

Rainwater on Tap: Drinking Local, By The Numbers

WMG's Living Lab and Learning Center is quickly on its way to being a rainwater-fed campus—and letting the municipal water lines go dry. Utilizing 3,200 square feet of roof space across two buildings, we are collecting the abundant water that falls from the sky. Ten thousand gallons of this bounty is stored in an underground tank, with another 2,000 gallons held in above-ground cisterns.

For the past year, we've been using only rainwater and greywater to irrigate our lush landscape plants and food forest. And now, with the installation of a filtration system, we have rainwater on tap for drinking, cooking, and showering. **This means we are off the water grid and meeting 100% of our indoor and outdoor needs with rainwater!**

This is exciting stuff, to be sure. But rather than let emotion carry the story, we've done the math and created a detailed rainwater budget that lays out the hard data. (We are scientists, after all.) As you can see, the numbers show us operating at a water surplus for the year! *(Continued on page 3)*

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Dear Readers

We've been told rainwater harvesting doesn't make a tangible difference when it comes to big water-related problems. It's just a feel-good activity, some people say. This issue of *A Watershed Moment* proves these naysayers wrong. WMG just completed a study on a south Tucson watershed with major flooding issues, and we found that we could significantly reduce the risk of flooding if just 10% of properties there installed rain gardens.

WMG's Living Lab and Learning Center will make a believer out of any naysayer. For the last year, we've proved we can meet all our outdoor irrigation needs without a drop of municipal water. All summer long, our native plants and gardens—including a thirsty crop of seasonal veggies and eight fruit trees—have been thriving off of rainwater and greywater alone.

And now, we're excited to announce that we have *rainwater on tap!* We're about to show the world that by collecting rainwater from 3,200 square feet of roof, we can support a lush campus in the desert and meet the water needs of 15 staff and thousands of visitors over the course of a year.



I hope you'll follow us on this journey and help spread the inspiring message: we can stop using our precious groundwater and importing water from the Colorado River. All our supply can come from the sky!

Sincerely,

Lisa Shipek
Executive Director

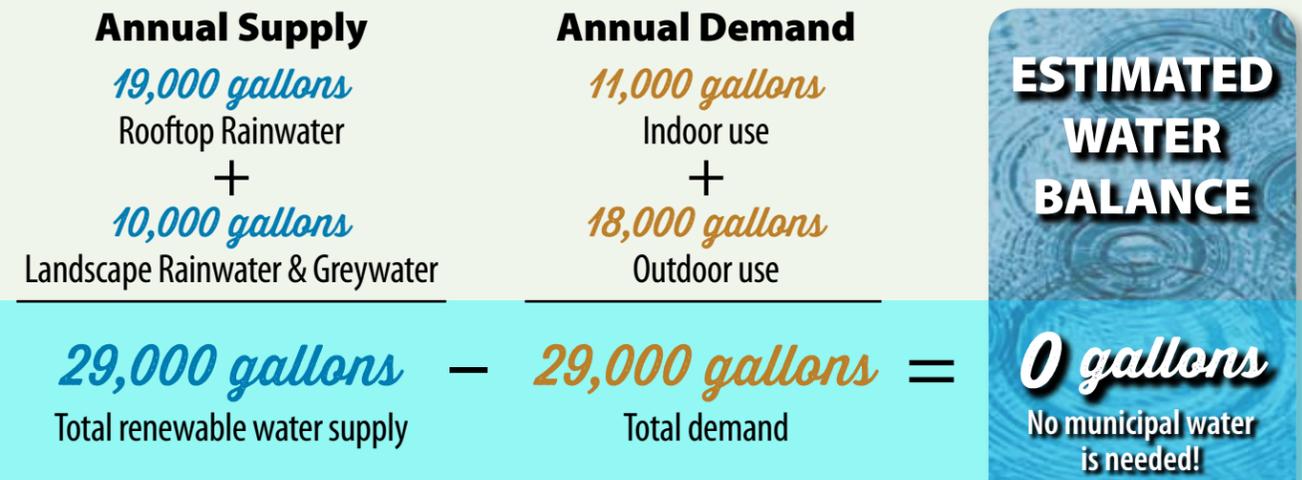
Kids love playing in Sabino Creek, one of the few watering holes to cool off in Tucson. Photo courtesy of Alvine Ceanne.

