

Groundbreaking study finds a natural way to fight climate change

Story by Doyle Rice, USA TODAY

Forget [groundhogs and their weather predictions](#). Now, fellow critters – beavers – are actually doing their part to [combat climate change](#), one dam at a time, a [new study](#) says.

The new research, published on March 18 in the journal [Communications Earth & Environment](#), has, for the first time, calculated the carbon dioxide emitted and sequestered due to engineering work by beavers in suitable wetland areas.

"Our findings show that beavers don't just change landscapes: they fundamentally shift how carbon dioxide moves through them," said study lead author [Joshua Larsen, of the University of Birmingham](#) in the United Kingdom, in a statement.

By slowing water, trapping sediments, and expanding wetlands, the beavers turn streams into powerful carbon "sinks," which are a key part of the planet's carbon cycle. Carbon dioxide is the greenhouse gas most responsible for human-caused global warming.



Two North American beavers check out a man-made beaver dam in the new beaver enclosure at the Smithsonian National Zoo August 29, 2012, in Washington, D.C. Wild beavers in Europe were part of a recent experiment to see how much carbon dioxide the animals could contain.© Allison Shelley, Getty Images

This first-of-its-kind study represents an important opportunity and breakthrough for future nature-based climate solutions across Europe, Larsen said.

What is a carbon sink, and why are they important?

A carbon sink is any system that stores more carbon than it releases, according to study coauthor Lukas Hallberg of the University of Birmingham. "So instead of carbon going into the atmosphere, it gets locked away in soils, sediments, or vegetation."

"That matters because gases like carbon dioxide and methane drive climate warming. If we can store carbon in landscapes for long periods, it reduces how much ends up in the atmosphere. So carbon sinks act as a kind of natural buffer against climate change," Hallberg said in an email to USA TODAY.

Where was the study conducted?

Led by several European universities and numerous international partners, the study was conducted in a stream corridor in northern Switzerland, which has seen more than a decade of beaver activity.

Beavers are 'powerful agents of carbon capture and adsorption'

"Our research shows that beavers are powerful agents of carbon capture and adsorption," said study coauthor [Annegret Larsen, assistant professor in the soil geography and landscape group at Wageningen University](#) in the Netherlands. "By reshaping waterways and creating rich wetland habitats, beavers physically change how carbon is stored across landscapes."

When scaled across all floodplain areas suitable for beaver recolonization in Switzerland, researchers estimate that beaver wetlands could offset 1.2% to 1.8% of the nation's annual carbon emissions: delivering climate benefits without active human intervention or financial cost, according to a [statement from the University of Birmingham](#).

How were beavers chosen as a species to study?

"Beavers are a unique wildlife species that, like no other animal, have the capacity to reshape entire river valleys, in terms of hydrology and ecology," Hallberg told USA TODAY.

Overall, according to the study, beavers are increasingly returning to rivers and other natural landscapes across Europe, following decades of collaborative conservation efforts.

"Their prolific damming activities are in many cases providing similar ecosystem benefits as we humans try with our engineering approaches (creating wetlands, floodplains, etc)," Hallberg said.

"The ongoing resurgence of beavers, especially in Europe, presents us with an opportunity to further assess how and where these environmental benefits can be realized or not, and to provide further decision-support for wildlife management."

Were the researchers surprised by the findings?

"Yes, we were very surprised," Hallberg said. He said that at the annual scale, "we knew the system might vary in being a source vs sink of carbon, but we did not appreciate the degree to which the water flow and extent controlled this, with wetter conditions making it more of a sink and drier more of a potential source."

"In terms of the long-term carbon storage, we were very surprised about the scale of this," he said. "We went to so much effort to make sure we could get as good as estimate as possible and wouldn't risk overstating the amount."

Are there other examples of wildlife helping combat climate change?

Most natural carbon storage is driven by plants, so forests, peatlands and wetlands all store carbon because of plant growth and the build-up of organic material. In some cases, organisms like peat-forming moss actually build entire landscapes that store carbon over long timescales, Hallberg said.

"What makes beavers unusual is that, as an animal, they actively reshape the landscape in a similar way. By building dams, they create wetlands that trap and store carbon," he said.

"So they're a rare example of wildlife directly engineering new carbon storage, rather than just being part of the system," he concluded.

In an email to USA TODAY, study coauthor Larsen provided additional perspective, noting that "ecosystem engineers (like beavers) are key to maintaining well-functioning ecosystems, thereby enhancing environmental resilience and supporting climate change mitigation.

"The beaver is a prominent example, but others exist. For instance, caddisfly larvae stabilize riverbeds, earthworms are essential for soil fertility, and burrowing animals enhance soil infiltration. The range of such ecosystem engineers is extensive."

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