Beavers Open Savings Accounts

Wetlands, especially Peatlands, Store Carbon Best

If you canoe or kayak often, you've probably paddled by boggy areas with carnivorous pitcher plants — and signs of beaver nearby. Beaver dams on streams adjacent to boggy peatlands can help keep them water-logged, and safeguard the enormous amount of carbon stored there. Wetlands, and especially peatlands, are rated as the world's best ecosystems for capturing and storing carbon dioxide. This is especially crucial during the on-going climate crisis because destroying wetlands adds carbon dioxide, the major greenhouse gas, to the atmosphere.

At least a third of the world's wetlands are peatlands, characterized by the presence of peat (Sphagnum) moss and the accumulation of "peat" from dead and dying plants that are permanently water-logged. Although peatlands contain about 30% of global terrestrial carbon, they cover only 3% of the earth's land. Peatland cover in the U.S. is relatively high at 5 to 10%.

Swamp gas (methane) breaks down, or is oxidized, but carbon dioxide does not degrade.

Both the more common bogs and mineral-rich fens are types of peatlands that may benefit from beaver activity. Bogs and fens are often found intermingled with other wetlands. Over a million acres of wooded peatlands in Russia were drained in order to harvest timber. Luckily, after the lumberjacks left, beavers came in and dammed their drainage canals to help restore the ecology.

Even today, many peatlands are still not recognized, but are instead classified as forests, meadows or marshes. For example, New York state has over 51,000 acres of tidal wetlands that are classified as "vegetated marshes," extending all the way up the Hudson River to Troy, N.Y. These are actually peatlands, but most states are still mapping wetlands in general and have not yet begun to map peatlands.

When comparing estimates of the total organic carbon in live plants and soils of the world's land-based biomes (see the bottom chart on page 5) peatlands have the most. In terms of carbon density (see the middle chart), again peatlands is the clear winner.

In addition, the more general wetlands category beats both temperate and boreal forests with only tropical forests having more carbon. Why then are northern forests so often touted for pulling carbon out of the atmosphere and storing it (trees are called "carbon storage experts"), when wetlands actually do this better? According to Ohio University professor William Mitsch, wetlands have the best capacity of any ecosystem to retain carbon by permanent burial or sequestration. As might be expected, his recent research indicates that tropical wetlands hold more carbon than do wetlands in a temperate climate.

Photo by Sharon T. Brown

A beaver sits on an old dam that maintains a wetland upstream. Wetlands plants capture carbon dioxide.

About "swamp gas"

Wetlands have long been suspected of adding to global warming via the production of methane, called "swamp gas." Yet wetlands cannot be a major source of this greenhouse gas, because just as atmospheric methane has increased over 250 years, the world's wetlands were shrinking due to massive drainage. In addition, methane can be broken down, or oxidized, by certain bacteria.

"A big issue in wetland science is how carbon sequestration balances against the release of greenhouse gases," Dr. Mitsch said. "Methane is a more effective greenhouse gas than is carbon dioxide in terms of how much