The Living Lab Water Budget

Thanks to WMG's Policy and Technical Director Catlow Shipek for creating these custom calculations. It's our hope that the Living Lab water budget will provide inspiration and a replicable model that will spread throughout our community.

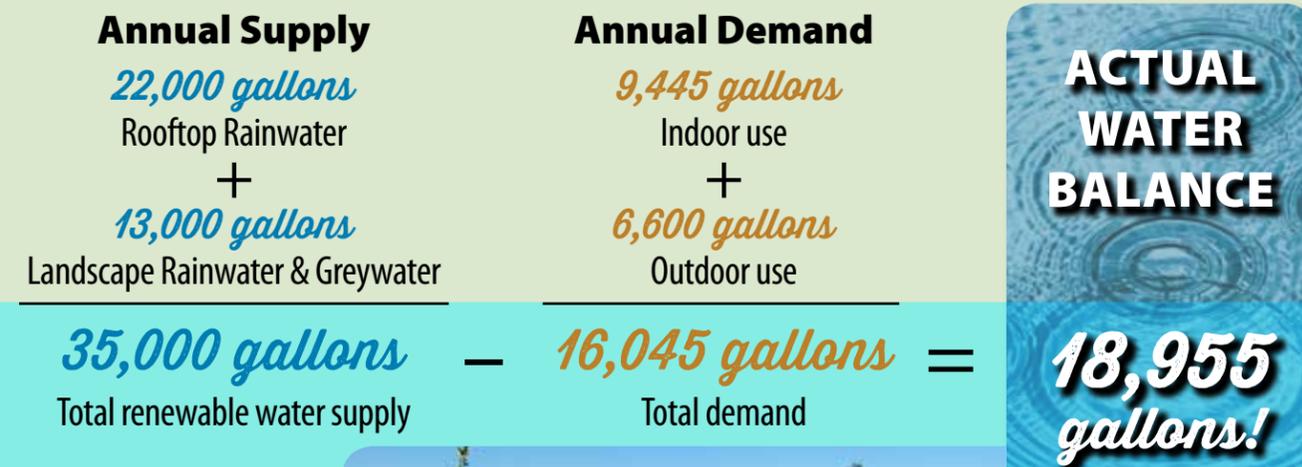
ESTIMATED ANNUAL WATER BUDGET

Annual budget is based on a conservative estimate of 10.8 inches of rain a year.



ACTUAL WATER BUDGET (Oct 2014 – Sept 2015)

We had a great year – we received 14 inches of rain – giving us a water surplus for the year!



WMG's 10,000 gallon tank is beneath the Living Lab plaza and captures and stores rainwater to meet 100% of our indoor and outdoor water needs.



8,000 gallons of this renewable water surplus is stored in our tanks. The other 10,955 gallons was rainwater surplus captured in our basins that infiltrated for groundwater recharge.

RAIN GARDENS FLEX THEIR MUSCLES TO TAME THE FLOOD

Next time it rains, go out and take a look at your yard. As the water fills your basins, pools behind berms, and soaks deep into the soil, it's easy to see the direct, personal benefits of harvesting the rain. Nuisance stormwater that once washed down your driveway now feeds lush, shade-giving plants that cool your home. **But what if your humble rain gardens are doing more good than you've imagined, like reducing flooding across your entire community? Can these home-scale green infrastructure features really tackle watershed-size problems?**

WMG Study Shows Rain Gardens Reduce Flooding

According to a study recently conducted by Watershed Management Group, the answer is yes: what you do in your home landscape, when scaled up across a watershed, can make a big difference. In fact, the study showed that water harvesting not only has the power to significantly reduce risk of flooding, but can also save you money, beautify your neighborhood, and improve your quality of life. How's that for an added bonus?

To understand the potential for green infrastructure to address major flooding challenges, WMG focused on the Airport Wash area of Tucson. Located between Drexel Road, I-19, and Tucson International Airport, this low-lying area experiences severe floods several times a year. These destructive events make the streets impassable and cause significant property damage throughout the community.

Working with the Pima County Regional Flood Control District, WMG identified water-harvesting opportunities for streets, homes, businesses, schools, and churches within the Airport Wash area. Two scenarios

were developed—one with 10% of private and public properties adopting green infrastructure features, and another with 25%—and evaluated for both flood reduction and cost-benefit effectiveness.

