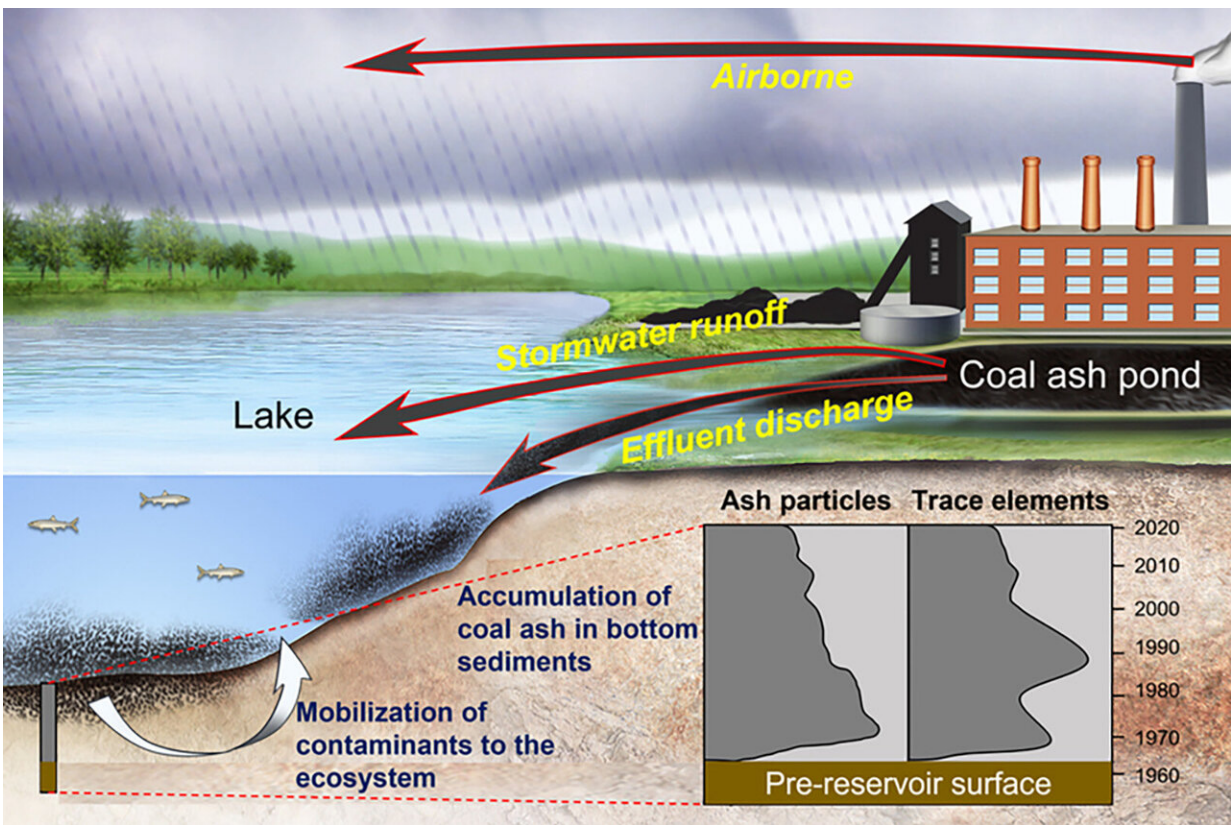


Lake sediments show decades of coal ash contamination

October 3 2022



Researchers who analyzed bottom sediments from five North Carolina lakes near coal-fired power plants say coal ash contamination has entered the lakes by three different routes. Credit: Wang et al, Environmental Science and Technology

An analysis of sediments from five North Carolina lakes near coal-

burning power plants has found that coal ash pollution of surface waters has been more persistent and widespread than was previously known.

The findings, from scientists at Duke University and Appalachian State University, show that large quantities of [coal](#) ash have been transferred and deposited in lake sediments since the beginning of coal operations in North Carolina.

