Oil sands study shows negative impact on lake systems

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(Phys.org)—Fifty years of Athabasca oil sands development has left a legacy of contaminants in lake ecosystems and that contamination reaches further from the development areas than previously recognized, according to new research at Queen's University.

"Our research tells a consistent story of increased contaminants and ecological change that has occurred in the region since industrial development of bitumen resources began," says lead author Joshua Kurek, a postdoctoral fellow at Queen's University, Department of Biology. "Today our study lakes are very different compared to 50 years ago, and are on a path of unprecedented change."

The study illustrates that multiple environmental stressors, including local industrial activities and climate change, have affected the structure and function of Athabasca oil sands lake ecosystems for nearly half a century.

It reveals toxic substances that are also prominent components of Athabasca oil sands bitumen, have increased in lake sediments since oil sands development began in the late 1960s. Additionally, increased contaminant levels were observed from one lake ecosystem 90 kilometres northwest of the major development area.

Researchers used the archives preserved in lake sediments to reconstruct past contaminant levels and ecological changes, since there is no direct monitoring data prior to the oil sands development. They found

increasing amounts of polycyclic aromatic hydrocarbons (PAH) and dibenothiophenes (DBT), both toxins released through oil sands processing and mining operations.

"Given that oil sands development will undoubtedly increase, we are certain that these trends will accelerate, and increased development will likely impact ecosystems farther from the current pollution sources," notes Queen's biology professor John Smol, Canada Research Chair in Environmental Change "Combined with the effects of climate change and other environmental stressors to aquatic ecosystems, these results are worrying."

This study was published in *Proceedings of the National Academy of Sciences* of the United States of America.

Other members of the research team include Research and Physical Scientists from Environment Canada's Aquatic Contaminants Research Division: Jane Kirk, Derek Muir, Xiaowa Wang and Marlene Evans.

More information: "Legacy of a half century of Athabasca oil sands development recorded by lake ecosystems," by Joshua Kurek et al. dx.doi.org/10.1073/pnas.1217675110

Provided by Queen's University