Coastal News

Newsletter of the New Zealand Coastal Society

A Technical Group of IPENZ

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Contents

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Spartina – an alien sediment accumulator in our estuaries

An experiment underway in the Manukau Harbour will, for the first time, quantify rates of sediment dispersal from sites where Spartina anglica patches are being eradicated by spraying with the herbicide Gallant. The experiment is being undertaken for DoC to assess any adverse effects from sediment dispersal, including increased water turbidity, sedimentation and smothering of benthic communities. This study is being complemented by research on wave and sediment dynamics and looking at Spartina ecology by NIWA.

Figure 1: Aerial view of a Spartina meadow in the southern Manukau Harbour

Spartina (townsendii) was first introduced to New Zealand at the Manawatu River estuary in 1913 and from this site was introduced to many of our estuaries. Spartina anglica, is a fertile species derived from S. townsendii and S. alterniflora, which were introduced in the 1950s. As elsewhere, Spartina was introduced to New Zealand because of its sediment trapping abilities and use in estuary reclamation, for coastal protection and stock grazing. Today, this perennial marine grass that forms extensive intertidal meadows in many New Zealand estuaries and is now classified as a noxious weed.

Today, the interest in Spartina focuses on eradicating this noxious plant from New Zealand estuaries. The reason for this is that Spartina modifies the hydrodynamic conditions, allowing large quantities of fine sediments to accumulate and, in turn, these physical changes have adverse ecological effects. While moves are afoot to eradicate Spartina, there is no information is available on the likelihood and potential effects of sediment re-mobilised when the Spartina is eradicated.

Studies carried out by NIWA of wave and sediment dynamics in and about Spartina show that small differences in wave energy have large effects on the quantity and type of sediment accumulating in Spartina. Shell material, re-mobilised by waves and trapped in Spartina patches, facilitates the growth of Spartina patches and accumulation of muddy sediments. Insidiously, Spartina also promotes mud accumulation on intertidal sand flats, well beyond its own spatial extent, and modifies the estuarine environment in a profound way. Figure 1 shows an aerial view of a Spartina meadow in the southern Manukau Harbour. Here, mud is actively accumulating on the sand flats (foreground) in the lee of the meadow protected from wave action.

The Manukau Harbour eradication experiment focuses on 2 pairs of Spartina patches planted in the mid-1970s by a local farmer. The two pairs of

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Figure 2: Spraying a Spartina patch in the Manukau with Gallant in December 1999

patches are separated by 500 m of intertidal flat and have different exposures to wave action. Wave data show a decline in wave energy between the two sites. This energy gradient is also indicated by the increasing mud content of sediments across the sand flats. The Spartina patches at the less exposed site have denser growth, cover a larger area and have accumulated much more sediment (i.e., 150–250 m^3) compared with the patches at the more exposed site (i.e., <50 m^3). The bed elevation within the patches is as much as 0.75 m above the surrounding sand flats. One Spartina patch from each pair was sprayed with Gallant in December 1999 (Fig. 2) and since then the rate of plant decomposition and sediment erosion has been monitored. Previous work suggests that root decomposition will take at least one year. Sediment dispersal from the eradicated patches will of course depend on the wave climate.

The experiment incorporates a number of different techniques. Firstly, bed morphology and changes in patch sediment volumes are quantified by detailed surveying, at monthly intervals and on a 1-m grid to sub-centimetre accuracy. Figure 3 shows a digital elevation model of sediment accumulation in a Spartina patch. Secondly, sediment cores are used to determine above and below surface Spartina biomass, stem density and benthic fauna abundance and diversity, inside and outside the patches. These surveys are being repeated as the stem and roots decompose. In addition the sediment dispersal events can be related to the local wind-wave climate, measured by a DOBIE wave gauge deployed at the site since October 1999.

Results to date from the experiment show that Spartina decomposition and dispersal of sediment deposits following spraying will be a slow process. Although the Spartina stems decomposed within two months of spraying, the decomposition of the more massive root material is taking much longer. Figure 4 shows the average dry weight of root material, which is normalised by the sediment core volume. Note that the shaded symbols represent the treated Spartina patches. It is evident that there is substantial variability in root biomass between surveys and these data suggest that even seven months after spraying there has been negligible root decomposition.

The elevation surveys of the Spartina patches show that although there have been noticeable morphological changes between surveys; sediment

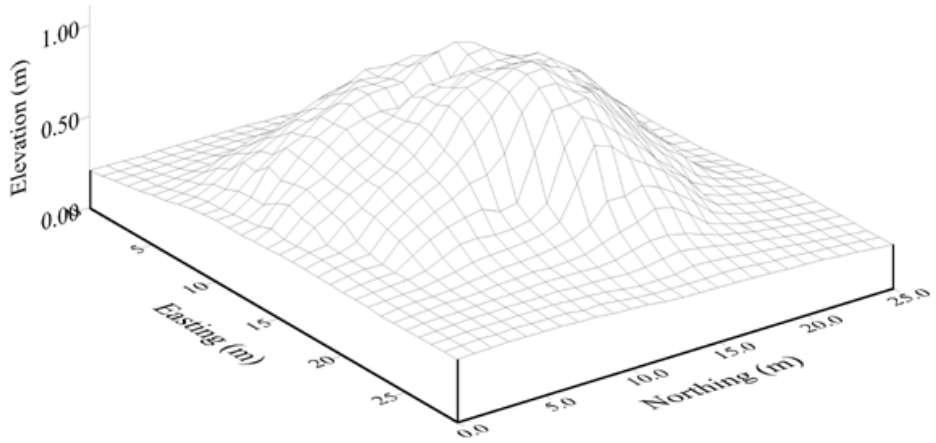

Figure 3: A digital elevation model of sediment accumulation in a Spartina patch. The accumulated fine sediment towers almost a meter above the surrounding sand flats

