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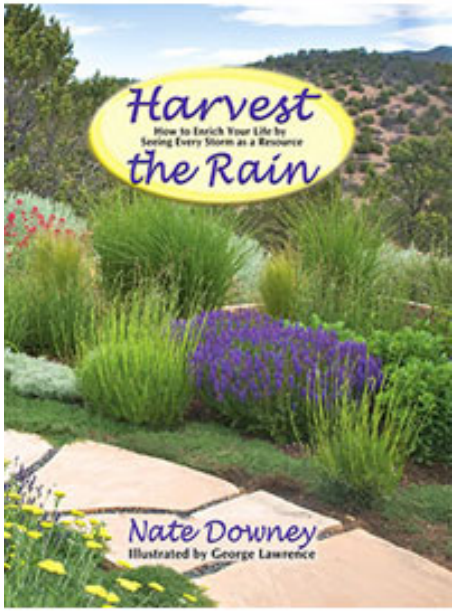
Water Harvesting is Poised to Invigorate the Job Market and Save the World

By Nate Downey, Founder, Santa Fe Permaculture and Author, "Harvest the Rain"

As news broke of an oil pipeline leak above the Yellowstone River, the 6,000 residents—and myriad species—of nearby Glendive, Montana were wondering how long their water would remain deadly. From my stormwater conference hotel room, all I could do was share the nightmare online, drink

some tap water, and close my eyes.



At dawn, I jumped out of bed. Intending to put some finishing tweaks on my presentation, I found myself staring through a thin, Houston fog. Just beyond a five-story garage and the already busy interstate, strange images were appearing through my wall-to-wall, floor-to-ceiling window.

Looking west, I could distinguish the dwindling rivers, disappearing reservoirs, and declining aquifers of Texas. I saw the desiccated acequias of New Mexico, the burning forests raging through Arizona, and the parched weed plantations covering Colorado. Snowless ski resorts scarred Utah. Empty swimming pools dotted Nevada. California? The Sierras were golden brown, like so many farms, lawns, and golf courses below.

Pivoting south, much of the Gulf Coast was heavily peppered with overdevelopment, wetlands abuse, and increasingly briny aquifers. Worse yet, the salty prospect of desalination—its enormous wastes, real dangers, and huge costs—loomed on the not-so-deep horizon, clenching and flinching like a drowning animal.

Moving east, I pictured pallets of bottled water trucked

to Charleston. Thanks to a Freedom Industries chemical spill last year, 300,000 West Virginians were prohibited from using their taps for five days. Meanwhile, just up I-75, the mayor of Toledo was comparing last summer's Lake Erie algae bloom to the events of 9/11. (If half a million of *your* constituents suddenly went waterless for three days, you'd understand.)

Facing north, I imagined the ever-shrinking Ogallala Aquifer. The largest water source for America's breadbasket is slated as a possible continental crossing point for the Keystone-XL pipeline. Ironically, one pipe scheme would send tar sands across the fabled Yellowstone, just upstream from Glendive.

Fortunately, before my nightmare spread to the rest of the world, my copy of Aldo Leopold's *A Sand County Almanac* caught my eye, prompting calmer thoughts. Leopold, who died in 1948, a year before his almanac was published, realized that the trick to saving humanity from itself would revolve around an ethical "harmony," a balance between economics and ecology. Ultimately, he said, our ethics should evolve to a point where "land" (soil, water, mycelium, bugs, plants, animals, and everything in between) gets a right to exist and to freely pursue a healthy and contented stability.

It's the same trick today, but we have come a long way in bridging the gap between the monetary "value of a thing," and the "things we value," cherish, or love. During the last 10 to 15 years, the transformations

toward solar and wind energy, hybrid-engine technology, organic and local food, green infrastructure, new urbanism, and socially responsible investing are proof of Leopold's concept: Harmony between economic and ecological forces can happen, and it can be powerful.

As a veteran permaculture landscape designer and longtime water-harvesting professional, my work has allowed me to witness the growth of the water harvesting industry over the last two decades. Given the aforementioned water stresses, the industry seems poised to be the next great harmonizer of the same eco-versus-eco dialectic. Ecological and economic benefits abound almost as soon as we pick up a shovel, see our roof as a resource, or consider an ethical landscape design.

Water harvesting is the act of collecting and using water, especially precipitation, before it becomes part of a surface water system (in rivers, reservoirs, etc.) or groundwater system (in aquifers). However, other often-neglected types of water, such as wastewater and condensation, also become part of a water harvester's playbook.

Water harvesting is referred to with words like "capture," "catchment," "collection," and "storage." These are often associated with "precipitation," "roof water," "runoff," "rain," "rainwater," "sheet flow," and "stormwater," as well as most hybridizations of the above.

Storage systems come in four forms: Passive, Active, Wastewater-focused, and Community-oriented.

Passive systems store water in the soil where plant material can easily access it. Rain gardens, wicks, key lines, French drains, dry wells, sheet mulch, check dams, and sophisticated land contouring are examples. Investment costs are relatively low compared to active systems, but harvesting is less precise in time and space.

Active systems store water in cisterns for later use. They are considered active because a pump with moving parts is typically involved. Significant upfront costs are often associated with active systems, but the harvested water can be automatically directed toward any usage imaginable.

