Carapace

NEWSLETTER FOR THE
Upper Gila Watershed Alliance
FALL 2026 Vol. 30 No. 2



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Upper Gila Watershed Alliance

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Mission Statement

The Upper Gila Watershed Alliance is a non-profit watershed protection and conservation organization working to promote the long-term health of the Upper Gila Watershed and its communities of life. Through advocacy, education, research and restoration projects, we are striving to build communities of stewards in more locally based economies.

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Carapace is published by the Upper Gila Watershed Alliance. It is sent free to all UGWA members.

UGWA is a 501(c)(3) organization incorporated in New Mexico. All contributions are tax-deductible.

Calendar of Events

February 13 **The Magic of Microbes**
2:00-4:00 pm Global Resource Center: ABC Room, 805 West 12th Street, Silver City on WNMU campus. FREE Event



Healthy soil contains a complex community of bacteria, fungi, protozoa, nematodes, and other organisms. Together, these organisms form what is often called the soil food web. These microorganisms are important for nutrient cycling, soil aggregation, food nutrition, and can influence the water-holding capacity of soil. Learn the benefits of soil microorganisms and look at various soil samples under the microscope. **BYOS (Bring Your Own Soil):** Bring a small sample of your garden soil or compost in a sealed bag to observe under the microscope!

March 20 **New Earth Project Fundraising Event**
9:30-11:30 am The Seedboat Collective, 214 West Yankee Street, Silver City

Do you have questions about the New Earth Project, or would you like to learn more and help it succeed? Join us for coffee, tea, scones, and a presentation on the latest developments in this community project. Get your questions answered and discover how you can contribute to this unique project!

April 3 **Composting Workshop**
1:00-2:30 pm Whiskey Creek Zocolo, 11786 US-180 East, Arenas Valley

Join educator and master composter Nan Franzblau for a demonstration and discussion of various composting techniques, including three-bin composting, backyard piles, vermicomposting, and lasagna gardening. UGWA interns will also discuss our Earth Cradle methodology. There's something for everyone!

April 17 **Give Grandly 2027**
10:00-2:00 Gough Park, Silver City

Come and see us at Give Grandly 2027! We'll have a booth at the in-person event again this year, so drop by and say hi. If you can't make it on April 17, online giving will be open April 3 – May 1. More details to come!

April 22-24 **Earth Day**
TBD



Be on the lookout! We're still making plans for how we will celebrate Earth Day 2027. More details to come!

About the Cover

Regenerate!

Original photo taken by Mike Fugagli.

Location: Autumn at the Mogollon Box.



We'd LOVE to stay in touch!

And we have a couple of great ways to do that!

Email If email is best for you, sign up for our monthly e-newsletter. We promise it's just once-a-month and an important bulletin every so often. Sign up on our website at ugwa.org and click on the Read Watch & Listen Tab.

Social Media If social media is more your flavor, we're on Facebook and Instagram. Give us a follow!

Or better yet, do both!

Message from the Executive Director



Photo by Mike Fugagli

For much of this decade, the public conversation about climate solutions has boiled down to one question: how much carbon can we store, and where? Forests became ledgers. Soil became a line item. The idea behind "natural climate solutions" was good, and it drew real attention and funding to the living world. But it asked the living world to do only one function.

A different understanding is now emerging, and it's coming from scientists who study the Earth as a whole. Johan Rockström and his colleagues have spent years showing that the planet's stability doesn't hinge on a single number. It depends on a web of interlocking processes: the cycling of water, soil health, the richness of life, and the balance of nutrients. Stress one strand, and the others feel it. Carbon matters enormously, but it is one thread in the cloth.

What follows is simple yet demanding. If the trouble is a loss of living function, the remedy must be regeneration. We have to restore the capacity of living systems to do what they have done for millions of years: hold water, build soil, feed and shelter countless species, and cool the ground beneath our feet.

For those of us who have spent our careers in the field, this rings true. Here on the Gila, Mike and I, along with community members and river lovers, have watched the river recover once we finally gave it room and reduced stressors. Healthy systems are more than the sum of their parts, and they repair themselves when we stop getting in the way and start helping.

That is the thread running through this issue of Carapace. The opening pages step back to examine the global picture and why soil sits at its center. Then we come home to the Upper Gila and the New Earth Project, where food scraps become living compost, trees take root among the bioreactors, and young people are learning to do the work themselves. Their hands, more than ours, will carry it forward.

Regeneration can feel too big to start. I've found it begins small and close to home, in a bin of food waste, a seedling, or a student who has just learned what is alive in a handful of dirt. Small beginnings are how large changes happen.

> "We have to restore the capacity of living systems to do what they have done for millions of years: hold water, build soil, feed and shelter countless species, and cool the ground beneath our feet."

I hope these pages help you see your own place in this work. There is room for all of us.

Roadless Rule Update

I Submitted My Comments, Now What?

By Carol Ann Fugagli

Thank you for joining more than 1.6 million people who submitted comments or signed petitions opposing the Trump administration's proposal to repeal the Roadless Rule. According to an analysis by the Center for Western Priorities, 99% of those comments opposed the repeal. The U.S. Forest Service is reviewing and responding to the large volume of public comments received during the comment period. After analyzing the comments, the Forest Service will issue a final environmental impact statement, a final rule, and a record of decision. A final ruling is expected in early 2027.



Photo by Mike Fugagli

Conservation groups and state attorneys general have said that lawsuits and requests for court injunctions are likely once the Forest Service issues its final decision.

The 2001 Roadless Rule remains in effect until the Forest Service makes a final decision and any legal challenges are resolved. We will keep you updated as we hear more.

You can find UGWA's comments on our website at: www.ugwa.org.

Thirty Years of UGWA

Message by Carol Ann Fugagli during the 30-year celebration, Oct. 4, 2026, at the Seedboat Collective.

Good afternoon, everyone. Thank you for being here to celebrate 30 years of the Upper Gila Watershed Alliance!

I'd like to begin before the beginning, because UGWA wasn't born in 1996. UGWA was born of years of stubborn love that preceded us.