The results were impressive. Both models showed that water harvesting can significantly reduce the flood impacts of even large rainstorms. As an example, under the 25% adoption scenario, peak flow conditions were diminished by 24% during a 100-year, three-hour rain event. This sizeable effect affirms the power of simple water-harvesting features like front yard rain gardens and streetside stormwater harvesting to provide substantial benefits in watershed-scale flood mitigation.

Rain Gardens Add Economic Value to Communities

In addition to flood reduction, rain gardens provide a variety of other benefits. They create lush, shady green spaces that raise property values, lower energy costs for cooling, reduce street maintenance needs, calm traffic, and improve air quality and walkability. As thirsty sponges that soak up storm flows, rain gardens also save on irrigation costs and municipal water use, while helping filter stormwater pollution that ends up in our creeks and washes. Adding up these benefits, **WMG's study found that water harvesting offers a strong return on investment, delivering \$2 – \$5 in community value for every dollar spent.** This results in a payback period of less than eight years.

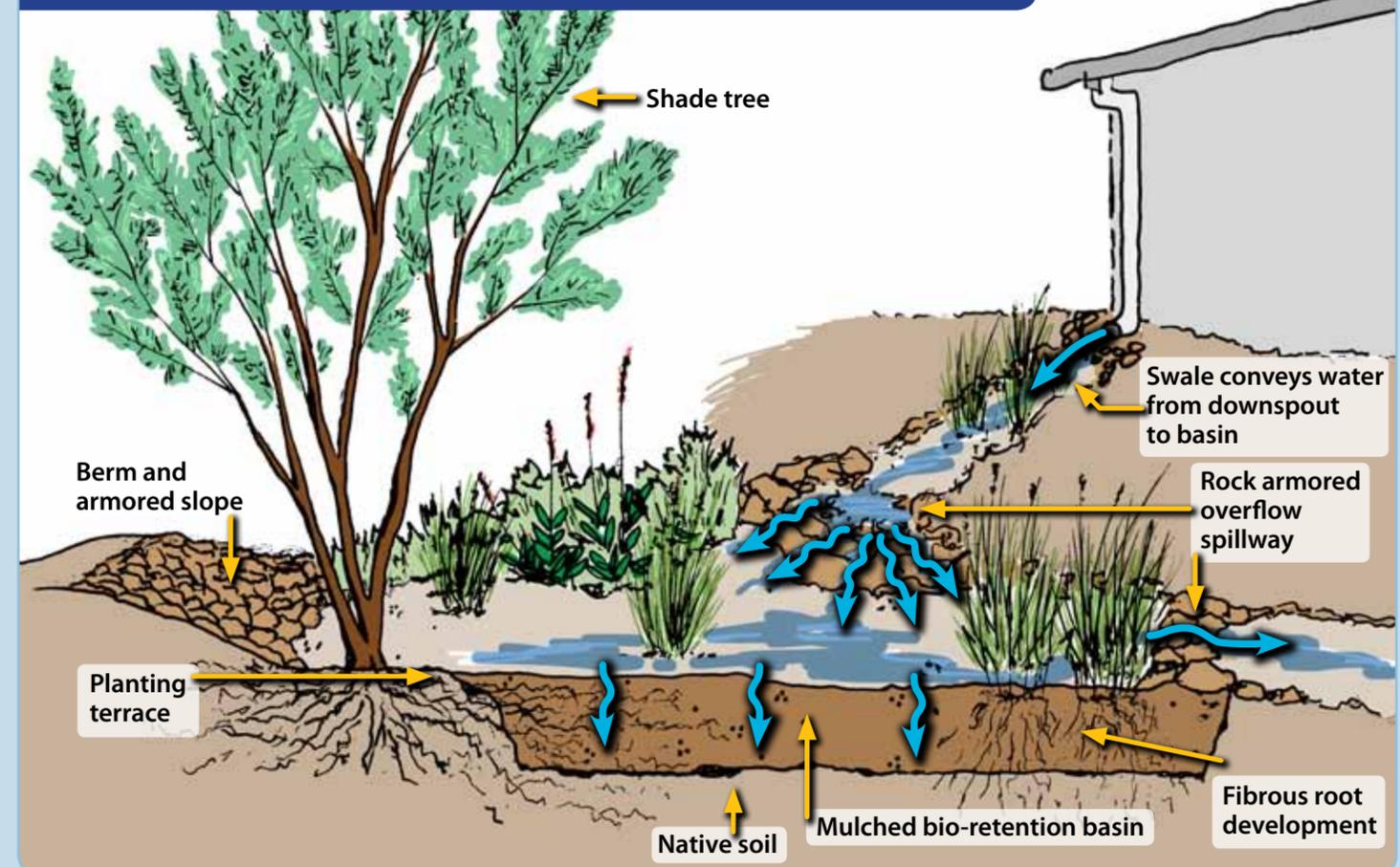
Reduce Flooding, Support More Fish

When we slow and sink stormwater, we increase the amount of water that infiltrates into the soil during rainstorms. This water moves down through the soil to recharge our aquifer and feed our rivers, instead of rushing violently through our washes at a breakneck pace. More stable groundwater levels can support more flow, creating habitat for fish and other riparian species.

