Coastal news

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Contents

Kohimara Beach Replenishment Project Earns Award

Photo by Patrick Reynolds

The creation of natural looking headlands at Kohimarama Beach earned Auckland City Council, Beca and Urban Solutions a Merit Award at this year's ACENZ Awards of Excellence

Leadership, teamwork and innovative solutions earned Auckland City Council, Beca and Urban Solutions a Merit award at this year's Association of Consulting Engineers of New Zealand (ACENZ) Awards of Excellence. They were rewarded for their joint involvement in the sand replenishment project at Kohimarama Beach, completed in 2004.

In the 1930's Tamaki Drive was constructed along the Waitemata beachfront to provide access to Auckland's eastern bays. Since the construction of the seawall to protect the roadway, sand levels of Kohimarama Beach had been gradually decreasing. This was caused predominantly through large stormwater outlets flushing the protective sand out of the beach system.

The loss of sand had exposed the seawall and its foundations, resulting in emergency works being carried out in 1994, but with the proviso from Auckland Regional Council that a more permanent solution was in place by December 2004.

Two original options were presented to Auckland City Council – the $4 million rebuild of the seawall, and a sand replenishment scheme at an estimated $6 million. Despite the extra cost involved, Council favoured the latter, subject to a favourable coastal engineering assessment and public feedback. This option would not only address the long-term issues of protecting Tamaki Drive by placing a barrier of sand between the high tide and the existing seawall, but would also provide an all-tide premier beach for the public to enjoy and preserve the natural character of the area.

Having worked with Auckland City Council in 1995 to replenish sand at Mission Bay, Beca was commissioned to provide design services, coastal modelling and ongoing technical advice for the project at Kohimarama. A coastal engineering report was produced to ascertain the feasibility of the project. The study demonstrated that sand could be contained with the introduction of headlands at each end of the

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beach. Diverting the two main stormwater outlets through the headlands could also prevent further sand losses from the beach.

Urban Solutions project managed the sand replenishment scheme from the embryonic stage through to completion. The team undertook extensive consultation with key stakeholders and interest groups throughout the project. These included council officers from each department of Auckland City Council and Auckland Regional Council, the Eastern Bays Community Board, Ngati Whatua and other Maori representatives, local residents and beach users, the Kohimarama Yacht Club, and coastal engineers and planners. Consultation took the form of open days and public presentations, using scaled models rather than CAD drawings to illustrate the concept of the headlands.

To achieve a high beach profile similar to the original required course grain sand (0.5 mm or greater) the sand needed to be durable, high density (minimal pumice) with a colour similar to natural Auckland east coast beaches. While working on the Mission Bay replenishment project, Beca had been faced with the issue of obtaining the correct sand type as described above.

Geological and coastal studies carried out by the team at that time, identified sand from a depth of up to 40 metres of water in the Hauraki Gulf to be ideal for the purpose, as it was derived from the same source as the Mission Bay and Kohimarama Beaches. Although in deep water, it exhibited the same grading characteristics as that found on the beaches.

The Mission Bay project had also confirmed that traffic congestion caused by importing sand by road would be unacceptable to commuters and locals. An innovative solution of pumping 50,000 m^3 of sand ashore directly from a barge was developed, and has since been adopted as best practice for other beach projects of this type. A total of 105 barge loads were delivered, each taking a 24-hour round trip. Taking a total of six months to complete, the dredging operation was vulnerable to persistent high swell conditions and strong winds prevailing in the outer gulf.

Naturalistic headlands were created at either end of Kohimarama Beach using 'sandcrete'. Photo by Patrick Reynolds.

The natural appearance artificial headlands were a first of their kind for New Zealand. Photo by Patrick Reynolds.

Two 'naturalistic headlands' were created at either end of the beach to 'contain' the new sand and minimise further loss. The original design called for the headland structure to be constructed using 'mudcrete', a mixture of harbour dredgings and cement. Due to the unexpected unavailability of marine dredgings at the time, the mudcrete option was no longer available. Urgent trials were conducted on site using a 'dirty', land-based source with 9% cement to form 'sandcrete'. While solving the immediate problem it also resulted in the interesting realisation that dirty land-based sand could actually be used in high quality engineering solutions.

The sandcrete core was covered in plastic reinforcing mesh, and sprayed under pressure with 100 mm of high strength gunite. This was sculpted immediately using hand tools to achieve texture and details. Natural oxides in blends of yellows, reds and browns were used to colour the structure and achieve a natural sandstone-like appearance.

The size, and more importantly naturalistic appearance of the artificial headlands created on each end of the beach, is a first for New Zealand. Whilst man-made structures are often built and designed to blend in with the natural surroundings, this was the first occasion where engineers were required to construct a man-made natural-looking structure in a coastal environment.

The large unsightly outfalls at the eastern and western ends of the beach were diverted through and disguised within the headland structures. 90% of the stormwater is now diverted through these outlets. The road stormwater catchpits were consolidated into two submerged locations under the beach to prevent further interference with the beach's coastal processes

The beach was opened to the public in October 2004 to enthusiastic support from the local community. The success at Kohimarama resulted in Council's commitment to a $7.4 million, 7-year beach replenishment programme for other local beaches.

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Nearshore Morphodynamics: complicated or complex?

Nearshore morphodynamics is the study of the form, structure and evolution of the flow-sediment interface as a result of a variety of inter-relating processes operating over a range of temporal and spatial scales. The processes regulating the interactions between the underlying geology, sediments, waves and currents result in the variety of patterns and changes observed in the coastal region.

With ever increasing developmental pressure and numbers of people living at the coast, the need for improved techniques to understand coastal morphological evolution is vital to avoid a future of escalating risk through uninformed decision-making at the interface between coastal change and the human environment. Furthermore, understanding nearshore morphodynamics is a vital step in many other coastal management functions such as improving our understanding transportation of pollutants, food webs and beach ecology.

Nevertheless, our understanding of the interactions governing nearshore morphological change is still limited. Current numerical modelling techniques simulating the processes between the inner shelf (where waves feel the seabed only under storm conditions) and the shoreline (where the interaction between waves and the seabed is essentially a continuous process) have limited predictive capability. In essence coastal scientists would probably agree that nearshore coastal processes are extremely complicated and that detailed predictions of shoreline position or erosion/accretion trends over long temporal and/or spatial scales are challenging (to say the least).

On the other hand, the nearshore also displays features that are typical of a non-linear, dissipative system. By attempting to explain how nearshore systems alter and evolve by focusing on these two properties is known as a complex-system approach. The significance of non-linearities in the nearshore is related to the presence of thresholds activating certain specific processes or, for example, to the relationships coupling flow motions and sediment response. In complex-system approaches these relationships are usually parameterized by relating the sediment transport fluxes to flow velocity taken to some power (typically greater than one).

The dissipative nature is another obvious feature of the nearshore, and can be easily recognized by considering the continuous input of energy in the system (through wind, waves, tides) and the subsequent loss of this energy due to bed friction, wave breaking, and work done suspending and transporting sediment. Of course this input of energy is continually varying over time and space, for example ocean waves are usually characterized by a stochastic nature and limited horizons of predictability.

Despite the complexity of the system, morphological patterns characterized by a rhythmic structure can be commonly observed

Figure 1: Some examples of nearshore patterns (Figures courtesy of Prof. A Short, Dr M Green & D Ramsay)

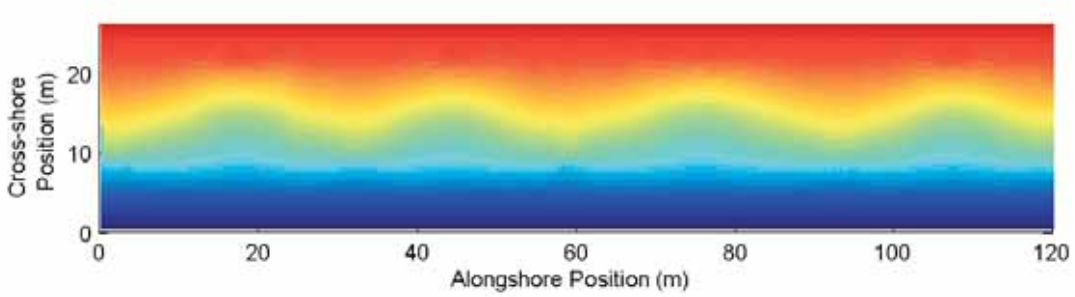

Figure 2: Aerial view of a numerically simulated beach cusp field (offshore is downwards)

over a wide range of spatial and temporal scales (Figure 1). The presence, as well as the striking regularity, of some of these patterns has puzzled scientists for decades. Beyond the interest in solving a scientific puzzle, understanding and being able to predict such pattern formation over the range of spatial and temporal scales occurring has always been considered a measure of the level of our ability to understand and simulate nearshore processes (sediment transport, hydrodynamics) and how they interact to shape the beachface and planshape. This is fundamental in terms of our capacity to predict beach dynamics and ultimately short- to long-term coastal change. At the core of a complex system approach is that complicated processes are not necessarily needed to study morphological patterns but that complexity can arise from interactions between simple processes and from interactions between processes and evolving morphology.