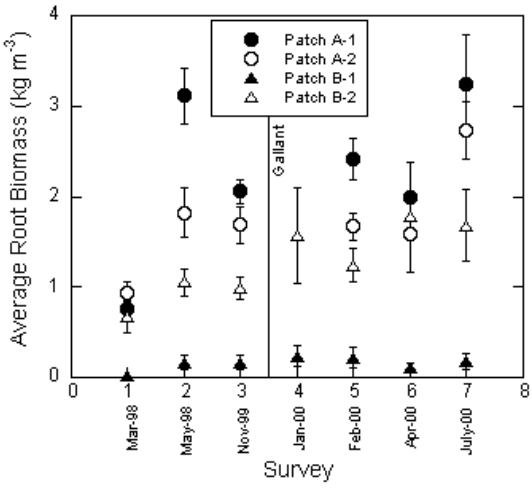

Figure 4: The average dry weight of root material, which is normalised by the sediment core volume. The shaded symbols represent the Spartina patches sprayed with Gallant in December 1999. It is evident that there is substantial variability in root biomass between surveys and that even seven months after spraying there has been negligible root decomposition

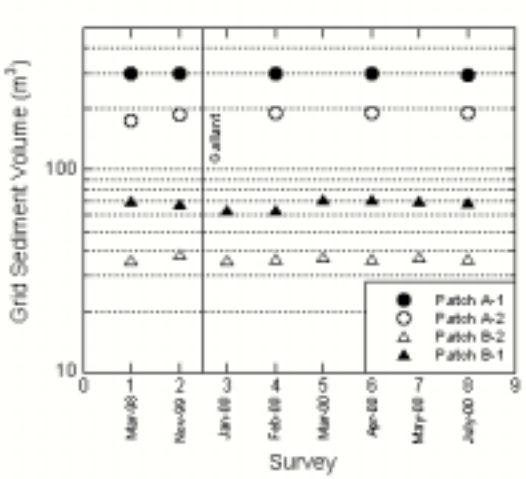

Figure 5: Changes in the volume of sediment trapped in the Spartina patches between March 1998 and July 2000

dispersal has been negligible (Figure 5). The smaller patches show more month-to-month variability in sediment volume than the large patches. This is due to the slightly greater wave exposure of the smaller patches and the fact that the larger patches have a much greater root biomass that effectively prevents sediment erosion.

Figure 6 shows the tide and wave record for the first 80 days of the experiment (i.e., since 1 December 1999). The near-bed wave orbital speed, which are shown as shaded circles, show that wave action at the site occurs episodically. Although wave heights (i.e., $H_s < 0.4$ m) and periods (i.e., $T < 4$ s) are small, wave orbital speeds can be as much as 0.4 m s^{-1}, which is more than adequate to mobilise intertidal sediments. The DOBIE record also shows that wave penetration, across the intertidal flats, to the site is more effective during spring tides (due to the increased water depth) and that wave height and period decays as the tide recedes. Consequently, even on the Manukau Harbours' relatively exposed intertidal flats the 'window-of-opportunity' for sediment dispersal from the Spartina patches is relatively small and depends on the coincidence of tides and windstorms. Analysis of wind and tide records shows that conditions favourable for sustained erosion events occur less than 1% of the time.

These studies show that Spartina is a highly effective sediment accumulator that is significantly modifying physical and biological characteristics of New Zealand estuaries. Further, eradicating Spartina the first step in restoring intertidal environments to their former character, will take time.

The studies were funded by the Department of Conservation and the Foundation for Research, Science and Technology (Contract CO1X0024, "The Effects of Sediments on Estuarine and Coastal Ecosystems").

By Andrew Swales, NIWA Hamilton
email: a.swales@niwa.cri.nz

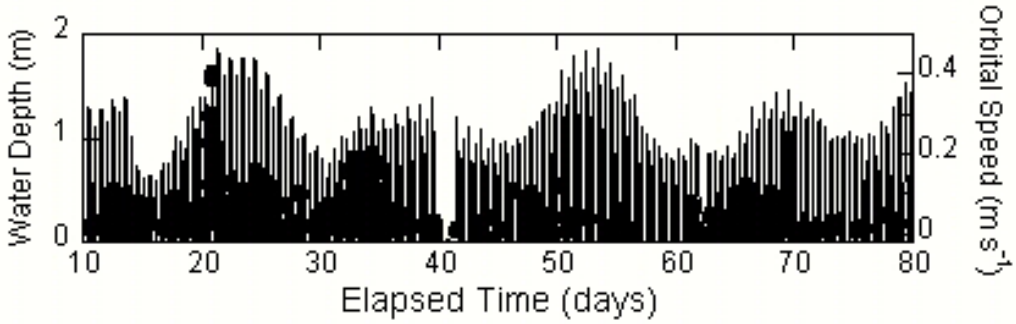

Figure 6: Tide (water depth) and wave (near-bed wave orbital currents) record for the first 80 days of the experiment (i.e., since 1 December 1999

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Committee News

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The NZCS has 283 members, of whom 250 are full financial, but 20 have still not paid their fees! We are also still seeking new members – so tell your friends.

The Committee is presently reviewing the Development Plan and progress with reference to the Plan.

Last year's Coastal Society Seminar, held in Wellington posted a small profit. Finances are in a good state, with money still to come in from some outstanding sources of past years. Revenue from the newsletter could be improved with more advertising, so if anyone needs to place advertisement, please contact the Editor.

The upcoming Seminar to be held in Auckland in October will be targeted to the Plan requirements. The Seminar will be held in Auckland on 12 and 13 October, with Sandra Lee as one confirmed guest speaker (refer to main article for more information).

The AGM for the NZCS will be held on October 12, before the Seminar begins. No nominations will be received for the Committee from the floor – so please get these to the secretary before the AGM. Fred Smits would like to advise that he will be standing down as Treasurer, and Sharyn Westlake will be standing down as Secretary.

Your Committee is presently drafting criteria for student sponsorship to remove the ad-hoc approach presently taken with regard to sponsoring students to attend Coastal events.

The NZCS website is under development and can be viewed at www.cae.canterbury.ac.nz/nzcs/NZCS.htm.

