Coastal news

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Newsletter of the New Zealand Coastal Society: a Technical Group of IPENZ

Contents

Samoa's Coastline in the Aftermath of Cyclone Heta

Wave action during cyclone Heta along Beach Road in front of the famous Aggie Grey's Hotel in Apia. Part of the riprap in front of this concrete capped riprap revetment has collapsed, and there is a considerable volume of timber debris along the foreshore.

On New Year's Day, 2004, cyclone Heta reached hurricane strength in an open area of the Pacific Ocean to the north east of Samoa. It first moved north, approaching and affecting the Tokelau Islands, and then back south, passing to the west of Samoa and American Samoa, finally tracking south east, gaining category five strength as it reached Niue. The devastating effects of cyclone Heta on Niue have been widely publicised in New Zealand media and elsewhere.

In Samoa, the damage was considerably less, but still significant. Damage, which is estimated to cost US$35 million, has affected trees, crops and coastal infrastructure. Although up to 80% of the breadfruit, banana, papaya and other fruit trees were damaged, it does not appear that there will be the same long-term impact on the economy as experienced after cyclones Ofa in 1990 and Val in 1991. Power, water, transport and other services were disrupted, but substantially repaired after 1 to 2 weeks. Fortunately there were no fatalities, although several houses were destroyed in the Moata'a to Fagali'i area, just to the east of the capital, Apia, by a local tornado apparently generated as a side effect of the hurricane winds.

During the first week of March 2004, the writer carried out an inspection of the coastal infrastructure around the main islands, Upolu and Savai'i, as part of the preparation and design phase of an International Development Agency recovery project. Earlier damage inspections had been carried out and reported within a few days of the cyclone involved staff from Samoa's Ministry of Works, Transport and Infrastructure, and Dr William Paterson of the International Development Agency.

The heaviest wave action generated by Cyclone Heta, with consequent infrastructure damage, occurred along the northern coasts of the main islands of Samoa, Upolu and Savai'i. Approximately 9 km of riprap seawalls was damaged and will require repair. Erosion occurred over some 20 km of coastline. Approximately 12 km of coastal roads were damaged by wave action and will require rehabilitation. Nonetheless, this still only represents 3% of the coastline length for which the sensitivity to coastal hazards was rated as high or very

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Figure 2: An example of a riprap seawall and road pavement failure in Savai'i. The land adjacent to the road has eroded some 8 to 10 metres inland.

high from previous studies. Along parts of the coastline of Savai'i, at Fagasa and Falealupo to Tufu for example, there was considerable accretion of sand, which built up dunes and, in places, inundated the coastal road.

Clear differences in the structural performance were apparent between designed systems that incorporated appropriate riprap sizes, construction detailing, filter systems and quality control, and ad hoc systems built by village communities. A considerable proportion of the rock debris thrown up onto coastal roads by wave action came from light seawalls constructed by village communities.

Culverts were most affected at sites where there were no headwall structures, and where adjacent riprap was not placed up to the culvert barrel and behind the headwalls. Culverts constructed with appropriate engineering details performed well.

Generally, scouring of the road pavement and sub-grade occurred where there was significant wave overtopping on to the road. This is a key vulnerability in low lying areas, but is also difficult to avoid without constructing revetments with a crest higher than the road level. Fortunately, repairs could be implemented relatively rapidly.

There was no damage to bridges or fords, but several coastal fords, at Malaemalu and Vaoai in Upolu and Lano and Safai in Savai'i, could not be passed due to overtopping by floodwaters. A vehicle was washed downstream at one location. In the past, there have been fatalities at a couple of these locations associated with vehicles being caught up in floodwaters. The above named fords in Savai'i also cause low-flow discharges to backup, resulting in stagnation of the upstream catchment.

After cyclones Ofa and Val, a major seawall was constructed at Solosolo in Upolu as part of the rehabilitation works. This involved a 4 to 5 layer riprap construction. It is an extremely heavy form of construction at a site where there is a wide opening in the fringing reef, which means that the coastline is exposed to the full impact of cyclone waves and long-period swell waves.

The beach is gravel and quite mobile, and the terrain immediately inland of the road is extremely steep. This makes the option of abandoning this section of road for a more inland route difficult.

The original design was tested using hydraulic physical modelling. The fact that the high porosity armour layers extend to a significant depth means that the structure can sustain heavier seas than more traditional two-layer systems. However, the structure has proven to be vulnerable to failure due to undermining of the toe over short segments. Even before cyclone Heta, riprap in a 50 metre segment of the seawall had slumped due to toe failure. Implementing repairs will be challenging at this site.

The International Development Agency is assisting the Government of Samoa to respond to the effects of cyclone Heta through the provision of a combined credit and grant facility. This will finance works and services to undertake road and drainage rehabilitation, replacement of minor river-crossing structures, structural rehabilitation and reconstruction of shoreline protection works, non-structural rehabilitation of the coastline, and small scale, community-led cyclone resilience strengthening programmes. Under the programme of shoreline protection reconstruction it is hoped to incorporate some "non-traditional" treatments as an experiment in alternatives to seawalls where the same or higher levels of coastal resilience can be achieved, or recreational, ecological and customary land use values can be improved. Treatment systems might include artificial reefs, detached breakwaters and headland control. Samples of non-structural treatments, such as beach nourishment and stabilised dune systems, are also proposed where technically feasible and sustainable.

In all cases, the framework of the Coastal Infrastructure Management Strategy (CIM) and, where available, CIM Plans (described by Steven Taylor and Graeme Roberts in Issue 25 of Coastal News) will be applied in designing and implementing any works. Engineering consultants, due to be appointed within a month or so, will undertake the design and construction supervision for these works. Construction contractors will be appointed sometime during 2005. It is anticipated that design work will have commenced by the end of the year, and that all construction will be completed by December 2006.

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Editorial: Do you believe in global warming?

My very first NZCS Conference was an exciting experience. The quality of speakers and variety of topics was amazing but my favourite time was the discussions following each presentation when scientists, planners, engineers, etc interacted. This highlighted to me what NZCS is all about – the bringing together of everyone involved in every aspect of coastal management so that they can learn from one another.

I noted with interest that a number of speakers mentioned global warming. I distinctly remember when I first heard about global warming as a child. The science of the phenomena may have been lost on me but I immediately grasped the significance when my father proposed buying a section higher up the hill so that we could move our beach front bach there when the sea level rose. As more information came out and scientists argued about the exact influence global warming would have on the world the nervous reaction that greeted the first news of global warming abated. We never did buy that section or move our beach front bach but I think that the possibility of a rise in sea level has remained ingrained in my psyche. I confess I would think twice about buying beach front property as either an investment opportunity or as a recreational luxury as an increasing number of New Zealanders are doing according to the article on real estate trends.

The debate about global warming has continued through the years and is still going strong today. An article by Professor David Bellamy, which appeared in the Daily Mail, July 9, 2004, referred to global warming as 'a load of poppycock'.

Professor Bellamy claimed that global warming is not a result of humans creating extra greenhouse gases but is instead largely a natural phenomenon. He says "carbon dioxide is not the dreaded killer greenhouse gas that the 1992 Earth Summit in Rio de Janeiro and the subsequent Kyoto Protocol five years later cracked it up to be. It is, in fact, the most important airborne fertiliser in the world, and without it there would be no green plants at all. That is because plants take in carbon dioxide and water and, with the help of a little sunshine, convert them into complex carbon compounds - that we either eat, build with or just admire - and oxygen, which just happens to keep the rest of the planet alive.

According to Professor Bellamy increasing the amount of carbon dioxide in the atmosphere would merely produce a rise in plant productivity. He claims a petition from the Oregon Institute of Science and Medicine, signed by over 18,000 scientists opposed to the Kyoto Protocol states 'Predictions of harmful climatic effects due to future increases in minor greenhouse gases like carbon dioxide are in error and do not conform to experimental knowledge.' And a recent scientific paper showed that increases in temperature are responsible for increases in atmospheric carbon dioxide levels, not the other way around.

Professor Bellamy claims global warming also occurred around the end of the last ice age13,000 years ago as a result of the Milankovitch Cycles, an entirely phenomenon resulting from the tilt of the Earth's axis and its orbit around the sun.