"The bottom sediments of a lake represent a complete history of what has fallen into the [lake water](#) and settled to the bottom," said Avner Vengosh, a Duke University Distinguished Professor of Environmental Quality at the Nicholas School of the Environment. "Using our age-dating methods, we were able to go back in time, in some cases even before the [coal plant](#) was built, and reconstruct the history of the lakes."

Coal ash is the residual material from burning coal to generate electricity, and is known to contain hazardous metals including lead, chromium, cadmium, mercury, arsenic, selenium and molybdenum, many of which have been tied to [human cancers](#) and other health effects.

The contaminants are not locked into the lake sediments, Vengosh said. A chemical analysis of the pore water within the [lake sediments](#) indicated the metals leached out from the buried coal ash and could enter the aquatic food chain. The study appears Oct. 3 in the journal *Environmental Science & Technology*.

"These are recreational lakes," said Zhen Wang, a Ph.D. student at Duke Nicholas School of the Environment and the lead author of the study.

"Some of them, like Hyco Lake, were originally built for the coal plant, but over the years, it has become very desirable real estate where people build their dream homes. It looks very pristine and beautiful, but if you dig in, you find piles of toxic coal ash."

The five lakes in the study were created for nearby coal plants: Hyco Lake and Mayo Lake, North of Durham in Person County; Belews Lake, northwest of Greensboro in Rockingham, Forsyth and Stokes Counties; Mountain Island Lake, northwest of Charlotte in Mecklenburg County; and Lake Sutton, northwest of Wilmington in Brunswick County. For comparison, the researchers also sampled Lake Waccamaw in Columbus County, west of Wilmington, a natural lake that was dammed in 1926 so it wouldn't dry out during droughts.

"By looking at the microscope we were able to identify the different types of coal ash that were deposited over time in the lakes " said Ellen Cowan, a professor of Geology at Appalachian State University who was a co-author of the study.

"At several of the sites, it appears that coal ash was initially just dumped into the nearby lake," Cowan said. "Over time, when the Clean Air Act was enforced and scrubbers were added to the coal plant smokestacks to catch fine particulates, we see changes in the coal ash with higher proportions of small particles."

Yet, the tiny particles of coal ash contain the highest concentrations of toxic elements, which made contamination worse for the lakes, Vengosh said. "The toxicity of the coal ash actually becomes worse because those small particles contain higher concentrations of the trace elements."

The study authors suggest the coal ash could reach lakes by three possible routes: Atmospheric emissions of coal ash, particularly before the installation of the scrubbers, settled in nearby lands and was washed back into the lake by its watershed; climate events like tropical storms and hurricanes flooded and flushed the nearby coal ash impoundments to overflow into the nearby lakes; and ordinary flows of effluents from the coal ash ponds reached the [lake](#) as part of their routine operation.

"While previously we thought that lakes and groundwater are being contaminated by leaking or effluents discharge from of coal ash ponds, the new findings indicate that we have underestimated the environmental impact of coal ash," Vengosh said. "We thought that the majority of the coal ash is restricted to coal ash ponds and landfills. Now we see it's already in the open environment."

The study authors warn that this is a much larger problem and given climate change it will only grow worse. "We did a very detailed examination of five lakes, but there are numerous lakes or open water reservoirs next to coal plants not only North Carolina, but all over the country," Vengosh said. "The phenomenon that we discovered probably applies to many other sites across the US and all of them are going to be vulnerable to more extreme weather events and flooding that we know is coming from global warming."

More information: Legacy of Coal Combustion: Widespread Contamination of Lake Sediments and Implications for Chronic Risks to Aquatic Ecosystems, *Environmental Science & Technology* (2022). [DOI: 10.1021/acs.est.2c04717](https://doi.org/10.1021/acs.est.2c04717)

Provided by Duke University

Citation: Lake sediments show decades of coal ash contamination (2022, October 3) retrieved 23 June 2024 from <https://phys.org/news/2022-10-lake-sediments-decades-coal-ash.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.