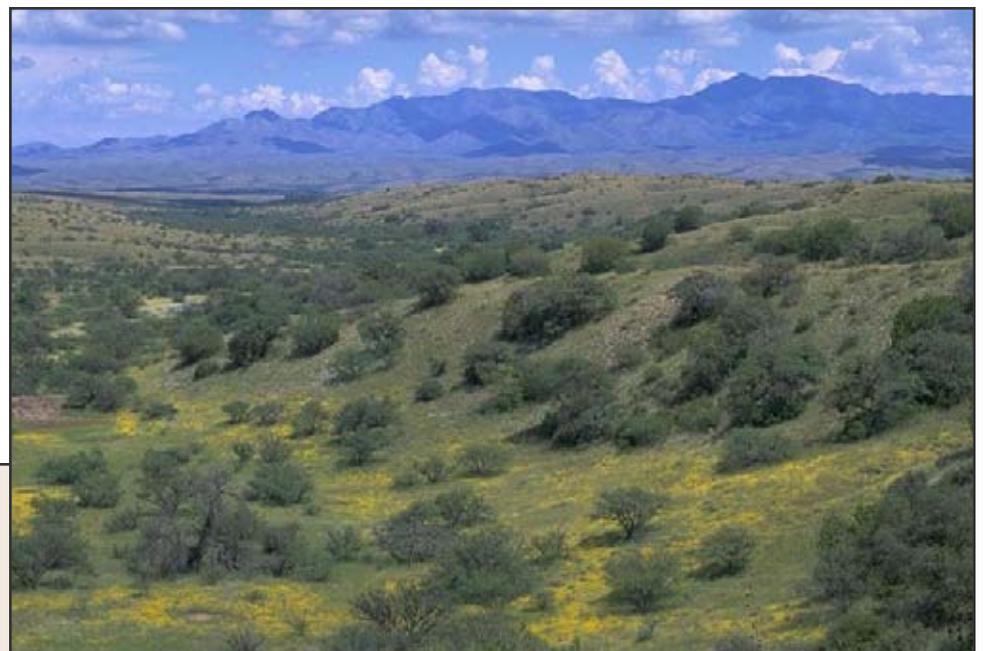
So, yes, you can chose a point that will not be affected in 100 years and say “Don’t worry, be happy.” By the time the effects of your action have played out fully, you and your children will be gone from this earth. A new

civilization will take our place, and perhaps a glacial period will have begun to refill the aquifers!

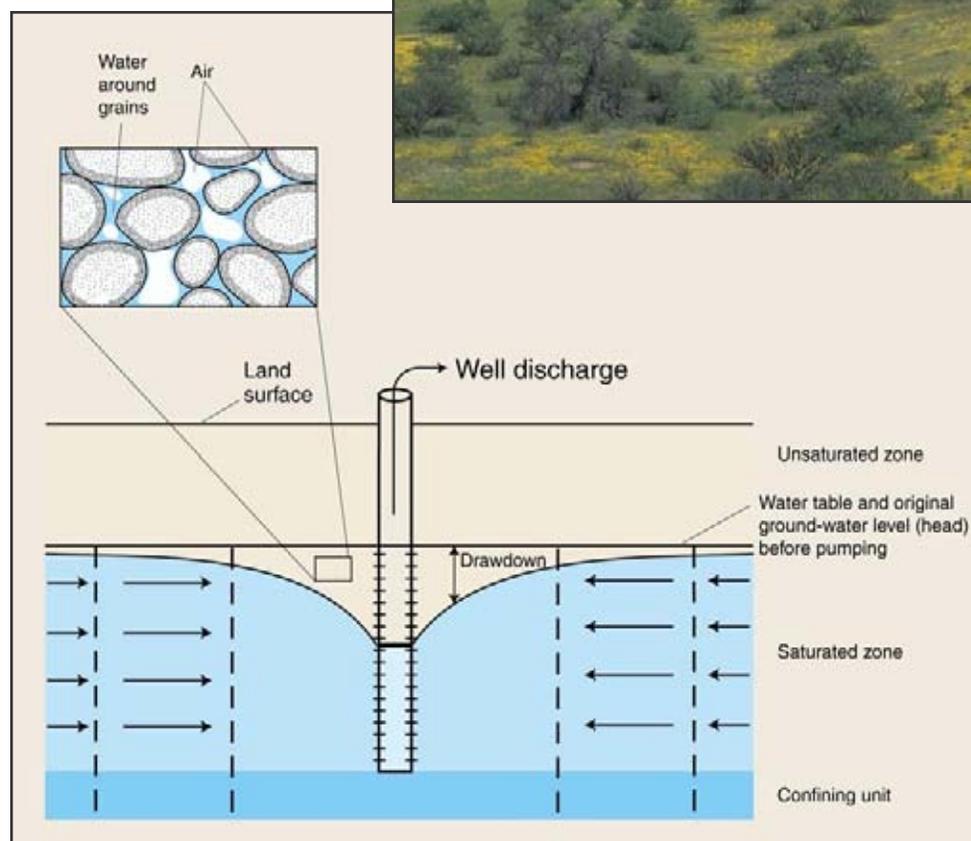
The dilemma of time-lagged effects and society’s capacity to change is similar, whether you are talking about an ozone hole, soil loss, global warming, or water. The answers will be similar too. We can put into practice a new ethic of water use, one that involves decreasing the use of groundwater, and carefully using rainwater and floodwater more than ever before. A new economy could take shape in our lifetimes, and we could begin to replenish our aquifers. There’s no need to keep digging the hole deeper.



*Julia Fonseca is a longtime SIA supporter and volunteer. You can read the report on Rosemont groundwater at [www.scenicsantaritas.org/docs/bd-rosemont.mine.cienega.basin.open.pit.ground.water.effects-1.pdf](http://www.scenicsantaritas.org/docs/bd-rosemont.mine.cienega.basin.open.pit.ground.water.effects-1.pdf) and a report on aquifer monitoring methods at [www.pima.gov/cmo/sdcp/reports/d51/Aquifer%20Report%20042808.pdf](http://www.pima.gov/cmo/sdcp/reports/d51/Aquifer%20Report%20042808.pdf)*



ABOVE **A landscape at risk— a view of the Empire/Las Ciénegas watershed in southern Arizona.** BLM



LEFT **Illustration of a cone of depression around a well.** <http://pubs.usgs.gov/circ/circ1186/pdf/circ1186.pdf>

# Streets and Public Rights-of-Way: Community Corridors of Heat and Dehydration OR Green Belts of Coolness and Rehydration

Article and photos by Brad Lancaster

For every *inch* of rainfall...

A 10-foot wide paved street will drain 27,800 gallons of runoff per mile

A 20-foot wide paved street will drain 55,700 gallons of runoff per mile

A 30-foot wide paved street will drain 83,500 gallons of runoff per mile

It's the rainy season — get out into a downpour. Dance in it, and *look*. Notice how stormwater flows along the street curbs like an ephemeral creek? That's because most of our street curbs *are* ephemeral creeks. Paved, heat-generating, flood-producing, water quality-worsening, *dead* creeks that rapidly drain water *out* of our desert community. Yet, we have the potential to make them work like porous, shade-cooled, flood-controlling, water-filtering, *living* creeks that naturally infiltrate water *into* the soils of our community.

Over 30% of Tucson's surface area is paved with streets, buildings, parking lots, driveways, patios, and sidewalks. This hardscape pavement, exposed to the sun, absorbs heat during the day like a battery, and radiates it out at night. This has contributed to a 10°F rise in summer temperatures in Phoenix and a 6°F rise in Tucson temperatures since the 1940s. This is not global warming. It is local warming. Caused entirely by local efforts that in turn compound global warming. Because of the hotter summer temperatures, more people will run their air conditioners, which are powered by electricity produced through the burning of coal. But we can easily turn this around.

In the 1970s the city of Davis, California did a study that found that neighborhoods which shaded 75% or more of their hardscape in summer (typically with yard and street trees) were 10°F cooler than neighborhoods without such shading of hardscapes.

Now, let's tie that cooling shade and the street runoff together for great effect. In an average year of rainfall (approx. 12 inches/year), the runoff from my Tucson, Arizona neighborhood's 38-foot wide streets equals over 1.25 million gallons per mile! That's enough street runoff to provide all the irrigation needs for over 400



ABOVE Curb cuts make it possible to harvest street runoff and food.

twenty-foot tall low-water-use native trees per mile, or a tree (needing 3,000 gallons of water per year) every 25 feet lining both sides of the street!

The rain and runoff can be harvested within mulched street-side basins about 6 inches deep, 6 feet wide, and 10 feet long, in which the street trees are planted (these dimensions can change, but we should strive to keep the storage volume of the earthworks in balance with local runoff needing to be captured). If the street has curbs, curb cuts may be needed to access the runoff. The City of Tucson now has a permit process and guidelines for street runoff-harvesting curb cuts. Contact the transportation department for details.

This way the street and its runoff become the passive irrigator of the street trees that grow to shade over and cool the street. In addition, the street-side mulched earthworks absorb all street runoff, naturally filter the toxins carried in the stormwater, and control local flooding. The use of hardy native shade trees reduces maintenance, enhances the bioremediation of the earthworks, and creates more wildlife habitat — enhancing local songbird and native pollinator populations.

