

Study finds arsenic contamination from Giant gold mine wiped out key algae and invertebrates from lake near Yellowknife

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A study led by researchers at the University of Ottawa and published today in *Proceedings of the Royal Society B* has found that a lake ecosystem was severely affected by arsenic contamination from the Giant Mine, which produced over seven million ounces of gold while it was active, between 1948 and 2004. Over 20,000 tonnes of toxic arsenic trioxide were released from the Giant Mine's roaster stack over the years as part of its process to extract gold from arsenopyrite ore.

The team of researchers relied on a paleoenvironmental approach, extracting core samples of lake sediments to show how lake contamination increased after mine began operations, and how the lake's ecosystem responded to that contamination.

"Many species of algae and invertebrates were killed off in Pocket Lake, near Yellowknife, by pollution from the mine's roaster stack, and these species have not recovered even now, more than ten years after the mine closed," says lead author

Joshua Thienpont, a postdoctoral researcher with the Department of Biology at the University of Ottawa.

“Our results show that arsenic contamination increased by over 1,700% when the mine was fully active in the 1960s,” adds Jules Blais, professor of biology and environmental toxicology at the University of Ottawa, who directed the research effort. “Other elements, including lead, antimony and mercury were also responsible for the toxicity of these roaster emissions from the Giant Mine.”

The researchers are now trying to understand why the ecosystem has not yet recovered over ten years after the closure of the Giant Mine. “Contaminant levels, while still quite high, have significantly decreased since the peak of contamination, but the biology has not responded. We are very interested in why that is,” says Jennifer Korosi, assistant professor in geography at York University, who contributed to the study while a Banting postdoctoral fellow at the University of Ottawa.

These findings support earlier research by the uOttawa team which found that most small lakes within a 15-to-20 km radius of mines in Yellowknife contain arsenic in concentrations that significantly exceed drinking water guidelines and levels required for protecting aquatic life. The new findings raise important questions about the broader impact of arsenic contamination on surrounding ecosystems and local populations. Pocket Lake is located just seven km away from Yellowknife.

“We tend to think of most northern regions as relatively pristine, but I have worked in many industrialized areas, and I have never seen such striking biological changes. These results were a real eye-opener on the toxic effects of past mining practices,” says John Smol, professor of biology at Queen’s University, who was part of the research team.

“These studies are important because they provide key information needed to develop more sustainable mining practices,” says Blais. “We can’t let this kind of history repeat itself.”

For more information:

Multi-trophic level response to extreme metal contamination from gold mining in a subarctic lake

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