He says the climate has been yo-yoing up and down ever since. "Whereas it was warm enough for Romans to produce good wine in York, on the other hand, King Canute had to dig up peat to warm his people. Up and down, up and down - that is how temperature and climate have always gone in the past and there is no proof they are not still doing exactly the same thing now. In other words, climate change is … nothing to do with the burning of fossil fuels."

Regardless of what you believe on the whys and wherefores global warming is not a phenomenon coastal managers can chose to ignore.

Changed Your Address?

To change your address or other contact details, inquire about membership, or to report website problems, contact Alex Eagles at penguins@clear.net.nz

The Changing View of Coastal Property

In the past New Zealanders viewed coastal property as a holiday retreat but nowadays an increasing number are purchasing coastal land for investment purposes with property prices reflecting the increased demand.

The waterfront market is big and increasing in value. For example, Bayleys Real Estate alone sold $10 million of waterfront properties in 1995 compare with in excess of $160 million in 2003.

An example of prime coastal real estate at Te Rere Cove, Waiheke Island.

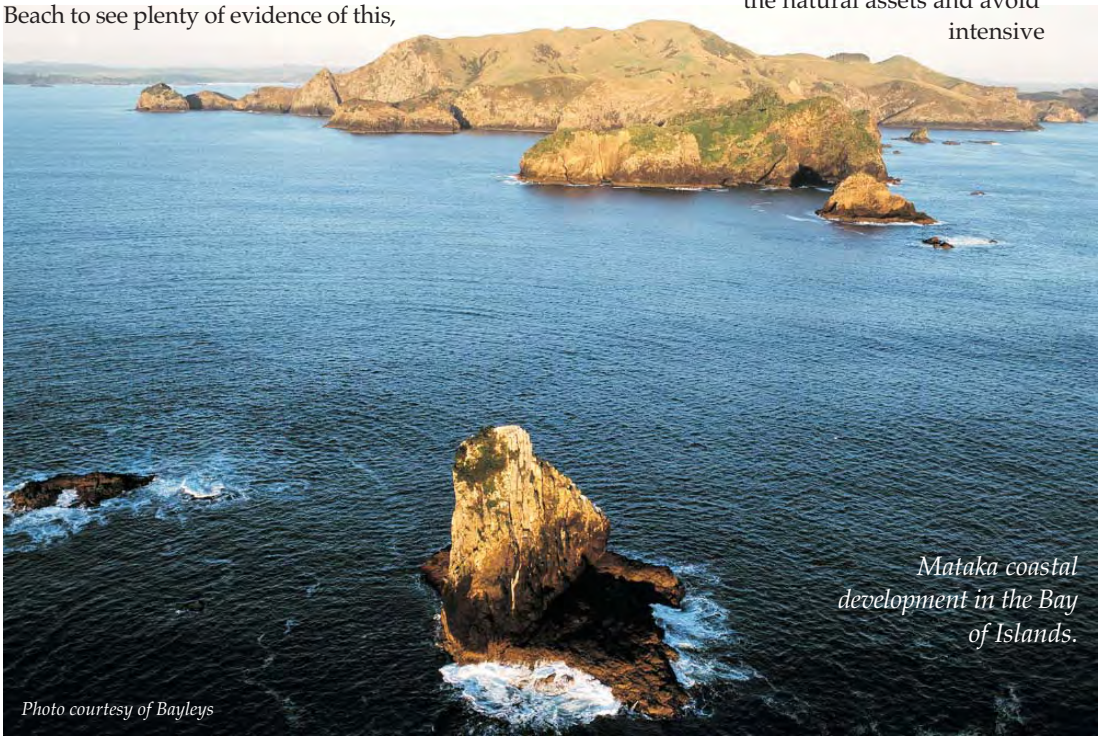
Photo courtesy of Bayleys

Due to time becoming an increasingly important factor during the last decade - lack of it of course - the closer the property to the big population bases, the more expensive it became. This meant an increasing number of people had to look for properties further away. The magic two hours became three and sometimes four hours. Because coastal land close to large population centres was at a premium developers attracted buyers by creating higher density developments in areas like Gulf Harbour, Mt Maunganui and more latterly in traditional bachy hang outs like the Coromandel, Waiheke Island and in the Bay of Islands.

This sort of intensification is of course common place overseas. You need look no further than across the Tasman to the Gold Coast or even Bondi Beach to see plenty of evidence of this, much of it dating well back in time. It is, however, a much newer phenomenon here and one that has generated a good level of healthy debate.

Wanting to be near the coast is something that is deeply ingrained in the New Zealand psyche and the success of coastal subdivisions clearly demonstrates that substantial numbers of people prepared to sacrifice space in order to be able to afford to buy somewhere close to the water. Not everybody wants to wake up in the morning to the sound of their neighbour singing in the shower though, and the density of the subdivision of coastal areas has seen the emergence of a different type of buyer and the demand for the true retreat property.

The latest trend in coastal developments caters for buyers looking for large sections of secluded coastal property. Breamtail, for example, is a magnificent 5km stretch of unspoilt Northland coastline, located 90 minutes from Auckland, where development is being limited to 41 homes on a 439 hectare headland property. What is exciting about Breamtail is that 186 hectares of it are conservation areas, comprising native forest with pre-European kauri trees, wetlands and wildlife. The principal objective of the Breamtail development has been to preserve the quality of the natural assets and avoid intensive



Mataka coastal development in the Bay of Islands.

Photo courtesy of Bayleys

sub-division. Over $1.5 million is being spent on enhancing and protecting the conservation estate and building a walkway for use by the general public along the coastal portion of the property. The value of this kind of development is, however, reflected in the prices of the properties, which are in the $2 million to $6 million range. Eight lots ranging in size between 1.2 hectares and 24 hectares have been sold to date.

Mataka in the Bay of Islands, while being developed along similar lines, caters for a different market. Mataka has 30 sites of 20 to 57 hectares located on a 1000 hectare coastal farm. So far 22 sites have been released and 21 sold, 17 to Kiwis and four to offshore buyers, at prices between $1.8 million and $2.75 million. Owners have access to four beaches, more than 10 kilometres of coastline, conservation areas that are home to several hundred kiwi, and walking, and riding trails. Owners are able to build a house on their lot and utilise up to 4 hectares as garden. The balance of the lot is leased to Mataka Station Ltd as part of a sheep and cattle farm. Income received by owners from the farm lease helps offset the costs of upkeep of conservation areas. While Mataka buyers have been predominantly males without dependent children able to make decisions quickly Breamtail appeals to the two hours from Auckland market with children.

These development examples are a new trend but it is unlikely that eco friendly "farm parks" will be the next development phenomenon and that this is a quick fix planning solution or alternative to more intensive subdivision. This model requires a very special type of property to make it work and there is only a limited number of buyers who can afford to pay millions of dollars for a piece of land.

The bulk of the buying public have price and family constraints to their lifestyle. Perhaps to fulfil this niche we will see satellite developments, close to recreational parks or beaches where price and proximity can be combined.

There has been another interesting trend in the last few years – coastal property has been a phenomenal investment performer. Once it was simply an investment in lifestyle, now in some instances it is firstly an investment in capital appreciation that comes with a lifestyle bonus. This has increased the size of the market considerably.

The main buyers of waterfront property are not perhaps whom you think and certainly not whom the media keep suggesting. We are not selling our soul to foreigners. Although there have been some highly visible and contentious properties sold to offshore parties, the number of sales to foreign buyers is less than 5%.

Contrary to popular opinion foreign investors are not responsible for the rapid escalation in coastal property prices. There simply are not enough of them buying here in sufficient volume to have any significant impact on values. In fact, well-heeled New Zealanders, particularly Aucklanders, are behind the escalation of prices.

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Mataka coastal development in the Bay of Islands

Photo courtesy of Bayleys

Coastal News

Annual Report of the New Zealand Coastal Society Inc.

For the Year October 2003 – October 2004

It is my great pleasure to report to you on the activities and achievements of the New Zealand Coastal Society (NZCS) over the past 12 months. As chairman, it has been my pleasure to work with a very capable and enthusiastic committee, which has helped to lead a year of achievement and change for the society.