I've done this in my neighborhood, as have many of my neighbors. The key is to first plant the rain within water-harvesting earthworks. Then plant the trees. And whenever possible to do it all together to learn with and help each other.



ABOVE Dunbar/Spring right-of-way in 2006 after water-harvesting earthworks and tree planting. BELOW Same section of Dunbar/Spring right-of-way in 1994 before water-harvesting earthworks and tree planting.



This is one of the ways you end up living in a community of friends, rather than a community of strangers. These efforts will strengthen the ties of community beyond just people. Before water harvesting and tree planting, our home and street only supported exotic pigeons. Post harvesting and planting we find the area now home to over two dozen native bird species attracted to the new habitat, shady microclimates, and food plants. Rain and runoff-irrigated food plants that we enjoy in the form of naturally sweet mesquite pods, peanut-flavored ironwood seeds, flowers and barley-flavored palo verde seeds, wild chiltepinas, cholla flower buds, and more. For more information about such harvests and community celebrations around them visit [www.DesertHarvesters.org](http://www.DesertHarvesters.org)

The idea is to live our daily lives in such a way that we enhance our local natural resources rather than deplete them, and to have fun as we do it.



Brad Lancaster is the author of the award-winning book *Rainwater Harvesting for Drylands and Beyond, Volume 1: How to Welcome Rain into Your Life and Landscape* and its Volume 2 companion: *Water-Harvesting Earthworks* (see review next page). He is also the creator of the information-packed website [www.HarvestingRainwater.com](http://www.HarvestingRainwater.com). Enter "water-harvesting demonstration sites" in the website search box to get images and info on other public rights-of-way water harvesting throughout the world — in particular check out Seattle's SEA Streets project and the Portland, Oregon Green Streets.

See [www.DesertHarvesters.org](http://www.DesertHarvesters.org) for a list of multi-use, low-water-use native trees and other information for Tucson and the surrounding area.

# Saving For (From) A Rainy Day

Book Review by Kevin Dahl

**Rainwater Harvesting for Drylands and Beyond: Volume 2, Water-Harvesting Earthworks** by Brad Lancaster, Foreword by Andy Lipkis, 2008, 419pp, Trade paperback, \$32.95, published by Rainsource Press, Tucson.

On the next block from where I live in mid-town Tucson there are two very different front yards right next to each other. One is a holdover from the '60s — a flat, plantless expanse covered in gravel you can tell was once painted green. Today there are many descendants of the green gravel yard, only slightly improved, covered with different grades and shapes of gravel, mined from various remote and once-beautiful places in the desert and shipped in oil-gulping trucks to provide just the right decorator color (earthtones, of course). Such yards might boast a small hill (or an “Indian burial mounds” as my friend Dale calls them) or a couple of cactus (creating what my friend Geoffrey used to call a Disney Desert). These “xero-scapes” might be saving water over a conventional lawn, but...

Then there's the neighbor's yard: Bruce and Judith have laid out meandering paths through several deep and wide basins filled with natural mulch, interesting shrubs, an occasional herb or vegetable, and an abundance of wildflowers in season. The basins collect rainwater (nothing runs off this yard). Cisterns store water collected from their roof to be used in the basins when it doesn't rain. The yard supports several large native trees. It is lush, cool, productive, attractive to our eyes and all sorts of wildlife, and uses no more groundwater than the neighbor's.

Brad Lancaster has studied, created, and championed such rain-fed landscapes, not just in the Southwest but from other arid lands as well. His first book is an overview of water harvesting and his next book will focus on active systems like cisterns. Sandwiched between them is the newly published Volume 2, *Water-Harvesting Earthworks*, is a how-to manual, and if you are ready to start managing your landscape it is perfect for you. It has an incredible amount of information on how to use earthworks to direct and store rainfall. Put it into practice, and the result creates habitat for both wildlife and us that is so much better than what most landscapers are doing these days. It can restore and refresh.

His techniques, tips and success stories are inspiring. The reference material astounds me, and there are updates on his website. The illustrations make it seem all so easy (which some of it is). You learn all you need to create functional terraces, French drains, infiltration basins, check dams and diversion swales. I know you want to build and use a bunyip (both an Australian mythical creature and, in this case, a simple water level) — who wouldn't? Brad shows how imprinting, mulching, greywater (kitchen, laundry and shower) harvesting, and replacing hardscape with permeable paving can improve your life. All of our lives, really.

Well-planned earthworks can also do wonders on the wider landscape, where mismanagement of forests and grasslands has caused huge erosion problems. For instance, Brad includes the story of how Arizona ranchers Joe and Valer Austin have used gabions (wire-net filled rock dams) — 20,000 gabions at last count — to bring back healthy watersheds on thousands of acres. Their efforts benefit both cattle and endangered species alike.

Another neighbor of mine recently added to his front yard a classic water fountain topped with an elephant that appears to spout water from his trunk (I know, I know; I can't make up stuff like this). It sits near a line of river rocks (pretending to be a stream) that bisects the inevitable gravel of his new landscape. He needs a copy of Brad's book. We all do.

# A New Path for Water Use by Melissa Lamberton

“I do not love my country,” writes the Mexican poet Jose Emilio Pacheco, “but I would give my life for ten places in it.”

I have never been asked to choose ten places worth dying for. But when I think of Arizona, I think of rivers—sleek wild waters carving a desert landscape into cloud canyons and stone-washed gullies. Geography is the only form of government when it comes to what we love.

It is hard to believe that people settled in Tucson because they could farm the fertile banks of a wandering Santa Cruz, or that the first travelers could lie down in grass so lush they could not see the sky.

That place is gone. The aquifer that once touched the surface is now in some places hundreds of feet below us, and the rivers we drink from are hundreds of miles away. The Tohono O'odham pray for rain; new arrivals now demand water from dams and canals.

This is what Dr. Peter Gleick, water policy expert and editor of the biennial report *The World's Water*, calls the “hard path”—a system that relies almost exclusively on infrastructures to deliver water to our homes. The hard path to water brought us the Hoover Dam, the Central Arizona Project and thousands of other structures that divert water for human use. These projects offer enormous benefits, not the least of which is the water that I drink from my tap.

But Gleick suggests another way to think about water to complement the existing infrastructure and improve on it. His “soft path” requires communities and governments to focus on a critical question: What is the water for?

We do not need drinking-quality water greening our lawns or flushing our toilets. Instead, we can match quality of supply to its purpose. Treated wastewater, contaminated groundwater and other sources can all replace expensive potable supplies for irrigation, industrial uses or aquifer recharge.

In the United States, it hardly seems necessary to prioritize our supplies this way. We rarely have to struggle to provide people with water for their basic needs. Yet the United Nations reports that one billion people in the world do not have clean water to drink. Between 10 and 20 thousand children die every day from *preventable* water-related diseases.

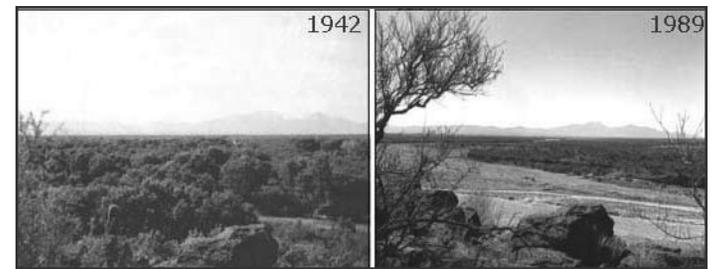
This, in a world where Americans wash their cars in drinking water. Will we wait to change our policies until, instead of New Delhi women in brightly colored saris, it is American girls waiting in long queues to get clean water, with buckets in their hands?

For a century Tucsonans have watched the desert go dry and rivers disappear. But Gleick's vision shows that a hard path is not the only path. His message is one of hope: We do not have to run out of water. But we must learn to deal carefully with the supplies that we have.

In this, the cactus do much better than the legislature. Somewhere between raising the San Xavier Mission and designing Rio Nuevo, we forgot that we live in a dry place. We do not have a right to demand more from the land than it can give. We do not have a right to make this place less livable for our children.

Countries are not made from laws and legislatures. They arise from the places where water springs to the surface, running rampant through the geography of our lives.

*continued next page*



**Increased ground-water pumping to support population growth in south-central Arizona has resulted in water-level declines of between 300 and 500 feet in much of the area. Land subsidence was first noticed in the 1940s and subsequently as much as 12.5 feet of subsidence has been measured. Additionally, lowering of the water table has resulted in the loss of streamside vegetation. These pictures show a reach of the Santa Cruz River south of Tucson. In the 1942 picture vegetation is growing in the riparian area the river, indicating that sufficient water in the soil existed at a level that plant roots could access it. The same site in 1989 shows that the riparian trees have largely disappeared as a result of lowered ground-water levels. Photo by Robert Webb, USGS.**

# The Power of Water

by Janice Przybyl

I'm about six years old and standing on the brink of Niagara Falls. Well not exactly on the brink, but as close to that edge as the park's railing will let me. I'm fascinated by and staring at the edge, the very sharp knife edge where the water changes direction abruptly from horizontal to vertical. What enthralled me then, and still does, is that despite the tremendous amount rushing by, the water at the cliff edge seems only inches deep. I remember being able to see the river bottom clearly through the racing water.