The Airport Wash study stands as a clear confirmation that the innovative water-harvesting policies Tucson has been pioneering are smart and sustainable investments for the future. Programs that encourage greater adoption of rain gardens and their care—such as Tucson Water's rainwater harvesting rebate, the City's commercial rainwater harvesting ordinance, and the WMG-led Green Streets Policy—are creating safer, healthier communities by managing stormwater as a valuable resource rather than a costly nuisance.



RAIN GARDENS CREATE AN EARTHWORKS SPONGE

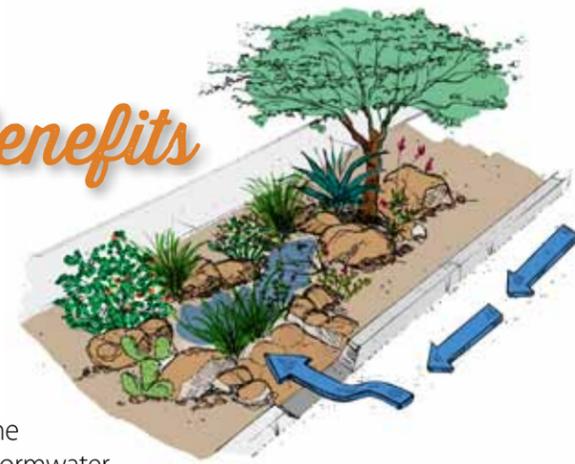


Organic mulch is applied to basins, 2 – 4 inches thick, to help infiltrate more water, reduce evaporation of soil moisture, and replenish nutrients in the soil.



A Tale of Two Watersheds

Comparing Tucson and Sierra Vista's Rain Garden Benefits



TUCSON'S ANNUAL RAIN GARDEN BENEFITS:

1 Streetside Rain Garden Costs \$500

Captures **12,000 gallons** of stormwater

Provides **\$2,600** in community benefits & **4,000 gallons** of groundwater recharge




500 Streetside Rain Gardens Cost \$250,000

Capture **6,000,000 gallons** of stormwater

Provide **\$1,300,000** in community benefits & **2,000,000 gallons** of groundwater recharge




SIERRA VISTA'S ANNUAL RAIN GARDEN BENEFITS:

1 Streetside Rain Garden Costs \$500

Captures **5,000 gallons** of stormwater

Provides **\$5,000** in community benefits & **3,500 gallons** groundwater saved from pumping




500 Streetside Rain Gardens Cost \$250,000

Capture **2,500,000 gallons** of stormwater

Provide **\$2,500,000** in community benefits & **1,750,000 gallons** groundwater saved from pumping




All rain gardens are not created equal. The impact of a rain garden depends on many factors, including soil type, climate, rainfall patterns, and plant palette. WMG ran a cost benefit analysis for rain gardens in Tucson and Sierra Vista to compare the impacts these features are making in two Arizona desert communities.

Our calculations are based on a 40 square foot rain garden with 1 to 2 native trees, organic mulch, native shrubs, and bunch grasses—totaling an average cost of \$500.

Soil type plays a large role in a rain garden's performance. In Tucson, most soils can infiltrate water quickly, which supports deeper basins. This also allows for higher rates of groundwater recharge, as more water seeps through the soil to the aquifer before being used by rain garden plants. This is especially important in areas of shallow groundwater, like Sabino Creek.

Although Sierra Vista receives more rainfall than Tucson,

the prevalence of high-clay soils with poor infiltration rates limits the amount of stormwater that can be harvested there. Shallower basins must be used to ensure that water does not "pond" in the landscape. Even without much groundwater recharge capacity, rain gardens in Sierra Vista provide a water conservation benefit by reducing demand for supplemental irrigation. This, in turn, reduces the need to pump more groundwater—which keeps more water flowing in the San Pedro River.

