Coastal news

Issue 36 • October 2007

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

Contents



# Coastal Cliff Erosion near Oamaru

A storm at the end of June 2007 caused erosion of coastal cliffs at Oamaru and the loss of a factory. This article clarifies some aspects of the erosion through provision of the geological context, analysis of pre- and post-storm cliff and beach profiles, and analysis of wave data.

## Study site and geological context

The erosion spot sits on the southern portion of the loess-capped alluvial fan (Figure 1) constructed by the Waitaki River during previous glacial periods (Carter and Carter, 1990). For about the last 7000 years the sea has remained close to its present level (Gibb, 1986) and the shoreline has eroded back into the alluvial fan, forming a near-continuous line of cliffs. The surface of the fan is convex, such that in a north-south direction the maximum elevation is close to the river and dips gently away in both directions. Thus the shoreline cliffs are 21–22 m above mean sea level (m.s.l) at McEneany Rd and reduce in elevation toward Hedges Rd (16–17 m) and Caen St (9 m). Likewise, on the north side of the fan, cliffs are around 20 m above m.s.l at Simpsons Rd but reduce to only 9–10 m at Morven Beach Rd. The hinterland is close to sea level at Waihao Box.

The sea cliffs expose a sequence of alluvial fan gravels with intercalated sand and a small proportion of mud. Overlaying the gravels there is a cap of fine-grained loess that thickens toward the south. The elevation of the gravel/ loess boundary was surveyed at three sites along 10 km of shoreline north of Oamaru (Figure 1). At McEneany Rd it is about 21 m above m.s.l and the loess cover is generally less than 1 m thick. At Hedges Rd and Caen St the loess is about 5 m thick and the elevation of the loess/gravel boundary is 11.5 m and 3.5 m above sea level, respectively. When these cliffs erode, the sand and gravel stays onshore to form beaches that help protect the cliff from further erosion, but the clay-rich loess quickly "dissolves" and is washed offshore Thus going south towards Oamaru, the sloping loess/gravel boundary means that cliff retreat provides progressively less beach material (Figure 2).

## Pre- and post-storm surveys

In November 2006 and July/Aug 2007, pre- and post-storm cliff and beach surveys were conducted at the three survey sites. In

ISSN 1172-6938

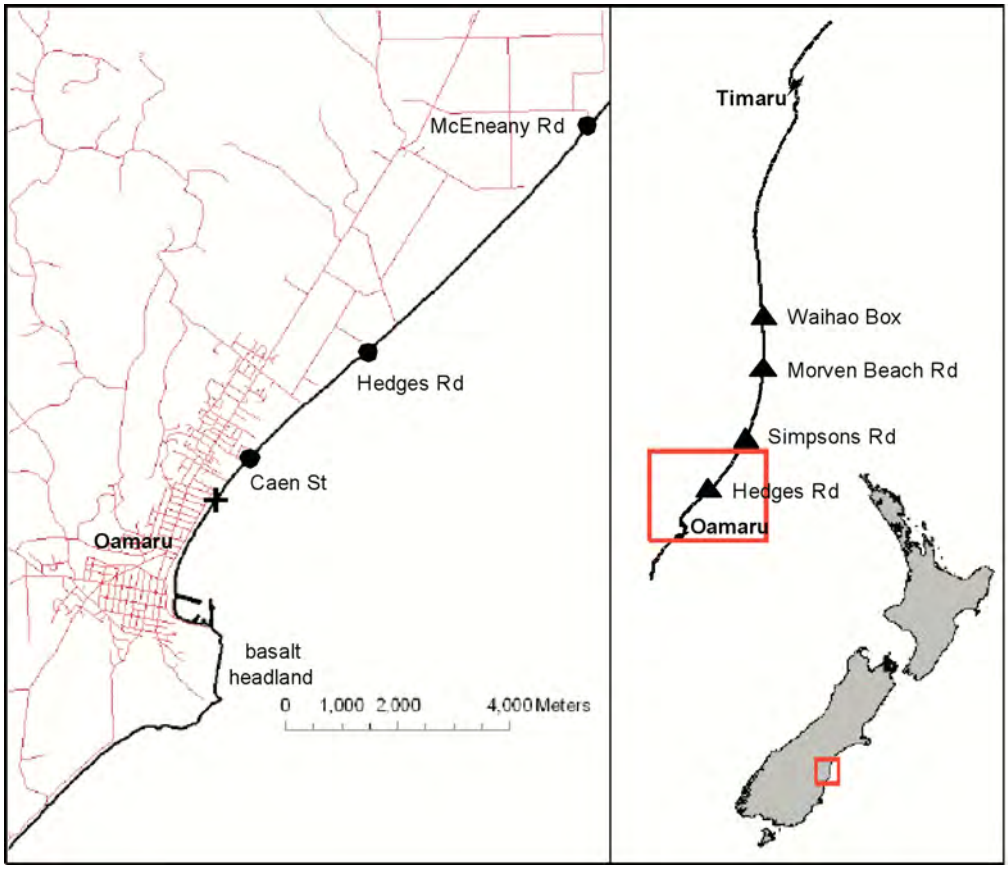


*Figure 1: Study area showing location of survey sites (circles), the erosion hotspot (cross), and locations of longshore energy flux analysis (triangles) across the protruding Waitaki alluvial fan.*

contrast to reports of 20 m erosion at the factory, just 800 m north at Caen St our survey showed cliff retreat to be generally 0.2– 0.4 m. Notably, however, the storm did result in a very marked change in beach level at McEneany Rd (Figure 3), where we surveyed a drop in beach elevation of over 2 m as the beach thinned and moved seaward. Wider inspection of the cliff toe at this location showed several narrow ledges remnant from the pre-storm beach, hence the storm did not lower the full width of beach everywhere. This, coupled with the cliff-top survey, implies that storm waves at McEneany Rd expended most of their energy on the beach gravel rather than attacking the cliff.

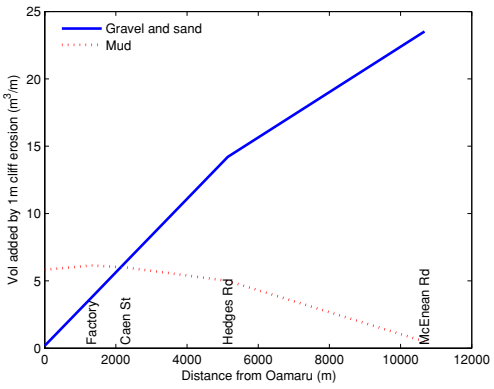


*Figure 2: Volume of gravel, sand and mud resulting from 1 m cliff retreat along 10km of shoreline north of Oamaru.*

## Wave analysis: longshore component of energy flux

The comment by the Oamaru factory owner, Mr Gary Firman, that a change had occurred in wave conditions in the 5–6 weeks before the storm, warrants further attention. We analysed data from the Banks Peninsula wave buoy for the months January to July 2007 (i.e. the approximate period separating the repeated beach and cliff surveys). Using the buoy's record of wave height, direction, and period, we evaluated the longshore component of wave energy flux for four locations spread along the Waitaki fan (Figure 4).

