

Researchers uncover signs of ecosystem collapse in significant PNG wetland

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View over Lake Kutubu in Papua New Guinea. Credit: Professor Simon Haberle

A new study by researchers from The Australian National University

(ANU) has identified warning signs of ecosystem collapse at a wetland of international significance in Papua New Guinea (PNG).

The internationally-recognized Ramsar Convention on Wetlands said ongoing ecological monitoring and the development of wetland management plans are needed to conserve PNG's second largest [lake](#), Lake Kutubu.

The lake has been recognized as one of the most pristine freshwater sites in the Asia-Pacific region since being listed as a Ramsar site of international significance in 1998.

The researchers from the ANU School of Culture, History and Language (CHL), in collaboration with the University of Papua New Guinea and local land owners, analyzed [sediment cores](#) over several years from Lake Kutubu and found human impacts, including deforestation, mining and increased human populations in the area, have significantly transformed the lake during the past century.

Dr. Kelsie Long has examined the [human impacts](#) and [environmental changes](#) at Lake Kutubu. She said changes in the algal, fungi and geochemical compositions of the lake sediments provide early indicators of ecosystem collapse.

Dr. Long said the potential for the sudden collapse of ecosystems in response to interacting pressures has been of increasing concern in ecological and conservation research, as well as to the [local communities](#) that rely on the ecosystem.

"The health of Lake Kutubu is changing. Villagers have been reporting the release of plumes of chemicals into the lake, fish kill events and subsequent health issues of people who rely on the lake for food and water," Dr. Long said.

"We can see these changes clearly in the chemical composition of sediments laid down at the bottom of the lake, before and after the start of resource extraction activities and increasing population growth in the region in the 1980s and 90s."

At 19 kilometers long, four kilometers wide and up to 70 meters deep, Lake Kutubu is an area of highly diverse rainforest flora and fauna, inhabited by human populations that are equally diverse both culturally and linguistically.

The research identified major shifts in algal composition and dung fungi in sediment occurring in the 1980s, suggesting a drop in water quality that matches the timing of increasing livestock and habitations in the areas around Lake Kutubu.

The research team also included CHL Director Professor Simon Haberle and Dr. Larissa Schneider, who have both been researching changes to Lake Kutubu's health over a number of years.

Dr. Schneider said the team's research shows how industrialisation and economic growth affects the life of traditional communities to a disproportionate extent.

"These communities don't have a strong political voice, so independent studies like ours are important to support traditional communities to stand up to environmental injustice," Dr. Schneider said.

CHL palaeoecologist Dr. Simon Connor did the statistical analysis in the [research paper](#).

"We have to remember that Ramsar wetlands are not museum exhibits—they are the result of all the changes that went on in the past and are responding every moment to the changes happening now," Dr.

Connor said.

"Scientific studies like ours don't tell local communities anything they don't already know, but they can force governments and corporations to take action to prevent further damage."

Their paper, "Tropical Forests as Key Sites of the 'Anthropocene' - Past and Present Perspectives," has been published by the *Proceedings of the National Academy of Sciences*.

More information: Kelsie E. Long et al, Human impacts and Anthropocene environmental change at Lake Kutubu, a Ramsar wetland in Papua New Guinea, *Proceedings of the National Academy of Sciences* (2021). [DOI: 10.1073/pnas.2022216118](https://doi.org/10.1073/pnas.2022216118)

Provided by Australian National University

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