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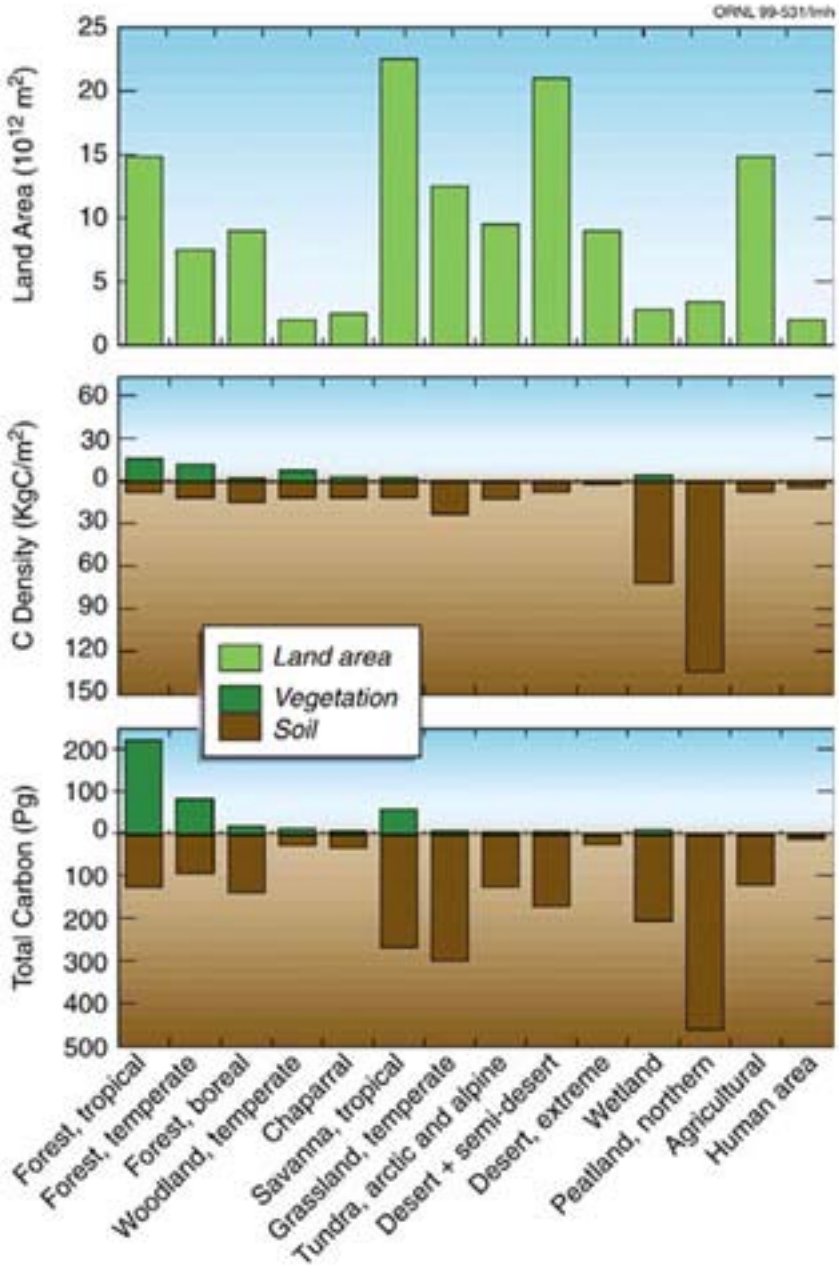
radiation it absorbs, but it also oxidizes in the atmosphere. Carbon dioxide does not degrade – it is an end product. If you take that into account I think wetlands are very effective systems for sequestering carbon."

Dr. Mitsch has also found evidence that man-made levees and dams interfere with the natural breakdown of methane. His research has shown that methane emissions double in wetlands that lack the "pulses" from natural floods. "We build dams to minimize pulses and manage rivers to stay in their channels," he said. "Nature does not 'like' even or predictable flows; only humans do. Nature is smarter than we are in managing its gases."

Many wetlands have functioned as carbon sinks for thousands of years as sediments and nutrients were slowly deposited in these lowland areas. Peatlands (bogs, mires and fens) store the most terrestrial carbon, yet only recently has this begun to receive public recognition.

Global Warming is widely acknowledged to be the planet's most urgent environment problem because it affects all living things on earth. Because wetlands contain the planet's largest stores of carbon, draining wetlands and burning peatlands can release significant amounts of carbon dioxide, adding to the climate crisis.

Dr. Mitsch says, "When we destroy these ecosystems, by burning or draining them, we are contributing to climate change due to the release of that carbon into the atmosphere" It follows that we'd be wise to leave existing natural wetlands as they are and to support the beaver in restoring and maintaining these important carbon sinks.



The top chart gives the estimated global area of land in 14 terrestrial biomes (excluding lake/stream and perpetual ice).

The middle chart shows estimated average organic carbon density in living plants and soils in the 14 biomes.

The bottom chart shows estimated global total organic carbon in living plants and soils in the 14 biomes.

From: The Center for Research on Enhancing Carbon Sequestration in Terrestrial Ecosystem (Oak Ridge Nat. Lab.) 2/16/99 report, p. 42.

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