The striking feature is that in the days leading up to the storm, at Hedges Rd and to a lesser extent Simpsons Rd, northward sediment transport rates increased considerably. This increase resulted from the orientation of the local shoreline and the approach direction of the waves, which in this case were directed almost due north in deep water. Rates of sediment transport reach a maximum when the relative wave angle to the shoreline is approximately 45°, whereas transport rates decrease toward zero in the case of waves that are perfectly shore normal or shore parallel (e.g. Komar, 1998). Hence, under southerly waves approaching from a bearing of 180° E of N, the shoreline orientation around Hedges Rd (~45° E of N) results in the maximum possible northward sediment transport. Transport rates reduce further north as the shoreline orientation changes through Simpsons Rd (~25°), Morven Beach Rd (~0°) and Waihao Box (355°).

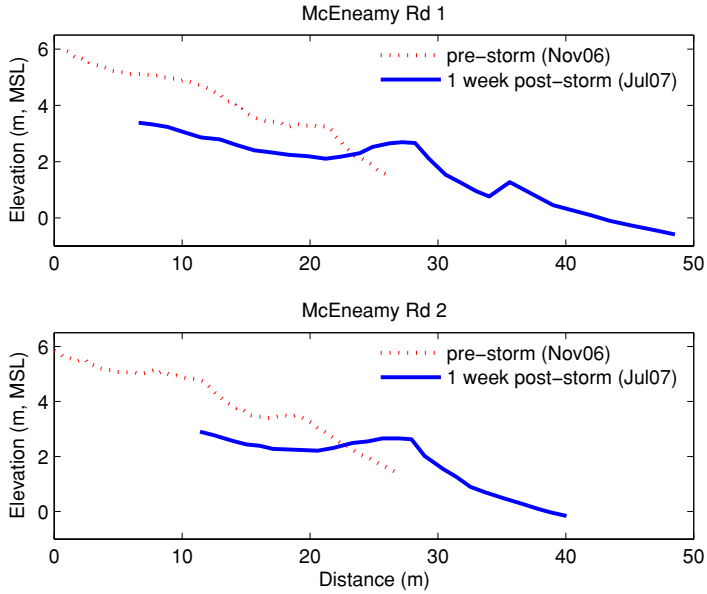


*Figure 3. Beach profile change between Nov 2006 and July 2007. The stripping and seaward movement of beach gravels occurred during the storm at the end of June 2007.*

## Discussion

The reported erosion was highly localised. Whereas 10–20 m of erosion occurred at a factory in the northern part of Oamaru, at a survey reach 800 m north of this site cliff erosion during the same storm accounted for only 0.2–0.4 m cliff retreat.

This southern section of the Waitaki alluvial fan is vulnerable to rapid erosion for several reasons. First, the gradient of the alluvial fan means that the gravel surface reduces from the river south and drops below beach level at the northern end of Oamaru. The overlying deposits of loess contribute very little beach material. Whereas erosion of high cliffs north of Hedges Rd supply beaches with quantities of gravel, beaches remain extremely sparse near Oamaru. Second, southerly storm waves make an angle to the local shoreline at Oamaru of ~45°. This maximises the rate of northward sediment transport. Because the Oamaru headland prevents bypassing of beach sediment from the south, any prolonged period of southerly wave action will rapidly shunt Oamaru beach sediment north. The absence of significant beach material will then allow storm waves to reach the cliff toe, and the loess cliff material will be particularly vulnerable where it adjoins the end of any hard structures.

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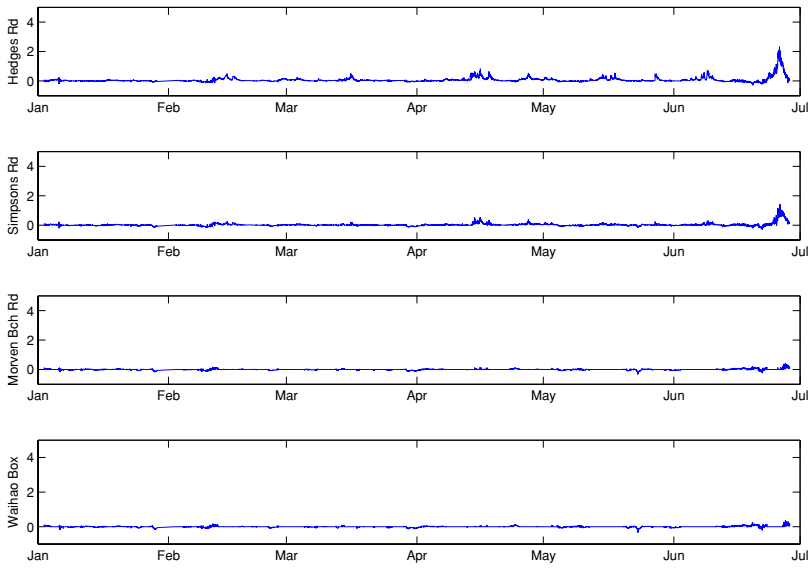


*Figure 4. Longshore flux of energy for selected shoreline segments. Positive indicates northward sediment transport.*

# Sea-level Rise and Australia's Coast

*Figure 1: Billions of dollars of coastal infrastructure has been built immediately adjacent to the coast (Photo of the Gold Coast, by Bruce Miller)*

*This is an abbreviated version of the talk presented at the "Climate Change and the Coast: Think Global act Local" Workshop held at Mandurah, Western Australia, 20 August 2007.*

The coastal zone changed profoundly during the 20th century and will continue to change, as a result of growing population pressures and increasing urbanization. About half of Australia's population lives within 7 km of the coast, with as many as 30%, or about six million people, within 2 km of the coast.

Sea level was 4 to 6 m above present day values during the last interglacial period, about 125,000 years ago. It then dropped to more than 120 m below modern levels during the last glacial maximum. Starting about 20,0000 years age, sea level has again risen by more than 120 m, at an average rate of about 10 mm per yr (1 m per century), and with peak rates of about 40 mm per yr (4 m per century). Sea level rose much more slowly over the past 7,000 years and there has been little net change in sea level from 2,000 years ago until the start of the 19th century. Almost all of these earlier changes occurred prior to mankind's sedentary occupation of coastal regions.

Sediment cores from salt marshes reveal an increase in the rate of rise in sea level during the 19th century and early 20th century, consistent with long tide-gauge records. Between 1870 and 2001, global averaged sea level rose by just under 20 cm, at an average rate of 1.7 mm per yr during the 20th century and with an increase in the rate of rise over this period (Figure 2). From 1993 to the end of 2006, high precision satellite altimeters indicate global average sea level rose at 3.1 ± 0.4 mm per yr, an order of magnitude larger than the rate of rise over the two thousand years prior to the 19th century.