Long before there was a nonprofit organization, a handful of neighbors in the Cliff-Gila Valley looked at the Gila River and refused to accept what they saw: trampled banks, willows browsed to nubs, and springs churned into mud by cattle. They fought that battle for years, mostly alone. No grants, no staff, no website. Just each other.

They called themselves Friends of the Gila River. People like Steve MacDonald, Sue Mullen, and Howard Smith gave their weekends, weeknights, and a good deal of their sanity to the river. In particular, Steve MacDonald—a mammalogist, a Quaker, and a man who thinks in geologic time—saw that this circle of friends could become something that would outlast any one of them.



The Silver City String Beans played their iconic dance music during the 30-year celebration. Photo by Mike Fugagli

So in 1996 the Upper Gila Watershed Alliance was born with guidance from Nena MacDonald, Tom Cooper, Roger Skaggs, Cindy Serna, Nora Fiedler, and Mike Fugagli.

The founders made a choice that shaped everything that followed: they decided by consensus. Consensus is slow. It takes patience. It means sitting around a kitchen table until everyone can live with the decision. But consensus also means that every person owns every choice and that this organization would be a circle, not a pyramid. Thirty years later, we still are.

There's a line often attributed to Margaret Mead: never doubt that a small group of thoughtful, committed citizens can change the world, because it's the only thing that ever has.

Today, I want to show you that here in this watershed, it's true.

In those early years, UGWA's work was hands-on. Volunteers built fences to keep cattle off the river. They protected springs, those precious desert waters on which entire communities of life depend. Youth Conservation Corps crews built check dams to slow erosion and retain water in the land. Young people sank cottonwood and willow poles into the riverbanks. Some of those poles are now trees, casting shade that those same young people could stand under today.

We now have a vibrant spring protection program led by Dylan Duvergé. We have kept grazers out of Adair Springs in Luna County and protected the flourishing Bloodgood Spring in Kingston. More is on the way!

UGWA also held the Forest Service's feet to the fire. We showed up for meetings, submitted comments, and read the fine print. We insisted, politely and relentlessly, that the ecology of the Upper Gila Watershed mattered. Over the years, that meant standing up for sensible travel management on the Gila National Forest, defending the Gila River against an unnecessary diversion, and, when the Forest Plan was revised, pressing the agency to treat the climate crisis as the emergency it is.

Our advocacy also meant dreaming big. We have worked for years to bring the river otter home to the Gila. That campaign hasn't succeeded yet. But we're still at it, because that is what this organization does. We don't give up on a river, and we don't give up on the creatures that belong to that river.



Allison Boyd, Jeff Boyd, and Bob Schiowitz enjoy a beverage from Open Space Brewery Photo by Mary Stone

Restoration is often about removing what harms, not just adding what heals. For years, UGWA crews ventured into the wilderness, sometimes by mule, to remove salt cedar, the invasive plant that chokes out native riparian forests. Today, all known salt cedar has been removed from all three forks of the Gila on national forest land. Hundreds of locations. Thousands of stems. Pulled and cut one at a time.

That tamarisk work led us back to the heart of the matter. In the mainstem wilderness reach below the Sapillo confluence, one of the Gila's most important climate refuges, a feral herd of cattle had run wild for more than forty years, ever since a rancher abandoned them in the 1970s. Eight roundups over three decades had failed, and everyone assumed nothing could be done.

UGWA didn't accept that. We worked alongside the Center for Biological

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Donna Gianoulis, Cissy McAndrew, Suzi Calhoun and Janey Katz enjoy one another's company during the 30-year celebration. Photo by Mary Stone

The Living Systems Shift

By Mike Fugagli and Carol Ann Fugagli

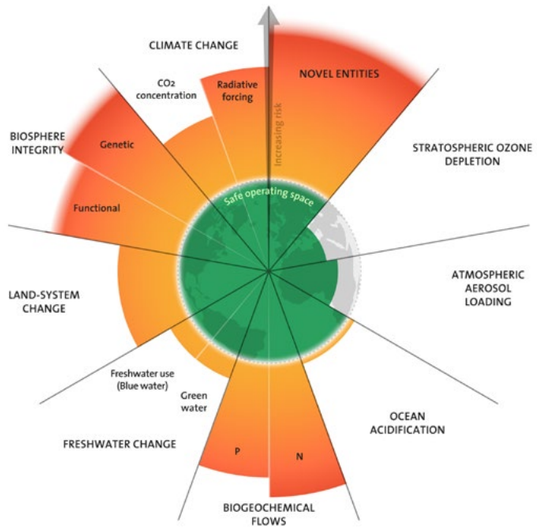
Every year, a team of scientists at the Potsdam Institute for Climate Impact Research in Germany takes the planet's vital signs, known as the Planetary Health Check. This year's report, released September 21, 2026, found that seven of the nine planetary boundaries are now beyond their safe limits, with ocean acidification the latest to cross its limit in 2025. All seven are at their highest recorded levels. The seven planetary boundaries are climate, biosphere integrity, land-system change, freshwater, nutrient cycles, novel entities (human-made chemicals and materials), and ocean acidification. Only ozone depletion and aerosol loading have improved over the past decade.

Recent years have shown what this looks like on the ground. From January 2023 to September 2025, bleaching-level heat stress hit about 84 percent of the world's coral reef area, the largest bleaching event ever recorded. The same report points to Pakistan's monsoon floods, record ocean heat, and wildfires across Europe and Canada.

The most important finding for readers of this newsletter may be this: forests, grasslands, and soils absorb a large share of the carbon we emit. But repeated heat, drought, fire, and degradation can reduce that uptake and, in some places, turn ecosystems from carbon sinks into sources. The report asks whether the models behind scientists' climate projections overestimate the land carbon sink. The lead author, Johan Rockström, put the stakes plainly: our path to net zero relies on functioning carbon sinks, and observations suggest the planet may be losing some of its buffering capacity.

This is why the "natural climate solutions" framing, useful as it was, isn't enough. If we treat ecosystems as carbon warehouses, we miss that a warehouse can hold only what a healthy system keeps producing. The sink depends on the continued functioning of the planet's living systems.