I'm drawn in and tempted to dip my fingers into the water at the precipice and touch the rocky bottom, but I don't. Even though a scrawny six-year old could easily slip through the railing, I don't move. I'm frozen in place because I can feel the tremendous power of the water. I knew that as soon as I touched the mighty Niagara, she would grab the entirety of me and dash me down the Falls to the rocks 110 feet below... without a barrel.\*

It's little wonder that I sensed that power. Niagara Falls is the second largest waterfall on the planet, the first being Victoria Falls in Africa. One fifth of the world's fresh water lies in the four Upper Great Lakes – Michigan, Huron, Superior, and Erie – and all the outflow empties into the Niagara River and surges over the Falls. At the crest of the American Falls, where I stood, peak water flow is 202,000 cfs (cubic feet per second). Victoria Falls runs at 250,000 cfs during the wet season. For local comparison, in July 2006 the Rillito River hit a record rate of 30,000 cfs. Maybe I've lived in the desert too long (wait that's not right, you can *never* live in the desert too long), but I am just as captivated when the Rillito or Santa Cruz Rivers run bank-to-bank as when I stood on the brink of Niagara Falls. I am equally astounded by water's power when I stand in a dry wash.

While tracking and collecting data for our Wildlife Linkages Program, I'll often come upon a tree with leaves, twigs, and other debris caught within exposed roots or lower branches. Many of our tracking transects lie along drainages which are dry 9 out of 10 times. The debris cache is evidence that some time within the last few months the wash did flow and not as a mere trickle. The leaf and twig litter is thick and high, up to eye-level. As I stand in that dry wash, I try to imagine the initial wall of water barreling down the wash, dense brown water churning around me, rising up to my chin. If such were the case I would not be standing still at all. The water's force would toss me along until I too

became a bit of flotsam and jetsam snagged by a downstream tree, a cottonwood maybe. The image of a yellow traffic sign floats through my head: "Do Not Enter When Flooded."

But in the dry wash, the only moving water is a salty trickle of sweat inching down my forehead into my eyes. It is late spring, almost summer, and the heat is immense, an entity unto itself. The trickle of sweat vaporizes, leaving a salt smear. I can feel the earth ache for water, the want is desperate. Too many days and nights have passed without rain in the Sky Islands of Arizona. Moisture is but a memory of winter, vaporized into the wind.

Even in its absence, water exerts power, power over life. The lack pushes wildlife to move in search of sources elsewhere. That might be why I'm not finding tracks. The bobcat and mountain lion and bear already moved through this wildlife corridor toward "greener pastures," to the river on the far side of the highway. Either that or the super dry ground is just too hard to sustain an impression from a passing critter's paw, especially a smaller lighter critter like a coati.

Looking south, far off in the distance, on the other side of the horizon, on the other side of the border, I see hope in the form of puffy white clouds. Only the tops of what might be massive monsoonal orbs are visible. Yep, back at the office my officemates, the weather geeks, confirm my suspicions. Monsoons are reported over the Sierra Madres and moving north. Relief is on the way. Days later, more than a week after the new "official" start of the monsoon season, we experience the debut storm. The skies fill with clouds, darken, then explode with a Niagara of rain. A gully washer. Sky Island Alliance staff is rooted at the windows in awe, as if we've never experienced a monsoon before. But that's the power of monsoons, they hold us spellbound.

In the alley behind the Historic Y, the runoff is deep and flowing. Clipping along. I idly speculate about the flow rate, the cfs. I venture outside and dip my fingers into the water running in the alley, to feel the force, to feel the water's power.

\*On October 24th, 1901, Annie Taylor, a 63-year old school teacher from Michigan, became the first person and the first woman to go over the falls in a barrel and survive. Accompanied by her cat, Ms. Taylor decided to tempt fate in an effort to gain fame and fortune. From [www.imaxniagara.com/daredevil-gallery/facts.cfm](http://www.imaxniagara.com/daredevil-gallery/facts.cfm)

## Books of Note

Want to expand your perspective about Water? Sky Island Alliance staff recommends:

**Lahsha recommends:** *The Desert Smells like Rain* by Gary Nabhan (1982) — *A great read about local cultures, and how they coexist in an arid landscape. The gardening part is particularly interesting, especially about monsoon-adapted veggies.*

**Matt recommends:** *Gila: The Life and Death of an American River* by Gregory McNamee (1994); *The Lessening Stream: An Environmental History of the Santa Cruz River* by Michael F. Logan (2002); *The Changing Mile* by James Hasting and Raymond Turner (1965) and *The Changing Mile Revisited: An Ecological Study of Vegetation Change with Time in the Lower Mile of an Arid and Semiarid Region* by Raymond Turner, Robert Webb, Janice Bowers, and James Hastings (2003)

**Moniqua recommends:** *Water Follies: Groundwater Pumping and the Fate of America's Fresh Waters* by Robert Glennon (2002).

**Sarah recommends (and Julie concurs):** *The Secret Knowledge of Water* by Craig Childs (2000)

**Julie recommends:** *Ocean Power* by Ofelia Zepeda (1995) — *All wonderful poems, but my favorite is "Flood of 1983 and Others";* *The Eagle Bird: Mapping a New West* by Charles Wilkinson (1992); *Down the River* by Edward Abbey (1982); *Going Back to Bisbee* by Richard Shelton (1992)

**Mike recommends:** "Before the Deluge" [song] by Jackson Browne; "Neither Out Far Nor In Deep" [poem] by Robert Frost; *The Water Is Wide* by Pat Conroy; *The Lost Amazon: The Photographic Journey of Richard Evans Schultes* by Wade Davis; *The Hidden Messages in Water* by Masaru Emoto; and an encore suggestion, seconded by Moniqua: *Cadillac Desert* by Marc Reisner (1986).

## A New Path for Water Use

continued from page 7

These places have faded from our canyon landscape and are almost beyond memory. Their world has been replaced by another, which is not, in itself, a bad one: A world where people can live comfortably in lonely places.

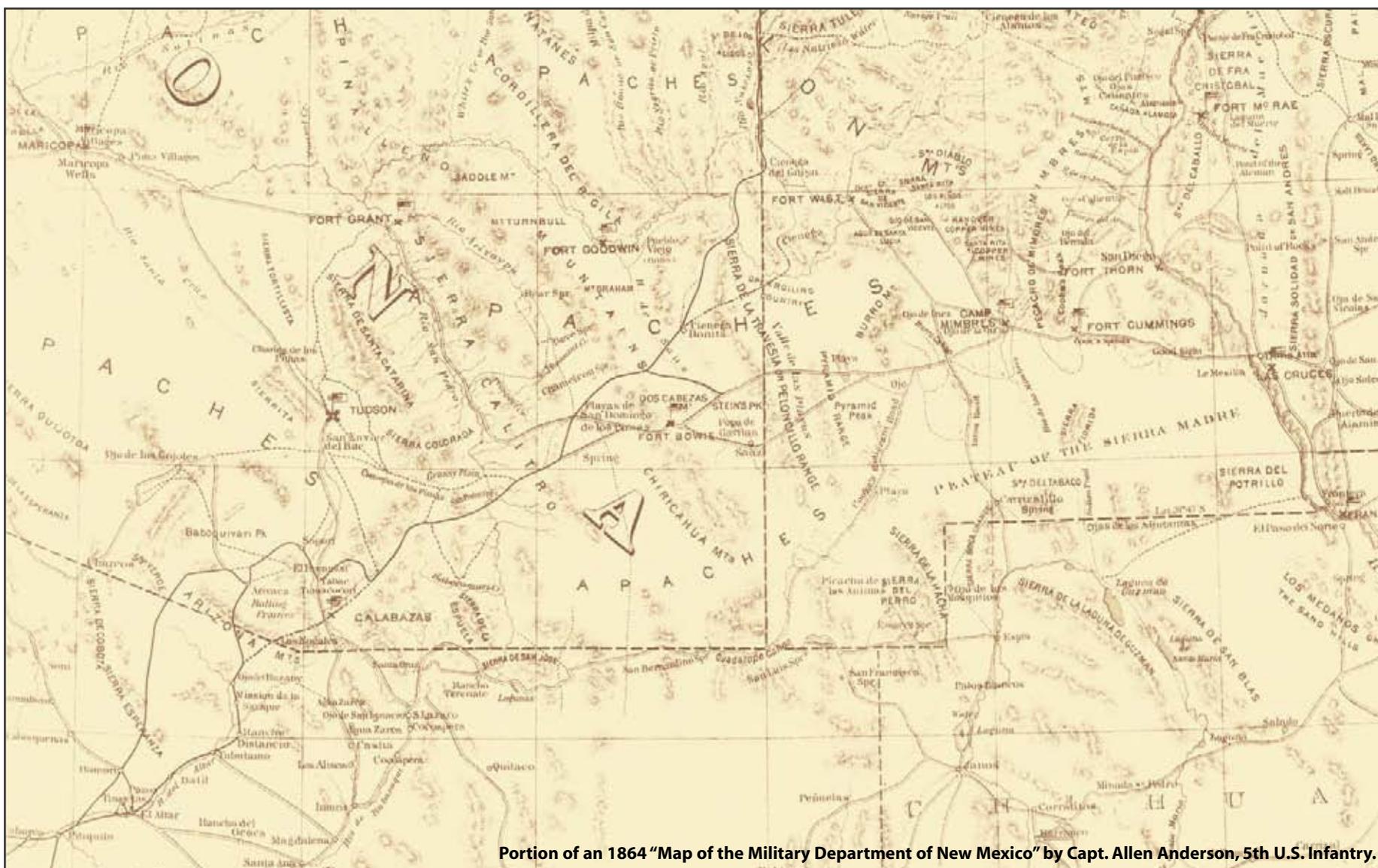
But we will lose this, too, unless we regain a measure of respect for the natural world. Our children gaze at us from their cradles with accountability in their eyes, while outside the windows the tattered remnants of the cottonwood trees drop each leaf like a warning flag. Elsewhere in the world, people die when rivers disappear.