The two major reasons for 20th and 21st century sea-level rise are expansion of ocean waters as they warm and an increase in the amount of water in the ocean, principally from land-based sources of ice (glaciers and ice caps and the ice sheets of Greenland and Antarctica). Global warming from increasing greenhouse gas concentrations is a significant driver of both contributions.

In 2001, the Intergovernmental Panel on Climate Change (IPCC) projected a sea-level rise of 9 to 88 cm when an uncertainty for land-ice changes was included. In 2007, the sea-level projections are 18 to 59 cm over the period from 1980-2000 to 2090-2100. Allowing for additional ice-sheet uncertainties, the IPCC authors increased the upper limit (59 cm) by 10 to 20 cm and stated that 'larger values cannot be excluded, but understanding of these effects is too limited to assess their likelihood or provide a best estimate or an upper bound for sea-level rise.' The end result is that the two sets of projections (Figure 3) are similar.

Sea-level rise projections for the 21st century presented in the Third Assessment Report is shown

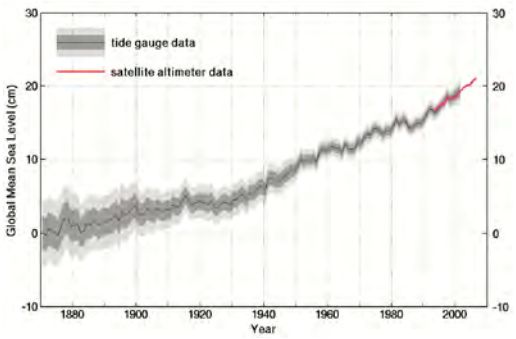


*Figure 2: Global averaged sea levels from 1870 to 2006 as inferred from tide-gauge data (black, with 66% and 95% confidence limits given in dark and light shading respectively) and satellite altimeter data (red).*

by the curved lines and the shaded regions. The IPCC 2007 projections are shown by the bars: purple for the model projections and red for the poorly quantified contribution from a dynamic response of the Greenland and Antarctic ice sheets.

Observed sea level during the first 16 years of the IPCC projections (1990 to 2006) has been rising more rapidly than the central range of the IPCC model projections and near the upper end of the total range of the projections. These observations indicate that one or more of the modelled contributions to sea-level rise is underestimated.

There is increasing concern about the longer-term contributions of the ice sheets. Global average temperature increase relative to pre-industrial values of greater than 3.1°C (with a range of 1.9°C to 4.6°C) will lead to surface melting exceeding precipitation over the Greenland Ice Sheet. This imbalance will result in an ongoing melting of the Greenland Ice Sheet for centuries and millennia, likely resulting in sea levels similar to those in the last interglacial and several metres higher than today's value. This value could be crossed late in the 21st century if effective

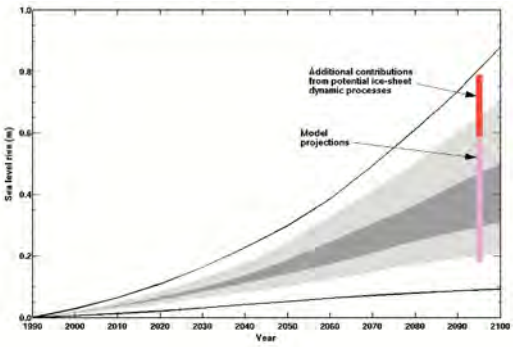


*Figure 3: Comparison of projected sea-level rise for the twenty-first century between the 2001 IPCC Third Assessment Report (curved lines and shaded areas) and the recently released Fourth Assessment Report (bars)*

mitigation measures are not adopted. The poorly understood dynamic responses of the Greenland and West Antarctic Ice Sheets could lead to a more rapid rate of rise than from surface melting alone.

The impacts of sea-level rise will be felt most acutely through extreme events. Coastal flooding events of a given level will occur more frequently and the largest flooding events will be more severe than previously and beach erosion will accelerate.

Successful adaptation could significantly reduce the impacts of sea-level rise. Addressing both the mitigation and impacts of sea-level rise will require partnerships between science, governments, business and the community. We will need to focus on developing real, specific solutions, including appropriate legislation, to adjust to increasingly rapid changes in our coastal environment.

Sea-level rise is happening now and is beginning to have real impacts.

*Acknowledgement:* This article is a contribution to the CSIRO Climate Change Research Program and the CSIRO Wealth from Oceans Flagship and was supported by the Australian Government's Cooperative Research Centres Programme through the Antarctic Climate and Ecosystems Cooperative Research Centre. JAC was part funded by the Australian Climate Change Science Program.

*Further Reading*

John A. Church (2007). The Roger Revelle Lecture *Global Sea Levels: Past, Present and Future*, presented at the Intergovernmental Oceanographic Commission (IOC) of UNESCO's Thirty-ninth Executive Council (2006) and published in the 2006 IOC Annual Report. (http://unesdoc.unesco.org/images/0015/001531/153144E.pdf)

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# Bay of Plenty Beach Profile Monitoring 1990-2006

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Environment Bay of Plenty established a coastal monitoring programme in 1990 as part of its Natural Environment Regional Monitoring Network (NERMN) programme. Information obtained in the process assists with the assessment of impacts of consent related activities, such as sand extraction and dredging, and provides baseline environmental data. Additionally, long-term trend detection using environmental baseline data enables the council to assess the effectiveness of its own policies and plans in maintaining or enhancing the environment and in meeting its statutory obligations under the Resource Management Act (RMA) 1991.

A total of 53 sites between Waihi Beach in the west to Hikuwai Beach in the east are profiled on an annual basis within the current coastal monitoring programme. This monitoring covers 135 kilometres of the open coastline. Some selected sites are monitored quarterly; others are monitored as necessary, i.e. after storm events or where a beach is considered to be of significant concern to the public due to impacts on private property. The profiles include three off-shore profile datasets and enable volumetric comparisons to be made as well as trends in the position of the dune toe at each site over time.

Over the course of a year along the Bay of Plenty coastline, changes in the beach morphology result from "cut and fill" processes. The movement of sediment from this process is dependant on wind and wave action as well as sediment properties. These seasonal changes are superimposed on short and long term processes which act to produce periods (tens of years) of erosion, accretion and dynamic equilibrium.

Wave action is the dominant forcing process causing changes in erosion and accretion patterns along the Bay of Plenty coastline. Wave conditions in the Bay of Plenty are moderately influenced by the El Niño Southern Oscillation. More stormy conditions than average tend to occur during La Niña periods, which are associated with an increase in northeasterlies in the New Zealand region. During El Niño years, where a higher occurrence of southwesterlies occurs, wave conditions in the Bay of Plenty are somewhat reduced although episodic ex-tropical cyclones still occur. Given that since 1998 we have entered a negative phase of the Interdecadal Pacific Oscillation where neutral or La Niña conditions may be more likely to occur, it is possible that the Bay of Plenty region may experience increased rates of erosion over the next 20 to 30 years, similar to that experienced in the late 1960s and early to mid 1970s.