In late 2025, Johan Rockström and a large group of Earth-system scientists published a commentary concluding that the world has missed a decade needed to keep the Earth system inside its safe operating space, though stabilizing our planet remains possible. They argue that an overshoot of 1.5°C is now unavoidable but need not be permanent, and that we must rapidly adopt pathways that reduce harm and optimize regeneration. That language is new and worth noticing.



Mitigation alone is no longer the whole story.

A companion paper by Carl Folke, Jörn Fischer, and colleagues clarifies the terms. Resilience thinking, which underpins the planetary boundaries, asks how systems absorb shocks and avoid tipping into worse states. Regeneration goes further: it seeks net improvement in a place, not merely less harm, and emphasizes human agency and mutually beneficial relationships between people and the rest of nature.

Two of their ideas stand out.

The first is that degeneration and regeneration both build momentum. Degenerative spirals feed into one another, creating what scientists call a polycrisis. Picture a dry year that thins the grass on a hillside. Bare ground sheds rain instead of soaking it up, so the next storm carries soil into the stream. The soil that remains holds less water, so the following drought hits harder, and the dry, thinned vegetation burns more readily. Each loss makes the next one more likely, and each one lands on people too: smaller harvests, lost income, and less to spend on repair. Regenerative dynamics can also reinforce one another across a community and its landscape.

The second idea from Folke and other scientists is that once regenerative dynamics gain momentum, they can largely sustain themselves. Escaping a degenerative cycle takes a big push, but keeping a regenerative one going takes far less. The hard part is getting over the hump. The authors call the resulting possibilities "poly-opportunities," because a gain in one area, such as healthier soil, can open many others, including water, food, habitat, and livelihoods. Regenerative agriculture, in which farmers actively build soil fertility and biodiversity, is one concrete example.

When these findings are considered together, a clear picture emerges. Several of the boundaries already crossed, including land-system change, freshwater, biosphere integrity, and nutrient cycles, are ones that living systems can help repair. Soil sits at the center of several of them. It holds water, cycles nutrients, supports biodiversity, and stores carbon.

Regeneration, then, isn't a soft alternative to hard climate science. It is where science is headed. As Johan Rockström puts it: "We do not have the luxury of time, but we do have the knowledge, capacity, and solutions to change course."

Sources: Planetary Health Check 2026 (Potsdam Institute for Climate Impact Research); Rockström et al., One Earth (Nov. 2025); Fischer, Farny, Pacheco-Romero and Folke, Ambio (2026).

Reforestation: Built to Grow

By Mike Fugagli

When we laid out our bioreactor array for UGWA's New Earth Project, we weren't only thinking about compost. We were thinking about efficiency —how a single system, built with the right proportions and placement, could do more than one job at once.

The Earth itself works this way. Oceans, forests, grasslands, and soil have quietly absorbed more than half of what we've emitted into the atmosphere for decades, buying us time we didn't earn on our own. That buffer is a living system doing far more than its one obvious job. We built our own bioreactor array to work the same way, on a much smaller scale, on purpose.

Our bioreactor field sits on a terraced slope that, not long ago, was bare and sun-baked — about as hard a place to grow anything as any place in Silver City. From the start, we planted a native tree in the eight-foot gap between each bioreactor. We knew the bioreactors would need tending, and we understood that a young tree planted in that kind of tended ground would receive more consistent care than almost anywhere else.

What we're watching now is a series of small experiments confirming what we hoped for before we ever put a shovel in the ground. Every tree we've planted has survived. A velvet ash planted just three years ago already stands taller than the bioreactor beside it, full and green against the fence line. We haven't needed to cage most of them — deer, it turns out, aren't eager to walk into a field of dark, unfamiliar structures, saplings or not.

A young tree's biggest enemy usually isn't the stress of planting. It's everything that happens, or doesn't happen, afterward — the watering nobody remembers to keep up, the summer nobody checks on that vulnerable sapling. We placed our trees exactly where neglect wasn't an option, because someone tends the bioreactors anyway, on a schedule that has nothing to do with the trees.

We accounted for something more literal, too: shade. A hundred bioreactors, spaced closely and standing tall, cast shade across the ground between them, cooling the soil and slowing moisture loss that kills so many young trees on a hot, open slope. Ecologists call this "nurse plant facilitation," the same reason a saguaro in the wild almost always starts life in the shelter of a palo verde tree and rarely survives in the open sun. We built our own version of that kind of shelter, one that also produces living compost.



Arizona Sycamore growing stately between the bioreactors. Photo by Carol Ann Fugagli

And there's a third piece we had in mind from the start. The fungal-dominant compost our bioreactors produce isn't a generic soil amendment. Soil scientists have long known that different plant communities need different things from the soil beneath them — grasses and vegetables lean toward equal amounts of bacteria and fungi, while berries and trees depend on soil that's heavily fungal, sometimes by a hundredfold.

> "Soil scientists have long known that different plant communities need different things from the soil beneath them — grasses and vegetables lean toward equal amounts of bacteria and fungi, while berries and trees depend on soil that's heavily fungal, sometimes by a hundredfold."

That knowledge made pairing this specific kind of composting with a tree nursery a natural fit. We were producing the biology these trees needed most.

We planned it all, building on principles we understood and designed for in advance rather than discovering by accident. Moreover, understand how a living system actually behaves, build your conditions around that understanding, and it will do even more than you asked — reliably, not by luck. We have been learning the same lesson about the Earth's carbon and soil cycle—and every living system we ask to do work that benefits all beings.

We're still learning what this array will look like in five years, when we hope to have a forest canopy shading our work. But for now, on a slope that used to hold nothing but caliche and afternoon heat, something we intentionally designed is growing green and robustly between a hundred humble bins of decomposing food scraps.

Bloodgood Spring: When Things Go Right

By Dylan Duvergé, UGWA Spring/Riparian Areas Protection Manager

Having spent much of my career behind a desk, working in environmental planning and thinking about environmental impacts more conceptually than practically, I've found it gratifying and educational to help take a riparian protection project from funding through construction and monitoring, and to see the results on the ground. UGWA's Bloodgood Spring project, near Kingston in the Black Range, has been especially rewarding because springs like Bloodgood provide critical climate change refugia for wildlife, and because of the cooperation among agencies, the fence contractor, the grazing permittee, and local residents who helped make the project successful.