Various complex system modelling techniques have already been applied to the study of nearshore systems (e.g. stability analysis, cellular automata). Such applications have already provided tantalizingly simple explanations for the development of rhythmic patterns seen on coastlines, refutation of long-accepted hypotheses by proposing novel mechanisms, demonstration of links between local instabilities and the development of patterns at different temporal and spatial scales. Examples include the development of wave-generated ripples, beach cusps (Figure 2), bar systems and rip channels, and a variety of bedforms that develop on the inner shelf. Such models focus on the so-called "feedback loop" an intuitive example of which can be seen by considering flow over a sandy bottom, Figure 3. Such a flow will cause fluxes of sediment and changes in the sea bed that will in turn affect the flow and so on. The factor coupling the two systems is sediment transport which, as previously indicated, is usually modelled as proportional to a high-power of the fluid velocity.

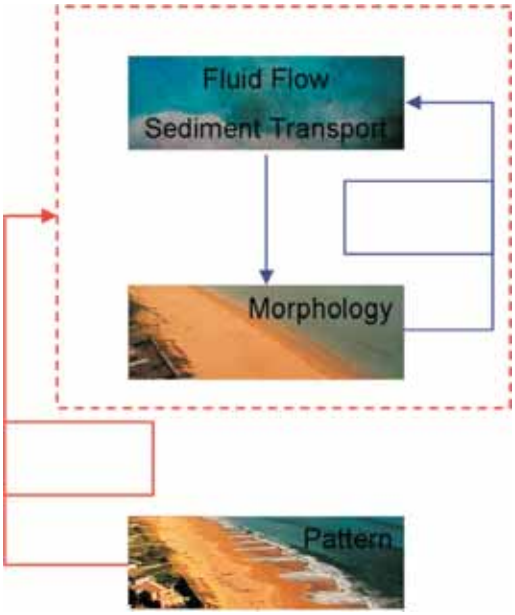

Figure 3: Conceptual morphodynamic feedback loop (images courtesy of NIWA Cam-era and Rod Budd). The positive feedback loop enhances instabilities of the interactions between flow, sediment transport and morphology. Negative feedbacks restrict the growth of instabilities.

The implications resulting from such a modeling approach are significant, and include: a) local perturbations of the seabed can result in a long- and large-term influence on the development of morphology; b) in contrast to deterministic approaches a range of likely responses to wave forcing should be expected; c) the response of a beach will depend on the sequences of wave-events rather than just the extreme wave-values; and d) limits in predictability may well be an inherent characteristic of the system.

Whilst it is evident that a complex system approach has a strong dynamical consistency which has the potential to be a powerful tool in understanding and predicting the behaviour of natural beaches, further model development, particularly focusing on prediction is ongoing. Further work is also needed to provide a general framework to link knowledge deriving from traditional (i.e., deterministic modeling techniques) and these new modelling approaches. Such an integrative approach is likely to further improve our understanding of the nearshore and stretch our predictive capabilities.

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Missed an article in *Coastal News*?

Back issues (from Issue 6, April 1996) are available as pdf downloads from www.coastalsociety.org.nz - follow the Publications link on the front page.

Word from the Chair

This is my last 'Word from the Chair' as I will be standing down at the 2006 AGM. I have been on the NZCS Committee now for 6 years and in the role of Chair for 2 years. As a Committee we have worked hard to continually make sure that the members of the NZCS receive value for their membership. I would like to look back on our successes over the last two years and focus on the work and support that the Committee have given to enable me to lead the NZCS forward. Below provides a highlight of those successes.

It is very important to the long-term viability of the NZCS that we have successful conferences. The NZCS 2006 Conference in Kaikoura is all set to be a great success. Thanks must be extended to Justin Cope, Brodie Young and all their volunteers on the Conference Organising Committee for all their hard work in the preparations. Vaughan Cooper has also assisted by providing invaluable experience from the very successful 2005 Conference in Tutukaka. We look forward to a great variety of presenters, some inspiring speakers and fun field trips.

The Committee is responsible for making sure that the operation of NZCS is in a financially sustainable manner. Over the last couple of years Doug Ramsay and Eric Verstappen have worked hard on reviewing our 5-year budget which has given the Committee an insight into where our efforts need to be focused and also highlighted the importance of successful annual conferences as well as the Australasian Conference we host every six years.

In 2005 the NZCS Committee reviewed the administration services NZCS requires and whether IPENZ continues to be the best place to source these. The members agreed at the last AGM to continue with IPENZ at this stage. Please be assured that the Committee work closely with IPENZ to make sure we are getting the best value. Thank you to John Lumsden, Eric Verstappen and David Phizacklea for their work on this review. As a result we also agreed to employ a part time Administrator to provide the additional services IPENZ are unable to. This has been very successful and Hannah Hopkins now provides a vital link between the Committee and its members and support for the Committee.

In order to gain continued growth and diversification of the NZCS membership we have reviewed our membership structure and changes were agreed to at the last AGM. Specifically the Corporate Membership has been restructured and we have also included a new category called Life Member for those individuals who have made an extraordinary contribution to the Society and/or knowledge and understanding in the coastal zone. We are hopeful that the new Corporate Structure will encourage more corporates to support the NZCS. The awarding of a Life Membership remains at the discretion of the Committee. David Phizacklea worked hard to develop the new structures and it is great to see the changes being implemented this year.

We have continued to work hard to make sure that *Coastal News*, our tri-annual newsletter, remains a high quality product that our members look forward to receiving to gain an update of what is happening around the country and internationally in the coastal world. Our Editor, Alex Eagles, and our graphic designer, Charles Hendtlass, continue to provide an excellent service to the NZCS. It has been great to see this publication go from strength to strength as a flagship for NZCS.

The NZCS website is an important part of communicating with both our members and the wider coastal community and John Lumsden has worked hard to make sure we are provided with the most cost effective service. We have been working on a 'Members Only Page' and will have news soon on how members can access that to view the latest *Coastal News* and other documents such as the Marketing Plan and our Annual Survey results. Kath Coombes has worked on analysing the results of the survey as well as making sure that the successive surveys are updated to refine the questions and to open discussion with the Committee on the directions the members would like to see NZCS take.

The NZCS Committee are continuing to focus on providing support to the Regional Co-ordinators to help them promote the activities of the Coastal Society in the regions – such as support for running local workshops and seminars on current coastal issues. This is not an easy area and I would like to thank Jenni Paul and Rick Liefting for their work supporting the regions.

It is exciting to see preparations underway for the Australasian Coasts and Ports Conference 2009. Te Papa, Wellington has been confirmed as a venue and Andrew Laing has accepted the role of Chairperson for this significant NZCS event. My thanks also to David Kennedy for his work on kicking off the preparation and to Kath Coombes for providing knowledge from the 2003 Auckland Conference.

I have really enjoyed my time with NZCS and particularly the last 2 years leading us forward. I continue to be in awe of the commitment many of the members and the Committee of the NZCS give voluntarily, without which the NZCS would not exist. I look forward to watching the NZCS develop over the next few years and hopefully the society will continue to be at the forefront of the coastal world in this country.

Lucy Brake
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Mount Reef Nears Completion

Very flat seas are required to pump sand into the giant bags that make up the Mount Reef (Photo: Dean Tully)

New Zealand's first artificial surfing reef is finally ready to roll having being dogged by weather, funding and equipment problems since construction first commenced in 2005.

The Mount artificial surfing reef had its beginnings as a research idea at the University of Waikato, under the direction of Professor Kerry Black. The Artificial Reefs Program (ARP) was developed as part of positive coastal development, forming the basis of many student research projects.

In the past, major coastal constructions were for a single purpose, such as port protection and erosion prevention. The ARP sought ways to improve the environmental value of these by incorporating surfing, diving, fishing, biological enhancement, and aesthetic values as well as swimming and boating safety.

After eight years of research into the enhancement of surfing waves, the expertise to design world-class surfing breaks was born. As a result Professor Black and PhD student, Shaw Meads formed Artificial Surf Reefs (ASR) Ltd, and subsequently designed the world's first reef for coastal protection and surfing at Narrowneck in Surfers Paradise.