I have never been asked to give my life for a river.



Melissa Lambertson is an Environmental Sciences undergraduate at the University of Arizona. A native Tucsonan, she has written about the environment for the Tucson Citizen, Arizona Daily Star, UANews, and Arroyo. She is Education Coordinator for the Phoenix Mars Mission





Portion of an 1864 "Map of the Military Department of New Mexico" by Capt. Allen Anderson, 5th U.S. Infantry.

## What is a Ciénega? (and Why Do We Care?) *by Dale Turner and Julia Fonseca*

Southeast of Tucson lies a National Conservation Area named *Las Ciénegas*. Flowing through the area is Cienega Creek. If you drive past the area heading south, you'll soon pass Canelo Hills Cienega. Exploring further in the Sky Island region you might encounter some forty other places with "ciénega" in their name. What do these places have in common?

Ciénega is a term from the Spanish colonial period, variously described as rooted in "cien aguas" (100 waters) or "cieno" (wet, muddy soil). In common usage, it refers to grassy freshwater wetlands with permanently saturated soils, which may be maintained naturally by geologic features or artificially by dams or other human structures. Ciénegas are located in basins, typically in an unincised channel where groundwater reaches the soil surface. While there are some high-elevation features with that name, most are found at elevations of 3,000 to 6,000 feet, set in a matrix of semidesert grasslands.

Ciénegas were important places for prehistoric and historic inhabitants. Look at any historic map of southern Arizona, and you will see that most of the early settlements are located where there is water near the surface. A number of these were called ciénegas, including the Cienega de los Pimas, now known as Pantano Wash in Tucson. Historically, ciénegas were abundant in this region, but most were destroyed during the late 19th Century by arroyo cutting. Most of the remnant ciénegas are located in areas that had some protection

from erosion and groundwater pumping, mainly at spring-fed stream headwaters.

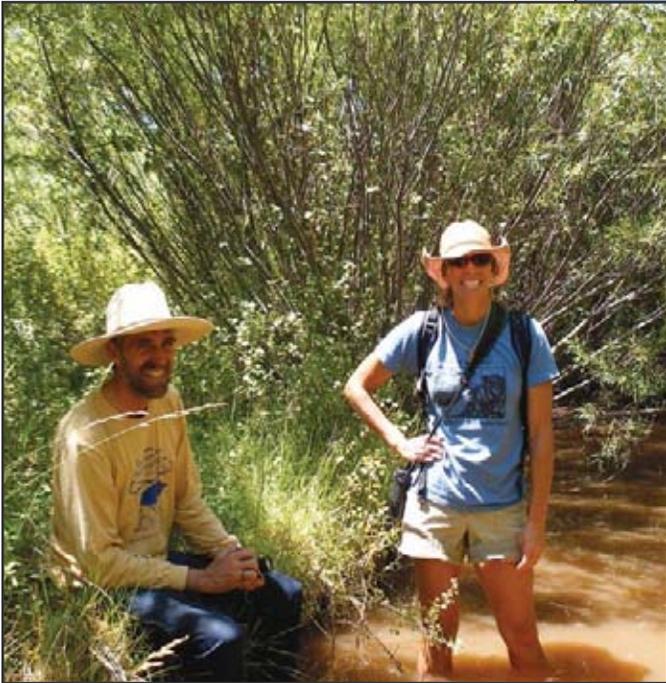
Many of the remaining spring-fed ciénegas were excavated and the water dammed to maintain a pond for livestock or sport fishing. The ponds at Slaughter Ranch near Douglas and Agua Caliente Park in Tucson are examples of former ciénegas. Ponding of water radically alters the hydrology and biology of these wetlands (see table on page 4 of this section). Migratory waterfowl benefit from the conversion to ponds, but in general, native aquatic wildlife loses—turtles, frogs, snakes, molluscs, and fish in particular.

Ciénegas are important flood- and erosion-control features, where they persist. These are the places where flood waters spread out and deposit their sediment. They store water for slow downstream release.

To see a good modern-day ciénega, visit Arivaca Cienega at Buenos Aires National Wildlife Refuge. Fringing cottonwoods and little ponds are rich with birdlife. Better yet, visit Rancho El Aribabi, where good management supports a thriving ciénega along northern Sonora's Rio Cocospera.

*To read about ciénegas: "Ciénegas: Climax Communities of the American Southwest" by Dean Hendrickson and Wendell Minckley, 1984, in Desert Plants. To visit Rancho El Aribabi: [elaribabi.org](http://elaribabi.org)*

# TNC's Canelo Hills Ciénega



ABOVE Van Clothier and Sarah Williams discuss fluvial processes at Canelo Hills Ciénega Preserve



This June, Trevor & Sarah set out with restoration practitioner Van Clothier to tour functioning ciénegas in the Sky Islands to determine the kind of goals they should set in restoring a ciénega in the Peloncillo Mountains.

# TNC's and Naturalia's Rancho Los Fresnos in Sonora



ABOVE Trevor Hare, Van Clothier, Jennifer Arnold and Daniel Toyos discuss erosional problems at Los Fresnos.



## Saracachi Ciénega at Rancho Agua Fria in Sonora

LEFT Van Clothier says, "The water comes up to about here."

## Peloncillo Mountains Ciénega



LEFT Paleoecologists Tom Minckley and Andrea Brunelle, Forest Service Hydrologist Salek Shafiqullah, and Van Clothier soil coring the Peloncillo Mountains Ciénega.