I helped UGWA secure funding through the New Mexico Environment Department's River Stewardship Program to protect approximately 3.5 acres of spring and riparian habitat on the Gila National Forest from livestock grazing. Bloodgood includes a spring head, seepage-fed wetlands, riparian meadows, and the spring-fed perennial creek, providing a variety of habitats within a relatively small area. Working with the Forest Service, we contracted with Noland Tough to construct a pipe-and-cable fence that excludes cattle while accommodating wildlife and seasonal flooding using a novel lift-up polypipe water gap fence. Construction was completed in March 2025, and we've been monitoring the site ever since.



One of the novel lift up polypipe structures
Photo by Dylan Duvergé

Obviously, cattle are persistent because they know where water is! Last October, calves discovered they could slip between or underneath the fence cables, while their mothers forced their way through the water gaps to retrieve them. Fortunately, Kingston residents who regularly visit Bloodgood had been keeping a close eye on the site. They documented the intrusions, walked the fence looking for entry points, shared wildlife cam footage, and suggested practical solutions. The grazing permittee was cooperative, promptly removing the cattle when notified. One resident proposed installing a third cable using drilled eyebolts, avoiding the need to bring welding equipment back to the site (and the associated wildfire risk). We coordinated with Noland Tough, who subsequently installed an additional cable and reinforced vulnerable locations with rocks, logs, and posts, at no additional cost to UGWA.

I've been particularly impressed by the involvement of local residents, whose interest goes well beyond enjoying the spring as a place to walk and observe wildlife. They've voluntarily spent considerable time monitoring the fence, reporting problems, and helping us address them. For a small nonprofit managing restoration projects in remote areas, **having knowledgeable and engaged neighbors is invaluable.** Finding a fencing contractor who stands behind their work and corrects issues without an invoice is a huge win too!

During our August 2026 inspection with NMED project officer Samantha Ferguson, we found the repairs holding up well following the summer monsoons, with no evidence of recent cattle entry or erosion around fence posts. More exciting was the noticeably greener and denser vegetation within the exclosure, particularly where the contrast with adjacent grazed areas is most apparent.



The spring head (which seeps down to the creek which would be dry without it).
Photo by Dylan Duvergé

I'm grateful to Carol Ann for trusting me to run with this, NMED and the Forest Service for their support, Noland Tough for standing behind their work, the grazing permittee for his cooperation, and especially the Kingston community for its active involvement. As our region becomes hotter and drier, protecting springs and riparian areas as climate refugia for wildlife will become increasingly important. We've recently submitted a proposal to protect additional riparian habitat in the Gila River Bird Habitat Area, and I hope we can build on the cooperation and experience gained at Bloodgood as we pursue this next project.



Inside/Outside comparison picture
Photo by Dylan Duvergé

Does Environmental Education Make a Difference?

Studies (and Teachers) Say Yes!

By Nan Franzblau and Mary Stone

Look at the news any day, and it's clear our planet is in crisis. Climate change, biodiversity loss, pollution, and food and water insecurity loom large and compel us to find effective, long-term solutions. Understanding humans' relationships to nature's systems and cycles is a vital first step to keeping these systems in balance.

For many years, UGWA has prioritized environmental education to empower young people with the knowledge and skills to manage and solve these crises. Teaching kids about sustainability and regeneration also gives us—the adults--hope.

But beyond this hope and the knowledge students gain, how effective is environmental education in shifting humankind's trajectory to a more sustainable future?

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Nan teaching plant needs to 1st graders at Central Elementary in Santa Clara. Photo by Mary Stone



5th graders from Harrison Schmitt Elementary at the Mogollon Box for the Children's Water Festival. Photo by Mary Stone.

Earth Detectives

Our Earth Detectives program inspires young learners to explore, ask questions, and connect with the natural world just outside their classroom. Through hands-on investigations, garden observations, and preparing and sharing food they've grown themselves, students develop environmental awareness and experience the rewards of growing their own food. By nurturing curiosity, sensory awareness, and a deep love of nature, Earth Detectives helps shape the next generation of caring environmental stewards!



Central 1st graders preparing their garden beds. Photo by Mary Stone



Emily, a 1st grader, holds a nasturtium her class planted. Photo by Mary Stone



5th graders from Jose Barrios Elementary enjoy free swim during the Children's Water Festival. Photo by Mary Stone

Children's Water Festival

The Children's Water Festival brings 5th-grade students from across the region to the river for an unforgettable, hands-on day of environmental learning. With guidance from passionate, dedicated educators, students discover river ecology, macroinvertebrates, watershed protection, and why it's important to conserve our local water resources. For many, it's their first visit to the river—an experience that builds a personal connection to our region's precious water systems and inspires them to protect these natural habitats for years to come!



Carol Ann Fugagli points out native flowers to 1st graders of Harrison Schmitt Elementary on a field trip to City of Rocks State Park. Photo by Mary Stone

City of Rocks Field Trip

The City of Rocks field trip takes 1st graders on an exciting outdoor adventure to explore one of our region's most remarkable natural landmarks. Students navigate dramatic rock formations, learn how nature shapes the landscape over time, and discover the plants and wildlife that call this unique desert habitat home. For many young learners, it's an empowering first step in nature study—building confidence, curiosity, and a sense of wonder in the great outdoors!



Students eat their 'erosion cookies' at City of Rocks State Park after learning about how the park was formed. Photo by Mary Stone



3rd graders from Jose Barrios enjoying the evening sunset at City of Rocks State Park. Photo by Mary Stone

Dark Skies Field Trip

The Dark Skies field trip takes 3rd graders to the City of Rocks for an empowering exploration of nocturnal science and dark sky preservation. Students learn to embrace the night, turning fear of the dark into curiosity, wonder, and respect. Through interactive stations on nocturnal wildlife, constellations, and the magic of protected night skies, they discover what thrives after sunset and gain the knowledge and confidence to feel at home in the natural world, day or night!