The reef at Mount Maunganui is a delta shaped 'A frame' that will produce fast peeling, tubing, right-hand and left-hand waves. The reef, which is located 250 m offshore from Tay Street, will be a smaller version of the Pipeline in Hawaii - with a fast wave on one side and a slower wave on the other depending on swell direction. With a ranking on the '1-10 ASR Wave Scale' of 6-7, i.e. suitable for top amateurs, the ride length will be about 50 metres on each side and the breaking wave will be "hollow", particularly on low tides. It is predicted that 50 surfers at a time could use the reef taking off in two directions.

The reef has been constructed from 24 bags of varying sizes. The bags are made from highly durable Terrafix geo-textile, which should provide the best possible resistance to vandalism, abrasion, and damage. This material has the added advantage of being able to trap sand within the 'hairy' outer brown layer, which significantly improves its puncture resistance and gives marine

Changes to Corporate Membership Structure

At the 2005 Annual General Meeting, the New Zealand Coastal Society resolved to amend the membership structure for the 2006/07 financial year. The key change was to the Corporate Member category with one nominated corporate contact rather than the previous structure of up to 10 corporate nominees. The amended membership structure was consulted on with each corporate member early last year. The resulting new structure is considered the fairest for both our small and large corporate members.

The NZCS is a Technical Interest Group of the Institute of Professional Engineers New Zealand (IPENZ). Each corporate nominee has been invited to become a paying individual member of the NZCS. The current annual membership fee for an individual, for the period 1 October 2006 to 30 September 2007, is $60 excluding GST, with an additional IPENZ administration fee of $38.

David Phizacklea, Membership Co-ordinator
New Zealand Coastal Society

Even before the Mount Reef was completed surfing waves were forming.

life a better surface to latch on to. Terrafix is a composite polyester and polypropylene, UV stabilised, material with a life of over 20 years. Geo-textiles are commonly used on roads, land construction and were fully tested on the Gold Coast surfing reef which has been in place for a number of years now.

The individual mega-bags used in the construction of the reef hold between 27 to 660 m^3 of sand. The older style smaller bags used on the Gold Coast reef have been totally stable in giant cyclone waves over 10 metres high. Due to the shallow depths at the Mount Reef, the biggest waves on the reef will be much less than this.

Prior to submersion the empty bags were tied onto a webbing lattice on dry land before being towed out to the reef site and pulled down into position on the seabed through Manta Ray Ancor Locs. Once secured in place 6000 m^3 of sand was pumped into the bags to create the shape of the reef.

The bags are laid out with the smallest bags at the front or seaward side of the reef. These bags are about 1 m high and 35 m long. The bags gradually get bigger as they go towards the back of the reef with the largest being 3.5 m high, 50 m long and each holding 660 m^3 of sand. A smaller "scour tube" is attached to the back of the reef to prevent sand being scoured from under the two big bags. A 'geomat' has been laid under the first 25 m of the nose or 'focus' of the reef to ensure this critical section, which sets up the wave, does not sink into the sand. The rest will most likely sink by about 0.5 m over the first year but this has been taken into account in the design.

An added feature of the reef is the ability to remove it if necessary. ARP research has found that the effects of an offshore submerged reef are positive and minimal, however, by designing with removal in mind a precautionary approach can be taken.

Construction of the Mount Reef has been plagued by problems right from the start. On the second night of pumping an unexpected storm changed the sea from flat calm at 11pm to 2 metre waves and a 25 knot onshore wind by midnight. Work was forced to be abandoned and the damaged barge had to be salvaged after it ended up on the beach. The three week time delay needed to repair the barge and pipeline proved costly. A favourable weather window was lost during this period while construction was subsequently plagued by incessant swells once the barge was repaired.

Keeping equipment on hire over such a long period while waiting for suitable weather also proved expensive. The original budget of $250,000 to install the whole reef was based on a three week, construction period and with over 20 trips out to the reef, each costing approximately $10,000 per day, the original budget was soon used up. An additional $350,000 had to be raised by the Mount Reef Trust before construction could continue.

Once the additional money was raised work on the first stage of the reef recommenced with the largest bags being almost completely filled with sand. However, the smaller, deeper bags could not be topped up because they were buried under 2 metres of sand. A July bathymetric survey of the Mount seabed highlighted some areas 300 metres offshore that were only 2 metres deep at low tide. Somewhat ironically construction had to wait for a big swell with offshore winds to remove the sand bar before the second half of the reef could be installed.

As part of the resource consent requirements the Bay of Plenty Polytechnic Marine Studies Department have undertaken monitoring of the reef for Environment Bay of Plenty. Recent results showed fluctuations in beach shape and volume typical for this section of coastline. A high wide berm was present briefly in January and there has been a slight amount of deposition on the upper beach and a small amount of deposition in the swash zone in the lee of the reef.

Initially there were very few marine creatures on the sandy site but even before the reef was completed monitoring revealed the number of sea creatures present had greatly increased, as it provides a stable seabed with lots of cavities for marine organisms.

Although there have already been some small surfing waves produced by the reef the spectacular barrels expected may not appear until next summer. The predicted El Nino weather tends to reduce the swells in the area as the tropical cyclones that usually produce the waves are pushed further east, while strong westerly winds keep any swell that is present well off-shore.

While ASR Ltd's claims that the Mount Reef will provide a marine habitat for fish and other marine life and coastal protection may well be prophetic it seems only time will tell if it will also produce world-class surfing, wind surfing, kite surfing, and body boarding. In the meantime ASR Ltd is planning the construction of another artificial surf reef at Opunake.

Volkner Rocks Marine Reserve

Coastal News

Te Paepae o Aotea (or the Volkner Rocks) Marine Reserve, which was opened on October 12, is an outstanding cultural, natural and ecological feature of international significance.

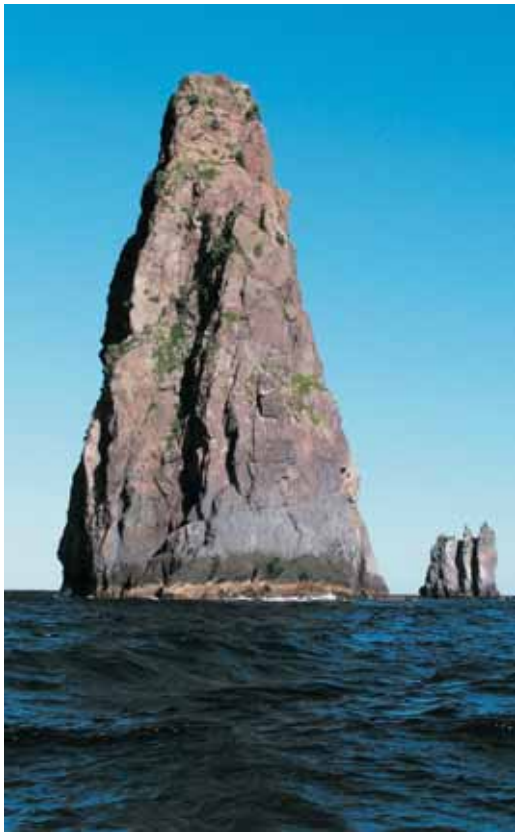
Located, near White Island, 55 km offshore from Whakatane in the Bay of Plenty, the 1267 ha marine reserve is a small but important piece in a network of marine reserves which forms part of a national goal of having 10 per cent of New Zealand's marine environment protected by 2010.

The warm ocean current which passes through the area allows species to survive that are usually found much further north. As a result the reserve will protect a spectacular volcanic marine habitat that is an important breeding area for up to 60 species of fish and home to several notable species such as some rare soft corals, sponges, rare anemones and black coral.

The reserve was first suggested in 1991. It was created after numerous consultation processes which resulted in a reserve boundary that excludes a prized king fishing area.

As well as being renowned for marine life Te Paepae o Aotea is also one of the most significant cultural seascapes in New Zealand. Like Te Rerenga Wairua in the north, it is the departure place of the spirits of people descended from the Mataatua waka.

The new marine reserve status will not only protect the underwater life but also the rocks themselves which were used by the navy for target practice up until the mid-1990s.



The Volkner Rocks are renowned for the unusual marine they harbour

The Volkner Rocks were used as target practice by the New Zealand Navy until the mid-1990s

Whangarei Harbour Marine Reserve

New Zealand's latest marine reserve, the Whangarei Harbour Marine Reserve, was recently opened on 18 October 16 years after Kamo High School students first broached the idea.

Kamo High School's Year 13 students began work on the marine reserve application in 1990 as part of geography syllabus.