## Method

To determine the beach state (Figure 1) for the 16 years of collected record (~1700 profiles) a set of objective criteria were determined based on a 0.01 level of significance. The linear regression test was performed on both the volume and toe of foredune. Where the test proved true (<0.01) the coefficient was then used to determine whether the beach was in an erosion (retreat) or accretion (advance) trend state. When the test was false (>0.01) the dataset was deemed stable (or sometimes referred to as being in dynamic equilibrium). Where the two datasets arrived at contradictory results the following rules outlined in Table 1 were used.

| Beach Volume & Toe of Foredune Trend | Criteria | Comment |
|---|---|---|
| Stable and stable | Stable | Dominant stable trend exists in the recorded dataset |
| Erosion and erosion | Erosion | Dominant erosion trend exists in the recorded dataset |
| Accretion and accretion | Accretion | Dominant accretionary trend exists in the recorded dataset |
| Erosion and stable (or vice versa) | Erosion? | In this case when either one of the tests differs from the other, the non stable state was chosen but inclusion of the ? highlights the variability in the dataset and also the requirement for additional/continual monitoring to strengthen the direction of the trend. |
| Accretion and stable (or vice versa) | Accretion? | In this case when either one of the tests differs from the other, the non stable state was chosen but inclusion of the ? highlights the variability in the dataset and also the requirement for additional/continual monitoring to strengthen the direction of the trend. |

*Table 1: Trend Criteria*

## Findings

Figure 1 presents the overall trends since 1990 for each of the 53 sites.

The overall beach state for the region generally shows common patterns per reported beach system. This is not unexpected as typically these beach systems are affected by sources of localised sediment influx from fluvial sources or are separated by a number of natural obstructions, such as:

- hard-rock coastline north of Waihi Beach
- northern Tauranga Harbour entrance
- southern Tauranga Harbour entrance
- Mount Maunganui
- Town Point, Maketu
- Kohi Point headland, Whakatane
- Ohiwa Harbour entrance.

These features punctuate the general direction of littoral drift in the Bay of Plenty of northwest to south east flux, though there are areas where the direction of net sediment movement has been modelled to be orientated towards the north-west. Littoral drift is the main mechanism by which sediment is supplied to a beach; it is also a value that is difficult to measure directly.

Results from this report show that the following beaches are showing trends of erosion for the period 1990-2006:

- Ohope Beach
- Pukehina Beach
- Southern area of Waihi Beach
- Central section of Hikuwai Beach.

A continuation of the beach profiling programme is important in the management regime of the Bay of Plenty coast with the increasing development and recreational pressures in this coastal environment. The profile monitoring provides a baseline dataset for determining the physical state of these beach systems. Additional increasing pressures such as sea level rise further enforce the requirement for this monitoring to continue.

The report can be viewed in pdf format at www.envbop.govt.nz under the Coast pages.

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*Figure 1: Beach Erosion/Accretion Trends for the Bay of Plenty*

### 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.

Coastal News

# News from the UK

*'Let's see the change' – an update on the proposed UK Marine Bill*

In March 2007, the UK government released a marine policy paper, 'A Sea Change'. The bold policy, proposes a new Marine Bill that aims to integrate marine fisheries and nature conservation, develop marine spatial planning and establish a marine management organisation (MMO) to deliver its promises. It outlines the processes and commitment to overhaul the current sector based assessment of activities and adapts the current model of centralised decision making. It is interesting to reflect on why the UK government are proposing such changes, evaluate their proposed tools and to consider if there are any lessons for New Zealand marine management.


The reason for change is driven by several key factors, mainly the need for greater certainty and transparency, efficiency and future planning. The driver for greater certainty and transparency comes from two, normally opposing parties, maritime industries and the nature conservation bodies. Industry operators were demanding clear policies and processes to understand the likelihood of approvals. Nature conservation bodies were calling for the same clarity to protect and conserve resources. The two parties seem to finally agree that investing in strategic policy will assist both their needs. The second driver is efficiency. Several UK government reviews have identified the need to remove duplication of effort, reduce and remove overlapping regulation. The reviews also identified the need for streamlined decision making and joined up government departments. Not a small task. The final external driver is future planning. The UK government has identified the need to plan and provide for future uses of the marine environment, e.g. renewable energy, $CO_2$ sea sequestration and bio-prospecting. This strategic thinking is commendable. An additional benefit in providing for these new activities is that effective implementation will assist the government to meet international climate change agreements and compliance with ever increasing numbers of European Union Directives.

Implementation is already underway. Agencies within England and Northern Ireland have been restructured and merged with central licensing departments (Marine Fisheries Agency and Marine Consents Unit). Work has started on piloting concepts of marine spatial planning and the practicalities of regional sea plans to manage activities. These plans aim to ensure that fisheries and nature conservation resources are managed holistically. In addition, the plans will be adaptive to respond to new information and activities. The Marine Bill itself is likely to be introduced in the 2008/9 parliamentary session with the concept currently holding cross party support.

The current decision making model is centralised for all marine activities but suffers from a lack of clear policy direction and conflicting priorities. The proposed MMO will be guided by clear strategic policies and will merge departments and agencies that have responsibilities for fisheries, licensing and enforcement all underpinned by marine spatial planning and direct links to scientific advice. Although the model is still effectively centralised it does provide for local input via steering groups.

One challenging factor for the UK government is to agree with their neighbours over cross boundary management polices and tools. In this case, Scotland and Wales have chosen not to apply the Marine Bill to their territorial waters. In practice, this will mean they will have a separate consenting regime to their neighbours. As an observer this seems like a missed opportunity. However, I can appreciate that the time restraints for seeking agreements may have been a limiting factor.

When considering this new approach there are at least three interesting components of this model for New Zealand policy makers and industry bodies. One is the inclusion of fisheries management with other uses of the sea. This is different to our approach. Perhaps it is worth considering integrating fisheries management with other uses to avoid conflict and provide for future fisheries resources? The second interesting aspect is their use of marine spatial planning to protect and conserve resources while providing for certainty for economic development. Although marine planning seems like a practical tool it will no doubt be a challenge in a relatively unmapped environment. Providing for development encourages quite a prescriptive approach to managing uses within the marine environment. The third aspect is the concept of core central policies that guide future use and development of marine resources. This is a hands on approach that differs from our regional decision making.

It will be interesting to observe the development of the actual Marine Bill, the practical implementation of the MMO and their tools for management. In good Kiwi fashion we will be able to observe from afar, adapt and perhaps apply the good aspects for the benefit of our marine environment.

