RIGHT AS RAAIN

As a little-known hub for the practice of harvesting rainfall, Santa Fe is taking the lead in a new way to save the West's vanishing water.

by Marin Sardy



elissa McDonald and Nate Downey's backyard is a microcosm of the water-wise outdoor world they envision for Santa Fe: Stretching between their South Capitol Stamm-style home and the casita they use as the office for their landscape-design business (Santa Fe Permaculture), their water-politic utopia overflows with drought-resistant shrubs and native

wildflowers, all of which surround a covered lettuce patch. flagstone walkways, and a large shade tree with a swing for their two children. Yet the most dramatic—and dramatically water-conserving—feature of the yard is invisible. Buried beneath the carefully selected plants and heavily mulched earth, a 10,000-gallon cistern holds an entire winter's worth of rainfall and snowmelt under the family's feet, for use during the drier months of the growing season.

The husband-and-wife team are part of the reason Santa Fe has become a national hub for the water-harvesting movement This vision of a water-sustainable Santa Fe is one that, for 15 years, they and a growing cadre of local design and building professionals have been steadily working to create. Santa Fe Permaculture is just one of the more than 60 businesses based here, from systems designers to parts dealers, that offer services and products related to the practice. "We probably have more vendors for a city our size than anywhere except Hawaii," says local expert Doug Pushard, founder of the popular harvesth20.com website and owner of the residential watersystems design and installation business Harvest H₂O.

This growth is linked in no small part to an evolving series of state, county, and city regulations created in the last seven years to support and promote water harvesting. Most recently, the Santa Fe city council passed a new long-term water plan this past January. With Santa Fe's third hike in water fees in 12 years included in the package, there's more reason than ever for residents to follow in the professionals' footsteps and find feasible ways to both conserve and harvest the West's most precious resource. And given the abundance of know-how right here in town, it's easier to get started than you might think.

WHY HARVEST RAINWATER?

"I think anybody who is doing their share to take care of our watershed should make sure none of their rainwater leaves their property," says Claudia Borchert, water-resources project coordinator for the City of Santa Fe Water Division. The reasons break down like this: Santa Fe receives an average annual precipitation of 16 inches per year. Coming off a 1.000-square-foot roof, for instance, that amounts to some 9.000 gallons that, if not collected, would otherwise rush out of home drain spouts, across the pavement of neighborhood driveways and streets (picking up pollutants like tar and oil along the way), and into the Santa Fe River.



Properly funneled from its rooftop landing pad into a holding tank. however, the rain can instead replace city water to irrigate a lush yard and garden. If every Santa Fe household collected 9,000 gallons of precipitation each year, it would cut average annual residential use of city water by nearly 25 percent and save each household some \$100 to \$150 per year in water fees. As for safety, although the Environmental Protection Agency does not consider roof-harvested rainwater (which does pick up a few rooftop pollutants) to be clean enough for use as drinking water, it can be close to potable if properly filtered. In general, says Pushard, whose online water-harvesting forum gets some 200,000 hits per month, catchment water is very high quality.

Amazingly enough, rainwater harvesting wasn't even an option in this state until 2003, when the New Mexico Office of the State Engineer announced a new policy acknowledging landowners' rights to store and use rainwater falling on their property. Combined with the state legislature's passage, that spring, of a landmark bill allowing the use of graywater (including roof-collected water) for irrigation, this gave New Mexicans the green light. Then, as early as October 2003, Santa Fe County took the idea a step further by mandating rooftop rainwater collection for all new, heated structures within its jurisdiction, and actual cisterns for those larger than 2,500 square feet

The regulations required that each system capture at least 85 percent of rooftop drainage and reuse it for landscape irrigation, with the size of the holding tank based on roof size. The following year, the joint city-county Extraterritorial Zoning Authority extended these regulatory dimensions to apply to every structure within a two-mile ring around the city. But when a similar plan to mandate rainwater collection on new constructions within Santa Fe city limits reached the city council in 2004, it was struck down.

Yet despite consistent opposition within Santa Fe to most waterconservation and -harvesting measures, many have passed—including rebates for rain barrels and the newest set of hotly debated water-rate hikes. On January 28 of this year, the city council passed a set of regulations that, since taking effect March 1, increases water charges by 8.2 percent per year for a period of five years. The new rates, which slipped through a split council with the help of Mayor David Coss's tie-breaking vote, will (assuming constant per capita usage) bring the average Santa Fean's monthly residential water bill up from 2008's \$31.51 to \$46.72 in 2013—a total increase of nearly 50 percent.

