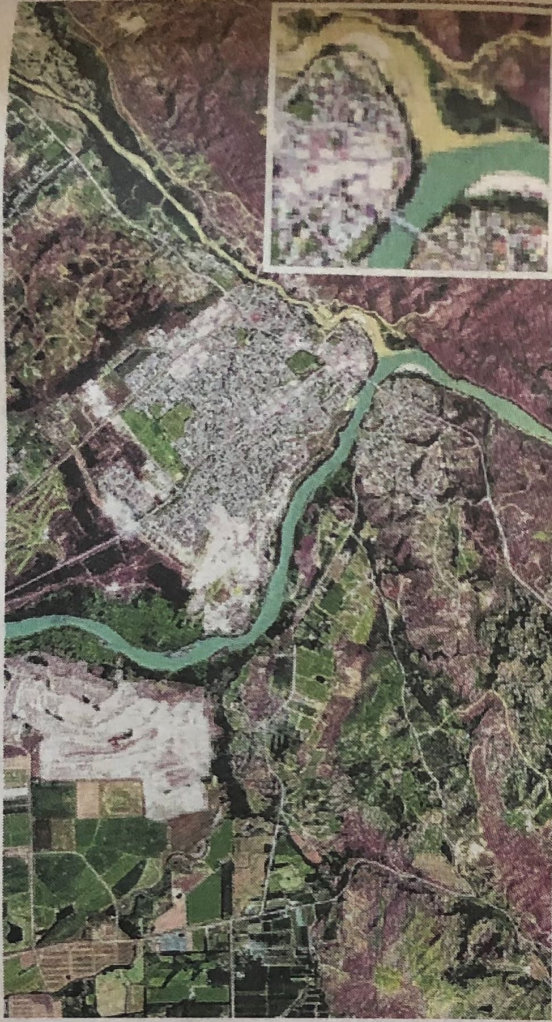




Plain to see ... Sediment from the Clutha River discharges into the Pacific Ocean 75km southwest of Dunedin last November.

PHOTO: SUPPLIED



Spot the difference ... Silt runoff (yellow) in the Manuhukia River contrasts with the Clutha River at their confluence in Alexandra last November.

PHOTO: SUPPLIED

Satellite images track river changes

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Understanding how the Clutha River connects all of Otago is the aim of Alexandra's Centre for Space Science Technology.

CSST senior scientist Dr Moritz Lehmann said satellite images could track changes across the entire path of the Clutha River from the Southern Alps to the Pacific Ocean.

The images came from the Sentinel-2 mission, run by the European Space Agency.

"It's actually two satellites that fly in constellation".

This meant they worked in concert to provide overlapping

coverage across the globe.

"So every five days we get a new image."

Among the benefits of using imagery was that it provided a clear picture of what was in the water.

"The colour of the water and the colour of the surface of the earth as it is seen from space is really our main source of information."



Dr Moritz Lehmann

"For example, a clear pristine lake is blue, and if you look at a shallow green lake it is filled with algae."

The same was true of rivers — "a brown river indicates there is suspended sediment and soil in the water."

Also, sensors on the satellite were able to measure colour much better than the human eye, providing "nuances" that constituted valuable data.

"There is more information in there than meets the eye."

Precise information could be gained from satellite imagery, and the images could be run together, providing a visual playback of changes.

"Satellite images give us this view over space and time."

"What we often do is we take all the images of the same area that were taken over time and look at how it develops, look at the time stack of images."

This can enable studies to understand the effects of both human activity like agriculture and construction as well as seasonal weather events, he said.

Cloud cover sometimes obscured the ground, but "theoretically, we can get an image of the entire country every five days".

Satellite images could be converted into scientific or chemical units, for example

providing the amount of suspended sediments in grams per litre of river water.

Over time it could be possible to measure how much sediment discharge was emptying into the Pacific Ocean from the Clutha River, but more research was needed, Dr Lehmann said.

Although images from Sentinel-2 were available to the public, the focus for CSST was on finding ways to add value to the images through processes such as automated monitoring and analysis.

"We can automate this and we can add layers that are derived from these images, like statistics and other processing tools."