

THE CONVERSATION

Academic rigor, journalistic flair

The fate of Africa's Lake Tanganyika lies in the balance

April 27, 2017 12.09pm EDT



The declining fishing yield in the Lake Tanganyika region is being exacerbated by an influx of refugees. Reuters/Sala Lewis

Standing on the steep rocky shores of Lake Tanganyika at sunset, looking out at fishermen heading out for their nightly lamp-boat fishing trips, it's easy to imagine this immense 32,900km² body of water as serene and unchanging.

Located in the western branch of the great African Rift Valley it's divided among four countries; Tanzania, the Democratic Republic of the Congo, Burundi, and Zambia. It's one of the oldest lakes in the world, probably dating back about 10 million years.

That expanse of geological time has permitted literally hundreds of unusual species of fish and invertebrates to evolve in isolation - organisms that are unique among the world's lakes. Every day millions of people rely on the lake's riches.

But despite being a world class reservoir of biodiversity, food and economic activity, the lake is changing rapidly and may be facing a turbulent future.

Lake Tanganyika was recently declared the "Threatened Lake of 2017" – adversely affected by human activity in the form of climate change, deforestation, overfishing and hydrocarbon exploitation.

The threats

Author



Andrew Cohen

University Distinguished Professor Joint Professor, Geosciences and Ecology and Evolutionary Biology, University of Arizona

Languages

Read this article in French and English

Beginning in the late 1980s scientists studying the lake began to notice significant and concerning changes caused by human activity.

But at the time worldwide attention was focused on other African Great Lakes, particularly Lake Victoria where evidence was beginning to emerge of the enormous impact the Nile Perch – an introduced species – was having.

The problems in Tanganyika were somewhat different.

Fortunately, no major exotic species introductions have occurred up to now. Instead, evidence shows that underwater habitat degradation is taking place adjacent to hill slopes. They are being rapidly deforested – converted to agricultural lands or for urban expansion – in the fast growing population centres around the lake. This activity has led to a rapid increase in the amount of loose sand and mud being washed into the lake which is smothering the lake floor.

Danger of sediment

The biodiversity of Lake Tanganyika can be imagined like a thin bathtub ring. It hugs the shallow zones around a deep and steep bottomed lake, up to 1470m in its deepest parts. The hundreds of species that inhabit the sunlit shallows give way to a dark expanse of water lacking oxygen and, so, animal life.

This narrow strip of extraordinary biodiversity is on the front line. Eroded sediments are being carried into the lake, affecting this strip.

Researchers have begun to document where the impact is being felt. They are also looking back in time by collecting sediment cores with fossils of the many endemic animals to see when the impact was first felt.

They have found that some heavily populated regions lost much of their diversity more than 150 years ago. Other regions, particularly in the more southerly part of the lake, are seeing these effects unfold only in recent decades.

Other pressures

Excess sedimentation is just one problem. Fishing pressure and climate change are also affecting the lake.

Large scale fisheries for the lake's small sardines started in the 1950s, quickly mushrooming into a major industry. They export up to 200,000 tons of fish per year and make up a very large portion of the average person's animal protein intake in the surrounding regions.

In recent years this fishing yield has declined dramatically. This has been partially caused by the unsustainable growth in fisheries, and exacerbated by large numbers of refugees flooding into the region because of conflicts in Rwanda, Burundi and the DRC during the 1990s.

It's now increasingly clear that another factor has also been at play.

Starting in the early 2000s, scientists began to **document** that the surface waters of Lake Tanganyika were warming rapidly. This is most likely because of global climate change **related** to an increase in greenhouse gas emissions. This warming has had serious consequences for the lake's fragile ecosystems.

Warming lake

Warm water is relatively light and struggles to mix with the deeper layers of the lake. This in turn keeps the vast pools of nutrients from being churned back to the surface by waves. It cuts down on the growth of floating plankton, which is what the lake's many fish populations eat.

Scientists have been able to **show** that the decline in fish populations began well before the onset of commercial fishery in the 1950s. This implicates climate change and lake warming as the probable cause for much of the fishery's long-term decline.

Unfortunately, this trend is unlikely to be reversed as long as the climate in the **region** continues to warm.

A related consequence of the reduction of mixing in the lake, is a continuous shallowing of the transition from the oxygenated to deoxygenated waters on the lake floor. This means there's less of an oxygenated ring, reducing the habitat area within the bathtub ring of biodiversity from below.

As if scientists and lake managers at Lake Tanganyika didn't have enough on their plates, a new problem has emerged: **the search** for oil and gas deposits.

Rift lake sediments of the type found in Lake Tanganyika are **well known** among geologists as reservoirs of hydrocarbons, as over millions of years vast quantities of plankton have died and settled on the lake floor.

The consequences of actual production are still unknown. But the recent record of catastrophic oil spills, for example along the **Niger River Delta**, highlight the critical need for very careful study and environmental planning before production proceeds in fragile Lake Tanganyika.

The biological and economic riches produced by 10 million years of evolution could lie in the balance.

 [Agriculture](#) [Climate change](#) [Biodiversity](#) [Deforestation](#) [Zambia](#) [Tanzania](#)