Wastewater systems recycle greywater (everything but the kitchen sink, the dishwater, and the toilet) and black water (all forms of sewage). Often neglected and feared, wastewater can be harvested in passive and active systems depending on the needs and desires of the land and its human inhabitants.

Community water harvesting includes teaching, investing, political organizing, public tree-planting projects, community gardening, lobbying efforts, marketing campaigns, and any other form of spreading information about the importance of harvesting precipitation.

Harvested water can be treated to meet any standard. It can be used to grow food and other crops, to create shade and wind protection, and to offer beauty and biodiversity to the world. It is also critical to understand that harvesting upstream precipitation is also good for people downstream who otherwise get inundated by stormwater runoff caused by conventional forms of human development.

Water harvesting represents a perfect storm of economic activity by which a vital and often scarce resource is conveniently tapped. However, this mostly neglected water supply is more than a fleeting tempest capable of merely lubricating or stimulating a market. It's an economic engine made up of six powerful pistons:

- **Tangible assets.** Although taken for granted, water is the most valuable of tangible assets. It makes life possible and is required for commerce.

• **Value-added products / innovation.** Modern economies need more than assets. Dollars are made when value is added to assets. When rain is easily stored, value is added, and wealth is created. A close cousin of the value-added-products concept, innovation is also a revenue generator. This is clear at the American Rainwater Catchment Systems Association's annual conference and expo. As improvements in the collection, conveyance, filtration, storage, and distribution of precipitation are unveiled, marketed, and sold, money is made.

• **Cost-savings.** Cost savings can be realized on private property whenever community water lines are distant and well drilling is difficult. In community-watershed settings, rain capture has the potential to significantly reduce sediment levels in stormwater. This decreases the need for reservoir dredging, treatment, and other costs of providing water.

• **Increased property values.** Wherever water resources are limited, properties with rain catchment increase the value of real estate. On a regional scale, communities that invest in water harvesting will attract outside investment, generate tourism, and increase a community's desirability in the real-estate market, while shade trees and biodiversity return to public spaces. Less sediment also means less soil erosion. This elevates agricultural productivity, improves wildlife habitat, and reduces upkeep expenditures.

• **Resiliency.** Water harvesting can make households, businesses, and communities safer and healthier during and after natural disasters. This resiliency points to greater economic and social sustainability in the short and long term.

• **Diversification.** By diversifying a home or community water-

portfolio—much like diversifying an investment portfolio—a significant return on investment can be expected, while the likelihood of an unstable situation decreases.

The true economic strength of water harvesting, however, comes from the fact that it has the potential to create large numbers of new jobs in a wide variety of ways. Given the sheer number of roofs and roads without water harvesting systems, a rainwater revolution would not only help in terms of the sheer numbers of projects begun, but also by the fact that these jobs are local, permanent, and have a multiplier effect on other local employment sectors.

Let's first look at water harvesting's relationship to manufacturing. Due to the costs of transportation of large water tanks, it is hard to think of any product that is any harder to make more inexpensively overseas. Although certain types of cisterns can be economically imported, it is often cost prohibitive to move large, heavy, empty containers over long distances. The sheer size of a water tank creates a need for nearby fabrication.

On the design and installation side of every project, employment associated with the construction of roof water harvesting is even less easily outsourced. An installer's job, by definition, is a local job. Plus, rain capture, like construction, supports employees of local hardware stores, garden centers, lumberyards, and take-out-food joints.

Precipitation collection systems also generate a long-term career creation multiplier. Who will take care of the landscapes that grow because additional water is available? Who will maintain the systems themselves? Who will invent, inspect, finance, insure, market, and test these systems? Who will sell the additional real estate that has increased in value because of the precipitation redistribution revolution? The revolution may

not be televised in the traditional sense, but crews will need to be paid to take and direct the professional documentary footage, to mix the sound, and to produce and promote the next pivotal videos of our time.

Moreover, the entire land development industry is currently being transformed by a wide variety of technologies from drones and robotics to ever-improving LIDAR, GIS, and GPS systems. This not only allows for water harvesters to get a jumpstart during a time of increased efficiencies, but it also allows for more interface between clean tech jobs and ecological projects in the real world.

These mostly green collar jobs represent skilled and worthy long-term career options as well as an endless array of potential entrepreneurial enterprises. The six pistons, above, support this job market with their ability to create assets and grow wealth out of substances, stormwater and wastewater, that are typically considered to be pollutants.

Leopold knew that the land ethic he was proposing was in an embryonic stage. People like you and me would come after him and take his thoughts and actions (as a scientist, teacher, ranger, farmer, rancher, hunter, and family man) and improve them. Water harvesting does this and does it more efficiently and productively than most other pursuits.

Article by Nate Downey, who is—by night—the author of *Harvest the Rain: How to Enrich Your Life by Seeing Every Storm as a Resource* (Sunstone Press 2010) and has written a column called “Permaculture in Practice” for the *Santa Fe New Mexican* since 1998. By day—the former chairman of the board of the Permaculture Credit Union—is the founder, president, and lead designer at Santa Fe Permaculture, Inc. and PermaDesign, Inc. Look for his work featured in *Sunset Magazine, Su Casa, The Santa Fean, Haciendas, Trends, New Mexico Magazine*, and at www.permadesign.com

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