From a personal perspective, the passage of my final year as chairman gives me pause to consider the issues I first discussed in 2001, when as a society, we decided that a change in direction was needed. Some of you may recall my call in Nelson for a change from a culture of transactional thinking to one of transformation and change. That change was about becoming an organisation with a greater public profile, an organisation recognised as a leader in coastal issues throughout New Zealand, and a provider of excellent services and products to its members and the wider community.

Our society has, over the course of its 12+ years achieved many great things, however as chairman I remain concerned that the society projects as being somewhat timid and reluctant to engage, to encourage debate and to forge relationships. At some time its members, and its committee, will need to have the courage to lead the debate, take a position and perhaps even cause controversy. If not, I fear the society will find itself marginalised as an interesting collection of technically minded experts, but without voice and influence where it matters.

Others have managed to create such a voice in coastal issues, and I urge the society to consider its leap to the next level of leadership. I do not mean that the society needs to become loud, brash or outspoken, but rather that it needs to stay and remain relevant.

Having said that I am hugely proud of the society and what it achieves. Outside of the annual conference, NZCS exists principally through the activity of its committee and its regional co-ordinators. Our committee has remained smaller than it was prior to 2001 and each committee member has defined roles and outcomes that they take ownership of while in service to the society.

To this end in the past year we have moved to put much more resource and effort into the provision of service to our members, mainly through the employment of a permanent society administrator, so we can focus more on defining a path forward for the society. I am pleased to say that this has led to good outcomes, quicker resolution of issues and generally better service to our members.

More specifically, the stand-out achievements for me and the committee in the past year have included:

1 The continued evolution and increased readership of our flagship publication *Coastal News*. *Coastal News* is a high-quality publication which represents many of the major coastal interests in New Zealand, and is published to a regular schedule. *Coastal News* fills a well-defined niche in between technical journals and general media publications, and does it in a way which is readable to a very wide audience. It really is our flagship product, and one which I think the whole society can be very proud of. Special mention must go to Lucy Brake and our administrator Alex Eagles, who has evolved her role considerably and has taken on the lion's share of the process for developing and publishing *Coastal News*.

2 The NZCS web-site has continued to evolve, and is now more actively managed to ensure it is up to date, topical and interesting to readers world-wide. In the past year we have further updated content and revamped the overall structure of the site to make it more navigable and useable to our members and the wider internet community. John Lumsden has been instrumental in this, working alongside Charles Hentlass from CAE to ensure we have a worthwhile and attractive portal onto the world-wide-web.

3 Membership remains a key focus, as it is for any organisation like ours. Our membership has continued to grow — now standing at a total of 332, with the major area of growth continuing to be in student membership. This is something I am particularly happy with, as it has mainly resulted from the drive of the committee in 2002 to make the society more accessible for emerging students and graduates. There remains some work to do on engaging with the many corporates and organisations who are involved in the coastal field, and I urge the new committee to make this a focus.

4 We continue to develop linkages in the regions thanks to the identification of regional sub-committee representatives. These people act as catalysts for the discussion of coastal issues and the convening of meetings and gatherings from time to time. I would like to thank all the regional co-ordinators for taking the time to maintain relationships, encourage discussion and debate, and keeping the society alive in the regions. At the end of the day it is these initiatives, which determine the success of the society as an organisation, and

I applaud their efforts.

5 I cannot understate the effort required to hold an event such as the NZCS Annual Conference. Along with *Coastal News*, the seminar is the most tangible evidence of the NZCS, so its success is a major factor in a successful year for the society. It requires commitment, skilled planning plus some dogged determination to sort out speakers, venues and sponsors, let alone attract participants from all over New Zealand and even beyond. Your attendance is the best assurance of success we can hope for, and I am sure the next 2-3 days will prove to be of considerable value. Mike Hilton and his team have poured a great deal of time and passion into this event and they receive my heartfelt thanks. They have forged a relationship with a major international society to expand the scope of this conference, which will add tremendous value to these days. I am sure this will be our most successful conference ever, by any measure. I would also like to mention the tremendous work of Stephen Priestly and his conference committee who looked after the 2003 *Ports and Coasts Conference*, which was a huge success both for that conference organisers, and also financially for the coastal society.

Our financial position remains very strong and has improved considerably this year due to the success of the *Coasts and Ports* 2003 conference. The society has total net assets of $135,000, an increase of $53,000 on the same time last year. The treasurer's report gives a detailed breakdown of our financial position. As a committee, we have been very mindful of the need to maintain the Society's strong financial position, against the need to make wise investments for the good of our members and coastal management in New Zealand. Over the past three years we have invested in a showcase book on the New Zealand Coast and student scholarships, and importantly on better operational and administrative support for the society. However, compared to the cash reserves of the society these are modest, one might even say paltry investments. I do remain concerned that the society finds sustainable ways to deliver value to its members and the wider coastal community of New Zealand, and hope that the next committee makes this a priority, with input from its members. The society has done very well financially, but it is not a bank and it owes its members a return on their investment and time.

New Zealand is a small place and the coastal community is even smaller. There is simply not enough room for competition for attention between professional coastal organisations and societies. In 2004 we have developed an initial relationship with the Environmental Defence Society (EDS) and I hope sincerely that this relationship will flourish to everybody's mutual advantage. EDS are making great strides in encouraging the coastal community to question its direction, to debate and to lead. I welcome Emma Green and Raewyn Peart from the EDS to our conference and I hope that we develop a tradition of mutual sharing and co-ordination and that may even extent to joint investments over time.

With my retrospective assessment complete, I'd like to look to the future. The society and the committee you elect today will continue to grow as a central player in coastal and ocean management matters in New Zealand. Our regional subcommittees will strengthen and provide a solid foundation for the sharing of ideas and knowledge at a regional level. You, our members, will continue to receive a suite of high quality products via *Coastal News*, these conferences and our web site. The society will continue to invest in services and products that benefit its members and the wider coastal community. And of course the net result of our efforts, and all of those involved in matters coastal will be that our world class coastal and ocean areas are, even if in a small way, better managed, better protected and better off for future generations.

Lastly, as we in the committee have done over the past three years, I'd like to leave you with a quote for the future:

> *Beware your thoughts, for your thoughts become your words*
>
> *Beware your words, for your words become your actions*
>
> *Beware your actions, for your actions become your habits*
>
> *Beware your habits, for your habits become your beliefs*
>
> *Beware your beliefs, for your beliefs become your destiny*
>
> *(Anon, quoted by Frances Hesselbein, 2004)*

It has been my honour serving you as chairman and to the new committee and the new chairperson my best wishes for the society and its future.

Yours
Harvey Brookes

Seeking Contributions to *Coastal News*

Your contributions to Coastal News are welcome. These contributions are important to keep NZCS members informed about coastal issues in New Zealand and around the world. Contributions may be in the form of advertisements, notification about conferences or workshops, short news items, or longer articles of 400-800 words plus photos or diagrams.

For further information or to submit an idea please contact Alex Eagles, Editor, Coastal News on penguins@clear.net.nz.

Sandy Bits

Coastal News

Marine Environments Classification

The Marine Environments Classification (MEC) is a tool for mapping ecologically distinctive marine environments based on eight physical characteristics that influence the distinctiveness of ecological systems. The classification is being developed at two different scales - Exclusive Economic Zone (EEZ) and regional. The end result of the classifications will be maps that sub-divide the marine environment into areas where ecosystem properties are different and where effects of resource uses can be expected to differ. The maps will also identify areas that are considered to be ecologically similar. The classification does not tell you what marine plants and animals will be present at specific locations, but it can be used to predict what species could be expected in an environment.

The MEC is intended to depict areas of ecological similarity with the aim of assisting decision-makers/managers to: transfer knowledge between information-rich marine environments to similar information-poor marine environments located elsewhere in the EEZ or region; define management units; predict the potential impacts of events or activities based on ecosystem susceptibility; identify priorities for protection or management; regulate resource use; and identify priorities for further research.

It is anticipated that the classifications will be finalised and made available for use by the end of 2004. For further information contact Megan Linwood at megan.linwood@mfe.govt.nz.

Seawalls Increase Risk Of Flooding

Coastal scientists from Halcrow Ltd looked at 1,000 locations in the first study of its kind in the UK. They found 61% of the shorelines and beaches had steepened over the last century because of man-made defences. The authors claim that structures such as sea walls and promenades prevent the natural functioning of coastal environments.