For further information look at defra's website (www.defra.gov.uk/corporate/consult/marine bill-whitepaper07/index.htm) or for comments on the article contact Stacey Faire at: Stacey@MarineNet.co.nz.

*Stacey Faire is on the NZCS committee and is currently on parental leave from the Ministry for the Environment. Prior to returning to NZ in 2006 Stacey worked in England for three years providing regulatory advice to the UK government.*

# Word from the Chair

By the time you read this, this year's New Zealand Coastal Society Conference will be upon us and hopefully you will be there. The conference has some great key note speakers and an excellent range of paper presentations.

The Minister of Conservation's attendance at this year's conference will be timely given the draft revised New Zealand Coastal Policy Statement is expected to be notified for submissions later this year. The NZCPS has been in existence since 1994 and coastal management issues have evolved in many areas since then, including aquaculture, natural hazard risk, foreshore and seabed legislation, and mangrove management to name but a few.

The NZCS Annual General Meeting is being held as part of the conference at 5.30pm on Thursday 22 November. It is important that members attend as it is an opportunity to hear what the Management Committee has done on your behalf over the past 12 months, raise issues and ask questions.

The Society's Strategic Plan governs what we do and is updated every three years. The Committee has just completed a review of the 2004-2007 Strategic Plan setting out what we said we would do and what has been achieved during those three years. The new Strategic Plan covering the period from October 2007 to October 2010 will provide the direction for the Society over the next three years. Both the reviewed and new strategic plan will be presented at the AGM and will be available to read in the members' area of the NZCS website.

Andrew Laing attended the 2007 Australasian Coasts & Ports Conference held in July in Melbourne. His report is included in this edition of *Coastal News*. As Chair of the next Australasian Coasts and Ports Conference in at Te Papa in Wellington in September 2009, Andrew and his Organising Committee have been doing a great job organising the Conference.

Thanks to the work of Rick Liefting, Regional Coordinator, we now have guidelines for Regional Events. These have been posted in the members' section of the website. If you have any ideas for a regional event in your area, particularly with the end of year approaching, get in touch with your local regional coordinator. Their contact details are listed in *Coastal News*. Regional events may involve a guest speaker, presentation from your local council or consultancy on a local coastal project, or a site visit and discussion on a topical issue in your area.

Following a settling in period, our membership numbers have stablised at around 330 members. The changes made to the membership structure have seen an increase in the number of financial members, although this has been at the expense of some of our corporate members. Our Membership Coordinator, Vaughan Cooper is working hard to maintain and increase membership, and ensure the Society is delivering promised services to all members. The corporate members' page is now up and running on the Society's website, which acknowledges the support of those organisations. Wherever possible please support our corporate members as they support us and are vital to the success of the Society.

As part of offering more to our corporate members, you will see that the back page of this edition of *Coastal News* has been devoted to corporate membership and acknowledging our corporate sponsors. It is intended that we will profile a different corporate member each edition.

In terms of our student membership, I am pleased that we have been able to award three $500 student travel scholarships to attend the 2007 NZCS Conference in Tauranga, with a high standard of applications for this award received. The student travel scholarship and student research scholarship, along with an award for the best student paper presentation at the conference aims to recognise and encourage our student members to continue their interest in the coast and maintain their association with the New Zealand Coastal Society.

The NZCS Management Committee is to shortly announce the recipients of the inaugural student scholarship towards tertiary research. This scholarship is for up to $5,000 towards tertiary study at masters or doctorate level on a coastal related topic. This is a great initiative and special thanks must go to Deirdre Hart and David Kennedy for coordinating this initiative.

If you have any information to disseminate to members, make use of NZCS Email Digest. Members can send information for inclusion in the digest to Hannah Hopkins (NZCS Administrator) at hannah.hopkins@ew.govt.nz.

Keep safe and enjoy the NZCS Annual Conference for those of you attending.

*David Phizacklea, Chair*
*New Zealand Coastal Society*
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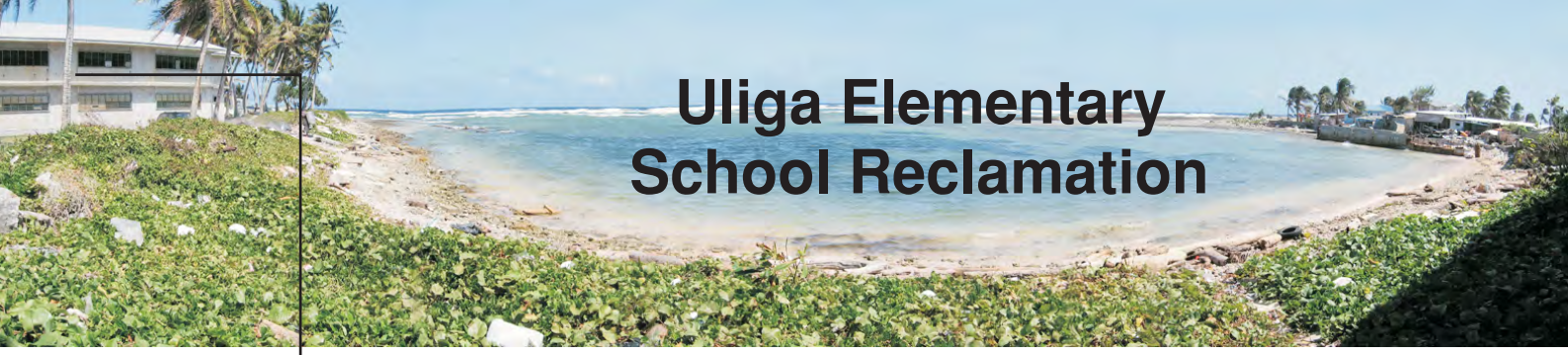

# Uliga Elementary School Reclamation

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Finding land for a new school on a small coral atoll isn't easy, so when Uliga Elementary School in the Republic of the Marshall Islands was closed down by the local environmental agency, reclaiming land to rebuild it on was the most feasible option. Public support for relocating the school was high and Beca was commissioned to provide design services and environmental permitting advice.

Being located 6 feet above sea level provides many challenges for the Marshall Islands. Severe tropical storms, while not frequent, are devastating. Sea level rise is talked about, but the country lacks the funds to construct adequate defences along the whole coastline to reduce the effects of higher sea levels and consequent increased wave action.

The Intergovernmental Panel on Climate Change's 2007 sea level rise prediction of 0.08-0.88m by 2100 is particularly worrying, as even the midrange projection of 0.48m would result in loss of a considerable area of land to the sea, as well as significantly increasing the wave heights that could develop across the reef flat.

The only quarry operating on the island is on the ocean-side reef flat. Rock is blasted from the reef and then used as either armouring for coastal structures or crushed for concrete aggregate. The reef is the atoll's only defence from the sea and complete removal or lowering of the reef flat would have devastating effects.

