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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Leave It to Beavers

Of all the good things beavers do, the least appreciated may be their role as wetland carbon engineers.

Thanks to a high density of plant matter and a low rate of decomposition, wetlands are the world's best ecosystems for capturing and storing the carbon from CO_2. Their destruction, on the other hand, releases lots of CO_2 into the atmosphere as their soils dry out and oxidize. Moreover, at least one-third of the world's wetlands are composed of peat, a type of soil created by dead or dying plants that are permanently water-bound. Peatlands, which include bogs and fens, contain 30 percent of global terrestrial carbon but cover only three percent of the earth's land surface (eight percent in the U.S.)—which is a lot of carbon bang for the buck.

Alas, of the approximately 200 million acres of wetlands that existed in the U.S. during the 1600s, more than half has been destroyed, mostly by draining and conversion to farming or commercial and residential development. Although the rate of destruction has slowed considerably in recent years, thanks to our understanding of the critical role wetlands play in ecosystem health, roughly 60,000 acres are still lost every year.

Which is where our friend the beaver comes in.

Beaver, *Castor canadensis.* @ Shutterstock.com

Beaver dams create wetlands by trapping sediment and slowing down water (one hydrologist calls beaver dams "speed bumps" in a creek). By one estimate, as much as one meter of sediment per year is caught behind beaver dams, and some sites can be occupied as long as fifty years. Many dams are large as well, often stretching 1,500 feet. In 2010, researchers in northern Alberta, Canada discovered the world's biggest beaver dam, which at nearly 2,800 feet is twice the length of Hoover Dam!

Biologists have long considered beaver to be a keystone species, estimating that 85 percent of all wildlife in the American West at some point in their lives rely on the ponds and riparian habitat that beavers create. For example, beaver ponds are important nurseries for fish, including many rare and endangered species. And it's not just wildlife that benefit from our industrious friends. According to the EPA, beaver ponds allow wetland microorganisms to detoxify pesticides and other pollutants, producing cleaner drinking water for people and reducing the cost of treatments downstream.

Conversely, when beavers are killed or trapped for removal and their dams fall apart, a cascading series of unhappy changes occur, including decreased riparian stability, lowered water tables, higher and more frequent flooding, reduced

QUIVIRA COALITION

1413 Second Street, Suite 1
Santa Fe, NM 87505
phone **505.820.2544** fax **505.955.8922**
email **admin@quiviracoalition.org** web **www.quiviracoalition.org**

wetland acreage, degraded habitat for wildlife, diminished water quality and less resilience to the effects of drought—not to mention all the carbon that is released back into the atmosphere.

And we've trapped a lot of beavers over the years.

Before the arrival of Europeans, it's estimated that 100 to 400 million beavers existed in North America, or roughly 10 to 50 beavers per mile of stream. Today, only 6 to12 million beavers remain in their original habitat, which once extended from the Arctic to northern Mexico. Researchers directly link the removal of so many beavers to the widespread degradation of watersheds that we see today, which is why many consider the beaver's near annihilation to be this nation's greatest environmental disaster. Fortunately, it's a mistake that we can correct and we are beginning to do so.

The beaver is the largest rodent in North America. It weighs 40 to 50 pounds and has a scaly, paddle-shaped tail and four buck teeth, two on top, two on bottom. These incisors never stop growing, which means that beavers need to keep them filed down by gnawing on trees and other woody objects. Beavers have webbed feet, dexterous hands and transparent lids that cover their eyes when they swim. They also have a slick coat of fur and guard hair that enables them to live in a wide variety of ecosystems, a characteristic that unfortunately made for high-quality hats as well.

Beavers' tree-cutting, dam-building ways haven't endeared them to landowners, however, especially ones who fail to see the ecological benefits of their busy work. Fortunately, this "varmint" attitude among rural residents has been changing in recent years, as landowners begin to understand that beaver dams keep water on their land longer. In a drought, this extra water is much appreciated!

Which brings up another reason to put these wetland carbon engineers back to work: *adaptation*.

In an era of climate change, which includes greater variability in weather extremes, beavers and their dams increase the land's ecological resilience to unanticipated changes. Here's a list of resilient attributes, borrowed from the *Seventh-Generation Institute*, a nonprofit that works to restore beavers to their rightful role. A beaver dam:

- Slows snowmelt runoff, which extends summertime stream flows and restores perennial flows to some streams.
- Slows flood events, which could otherwise incise stream channels.
- Contributes to the establishment of deep rooted sedges, rushes and native hydric grasses, which buffer banks against erosion during high flows and provide shade to creeks and streams, reducing water temperature.
- Elevates the water table, which can sub-irrigate nearby land (including farmland).
- Increases the amount of open canopy in forested areas.
- Creates conditions favorable to wildlife that depend upon ponds, pond edges, dead trees or other habitats in streams not modified by beaver.
- Increases the mass of insects emerging from the water surface.
- Creates favorable conditions for the growth of bank-stabilizing trees and shrubs, including willow and alder.
- Greatly increases the amount of organic carbon, nitrogen and other nutrients in the stream channel.
- Ameliorates stream acidity.
- Increases the ecosystem's resistance to perturbation.

In a world awash with high-tech ideas for solving our food, energy and climate challenges, we sometimes forget that nature has the best solutions—merely field tested for millennia! Our friend the beaver is a case in point. Toss in the job of carbon sequestration and the picture gets even better.

To top it off—beavers do their carbon engineering for free!

As we enter a period of longer droughts, bigger floods and rising demands for increased water quality and quantity, competition among water users will only increase. Here's one simple answer: get beavers back to work.

Beaver dam. @ Shutterstock.com

For more info see: Beaver as a Climate Change Adaptation Tool: Concepts and Priority Sites in New Mexico at *www.seventh-generation.org/Publications.html*

For additional *2% Solutions* and more of Courtney's writing: *www.awestthatworks.com*