# Secrets of the Ciénegas

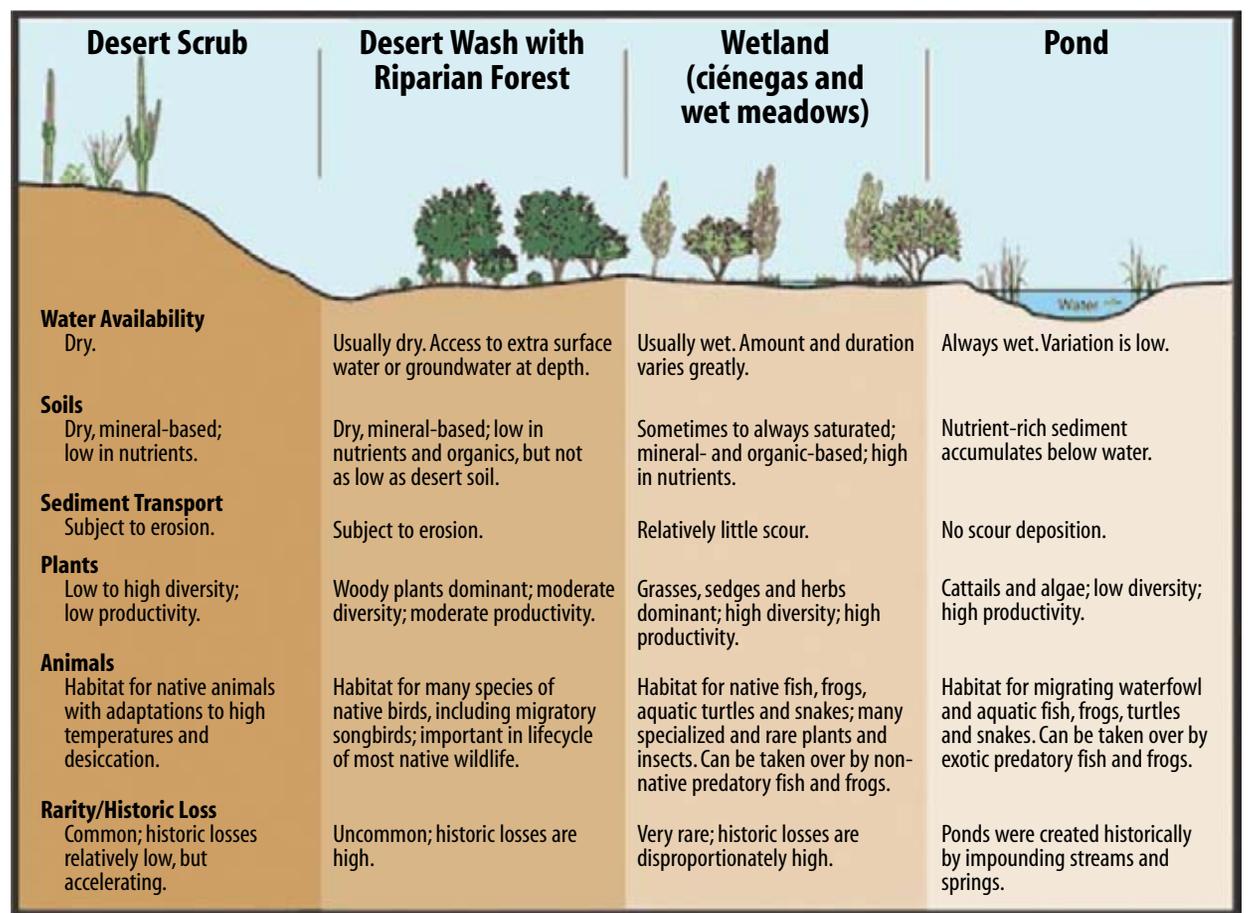
by Trevor Hare

Ciénega is an exotic word for what amounts to a marsh, but what lovely marshes they are. Teeming with grizzly bears and jaguars, garter snakes and leopard frogs, gray hawks and turkeys, toe biters and Dobson fly larvae, and water, amazing water in the desert. Ciénegas occur like visions on the desert's parched floodplains and dry canyons — rare and green, they are lush and thick and wet. As you wade in, look over your back for *el tigre*, watch as the kingfisher fishes, dive down for a look at a frog and a turtle, touch the vegetation, experience the insects, and drink deep.

Ciénegas were once a common landscape feature in valley bottoms and at springs and streamsides throughout the Sky Island region. Today most of these wetlands are gone, victims of land conversion, water pumping and arroyo cutting. Where they do still persist they face a host of threats — headcuts and dams, cattle and bullfrogs, ATVs and mud-boggers, and of course ignorance. Many valley bottom ciénegas were drained to reduce mosquito habitat and increase farmable land, and while farming is not increasing, the human population is and fears of mosquitoes have derailed some amazing ciénega restoration plans.

Historically the watered parts of our landscape are the areas that were first claimed as private property and many of the remaining ciénegas are merely remnants of much larger systems. A few ciénegas still remain in public ownership on Forest and BLM lands, but the majority of them — and the larger examples — occur on private lands... in the Canelo Hills southeast of Sonoita, in the Animas Valley of southwestern New Mexico, on Rancho Los Fresnos and Rancho Agua Fria in Sonora, and along the San Pedro River. Because of the private ownership of the bigger, and we hope more resilient ciénegas, collaborative efforts are necessary to plan, fund and implement restoration activities. Landowners usually recognize that these wetlands host an amazing abundance of plants and animals, but may not recognize the universal importance of such a rare resource as they continue to harvest water and livestock forage from them.

Sky Island Alliance has developed a riparian restoration planning process that brings volunteers, landowners, land and wildlife management agencies and the interested public together to collaboratively plan restoration on public and private lands to benefit wildlife, the landowner and the public commons. This robust planning process starts with putting volunteer boots on the ground to map and assess riparian areas, stream courses, erosional features, and native and non-native species occurrences. This



Agua Caliente Restoration Study Comparison. Courtesy Pima County.

information is then presented to land and wildlife managers and the landowners or grazing permittees, so we can discuss problems, potential remedies, interest and ability, and the costs and benefits of restoring degraded systems.



The fireflies of Saracachi Ciénega are most likely an endemic species un-described and unknown to science. As we ate adobado and drank cerveza and Bacanora with Alfredo, el vaquero de Rancho Agua Fria, the sky darkened and they began to appear... by the thousands. Their lights danced and we sat transfixed by this natural wonder and a little Mexican moonshine.

In visiting Saracachi, Rancho Los Fresnos, and the Canelo Hills, we sought some kind of holy ciénega grail that would inspire us as we moved thousands of cubic yards of earth on a Sky Island Alliance ciénega restoration project currently underway in the Peloncillo Mountains.

What we learned was that ciénegas don't give up their secrets easily, and a two-day visit only makes you want to give up your day job, pitch a tent under an ash tree and watch the water flow by.

The Saracachi Ciénega sits on the edge of the Rio Saracachi floodplain and seemed to be fed by a watershed above. Yet when we searched the top of the ciénega its source was obviously an underground flow from either mountainside recharge or a spring forced to the surface by an unseen geological feature... but if this is the case, why is it not a regular stream channel like the nearby river? We don't know!

In the Southern Peloncillos, with some smart people, a lot of time and a lot of love, a few road

trips and a little bit of money, we're starting to piece it together. These are very exciting times in the Sky Islands as restoration activities attract more attention from landowners, agencies and funding organizations. Very exciting times as we enter the era of the restoration economy.

The "Restoration Economy" — I searched high and low for where I first saw this buzzword but could only find a book that popped up on amazon dot com. It looks very interesting, but under my restoration economy I couldn't afford it. What I thought of immediately though is the amount of interest and money that will be invested in the next 20 years repairing degraded ecosystems and restoring much of what we screwed up over the last 400 years. The border wall is especially attractive to me as it is such a social, economic and environmental disaster that it will be removed as soon as cooler heads prevail in Washington D.C. Other interesting policy impacts from a restorative point of view are the current U.S. Forest Service Travel Management Plan process, their implementation of the ORV Rules and the Roadless Rules, Wilderness proposals, and the potential to protect and restore millions of acres of our wildlands. So watch as Sky Island Alliance grows and fulfills its mission of protecting and restoring this place we call home.

Waking up in the oak grove next to the nameless ciénega on our restoration study site in the Peloncillo Mountains, the turkeys are talking and the air smells like paradise. After a cup of coffee, all of the sudden my boots are muddy and my heart soars as we explore the nooks and crannies, the ups and downs, and the valley thalweg of an amazing landscape feature that we hope to help realize its full potential. Join us.





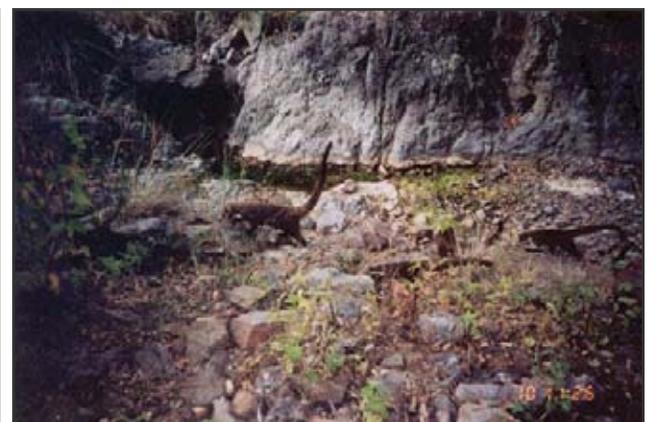
## Monitoring Water with Remote Cameras

by Sergio Avila, Northern Mexico Conservation Program

**ABOVE** Showing abundant populations of predators and prey, Camera 14 captured a deer (August 2007), lions (August 2007, April 2008), and javelina (January 2008). Notice the changing vegetation levels.

**BELOW** Not only a lion (May 2007) and coatis (November 2007), but also a surge of water from last July's monsoons triggered Camera 15.

In February of last year, Sky Island Alliance began a wildlife study based on the use of remote camera traps to monitor the presence and movements of wild felids. In short time, we started documenting numerous species of fauna, including new records of ocelots, and observing wildlife behavior through photographs — large groups of javelina and coatis of different ages; curious ringtails and skunks, adult and juvenile mountain lions and deer, and much more. In addition, remote cameras can function as a permanent open-eye — as long as batteries work, that is — which allows us to “see” changes through time at every camera site. Year-round cycles of leaf-less trees or bright green, bare ground or grassy patches, dry or rainy seasons, water levels in arroyos and even precipitation and wind are registered with these cameras, and amazing contrasts can be observed. Using rocks, trees, logs or other landmarks as visual references, we can compare the status of each camera site during different seasons, based on the date printed on each photo. Following are series of photographs from two camera locations where we can observe water fluctuations; notice that these photos are in daylight, and so wildlife species are diurnal (nocturnal species are present too — gray fox, ringtail, skunks).



# Waste Water / Holy Water

By Ken Lamberton

In early June, on what promises to be the hottest day of the year so far (104 degrees F.), I arrive at Grant Road and the Santa Cruz River with great intentions of hiking eight miles or so along its course to the Ina Road bridge. It's six AM. I park my 1979 Datsun 210 in the meager shade of a paloverde tree, having made arrangements for my daughter Jessica to pick me up in five hours.

A railing-topped, gunite-stabilized bank provides a nice walking path on both sides of the river, so I choose the west bank, stepping high above a desert broom-choked ditch of sand. The giant channel seems to amplify the sounds of the freeway and a distant train whistle but also the clear ringing *peeking* of an Abert's towhee.

Where the river shifts to the west, a red-tailed hawk, perched atop a power pole beside some cornfields, stretches its body and takes its first morning flight. My path now drops away on both sides, and I walk along a narrow section of berm that smoothes out and reshapes the river's formerly wide personality swings, which once cut deeply into its western flank. What remains on my left is a wide half-moon of gouged land, cutoff from the channel on my right and open to brush, sprinting jackrabbits, and the makeshift shelters of the homeless.