The formal application by the school, lodged in 2002, contained a proposal to include an ecological sequence of connected marine habitats: a mangrove area at Waikaraka, near Onerahi; a unique rocky reef at Motukaroro (Passage Island), near Reotahi; and a mudflat area at Motumatakohe (Limestone Island).

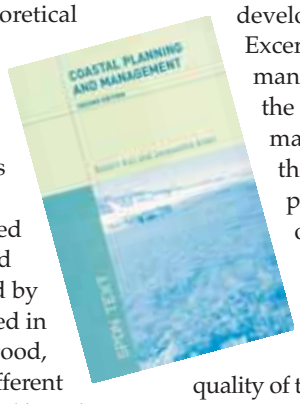
The approved result comprises of two sites – one at Waikaraka, and the other at Motukaroro. The combined area of both these sites is approximately 237 hectares, or 2.37% of the total area of Whangarei Harbour set aside to protect marine biodiversity for now and future generations.

Book Review

Coastal Planning and Management – Second Edition

by Robert Kay and Jacqueline Alder (2005) London: Taylor & Francis

Many of the coastal planning texts and articles I read lack a sense of the reality of the planners and management world. Others lack the 'big picture' and are hidebound in a particular theoretical stream or way of doing things, barely better than manuals. Kay, based in Western Australia but with New Zealand experience, and Canadian-based Alder are both coastal consultants with academic connections and have succeeded in providing a contextualised toolkit useful to both practitioners and students. The 1999 edition (published by Spon) was useful but somewhat limited in perspective. This edition provides a good, succinct but expanded overview of different approaches to planning and updates and broadens the range of examples of 'best' practice from around the world.



The scope of coverage ranges over the international to the site, and material includes matters not often found in such texts, such as the application of Checkland's Soft Systems Methodology to sustainability indicators in Malta and public participatory techniques employed in Indonesia. Significant concepts from tourism and recreation are covered as well as approaches to planning for hazards.

The strength, and weakness, of the text, for me, lay in the many boxes and figures. These provided fascinating insights into the approaches taken by coastal planners/managers in a variety of developing and developed countries. Excerpts from or descriptions of coastal management plans and processes such as the Thames River Estuary plan and dune management in Western Australia add to the more familiar material on coastal planning in Sri Lanka and management of the Great Barrier Reef. The straightforward description of economic valuation techniques will aid students and science-based practitioners wanting to check out the quality of the analyses done by the various current experts on coastal valuation.

However, the text is over-fragmented by the frequent boxes. The lack of a list of boxes, figures and plates is frustrating. There is a real sense that the eclectic mix represents what the authors have found personally useful and will not satisfy everyone, although it matches much of the material I have found particularly useful over the years. If looking for a new, practical text on coastal planning and management it is hard to go past this one.

Reviewed by Hamish G. Rennie
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News From The Regions

Coastal News

Otago Region

Paul Pope, Otago Regional Coordinator

Long Beach Liberation Front Makes Its Opinions Known

If you ask any property or business owner in some of New Zealand's larger cities they'll tell you that tagging is a costly and unsightly nuisance. Whatever your opinion, whether you think tagging is a crime or a legitimate art form, it is not usually associated with small coastal towns in Otago.

However, north of Dunedin in the tiny but picturesque town of Long Beach (population a few dozen people, and several dogs) has been the recent scene of a new coastal protest movement, the Long Beach Liberation Front (LBLF). Armed with jingoistic slogans daubed on available surfaces, the LBLF have expressed their displeasure at changes to coastal reserve access in an effort to receive a groundswell of public support.

The protest rests around plans by the community and the Dunedin City Council to upgrade the facilities and reserve adjacent to the beach access in Long Beach. Plans to reduce vehicular access using post and chain barriers have not found favour with some members of the community.

Conflict and division within communities between those who view access as a 'right" and those who seek broader protection of coastal values, are divisive issues in small communities. While some may see such protests as trivial in nature, protest (at any scale) does emphasize the importance of careful and meaningful consultation over changes to traditional coastal access points by local authorities and communities.

User values can be exceedingly difficult to define, because community and individual aspirations mean different things to different people. The Long Beach example exemplifies the difficulty local authorities have balancing community aspirations with appropriate environmental outcomes. Vive le revolution!

Hawke's Bay Region

Gary Clode, Hawke's Bay Regional Coordinator

Coastal Plan

After a great deal of work, Hawke's Bay Regional Council (HBRC) has finally adopted its draft Regional Coastal Environment Plan (RCEP) and the proposed RCEP has now gone out for public submissions. Submissions close on 27 October 2006.

The proposed plan represents a significant change in the way council plans to manage the coastal environment. The PRCEP has a policy framework in relation to the avoidance and mitigation of coastal hazards in the region which suggest that responses to coastal hazards should be prioritised.

Briefly the priorities are:

1 Avoidance, (and relocation for existing development).

2 Maintaining and enhancing natural features.

3 Beach nourishment.

4 Hard structures as last resort.

Rules in the PRCEP are based on three hazard risk zones defined in the 2004 HB Regional Coastal Hazard Assessment by Tonkin & Taylor Ltd. Stricter controls apply in the high risk zones (CHZ1) and lesser restrictions apply in the medium (CHZ2) and long term (CHZ3) risk zones. New buildings in the high risk zone (CHZ1) will be non-complying, rather than prohibited as initially proposed.

The PRCEP does not include any policies or rules in relation to the threat of tsunami on the region.

Westshore Nourishment Contract

Tenders are being called for the annual Westshore Beach nourishment contract. This year, (similar to last year) the quantity required is 16,300 cubic metres. In previous years the average amount of nourishment has been generally about 10,000 cubic metres. There has been an increased number of heavy swells affecting our coast over the past couple of years. It is thought that this could be the pattern for the next few years.

Paul Komar Report

The report "Hawke's Bay, New Zealand: Environmental Change, Shoreline Erosion and Management Issues" by Dr Paul Komar, a consulting oceanographer from Oregon, USA has been finalised. This report provides a comprehensive review of Hawke's Bay's Coast

including tectonic impacts, human settlement, ocean processes and the dynamics of mixed sand-gravel beaches. A summarised version of the report will be available in the near future for those who are daunted by the near phone-book sized original.

Haumoana – Te Awanga Working Group

The Haumoana – Te Awanga Working Group, which includes three councillors from both Hastings District and Hawke's Bay Regional Councils and four community representatives, has been investigating possible management approaches for addressing the coastal hazards affecting the Haumoana and Te Awanga coastal communities.

A council report prepared for the working group has looked at four possible management approaches of: ongoing regulatory control, managed retreat, beach nourishment and hard engineering involving the use of groyne fields.

The report has highlighted the complexity of the issue and identified key advantages and disadvantages as well as points of uncertainty for each of the management approaches.

To date the working group has been unable to reach a consensus on a preferred management approach and a joint meeting between Hastings District Council and Hawke's Bay Regional Council will be held in late November to discuss the issues.

Bay of Plenty Region

Ben Lee and Aileen Lawrie, Bay of Plenty Regional Coordinator

Aquaculture Management Areas

Environment Bay of Plenty has just finished and released reports and maps from an extensive four year research project exploring opportunities for Aquaculture Management Areas.

The science part of the project has been a two stage process – the first being a data gathering phase and the second being the running of models developed by ASR Limited.

Data was gathered for:

- physical and chemical characteristics of the waters
- chlorophyll-a (i.e. plankton) concentrations
- current and temperature profiling of the water column
- benthic organisms
- sediment characteristics.

Much of the data was obtained through field surveys from mid 2003 through to 2004. The field surveys included the use of a current meter, underwater video, and sediment grabs.

The data was then used to calibrate models from the 3DD Suite (© Black, 2001). The models can simulate currents, plankton concentrations, water temperature and nutrient cycling.

One of the scenarios being run is the simulation of the depletion of phytoplankton and zooplankton for scenarios of two and four large mussel farms (approximately 5000 ha each) at different locations on the inner shelf of the central Bay of Plenty. Other scenarios being run include looking at how El Niño and La Niña climate variables can influence phytoplankton levels.

The Coastal Use and Value maps show all the uses and values of the region's offshore environment that may limit where aquaculture can take place. For example, aquaculture would be unsuitable in a commercial shipping lane.

The first job was to pull together all existing information. Information was sourced in-house (from existing resource consents and the coastal plan) and externally (from the Coastguard, Ministry of Fisheries and Department of Conservation). We also commissioned consultants, held hui with Maori, and carried out our own studies where there was little or no existing information (e.g. marine mammal presence, culturally significant sites to Maori and charter boat routes).