The committee is reviewing the possibilities for Libraries to hold the NZCS library collection. Present thinking is that the best venue is likely to be the Energy Library, although some issues with this option still need to be resolved.

No feedback has yet been received from MfE regarding the NZCS submission on the Coastal Indicators. We are following this up with MfE.

The IPENZ Technical Group Seminar will be held on 5 September. One of the objectives of the Seminar is to evaluate how IPENZ may better meet the needs of technical groups. NZCS will be represented at the seminar by Richard Reinen-Hamill and Jo Fagan.

New Zealand Coastal Society – Seminar 2000
Coastal Management in New Zealand: Theory vs. Practise

Date: 12 & 13 of October 2000

Venue: National Maritime Museum,
Quay Street, Auckland

The aim of this year's Coastal Society Seminar is to take a critical look at how well coastal management and scientific theory is meshing with reality in the 21st Century. We will focus on the three major themes, which have been identified in the Society's development plan, being:

- Coastal development
- Coastal monitoring
- Sea level rise and climate change

Three keynote speakers will provide information and theory on these topics, allowing participants to gain an understanding of the 'state of art'. Then participants will get out into the field and visit sites to test or assess the applicability of theory to the real world. Groups will consider the implications of development, the usefulness of coastal monitoring and how it should be implemented, and implications for sea level rise and climate change.

Finally, facilitated sessions will be held in order to determine the degree to which reality reflects theory, and to identify gaps in knowledge, practice and skills. These sessions seek to both challenges current conventions, and provide a positive atmosphere for developing regional and national perspectives on coastal issues.

The output from the seminar will be a series of observational critiques, asking how well we are doing in relation to the three key topic, and identifying potential future actions for best practice.

Registration Fees	Before 25/9	After 25/9
NZCS Member	$270	$300
Non-member	$300	$330
Full Time Student	$150	$180

Fees include tea, coffee, lunch, seminar dinner and Field Trip.

Contact Details

The NZCS 2000 Seminar
c/o Auckland Regional Council, Private Bag 92012 , Auckland
Phone: 09 366 2000, ext. 8401 (Stacey Devine)
Fax: 09 366 2155

What is IPENZ?

John Gardiner, Deputy Chief Executive of IPENZ, tells us about the organisation that provides the NZ Coastal Society with valuable administrative and financial support. NZCS members are affiliated to IPENZ.

The Institution of Professional Engineers New Zealand (IPENZ) is the professional body for professional engineers and technologists in New Zealand. Membership, which currently totals 8,000, is competency based with membership being in three main classes. These classes are Members (generally 4 year degrees plus at least 4 years experience post graduation), Technologists (3 years plus 4 years experience) and Engineering Associates (2 years tertiary qualification and experience). There is a Graduate Class for those with the educational qualifications and are developing the competencies for full membership. The Affiliate Class is an open membership class for those that are interested in the aims of IPENZ and wish to participate through membership.

A significant component of the activities of IPENZ are the processes involved in assessing and maintaining these competency systems. These include accreditation of degrees, monitoring the competency development of graduates, auditing continuing professional development, assessing competencies through the Professional Review. IPENZ also is actively involved in developing agreements with other engineering institutions that facilitates mobility of New Zealand engineers offshore.

Like any professional engineering body, one particularly important area of activity is assisting members with the acquisition of knowledge and the development of engineering practice standards. Two of our main means of delivering these to members is our Branches and Technical Groups. There are nine branches (including one in the United Kingdom) and twenty-two technical groups, of which the NZ Coastal Society is one. The Technical Groups are unique in that they also have among their members' people who are not members of IPENZ. These Groups cover a range of engineering disciplines and related sectors. Examples are; energy management, structural engineering, local government engineers and geotechnical engineering. IPENZ assists these groups through the provision of database and financial systems. Other means that IPENZ has to assist members to acquire and apply knowledge include our bi-monthly magazine "e.nz", weekly e-mail magazine, peer reviewed "Transactions", access to the knowledge base of other institutions through co-operation agreements and our web site www.ipenz.org.nz

One key responsibility of IPENZ is to raise the profile of engineering in the eyes of the public and decision-makers. This year, one of the key platforms for this is the Presidential Road show. This has involved local members, community groups, business interests and local government coming together and identifying ways that engineering and technology can be used to improve their local health, wealth and safety. Awareness by the next generation of the importance of engineering and technology is seen as the key to the development of a knowledge economy. IPENZ has a "Neighbourhood Engineers" programme that links engineers and engineering organisations with schools. This is designed to support the technology curriculum and give teachers and students a feel for what engineering is and how it underpins and provides our quality of life. It also provides them with information to consider engineering and technology as a rewarding career choice. In the last two years IPENZ has also run a national Congress which as focused on the economic policy options for New Zealand and what we need to do has a nation to develop a knowledge economy. This event has been very successful in positioning professional engineers in the debate about New Zealand's future.

John Gardiner, Deputy Chief Executive, IPENZ

Photo caption competition

And the winner is: Heather Lunn, Environment Canterbury with:

"Dr Duder & Dr Lumsden's Thatching Lotion".....'Only minutes ago I, and all my colleges here beside me, were bald as badgers. Now thanks to this lotion we're all chick magnet's.'

Heather your prize is in the mail!

Feeding the Beaches at Mt Maunganui to make them safer

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In December 1998, a young boy was digging a tunnel into a steep eroded dune face at Mt. Maunganui Beach, which then collapsed and completely buried him. If his diligent Aunty had not returned so promptly from her car, this little tunneller may not have survived. This remarkably close call raised deep concern over the state of this part of the Marine Parade beach, where erosion had cut steep dune scarps along the shore (see photo below). In contrast, the "Main Beach" between Mt. Maunganui Surf Club and Moturiki Island was in good condition, with a wide, gently sloped berm. The safer condition of the dunes in this area was largely due to the Port of Tauranga Limited having replenished this beach, using high quality sand from channel dredging at the entrance to the harbour.