In both cases, rain gardens reap big financial and watershed benefits for their community!

SOAKING UP THE WEALTH: WMG Goes Big with Stormwater Plan in Sierra Vista

Water is a valuable resource—and every rainstorm is like hitting the jackpot. But in cities throughout the West, we've been letting these abundant deposits slip through our fingers. Too often, rainwater rushes down streets and storm sewers instead of soaking into the earth and recharging the aquifers. As a result, many communities have been living beyond their means, racking up a stiff "water debt" by pumping out groundwater faster than it gets replenished.

WMG is working with the City of Sierra Vista, AZ to "fill the void" in their water budget and enhance flow in the nearby San Pedro River. Taking what we've learned from our experiences working at homes, neighborhoods, and businesses, we are going big and applying these strategies across an entire sub-watershed in Sierra Vista. We've developed green infrastructure (GI) modeling and a cost-benefit analysis that reveal the positive, tangible benefits of rain gardens, curb cuts, and other low-impact development features when adopted on a broad scale.

For example, when just 10% of residential and commercial sites implement GI practices in their

landscapes, the whole community reaps big rewards. We know that these features create greener, cooler, and more beautiful neighborhoods. But our Sierra Vista data shows they can do this while producing a net financial benefit in 8 – 9 years. Significantly, our models also show that water harvesting in the upper watershed does not reduce flows reaching the San Pedro River downstream. This means our rain gardens can capture rainwater to irrigate landscapes and reduce or eliminate the use of groundwater for irrigation with no fear of competing with downstream recharge opportunities which support year-round flow of the river.

As a next step, Sierra Vista officials are currently reviewing recommendations from WMG to integrate green infrastructure into the City's development code. We are thrilled that local governments are taking a serious look at putting these simple yet powerful water-harvesting techniques into practice. Thanks to our work in Sierra Vista and Airport Wash in Tucson, we now have the data to win over the skeptics and help communities soak up the wealth of rainwater!

WMG's Restore Sabino Creek Campaign is finding its flow!

Watershed Management Group's audacious vision to restore flowing desert rivers to Tucson is really taking off with our Restore Sabino Creek campaign. We've made great strides in beginning to connect people to the idea that together we can write a new story for Sabino Creek and our other diminished desert rivers.

With continued funding from our partner American Rivers, a new grant from the National Fish and Wildlife Federation, and support from many WMG donors, this campaign is coming to life.

- The WMG-led stakeholder advisory group continues to meet monthly and is making headway in creating a comprehensive watershed plan to restore Sabino Creek with input from residents, local leaders, hydrologists, and riparian restoration experts.
- Along with videos, social media, and online resources, WMG held a large public event at our Living Lab and Learning Center to highlight the campaign. More than 60 adults and 15 kids came out for *Once Upon a Creek: the Sabino Story* to share memories and explore photos of the creek, experience a special "river revival" puppet show by local talents Puppets Amongus, and speak for the creek by contributing Sabino Creek memories to a national oral history project through StoryCorps™.
- And now we are planning a number of on-the-ground restoration projects that will install water-harvesting and stream restoration features on public and private lands along Sabino Creek to reduce outdoor use of potable water, improve soil health to prevent erosion, and increase infiltration to recharge the shallow groundwater that supports the creek.

Left: Amanda Holderbaum and her friend Opel swimming behind the dam in Sabino Creek. The families escaped together from the dust bowl in Oklahoma and moved to Tucson in 1938.



Right: Marlene Holderbaum celebrating her 3rd birthday with her friend Maxine in 1938. Photos courtesy of JJ Lamb.



"I am Queen of the Canyon!" declares 4-year-old Jaime. Photo courtesy of Kathy Johnson.

Now is a great time for you to get involved and speak for our rivers. Visit watershedmg.org/rivers/sabino to join our River Speaks bulletin and share your stories and photos about Sabino and other desert rivers.



David Stevenson, WMG Donor

Q: How did you first get involved with WMG?

Several years ago, WMG was hosting streetside water-harvesting projects in the Rincon Heights neighborhood. I got involved to help out and was soon a Co-op member and water-harvesting student myself.

Q: How has WMG impacted you personally?

WMG first opened my eyes to the benefits of utilizing greywater and rainwater, and then they taught me how to do it through workshops and their Water Harvesting Certification Course. A few years and many projects later, greywater and rainwater nurture an abundance of life on my property while my water consumption has fallen to less than 1 CCF [about 750 gallons] of municipal water per month.