The narrowing and steepening of shorelines leads to an increase in the amount of wave energy hitting the sea defences which can lead to structural damage and overtopping. This is particularly marked on open coasts, where promenades and sea walls have been built across formerly wide sandy beaches, or in estuaries where low lying areas have been reclaimed for agriculture behind sea walls. These results have considerable implications for deciding on future coastal management options around not only the UK, but also potentially, the rest of the world. The study suggests that holding defence structures in their current positions will not be sustainable in the long term. As beach widths decrease and water depths increase in front of structures, they will no longer be able to offer the same levels of protection without further investment. The report also recommends coastlines be allowed to function as nature intended them to to avoid spend increasingly large amounts of money on sea defences.

Australian Coastal Society Proposed

The formation of an Australian Coastal Society was proposed at the national coastal conference Coast to Coast 2004 to advance sustainable use and management of Australia's coastal environment. The Society, proposed by Professor Bruce Thom, would provide an independent forum for members who possess knowledge of the Australian coast.

Activities would include supporting coastal conferences, following up recommendations, disseminating information with existing networks, promoting public debate of issues, lobbying for resources for improved coastal management, and reviewing government legislation, policies and programmes.

A steering group is canvassing opinions on how best to structure the organisation, and aims to formalize the Society at the next national Coast to Coast 2006 in Melbourne.

Guide For Coastal Health Indicators In Regional Plans

To help natural resource managers maintain the integrity of marine habitats a set of indicators of resource condition are being developed in Australia to assist groups to identify and select indicators that are relevant to their region, and meet their monitoring needs. The package does not provide new indicators, but rather organises relevant indicators and other information for estuarine, coastal and marine ecosystems. The guide identifies 15 major components of the environment that, when changed by human or other activities, can result in degradation to natural

resources, such as aquatic sediments, nutrients and hydrodynamics. These 15 key environmental stressors are then used to identify which of the 31 indicators detailed in the framework would be appropriate to monitor.

The package has been specifically developed to allow users the flexibility to monitor outcomes by using indicators that are relevant to their regional ecosystems, while using nationally consistent monitoring approaches to allow for comparisons and maximise efficiency of effort. To download a copy of Users' Guide to Estuarine, Coastal and Marine Indicators for Regional NRM Monitoring go to www.coastal.crc.org.au/Publications/indicators.html.

New Guidebook For MPA Managers

Effective management of marine protected areas (MPAs) is key to successful conservation of marine resources. A new step-by-step guide to assessing management effectiveness of MPAs has been produced to empower MPA managers by helping them determine specifically what is working and what is not. How's Your MPA Doing? was produced by WWF together with the US National Oceanic and Athmospheric Administration (NOAA) and the IUCN World. Hampered by insufficient budgets, staff, or community support, many MPAs are struggling to achieve their objectives.

Cooperation The Key

The PCE report "Missing Links: Connecting science with environmental policy" focuses on complex issues that face environmental policy makers and analyses ways in which science, research and technology can be used more effectively to address such issues. In doing so, it examines how the links between science, policy-making and the public interest can be strengthened to engender confidence in how policies are developed and what they will achieve. The report is available at www.pce.govt.nz/reports/allreports.

Farming Is Harming Our Environment

A report by the PCE, Growing for good: Intensive farming, sustainability and New Zealand's environment, released on November 3 2004 warned that unless farming practices change, the environmental impact will have a profound effect on all New Zealanders and undermine New Zealand's access to overseas markets. The report is available at www.pce.govt.nz/reports/allreports.

Consenting Existing Coastal Protection Structures

Coastal News

The number of Regional Coastal Plans now operative around New Zealand is steadily increasing with resulting implications for structures constructed prior to the Resource Management Act 1991 (RMA).

Transitional provisions set out in Sections 418(6) and (7) of the RMA, which allow the continued occupation of the coastal marine area (CMA) by pre-RMA structures, cease to have effect once a Regional Coastal Plan is operative. Consequently, Regional Coastal Plans that have no permitted activity rules for existing coastal structures to continue to occupy the coastal marine area mean that existing structures must obtain a resource consent if they are to be lawful once the plan is made operative. The exception are those Regional Coastal Plans that specifically list certain existing coastal structures at the time of plan notification as permitted activities allowing them to continue to occupy the CMA without obtaining resource consent. However, most of these permitted activity rules require that the structure remains the same scale and in the same location with appropriate maintenance to ensure on-going structural integrity (e.g. Tasman Resource Management Plan).

Western Bay of Plenty District Council (WBOPDC) have responded to the operative Bay of Plenty Regional Coastal Environment Plan (RCEP) by commissioning Beca Planning to prepare resource consent applications for existing coastal structures that the WBOPDC takes responsibility for because they are adjacent to Council owned land and serve a public purpose. The preparation of consent applications for over 40 different structures with varying levels of structural integrity has posed many challenges for the Beca Planning team.

Beca Planning have worked closely with both the WBOPDC and the Bay of Plenty Regional Council to make the process of consenting such a large number of existing structures as streamlined and efficient as possible. To simplify the consent application, existing coastal structures were separated into two groups; Group 1, which are the public access structures such as jetties, boat ramps and wharves and Group 2, which are the coastal protection structures (seawalls). A multiple consent for the two groups of structures has been sought from the Regional Council with each structure having a unique identifier to allow different conditions to be imposed depending on structural integrity and potential effects. Although the two groups of applications have been lodged separately, Beca has arranged with the Regional Council to publicly notify and hear the two group applications together, thereby increasing efficiency and reducing costs for all involved.

The Group 2 application for existing seawalls has presented its own set of challenges, in particular due to the fact that best practice coastal management directs that hard engineering coastal protection structures such as seawalls are the least favourable coastal erosion response option. The New Zealand Coastal Policy Statement promotes an hierarchy response to coastal erosion management, with a tiered approach. The lowest tier (Tier 1), which is the most favourable coastal protection response, consists of soft solutions that work with nature and have no hard engineering component. Tier 3 comprises hard engineering

Figure 1: Timber post and panel seawall at Athenree Road Reserve

Figure 2: Kotuku Rock wall

structures such as seawalls and these are generally viewed as being a last resort to coastline protection, to be used only after other, softer options have been investigated and discarded.

A necessary and important part of the process was therefore to assess each Council owned protection structure for effectiveness in providing erosion protection, the on-going need for the structure, the existing condition of the structure and whether the structure has any adverse environmental effect. As the existing coastal protection structures have been present for a number of years, most structures have no design drawings available that would allow coastal engineers to thoroughly assess the adequacy of their design. The seawalls therefore could not be assessed for compliance with current engineering standards. To overcome this, Beca engineers developed a condition grading sheet specifically for seawalls based on existing national condition gradings for jetties (National Parks & Recreation Asset Condition Grading Standards, 1998).

WBOPDC have been proactive in the management of coastal structures adjacent to public land through annual asset condition surveys over a number of years. These surveys assess the condition of the structures and recommend maintenance required allowing the Council to schedule future funding requirements. These previous condition assessments provided a good basis to compare the current condition of the structures and allowed an estimate of the remaining life of each structure. The estimated remaining life was utilised in the consent application by directly correlating it to the suggested review period for each specific structure. The review period of each structure therefore becomes the point at which the structure is critically analysed and any reconstruct conditions may be imposed by the Regional Council at that time if it is deemed necessary. This will make sure that any effects of the existing structures are minimised for the duration of the consent.

The Group 1 WBOPDC existing coastal structures consent application has been lodged with the Bay of Plenty Regional Council, with Group 2 expected to be lodged in October with a hearing in early 2005.

For further information on this project please contact Cushla Loomb, Beca Planning (cloomb@beca.co.nz) or Carl Bosselmann, WBOPDC (cgb@wbopdc.govt.nz).

NZCS Mission Statement

The New Zealand Coastal Society was inaugurated in 1992 "to promote and advance sustainable management of the coastal environment".

The Society provides a forum for those with a genuine interest in the coastal zone to communicate amongst themselves and with the public. The Society currently incorporates over 300 members.

Members include representatives from a wide range of coastal science, engineering and planning disciplines, and are employed in the engineering industry, local, regional and central government, research centres and universities.