The consultation process that followed was basically a check to make sure that we had mapped every relevant use and value and we had them in the right place.

Now that we have a good knowledge base and have the tools to model scenarios, the next step is to start exploring opportunities. Both the science and the mapping work indicate that there is space for more aquaculture in the Bay of Plenty. The council intends holding a regional forum late this year/early next to present the science and maps, and to discuss the future of aquaculture in the Bay.

For more information contact Aileen Lawrie (aileenl@envbop.govt.nz) or Ben Lee (benl@envbop.govt.nz).

Tauranga Harbour Integrated Management Strategy

Environment Bay of Plenty has recently released the Tauranga Harbour Integrated Management Strategy. The strategy identifies the issues, gaps and overlaps in the environmental management of Tauranga Harbour and recommends a number of actions to deal with those identified concerns.

The strategy covers both the harbour and fringing land. It was acknowledged that it was not possible to separate activities that happen on the adjacent land and the impacts they have on the harbour e.g. sedimentation.

The strategy seeks to compliment, and not repeat issues dealt with in other strategies such as the SmartGrowth Strategy and the integrated stormwater strategies.

The strategy has been produced by EBOP,

however, there has been input from the Western Bay of Plenty District Council and Tauranga City Council. It involved input from experts such as environmental scientists and consultation with key community members.

Sedimentation has been identified as the issue of most concern. EBOP intends to start work on a specific sediment strategy in the coming year.

Similarly population growth poses a management challenge for the recreational use of Tauranga Harbour. A strategy to deal with recreation in an integrated way is already being in the process of being developed – The Tauranga Harbour Recreation Strategy.

The strategy notes that a number of issues arise from coastal marine area boundary issues, and recommends that both regional and district councils need to be mindful of these boundaries and actively work to minimise the integration difficulties caused by legislation.

For more information contact Aileen Lawrie (aileenl@envbop.govt.nz).

Estuary Management and Mangrove Removal

As part of a greater estuary management programme, the second community based mangrove removal resource consent application has been lodged with Environment Bay of Plenty.

The Tanners Point Athenree Harbourcare Group has been working with EBOP operations staff to prepare an estuary management plan and the resource consent application. EBOP has made a commitment to actively assist estuary care groups with their activities including providing free resources for developing management plans and funding resource consent applications.

For more information contact Ray Thompson (rayt@envbop.govt.nz).

Ecological Corridors

A report has been completed on possible ecological corridors within the Tauranga Harbour catchment. It has highlighted two priority corridors of interest to follow up on.

One of these corridors is a series of salt marshes on the western side of the harbour, approximately halfway between Tauranga and Katikati. The other is a land based area. It is hoped that with some work, the two smaller corridors can be joined creating one big coast-to-the-Kaimai Ranges corridor.

A further report is to be done this summer defining the areas to concentrate biodiversity enhancement efforts.

For more information contact Lawrie Donald (lawried@envbop.govt.nz).

If you would like to contribute an article, news item or conference announcement to *Coastal News*, see the guide for contributors on page 18.

In Winds from Hell... Escape to the Mangroves

"The noise was incredible. Winds screamed like a chorus of stabbed pigs. Leaves, twigs, small branches attacked my glass windows, each recording its presence with notes of despair. Things hit the wall of my bedroom with heavy thuds. Doors occasionally slammed and a distant window became glass fragments, the full ugliness of which was not seen until well after day break…"

On the night of 15 and 16 September 2006, the remote island of Iriomote, the southern most landmass in the Okinawan Prefecture of Japan and the northern most island that is still, technically, in the tropics, was hit by Typhoon Shan Shan, the worst typhoon in 30 years.

Located near Taiwan in the East China Sea, Iriomote's 29,000 ha consists mostly of Biosphere Reserves with some cattle farms and pineapple plantations around the coastal fringes. Coral reefs decorate the coastline and extensive mangrove forests occupy its numerous bays, estuarine rivers and indentations.

Before Shan Shan struck, in the disciplined manner which typifies the Japanese response to warnings of imminent 'extreme events' such as tsunamis, volcanoes, earthquakes and….typhoons, the people of Iriomote took their many small boats to refuge sites within the much valued and widely respected mangroves. Most of these boats are the money spinning tools of eco and adventure tourism. Many are flat-bottom tour boats with canopies and twin 90 HP outboard motors. They are valuable investments and serve thousands of tourists, who visit the island paradise annually, from mainland Japan.

Around 5-8 typhoons or the less "evil" tropical storms lash these waters every year. They are born in the typhoon zone, towards the western side of the huge Pacific Ocean near the Philippine

archipelago. Their trajectories appear to be random (that's probably because we still don't yet understand them!), but their size and force can be huge. Can you imagine a typhoon 100 km wide with a wind speed of 136.4 km/hour?! Well that was Shan Shan at its peak (see table).

The people of Iriomote, mostly Japanese migrating here from other regions of Japan, do nevertheless respect the typhoon and look to 'their' mangroves as safe hiding places for their boats.

As can be seen from an inspection of the tabulated data, the island paradise of Iriomote was visited by winds from hell. Not for the first time and it won't be the last!

As the island's mangrove forests bear the full

Day	Time (hrs)	Air Pressure hPa	Wind Direction	Wind Speed		Remarks
				m/s	km/hr	
Friday 15.09.06	1 am	1006.6	ENE	7.1	25.56	Its on its way
	4 pm	999.3	ENE	10.4	37.44	Phone 999...while you still can
	9 pm	995.2	ENE	15.3	55.08	Still >5 km/h over the urban speed limit
	Midnight (2400)	985.5	ENE	19.9	71.60	Power cut!
Saturday 16.09.06	2 am	972.6	ENE	27.9	100.44	Highway speed limit
	4 am	942.1	NE	37.9	136.44	Hell is here
	6 am	928.6	N	19.8	72.00	
	7 am	946.3	NW	36.3	130.68	One hell of a gust!
	11 am	986.5	WNW	29.3	105.45	
	9 pm	1003.7	WNW	14.1	72.00	
	Midnight (2400)	1005.2	NW	8.4	30.24	Hells going...

Data based on JPS (Japanese Met Service) information

brunt of any typhoons one would expect some damage to them. Remarkably, my post-typhoon mangrove inspection revealed comparatively low rates of damage when compared to the island's terrestrial vegetation. Unlike the trees on land, along roadsides, beside houses and wind breaks adjacent to pineapple plantations, these 'trees in the sea' coped well. The reasons involve some interesting biophysics and tree architecture well beyond the scope of this article. But, in essence, both tree form and root structures are the key to the surviving typhoon force winds of 100 + km/hour.

Interestingly, the sole species of mangrove found in New Zealand, *Avicennia marina* is also represented in the mangrove flora of Iriomote. The form here is dwarf; squat compact shrubs of *A. marina* are typical. This shape plus the extensive below ground root system, designed as extensive cables and numerous, protruding, peg-like, aerial roots as pneumatophores, are the key to stability in an unstable substratum (sandy mud) and, at times, violent atmosphere.

Today in New Zealand there are those who choose to look upon mangroves as "weeds": unwanted coastal shrubs and trees that challenge their concept of water sports. This viewpoint stands in stark contrast to the people of Iriomote Island. Perhaps we, in Aoteoroa, are not as 'clean and green' as we like to think. In my view, those who threaten manawa (N.Z. *Avicennia marina* variety) with the negative title of "weed" should think again, and hard, perhaps taking a serious, scientific look at the root causes of mangrove expansion in places like Whangamata: sedimentation!

It is almost normalized and accepted in New Zealand to criticize 'the Japanese' for killing whales, yet are we slowly growing to accept killing (uprooting is killing!) mangroves as acceptable in New Zealand. Perhaps we, too, should respect our mangrove resources. After all, 'boaties' in Iriomote do!

