

Coastal habitat mapping: technology for coastal management

The importance of coastal environments, including estuaries, harbours and beaches, is well recognised, as is the need to look after them.

But getting the information necessary to manage these areas appropriately has not always been easy.

Recently however, the Cawthron Institute developed a simple and cost effective tool for measuring the health of coastal areas that is proving very popular with regional councils.

While it may sound obvious, simply describing the coastal resources that are present is a vital first step for nearly all subsequent management.

Cawthron has addressed that first step by providing a standardised method for mapping the dominant substrates (mud, sand, cobble, rock, etc.) and vegetation (eelgrass, salt marsh, coastal plant species) onto aerial photos, which are used to develop an electronic baseline map using a Geographical Information System (GIS). (See picture at right).

The baseline map provides a broad overview of the extent and type of habitat present, which, when combined with a risk matrix, identifies areas for more detailed investigation (e.g. representative sites for long-term monitoring, and high risk areas).

In the long-term monitoring scenario, more detailed sampling is usually undertaken in the most common habitat type to indicate overall estuary or coastal condition using chemical and biological characteristics, for example analyses of the nutrients, metals, and the plants and animals present.

These measures provide a means for detecting habitat degradation, as well as measuring subsequent change over time.

The methodology was initially established with funding and support from the Ministry for the Environment Sustainable Management Fund and 11 regional councils from across the country, published as the Estuarine Environmental Assessment and Monitoring Protocol (EMP).

The aim was to develop a simple, robust design to cost effectively gather information on the health of estuaries.

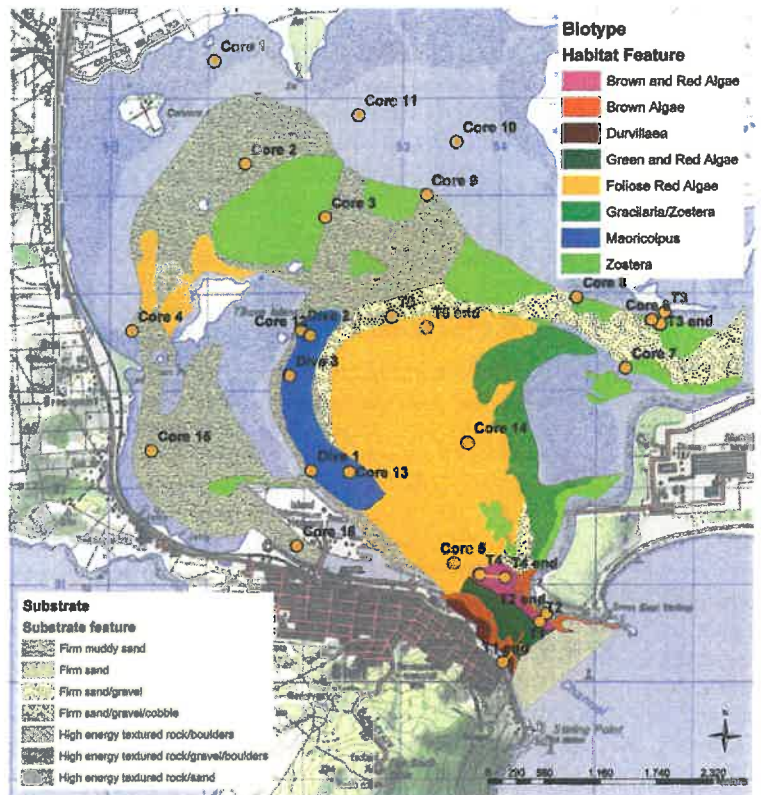
Cawthron has continued to expand the method by

incorporating beach and coastal areas, as well as sub-tidal habitat for different regional councils.

This expansion has involved a range of new sampling techniques including side-scan sonar imaging of harbour areas, as well as an adaptation of the United Kingdom coastal classification for use in New Zealand.

The outputs from the work have been used in a variety of ways, contributing directly to strategic planning, "state of the environment" reporting, the resource consent process, and in addressing pollution concerns.

It has also enabled priorities to be set to address (and to place in



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context) environmental pressures such as nutrient enrichment, effluent discharges, sedimentation, reclamation, aquaculture and vehicle use, and to identify areas where further information may be needed. The harbour and coastal components have proven very useful for the defensible selection of Aquaculture Management Areas AMAs - an issue most councils are currently grappling with.

Historical photos have also been used to demonstrate some remarkable changes in estuarine and coastal areas over the past 50 years.

The GIS format has allowed the size of habitat areas to be accurately measured. This has in particular highlighted changes in habitat composition and coverage, and the extent of reclamation and drainage along coastal margins. This type of output directly meets one of the MfE Confirmed Indicators for the Marine Environment (ME6, 2001) for assessing changes in the position and size of habitats over time. This is information that can be used to evaluate the implications of natural and human induced changes (and ultimately land use characteristics and related water and sediment quality) on the structure and function of an ecosystem.

Another component that has proved popular is the use of a very simple risk assessment matrix. (Above right) The matrix is used to define the level of concern associated with different pressures on a habitat in terms of potential sensitivity and consequence using a colour ranking from high (red) to low (green). The use of letters and numbers (A1-D4) enables further definition of the drivers for the level of concern based on the percentage of the resource affected, and the likely timeframe for recovery. Although the matrix does not confirm the presence of an impact, it does indicate where pressures may be present, and the

		RECOVERY FROM IMPACT			
		(SLOW) >10 years	5-10 years	1-4 years	(RAPID) <1 year
		1	2	3	4
% OF HABITAT AFFECTED	>50% (LARGE)	A1	A2	A3	A4
	30-50%	B1	B2	B3	B4
	10-30%	C1	C2	C3	C4
	0-10% (SMALL)	D1	D2	D3	D4

possible consequences associated with specific pressures should they occur.

Feedback from councils has been very positive. The visual presentation of information on maps and aerial photos has made a huge improvement in their ability to communicate the information to the public, something that has made their jobs much easier.

The ability of councils to compare their data to that collected elsewhere in the country has also proved especially valuable, enabling regions to place their results in a national context and gain a meaningful estimate of the quality and importance of the areas they are managing.

A common finding has been that estuaries and beaches are in a predominantly healthy condition, with only relatively small areas degraded by point source discharges. Historically, these point source discharges have often been the only parts monitored, thereby creating a false

impression that the entire estuary or beach is contaminated.

As pressure continues to increase on the coastal environment, being able to measure and assess the consequences of such pressure will become increasingly important. Councils need tools to effectively and efficiently manage their coastal environment.

Cawthron's monitoring methodology provides a popular tool to help councils meet their management obligations. ■

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Detailed sampling of estuary or coastal condition





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