Applications for membership should be sent to Alex Eagles (e-mail: penguins@clear.net.nz)

Coastal News

Word from the Chair

This is my first 'Word from the Chair' since being elected into the position of the NZ Coastal Society Chair by this year's incoming Management Committee. I have been on the Management Committee now for five years and I am excited about the role and the opportunities to progress the NZ Coastal Society into the next stages of its growth. I feel honoured to have a position that has been filled so admirably in the past by such a wide range of professional experts in the fields of coastal engineering, science and management. I would like to specially thank Harvey Brookes for all his hard work as Chair over the last three years and the big boots he has left me to fill!!

When we look back the society has come a long way since its inception in 1992. It has grown and developed into a strong society representing members across many sectors of the coastal industry. We have built on our 'lessons learnt' and on our past experiences. There are many opportunities for the society and directions we could now go into the future. As Chair of the society I believe we have some hard questions to ask ourselves this coming year about that direction, including who provides our administrative support, the publications we produce and support and the alliances we develop with other industry organisations.

As a starting point we have included a survey in this edition of *Coastal News* inviting you as a member to comment on the direction you would like the society to take in the future.

The society provides a forum for those with a genuine interest in the coastal environment to communicate amongst themselves and with the public. The society is about its members and the Management Committee's role is to run the society in a manner that adds value for the members. I would also like to focus these coming years on improving the support to the regional co-ordinators who can then in turn feel empowered to support the local members and grow the society in the directions they are interested in. The committee are now looking ahead to the 2005 Conference in Whangarei and we welcome any suggestions on how future conferences could be improved.

The Management Committee members are all voluntary (with the exception of Alex, our Co-ordinator) and it is often a hard and demanding role. The positions that they all hold are integral to the success of the society. I want to thank the new 2004/05 Management Committee, both new and old members from a range of fields and organisations across New Zealand, for their strength to be part of the team and for their dedication to contributing to the coastal industry in this country. I look forward to leading this Management Committee and the NZ Coastal Society through the growth over the next couple of years.

Lucy Brake
Chair, NZ Coastal Society
lbrake@beca.co.nz

Communities Caring For The Coast

Community Grants Assist RMA Understanding

The Ministry for the Environment has granted $250,000 to community groups throughout New Zealand to improve public involvement in resource management processes. Projects include regional community workshops on the Resource Management Act (RMA), funding for community advisers, and the development of guides on landscape management and coastal development under the RMA. Groups to receive funding included Community Law Canterbury, Community Legal Advice Wanganui, Nelson Environment Centre, Ngatiwai Trust Board in Whangarei, Tairawhiti Community Law Centre in Gisborne, Tauranga Environment Centre, Environmental Defence Society and Royal Forest & Bird Protection Society of NZ.

Hectors' Dolphins Need Your Help

With a total population of just 7,381 Hector's dolphins are an endangered species. The Hector's dolphin, which are only found off the coasts of New Zealand, are amongst the world's smallest dolphins, growing to just 1.4 metres long and weighing a mere 50 kilogrammes. WWF are looking for 7,381 people to adopt a Hector's Dolphin. For just $30 a year you receive the chance to name your dolphin, a certificate, soft toy, poster, and the option to be emailed news about your dolphin. To find out more visit www.wwf.org.nz/hectorschallenge/HD-tHECHALLENGE.cfm.

Rare Coastal Moth Under Threat

Since 2000 the Rarangi Landcare Group has worked hard to preserve and restore native foreshore plants along properties on the Rarangi coast. The survival of foreshore plants is vital for the survival of two species of insects, the 'stone moth' and the 'mat daisy jumper' which are unique to the Cloudy Bay area. So far the group has restored native plant species in over 20 areas with help from Outward Bound, DOC, Marlborough District Council, NZ Landcare Trust and the Transpower Landcare Trust Grants.

NZCS Management Committee

Chairperson	—	Lucy Brake (lbrake@beca.co.nz)
Deputy Chairperson/ Membership Coordinator	—	David Phizacklea (davidp@tauranga.govt.nz)
Secretary/Treasurer	—	Eric Verstappen (eric.verstappen@tdc.govt.nz)
Conference Coordinator	—	Kath Coombes (kath.coombes@arc.govt.nz)
Regional Coordinator	—	Jenni Fitzgerald (jennifer.fitzgerald@ew.govt.nz)
Publications Coordinator	—	John Lumsden (j.lumsden@cae.canterbury.ac.nz)
		Doug Ramsay (d.ramsay@niwa.govt.nz)
		Megan Linwood (megan.linwood@mfe.govt.nz)
		David Kennedy (david.kennedy@vuw.ac.nz)
Website Manager	—	Charles Hendtlass (c.hendtlass@cae.canterbury.ac.nz)
Conference 2005 Coordinator	—	Rick Stolwerk (stolwerk@xtra.co.nz)

For any enquiries regarding *Coastal News* articles or advertising, NZCS membership, or any general enquiries please contact:

NZCS Coordinator	—	Alex Eagles (penguins@clear.net.nz)

Profile: Doug Ramsay

NZCS Management Committee Member

Doug Ramsay, who recently joined the committee for the NZCS in 2003, is a coastal consultant based at NIWA's Hamilton office.

Originally from Scotland, he joined NIWA just over a year ago after a total of ten years at HR Wallingford, an international environmental and engineering research and consultancy organisation in the United Kingdom.

Prior to this Doug had spent two years as coastal management advisor to the Government of Kosrae in the Federated States of Micronesia.

Although Doug is a Chartered Civil Engineer with most of his career spent as a coastal engineer, his experience covers a broad range of technical disciplines including applied coastal geomorphology, coastal engineering and shoreline management planning, coastal hazard management, risk and vulnerability assessments, environmental impact assessment and community participation.

Within NIWA, Doug is leader of the NIWA / GNS Natural Hazards Centre and responsible for the development and coordination of coastal related consultancy work. This sees him involved in wide variety of projects both in New Zealand and in the Pacific region, most recently in Tuvalu and American Samoa.

A new project in the pipeline will see him involved with a hazard management project in Tonga.

Being relatively new to New Zealand, weekends are still being spent making good use of one of Hamilton's more endearing features – its central location, ideal for exploring the rest of the North Island.

Doug's contact details are:

NIWA, PO Box 11115, Hamilton

Phone 07 859 1894
e-mail: d.ramsay@niwa.co.nz

News from the Regions

Northland

by Andre' Labonte', NZCS Northland Regional Coordinator

Mining at Mangawhai

A Restricted Coastal Activity resource consent hearing was held over three days during mid-August at Mangawhai regarding the renewal of consents for Sea Tow Ltd. and Norsand Ltd. to continue nearshore sand mining at Mangawhai. The Mangawhai Harbour Restoration Society (MHRS) and community members were opposed to the consent which the Northland Regional Council had recommended for a five year phase out period. After hearing technical evidence prevented by experts for the MHRS (Dr. Robert Dean, Peter Riley and Andre' LaBonte'), the NRC staff recommendation was changed to recommending the applications be declined. A decision by the Hearing Committee to decline the application was made on 10 September. For additional information on this issue visit the MHRS website www.mangawhai.info

Beach Enhancement at Waipu Cove

A volunteer beach enhancement project organized by the Waipu Cove Surf Life Saving Club, the Waipu Cove Domain Board and LaBonte' Coastal Consultants is planned at Waipu Cove. The resource consent to relocate approximately 1000 cubic metres of sand from the north end of the beach to the eroded south end, revegetate using spinifex and pingao and install dune overwalks has been notified. It is hoped the work can be carried out next autumn.

Waikato

by Jenni Fitzgerald, NZCS Waikato Regional Coordinator

Dunes and Wetland Protected at Mataora Bay

Planting began early September on a major environmental restoration project at Mataora Bay, south of Whiritoa.

The project is a partnership between local iwi Ngati Porou ki Mataora, Environment Waikato, Nga Whenua Rahui and Project Crimson. The project aims to protect and restore sand dunes, coastal forests, an estuarine and freshwater wetland and the Mataora Stream.

The first stage of the project was completed last summer, with the construction of 2200 m of fencing to keep stock off the sand dunes and the wetland surrounding the local estuary. The group is now focusing on planting.

In the coming summer, it is planned to fence off the Mataora stream and another wetland to be followed up with further planting next winter. The project will take about five years to complete.