5th graders from Bayard Elementary identify macroinvertebrates at the Gila River. Photo by Mary Stone



Students document what they learned in cartoneras. Photo by Mary Stone



Nature Walk for 1st graders at City of Rocks State Park Photo by Mary Stone



3rd graders learn about bat sonar & crepuscular animals while trying out their red lights. Photo by Miss Kennedy



Star cookies at the star party! Photo by Carol Ann Fugagli



Group of 3rd graders preparing for a fun evening of learning at City of Rocks Ste Park Photo by Carol Ann Fugagli

Thirty Years of UGWA

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Diversity, New Mexico Wild, Audubon, the Native Plant Society, and more than twenty partner organizations. Much of our work happened quietly, through letters, research, and meetings, as we sought to keep the peace in our community even as we pushed hard for the river. Between 2021 and 2023, the Forest Service finally removed the feral cattle. In January 2025, a federal court upheld that decision.

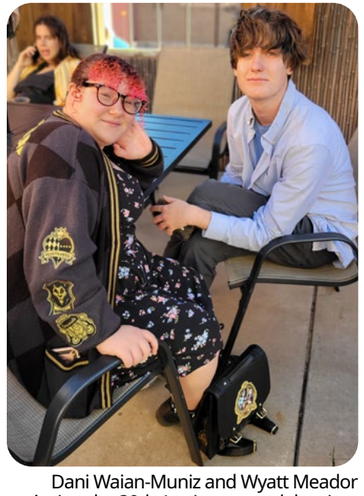
Think about that. Getting cattle off this river was the very reason Friends of the Gila River came together in the first place. Nearly thirty years after our founding, the mainstem of the Gila is free of feral cattle and recovering. The willows are returning. On a trip to that reach in 2024, my husband Mike woke at three in the morning in the old-growth cottonwoods to a pair of Western Screech Owls singing to each other, a bird he hadn't heard there in a decade.

That's what thirty years of stubborn love sounds like.

If fencing and advocacy were UGWA's first chapter, young people have been our second.

We now have a thriving environmental education program led by our Education Director Mary Stone.

Every month, we teach 1st graders at Central Elementary about their garden and our watershed. We regularly take 1st- and 3rd-graders from Harrison Schmitt Elementary on field trips to the City of Rocks. Under the leadership of Nan Franzblau, we hold monthly lessons with 4th graders about the importance of soil health. We also lead hands-on activities with 9th graders at Aldo Leopold Charter School on soil microbes and their role in drawing down atmospheric carbon.



Dani Waian-Muniz and Wyatt Meador enjoying the 30th Anniversary celebration. Photo by Mary Stone

Every spring, the Children's Water Festival also teaches hundreds of fifth graders from across the region where their water comes from and why it matters. We've led eco-camps that take high schoolers to the Gila River to learn about its plants and wildlife and how its waters move.

We've also welcomed people home. A few years ago, we brought elders and teenagers of the Fort Sill Apache Tribe, descendants of Geronimo's band, to swim in the Gila River for the first time since their ancestors were held as prisoners of war. Today, they have a seat at the table in how the Greater Gila is cared for.

Our climate-justice youth empowerment program, Thinking ON a Mountain, had students spot-map flycatcher territories by ear, band birds, and write letters to the Forest Supervisor about what they'd seen in the wilderness. Some of them sat across the table from him and asked him hard questions to his face.



Happy trio at UGWA's 30th Anniversary celebration. Photo by Mary Stone

Four students joined us for a four-day, eight-mile biological survey of the Gila's main stem. They documented forty-three bird species and sixteen butterfly species. That same year, we took students to Atlanta for Climate Reality Leadership training with former Vice President Al Gore. They returned home and staged a play. They then stood in Gough Park every Friday for more than a year, through heat, rain, and snow, urging this town to take climate change seriously.

> "Thirty years ago, a small group of committed people decided the Upper Gila was worth fighting for.
>
> They were right."

Along the way, as we engaged young people more and more, we did something pretty awesome: we began paying them for their environmental work. Aldo Leopold wrote that ecological education means living in a world of wounds. Our promise to young people has always been this: if you are brave enough to see those wounds, adults will show up with the tools, pay, and support to help you heal them.

Soon we moved from protest to direct action, and that became the New Earth Project.

Young people and volunteers have built and filled 168 bioreactors, each one is a cylinder standing five feet tall, three feet in diameter, holding 1,800 pounds of leftover food and wood scraps. They reach thermophilic temperatures of 140 degrees fahrenheit, cooking like a crockpot. Each one turns 600 pounds of food waste and 1,200 pounds of yard waste into 700 pounds of living, fungal-rich compost we call Living Earth. That's more than 100,000 pounds of food that would have gone to a landfill, now building soil instead of releasing methane. The kids get to name each bioreactor. Mathew Chavez, a longtime worker who now attends WNMU, named one of them, aiming for the longest name in history. That large black bioreactor is proudly called José Castillo Santiago Hernandez de la Cruz Jr.

The New Earth Project has taken root in places we never imagined. Through our participation in the Global Soil Restoration Network and collaboration with scientists such as Dr. Stuart Kauffman, our innovative methods are now headed to Botswana and Uganda. Moreover, this fall, two Aldo Leopold seniors, Rio Spaldin and Kale Dohtery, are helping to design a low-cost bioreactor called Earth Cradle that could be built almost anywhere in

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Part of a Larger Network

By Mike Fugagli

The New Earth Project's (NEP) work was never meant to remain confined to Silver City. The NEP is one node in the Global Soil Restoration Network, an informal and growing circle of practitioners, scientists, and community groups who share a simple conviction: healthy soil is rebuilt through many small, locally owned efforts, not a single large one.