Gordon S. Maxwell
Visiting Professor, International Society for Mangrove Ecosystem (ISME) and Tropical Biosphere Research Centre, University of Ryukyus, Iriomote Station, Okinawa, Japan

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	André Labonté	labonte@xtra.co.nz
Auckland	Scott Nichol	s.nichol@auckland.ac.nz
Waikato	Jenni Paul	jenni.paul@ew.govt.nz
Bay of Plenty	Aileen Lawrie	aileen@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

NZCS Mission Statement

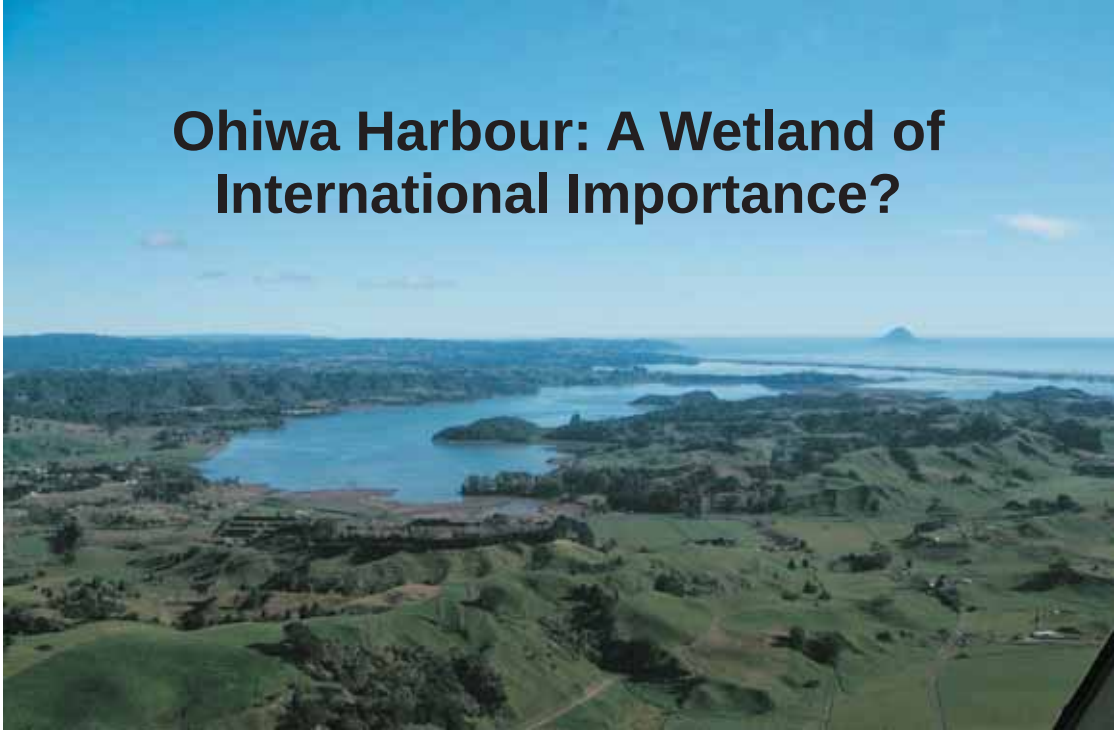
The New Zealand Coastal Society was inaugurated in 1992 "to promote and advance sustainable management of the coastal environment".

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 NZCS Administrator Hannah Hopkins (e-mail: hannah.hopkins@ew.govt.nz)

Ohiwa Harbour: A Wetland of International Importance?



On October 18 the Draft Ohiwa Harbour Strategy (DOHS) and a proposal to nominate the Ohiwa Harbour for inclusion in the List of Wetlands of International Importance, under the Ramsar Convention, was made public.

The Convention on Wetlands of International Importance Especially as Waterfowl Habitat is a global intergovernmental treaty, adopted in 1971 in the Iranian city of Ramsar, which recognises the most ecologically important wetlands in the world.

The emphasis of the convention was originally on the conservation and wise use of wetlands to provide habitats for waterbirds and waders worldwide. Over the years its scope has increased to recognise the importance of wetlands as being ecosystems that are also extremely important for the wellbeing of human communities and biodiversity conservation in general.

More than 1400 wetlands in the world have been included in the list. New Zealand became a party to the Convention in 1976 and has been successful in having six wetlands included so far - Farewell Spit, Firth of Thames, Whangamarino Wetland, Kopuatai Peat Dome, Waituna Lagoon, and the Manawatu River Estuary, Foxton.

Environment Bay of Plenty, Whakatane District Council, Opotiki District Council and local iwi have been working closely together to produce the DOHS.

The strategy suggests that the Ohiwa Harbour has the types of ecological, social, cultural and historical values a wetland should have to meet the Ramsar criteria. The harbour is already recognised as an important habitat for birds and other wildlife that represents the Whakatane Ecological Region. It has also long been valued by Maori as an important mahinga mataitai (food gathering place) and a traditional home with spiritual and historic importance.

The strategy sets out a vision for Ohiwa Harbour that will be used to carefully manage the harbour and catchment so that the special quality of the environment is retained, and where possible, improved in accordance with the Ramsar Convention.

Issues that have been identified which impact on the harbour's ecosystem values include: sedimentation, runoff, nutrification, and pollution; activities that destroy habitat or disturb wildlife, such as vehicles on mudflats; the spread of mangroves; and unsustainable kaimoana harvesting. None of these are new, and are mostly already being addressed through various mechanisms such as responsible land management, voluntary actions, regulations and environmental initiatives.

A Ramsar listing is not expected to create any further restrictions on activities (such as farming or subdivision) that are not already in place in existing regional or district plans. Responsible land management practices would continue to be supported and the present public uses of the harbour would not be curtailed, for example, cockle collecting and fishing would still continue.

Copies of the strategy are available from Environment Bay of Plenty on 0800 ENV BOP or www.envbop.govt.nz.

Conferences and Workshops

Coastal News

Coasts and Ports 2007 Conference

17 - 20 July 2007, Grand Hyatt Hotel, Melbourne, Australia

Coasts and Ports 2007, hosted by Engineers Australia, IPENZ, NZ Coastal Society, and PIANC (Australia), represents an amalgamation of the 18th Australasian Coastal and Ocean Engineering and 11th Australasian Ports and Harbour conferences with the Coasts and Ports conference series now the pre-eminent series for coastal and port professionals in the Australasian region.

Coasts and Ports 2007 will bring together engineers, planners, researchers and others working in disciplines relating to coastal and port matters, to engage in discussions currently facing this community. The scope of Coasts and Ports 2007, with its three-day technical program, will range from technological advances and emerging environmental issues to a review of policy and planning experience with an immediate relevance to working, living, playing and preserving the coast and port infrastructure.

For more information visit www.coastsandports2007.com.au or contact CLEMS (Conference Links & Event Management Services) at clems.sg@bigpond.com.

ICCCM'07: International Conference on Coastal Conservation and Management in the Atlantic and Mediterranean

March 22-26, 2007, Magic Life Africana Imperial Hotel, Hammamet, Tunisia

This multi-disciplinary conference is convened as a forum for scientists, engineers, planners and managers to discuss recent or new advances in scientific, technical, and socio-economic understanding of environmental issues related to coastal processes.

The conference includes an interesting programme: strategic environmental assessment in coastal areas; integrated coastal zone management (ICZM); coastal laws; coastal pollution; living with erosion; and sustainable coastal tourism.

More information is available at the conference website: www.fe.up.pt/ihrh/icccm07

International Coastal Symposium

April 16-20, 2007, Gold Coast, Queensland, Australia

The first ICS Conference to be held in Australia will bring together coastal scientists, managers, planners and engineers from around the world to discuss issues and activities relating to the coastal region such as coastal evolution, dynamics, ecology, geomorphology, chemical, geology, conservation, management, and engineering related research. The ICS2007 proceedings will be published in a special issue of the Journal of Coastal Research.

For further information please visit the www.griffith.edu.au/school/eng/ics2007 and/or contact ICS2007@griffith.edu.au.

IEES/OES Oceans 2007

June 18-21, 2007, Aberdeen, Scotland

The prestigious Oceans Conference and Exhibition is run under the auspices of the Oceanic Engineering Society (OES) and its parent organisation The Institute of Electrical and Electronic Engineers (IEEE).

Oceans07 Aberdeen will provide the premier forum for scientists, engineers and end-users worldwide to present their latest research, innovation, ideas and developments in all areas of oceanic engineering.

The theme for Oceans07, Marine Challenges: coastline to deep sea, highlights the significant challenges, from the shallowest waters around our coasts to the deepest subsea trenches, which still face marine and oceanic engineers in our drive to understand the complexities of the world's oceans and our ability to utilise, explore and preserve this unique environment.

For more information visit www.oceans07ieeeaberdeen.org/

Conserv-Vision: the Next Fifty Years

July 4-7, 2007, Waikato University, Hamilton, New Zealand

Conserv-Vision is a conference to celebrate the first 20 years of Department of Conservation's (DoC) existence and to reflect on the past and future of conservation.

The conference will cover all spheres of concern to conservationists, including science, management and advocacy, including especially the coastal and marine environment and DoC's role.

