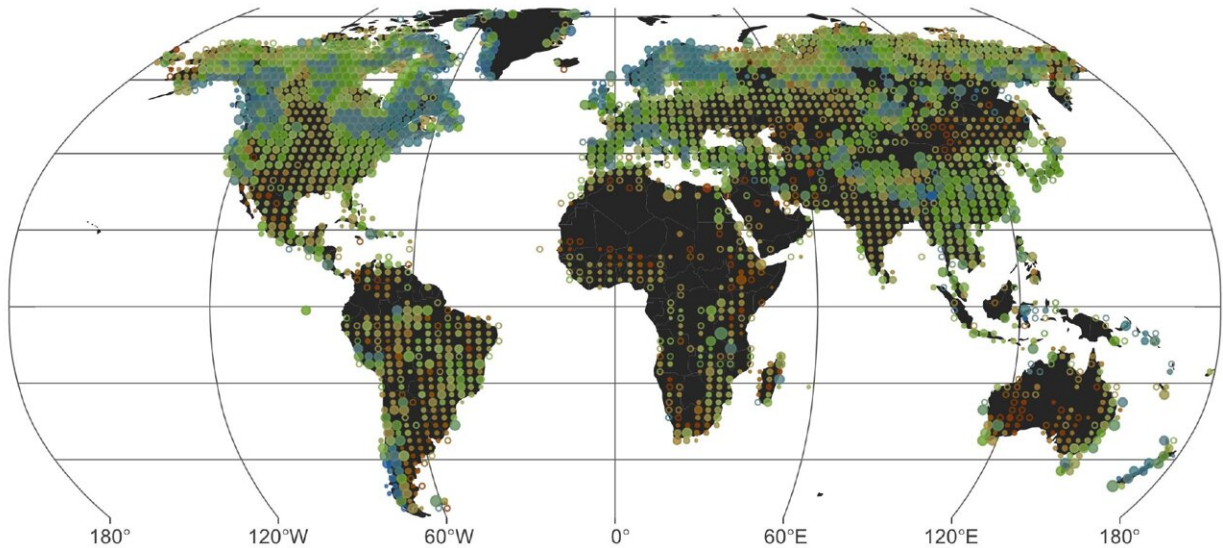


Climate change is making lakes less blue

September 22 2022



The new study presents the most extensive map of lake color, revealing that most of the world's lakes are already green-brown rather than blue. Credit: *AGU/Geophysical Research Letters*

If global warming persists, blue lakes worldwide are at risk of turning green-brown, according to a new study which presents the first global inventory of lake color. Shifts in lake water color can indicate a loss of ecosystem health. The new research was published in *Geophysical Research Letters*.

While substances such as [algae](#) and sediments can affect the color of lakes, the new study finds that air temperature, precipitation, lake depth

and elevation also play important roles in determining a lake's most common water color.

Blue lakes, which account for less than one-third of the world's lakes, tend to be deeper and are found in cool, high-latitude regions with high precipitation and winter ice cover. Green-brown lakes, which are 69% of all lakes, are more widespread, and are found in drier regions, continental interiors, and along coastlines, the study finds.

The researchers used 5.14 million satellite images for 85,360 lakes and reservoirs around the world from 2013 to 2020 to determine their most common water color.

"No one has ever studied the color of lakes at a global scale," said Xiao Yang, remote sensing hydrologist at Southern Methodist University and author of the study. "There were past studies of maybe 200 lakes across the globe, but the scale we're attempting here is much, much larger in terms of the number of lakes and also the coverage of small lakes. Even though we're not studying every single lake on Earth, we're trying to cover a large and representative sample of the lakes we have."

A lake's color can change seasonally, in part, due to changes in algal growth, so the authors characterized lake color by assessing the most frequent lake color over seven years. The results can be explored through an [interactive map](#) the authors developed.



The world's blue lakes, many of which are located at high northern latitudes, are at risk of losing their blue hues as a result of climate change, according to a new paper in *Geophysical Research Letters*. Credit: Eric Stein-Beldring/Unsplash

Additionally, the new study explored how different degrees of warming could affect water color if [climate change](#) persists. The study finds climate change may decrease the percentage of blue lakes, many of which are found in the Rocky Mountains, northeastern Canada, northern Europe and New Zealand.

"Warmer water, which produces more algal blooms, will tend to shift lakes towards green colors," said Catherine O'Reilly, an aquatic ecologist

at Illinois State University and author of the new study. "There are lots of examples of where people have actually seen this happen when they studied one individual lake."

For example, the North American Great Lakes are experiencing increased [algal blooms](#) and are also among the fastest warming lakes, O'Reilly said. Previous research has also shown remote Arctic regions have lakes with "intensifying greenness," said Yang.

While prior studies have used more complex and finer scale metrics to understand overall lake ecosystem health, water color is a simple yet viable metric for [water quality](#) that can be viewed from satellites at the global scale, the authors said. This approach provides a way to study how remote lakes are changing with climate.

"If you're using lakes for fisheries or sustenance or drinking water, changes in water quality that are likely happening when lakes become greener are probably going to mean it's going to be more expensive to treat that water," said O'Reilly. "There might be periods where the water isn't usable, and fish species might no longer be present, so we're not going to get the same [ecosystem services](#) essentially from those lakes when they shift from being blue to being green."

Additionally, changes to water color may have recreational and cultural implications in locations such as Sweden and Finland where lakes are culturally prevalent, O'Reilly said. As warming continues, lakes in northern Europe will likely lose their winter ice cover, which could affect winter and cultural activities.

"Nobody wants to go swim in a green lake," said O'Reilly, "so aesthetically, some of the lakes that we might have always thought of as a refuge or spiritual places, those places might be disappearing as the color changes."

More information: Xiao Yang et al, The Color of Earth's Lakes, *Geophysical Research Letters* (2022). [DOI: 10.1029/2022GL098925](https://doi.org/10.1029/2022GL098925)

Provided by American Geophysical Union

Citation: Climate change is making lakes less blue (2022, September 22) retrieved 26 April 2024 from <https://phys.org/news/2022-09-climate-lakes-blue.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.