If you have any questions about this project, contact Environment Waikato's Clean Streams and Beachcare Programme Manager Alan Campbell (Alan.Campbell@ew.govt.nz).

Ancient Beach Sand Returns

Renourishment of Buffalo Beach, Whitianga, has commenced utilising ancient sands that once formed part of Buffalo Beach. The 10,000 cubic metres of sand has been sourced from the Whitianga Waterways development and analysis has shown the sands are very compatible. The renourishment was a condition of the consent granted for the Buffalo Beach seawall, while the supply of sand for renourishment is likewise a condition of the Whitianga Waterways consent conditions imposed by Environment Waikato.

Any questions about this renourishment should be directed to Rick Liefting (Rick.Liefting@ew.govt.nz).

Sand replenishment at Buffalo Beach, Whitianga. Photo courtesy of Environment Waikato.

Beachcare Aids Coastal Communities

Environment Waikato's Beachcare groups are helping reduce coastal hazards and educating communities about how their beaches work. Beachcare activities have expanded and strengthened with two new groups at Raglan and Rings Beach. Other communities have also expressed an interest and facilitators have met with groups at Matarangi, Mataora, Hahei and Cooks Beach during the past year.

Extensive planting work was completed over the past year with about 22,000 plants, including 17,000 sand-binding grasses and sedges on the foredunes and 3500 ground cover, trees and shrubs on back dunes. An increased variety of coastal species was planted, enhancing the biodiversity of the Region's dunes. Twenty five different species were planted last year, including a couple of species very rare in the Waikato – sand pimelea and sand fescue. Some Beachcare groups were eliminating weed species, especially at Rings Beach where the community was eradicating a severe infestation of climbing asparagus on the dunes and local properties.

Erosion last year provided opportunities to

promote Beachcare messages about natural erosion cycles and the important role of dunes. There was continuing evidence that Beachcare is helping raise community appreciation and understanding of natural beach processes and the importance of dunes.

A group at Pauanui gained approval for a major reshaping and planting to re-establish a naturally functioning dune at the southern end of the beach. At Tairua there was widespread community reaction to unauthorised levelling of a coastal dune by a beachfront property owner.

There are still serious issues at some sites, especially Kariotahi where facilitators are working with Beachcare and other groups on environmental and safety issues of vehicles on the beach.

Please direct any questions about Beachcare in the Waikato Region to Alan Campbell (Alan.Campbell@ew.govt.nz).

Marine Farming Forum

Environment Waikato, in conjunction with Auckland Regional Council, hosted its first Regional Marine Farming Forum on Monday 13 September. These are intended to provide an opportunity for all stakeholders to meet, share information and discuss their views. The first meeting was held in Thames and focused on the Aquaculture Reform Bill.

Over 70 people attended, representing a wide range of interests including the marine farming industry, the fishing industry, environmental groups, tangata whenua, governmental agencies, community groups and local councils. The Forum heard presentations from MfE on the Aquaculture Reforms Bill, and from ARC and EW on developments within the regions, but the main purpose of the day was to allow forum members to ask questions and get answers.

Future meetings are expected to occur three times a year and will consist of presentations from research agencies, the industry, iwi, and any group that wishes to speak to the Forum. For further information about the Forum contact Graeme Silver at Environment Waikato on 07 859 0958 or Graeme.Silver@ew.govt.nz.

Iwi Environmental Plan

Hauraki iwi have released their environmental plan for the region – Whaia te Mahere Taiao a Hauraki. The plan was produced with the support of the Ministry for the Environment, Department of Conservation and Environment Waikato. It is a 50-year strategy which identifies issues of concern to Hauraki Whanui and a range of methods, or action plans, to address these issues. Coastal issues identified include pollution, habitat loss, shellfish depletion, impacts of ballast water, loss of productive capacity, coastal fisheries, marine mammals and management. Actions are targeted towards the management, protection and restoration of the coastal environment and its resources.

For more information about the environmental plan contact the Hauraki Maori Trust Board (07 862 7521).

Residents Elect to Live with Erosion at Mokau

Several houses at Mokau were threatened following storms in May of this year, when high tides and heavy swells combined to cause erosion of up to six metres in one night. The community elected a committee to investigate solutions including the purchase of the worst-affected properties and construction of a seawall. A survey was sent to all property owners on Mokau Spit. Survey results showed a high degree of opposition to funding a seawall and the buy-back of the properties at risk was also rejected by the community. The committee will now be focussing on developing projects to mitigate the effects of erosion such as dune planting, working with the community, the Waitomo District Council and Environment Waikato. Erosion at Mokau has been an ongoing problem, with major cutbacks also occurring in the 1960s, '70s and '90s.

For further information please contact Rick Liefting at Environment Waikato (07 859 0859 or Rick.Liefting@ew.govt.nz) or John Moran at Waitomo District Council (07 878 8801).

Erosion at Mokau. Photo courtesy of Environment Waikato.

Temporary seawall at Mokau. Photo courtesy of Environment Waikato.

Canterbury

by Justin Cope, NZCS Canterbury Regional Coordinator

Marine Farm Planned for Pegasus Bay

A partial uplifting of the marine farming moratorium will allow the restart of the consents

process for an offshore marine farm in Pegasus Bay. Pegasus Bay Aquaculture originally submitted an application for a 10,000ha marine farm two years ago but it was caught up in the government moratorium. The recent partial lifting will allow the unfreezing of the application for 2600ha of the farm that if successful would allow a trial area to determine the viability of offshore structures.

New Coast Care Groups

A couple of new coast care groups are have been initiated in the Canterbury region over the past few months. In North Canterbury the Pegasus Bay Coast Care Network has been formed. The aim of the network is to unite and give a common voice to all the communities of Pegasus Bay and to provide a support network to share ideas and help each other to protect and enhance the natural coastal environment of North Canterbury. In South Canterbury, the South Canterbury Coast Care Group is in its embryonic stages. This group brings together many different people from South Canterbury's extensive coastal community to create a public forum to identify, discuss and solve key issues affecting the diverse coastline of South Canterbury.

Airborne Laser Scanning

In September, a collaborative effort between Environment Canterbury, Meridian Energy and NIWA managed to piggy-back on Otago Regional Council's ALS (Airborne Laser Scanning) survey of Otago's coastline and get the survey extended 34km north of the Waitaki River. The results of the survey will allow a comparison with a previous less extensive ALS survey in 2001 that extended 12km along the Waitaki Fan coastal cliffs. It will allow an evaluation of the utility of repeat ALS surveys for monitoring changes in coastal sediment budgets and cliff erosion. It will also provide an extensive baseline survey of the retreating (and debatably lowering and thinning) beach barrier north of the Waitaki Fan.

Profile: Justin Cope

NZCS Canterbury Regional Coordinator

Justin has worked at Environment Canterbury since 1997 as a Coastal Resources Officer and since 2003 as the Coastal and Fluvial Resources Scientist.

An MSc (Geography) graduate from the University of Canterbury with a stint of post-graduate Resource Studies at Lincoln University, Justin's role at Environment Canterbury includes overseeing and designing ECan's extensive coastal and fluvial monitoring and investigations programme. He is particularly interested in applying and disseminating data collected within the programme to all aspects of coastal management, particularly the avoidance and mitigation of coastal hazards and state of the environment reporting. He also enjoys educating school and community groups on coastal processes and coastal geomorphology. Justin has been a member of the Coastal Society since 1997.

NZCS Regional Coordinators

Every region in the country has a NZCS Regional Coordinator who is available to help you with any queries about NZCS activities or coastal issues in your local area.

