

# US rivers and streams saturated with carbon

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A satellite view of the Mississippi River shows a mosaic of riverbank land-use patterns. Credit: NASA

Rivers and streams in the United States are releasing enough carbon into the atmosphere to fuel 3.4 million car trips to the moon, according to Yale researchers in *Nature Geoscience*. Their findings could change the way scientists model the movement of carbon between land, water and the atmosphere.

"These [rivers](#) breathe a lot of carbon," said David Butman, a doctoral student and co-author of a study with Pete Raymond, professor of ecosystem ecology, both at the Yale School of Forestry & Environmental Studies. "They are a source of CO<sub>2</sub>, just like we breathe CO<sub>2</sub> and like smokestacks emit CO<sub>2</sub>, and this has never been systematically estimated from a region as large as the [United States](#)."

The researchers assert that a significant amount of carbon contained in

land, which first is absorbed by plants and forests through the air, is leaking into [streams](#) and rivers and then released into the [atmosphere](#) before reaching coastal waterways.

"What we are able to show is that there is a source of atmospheric CO<sub>2</sub> from streams and rivers, and that it is significant enough for terrestrial modelers to take note of it," said Butman.

They analyzed samples taken by the United States Geological Survey from over 4,000 rivers and streams throughout the United States, and incorporated highly detailed geospatial data to model the flux of carbon dioxide from water. This release of carbon, said Butman, is the same as a car burning 40 billion gallons of gasoline.

The paper, titled "Significant Efflux of Carbon Dioxide from Streams and Rivers in the United States," also indicates that as the climate heats up there will be more rain and snow, and that an increase in precipitation will result in even more terrestrial carbon flowing into rivers and streams and being released into the atmosphere.

"This would mean that any estimate between carbon uptake in the biosphere and carbon being released through respiration in the biosphere will be even less likely to balance and must include the carbon in streams and rivers," he said.

The researchers note in the paper that currently it is impossible to determine exactly how to include this flux in regional [carbon](#) budgets, because the influence of human activity on the release of CO<sub>2</sub> into streams and rivers is still unknown.

Provided by Yale University

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