The local environmental agency has been urging for a complete ban on rock quarrying, however the cost of importing rock and aggregate is prohibitive for most of the projects on the island. For this project it is hoped that quarrying will be allowed within the reclamation site, so that the quarry pit created can be covered up by the reclamation itself. This will increase the need for reclamation fill, however the island has access to sand stockpiles in the lagoon large enough to meet the atoll's demand for fill for the foreseeable future.

To date these resources have not been utilised, as the main stockpiles are beneath 10-15m of water and there is no suitable dredge available on the island to win material from these depths.

Ownership of the seabed is also not clearly defined in Marshallese law and may need to be decided by the courts before any dredging can take place.

At the project site, previous reclamations have joined two islets together to form a causeway, leaving a large man-made bay with insufficient flushing capacity that has been turned into an unofficial rubbish dump. Rubbish dumped further up the coast has also been trapped in the bay and human and pig excrement is being discharged from surrounding properties. The Beca design team was advised that reclaiming this bay would remove a health hazard to local residents and improve surrounding water quality.

For the first time in the Marshall Islands, the community had the opportunity to comment on the project prior to the EIA being submitted and the feedback was overwhelmingly positive.

The Marshallese have only recently enacted environmental legislation to protect their natural resources. The reclamation was just the third project in the country that was required to complete a full environmental impact assessment. Acceptance of the EIA is expected from the Environmental Protection Agency within the next month.

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## Estuary Toolkit turns the Tide

The country's first comprehensive toolkit for those interested in their local estuary is now available. Turning the Tide – An Estuaries Toolkit for New Zealand Communities provides communities and estuary care groups with a complete guide to estuary health. Topics include the history and ecology of estuaries, an estuary 'warrant of fitness' check, running community meetings, highlighting areas for future action, seeking funding, and sharing advice and knowledge. There's also an easy-to-follow guide to creatures of the estuarine mudflat.

The 98-page full-colour kit was produced by NZ Landcare Trust coordinators with support from the Ministry for the Environment, the Taieri Trust and Wriggle Coastal Management. Kits cost $25 including postage.

For more information, contact Gretchen Robertson: gretchen.robertson@landcare.org.nz

# Coasts and Ports 2007

Coasts and Ports 2007, the biennial Australasian Coasts and Ports conference was held from the 18th to 20th July 2007 in Melbourne, Australia. …and it was an unusually cold Melbourne that greeted us. Indeed, the Tuesday preceding the main conference was the coldest day in Melbourne for 6 years. Sleet was observed! and upcountry the Victorian skifields had a great start to the season.

The conference themes were: working, living, playing and preserving the coast and port infrastructure, and I must give credit to the graphics designers who came up with a very slick logo and branding for the conference. The "anchored" ampersand and the portholes for each theme were eye-catching.

The conference was preceded by a two-day PIANC (the International Navigation Association) workshop. The workshop had two main themes – Environmental Management and Community Perceptions. I arrived in time for the tail end of the environmental sessions, which dealt with beneficial reuse of dredge material. The Community Perceptions section focused on urban encroachment of port areas. Getting rail into ports was the most evident priority. Other issues included managing the media when things go awry (a recent example to the fore being the grounding at Nobby's Beach near Newcastle), and stakeholder consultation around port developments (especially Port of Melbourne expansions).

The main conference was run over three days. There were about 220 registrants with about 14 exhibitors. The keynote on the first day, Eric Van den Eede, is President of PIANC and General Manager of the Waterways and Sea Canal Agency in Flanders. He outlined the role of PIANC and also spoke on vision and strategies for Flemish Seaports, getting cargo off the roads and onto the canals, and the European and National contexts for sustainable port developments.

On the second day Todd Bridges from the U.S. Army Engineer Research and Development Centre gave a very well delivered presentation on risk-informed decisions, drawing on the Hurricane Katrina lessons. Models don't solve problems, good decisions do. The key to good outcomes is deliberation.

On the third day a very telling keynote address was given by Gerry Byrne, a consultant engaged to advise on infrastructure rebuilding from the Aceh devastation after the Boxing Day 2004 earthquake and tsunami. A key message was that practicalities were not always evident in the planning of aid agencies – e.g. their wish to rebuild schools when there were sadly no children left.

The conference technical programme had a good mix of modelling, observational and analytical papers, and some planning and policy sessions. New areas, such as environmental forecasting for operations and planning, and emergent marine energy, did not feature. There was a single paper from New Zealand on the latter and perhaps two papers related to the former. One of these related to sea level predictions in the shallow waters of Galveston Bay. There, meteorological forcing is at least as great as astronomical forcing and a high success rate has been achieved in forecasting water levels using an artificial neural network.

Of about 120 papers about 15 were New Zealand offerings. Interesting points I picked up from my biased sample included: (a) The relative energy efficiencies for freight movement by road to rail to shipping have been quoted at 1:10:30 - an obvious argument for more coastal shipping; (b) the potential to better use radar (hf and microwave) as monitoring tools in an operational capacity; (c) Under-keel clearance is much more of an issue at Australasian ports, given their exposure to low frequency open-ocean waves than at European and Asian ports; (d) With increasing vessel sizes, there is concern about the effect on a moored ship (surge and sway) caused by the Bernoulli effect and the shallow water wave set up by ship passage; (e) Modelling of directional spectra associated with cyclones and parameterisations of energy dissipation in a strongly wind-forced environment.

I must note that one of the motivations for my own attendance at the conference was to announce and promote the 2009 conference in Wellington. The opportunity for this was given in the graveyard session at the closure, following the Friday afternoon session. A tribute to the organisers must be that the closing plenary was packed, and I had a very satisfying hearing. The secret to this was that (a) the random draw from early bird registrants for an iPod was held over until the closing and (b) a final parting drinks session was held after the closing.

Wellington is going to knock their socks off!

… and guess who won the iPod...

*Andrew Laing*
*a.laing@niwa.co.nz*

# Conferences and Workshops

**NZCS 2007 Conference Update**
*Pushing the Boundaries, 21-23 November 2007, Tauranga*


The Conference Organising Committee look forward to welcoming everyone to Tauranga for this year's conference. The conference is at the Sebel Trinity Wharf Hotel and Conference Centre, a worthy venue sitting out over the harbour in downtown Tauranga.

The theme of the conference is "Pushing the Boundaries", a theme which reflects a range of coastal issues and the increasing challenges coastal managers face with people wanting to live, play and develop within our coastal margins.

Key note speakers have been confirmed and include the Minister of Conservation, Hon Chris Carter, the Chief Executive of the Port of Tauranga, Mark Cairns and Professor Terry Healy from the University of Waikato.

In addition to great presentations there is the usual opportunity to network with colleagues and discuss topical issues such as the New Zealand Coastal Policy Statement, mangrove management, harbour bridge construction, sea level rise and tidal power generation. The Conference Organising Committee has kept the tradition of memorable conference dinners, with this year's being held locally at Mills Reef Winery and Restaurant in Bethlehem. The conference field trip on the Friday afternoon will encompass both a boat and bus component and will feature opportunities to be informed of innovative coastal management solutions in the Bay of Plenty.

