

Reductions in phosphorous in lakes in China due to government efforts

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Lake Kanas. Credit: Wikipedia/CC BY-SA 3.0

(Phys.org)—An international team of researchers has found that levels

of phosphorous found in Chinese lakes have fallen on average over the past nine years. In their paper published in the journal *Nature Geoscience*, the group describes how they examined data from government sources and what they found by doing so. Jessica Corman with the University of Wisconsin offers a News & Views article covering work done by the group in the same issue giving some opinions regarding what she believes still needs to be done.

Phosphorous can cause increases in [algae blooms](#) in lakes, which in turn can cause reductions in [oxygen levels](#), making it difficult for fish and plants to survive. The whole process is known as eutrophication. As phosphorous levels rise, the problem becomes worse. Officials in China recognized the problem in lakes throughout the country, and several years ago, adopted measures to reduce levels by improving sanitation efforts. In practice, this meant building waste treatment plants that cleaned water before pumping it into lakes or streams. This effort, the researchers report, has led to a reduction in the average amount of phosphorous in China's lakes.

After studying 850 datasets collected over the years 2006 to 2014 the researchers found a decline in phosphorous levels in approximately 60 percent of those listed—median concentrations declined from $80 \mu\text{g l}^{-1}$ to $51 \mu\text{g l}^{-1}$. The researchers noted that the highest level they found was $200 \mu\text{g l}^{-1}$. They also noted that the biggest declines occurred in the lakes with the highest concentrations during the early years of the cleanup effort. The declines in many of the lakes studied were enough to stop eutrophication from occurring.

But, as Corman notes, the problem of phosphorous buildup in Chinese lakes is not solved. There are still other sources that need to be reduced, most notably runoff from agriculture. The researchers also found that phosphorous levels were actually higher in some sparsely populated areas, which they suggest could be due to increased rainfall and erosion

of soil due to global warming.

More information: Yindong Tong et al. Decline in Chinese lake phosphorus concentration accompanied by shift in sources since 2006, *Nature Geoscience* (2017). [DOI: 10.1038/ngeo2967](https://doi.org/10.1038/ngeo2967)

Abstract

Domestic wastewater and agricultural activities are important sources of nutrient pollutants such as phosphorus and nitrogen. Upon reaching freshwater, these nutrients can lead to extensive growth of harmful algae, which results in eutrophication. Many Chinese lakes are subject to such eutrophication, especially in highly polluted areas, and as such, understanding nutrient fluxes to these lakes offers insights into the varying processes governing pollutant fluxes as well as lake water quality. Here we analyse water quality data, recorded between 2006 and 2014 in 862 freshwater lakes in four geographical regions of China, to assess the input of phosphorus from human activity. We find that improvements in sanitation of both rural and urban domestic wastewater have resulted in large-scale declines in lake phosphorus concentrations in the most populated parts of China. In more sparsely populated regions, diffuse sources such as aquaculture and livestock farming offset this decline. Anthropogenic deforestation and soil erosion may also offset decreases in point sources of pollution. In the light of these regional differences, we suggest that a spatially flexible set of policies for water quality control would be beneficial for the future health of Chinese lakes.

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