After an hour, I've crossed the arching ironwork bridge over Silvercroft Wash, whose source in Starr Pass behind my home cuts through the desert next to where my girls went to elementary school, slides west of Tumamoc Hill and along St. Mary's Road, and rushes past the grocery store where I shop, soon picking up Greasewood and Painted Hills washes before joining the Santa Cruz River in what must occasionally be a mad torrent of runoff.

Here, the water hazards and fairways of Silverbell Golf Course give Gambel's quail and golf balls a place to mingle beneath tall Aleppo pine and eucalyptus trees. The concrete-lined Camino Del Oeste Wash splits the greens evenly after coursing out of its source in Gates Pass and the backyard of the abandoned "Stone House" on my favorite trail named for my favorite social scientist, David Yetman.

From Hole 18, I can look across the Santa Cruz River into the impressive cottonwoods of one of the hottest of bird-watching hotspots in southern Arizona.



Sweetwater Wetlands gets its name from Sweetwater Wash, which drains a major watershed beneath Wasson Peak in the Tucson Mountains

before entering the river a bit farther downstream. The wash traces critical desert riparian habitat and is an important wildlife corridor that connects Tucson Mountain Park to the river.

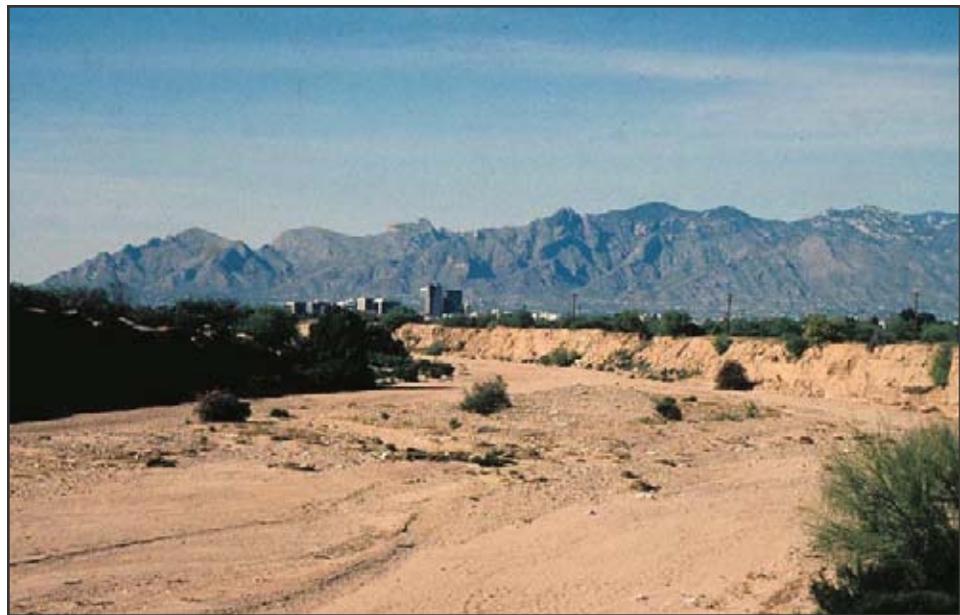
Recently, Pima County acquired a key segment of this corridor for conservation. Sweetwater Preserve, 695 acres of saguaro-clad foothills, is one of the largest remaining undeveloped, private tracts of land in the Tucson Mountains, home to mountain lions and grey fox, tiger rattlesnakes and leaf-nosed bats. Hikers and horseback riders, as they have for fifty years, still ply the trails, which meander among some fifty-two check dams build by the Civilian Conservation Corps in the 1930s

"Sweetwater" probably refers to the actual taste of the water that once bubbled to the surface near the Santa Cruz, so I suppose it's only ironic coincidence that an artificial wetland created by Tucson's wastewater would bear the same name. A committee of environmental and education experts directed the construction of the wetlands in 1996, opening it to the public in 1998. Relying on backwash from the nearby Roger Road Waste Water Treatment Plant, Sweetwater moves effluent from settling basins, through a series of polishing ponds and then finally into the recharge basins, where it percolates into the aquifer. Reclaimed water needed for Tucson's parks, golf courses, and school playgrounds is then pumped from the aquifer and chlorinated before delivery.

It's the polishing ponds that attract the wildlife and in turn the wildlife watchers. While aquatic plants like bulrushes and cattails create an environment for microbes to convert nitrogen into nutrients, they also provide the basis for a wetland ecosystem of insects, amphibians, reptiles, and birds.



Yesterday, I walked the paths among the giant four-wing saltbush and towering willow and cottonwoods ringing the wetlands on a mission for one particular bird. In the tall bulrushes and cattails, red-winged blackbirds gurgled liquid songs while fat desert spiny lizards blundered through the cornflake litter of saltbush. At the Gazebo Pond, dragonflies in orange and blue neon rattled in figure-eights above red-eared sliders paddling through water like pea soup. Everywhere was the smell of life's pungent byproducts.



The Santa Cruz. Courtesy Robin Silver

I came hoping to see a gray hawk, a short-winged migrant of riparian woodlands like those along the San Pedro River, and my bird of hope. This wasn't a fantasy of my own concocting. A year ago last May, birdwatchers Rick Taylor and Clive Green spotted an immature gray hawk at these ponds.

This past spring, Sweetwater Wetlands has been receiving a lot of attention in the bird-watching community. On May 5, 2008, weekend bird-guide Jerry Bock, on his usual rounds at Sweetwater, was stunned to see of a flyover swallow-tailed kite. Only once before, more than twenty-eight years ago, has this graceful, avian stealth-fighter been recorded in Arizona.

Even more extraordinary, last week (June 2) Jean Barchman reported a juvenile female elegant trogon at the Roger Road plant. The following day, the bird showed up at Sweetwater with an adult male. Elegant trogons, shining emerald and geranium birds of the tropics, usually haunt the oak-draped canyons of southeast Arizona's sky islands. These are the first ever seen at Sweetwater and maybe in the Tucson valley.

I didn't find any gray hawks at Sweetwater, or even hear one call. But I did encounter a great blue heron, the bird huge and holy in its dark feathered robe. I decided to believe that one day soon I would see the hawks return here, and that, for now, this sign of faith was enough.



At Christopher Columbus Park, I smell the full-bodied stink of effluent. This, however, isn't a Sweetwater smell but something much richer and darker, like comparing a Raging Sage French roast to Folger's in the can. This smell is caffeinated.

I cross the river bottom heading for a knotted rope of trees rising from the far bank and unwinding downstream as far as I can see, following the rushing sound of water and stepping over the sandy dimples of rabbit tracks and tail-draggs of lizards. Tiny burs penetrate my socks and needle their way inside my shoes.

When I reach the shade of the largest willow, I drop my pack and remove my camera. Water gushes from a huge culvert and falls into the riverbed, launching into a terrific upwelling pool of white noise and foam. Here, the “outfall” from the Roger Road wastewater facility transforms the Santa Cruz from a hot, dry, bank-stabilized ditch into a river gallery of willows and cottonwoods, not unlike, I think, the Santa Cruz of a hundred and fifty years ago.

The Roger Road facility is Tucson’s oldest sewage treatment operation, constructed in 1951 and now slated for decommission as our newer plant five miles downstream at Ina Road recently completed its expansion. When Pima County officials first began considering the closure, pumping the plant’s sewage through a conveyance line to Ina Road, it caused a stir in the environmental community, especially among bird watchers. Shutting off the flow of effluent into the river here “would turn it into a desert,” said Phil Rosen in a January 2, 2006, *Arizona Daily Star* article. “They are just thinking like engineers,” he went on, “without considering carefully the ecological aspects.”

The effluent discharge at Roger Road makes this part of the Santa Cruz River the third largest perennial stream in eastern Pima County, a human-made corridor of teeming wilderness right at our doorstep. This would all go, along with Sweetwater Wetlands.

Fortunately, the county is now recommending a different option, one that isn’t the least expensive but takes into account the ecology of the river. It’s called a “water campus,” a new reclamation facility constructed next to the aging and obsolete Roger Road plant and interconnected to the Ina Road plant. The water campus should be completed by 2015 and as part of the Tres Rios del Norte project will serve to support an eighteen-mile “greenbelt” along the river from Sweetwater Wetlands to Sanders Road in the town of Marana.

Our artificial river. I’ve heard stories that the Santa Cruz River may rise suddenly, as if the tide in some nearby estuary were changing and sending a tidal bore upriver. It can happen quickly enough to catch river-walkers off-guard, especially early in the morning on a weekday as hundreds of thousands of people begin flushing their toilets.



The gunite reinforcement on the west bank vanishes, and I hike at river level across a broad alluvium where two large washes enter from west, probably Roger and Sweetwater washes. This could have been a marsh at one time. I duck into the cool-shaded willows and a Cooper’s hawk darts by, chased by a smaller bird. The birds seem reckless with their voices as well. Bell’s vireos, Lucy’s and yellow warblers sing in various harmonies of *cheedle*, *cheedle-chee* and *wheedle*, *wheedle-whee*

together with the occasional bright *whitchy*, *whitchy-whitch* of a common yellowthroat.