North Island		
Northland	Andre Labonte	labonte@xtra.co.nz
Auckland	*TBA*	
Waikato	Jenni Fitzgerald	jennifer.fitzgerald@ew.govt.nz
Bay of Plenty	Aileen Lawrie	aileenl@envbop.govt.nz
Hawkes Bay	Gary Clode	garyc@hbrc.govt.nz
Taranaki	Peter Atkinson	dwk.newplymouth@duffillwatts.com
Manawatu/Wanganui	Johanna Rosier	d.j.rosier@massey.ac.nz
Wellington	David Kennedy	david.kennedy@vuw.ac.nz
South Island		
Upper South Island	Eric Verstappen	eric.verstappen@tdc.govt.nz
Canterbury	Justin Cope	justin.cope@ecan.govt.nz
Otago	Mike Hilton	mjh@geography.otago.ac.nz
	Paul Pope	poppa185@student.otago.ac.nz or popey@xtra.co.nz
Southland	Ken Murray	kmurray@doc.govt.nz

Conferences and Workshops

The 4th International Surfing Reef Symposium

January 12 – 15, 2005, Manhattan Beach, California, USA

This conference aims to continue an open dialog amongst surfers, scientists, ocean enthusiasts and coastal zone managers regarding topics such as: quantitative and qualitative descriptions of surfing waves; coastal zone management; reef projects; numerical modeling and design techniques; sediment transport; natural and artificial reef biological issues; surf forecasting and weather; surfing economics and environmental impacts; and water quality, runoff and pollution.

For more information visit www.surfrider.org/reef4/.

Coastal Dune Vegetation Network 2005 Conference

February 23 - 25, 2005, Forum North Conference Centre, Whangarei

The CDVN Conference, which is being hosted by the Whangarei District Council, will be a wonderful opportunity to share information and to learn about the features and challenges of Northland's coastline. The conference will include field trips to a range of Northland's coastal gems. There will be an optional weekend field trip to Pouto peninsula and Kauri Coast - Hokianga Harbour.

For further information contact Greg Steward, greg.steward@forestresearch.com.

Solutions to Coastal Disasters 2005

May 8-11, 2005, Charleston, South Carolina, USA

The American Society of Civil Engineers (ASCE) and Coasts, Oceans, Ports and Rivers Institute (COPRI) conference will include topics on erosion, hurricanes, coastal storms, tsunamis, seismic events, climate change, sea level rise, and wind hazards.

For further information visit www.asce.org/conferences/cd05.

International Conference on Ocean/Coastal Science and Engineering Education

June 6 – 8, 2005, Gold Coast, Queensland, Australia

The conference aims to improve coastal/ocean education and to encourage collaboration. Papers on past experiences, new ideas, methodologies, international partnerships and results with regard to coastal/ocean engineering and science education and research are welcome. Abstracts are due by 15 November 2004.

For details visit: www.griffith.edu.au/school/eng/OCSEE/OCSEE.html.

Land-Ocean Interactions in the Coastal Zone Conference

June 27-29, 2005, The Netherlands

The Land-Ocean Interactions in the Coastal Zone (LOICZ) inaugural open science meeting will address the geographic and scientific scope of LOICZ research for the next decade. Abstracts are invited on the following themes: vulnerability of coastal systems; hazards; implications of global change for coastal ecosystems; influences on the river basin and coastal zone interactions; fate and transformation of materials in coastal and shelf waters; and coastal system sustainability by managing land-ocean interactions.

For information see: www.loicz.org/conference or contact the secretariat at loicz.conference@nioz.nl.

Coasts and Ports Conference

September 20-23, 2005, Adelaide, Australia

Australia's 2005 conference on coastal and ocean engineering will include themes on: coastal processes - modelling, prediction and management; coastal planning and policy; catchment to coast; local government and the coast; aquaculture policy and planning; urban port infrastructure; maximising port efficiency; managing the needs of society, the environment and industry; and innovation in coastal and port engineering.

For further information visit www.plevin.com.au/coastsandports2005 or email coastsandports2005@plevin.com.au.

Have Your Say on the RMA Today

MfE want to hear from you about how they can improve the Resource Management Act.

There are five key headings they are seeking your views on:

- Balancing national and local interests
- Local resource management planning
- Resource consent processing
- Allocation of natural resources
- Capacity and practice in local government.

Share your views at:

- www.rma.govt.nz *or*
- phone 04 917 7400 *or*
- email feedback@mfe.govt.nz *or*
- write to Ministry for the Environment PO Box 10362 Wellington.

New Technology for Coastal Seafloor Mapping

Coastal News

The coastal seafloor, between 0-100 m water-depth, is not only subjected to the most human utilisation and impact, but also the most management of all the marine zones yet it has historically been the most difficult to map.

International and New Zealand studies unequivocally demonstrate that the physical environment is the predominant factor in determining the pattern of habitat and biodiversity, in both terrestrial and marine realms. Similarly, knowing the physical environment is a crucial element to underpin both engineering developments and sustainable resource utilisation and management. The nearshore and coastal zone, where human impact is increasingly significant, but where the marine environment is inherently difficult to map, the acquisition of spatially complete seafloor morphology and substrate composition data is becoming more important. Multibeam technology for deep-water (>500 m water-depth) though initially developed for initially military applications in the 1960's, has evolved into third generation systems and is a routine tool for marine science.

Shallow-water multi-beam mapping (e.g., < 200 m water-depth) has evolved, initially with applications in port hydrography and engineering. Over 540 shallow multibeam systems are now operated worldwide in a international service industry. Increasingly this technology is being used for issues of coastal management, aquaculture farming, coastal habitat mapping and biodiversity studies, hydrodynamic modeling, and time-series monitoring of the physical environment.

NIWA has recently purchased a shallow-water multibeam system for both research and consultancy projects. The dual-headed Simrad EM300D system operates at 300 kHz, with two transducers (Figure 1), and 254 separate beams imaging successive seafloor swath widths of four times the water-depth. The system can resolve variations of seafloor relief of 10-20 cm, coupled with survey speeds of 8-10 knots, and an acquisition "ping" rate of around eight –twelve times per second, can produce over 7 million seafloor data points for every hour of survey. Such volumes of data, though computationally intensive for acquisition and processing, provide very high-resolution imaging of coastal and nearshore environments. The transducers are being routinely moved by divers, between different survey platforms, including RV Tangaroa.

Figure 1: Hull mounted EM3000D multibeam system on survey launch Pelrous.

Since early 2004, the EM3000D has been used for hydrographic and biodiversity mapping in Antarctica, engineering and site investigations around Wellington (Figure 2), pipeline surveys, and coastal habitat mapping. Experience is showing that these high-resolution bathymetry data can provide the primary dataset for engineering design, providing unambiguous evidence of seafloor morphology and its bedforms.

Multibeam data not only provide information about seafloor morphology, but also substrate composition. Acoustic energy reflected from the seafloor is called backscattering – backscattering is the physical response of acoustic reflection from differing seafloor materials like rock, gravel, sand, and mud, and seafloor micro-topography. The backscatter will also vary for incidence angle – incidence angles of the 254 beams immediately beneath the survey vessel will have stronger decibel returns than those at higher incidence angles at the edges of the swath coverage. If these differences can be corrected, along with other propagation effects like ray bending and

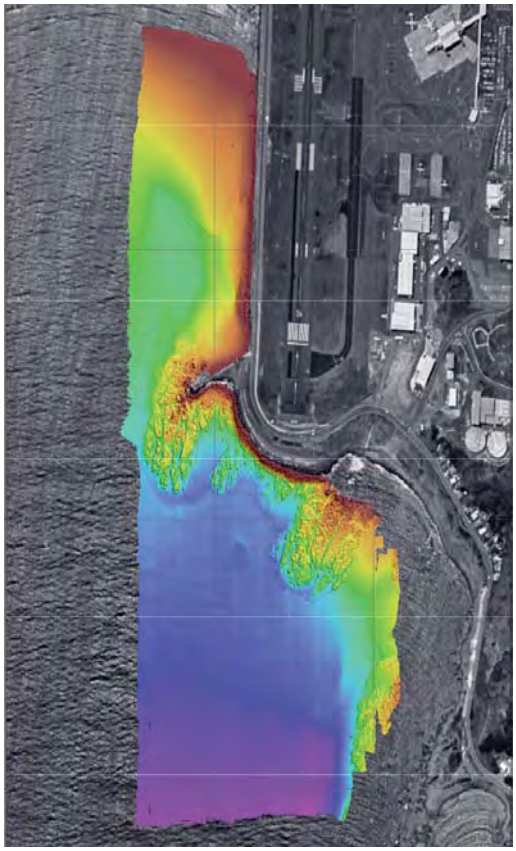

Figure 2: Seafloor terrain model of EM3000D data from the southern margin of the Wellington International airport.

attenuation, then is possible to produce backscatter images that are interpretable seafloor substrate maps. Another approach is to interpret the backscatter strength as a function of incidence angle to determine characterise profiles of different substrates or even heterogeneous mixes of substrate types. A simple case is illustrated in Figure 3 where sediment has a lower decibel return and narrower and peaked profile, where in contrast rock has a higher decibel return and broader profile – mixed substrates naturally having a combination of both profiles. Importantly, more subtle differences in substrate composition, with some "ground-truth" sampling, can also be distinguished like sandy gravel and muddy gravel. Such data is now becoming a base dataset for ecosystem management in coastal environments. Studies are also demonstrating fine-scale morphological texture (or seafloor rugosity) can be a good proxy for substrate heterogeneity. Greater seafloor heterogeneity in both morphology and substrate materials, appears to be coincide with greater marine biodiversity. This type of mapping is also providing insights about the time-series of seafloor processes. An example is the south Wellington coast where side-scan imagery, and now multibeam data, show that the pattern of gravel waves and partial sand cover, has been essentially in equilibrium with the ambient wave and current regime between 1976 and 1985 (Figure 4), was disturbed by 1994, but returned to a stable pattern of sediment distribution by 2004.