Q: Why do you give money to support WMG's capital campaign?

The Living Lab and Learning Center provides the best examples of water-harvesting and compost/soil processes in Tucson—processes that are used every day by WMG staff and the public. The facility hosts the best water-harvesting trainings in the country (and possibly the world). I support WMG's capital campaign financially so the Living Lab can continue to grow and provide education to all who want it.

Q: How would you encourage people to get involved with WMG?

Take a few minutes to think about the importance of water in your life: the benefits it brings you and the value it offers for life in the desert. Then ask yourself, "Because water is so precious here, what can I do to keep it flowing?" The simple answer is to get involved with WMG financially, as a student/participant, or as a volunteer.

REFRESHING THE VALLEY WITH WMG'S *Hydrate* project series

The Phoenix Valley is thirsty—thirsty for secure water sources, thirsty for a culture that uses our precious desert water wisely, and thirsty for information about how to build sustainable systems. Watershed Management Group has been helping to hydrate the greater Phoenix area for four years by working with city governments, building public demonstration sites, hosting residential workshops, and providing outreach presentations.

Now, WMG is excited to work with community partners to launch our first valleywide presentation series called *Hydrate*, featuring 24 presentations at local juice bars, breweries, and partner sites in Phoenix, Tempe, Mesa, and Glendale. Participants can hydrate with fresh juices, craft beer, and other beverages served at each event, and then soak in information from our expert instructors and guest speakers to learn how to create their own backyard oasis with rainwater-harvesting practices.

At each location, WMG will offer a course of six presentations on topics including composting, rain tanks, greywater systems, and water harvesting for food production. Attendees will complete a mini-project at each event to build a comprehensive action plan they can take home.

The series begins with the *Hydrate Phoenix* course at Sun Up Brewery in central Phoenix. Presentations will be held on Tuesday evenings from 6:00 – 7:30 p.m., beginning on October 13 and running through November 17. Participants can come to just one event or join us for the full series to complete their entire project folder.

Following the *Hydrate Phoenix* course, WMG will offer the series in Tempe, Mesa, and finally Glendale.

Series Schedule

- **Hydrate Your Home & Community**
Create a water budget for your home and give water back to your community
- **Hydrate Your Plants**
Create a beautiful landscape with native plants and trees
- **Hydrate Your Yard**
Harvest the rain with only a shovel
- **Hydrate Your Food**
Use rain tanks to support your vegetable garden
- **Hydrate Your Soils**
Turn waste into resources and build healthy soils
- **Hydrate With Greywater**
Harvest greywater to complete your backyard oasis

Go to watershedmg.org/hydrate-phoenix
for more details and to sign up.

WMG PLANTS THE WATER IN ARIZONA NATIONAL PARKS



Two National Park Service sites in Arizona are working with Watershed Management Group to weave rainwater and stormwater-harvesting practices into their goals to promote preservation, sustainability, education, and ecosystem restoration.

Andy Hubbard, Program Manager at the Sonoran Desert Network, which monitors water quality at 11 parks, said the inspiration for the water-harvesting work was to showcase the connection to water by transforming the sites in a way that is visible to the public. “We wanted to illustrate water conservation and highlight ecosystems in our parks,” he said.

Desert Research Learning Center

Located just east of Tucson, adjacent to Saguaro National Park East, the Desert Research Learning Center (DRLC) serves as a work and learning space for visiting researchers and local student groups.

When the National Park Service took over the 5,000-square-foot residential building in 2012, the site consisted of mostly concrete, including an old pool filled with dirt and weeds. “The area was not really usable,” said Andy.

Since acquiring the building, DRLC has worked with Watershed Management Group to transform the grounds to showcase a desert environment with sustainable practices. WMG’s design experts crafted a master landscape plan to implement features across the site and led four workshops that brought in volunteers from the community to help install rain tanks and shape the earth to collect rainwater at the source.

The site now features:

- Two cisterns with combined capacity of over 10,000 gallons
- Earthworks to harvest thousands of gallons of rainwater
- A pollinator garden
- Native landscaping and a habitat exhibit
- Tinaja habitat

Volunteers worked to repurpose the pool by filling it with recycled concrete and more than 10,000 gallons of harvested rainwater to build a wildlife habitat called a tinaja. Spanish for *little jar*, a tinaja is a perennial pool that provides habitat for unique plant and wildlife communities in the desert, including native fish and frogs. It will serve not only as an educational exhibit, but also to repopulate endangered species of the Rincon foothills. “It became the feature that everybody wants to see,” said Andy.