The city's stated goal in once again increasing water fees is to raise funds for its share of costs in the in-process Buckman Direct Diversion Project Scheduled to be completed by 2011, the diversion, says Borchert, will pull a stable supply of water from the San Juan– Chama river system, reducing reliance on the too-small (and highly variable) Santa Fe River reservoirs as well as our underground aquifers. And as many point out, it will also encourage residents to use less water. "We are mining our groundwater at an unsustainable rate right now," says Borchert. "We are taking water out of storage—the water in our aquifers is from the last ice age. We want to use the surface water when it's there, and only pump the aquifers as a backup."

Left, from top: A garden designed by Santa Fe Permaculture, watered via drip-irrigation components linked to a rainwater-collection system; a collection box (containing a filter), downspout, and aboveground cistern, to funnel and hold rooftop precipitation. Borchert, who acts as the city's long-range water-supply planner, confirms that the rate hikes are part of a larger effort to create a sustainable water supply for the county—one that accounts for both our growing population and dwindling amounts of available wet stuff. For area residents, this means political, educational, and practical elements are coming together to create ideal circumstances for harvesting rain.

RAIN-COLLECTION SYSTEMS

Harvesting-system designer Doug Pushard's yard is typical of those in older Santa Fe neighborhoods: small, walled, divided into flagstone walkways and garden zones. And while his home system—which collects precipitation from his roof and feeds it into a buried, 5-by-17-foot 1,700-gallon cistern—is designed specifically for his property, it's not much more complex than a setup that could have been built a century ago. Talking me through his water's path from roof to root. Pushard points out that although his cistern has a pump (an active rather than passive system), he keeps his designs as simple as possible.

Catchment systems can and do get much more complicated than Pushard's, with computerized controls, rain sensors, and timers that integrate the harvesting and irrigation components. But homeowners can avoid overcomplicating things by thinking first about their specific needs. "The number-one cost item is your tank," says Pushard, "so if you can first conserve water, you can get a smaller tank." And small tanks are pretty affordable: A seven-foot-tall, 225-gallon. standing cistern with a spigot at the bottom (no pump) costs about \$400 and requires very little maintenance.

When it comes to those 50-to-60-gallon rain barrels that increasingly occupy the corners of local homes, however, opinions are mixed. While Pushard still recommends them as the least expensive way to get started. Downey argues that it's better to install more effective passive means or spring for a larger cistern that's easier to use. "People are finally realizing that rain barrels are just symbolic," he says. "Unless you're using a pump that comes on whenever there's water in there, a 50-gallon rain barrel will fill up and spill over 70 times in an average year from a 500-square-foot roof. And getting the water out of the bottom part of that barrel is backbreaking and messy." It can even be dangerous: Last year, an Eldorado woman drowned in her rain barrel while apparently trying to retrieve her cat.

Better alternatives to a full pump-driven cistern—called "passive" means because they rely on gravity to power the movement of water—can make a major impact at a fraction of the cost "I don't like to, but I talk a lot of people out of cisterns," says Downey from behind the desk in his office casita. "Because I just have to tell them up front what it's probably going to cost" (Installing a system comparable to Pushard's would run about \$5,000.) But he stresses, passive means can do more than just complement the work of a pump-driven cistern. Depending on the property, it can even be the cornerstone of a catchment system.

How? The answer, it turns out, is down in the dirt "It's about creating environments that make your soil more acceptable to holding water, and that's one of the hard things in this climate," says McDonald.

Right, from top: A Santa Fe garden with a walkway of permeable hardscaping, which allows rainfall to soak into the ground; an arroyo near Tesuque, after a storm. Previous spread, from left: a rainstorm over Santa Fe; a Santa Fe garden of native regional shrubs and wildflowers.





Native plants thrive in heavily mulched earth at a Santa Fe home.

"That's a huge thing that people often overlook." Most New Mexico soils don't have the same water-holding capacity of ideal forest loam, and simple additions like a pumice wick—a strategically buried pile of porous stones that absorbs and holds water within the soil for up to six weeks—can be so effective that they may render irrigation unnecessary. "We've gone back to a place that had a pumice wick and had been neglected for two or three years—nobody lived there and the plants were doing great," says McDonald. "With no irrigation, at the end of a drought I was anazed." (Check out *Harvesting How-To*, opposite, for more on collection-system options.)