An evening of friends and food from the Global Soil Restoration Network: Steve Dobo, Glenna Norvelle, Carol Ann Fugagli, Mike Fugagli, Stuart Kaufmann, Tamra Arp, Mark Newland. Photo by Kate Piel

The Network is coordinated in part by Dr. Stuart Kauffman, a complexity scientist whose concept of the "adjacent possible" shapes how we think about emergent possibilities. Simply put, the adjacent possible describes how each next step of a process can be unexpected and ultimately lead to a final goal. For the goal of soil restoration, each project around the world takes the next step with local knowledge and materials,



Stuart Kaufmann enjoying a gift of 'Jimothy' during a gathering in Santa Fe. Photo by Kate Piel

then teaches others what it discovers. Nothing is imposed from the center. Every site tailors its composting method to its feedstocks, climate, and people.

- **Botswana.** A pilot in Gaborone is being planned and supported by astrophysicist Stuart Marongwe, whose university and government proposals are underway.
- **Uganda.** In Kisoro, NEP is co-developing a project with Up With Africa and The Audacity Lab, both Denver nonprofit organizations working closely with a community farm in Kisoro with partners in Rwanda and the Democratic Republic of the Congo.
- **Bhutan, Borneo, and India.** Sneha Podder of the Georgetown Institute of Open and Advanced Studies and Genie NGO is leading efforts in these countries, and several composting bioreactors have already been built and filled. Partnerships, conversations, and testing are underway.
- **Santa Fe and beyond.** Closer to home, the Mother Nature Center in Santa Fe is one of the Network's founders. Scientists Dr. Jan Dijksterhuis of the Westerdijk Fungal Biodiversity Institute in the Netherlands and Craig Arnold, CEO of Swiss Soil in Scotland, study the fungi and the water pathways that make our innovative designs of this compost work.

Ideas flow in both directions. Our interns from Aldo Leopold Charter School are testing a design called the Earth Cradle. This low-cost, modular unit is intended to be built by people who can't afford a factory-made version. What we learn from partners in Gaborone, Kisoro, and elsewhere will return to Silver City.

Everything we publish is licensed under an open Creative Commons license, so any community may build, adapt, and improve our innovative methods.

Thank you to the Chrysanta Foundation and Future Focused Education for their support.



UGWA intern Kale Doherty examines a compost sample. Photo by Carol Ann Fugagli



Mike Fugagli showing a rhizosheath around grass roots to Steve Dobo, Mark Newland, and Glenna Norvelle at the New Earth Project garden. Photo by Carol Ann Fugagli

Environmental Education
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After analyzing more than 100 peer-reviewed studies over a 20-year period, researchers at Stanford University found an astounding array of benefits of environmental education, including improvements in academic performance, enhanced critical thinking skills, and increases in confidence, civic engagement, collaboration, and positive environmental behaviors.

Educators in Hawaii witnessed an increased interest in school, higher cognitive test scores, and improved maturity levels and self-esteem. In New York, students with learning disabilities were more engaged in classes with ecology-based hands-on activities. In urban Pennsylvania, 4th graders took the initiative to collect water samples and hold a community clean-up of a polluted pond. In Indiana, 4th grade teachers found that spending just one day studying a natural environment led to a higher retention of terminology and ecological principles and greater environmental awareness than spending the same time in a traditional classroom setting. Success stories like these are widespread, from Florida to Montana and from Mexico to Greece and New Zealand.

But what are the impacts of environmental education here in southwest New Mexico?

Harrison Schmitt 4th grade teacher Jenny Sprague says that the positive impact of environmental education is evident. Since beginning their work with the New Earth Project, her students have become "more curious about and invested.....in doing what they can to help take care of the environment and the critters inhabiting it." Ms. Sprague has also noticed that the kids "have begun to develop a critical awareness of our interdependency with the systems and cycles in nature, and a growing sense of responsibility toward making sure the natural world.....is more sustainable in the future."

Crystal Kennedy and her 3rd grade classes at Harrison Schmitt have participated in UGWA's Dark Skies program at City of Rocks and our YCIP Butterfly Project. Mrs. Kennedy acknowledged an improvement in students' academics as they used measuring, data collection, and graphing to analyze findings. They also developed their language skills by keeping nature journals and writing reports featuring their observations and environmental topics. The 3rd graders have experienced personal growth too, "sharing their questions and discoveries with greater confidence during class discussions and feeling proud.....to express their opinions, dreams and goals."

All the teachers I spoke with agreed that environmental education shows students that they have choices that can impact the natural world, and consequently their own lives. Aldo Leopold Charter School teacher Molly Gibson has noticed how her students now see the world through a lens of sustainability: "I think that applying their experience from environmental education, not just to their daily lives but also special interests, hobbies, and passions, is powerful and helps create a more caring and thoughtful community."

As we prepare our youth for a challenging future, environmental education imparts more than knowledge. By revealing our place in the natural world, it provides relevance, builds critical thinking skills, encourages collaboration, and increases civic action and responsibility. ALCS teacher Sean Meister states, "Having the added support from UGWA gives me much-needed hope for an increasingly unknown future, as things change.....environmentally, politically, and culturally."

At UGWA, we are proud to share this journey with our community's educators and youth!

Thirty Years of UGWA
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the world. A three-year grant funds their work and encourages young people to lead.

I want to leave you with a story from Mike's eco-monitoring students.

One day on the Gila River, the kids found a lizard three feet underwater, flat on its back, apparently dead. They fished it out, circled up, and gave chest compressions right there in the river while singing "Stayin' Alive." Nothing happened. Eventually they gave up, laid the reptile gently on the hot sand, and walked away. Then the sun warmed the animal's body, and the lizard flipped over and ran off into the woods! They named him Lazarus.

Sometimes I wonder whether, even when we do everything we can, if what we do will be enough. But then nature or the world does its part. I remember Lazarus. The willow poles become trees. The river heals. The otters may yet come home. The kid who planted a sapling grows up to lead. The work we do is never wasted, even when we can't yet see the results.