On Marine Parade beach the erosion scarps cut by storms were slow to repair, and it was evident that some short-term dune retreat was also occurring. The lack of any beach profile measurements in the area meant the amount of erosion was difficult to quantify. However, at a location where fixed sandladders installed by Coast Care members crossed the dune it was evident that over 12 m of dune had been taken by the sea. Where there once was a dune, there was now only an eroded beach and swirling high tides. The high tides covering the beach resulted in more and more people using the remaining vegetated dune for recreation. It was obvious that all the good work achieved by local Coast Care members to improve and protect dune function was being undermined, literally. Clearly, to promote sustainable dune repair, this beach needed more sand.

The Port of Tauranga Limited (POTL) was at hand to assist. With the existing dredging consent having expired, hearings for a new consent concluded with an amicable agreement that POTL and the Mt. Maunganui Coast Care group co-operate on a campaign to replenish the affected area of beach. POTL was able to supply up to 120,000 cubic metres of high-grade clean sand from harbour entrance dredging. The cutter suction dredge Pelican took the sand, south to Marine Parade to the disposal grounds in about 7 m water depth. From the shallow nearshore low swell can comb the sand back to the beaches. For the current year, delays in the consent process have restricted the available sand to 37,000 cubic metres.

The dredge MV Pelican steaming to the disposal site

The Pelican's split-hull opening and dropping its load of sand to the seabed

Dune scarp on Marine Parade beach in the winter of 1999

To retain this new sand within the beach system, Mt. Maunganui Coast Care members are work towards improving the quantity and quality of native dune vegetation. It is anticipated that this work will help trap new sand in incipient dunes as it comes ashore from the seabed. The growth of existing Spinifex and Pingao is being stimulated by applying N-Rich Urea (donated by BOP Fertiliser Ltd.) to improve their sand trapping abilities. Also

additional Spinifex and Pingao are being planted where necessary to contain new sand in the foredune. However it is anticipated that urea application will provide the desired result over most of the area, with little need to resort to the more expensive replanting option.

This is a great opportunity for two prominent local organisations to work closely together, for the improvement of the coastal environment. Additionally, it is also a demonstration of the Resource Management Act providing positive outcomes for sustainable management.

Greg Jenks, Regional Coast Care Co-ordinator, Environment B.O.P, and Tony Reynish, Property Manager, Port of Tauranga Ltd.

"The New Zealand Coast: Te Tai O Aotearoa"

A book on the New Zealand coast is about to hit the market. It will take the form of an edited volume, and aims to provide a review of contemporary New Zealand coastal science, and a view to how an increased understanding of the unique New Zealand coast will improve our relationship with the coast in the new millennium. Each chapter is being written by relevant experts from CRI's, Universities, local government authorities and consultancies. The chapters will all be edited and peer reviewed before publication, which is planned for early 2001. Chapter topics include tectonic history, physical oceanography, extreme events, shelf environments, sandy beaches, gravelly beaches, barriers and dunes, estuaries, coastal wetlands, archaeology at the coast, pollution and coastal management.

The book is being part-funded by the Coastal Society and some Regional Councils. It is hoped that "The New Zealand Coast" will be a publication of equivalent stature and success as the New Zealand Hydrological Society's "Waters of New Zealand", and will be a useful reference for all students and practitioners working in the coastal environment, including local iwi, geographers, geologists, engineers, conservationists, recreational users and the general public.

Helen Rouse, West Coast Regional Council

2001 Geography, a Spatial Odyssey

The NZ Geographical Society and the Institute of Australian Geographers are holding a joint conference over Monday 29 January - Friday 2 February 2001. The conference will be hosted by the Otago Branch of the New Zealand Geographical Society in Dunedin. The conference themes are Journeys and movement, Spaces and places, The future, New frontiers in geographical teaching in schools and, Environmental change.

The conference will be preceded by a pre-conference field trip to southern New Zealand. This trip should appeal to those with an interest in the ecology and geomorphology of the dune systems of coastal Southland and Stewart Island. Stewart Island contains some of New Zealand's most spectacular and best-preserved dune systems. The trip will run from Wednesday 24 to Sunday 29 January and be hosted by Dr Mike Hilton. Places are limited to 12 persons so book early. Mike assures us that a high level of fitness is not required, but when you are visiting places with names like The Catlins and Little Hellfire with a guide like Mike, who can tell?

For further information contact Pam Quin, Division of Science, University of Otago, PO Box 56 Dunedin, New Zealand (e-mail pam.quin@stonebow.otago.ac.nz), or see the Conference web site at www.geography.otago.ac.nz for further details of the Conference or field trip, and images of the sites to be visited.

National Beach Care Day 2000

The Papamoa Domain Surf Club at Papamoa Beach is the venue for National Beach Care Day 2000 on Sunday 15 October. The aim of the day is to provide community volunteers with opportunities to learn more about their coastal environment, to share ideas on problem solving, and to have a well-deserved and fun day out.

Most of the people who are attending are members of Coast / Beach Care groups, Coastal Management agencies and industry representative. They are individuals with commitment who combine their individually unique skills to maintain and

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enhance our beautiful beaches and coastal ecosystems.

The day will be started by Marian Hobbs the Minister for the Environment, and will include presentations on the evolution of Coast Care, CamEra video monitoring of the environment, Papamoa Beach projects, the Coastal Dune Vegetation Network, the Artificial Surfing Reef Project, and a trip to Papamoa east. A special programme will be run for children by Environment BOP's Pollution Busters club.

For additional information and/or registration (closes 2 October 2000) contact Greg Jenks or Lucy Brake on 0800 368267.

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Orrin Pilkey takes the Stand

Professor Orrin Pilkey, well known for his outspoken criticism of engineering intervention on the coast, gave inspiring lectures at the Auckland and Waikato Branches of the NZ Coastal Society in May. His evening lecture was particularly well attended in Hamilton, where nearly 90 people were generously hosted at Environment Waikato.