HOW SANTA FE STACKS UP

Santa Fe isn't the first American city to begin to embrace rainwater harvesting on a community-wide scale; both Austin, Texas, and Portland, Oregon, actively support the practice through educational and incentive programs. And in October 2008, the city of Tucson passed the nation's first law to require rainwater collection on commercial properties. Meanwhile, Austin has been offering \$500 Globally, the U.S. isn't a front-runner either: In Australia and New Zealand, where the governments offer incentives for installing collection systems, 17 and 10 percent of households, respectively, practice rainwater harvesting. Many of the most convenient and attractive catchment-system products available in Santa Fe—from colorful, modular, aboveground cisterns to ornate copper rain chains—are imported from as far away as Down Under (or at least California).

But regionally, New Mexico is in many ways a leader in promoting the practice. Collecting rainfall for home use is still illegal in Washington, and Colorado is just this year beginning to allow harvesting by rural residents. In Utah, putting in a catchment system requires a state permit—but, says Pushard, "the odds of that occurring are none." And in other states where the practice is legal, water harvesting is still rare in many cities; in Phoenix and Las Vegas, for instance, local participation in city planning and conservation is less a part of the culture than in Santa Fe. Instead, says Pushard, "The preference is to do multibillion-dollar projects to drill for water somewhere else and bring it in, versus looking for simpler solutions."

For Santa Fe, these simpler solutions have so far been more about the conservation than the harvesting of water. In an effort to decrease water consumption, the city first raised the water rates in 1996. Early in the summer of that year, amid a multiyear sustained drought, the city council enacted an ordinance requiring all residential and commercial water users to reduce consumption by 25 percent of their previous year's use. By late September, the *Santa Fe New Mexican* reported that nearly a third of the city's water users had been slapped with surcharges for failing to comply. But even as the city struggled with contested cases and angry residents, the plan was working: By August 1996, the number of users who consumed between 12,500 and 25,000 gallons of water had been more than halved from the year before, down from 20 percent to just 7,5 percent.

Within a decade, Santa Fe was emerging as one of the most waterwise cities in the West According to the city's water-conservation manager, Daniel Ranson, residents served by the Sangre De Cristo Water Division reduced their water use by 40 percent between 1995 and 2007. Although he's tight-lipped about the question of whether our water supply is sustainable, Ransom is more open about the bigger picture of our desert environment "Sometimes what we say in the Southwest is that when it's raining, we're out of drought; when it stops raining, it's a drought," he says. "But when you only get a dozen inches of rain per year, and a significant portion of that is during the winter, we're pretty much always in a drought."

Getting residents to reduce indoor use by investing in frontload washing machines, hot-water circulators, low-flow faucets, and especially low-flow toilets, says Borchert, has had a huge impact. Outdoors, a panoply of restrictions, including outright bans on everything from hosing down driveways to installing lawns with more than 25 percent Kentucky bluegrass, has not only reduced lawn and garden water use but has also helped push residents to

HARVESTING HOW-TO

If you balk at the idea of relying on unfamiliar systems for sustainable home water use, tune in to two secrets local experts know: It doesn't have to cost a fortune, and it doesn't mean you have to give up having a gorgeous garden. The key, says Melissa McDonald, of Santa Fe Permaculture, is tailoring your system to the needs of your life and land.

ACTIVE There are five basic steps to active rainwater harvestingcollection, conveyance, storage, pumping, and filtration.

Collection: A metal roof is ideal, but a tar-and-gravel roof works fine. For either type, have components in place to divert the first few (dirty) gallons of rainfall away from the tank.

2 Conveyance, via downspouts leading from the roof to the ground: In the case of HarvestH₂O principal Doug Pushard's home setup, artistic metal rain chains direct water through large copper pots (or less expensive glazed clay pots, available at Jackalope). "Most people think they have to be ugly," Pushard says. "They don't have to be ugly."