So, today, thank you. Thank you to the people who started this fight before any of us arrived. Thank you to our founders. Thank you to former directors like Donna Stevens and Melanie Gasparich, and to former board members who passed away, including Tom Krohley and Jim Furnish, who, as Deputy Forest Supervisor, helped pass the Roadless Rule in 2001. Thank you to our current board members: Sharman Apt Russell, Nora Fielder, Sarah Johnson, Ron Parry, and Dennis Weller, who have led our board with wisdom for over two decades. Thank you to our amazing staff, who haven't yet been recognized: Rebecca Martin, our administrator, who is always there for me; Mike Fugagli, our conservation biologist, who always looks at the big picture; Gia Bezuyen, who manages our tree nursery; and Jarrett Marcum, who helps the New Earth Project achieve its goals. Thank you to all of our partners, and to YOU, our members and supporters, our volunteers, and every young person who ever got their boots wet for the Gila River.

Thirty years ago, a small group of committed people decided the Upper Gila was worth fighting for.

They were right.

Here's to the next thirty years.

Soil as the Hinge

By Mike Fugagli and Carol Ann Fugagli

Think of a door. It swings on a small piece of hardware most of us never notice until it fails. Soil is the living world's hinge: food, water, carbon, and biodiversity all depend on that same thin, living skin.

A good hinge is easy to overlook. When it works well, the door swings freely, and nobody gives it a thought. When it stiffens, everything connected to it feels the strain. Healthy soil works the same way: it holds rain where it falls, nourishes the crops that feed us, stores more carbon than the atmosphere and all land plants combined, and shelters a vast community of life we can barely see. When soil is worn down, the effects show up everywhere at once—in thirstier fields, thinner harvests, muddier rivers, and a warming sky.

It's easy to underestimate how much we depend on soil. According to the UN Food and Agriculture Organization (FAO), an estimated 95 percent of our food is produced, directly or indirectly, in soil. Soils are also among the planet's largest carbon reservoirs and support more than a quarter of the world's biological diversity. They store and filter water, and cycle the nutrients on which every plant and every meal depends.

The damage is as extensive as our dependence. The FAO's 2025 World Soil Day assessment estimated that more than a third of the world's soils are degraded, with up to 30 billion tonnes of topsoil lost each year.

Scientists assess the planet's health using nine limits known as planetary boundaries. Each represents a natural system—such as the climate, ozone layer, or freshwater—that human activity is pushing toward a dangerous threshold. Soil is not currently included. A 2021 paper argues that it should be added as a tenth boundary because soil degradation meets the same criteria: it is driven by human activity and can pass a critical threshold, after which recovery is very slow without assistance. It is also closely connected to boundaries already crossed, including biosphere integrity, nutrient cycles, climate, and land-system change. The authors acknowledge that there is no agreed way to measure soil degradation yet, and suggest tracking changes in soil organic carbon. The case is still being made.

Whatever scientists decide, the choice in every field and garden remains the same. Every patch of soil faces two paths. Degradation means losing its living capacity—its carbon, its ability to retain water, and the life it supports. Regeneration is the opposite: rebuilding that capacity by nourishing and protecting the soil so it can restore itself.

That is what makes soil a hinge. A hinge doesn't determine which way a door swings; it lets the door swing either way. Soil connects the air above us
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Soil Health Principle #1: Keep soil covered

In nature, bare soil is an anomaly. Cover is critical to protect soil from wind and water erosion, provide food and habitat for macro- and microorganisms, buffer soil temperature, reduce evaporation, and make the most of scarce water resources. Grow living plants year-round or protect the soil by applying mulch or keeping plant residue on the ground.



Soil Health Principle #2: Minimize soil disturbance on cropland & minimize external inputs

Both physical and chemical disturbances can harm soil life; therefore, avoid synthetic fertilizers, herbicides, pesticides, and fungicides as much as possible. Alternatively, compost boosts soil health, promoting stronger plants and disease resilience while supporting soil microbes that feed directly on parasites. Tillage destroys soil structure, including aggregates and pore spaces that allow water to infiltrate the soil, leading to erosion.



Soil Health Principle #3: Maximize biodiversity

Diversity above ground is mirrored below. Each animal, plant, or insect plays a role in maintaining soil health. Together they provide a varied diet for soil microorganisms, break disease cycles, and create habitat for wildlife and pollinators. Nature does not know monocultures!



Soil Health Principle #4: Maintain living roots

Soil organisms cluster around roots, where they exchange nutrients with plants. Those living roots provide their basic food source: carbon. In turn, the soil microbiome fuels the plant nutrient cycle. To ensure roots in the ground year-round, plant perennials or multi-species cover crops, or encourage a variety of warm and cool season grasses.



Soil Health Principle #5: Integrate animals

A healthy ecosystem provides habitat for animals large and small. The grasslands of the arid Southwest once flourished under the impact of grazing and browsing animals. On the farm, ruminants graze cover crops, beneficial insects find food and shelter in hedgerows and pollinator strips, and earthworms thrive in healthy soil.



Soil Health Principle #6: Know your context

Every place has its unique history, strengths and vulnerabilities. Understanding the context of the land – including farm or ranch history, goals and objectives, desired profits, production system and markets – is central to being a good caretaker and will inform how best to apply the soil health principles.

For more information, visit: New Mexico Healthy Soil Working Group:
https://www.nmhealthysoil.org/

UGWA Membership Application

Your membership and additional financial support sustain UGWA and are critical to the organization's ongoing health. Share in the protection and conservation of our watershed and become an UGWA member today.

_____
Name(s)

_____
Address

_____
City State Zip

_____
Telephone

_____
E-Mail

Membership Categories—Annual Dues:

Chiricahua Leopard Frog	$ 20
Gila Trout	30
Mexican Gray Wolf	50
Beaver	100
River Otter	250
Yellow-billed Cuckoo	500
Other Amount	_____

Make your check payable to

UGWA

and send to

PO Box 1536, Silver City NM 88062

☐ I don't wish to join at this time but please notify me of upcoming events.

_____
Name

_____
E-Mail

UGWA's Statement of Philosophy

The members of the UGWA recognize a vital and necessary connection between our individual and collective rights and responsibilities as landowners and community members and the long-term stewardship of the Upper Gila River Valley and Watershed.

The members of the UGWA share a love and concern for our community which is an integral part of our lives and, therefore, seek to harmonize our presence and activities within the watershed for the health and integrity of the entire "community," which includes the soil, the air, the water, the people, the plants, and animals.