The Committee received nearly 50 abstracts for paper presentations to the conference, from which 36 papers were selected for the two concurrent paper sessions being run during the conference. One of the key strengths of the annual conference is that it allows members the opportunity to present recent coastal research they have undertaken.

While we lost our original conference convener to the winterless north during the year, the Committee has continued on with the task of organising the conference and attending to every detail, from registrations to sponsorship to fieldtrip arrangements. Special thanks to Emma Wiggins for managing the abstracts and paper presentations, Glen Nicholson for coordinating the fieldtrip, and Lynda Sheppard for administering registrations and accounts.

The Saturday after the conference sees a unique opportunity for those from out of town to take a trip to the active volcano of White Island. This involves a trip from Tauranga down to Whakatane for departure on White Island Tours (www.whiteisland.co.nz). The boat ride aboard the luxury launch takes 80 minutes but is well worth it to experience this award winning trip with a trained guide taking you on to the island. If you haven't booked yet, I highly recommend you do so.

More details about the conference are on the website/conference. This includes the updated conference programme and a list of the paper presentations by session.

*David Phizacklea, Conference Convener*

**International Conference on Coastal Management 2007**
*October 31 - 1 November 2007, Cardiff, Wales*

The papers presented at this conference will cover a wide range of coastal management topics including:

- Coastal policies and management arrangements
- Managing the dynamic coast
- Mapping, monitoring and new technologies
- Coastal and estuary engineering
- Coastal environment management and enhancement
- Achieving better integrated coastal zone management.

For further information visit iceconferences@iceconferences.ice.org.uk

**PACON 2008**
*June 1-5, 2008, Honolulu, Hawaii*

The Pacific Congress on Marine Science and Technology (PACON International) will host two theme sessions - one on "Energy" and one on "Climate Change".

Topics covered will include adaptation to climate change, aquaculture and mariculture technology, climate change, coastal hazards, coastal environment, coastal sediment processes, coastal structures, coastal water level fluctuations, coral reef science, education in marine science and technology, environmental finance, fisheries technology, hydrodynamics of coastal waters, marine biotechnology, mitigation of climate change, ocean observing systems, operational experiences in environmental monitoring, remote sensing and oceanographic satellites, renewable energy sustainable coastal development, and traditional energy sources and their impact. For further information please email pacon@hawaii.edu or visit www.hawaii.edu/pacon.

# On Campus: Coastal Research at the University of Waikato

Coastal Science research at the University of Waikato is mainly undertaken by the Coastal Marine Group. Its mission statement is:

- Fostering the status of New Zealand's leading coastal research;
- To encourage national and international students to undertake coastal research training;
- To advance understanding of coastal processes in both a fundamental and applied context;
- To link with industry for specialised projects; and
- To advance knowledge by maintaining a high level of peer-reviewed publications.

The Coastal Marine Group consists of Professor Terry Healy, Dr Willem de Lange, Dr Karin Bryan, Mr Dirk Immenga (all in the Earth and Ocean Sciences Department) and Dr Conrad Pilditch in the Biological Sciences Department. We also have peripheral members that contribute expertise on nutrient modelling, environmental chemistry, GIS, Geography, Management and Planning. However, we have recently lost our Coastal Geographer with Dr Hamish Rennie moving to Lincoln University.

Research interests and expertise of the core group range widely from Prof. Healy who specialises in port and harbour redevelopment, beach erosion and renourishment, dredge spoil impacts and dispersal, muddy coasts and estuarine and coastal sedimentation modelling studies. Dr de Lange has concentrated efforts recently on mapping and interpreting tsunami deposits, coastal cliff stability and erosion and tsunami inundation modelling. Dr Bryan continues her work in surf-zone physics and understanding the contribution of waves to coastal flooding hazards, video techniques for mapping morphological evolution, uncovering nonlinearities in coastal processes, and numerical solutions to applied coastal problems and has also recently extended her modelling work to nutrient dynamics in estuaries. Mr Immenga continues to work on hydrographic surveying, side scan sonar and multibeam surveying of coastal systems. Finally, Dr Pilditch works in benthic ecology, including the effect of biota on sediment stabilisation, nutrient regeneration from sediments and physical controls on biological processes.

*PhD student Debra Stokes manhandling (woman-handling?) sediment samples from a dense mangrove patch in Tauranga Harbour.*

*Visiting student Peter de Ruiter, from University of Utrecht, upgrading the Argus camera at Muriwai Beach, April 2007.*

We supervise both Masters and Phd students, and have on average about 20 enrolled at any one time. Projects range in scope, but key field sites are the Bay of Plenty, Tauranga Harbour, Maketu Estuary, Tairua Estuary and Beaches, Raglan Estuary and Beach, Firth of Thames, Whangapoua Estuary, Whitianga Estuary and Muriwai Beach. A selection of recent topics currently being undertaken in the group are:

- Assessing the feasibility of a deep water dredge disposal ground (B. Flaim, PhD);
- Environmentally sustainable aquaculture (P. Longdill, PhD);
- The role of intertidal flats in controlling nutrient dynamics in small estuaries (H. Tay, PhD);

- A modelling assessment of a large tropical embayment for the development of aquaculture (G. Prasetya, PhD);
- Sustainable management of surfing breaks (B. Scarfe, PhD);
- Multibeam signal processing for benthic habitat mapping (A. Schimel, PhD);
- Sedimentological and ecological response to mangrove removal in Tauranga Harbour (D. Stokes, PhD);
- Hydrodynamic modelling of harbour circulation patterns and the influence of entrance channel topography on hydraulic efficiency (K. Spiers, PhD).

We also teach a range of coastal marine courses at all levels on topics ranging from oceanography, coastal engineering, coastal geomorphology, marine ecology and coastal management. We specialise in introducing our graduates to applied numerical modelling problems.

Our collaborations are largely with the coastal and benthic scientists at NIWA, Hamilton which is situated about 200m from our doorstep, but we also maintain strong links with Dr Pickett at Environment Waikato, Stephen Parks at Environmental Bay of Plenty and have had a long association with the Port of Tauranga. Prof. Healy also works closely with various consultancies and who support his students through Technology Industry Fellowships.

For more information, contact anyone in the group (t.healy, w.delange, k.bryan, d.immenga, c.pilditch who are all @waikato.ac.nz).

## Management Committee Profile: Rick Liefting

Rick Liefting is a coastal scientist with Tonkin and Taylor (Hamilton) and has 10 years experience in the coastal field.

After completing his M.Sc from Waikato University, Rick spent 5 1/2 years at NIWA (Hamilton) in the coastal Hydrodynamics/Physical groups and spent a lot of time diving and doing field work. Rick then enjoyed a 1 year stint as coastal scientist at Environment Waikato.