In 2000, a year-long federal study found 112 species of birds on the river between Sweetwater Drive and Ina Road, while a later study found a rare yellow-billed cuckoo, a long-tailed, woodland relative of our common roadrunner. In 2004, a LeConte’s sparrow, a tiny, secretive grassland species with brightly patterned black streaks over buff-yellow, was found just south of Ina Road. It is only the second confirmed sighting of the bird in Arizona. The updated (10/03/06) bird checklist I picked up at Sweetwater lists 230 species for the wetlands, which will now have to include elegant trogons.

After passing beneath the Camino Del Cerro bridge, I enter what I consider to be the finest part of the river, an historic Santa Cruz. Sunflowers bloom over a wide floodplain erupting with dense tangled thickets of mesquite trees. Along the dark stream, a black phoebe perches on a bare snag watching for passing insects not already swooped upon by the patrolling rough-winged swallows. Lesser goldfinches chortle and squeak from the willows while more Lucy’s warblers send their sweet, cheerful songs from the cottonwoods.

At ten AM, the heat is on and I rest in the shade of some of the largest willows I’ve seen so far. Behind me, a pole-sitting red-tailed hawk screams at my presence. Suddenly, an owl flushes from a willow and heads downstream. At first I think it’s a great horned owl by the size of it, but then I see that its color is all wrong, a much lighter brown, almost tawny like a barn owl’s plumage. I drop my pack and pull out my binoculars, finally relocating the bird in another willow. When it turns its oval face away from me I see two tiny dark tufts of feathers above its yellow eyes—a short-eared owl!

Amazing! Short-eared owls normally spend the summer in northern Canada and Alaska, floating across open prairie and tundra sometimes in daylight, searching for mice and other rodents. They range nearly worldwide. In North America, they drop south into middle of the US during winter but are considered fairly rare in Arizona, especially for June.

Trogons from the southern tropics and owls from the northern tundra! I’m beginning to realize that this reclaimed part of the Santa Cruz River west of Tucson is linking wildlife across the entire northern hemisphere.



By ten-thirty AM, I make it to the Rillito River confluence where the Santa Cruz spreads out and meanders over a flat, sandy plain. The Rillito, a dry wash deeply incised at this point, must be half a mile wide. A slow backwater slips into the drainage and mirrors its high, gunite-stabilized north bank. Here, I understand, will be a future River Walk

connecting the Santa Cruz with the Rillito River Park.

I move on but the walking becomes a slog over hot sand that tugs at my legs as I lose traction. Even worse, the shade is gone and I’m wishing I had worn my hat. I feel my sunscreen growing ineffective.

I’ve had enough.

Knowing Jessica must be on her way, I bail out just past where the Cañada Del Oro wash shoves in from the east with another landscape of Catalina Mountain sand. I’m within sight of the Ina Road bridge, but instead I cut through an uneven terrain of dry grasses and creosote and take a dirt track to Silverbell Road past signs lettered “No Trespassing.”

“Almost made it,” Jessica says when she picks me up, handing me a bottle of Aquafina from the cab of her truck.

The water is hot.



Today, the day will be twenty-seven seconds longer and the sun will set at seven-thirty. I drive to the Santa Cruz River at Ina Road bridge and park on the northwest side to watch this evening’s display of lesser nighthawks as they lift themselves from the surrounding fields to screen the hot air of mosquito plankton. The feeding has already begun when I arrive.

From under the bridge, water cascades over concrete, the rushing flow from the Ina Road Water Pollution Control Facility joining the Roger Road plant’s output in a broad, darkening meander. The rich smell hangs in the air like the winged insects, which glitter in the angling sunlight. Nighthawks congregate above several large willows, dipping and swinging languidly against a crepuscular sky. There are too many to count.

The writer Peggy Schumaker says that water in the desert is always holy. *Always*. If this is true no matter what its source, then this reach of the Santa Cruz, the river of the Holy Cross, must be sacred ground.



This article is adapted from Ken Lamberton’s forthcoming book *Santa Cruz: Stories of Life and Redemption on a Dead River*.



# H<sub>2</sub>Oly Stories

by Rev. Doug Bland, Storyteller; Pastor, Tempe Community Christian Church; Chair, Arizona Ecumenical Council Earth Care Commission.

On my bookshelf stand twenty-six bottles of holy water. The water is “holy,” not because of special prayers or incantations, but because each bottle of water has a story to tell. Last summer I spent my sabbatical on a pilgrimage in search of deep wells and life-giving springs. In Ireland, near the River Shannon, I studied ancient Celtic water lore and traversed green hills to visit wells named after beloved saints. Back in arid Arizona, I explored the sacred gift of water through Hopi folklore and joined others in the Paatuwaquatsi (“Water is Life”) run near First Mesa. I learned this: If anything is sacred, our stories make it so.

One of the bottles of holy water I treasure most comes from the River Boyne, north of Dublin, a beautiful, blue ribbon of a river that ties together one corner of the green gift that is the Emerald Isle. According to Irish lore, the River Boyne was created by the goddess Boann.

The source of the River Boyne was a sacred spring, the Well of Segais. Nine hazel trees surrounded this spring and nine salmon swam in its depths. Each year, when the hazel nuts matured, they turned crimson, ripe with all the wisdom in the world! As they fell from the tree into the pool, the salmon rose from the watery depths and consumed the wisdom. Whoever ate that pink salmon flesh, was filled with all the knowledge of the world.

However, no one could get close to the well to enjoy its beauty, drink its sweet water, or take advantage of the wisdom to be found in its depths. The god Nechtair set himself up as the “protector” of the well. In fact, he was the waters’ tyrannical dictator. He wouldn’t even allow his wife, the beautiful Boann, near the well. He lied and told her the water was poison.

For a long time, Boann believed him and avoided the well. But one morning she challenged Nechtair’s decree. She approached the well. Because she dared to defy this taboo, the waters of the Well of Segais rose up like a knife and cut off her arm. Then, like a razor, the water cut out her eye. Still she continued to walk to the well, and the waters rose up and, sharp as a sword, cut off her leg. Blind, lame and maimed, never had she seen more clearly, run more swiftly or faced challenge with more strength. The waters tried to drown her. They chased her down the hillside, across the valley and out to the sea. Today, the River Boyne nourishes many and refreshes the



Holy H<sub>2</sub>Oly Water. Courtesy Doug Bland

earth wherever it flows, thanks to the daring goddess Boann.

Though thousands of years old, this tale is as timely and relevant as any story I found on my sabbatical. It’s a tale of tyrants and heroes, just like the stories of rivers and springs here in Arizona.

Each time I drive I-10 between Tucson and Phoenix, I cross the dry bed of sand and stone that marks “The Gila River.” I used to laugh. Now I’m more inclined to weep. Until recently, nearly within living memory, the Gila and its tributaries formed the most important river system in the Southwestern heartland. Rising in New Mexico’s Black range it flows 649 miles across Arizona to the Colorado River. Once, most of the Gila was navigable. Its lush riparian growth gave haven for indigenous people and a great diversity of plants and animals. Then came the “tyrants.” The Spanish brought cattle that trampled and ate the chest high grass down to nothing and eroded the banks. Trappers decimated the beaver population and destroyed the ecology of the river. Early settlers diverted the water for their own use with little thought for others. Today, we have dammed the Gila for agriculture and municipal use, leaving little water for a culture dependant on the river for survival. Social workers on the Gila River Reservation speak of the correlation between the declining health of the river and the corresponding increase in drug abuse, health concerns and violence.

The bottle on my shelf from the Gila River is filled with sand to remind me of the sad story of a river’s demise, but next to it is a bottle of water from a sacred spring on the Hopi Reservation. During my sabbatical, I visited Hopi to participate in the “Paatuwaquatsi” (Water is Life)

run. Wiry and wise, Bucky Preston, an accomplished Hopi runner and spiritual leader, founded the run in 2003 to teach Hopi values of sustainability and celebrate the gift of water. The full run zigzags for thirty miles from one sacred well to another. At each spring, Hopi runners stop to sprinkle corn pollen and offer prayers of gratitude.

The day before the run I visited a jewelry store near First Mesa. Beneath the glass was a large, black, velvet tray of silver jewelry. Featured were clouds, lizards, turtles, waves, lightning, serpents, frogs, and corn. On and on, row after row after row. I said to the clerk, “I’m most interested in the jewelry that shows rain and water motifs. Would you mind pointing them out to me?” She gave me a look that said, “What planet are you from?” But she was polite. With only an edge of irritation in her voice, she said, “Here at Hopi, everything has to do with water.”

So it is everywhere on this planet. We err when we use only the language of science, economics, and law to defend the earth and her life’s blood, water. We need the imaginative language of myth and folklore to see the whole and the holy. Stronger than a White House veto, more powerful than Exxon/Mobil, able to leap tall stacks of environmental impact statements in a single bound, our stories are the interpretive lenses through which we perceive the world, the anvil on which we hammer out our decisions and fashion our lives. Only compelling stories can tell the truth in such a way that our hearts hear, our wills respond and our hands act.

Water is “holy.” Our best stories say it is so.