In addition to creating publicly visible demonstrations of water-harvesting practices, the DRLC has used the captured rainwater to add gardens, landscaping, and native trees and plants to what was a barren site, and to support a seasonally wet wash. Looking to future development, the DRLC is installing a heritage orchard at the site and plans to plumb cisterns into the drip irrigation system.



Before



After

PLAN A VISIT

The Desert Research Learning Center welcomes self-guided site tours during business hours.

12661 E Broadway Blvd,
Tucson, AZ

Hours: 9:00am – 4:30pm
weekdays

Tonto National Monument

Inspired by WMG’s work at the DRLC, Tonto National Monument, two hours northeast of Phoenix, contacted WMG to provide design services as part of the 2016 Centennial Initiative to celebrate the 100th anniversary of the National Park Service.

The site plan for the Visitor Center includes a rain garden with green infrastructure features to collect stormwater from a parking lot median strip and integrate water-harvesting basins with native plants.

Duane C. Hubbard, Superintendent at Tonto National Monument, admires how early desert dwellers were able to thrive using the resources they had available without destroying the natural environment. “We feel an obligation to the public to talk about preservation and sustainability, and also to tie that into how people traditionally did that in this same environment,” he said.

Duane says harvesting rainwater will help take pressure off the nearby spring. “We have finite resources here, and we need to protect those,” he said.

SUSTAINABLE LIVING IN CYBERSPACE: WMG's Knowledge is Now Online!

Our Living Lab and Learning Center has gone virtual! That's right—we've launched an online resource library for you to explore, covering many of the topics and techniques demonstrated at the Living Lab. **To access this free archive, visit the Resource Library page on our website: watershedmg.org/learn/resource-library.** On this page, you'll find all of WMG's digital resources in one place. This includes our newsletters, manuals, handouts, and videos. Think of it as your "one-stop shop" for information on sustainable living! We'll be continuing to add new resources to the site. **Here are some of the offerings currently available:**

Videos to inspire

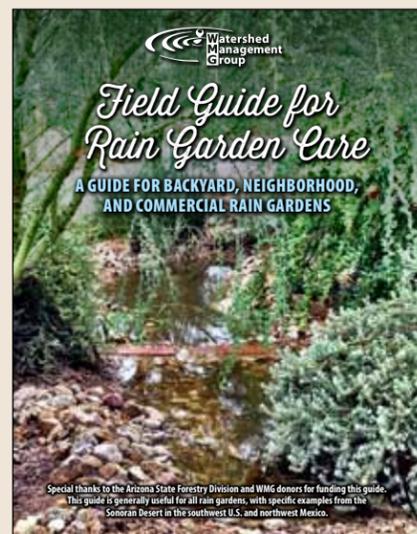


"Waste Not! Transform Your Waste into Soil, Water, and Energy" – One of our most popular videos, featuring Brad Lancaster.

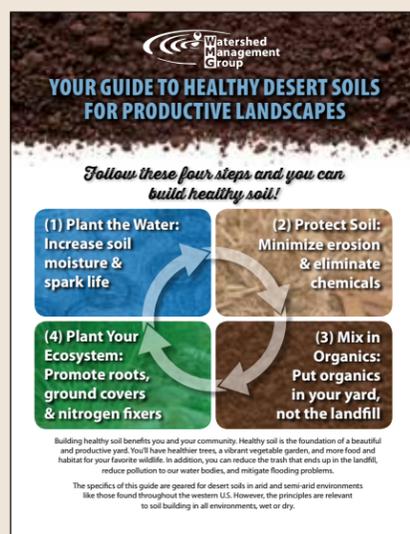


"Restoring Hope: Get Your Feet Wet in Shallow Groundwater" – The first video in a series exploring our vision for restored desert rivers.