Rick is particularly interested in shoreline dynamics, coastal hazards and estuarine sedimentation. At Tonkin and Taylor, Rick currently undertakes coastal process and hazard assessments while also providing advice for regional and local councils. Rick also specialises in GIS, especially in the coastal area.

Outside of the coastal realm, Rick is a part time exercise instructor at the local gym and enjoys motor sport and spending time with his family.

# Sandy Bits

### Before all the Ice Melts

Due to climate change it is possible that the summertime Arctic Ocean could become ice-free by mid-century, according to the worst-case scenario of warming. This would open the relatively pristine Arctic marine ecosystem to industrial activities including fishing, shipping, and petroleum exploration and drilling. Arctic nations are already staking claims to portions of the Arctic seabed beyond their traditional 200-nm EEZs, seeking national jurisdiction over the resources there.

### Names of New Species to be Auctioned

"The Blue Auction", which occurred 20 September in Monaco, sold the rights to name several species of fish discovered during surveys of the Bird's Head Seascape region of Indonesia. The surveys, conducted in 2006, were part of an ongoing initiative to establish ecosystem-based management in the region. Proceeds from the auction will go to fund the initiative, which is a partnership of Conservation International, The Nature Conservancy, WWF-Indonesia, local and national governments, and local NGOs.

For sale were the naming rights to each of 12 items: 10 endemic species of fish as well as a patrol vessel and a future research expedition in the region. Suggested starting bids for the fish ranged from US $45,000 for a species of rainbowfish, to $500,000 for a unique shark species that crawls on its pectoral fins. More information is available at www.theblueauction.com.

### Impacts of Acid Rain on Coastal Waters

New research indicates that the release of sulfur and nitrogen into the atmosphere plays a minor role in making the ocean more acidic on a global scale, but the impact is greatly amplified in coastal waters – see: www.whoi.edu/page.do?pid=7545&tid=282&cid=31286&ct=162.

### Estimating Oil Entering the Marine Environment

"Estimates of Oil Entering the Marine Environment from Sea-based Activities" is the report of the GESAMP Working Group on the Scientific Aspects of Marine Environmental Protection. The report provides estimates of the wide range of types and quantities of oil inputs

from ship and other sea-based activities, and addresses the methods that can be used for making such estimates of input and the difficulties and uncertainties involved. The report is available at http://gesamp.net/page.php?page=48.

### Improving Coastal Access in the UK

Natural England is a government agency that works to conserve and enhance biodiversity, landscapes and wildlife in rural, urban, coastal and marine areas. At the request of the UK Department for the Environment, Food and Rural Affairs, Natural England studied how to improve access to coastal land in England and undertook a detailed programme of research and investigation into the underlying facts. The findings are available at: www.countryside.gov.uk/LAR/Access/coastal_access/coastal_access_report.asp.

### Marine Ecoregions of the World

A new study from The Nature Conservancy and the World Wildlife Fund (WWF) presents the first classification system of the world's coastal waters. The report classifies the habitats and species in the world's oceans by dividing coastal waters into 12 realms (e.g., Temperate Northern Atlantic); 62 provinces (e.g., Cold Temperate Northwest Atlantic); and 232 ecoregions (smaller and more homogenous units such as the Gulf of St. Lawrence-Eastern Scotian Shelf). For information access: www.nature.org/tncscience/news/meow.html.

### GIS, Remote Sensing and Mapping for Marine Aquaculture

The objective of this FAO publication entitled "Geographic Information Systems, Remote Sensing and Mapping for the Development and Management of Marine Aquaculture" is to show how these tools can play a role in the development and management of marine aquaculture per se and in relation to competing and conflicting uses. The focus is on the ways the tools have been used for problem solving and on example applications. The document is available at: www.fao.org/docrep/009/a0906e/a0906e00.htm.

### Cleaning the Shoreline

Over 68 countries took part in this years Ocean Conservancy's International Coastal Cleanup on 15-23 September. Data is collected from each cleanup to determine the major (and minor) causes of shoreline litter in each region. For further information on the findings visit www.coastalcleanup.org.

## 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 | Hugh Leersnyder | hugh.leersnyder@beca.com |
| Waikato | Jenni Paul | jenni.paul@ew.govt.nz |
| Bay of Plenty | Reuben Fraser | reubenf@envbop.govt.nz |
| Hawkes Bay | Gary Clode | garyc@hbrc.govt.nz |
| Taranaki | Kate Giles | kate.giles@trc.govt.nz |
| Manawatu/Wanganui | Johanna Rosier | d.j.rosier@massey.ac.nz |
| Wellington | Iain Dawe | iain.dawe@gw.govt.nz |

**South Island**

| | | |
|---|---|---|
| Upper South Island | Eric Verstappen | eric.verstappen@tdc.govt.nz |
| Canterbury | Justin Cope | justin.cope@ecan.govt.nz |
| Otago | Paul Pope | 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)

# New Zealand Coastal Society Corporate Members

Coastal News

Corporate membership enables organisations and companies to become part of the New Zealand Coastal Society and support the Society's mission of taking a leading role in facilitating a vibrant, healthy and sustainable coastal and ocean environment.

Organisations and companies can show their support for the aims and activities of the society and achieve public recognition of that support.

Corporate membership benefits include:

- High profile listing as a corporate member sponsor on the NZCS website homepage (www.coastalsociety.org.nz/Corporate.htm)
- Website listing of services provided by corporate organisation, contact details, and links to recent projects or corporate organisation website.
- One free individual membership for the person nominated as the corporate contact or any subsequent replacement alternate.
- Five complimentary copies of *Coastal News* published three times per year – March, June and November.
- Discounted registration at member rates for the corporate contact to all NZCS Conferences.
- Short feature on a Corporate Member in *Coastal News*.

A new regular feature in the coastal society news will be corporate member profiles and information on key people in their organisation or recent projects undertaken. See below for our first profile of corporate members Beca.

For more information on Corporate memberships please contact:

Vaughan Cooper
Membership Coordinator
Coastal Society Committee
vaughanc@nrc.govt.nz

The Coastal Society would like to acknowledge our corporate members for their support:

## Corporate Member: Beca

Beca is a multi-national employee-owned consultancy services group with over 1800 employees including engineers, project managers, planners, environmental scientists, valuers, cost estimators, architects and surveyors. The Beca Ports and Coastal team comprises staff from all of the disciplines and takes the approach of the 'best person/team for the job', irrespective of location.

Beca has gained a solid appreciation of the many issues surrounding port and coastal projects through our diverse experience in the port and coastal sector, and longstanding relationships with many of our port and coastal sector clients. We apply this knowledge and understanding in order to provide effective solutions that meet our clients' needs on projects ranging from ports and marina design and construction through to coastal management strategies.

Contact: portsandcoastal@beca.com.