3 Storage, either below ground or above: Aboveground tanks are typically smaller, don't always require a pump, and are simpler to install than a buried tank. "The nice thing about tanks nowadays is you can paint them the same color as your house. When I started 10 years ago, it was pretty boring stuff, but now..." Pushard shows me a photograph of stylish rectangular cisterns in red, lime green, and cyan. Burying a cistern, often preferable for large systems, requires renting a backhoe or hiring someone to install it. But Pushard and Santa Fe Permaculture's Nate Downey say burial makes maintenance easier in this climate, with its freeze-and-thaw cycles. Pushard accesses his cistern by lifting a flagstone notched with handholds, beneath which he opens a manhole, revealing a buried tank full with the bounty of winter's storms.

4 & 5 Pumping and filtration: To pump water out, hook your tank directly to the irrigation system via an electric pump. To keep it clean, install filters both on the pump and in the collection box.

PASSIVE If a full-size cistern isn't feasible for your budget or lifestyle, says McDonald, passive rainwater catchment offers more options than homeowners might think. Replacing pavement with permeable hardscaping, like gravel, allows storm water to soak in rather than slip away. Landscape features, including buried porous stones (pumice wicks) and narrow ditch-like contours (swales), absorb, hold, and deliver runoff through the soil toward plants. Irrigation-system components, from deep pipes to gator bags, direct and keep water where roots can reach it.

But Downey and McDonald insist that one of the most effective tools for creating a thriving yet water-wise Santa Fe garden is also one of the simplest: mulch. The easy, low-cost addition of mulch conserves water by dramatically reducing evaporative loss. "When we teach classes," says Downey, "when people are getting a little overwhelmed and see there's a lot more information coming, I say, 'If you leave this class having only learned one thing, just remember: Use the mulch.""

Selecting plants that are not only appropriate to our high-desert climate but are also well suited to the microclimates of your yard isn't a form of water harvesting—but it *is* key. Native wildflowers and shrubs, such as yarrow and agastache, as well as ornamental grasses, grow best here. Typically colorful and dramatically textured, they don't make for a dull yardscape, either. And while gardening in this region requires sacrificing some eastern ornamentals, certain varieties of roses and lawns that thrive in this climate can replace old favorites.

Local gardens that use water efficiently can even sustain some water-hungry plants, such as edibles. "All these things combine," says Maggie Lee, of Terra Flora Garden Design. "Harvesting and organizing water and land contouring, along with restoring the soil and grouping plants compatible in moisture needs, are all important. You have to work with what will thrive. That's where it's important to study the nature around us to see what does well, and expand from that."

Below, from left: The cistern at Santa Fe Children's Museum; a copper conveyance from rainchains.com; at Doug Pushard's home, a rain chain transfers rooftop rainfall to an underground cistern.



"RIGHT AS RAIN" CONTINUED FROM PAGE 80 Railyard, says he'd like to see the city put specific installation guidelines into its permit code. "There's actually a small industry," he says, "in fixing screwed-up systems." But he adds, "I have no complaints about what's gone down so far. It's not a linear, always-gettingbetter thing, but it's a good process."

Still, while the benefits of harvesting rainwater are many, the practice isn't without its doubters, even within Santa Fe's own water-conservation offices. Borchert points out that as soon as you pull water from any single source, you're depriving another wouldbe recipient downstream. If the source is one of this region's aquifers, that's the Rio Grande. In terms of the rain, there's very little evidence to show who may or may not lose out (existing data suggest that collecting rainwater has only a minor impact on downstream flow) Similar concerns have been expressed by state engineers in Colorado, where a grassroots push to allow rainwater harvesting clashes with a water-claims system that's more than a century old. The practice can also create users with sporadic water needs, complicating water-services planning efforts. "My concern personally," explains Borchert, "is that if people don't build a cistern that's large enough, or if it doesn't rain, we still have to figure out how to supply them in times of drought. It's trickier from a policy perspective."

Pushard laughs off the skepticism. "It's like they believe the water's disappearing from the watershed," he says, citing a Colorado study that found that, in dry conditions, only about three percent of rainfall makes it to streams (that goes up to about 15 percent in wet conditions). He also sees another motive for opposing rain catchment: It would reduce the demand for water provided by for-profit utility companies, cutting into their bottom lines. Yet the changes on the horizon, both here and in Colorado, come as no surprise to Pushard and Jennings. The inevitable necessity of the practice, they believe, boils down to simple math. "Conservation is only using less of what you've got," says Jennings. "Rainwater harvesting is gaining more." Pushard puts it even more succinctly: "Time is on our side," he says, "because it's hard to fight logic over time." Sf