In his lecture, "Rising sea level and shifting shores – how do we solve the erosion problem", Orrin made the point that of all the problems that seem to follow the world's rush to the shoreline, none is more visible than the coastal erosion issue. The visibility is created by the sight of buildings falling into the sea and the presence of sometimes spectacularly massive sea walls designed to hold the mobile shoreline in place. Huge costs incurred by some governments, (e.g. Taiwan and Japan) in attempts to hold their shorelines in place and to save beachfront buildings add to the perception of the problem. Although there are no hard numbers, it is probable that more than 80% of the world's shorelines are eroding, some at rates of centimetres per year and others at rates of meters per year. A recent report on coastal hazards in the United States has predicted up to 1500 homes per year being lost to coastal erosion, with annual national costs of about US $500 million.

Orrin discussed the 3 alternative approaches to erosion management. Firstly hard stabilization which involves any method of holding the shoreline in place using fixed hard objects (e.g., walls and groynes). The advantages are: (1) hard shoreline stabilization is the best way to preserve beachfront property, the bigger the wall the better. The disadvantages are: (1) degradation and eventual destruction of the beach, (2) cost, (3) it restricts access, and (4) it's ugly. Secondly, soft stabilization involving beach nourishment or holding the shoreline in place by placing of sand from an outside source on a beach, provides a "soft" way to combat erosion. The advantages of nourishment are that it: (1) 'improves' the beach and (2) protects buildings while the beach is in place. The disadvantages are that it's (1) costly and (2) temporary. Lastly relocation, sometimes referred to as retreat, this is the do-nothing (and let houses fall in) or move 'em back approach. However it is done, this alternative allows nature and the sea level rise to roll on. The advantages are: (1) saves the beach and (2) saves shoreline stabilization costs. The disadvantages are: (1) that politically it's very difficult, (2) that it could be financially costly if government is required to purchase buildings, and (3) a loss of land.

The facts of life. There are miles and miles of heavily developed shorelines in North America and Japan, from which lot of hard lessons can be taken and applied to the New Zealand situation. Lesson #1. It seems to be a universal truth that the first thing people want to do when they confront an erosion problem is to build a hard structure. But it is best to start "soft" and then go "hard" especially if preservation of the beach is a priority.

Lesson # 2. The soft solution can be very costly. Typically on the major nourished beaches of the East Coast of the US the cost has come down to US $10,000 per beachfront house per year. Nourishment is a real gift to beachfront property owners from the taxpayers especially since they caused the problem to begin with.

Lesson # 3 Take a hard look at what is being preserved. Why for example, protect parkland? Does it really create problems to let park beaches retreat? Can the buildings be moved? Are they worth the cost of nourishment?

Lesson # 4. Once you start, you can't stop. Once hard stabilization is put in, it is essentially never removed. Hard structures will grow larger over the coming decades. Even more critical; hard struc-

tures very frequently cause erosion on adjacent beaches leading to a proliferation of more hard structures.

Orrin Pilkey is the James B. Duke Professor of Geology and Director of the Program for the Study of Developed Shorelines (PSDS) within the Division of Earth and Ocean Science at Duke University, North Carolina, USA.

Currently PSDS research focuses on beach replenishment and other forms of shoreline stabilization, evaluation of the validity of mathematical models of beach behaviour, hazard risk mapping on barrier islands, sedimentary processes on shorefaces, mitigation of hurricane property damage on barriers, and principles of barrier island evolution in Colombia, South America (see the PSDS web site at http://www.geo.duke.edu/Research/psds/psds.htm). Orrin was in New Zealand as a keynote speaker at ICS2000. His visit to New Zealand was sponsored by NIWA's Visiting Scientist Programme (Contract VSM002).

Terry Hume, NIWA

Profiles of Committee Members

Dr Terry Hume is a coastal scientist and Assistant Regional Manager at NIWA in Hamilton. He is a marine geologist/coastal oceanographer with current interests in large scale coastal process, including sand storage in east coast beaches and embayments, movement and storage of sand in the open west coast sand systems, the role of headlands and tidal inlets in controlling sand bypassing and storage on the coast, sedimentation and infilling in estuaries and estuary classification. Terry is the Editor of *Coastal News.*

Richard Reinen-Hamill (ME) is a Senior Coastal Engineer and a principal of Tonkin & Taylor Ltd. He specialised in coastal process studies and the design of coastal management systems and marine works. Prior to working with Tonkin & Taylor he spent 4 years at the Delft Hydraulics Research Institute. He is interested in the management of the coastal margins and the impacts of human development and the improvement in understanding and knowledge of the coastal system.

Sharyn Westlake (BE (Civil), DipHE, MSc, MIPENZ, RegEng) is a senior Coastal/Marine Engineer with Opus International Consultants Ltd, based in Wellington. Sharyn joined Opus in 1996 after working overseas in the USA, England and studies and work in the Netherlands. With Opus, Sharyn has been involved with projects throughout New Zealand and in Samoa. Sharyn has a background in the investigation, design and management of coastal protection schemes and erosion management strategies, and has had extensive involvement with coastal hazard and risk studies. She is a Board Member of the Institution of Professional Engineers New Zealand and Secretary of the New Zealand Coastal Society.

East Coast beaches suffer in the June-July 2000 Storms

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From late June this year there was a period of 30 days of continuous easterly wave conditions, which brought erosion to the northeast coast of the North Island. The heavy seas were generated by a low-pressure area to the north of New Zealand which was prevented from moving east and away from New Zealand by a high pressure area centered over the Chatham Islands.

Harvey Brookes of the Auckland Regional Council describes the wave activity recorded by the ARC wave rider buoy, moored in 50 m water depth north of Mokohinau Islands, as consisting of three separate events. The first event occurred on the 28 June when wave heights exceeded 4 m for 24 hours. The second event occurred between 4-7 July with waves of 3.5-4 m and occasional peaks to 7-9 m, while a wave of 12.4 m height was measured on 9 July. The third event was the most severe with waves in excess of 5 m being recorded for 36 hours from 15-16 July.