The members of the UGWA share the conviction that men and women work best together in a spirit of cooperation, conflict resolution, and consensual agreement that builds upon a common ground that benefits from the views and concerns of each individual acting as uncoerced free agents.

To realize our vision for the common benefit of the entire community served by the Upper Gila Watershed, and for the sake of future generations, the UGWA seeks ways and means to bring people and organizations together in constructive dialogue and activities aimed at clear communication, education, land restoration, research, and local economic health.

Soil as the Hinge

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with the living world that depends on it, and much of our climate and food production depends on how that connection works. When mistreated, soil loses carbon, water, and life. When restored, it can regain them. The FAO estimates that soil degradation has already released up to 78 gigatonnes of carbon into the atmosphere. In principle, much of that carbon can return to the ground.

Soil regeneration isn't a silver bullet: carbon outcomes vary widely depending on location, practice, and time. But unlike most planetary-scale problems, soil is something ordinary people can work on directly—whether in a garden, on a farm, or in a compost bin. Regeneration depends on biological mechanisms—roots, fungi, bacteria, and organic matter—that respond to care.

Which brings us home. Most of the Upper Gila's soil lies on public land and dates back a century or more—long before UGWA's projects, including the New Earth Project and our tamarisk removal work. We aim to teach the next generation about the importance of soil through our Healthy Soils Curriculum for 4th and 9th graders, while teaching 1st graders about gardening. Soil is something we shouldn't take for granted; otherwise, the soil hinge could swing shut on a living world.

Your contributions make a positive impact on the lives of young people, help protect our rivers and springs, support our native tree nursery, and safeguard the soil in our watershed. We appreciate your generosity!

So Many Ways to Donate

ONLINE: Do you prefer online payment instead of paper checks? We've got you covered! Simply go to our website at ugwa.org and click the Donate Button.

RECURRING: We'd love to see you again. And again. To become a Recurring Member, go to our website at ugwa.org, click the Donate Button and choose "Make this a monthly donation."

PROGRAM SPECIFIC: Do you have a favorite program you want to support? Include a note with your donation and we'll apply your donation to that program! Donating online? Let us know by an email to admin@ugwa.org.

thank you

Thank you to everyone who supported UGWA over the past several months. This list includes new members and renewing members, recurring members (monthly donations), volunteers and funders that provided support between April 5, 2026 and November 3, 2026. If we missed you, please let us know!

New Members

James York & Grace Williams • Sandra Haire • Lew Bremenstul • Katherine Navarrete • Cathy Owens Joe & Patricia Stone • Heather Frankland • Peter Rankaitis • Marla McDonald • Loren Gunderson • Susan Price Denise & Steve Blake • Anna Blomfield • Heidi Erstad • Corinne Reinhard • Alex de la Peña • Bruce Sheffer Zinnia Bessent • Adina Lehrman • Susan Thompson • Janey Katz & Suzi Calhoun

Recurring Members

Jene Moseley • Marc Nevas • Diane LaFrance • Andy Payne Karen Watson & Tom Weller • Andrea & Jon Walker • Donna Gianoulis

Returning Members

Cissy McAndrew • Lynda Aiman-Smith • Joseph & Marilyn Gendron • Marguerite Bellringer & Bill Schum Joyce Newman • Jeff Goin • Dennis Weller • Carol & Richard Martin • Joanie Connors • Loren Poole • Dave Becker Cindy Gagnon • Carrie Hinds & Nancy Kendrick • Sarah Johnson & Kevin Keith • Steven McGarity • Corinne Smith Carlene Roters & Frank Merritt • Ron Parry • Jackie & James Blurton • Paul & Aileen Walmsley Debbie & Armando Guerra • Ed & Beth Leuck • Michael Sheffer • Susan Coe Brown • Steve Chapman Sharman & Peter Russell • Rebecca Martin • Tris Germain & Marilyn Wright-Germain Athena & Two Crow Schumacher • Dianna Wynn • Linda Moore • Meriwether McClorey Carol Ann & Mike Fugagli • Jeff & Allison Boyd • Marcia Stout & Dale Housley • Ronald Groves Kathryn Haase & Jac Estes • Susan Slade • Hara & Scott Davis • Mary Barrett • Sue Ann Childers & Randy Harkins Betty Lawson • Bill Stites • Melissa Green Kathryn Kanely • Emanuel & Gail Stamler • Kate Dixon Nora & Andrew Fiedler • Jamie & Marion Newton • Don Benage • Linda Zatopek & George Farmer Nancy Brennan • Deb Preusch & Tom Barry • Scott Hennes • Robert Garrett • Eric Brown • Monica Rude Gail Langsner • John Lathrop • Marie & Alain Duvergé • Jeffrey Hager • Spike & Angela Flanders Susan & David Berry • Kathleen Wigley & Robert Pittman • Michael Scherer • Nena & Stephen Macdonald Bill Stites • Valerie McCaffrey • Meyoni Geouge • Susie Siedentop • Rich Bigelow & Mary Stoecker Starr Belsky • William Maunders

Volunteer Thank You!

Lisa Houston • Barb Stone • Zoe Wolf • Chris Jepson • Alexis Wolf • John Feree • Anna Marie Nachman • Dani Waian-Muniz

Funder Thank You!

Lineberry Foundation • Environmental Education Association • Whole Foods Market Foundation Protect New Mexico Public Lands • The KGM and RLM Fund • Rose Byersdorfer Memorial • La Rosa de Plata Community Foundation of Southern New Mexico • Gila Community Foundation United Way of Southwest New Mexico • New Mexico GRO Fund • U. S. Department of Agriculture Tides Foundation • Future Focused Education • Nusenda Credit Union New Mexico Environment Department: River Stewardship Program

Special Thanks

To Advocates for Snake Preservation for providing staff instruction and leaflets for the Children's Water Festival on how to help snakes.

To Zoe Wolfe, Susan Berry, Cedar Smith, Sharman Apt Russell, Mike & Carol Ann Fugagli and Rebecca Martin for their generous donations to our fundraising raffle at the 30th Anniversary Celebration.



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