

Toolbox to help monitor beaches

NIWA is developing an easy-to-use, integrated, Windows-based tool to process, analyse, plot, and archive beach profile survey data. Regional councils and territorial authorities collect and use such data to monitor the patterns of beach erosion and accretion over time.

Currently, they use a variety of packages to process their beach profile survey data, but many tell us they find the existing methods inflexible. Weaknesses include: no data management control, can't produce presentation quality plots, and can't tag the location of features, such as the high water mark, on the survey profile.

NIWA's Beach Profile Analysis Toolbox is designed specifically to address these needs. It is due for commercial release in early December, but a demonstration version is available now. The demo version includes a fully functional (but time-limited) archive module, demo database, and online help. For a copy, contact Jeremy Walsh at j.walsh@niwa.co.nz



Classifying the coast

Imagine being able to find out the likely physical features of a piece of the coast – beach type, wave and tidal characteristics, geomorphology, hinterland, and so on – at the click of a mouse.

NIWA is developing a GIS-based classification of the New Zealand coast, which we hope will give coastal managers robust, initial information, where a plethora of individual studies would be inefficient, time-consuming, and costly. For example, is this stretch of coast the type which is particularly vulnerable to storm surges or erosion?

The final product will be maps that show where various physical environments occur along the coast and how they interrelate. The ultimate goal is an interactive website where people can select and use the information they require. We hope to have a demonstration version on-line by the end of the year.

The work is funded by the Foundation for Research, Science & Technology (FRST), with the support of regional councils.



How to manage coastal hazards

Participants at a recent two-day course on managing coastal hazards look at fascines installed by iwi to reduce the potential for beach erosion in front of their property in Raglan. The fascines are constructed by driving stakes into the beach and weaving manuka branches to create a fence. This traps sand being blown along the beach helping to raise beach levels.

The course was run by NIWA under the auspices of the NIWA/GNS Natural Hazards Centre, with help from Willem de Lange (University of Waikato) and Jim Dahm (Eco Nomos Ltd).

For details of courses available through the Natural Hazards Centre, visit www.naturalhazards.net.nz/courses



How do dams affect coastal erosion?

The stability of 'soft' coasts, fronted by beaches of sand or gravel, depends very much on how much sediment is washed there from rivers, cliffs, other beaches, and the continental shelf. These are complex processes but crucial for considering how building a dam or a harbour breakwater, changing landuse, or climate change, might affect coastal hazards.

Meridian Energy has commissioned NIWA to study the effects of the Waitaki River hydro dams on the coast spanning North Otago to South Canterbury. This coast has low cliffs fronted by a narrow gravel beach ridge, which needs continuous replenishment. For the past 7000 years or so, it has been naturally eroding, but the river has helped slow down the erosion by sweeping gravel out to the beach ridge.

Studies have suggested that the hydro dams may have intercepted about half of the natural gravel load of the river. But how does this affect the coast?

So far, we have found that the coastal erosion in recent decades is no greater than the long-term average. The gravel stored in the 70 km of braided riverbed between the last dam and the coast, and in the very elongated delta at the river mouth, may have buffered the effects of the dam.

Recently, we conducted an airborne laser scanning (LIDAR) survey of the coast to get an accurate baseline for measuring future changes in the coastal topography. NIWA scientists plan to model the river's response to gravel entrapment in dams and couple this with Dr Mark Dickson's cliff erosion modelling study (see below). Eventually, we hope to be able to predict quantitatively the impacts of dams on coastal erosion rates and the time lags involved.

Some of the research underpinning this project is funded by FRST.

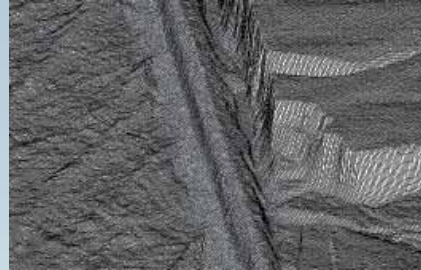


Image of cliffs on the Waitaki coast produced by airborne laser scanning (LIDAR). LIDAR is a much more informative way of tracking coastal cliff erosion than measuring changes from aerial photographs.

How will rising sea levels affect coastal cliff erosion?

It's not as simple as it seems

Dr Mark Dickson is a FRST Postdoctoral Research Fellow based at NIWA. He's been working with colleagues at the University of Newcastle upon Tyne to develop and apply a numerical model called SCAPE (Soft Cliff and Platform Erosion).

'So far the model's predictions agree well with real measurements,' says Mark.

'There was a good match between the erosion rates predicted by the model, and those measured from historical maps in Norfolk (UK) over a period of more than 100 years. We then ran simulations of potential management and climate change effects between the years 2000 and 2100, which indicated that coastal cliff erosion is generally sensitive to increased rates of sea-level rise. While some sectors of the coast eroded about 50% more quickly under higher rates of sea level rise, other sectors actually eroded less quickly! This complex response is related to the way that sediments released from cliff and beach erosion were distributed along the coast.'

SCAPE and similar models are currently being developed at NIWA to study eroding coastlines around New Zealand. At present, Mark's focus is on the gravel barrier beach and cliffed coast flanking the Waitaki River in the South Island.

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