Beach profiles were measured from Whangapoua Beach to Poverty Bay between 14 and 23 July to assess the effect of these three events on coastline stability. In addition the Auckland Regional Council surveyed Pakiri Beach and also reported local erosion at a number of beaches immediately north of Auckland City. Environment Waikato surveyed beach profiles in the northern Coromandel and at Oputere.

Beach profile surveys revealed that both Pakiri and Mangawhai beaches, were eroded and that the dune toe was scarped. At the worst affected site P7 at the southern half of Pakiri Beach, a scarp in excess of 5 m height was observed. For the rest of the beach the scarp was about 3 m. The northern end of Omaha and Long bay were eroded and the remaining north Auckland beaches were lowered to some extent. Takapuna Beach was cut to bed rock on the lower beachface.

Figure 2:Whiritoa beach illustrating the cut back beach with no dune scarping on the coarse sand beaches of the Coromandel

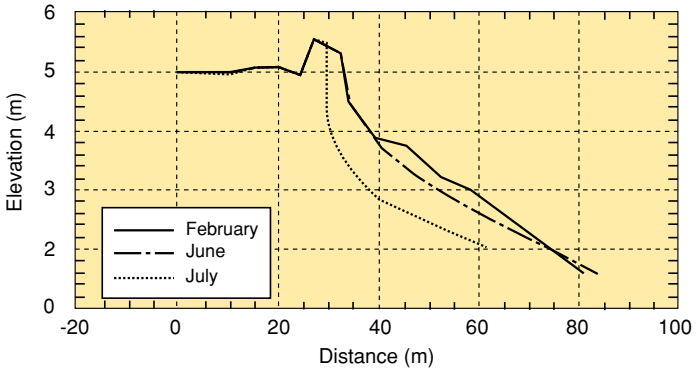

Figure 3: Beach profiles at site 31, Cooks Beach, for February, June and July 2000 showing the lowering of the beach face and the retreat of the dune scarp

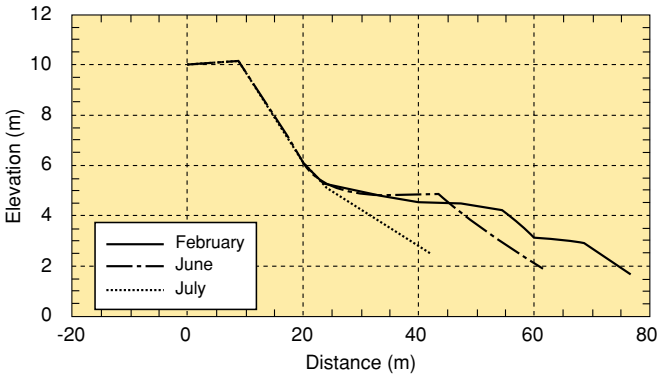

Figure 1: Whiritoa beach showing the retreat of the beach face during the July storm sequence. Note there was no damage to the dune toe

On the Coromandel beaches there were very mixed responses to the storm waves. In general coarse sand beaches retreated towards the dune toe but no scarp was cut (Figs 1 and 2). On the fine sand beaches the beach face was lowered and waves attacked the dune toe cutting a scarp (Fig. 3). At Cooks Beach the lowering of the beach was sufficient to expose the top of sand bags placed on the beach in 1978 as part of the

Figure 4: Cooks Beach showing the erosion of the dune toe exposing the rock works along the front of the beach. In the foreground are the tops of sand bags placed on the beach is 1978

beach protection after storms in that year.

Further to the south in the Bay of Plenty the storms caused considerable damage to the dune face from Waihi to Matata, but there was less damage to beaches lying further towards the east. At Ohope there was no damage at West End and only minor lowering of the beach in the middle of Ohope Spit.

Meanwhile in Poverty Bay the beaches were sheltered from the storms and the beaches surveyed there were in a well-nourished condition. This is similar to what happened in 1978. In contrast and during the 1974 storms Poverty Bay as well as the Bay of Plenty beaches suffered similar amounts of erosion.

On the whole, damage to beaches during the storms was quite variable and appears to reflect beach exposure. Beaches like Whangapoua were untouched, while those such as Cooks Beach, Hahei, Pukehina and Otamarakau suffered quite serious dune scarping. One of the most noticeable aspects of the storm damage in the Bay of Plenty was the pattern of broad curving embayments cuts in the shoreline made by the waves. These embayments were 200-250 m long and cut landwards for 5-10 m and were separated by small sandy headlands where there was little or no damage to the dunes. Similar features are called 'rip current embayments' because of their association with rip currents. Figure 5 shows an example of such an embayment on Otamarakau Beach where the dunes have been cut back some 10 m behind the line of the sandy headlands.

From a coastal planning and hazard assessment point of view it would be nice to estimate the frequency of the June-July event(s). This is difficult as in this case the storm damage was the culmination of a number of closely spaced events. There have certainly been bigger individual storms in the Bay of Plenty for instance in 1936, 1946, 1954 and 1968, but unfortunately we do not have data to establish the amount of beach erosion sustained during those events. The 1968 "Wahine" storm (Cyclone Giselle) caused a lot of flooding due to storm surge, but there is little recorded about coastline erosion associated with that event. First impressions are that the erosion is not as serious as that in 1919 or 1978 when a series of events caused severe coastal erosion. At this stage the best estimate is that the storms of July 2000 are possibly of a 20-25 year frequency.

Keith Smith, NIWA, Hamilton

Figure 5: Looking along the beach at Otamarakau showing the wave cut scarp in the middle distance to the right and the undamaged beach in the middle distance centre left

Coastal News

Activities in the Branches

On 21 March the Auckland Branch were hosted by ARC Environment to hear the following presentations:

- 'The wave climate strategy for the Auckland region' by Harvey Brookes
- 'Hazard management: Omaha Beach' by Ewan Henderson of Boffa Miskell and Richard Reinin-Hamill of Tonkin and Taylor

On 2 May Auckland Branch were hosted by the School of Engineering at the University of Auckland to hear Professor Orrin Pilkey give a presentation entitled: 'Rising sea level and shifting shores – how do we solve the erosion problem'. Orrin Pilkey of Duke University in South Carolina is well known for his outspoken criticism of engineering intervention on the coast. On 4 May Orrin gave a similar presentation to a meeting of the Hamilton Branch, where nearly 90 people were generously hosted at Environment Waikato (see summary of his presentation on page 8).

