

# Researchers offer unique way to monitor carbon emissions in bodies of water

March 14 2024

---



A sensor, used for tracking carbon emissions from bodies of water, has been retrofitted to a floating apparatus for use in streams, rivers and other running water bodies. The floatation allows the sensor to rise and fall with changing water levels in lotic environments. Credit: UNH/Drew Robison

Carbon dioxide (CO<sub>2</sub>) emissions are not typically associated with water

ways, like streams and rivers, but emerging research shows that water bodies play an important role in storing and releasing carbon dioxide.

As many states look for cost-effective ways to mitigate [climate change](#), scientists at the New Hampshire Agricultural Experiment Station at the University of New Hampshire looked at a way to optimize CO<sub>2</sub> sensors to better measure [carbon dioxide emissions](#) in lotic, or moving, bodies of water offering a new tool that can help provide valuable information for everything from land use to climate action plans.

"These sensors, adapted for highly dynamic flow like floods, allow us to see if a disproportionate amount of CO<sub>2</sub> is transferred from land during short periods of time, and whether this can contribute significant emissions to the atmosphere," said Wilfred Wollheim, associate professor of natural resources and environment.

The study published in [Limnology and Oceanography: Methods](#) outlines how the researchers modified an existing sensor—originally developed to measure dissolved carbon dioxide in oceans—by adding a protective housing that accounted for changing [water levels](#) and unidirectional flow of running water.

The researchers also chose materials known to limit damage to the sensor by microorganisms. The team plans to make these sensor modifications publicly available, allowing other scientists to use the design.

"After making these adaptations, we found the sensors to be quite reliable in measuring carbon dioxide in streams," said graduate student Drew Robison and lead author. "We were able to differentiate between streams that were bigger sources of CO<sub>2</sub> and start to examine when and why moments of high CO<sub>2</sub> emissions occurred."

In addition to being able to accurately measure CO<sub>2</sub> levels in streams and rivers, the researchers wanted to significantly increase the frequency at which emissions could be captured, helping to better understand the impacts of extreme precipitation events and other periods when there could be disruptions to normal observed water flow rates.

The researchers say this information could be particularly important in determining how [land use](#) choices may alter the CO<sub>2</sub> regimes of streams and rivers. For example, if a forest is developed into a farm, or a suburban neighborhood, the sensors could help understand the mechanism of any change, such as altering stream metabolism or the runoff dynamics.

Wollheim has begun related sensor modification projects to measure carbon and nitrogen in other environments, including forests and [agricultural lands](#). These [sensors](#) will focus on soil characteristics, potentially providing farmers and other land managers with almost real-time information for optimizing soil nutrients to support their farming operations and minimizing excess fertilizer applications that could lead to runoff and surplus nutrients in nearby lakes, ponds and other bodies of water.

**More information:** Andrew L. Robison et al, Lotic-SIPCO<sub>2</sub>: Adaptation of an open-source CO<sub>2</sub> sensor system and examination of associated emission uncertainties across a range of stream sizes and land uses, *Limnology and Oceanography: Methods* (2024). [DOI: 10.1002/lom3.10600](#)

Provided by University of New Hampshire

Citation: Researchers offer unique way to monitor carbon emissions in bodies of water (2024, March 14) retrieved 28 April 2024 from <https://phys.org/news/2024-03-unique-carbon-emissions-bodies.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.