# Good Food and Refuge at The Adobe Cafe & Bakery

by Mary Rakestraw

After hiking for days in the Blue Range Wilderness or in the Gila Forest, living on freeze-dried beans and instant coffee, just maybe you get a hankering for good strong cappuccino and delicious cuisine. And maybe after days away from the internet you're itching to check your email. Or maybe you're on the road from Silver City to Springerville and it's lunchtime! Then stop in at The Adobe Café & Hidden Springs Inn just outside of Reserve, New Mexico. Mary's review introduces us to the Café's owners and to the myriad of offerings you'll find at their restaurant—including the best snickerdoodles on the planet! Yum! — Janice

Jennifer Swenson and Nick Deratany, brother and sister born and raised in Cottonwood, Arizona, dreamed of an enterprise where their skills and knowledge could best be served. In 2001, they met those expectations when they opened The Adobe Café and Bakery.

The Café sits just off Highway 180, about seven miles west of Reserve and about one quarter of a mile south of the junction of Highway 180 and Highway 12. There's seating for about 40 patrons, and a raised platform for musicians. As you enter the Café, the bakery display case greets you on the left, with a counter for eating just to the right, and behind the counter is Nick.

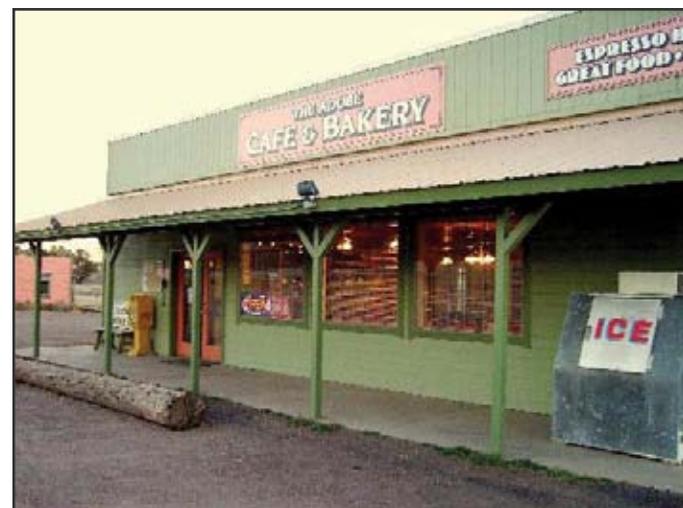
Nick has a ready wit and gracious smile for all. He takes special pride in the coffees and espressos they offer — "We purchase our coffee beans from New

Mexico roasters, and we grind daily to ensure freshness." Each month the Café has a special coffee offering, and this month it is "Olso Dark Roast." Nick is also responsible for the espressos, as he has researched into the exact blends necessary for flavorings. This month's espresso flavor is "Irish Macchiato." Hearty lattes and cappuccinos are available.

Jennifer, an amazing cook, bakes fresh breads, cookies, strudels, tortes and pies every day — "I use only the finest ingredients, and I bake and cook from scratch. The recipes I use are from my German family's history, and I also have developed quite a few recipes of my own." Jennifer maintains a small garden to supplement dishes with fresh produce such as tomatoes and greens.

Jennifer and Nick take special pride in the innovations they've developed. There's live music on

Sundays — folk, rock, jazz, country or blues. The menu includes a "daily feature item" and is faxed to local businesses with free delivery service. Coffee and espressos selections are seasonally tailored, lemonade is fresh-squeezed, and multiple tea selections are available. In addition, Jennifer and Nick deliver fresh-baked foodstuffs to Silver City, offer catering services both on- and off-site, and contribute services



and goods extensively and graciously to the community surrounding Reserve. Internet service is available, and inside the Café you can find a full line of vitamins/herb supplements as well as locally generated body care products and mineral make-up. Last but not least, the Café practices recycling.

Jennifer and her husband John have three children — Zakeya, 9, Cyrus, 6, and Elias, 18 months. John assists with building maintenance, and Zakeya and Cyrus help with the recycling operation. The Café has five employees.

The Adobe Café and Bakery does have a seasonal schedule, so check the website for specifics: [www.theadobecafeandbakery.com](http://www.theadobecafeandbakery.com).



ABOUT THE REVIEWER: Mary Rakestraw has been involved in woodland stewardship programs in all three states where she has lived: Wisconsin, Colorado and, for the last six years, New Mexico. She and her husband Bert live in a yurt and are currently building an off-the-grid adobe home outside of Reserve. Mary is owner/broker of Open Range Real Estate, LLC, specializing in properties within the Gila and Apache National Forests. Her office is right next door to The Adobe Café in the original Little Adobe Café building. Mary enjoys working with people who can fully appreciate what the Gila and Apache National Forests have to offer private landowners in the area and who value stewardship of the same. Learn more by checking [www.openrangerealestate.com](http://www.openrangerealestate.com) or [www.unitedcountry.com/reservenm](http://www.unitedcountry.com/reservenm).

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## Landscape Restoration Field Schedule: Summer to Fall 2008

**15–17 August. Peloncillos Riparian Restoration Weekend.** Must RSVP and be able to leave Tucson at noon Friday.

**29 August–1 September. Umpteenth Annual Labor Day in the Chiricahua Mountains.** Join us in celebrating the Sky Islands! 2.5 hours from Tucson.

**12–14 September. Riparian Restoration Weekend on the San Francisco River.** 4.5 hours from Tucson.

**26–28 September. Mescal Mountains Exploratory Volunteer Fun Weekend!** Recent volunteers can join us as we explore the wilds of Arizona. 4–6 hours from Tucson. Space is limited. Contact Trevor for more information.

**10–12 October. Malpai Restoration Weekend.** Within 4 hours of Tucson.

**24–26 October. Peloncillos Riparian Restoration Weekend.** Must RSVP and be able to leave Tucson at noon Friday.

**7–9 November. Road Closure and Restoration Weekend.** In cooperation with Bat Conservation International. Within 2 hours of Tucson.

**21–23 November. Peloncillos Riparian Restoration Weekend.** Must RSVP and be able to leave Tucson at noon Friday.

There's always more opportunities to rejoice in / restore our Sky Islands!

Watch [www.skyislandalliance.org](http://www.skyislandalliance.org) for the latest schedule!

or contact Sarah at [sarah@skyislandalliance.org](mailto:sarah@skyislandalliance.org) or 520 624-7080 x23.

## Wishlist:

Late model SUV, Bobcat or other small tractor, Utility trailer — must be in good running condition and ready for fieldwork; Digital cameras; Road closure materials—boulders & steel posts



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## Volunteers Make It Happen

by Sarah Williams, Field Associate & Volunteer Coordinator

*Since 1998, volunteers working with Sky Island Alliance have spent more than 50,000 hours turning their concern for our surrounding environment into tangible, hands-on action. As a grassroots organization, we could not achieve the results we do without the efforts of our dedicated volunteers — the real roots in “grassroots.” The purpose of this column is to celebrate our volunteers and to share a little bit about who they are.*

Tim Van Devender first heard about Sky Island Alliance volunteer field weekends through a friend while seeking a social group to go camping with. He soon became one of our regular volunteers. Tim’s charitable intentions were rewarded in an unforeseeable fashion a couple years later.

Anna Hetsler learned of field opportunities with Sky Island Alliance at an Earth Day festival. She signed up for the next trip, and inquired about hitching a ride with another volunteer. Anna soon found herself riding shotgun in Tim’s truck en route to a Las Ciénegas road restoration project. The two immediately felt at ease with each other and comfortable conversation ensued.

At camp, Anna realized she had forgotten most of her food at home. Tim and the other volunteers were more than happy to share their grub. There is always enough to go around at SIA outings.

After a successful weekend, Tim and Anna were looking forward to the drive home and the chance to

learn more about one another. They parted ways, hoping to meet again soon. It was months before curiosity overcame shyness. Tim called Anna and suggested a hiking date. A few weeks later the two of them returned to Las Ciénegas for another SIA road closure weekend, this time as a couple. In March of this year, Tim and Anna married in a beautiful ceremony at Tohono Chul Park.

When Tim, a software engineer, and Anna, a science teacher, aren’t at work or on a volunteer weekend you might find them entertaining their pets or delving into a good book. Tim also enjoys star gazing, strumming his guitar, and photography (we use many of his pictures at SIA!) while Anna likes to play with plants, sing silly songs and ride her bike.

Their favorite places in the Sky Island region include the Pinalenos for the cool weather and Las Ciénegas for its familiarity. Getting outdoors and meeting fun and interesting people are two of the things they enjoy most about volunteer trips. Group campfires and the chance to dig in the dirt also keep them coming back.



Asked to describe why SIA’s mission is important to her, Anna said she believes in contributing because “the regional scale of planning is combined with up close and personal volunteering.”

“I’ve lived here all my life and can see the damage people are doing,” Tim said, “so I’m trying to offset that and clean up after ourselves a little bit.”

I had the pleasure of working on a road closure with Tim and Anna at Las Ciénegas this past spring, two months after their wedding. As we sat under the giant Frémont cottonwood, eating lunch and trying to revive after several warm morning hours of moving brush, re-planting and sweating, Anna brought out a large tin. Inside were the most delicious peanut butter chocolate cookies I have ever tasted. She said they were a token of thanks from the two of them, two selfless volunteers, showing that giving is getting.