Key speakers include:

- Ross Cullen PhD (Otago), Professor of Resource Economics, Lincoln University
- Jeffrey A. McNeely, IUCN Chief Scientist
- Geoff Park, Wellington-based Ecologist and writer, author of *Nga Uruora* and *Theatre Country.*
- Daniel Simberloff, PhD (Harvard) Department of Ecology and Evolutionary Biology, The University of Tennessee

continued on page 17

Members Satisfied with NZCS

A satisfaction survey was undertaken in November/December 2005 in order to determine how the New Zealand Coastal Society can provide improved services to its members. Survey forms were distributed to all attendees at the NZCS conference in Tutukaka and also emailed to all NZCS members after the conference. A total of 50 forms were received. The lucky respondent to win a copy of the book "The New Zealand Coast" was P. King from Whangarei.

Levels of satisfaction with the annual conference continue to remain high. Overall 92% of respondents were either satisfied or very satisfied with the annual conference. People noted the value of the conferences for networking, keeping up to date with new research, and hearing about multidisciplinary projects around New Zealand.

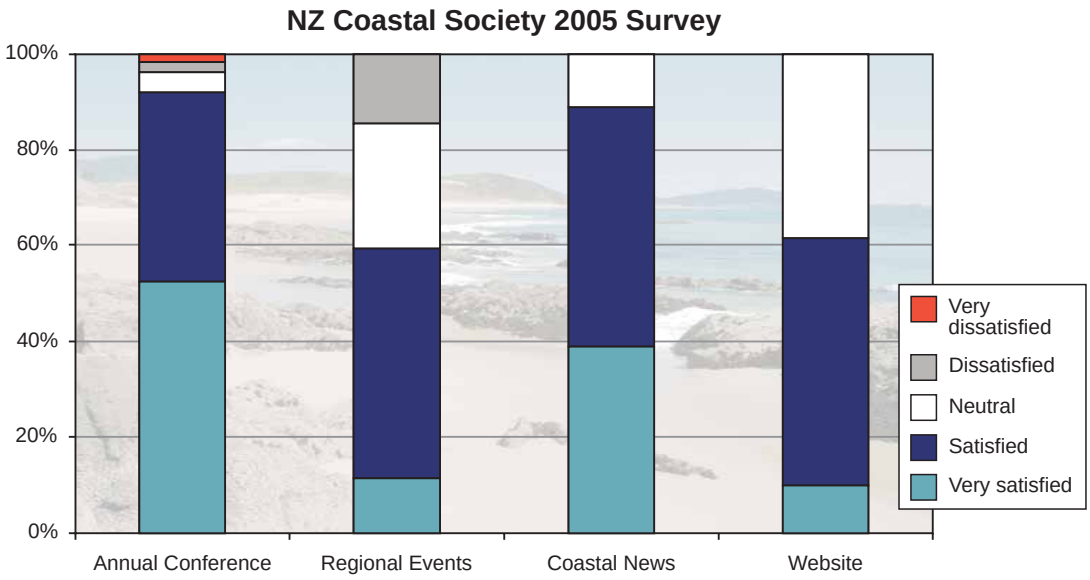
Suggestions for improvement included requests for more technical and social science presentations, less time pressure on presentations and shorter fieldtrips. These points have been taken into account in planning the Kaikoura conference.

Satisfaction with regional events was lower (59% very satisfied or satisfied), possibly reflecting the infrequent occurrence of such events in many regions.

Eighty seven percent of respondents said they 'always or often' read Coastal News. The NZCS website is accessed less frequently with 4% accessing it 'often', 65% 'sometimes' and 31% 'never'. Percentages of respondents who were satisfied or very satisfied were 98% for Coastal News and 62% for the website. Several suggestions were made regarding the website content and the NZCS Committee is following up on these.

A similar survey will be distributed at the end of 2006 to track our progress. Please give us your feedback and ideas for improvements. You might win a book!

Kath Coombes
NZCS Committee Member
kath.coombes@arc.govt.nz



- Vandana Shiva, PhD, Research Foundation for Science, Technology and Ecology, New Delhi
- David Young, author of *Woven by Water: Histories from the Whanganui River* and *Our Silands, Our Selves A History of Conservation in New Zealand*.

You can find out more at www.waikato.ac.nz/wfass/Conserv-Vision/

Coastal Zone 07: Brewing Local Solutions to Your Coastal Issues

July 22-26, 2007, Portland, Oregon, USA

The biennial Coastal Zone conference, now in its fifteenth edition, is the largest international gathering of ocean and coastal management professionals in the world. Nearly 1,000 people attend, representing state and local governments, academia, nonprofit organizations, and private industry.

The conference provides a platform to discuss the issues facing our world's coasts and oceans and a forum for discovering new strategies and solutions through oral and poster presentations detailing case studies, lessons learned, and success stories.

For more information visit www.csc.noaa.gov/cz/

Coastal News

Shore Protection Manual Replaced

The U.S. Army Corps of Engineers Veri-Tech Inc. have just released a modern replacement for the world's most popular coastal manual the Shore Protection Manual (SPM).

The SPM has been the basis for coastal engineering practices in the U.S. Army Corps of Engineers and most standard engineering projects throughout the world since 1973.

The Coastal Engineering Manual (CEM) is the modern replacement of the SPM. CEM incorporates contributions from worldwide experts/practitioners on the latest research techniques, procedures, and information. The CEM aims to provide broader coverage of all aspects of coastal engineering than the SPM.

New sections have been added on navigation and harbour design, dredging and disposal, structure repair and rehabilitation, beach restoration, wetland and low energy shore protection, cohesive shores, risk analysis, field instrumentation, numerical simulation, and the engineering process.

The CEM is also available as a Windows-based CD-ROM document that incorporates all the tools and procedures used to plan, design, construct, and maintain coastal projects. This is a comprehensive, state-of-the-art guide including the basic principles of coastal processes, methods for computing coastal engineering planning and design parameters, and guidance on how to formulate and conduct studies in support of coastal flooding, shore protection, and navigation projects.

The CEM is made up of six parts containing over 3,000 pages:

- Part I describes the scope and applicability of the material, discusses the coastal diversity of oceans and lakes, highlights the history of coastal engineering, outlines the content of the manual, and provides help in using the electronic version.
- Part II contains eight chapters on coastal hydrodynamics - water wave mechanics, meteorology and wave climate, estimation of nearshore waves, surf zone hydrodynamics, water levels and long waves, hydrodynamics of tidal inlets, harbor hydrodynamics, and hydrodynamic analysis and design conditions.
- Part III covers coastal sediment properties, longshore sediment transport, cross-shore sediment transport processes, wind-blown sediment transport, erosion, transport, and deposition of cohesive sediments, and sediment transport outside the surf zone.
- Part IV provides information on coastal geologic environments, classification and morphology, and morphodynamics.
- Part V includes seven chapters on the planning and design process, site characterization, shore protection projects, navigation projects, sediment management at inlets/harbors, and coastal engineering for environmental enhancement.
- Part VI contains eight chapters on introduction to coastal project element design, types and functions of coastal structures, site specific design conditions, materials and construction aspects, fundamentals of design, reliability based design of coastal structures, design of specific project elements, and designing for repair, rehabilitation, and modification.

The Coastal Engineering Design and Analysis System (CEDAS) is an interactive, Windows-based design and analysis system for engineers and scientists working in the fields of coastal, ocean, and hydraulic engineering and oceanography and geology. CEDAS is a comprehensive collection of coastal engineering design and analysis software, developed by or for the U.S. Army Engineer Waterways Experiment Station.

Contents of CEDAS range from the simple technologies of the popular ACES package, to sophisticated models for multi-dimensional hydrodynamics, wave propagation, nearshore hydrodynamics and beach processes, inlet technology, and harbour oscillation.

The powerful tools in this package are complemented by pre- and post-processing routines, multi-dimensional graphical tools for results visualization and animation, grid generation software, and access to extensive wave/wind/bathymetric data resources.

For more information on the CEM or CEDAS visit www.veritechinc.com.

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.

Back issues of Coastal News are available on the NZCS website at www.coastalsociety.org.nz

New Zealand Seismic Tsunami Hazard

Since the Sumatran Tsunami of Boxing Day 2004, there has been a heightened awareness in the media of the potential tsunami hazard following submarine earthquakes. The Tonga Earthquake and Tsunami of 4 May 2006 contributed to an overreaction of the public at some coastal locations around New Zealand. This lead to criticism of the way the Ministry of Civil Defence and Emergency Management handled the event. This article attempts to summarise our current understanding of the hazard associated with seismically generated tsunami for New Zealand.

For emergency management purposes, it is useful to distinguish between tsunami generated more than 3 hours travel time from the New Zealand coast (distant tsunami), from those generated closer (local tsunami). This distinction arises because of the way tsunami warnings are handled by the Pacific Tsunami Warning Centre (PTWC). Local authorities should receive sufficient warning for distant tsunami, but probably will not for local tsunami.

