River Thames study: Climate change limits cleanup efforts by accelerating algal growth

February 24 2025

Credit: University of Waterloo

A study led by a University of Waterloo researcher has learned that climate change is increasing the potential for algal blooms in the United Kingdom's River Thames despite a four-decade-long decline in phosphorus loads. The study, published in *Communications Earth & Environment*, completed a detailed analysis of the river's 150-year water quality record to learn this information.

The River Thames dataset is the world's longest continuous water quality record, providing an unparalleled historical perspective on how human activity and policy have shaped one of the world's most iconic rivers and sets a new benchmark for assessing modern water quality challenges.

"This dataset is truly amazing and provides a unique historical record: it tells the story of our socio-economic, agricultural and industrial history through the changing quality and ecological status of a vital freshwater resource," said Helen Jarvie, professor in the Faculty of Environment and University Research Chair in Global Water Quality at the University of Waterloo.

"More broadly, it provides scientists with a template to better understand how humans can impact river health."

Jarvie's research revealed that phosphorus loads in the River Thames have decreased by approximately 80% over the past 40 years—thanks to improved wastewater treatment and agricultural practices—yet algal bloom threats persist.

Rising river temperatures driven by climate change are increasing the risk of both spring diatom blooms and summer cyanobacterial blooms, the study found. These can have big impacts on the health of rivers, by shading out and suffocating aquatic life, using up oxygen in the water when they decompose, and being exposed to potentially toxic cyanobacteria.

Algal blooms also increase the cost of drinking water treatment and can limit recreational activities such as sailing, fishing and swimming. Controlling phosphorus from sewage discharges and agricultural runoff is a key strategy to reduce algal blooms in rivers and lakes, because the algae require phosphorus to grow.

"Despite huge successes in reducing phosphorus loads in the River Thames, phosphorus concentrations remain above levels that would limit algal growth and rising water temperatures are now increasing the potential for algal blooms in the river. Our results suggest that water quality management is now 'treading water' in a warming climate," Jarvie said.

"This research documents 150 years of remarkable changes in river water quality. This is of particular importance and timeliness given the challenges we now face in managing water quality in a warming climate, and contemporary water quality concerns in Britain and around the world," Jarvie said.

More information: Helen P. Jarvie et al, A 150-year river water quality record shows reductions in phosphorus loads but not in algal growth potential, *Communications Earth & Environment* (2025). DOI: 10.1038/s43247-024-01978-4

Provided by University of Waterloo