This type of spatial seafloor mapping will be increasingly the basis for informed management of the nearshore as the coastal zone becomes a site of greater and more varied use for aquaculture, tourism, marine conservation, fishing, recreation, and offshore engineering.

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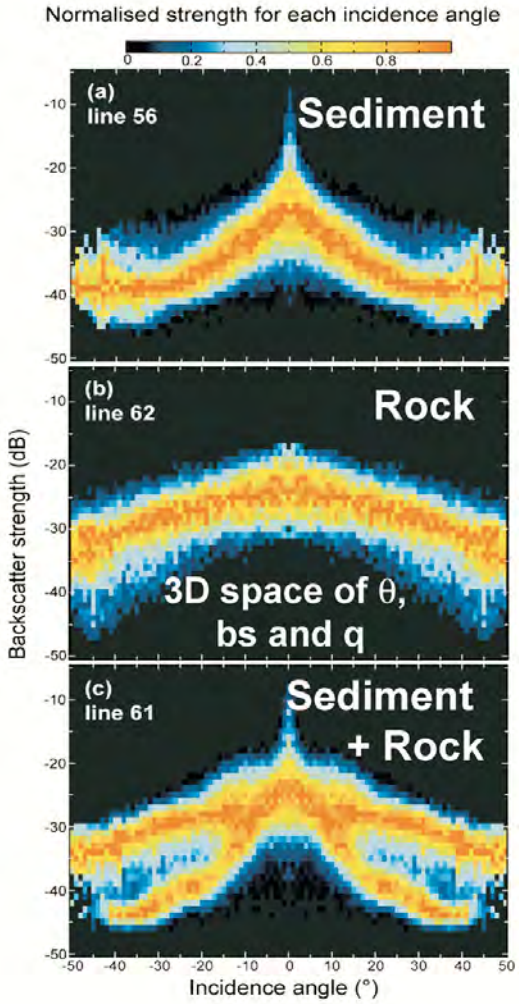
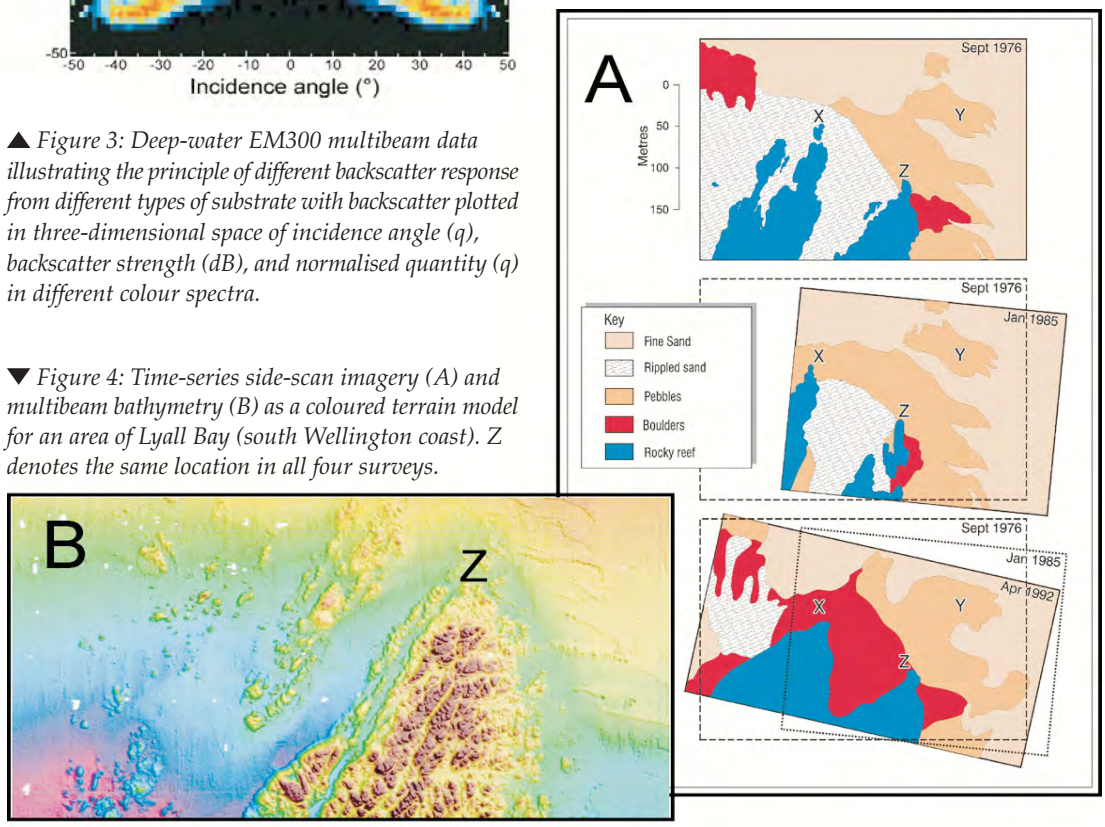


▲ *Figure 3: Deep-water EM300 multibeam data illustrating the principle of different backscatter response from different types of substrate with backscatter plotted in three-dimensional space of incidence angle (q), backscatter strength (dB), and normalised quantity (q) in different colour spectra.*



▼ *Figure 4: Time-series side-scan imagery (A) and multibeam bathymetry (B) as a coloured terrain model for an area of Lyall Bay (south Wellington coast). Z denotes the same location in all four surveys.*

RENOURISHMENT, REVEGETATION AND STABILISATION OF THE WAIPU COVE

DOMAIN FORE DUNE, NORTHLAND - A COMMUNITY PROJECT

1.

WAIPU COVE BEFORE HUMAN INTERFERENCE - COMPUTER SIMULATION

When the Waipu River mouth was functioning in its natural state several hundred years ago, a low sand spit would have extended from the present surf club to near the southern rocky headland.

2.

BREACHES IN THE DUNE SYSTEM

Breaches in the dune system over a 100 year period from 1853, reduced navigation of the river and threatened buildings at Waipu Cove. As a result of a breach north of Waipu Cove a groyne was created to keep this breach navigable. The result of this action created a low lying dune area at Waipu Cove susceptible to storm damage.

3.

MID - LATE C20th STORMS

In the 1950's clay and concrete rubble were deposited in front of the surf club and campground to build a dune-like barrier against intrusion by the sea. North easterly storm damage over a fifty year period broke through the "rubble" dune destroying the first surf club in the 1960's and threatening the present Waipu Cove Surf Life Saving Club.

4.

A COMMUNITY INITIATED PROJECT

In 2002 the Waipu Cove Surf Life Saving Club applied for resource consent to stabilise, renourish and revegetate 250 metres of the Waipu Cove foredune. This process would restore the dune system to the natural existing dune system as illustrated.

N

WAIPU COVE
SURF LIFE SAVING CLUB

5.

A RENOURISHED AND STABILISED WAIPU COVE FOREDUNE

Late 2002 saw initial stabilisation work begin on the foredune. Community involvement planting pingao and spinifex over the 2003/4 planting seasons and the construction of dune over walks will enable revegetation to occur naturally.

nz landcare trust
nga matapopore whenua

Bream Bay Coastal Care Trust
RD 2 WAIPU, Northland. Email: stolwerk@xtra.co.nz

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