Figure 1 summarises the maximum tsunami height at the coast for historic distant tsunami events affecting New Zealand since 1800. It is evident that some locations experience much larger tsunami than most of the New Zealand coast. This occurs due to focussing of the tsunami by offshore features such as the Chatham Rise, and local resonance as in Pegasus Bay and Lyttelton Harbour. Historically the largest distant tsunamis have been generated near South America, from the coasts of Chile and Peru, particularly from the Arica Bight.

Due to the short historical record, it is possible that large distant tsunami generated elsewhere around the Pacific could result in large tsunami around New Zealand, but have not yet been recorded. For large seismic tsunami, the maximum wave heights occur parallel to the fault rupture, so the greatest hazard for New Zealand is due to subduction zones parallel to our coast. Further, the Southwest Pacific Ocean has a very high concentration of islands and shallow ridges and plateaux that scatter and reflect tsunami energy, reducing the maximum tsunami wave height.

Therefore, apart from South America, there are two other potential sources of large seismic distant tsunami representing a significant hazard to New Zealand: the Tonga-Kermadec Trench and the New Hebrides Trench north of New Zealand. Seismic data indicate that very large earthquakes are associated with thick accumulations of sediment (>1 km thick), and lineaments of abyssal hills that are roughly parallel to the trench axis. Both occur along the South American coast.

A small section of the Tonga-Kermadec Trench in the vicinity of the Kermadec Islands is associated with sediment deposits >1 km thick. Otherwise, both the Tonga-Kermadec and New Hebrides Trenches are associated with sediment layers ~300 m thick, and lineaments intersect at angles of 60-90°. Historically, there have been several earthquakes >Mw 8 near the Kermadec Islands in the region of thickest sediments, and earthquakes of Mw 7.5 – 8 near Tonga, but none of these have caused significant tsunami affecting New Zealand. Historic tsunamigenic earthquakes associated with the New Hebrides Trench have occurred along the coast of Vanuatu, and not produced significant tsunami waves reaching New Zealand. Hence, it is likely that earthquakes associated with either trench are not a threat to New Zealand.

The distribution of local seismic tsunami maximum wave height closely follows the distribution of major faults associated with the tectonic plate boundaries through New Zealand (Figure 2), with the greatest hazard associated with the southern end of the Tonga-Kermadec Trench. There are well-defined relationships for the amount of energy transferred from a seismic rupture to any tsunami generated, which then defines the maximum wave height (Table 1). The

Earthquake magnitude	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
Maximum tsunami height (m)	0.8	1.4	2.5	4.5	7.9	14.1	25.1	44.7

Table 1: Maximum seismic tsunami wave height expected close to source in New Zealand for given earthquake moment magnitudes. Beyond 50-100 km from source wave heights decay exponentially, halving in height over the first 50-100 km.

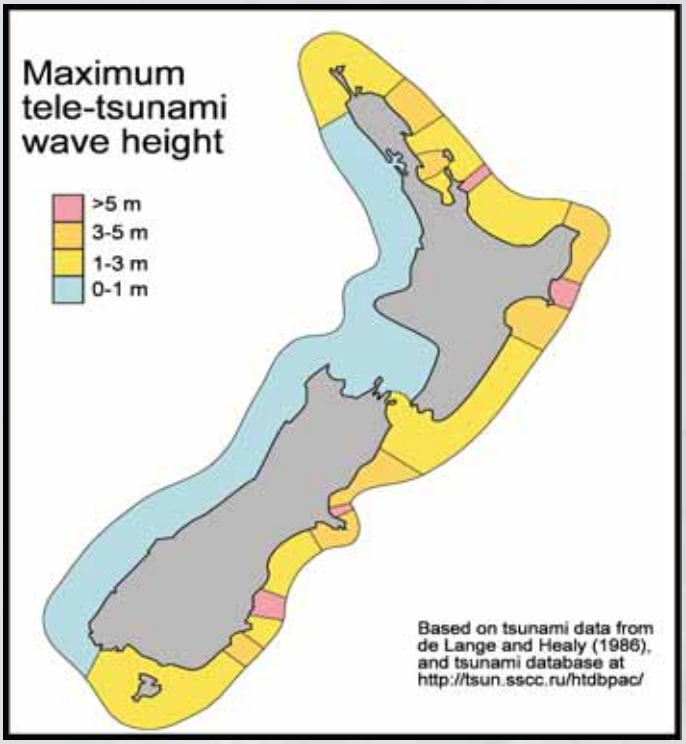


Figure 1: Maximum tsunami wave height for distant tsunami recorded around New Zealand since 1840. Data are available online at http://tsun.sscc.ru/htdbpac/. Most maximum wave heights are associated with tsunami from Chile in 1868 and 1960.

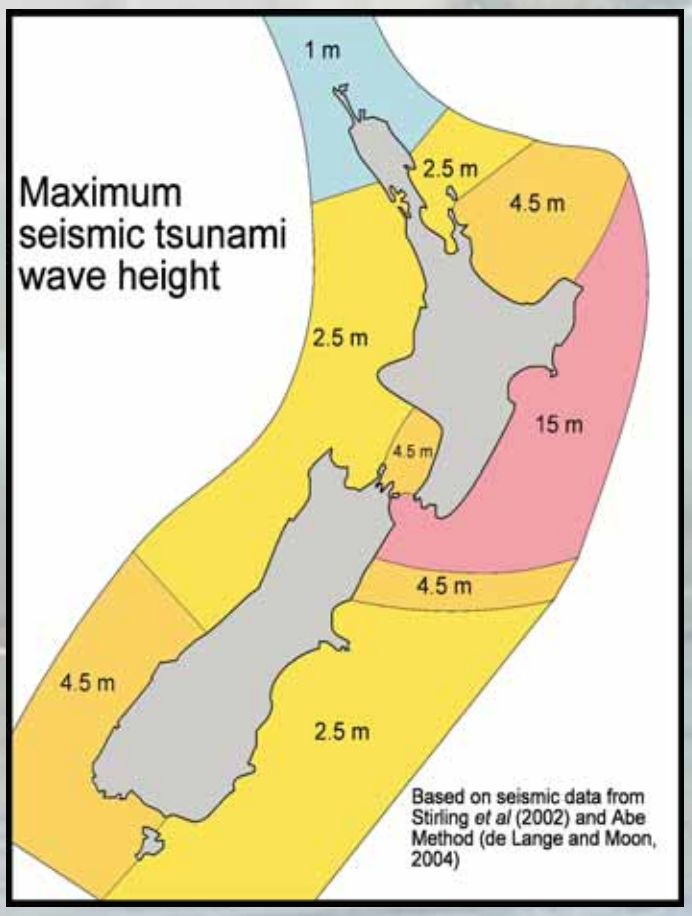


Figure 2: Maximum local tsunami wave height due to the maximum expected earthquake events for submarine faults around the New Zealand coast. Maximum wave heights are determined by scaling the available seismic energy using standard techniques. Close to the fault rupture (50-100 km) it is possible for the height to double due to local amplification.

maximum seismic event for all known submarine faults around the New Zealand coast has been determined by Mark Stirling, Graeme McVerry and Kelvin Berryman at GNS, and these data have been used to estimate the maximum tsunami wave height for each fault. Close to the fault rupture, it is possible that the tsunami wave height may be higher than predicted by the standard relationships. However, to date, all known local seismic tsunami have been smaller than predicted, so Figure 2 is considered a reasonable upper limit.

The upper limits are based on seismic sources only. Landslides have generated larger local tsunamis since 1840, but these have been confined to small sections of the coast. Scott Nicol of Auckland University, James Goff of NIWA and their co-workers have shown that palaeotsunami deposits occur to elevations of >30 m above sea level around the New Zealand coast that suggest that tsunami may exceed the limits in Figures 1 & 2. However, it appears that only one event during the 15th Century significantly exceeds the limits, and there is ongoing research to determine the source of this event. It is possible that it this event was generated by a non-seismic source.

Based on the data presented in Figures 1 & 2, it is evident that the greatest hazard is associated with local tsunami, and the hazard varies significantly around the New Zealand coast. Based on the available data the suggested 35 m above sea level evacuation level adopted by the Ministry of Civil Defence and Emergency Management would seem excessively conservative, and may cause unnecessary complications during evacuations.

With respect to distant tsunami, there is a need to better inform the public about the nature of the hazard to prevent unnecessary evacuations. This could be done in advance, without relying on announcements from the Ministry every time an earthquake occurs around the Pacific.

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