Coastal News

ICS2000 Conference

The 6th International Coastal Symposium was held at Rotorua from 24-28 April 2000. The theme of the conference was "Challenges for the 21st Century in Coastal Sciences, Engineering and Environment". The conference was organised around a series of formal paper presentations, poster displays, and three significant field excursions, including trips to:

- Ohiwa Harbour, Ohope barrier-Rangitaiki coastal plains (half day);
- Tauranga harbour/Bay of Plenty (half day); and
- Miranda, Firth of Thames, Thames, Tairua (full day).

Keynote Addresses

Three keynotes addresses were given at the conference, presented by:

- Professor Kerry Black of the University of Waikato: 'Artificial surfing reefs for erosion control and amenity'
- Professor Orrin Pilkey of Duke University, South Carolina: 'A global view of barrier islands'
- Professor Bob Dean of the University of Florida: 'Equilibrium beach profiles: recent results and new applications'

Papers Presented

Some 106 papers were presented on a variety of topics including: Sediment transport, sand-gravel beaches, data collection methodologies, coastal geomorphology, storm surge and sea-level rise, tidal inlets and estuaries, waves, coastal protection, numerical modelling, dune vegetation and processes, video monitoring, muddy coasts, coastal oceanography and coastal management.

A special issue of the Journal of Coastal Research is to be published which will contain most of the papers presented.

NZCS Poster(s)

The NZ Coastal Society posters developed by Ewen Henderson were successfully displayed in the foyer of the conference venue. Some impact was lost by us not being able to display them all together, but still the overall impression was very good and gave good exposure to the NZCS.

General

As a general comment, the conference presented a good range of papers from science and management perspectives. Coastal geomorphology seemed to be well represented. I understand there was a perceived lack of input from the coastal engineering point of view, however as a non-engineer I found that quite refreshing. With the biannual Australasian coastal and port engineering series, I don't think any such lack should cause too much concern.

Overall I thought New Zealand's level of attainment in terms of coastal science and management rated very well, and in some respects, outstandingly compared to overseas sourced papers. The technical material presented from NZ was amongst the most informative provided, and the papers more pitched at management were equally interesting, and suggested our system of coastal management in NZ is well advanced of many other nations.

Professor Terry Healy and his organising committee are to be congratulated for the success of the symposium.

Harvey Brookes

Whats hot on the Web

Water safety

The site for Water Safety New Zealand (WSNZ), the national organisation responsible for leading, profiling and achieving water safety in New Zealand. Its prime focus is to ensure everyone in New Zealand will have the water safe attitudes, skills and behaviour necessary to use and enjoy water environments safely. Collectively, WSNZ represents the wide focus of water safety and drowning prevention in New Zealand.

http://www.watersafety.org.nz/

Australian coastal scene

An informative site about happening on the Australian coast, including tourism, coastal environment news, live video, daily surf, fishing and diving reports, live weather stations

http://www.coastalwatch.com.au/default.asp

NZCS Website

Don't forget that the New Zealand Coastal Society now has its own web presence — and we're looking for feedback and suggestions please!

See page 16 for details.

Society seeks funding for Major Project

The Coastal Society has developed a proposal for the purpose of seeking funding to assist with a large multi-disciplinary project that will lead to the publication of *Guidelines for the Sustainable Management of the New Zealand Coastline*. The main goal of this project will be to provide best practice guidelines that identify, explain and promote the necessary strategies. This means, not only providing guidance for coping with present coastal management issues, but also allowing for future development in a manner that is consistent with maintenance of the physical, cultural and ecological integrity of New Zealand's coasts.

Why the Project is Necessary

The coastline of New Zealand is around 11,000 km long and is blessed with a tremendous range of ecosystems, habitats and landscapes. The coast supports substantial economic and social wealth. Its importance to New Zealanders is enshrined in the Resource Management Act 1991 where preservation of the natural character of the coastal environment, and its protection from inappropriate subdivision, use, and development, are recognised as matters of national importance.

Proper coastal management requires a multi-disciplinary approach. Among the skills are, planning, law, geomorphology, biology, geology, engineering, oceanography and meteorology. Most practitioners involved in the coastal zone tend to have a specialised knowledge in just one or two of these areas and, sometimes, little appreciation of the complex nature of most resource problems. They may also be ill-equipped to deal with cultural, social and economic issues that can arise.

Furthermore, since introduction of the Resource Management Act (1991), members of the public have been brought into decision-making processes to a much greater extent but the community-at-large often struggles to understand the issues involved.

At present there is no one resource that offers a comprehensive review of coastal management problem-solving and assists practitioners to balance the often competing and conflicting demands of coastal resource use, hazard mitigation, economic development and conservation.

The principal outcome of this project will be a published set of guidelines that will provide local authority and central government planners, and scientists, consultants, engineers, environmentalists, academics and lay people with essential information to enable them to make informed and rational decisions about coastal issues.

It is proposed to include an extensive bibliography to assist those who require additional information about a particular topic, and to arrange seminars/workshops following publication.

Central to all of this will be the need to not lose sight of the social and economic drivers and obstacles underlying environmental management. The proposed publication and other outputs from the project are expected to foster an integrated approach to sustainable management of the coastline, and change the way people think about the coast. In achieving this goal, the Society will have made a major contribution towards sustainability in New Zealand.

The steering group responsible for putting these proposals together includes Harvey Brookes, Jim Dahm, Mike Hilton, Terry Hume and John Lumsden. Many other Coastal Society members have provided comment and the proposal has received wide support from regional councils, TLAs and various government agencies.

