Although the techniques for transplanting seagrasses are available, we do not as yet fully understand what makes a site suitable for restoration (Thorhaug 1985).

Issues which need to be addressed in future years include identifying the degree of disturbance that may be imposed on a habitat without rendering it unsuitable for the re-establishment of seagrasses, as well as the preparation and modification of suitable sites, in particular restoring environmental conditions favourable to seagrass growth.

The conservation and restoration of seagrass systems may be one of the most challenging problems in coastal management. ■

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Further reading

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RALPH: clarifying sediment transport in estuaries

ESTUARIES can be dirty places – literally. In New Zealand, fine sediment is an estuary's most ubiquitous and obvious pollutant. By clouding the water, it can reduce the recreational appeal of the area and degrade the habitats of benthic creatures. In addition, fine-sediment particles may provide some chemical pollutants with a "free ride" around the estuary.

Developing methods of controlling or reducing sediment pollution requires an understanding of the processes which allow sediment to be transported by flowing water.

A NIWA research programme "Mitigating sediment pollution", funded by the Foundation for Research, Science and Technology, aims to provide this understanding.

The first requirement of the research was suitable data. An ideal candidate for collecting such data turned out to be a three-legged Canadian called RALPH.

RALPH is a 2.5-metre high tripod that holds a suite of sophisticated instruments for measuring a range of factors related to sediment transport. This self-contained, battery-powered device stores data on a sealed-in hard-disk drive, and carries computers for coordinating the sensors, acquiring the data, monitoring the power supply and a host of other engineering parameters, and communicating with the outside world.

The tripod was deployed by helicopter at the end of March 1995 on an intertidal sandflat in the Manukau Harbour (Auckland). It remained there until mid-May, measuring the waves and currents that cause sediment to be suspended, transported and deposited. At high tide RALPH was under 4 metres of water, but at spring low tide it became high and dry.

This is a collaborative experiment between NIWA and the Geological Survey of Canada (GSC) (Atlantic), who own RALPH. No suitable package is available in New Zealand for making long-term, unattended measurements of this kind in estuaries. The instrument was accompanied to New Zealand by Dave Heffler (GSC Atlantic), RALPH's designer/developer, to assist with deployment, servicing and preliminary data processing. Detailed interpretation of the data will be in collaboration with Carl Amos (GSC Atlantic).

RALPH being lowered into place in the Manukau Harbour by helicopter. TVNZ filmed the deployment from another helicopter, seen in the background. (Photo: Mal Green)

We are especially interested in storms. Wind-generated waves, even in an enclosed estuary, may be capable of mobilising more than a hundred times more sediment than tidal currents acting alone. So, specifically, we want to evaluate the relative roles of waves and tidal currents in resuspending bed sediments and to investigate how sediment is exchanged between the shallow intertidal flats and the deeper channels. Knowledge of the former is needed to design the foundations for an estuarine sediment-transport model, which can be used to predict impacts of sediment pollution. The latter is the key to understanding the general circulation of sediment within the harbour.

The RALPH experiment will not be the last of its type in New Zealand. We have used the experience to develop plans for acquiring and operating our own sophisticated sensor package for measuring seabed boundary-layer flows in marine and estuarine environments. Pending Board approval of 1995-96 capital expenditure, NIWA's package, to be called ALICE, is expected to be ready for its maiden deployment in March 1996, on the continental shelf off Mangawhai (north of Auckland). The work is part of the NIWA research programme "Nearshore-offshore exchanges", which is investigating the cycling and transfer of matter and energy between the coast and offshore waters.

Mal Green and Rob Bell, NIWA, Hamilton

Upper photo:
RALPH, near low tide. At high tide RALPH was under 4 metres of water. The large cylindrical pressure cases house electronics, computers and a power supply. The small tube in the centre of the tripod is a flashlight used in photographing the seabed. RALPH's sensor suite includes optical backscatter sensors (for measuring suspended-sediment concentration), electromagnetic current meters (for measuring current speed and direction) and pressure sensors (for measuring waves and tides).
(Photo: Mal Green)