Case Study 1 – Estuarine Monitoring Programme

Introduction

Northland's estuaries are important economic, social and cultural assets, as well as being an important part of our coastal environment. Because estuaries and harbours are located at the end of the freshwater drainage system, they are affected by activities that occur in the rivers and streams that feed into them (their 'catchment').

Sediments and contaminants carried in freshwater tend to be deposited in our estuaries as when freshwater meets saltwater, it causes fine silts and clays to settle to the bottom, often with contaminants, such as bacteria, attached to them. These deposits can impact the health of the estuarine environment and can make a site unsuitable for activities such as kaimoana gathering and swimming.

Cockles are a popular shellfish and one of the species that can be affected by contaminants.

Many of Northland's estuaries have been changed or impacted by human activity. Vegetation clearance and development has increased sediment, and land-use activities have increased the amount of nutrients and metals in rivers and streams, which eventually enters our estuaries. In addition, significant areas of saltmarsh and mangrove forest in our estuaries, which can act as natural filters to sediment and contaminants, have been drained for agriculture, development and infrastructure.

The Council monitors and protects Northland's coastal environment, including estuaries and harbours, through the Regional Policy Statement for Northland and regional plans. The Council also runs an Estuarine Monitoring Programme (EMP) to help assess the health of our estuaries and monitor change over time. This programme also aims to identify the impact of human activities on these systems, assess the effectiveness of rules contained in the regional plans and promote awareness of environmental issues which impact estuarine health.

What does the EMP monitor?

The Council's EMP follows a standard methodology, developed by the Cawthron Institute, used by a number of Regional Councils in New Zealand. This means that the data collected by the Council is scientifically sound and can be compared to results collected elsewhere in the country.

The programme involves identifying catchment land-use and possible inputs into each estuarine system; sampling the physical (sediment grain size) and chemical properties (nutrient and metal contaminants) of the sediment, and recording the animals (biological communities) and habitats within the intertidal habitat of each estuary in the programme.

Coastal estuarine monitoring performance targets

Continue to implement and improve a prioritised State of the Environment (SoE) monitoring programme and monitor compliance with, and the effects of, the exercise of resource consents and Regional Plans by:

- Carry out a prioritised estuary health monitoring programme.

Regional Council monitoring staff take samples of one of the three estuaries monitored in Northland.

Key points

- 3 estuaries are monitored in Northland—Whāngārei harbour, the Kerikeri inlet and Ruakaka estuary.
- Sediment nutrient concentrations in all three were high compared to similar monitoring programmes in New Zealand.
- Sediment metal concentrations did not exceed recommended guidelines.
- Biological communities have been negatively affected by human activity.

A Regional Council laboratory technician sorts sediment from an estuarine sample.

What additional work is being done?

The Council introduced two new estuaries in 2009 - the Kaipara harbour and Whangaroa harbour. Monitoring results from these two estuaries will be processed later in the year.

To compliment the EMP, the Council has developed a programme to investigate sedimentation rates in our estuaries and harbours.

Sediment plates have been buried at all estuary monitoring sites in the EMP in order to measure the current rate at which sediment is deposited in these areas. Results from this programme will be used to indicate whether or not sedimentation rates also affect biological communities.

Biological Communities

Initial results from the three estuaries sampled in 2008 indicate that the biological communities have been negatively affected by human activity.

The biological communities at each monitoring site were found to be distinctly different from each other and there is evidence to suggest that these communities have been influenced by human disturbance.

The abundance of 'sensitive' species (those sensitive to human disturbance) was generally lower at sites where concentrations of metals and nutrients were found to be raised. On the other hand, species that are tolerant to human disturbance were generally more abundant at these sites.

In 2008, the Council monitored three Northland estuaries; the Whāngārei harbour, the Kerikeri inlet and the Ruakaka estuary. These estuaries have been chosen based on the land-use and activities that occur in their catchments. The catchment of Ruakaka estuary is largely dominated by grazed pasture; the catchment of the Kerikeri inlet contains a large amount of horticulture and the catchment of the Whāngārei harbour contains largely urban or industrial land-use.

Sediment runoff into the Whāngārei harbour.

Results from 2008

Nutrients

Sediment nutrient concentrations in the Whāngārei Harbour, Kerikeri Inlet and to a lesser extent the Ruakaka Estuary were high in comparison to concentrations recorded in similar monitoring programmes elsewhere in New Zealand. They were at levels that suggest these systems are 'enriched'. Nutrient enrichment can lead to excessive plant growth, which can in turn cause a rapid reduction in water quality, harmful algal blooms, shellfish contamination, fish kills and a reduction in the number of species present.

Metals

Sediment metal concentrations recorded in the Whangarei Harbour, Kerikeri Inlet and Ruakaka Estuary did not exceed the recommended guidelines in 2008, with the exception of nickel at one site in Kerikeri Inlet. However, metal concentrations were generally found to be above levels reported in similar monitoring programmes elsewhere in New Zealand.

In the Ruakaka Estuary, concentrations of zinc and lead were relatively high for an estuary with a largely rural catchment. Runoff from roading, urban areas, agricultural and horticultural land, and stormwater discharges are all likely sources of metal contamination in these catchments.

The image (above) shows the extent of the Ruakaka estuary. The red dots depict the two sites where samples are taken