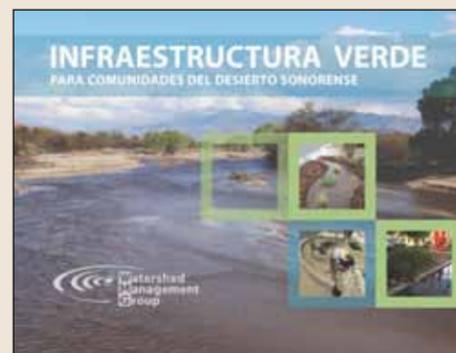
Guides to help



Field Guide for Rain Garden Care – Caring for your rain gardens is essential for their long-term health and impact. Includes a native plant guide.*

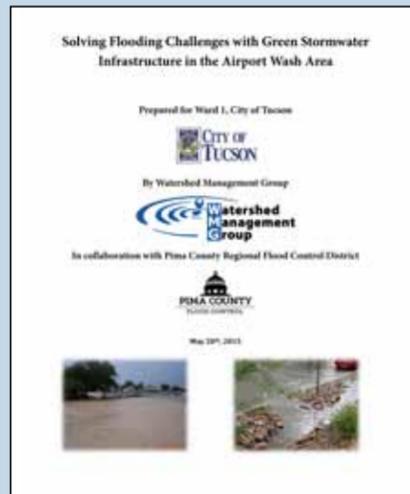


Healthy Soils Resource Guide – Originally published in the spring of 2014, this detailed guide reveals the fertile possibilities for desert soils.



Infraestructura Verde para Comunidades del Desierto Sonorense – The Spanish version of our green infrastructure guide for communities.*

Studies to quantify



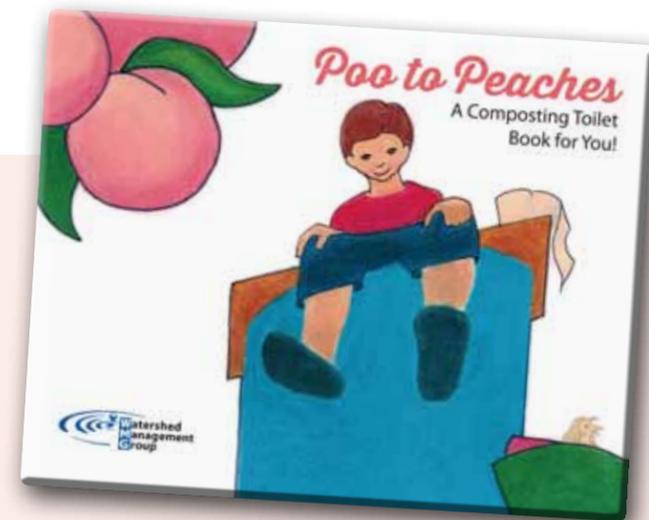
"Solving Flooding Challenges with Green Stormwater Infrastructure in the Airport Wash Area" – Time to geek out! Read the full results of our Airport Wash study, described in this newsletter on page 4.

Poo to Peaches

A Fertile Read for All Ages

WMG has been working to open people's eyes—and minds—to the water, energy, and money-saving benefits of composting toilets (CT). We are making great progress in getting affordable site-built CT designs legally permitted by the State of Arizona. But we've realized that the biggest barrier to greater adoption of composting toilets lies with public perception around composting human waste. To make this a more accepted idea, we are starting with our children.

In our efforts to shift the potty paradigm, WMG has created a book called *Poo to Peaches* to teach children about composting toilets and the nutrient cycle. With this book, kids learn how CTs transform poo into fertile compost, which can be added to the soil to grow more food. Colorfully illustrated by Kim Afinowich, this fun and engaging book also contains pages for adults with technical information on CT use and maintenance. We think of it as sustainable potty training for all ages!



Earlier this year, WMG raised over \$12,000 through a Kickstarter campaign to publish *Poo to Peaches* and support educational outreach at schools and libraries. **The official book release will take place during our Edible Shade Mesquite Pancake Breakfast on November 22nd with a live reading and signing.** Can't wait? You can purchase the book now on our website. And we invite you to try out our CT at the Living Lab during the next public tour or event. Happy composting!

Edible Shade

MESQUITE PANCAKE BREAKFAST

SUNDAY, NOVEMBER 22, 2015 • 9AM-12PM

WATERSHEDMG.ORG/PANCAKES



* Printed copies of these publications are available for purchase on our website and at the Living Lab.



1137 N Dodge Blvd
Tucson, AZ 85716

MISSION:
Watershed Management Group develops and implements community-based solutions to ensure the long-term prosperity of people and health of the environment. We provide people with the knowledge, skills, and resources for sustainable livelihoods.

Respect the creek! Sabino Creek experienced dramatic flooding in July 2006, with flows up to 8 feet deep. Photo courtesy of Janice Hughes.