A draft list of contents will soon be placed on the Coastal Society's web site and Coastal Society members will be kept informed as the project proceeds. Members are invited to comment and any offers of help, either in the form of expertise or funding, will be gratefully received.

John Lumsden
Project Director
j.lumsden@cae.canterbury.ac.nz

The Coastal Erosion Management Manual and the Coastal Hazard Strategy

Coastal News

Introduction

The ARC's statutory responsibilities require it to address coastal hazards in terms of avoidance and mitigation. These can be thought of as two questions:

"What can we do to avoid hazards?" **and**

"What can we do once they are present?"

The first question requires an assessment of the scale and degree of the actual or potential hazards in the Auckland region. This then allows strategies to be set in place to either avoid them, or mitigate the effect of their presence. This can be achieved most readily through land use controls in district and regional plans. The *Coastal Hazard Strategy* has been developed to implement a process to achieve this.

Once development has occurred to the point where a hazard is present, the only option available is to mitigate it.

The most common coastal hazard is coastal erosion. Mitigation of the coastal erosion hazard can be through modifications to natural processes, e.g. the construction of seawalls, groynes and the like, or by the enhancement of natural buffers, e.g. beach nourishment.

The *Coastal Erosion Management Manual* has been developed to provide guidance on coastal erosion mitigation techniques.

Strategic Approach

The project design system used by the Coastal Environment Section is illustrated below. This system is used to determine where the greatest mutual benefits can be gained from each programme, not only in terms of coastal hazard management, but sustainable coastal management in general.

Development of a Coastal Hazards Strategy

To give effect to the direction of the proposed regional plan: coastal, the coastal hazard strategy has been developed. The CHS sets out a broad philosophy for coastal hazard management, as well as integrating it within the wider hazard management framework established by the ARC, which is set out in the regional policy statement.

The strategy therefore acts as both an information source and a summary of the way in which the arc will approach coastal hazards in the medium to long term (5 to 10 years).

Using the above programmes as a guide, application and implementation of coastal hazard techniques along the Auckland coastline was considered. In brief this process had 3 aims:

- To spread the benefits and technical knowledge from coastal hazard assessments across the TLA's of the region;
- To ensure that a representative set of coastal environments were assessed, so that techniques could be evaluated in terms of their applicability to specific coastal geology; and
- To choose sites where coastal hazard information would be of strategic and technical relevance and

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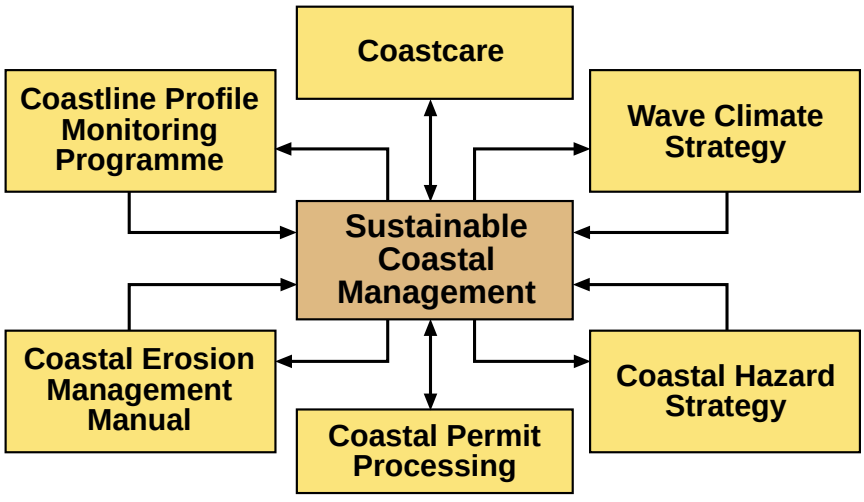

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would assist the ARC and TLA's in meeting their statutory duties.

The Coastal Erosion Management Manual

The Coastal Erosion Management Manual (CEMM) brings together the contemporary knowledge of coastal erosion management relevant to the Auckland region.

It provides information to assist people who have an interest in coastal erosion management. It includes information on the nature of the coastal erosion hazard, the processes that cause or contribute towards coastal erosion, and information on the potential environmental effects of implementing a particular coastal erosion management response.

Content of the Manual

The CEMM has two parts. Part 1 introduces and discusses coastal erosion management. Part 2 provides further details of the issues, identifies data sources and indicates appropriate references for design purposes.

Availability

The CHS and CEMM are now available in hard copy, or as a CD Rom. The hard copy document is approximately 400 (full colour) pages long and comes in a hard wearing plastic ring binder. Cost = $129.00 (incl. GST). The CD Rom is in MWS Word format, and is available at $49.00 (incl GST).

To order your copy of the document, please contact Harvey Brookes, Auckland Regional Council, Ph (09) 366 2000 ext 8190, or e-mail hbrookes@arc.govt.nz.

Harvey Brookes Auckland Regional Council

NZCS Website

A New Zealand Coastal Society website has been up and running for some months now. We have been asking members for comments on the design and what sort of material we should have on it, but to date we have only received one (positive) comment back! Please visit the site at: www.cae.canterbury.ac.nz/nzcs/nzcs.htm and let us know what you think. If you missed an copy of *Coastal News*, back issues are available on the site (in colour).

Coastal News

Notice of AGM

The Annual General Meeting of the New Zealand Coastal Society is to be held during the New Zealand Coastal Society Seminar at the National Maritime Museum, Quay Street, Auckland at 7:30 am on 12 October. Breakfast will be served.

Nominations (seconded too please) for Committee Members shall be made in writing to Sharyn Westlake, Opus International Consultants Ltd, PO Box 12-003, Wellington (e-mail sharyn.westlake@opus.co.nz). Nominations will not be accepted from the floor during the AGM.

Notification of Change to the Rules New Zealand Coastal Society

The Management committee recommends a change in the rules of the NZCS to replace the word "Council" (of IPENZ) with "Board" (of IPENZ), as it occurs in the Rules. This is the advance notification of this change, which will be discussed at the AGM.