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## Technology Story

# New tool in battle against toxic algae

Saturday January 20, 2007

By [Juliet Rowan](#)

Satellite images on Google Earth have inspired a new tool in the fight against toxic algal blooms in New Zealand lakes.

"Good old Google Earth put me on to the fact that our Waikato lakes were vastly different colours and that there was a story, information, locked up in those colours," said Waikato University biologist Brendan Hicks.

Dr Hicks, associate professor of biological sciences, had been looking for ways to simplify and expand lake-water monitoring.

Working with geography lecturer Lars Brabyn and master's student Mathew Allan, he combined a satellite image with water-quality data to create a map of algae distribution – which shows nutrient pollution – in the Rotorua lakes.

Red shows the highest algae concentration, which is probably unsafe for swimming. Dark blue shows the lowest algae levels.

Unlike traditional algal maps, the map shows startling variations of algae in each lake.

"We know algae are patchy. Now we can see their patchiness," Dr Hicks said. "It's pretty cool and it's never been done in New Zealand before."

The scientists used a technique similar to one developed at the University of Minnesota, matching an image from the Landsat international satellite with physical measurements of water clarity and chlorophyll-a (an indicator of algae) taken two days apart in January 2002.

They could then predict algae content for small areas of lake (30m by 30m), which each occupy a pixel on the map.

The satellite reveals differences in water colour (the greener the water, the higher the algae content), making it possible to calculate a chlorophyll value at the exact location where the physical samples were taken.

By applying this across the lake, they could give a predicted chlorophyll measurement for each 30m by 30m area. Traditional algal maps cannot show such detail because they rely on a limited number of physical samples.

Dr Hicks and his colleagues chose the Rotorua lakes because water-quality data already existed.

Lake Rotoehu had the highest concentration of algae, while Lake Rotoiti has a lot of variation.

The eastern end has better water quality, while the western end, at Okawa Bay, has a lot of algae. Okawa Bay is often closed in summer because of toxic algal blooms.

Dr Hicks said the problem could be worse in the bay because it was deep and isolated from the rest of the lake.

"It's just corroborative evidence. It shows you can see the bloom from space, which is enormously useful."

Nutrient pollution in the lakes comes from several sources, including runoff from farms and septic tanks.

The local and regional councils are spending tens of millions of dollars on improving water quality and Dr Hicks said the new technique would let them monitor progress better and understand what degraded the water.

Other historical data and satellite images could also be used to map deterioration over time.

Dr Hicks and his colleagues aim to apply the technique to lakes nationwide, with the Waikato next.

There they hope to prove water quality has deteriorated since pest fish were introduced, so efforts to eradicate species such as koi carp will become a priority.

Auckland's 3000 lakes could potentially be mapped all at once, producing a single image with detailed information on algae distribution.

"It really increases the power of our analysis and understanding of the way lakes are working."

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