2% SOLUTIONS FOR HUNGER, THIRST AND CO_2

by Courtney White

- 2% increase in soil carbon, produced by only
- 2% of a nation's population, for only
- 2% of a nation's Gross Domestic Product

CAN MAKE ALL THE DIFFERENCE IN THE WORLD

These case studies highlight practices that soak up CO_2 in soils, reduce energy use, sustainably intensify food production and increase water quality.

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Thinking Like a Creek

During my travels, I heard a story about a man who had put short fences across a cattle trail in the sandy bottom of a canyon in Navajo country. This forced the cattle to meander in an S-pattern as they walked, encouraging stormwater to meander too and thus slowing erosion. I thought this idea was wonderfully heretical. That's because the standard solution for degraded creeks is to spend a bunch of money on cement, riprap and diesel-driven machines. Putting fences in the way of cattle and letting them do the work? How cool.

The man was Bill Zeedyk, a retired biologist with the U.S. Forest Service reincarnated as a riparian restoration specialist. Was the story true? I asked him. It was, he assured me. Recognizing that water running down a straight trail will cut a deeper and deeper incision in soft soil with each storm, Bill talked the local Navajo ranchers into placing fences at intervals along the trail so that the cows would be forced to create a meander pattern in the soil precisely where he thought nature would do so in their absence. Water likes to meander, which is nature's way of dissipating energy, and it will gravitate toward doing so even when it's temporarily trapped in a cattle-caused rut (or human-caused hiking trail). Bill's fence idea was a way to move the process along.

What happened after the fences were put in? The water table came up as vegetation grew back, replied Bill, because the water was now traveling more slowly and had a chance to percolate into the ground, rather than run off as it had before. Eroded banks began to revegetate as the water table rose, and more water appeared in the bottom of the canyon, which encouraged riparian plant growth.

"Nature did all the heavy lifting," Bill said. Then he added, with a warm, knowing smile. "It worked great, until someone stole the fences."

Over the years, Bill has developed a very effective set of low-cost techniques that reduce erosion, return degraded riparian areas to a properly functioning condition and restore wet meadows. This is important because a big part of the West exists in an eroded condition, generally the result of historically poor land management. This point was brought home to me in force one day when I walked under a barbed wire fence that stretched across a gully on a New Mexico ranch. The fence was five feet above my head. The rancher told me that the fence was built in 1937 and the fence posts originally rested on the ground!

These fence posts rested on the ground in 1937. © Courtney White

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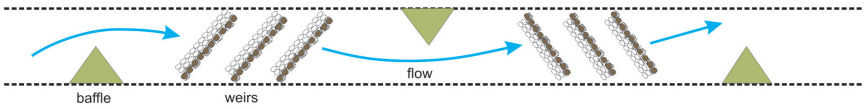
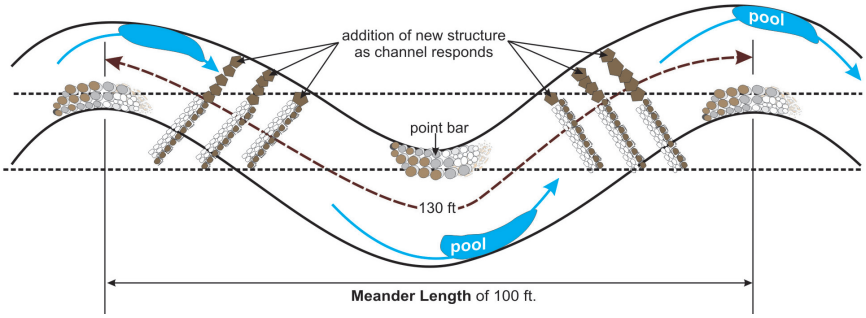
Before: Incised channel with a **Bankfull Width** of 10 ft., a **Channel Length** of 100 ft., and a **Sinuosity** of 1.0.



After: Meandering channel with a **Bankfull Width** of 13 ft., a **Channel Length** of 130 ft., and **Sinuosity** of 1.3.



Graphic representation of the Induced Meandering Process. Schematic dimensions exaggerated (Zeedyk and Clothier 2009).

To repair this kind of damage, Bill has put together a toolbox designed to "heal nature with nature." It includes:

- One rock dams/weirs, grade-control structures composed of wooden pickets or rocks that are literally one-rock high and simulate a "riffle" effect in creeks.
- Baffles/deflectors, wedge-shaped structures that steer water flow.
- Vanes, a row of posts that project upstream to deflect water away from eroding banks.
- Headcut control structures/rock bowls, to slow or stop the relentless march of erosion up a creek and trap water so that vegetation can grow.
- Worm ditches, to redirect water away from headcuts in wet meadows.

The goal of these structures is to stop downcutting in creeks, often by "inducing" an incised stream to return to a dynamically stable channel through the power of small flood events. Bill calls this "Induced Meandering." When a creek loses its riparian vegetation—grasses, sedges, rushes, willows and other water-loving plants—it tends to straighten out and cut downward because the speed of water is now greater, causing the scouring power of sediment to increase. Over time, this downcutting results in the creek becoming entrenched below its original floodplain, which causes all sorts of ecological havoc, including a drop in the water table. Eventually the creek will create a new floodplain at this lower level by remeandering itself, but that's a process that often takes decades. Bill's idea is to goose the process along by forcing the creek to remeander itself as the result of his carefully calculated and emplaced vanes, baffles and riffle weirs. Once water begins to slow down, guess what begins to grow? Willows, sedges and rushes!

"My aim is to armor eroded streambanks the old fashioned way," said Bill, "with green, growing plants, not with cement and rock gabions."

The employment of one rock dams typifies Bill's naturalistic approach. The conventional response of landowners to eroded and downcut streams and arroyos has been to build check dams in the middle of the water course. The old idea was to trap sediment behind a dam, which would give vegetation a place to take root as moisture is captured and stored. The trouble is, check dams work against nature's long-term plans.

"All check dams, big or small, are doomed to fail," said Bill. "That's because nature has a lot more time than we do. As water does its work, especially during floods, the dam will undercut and eventually collapse, sending all that sediment downstream and making things worse than if you did nothing at all."

"The trick is to think like a creek," he continued. "As someone once told me long ago, creeks don't like to be lakes, even tiny ones. Over time, they'll be creeks again."

Bill's one rock dams don't collapse because they are only one rock high. Instead, they slow water down, capture sediment, store a bit of moisture and give vegetation a place to take root. It just takes a little more time to see the effect.

"As a species, we humans want immediate results. But nature often has the last word," said Bill. "It took 150 years to get the land into this condition; it's going to take at least as long to get it repaired." The key is to learn how to read the landscape—to become literate in the language of ecological health.

"All ecological change is a matter of process. I try to learn the process and let nature do the work," said Bill, "but you've got to understand the process. If you don't, you can't fix the problem."

Over 15 years and across a dozen states, Bill has implemented hundreds of restoration projects, healing miles of riparian areas—all by thinking like a creek!

Bill Zeedyk.