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Saving the Kapiti Coast



The Kapiti Coast District Council is currently using innovative ideas to develop a coastal management strategy, undertake dune restoration and protection, and work through a coastal hazard risk assessment.

The Kapiti coastline is approximately 40 km long and an important community asset with many unique characteristics and natural qualities.

Its physical characteristics vary greatly throughout the length of the district. It is mostly in its natural state in predominantly rural areas in the north, while southern areas are more urban, with seawalls and rock revetments.

The coast has economic value in its tourism, property values and recreation opportunities, while local iwi value the coast as a significant resource for traditional activities.

The coast today is a highly modified system in most urban areas and experiencing significant erosion challenges.

Developing the Coastal Management Strategy

The Kapiti Coast District Council (KCDC) is developing a comprehensive Coastal Management Strategy which focuses on the

quality and nature of intervention along the coast relating to access, erosion hazards, recreation and the natural and built environments. The approach will reflect the Community Outcomes and treat the coast as an ecosystem to be managed as a whole, while retaining the coastal lifestyle values of residents.

KCDC found that the key to developing a robust strategy was engaging the community in the strategy's development.

A series of coastal explorations called "walkshops" held on Saturday afternoons over a period of a few months looked at local issues on the beach and sought ideas for solutions. Local environmental groups talked about their dune restoration projects. Many innovative ideas were suggested and they are being considered for inclusion in the strategy.

At each session participants were provided with a booklet containing some local history, vegetation survey information and an outline of the strategy process and principles.

Feedback from participants showed that "walkshops" were seen as a great way to get to grips with issues on site and to promote lively, informed discussion.

SEE YOU AT THE NZCS 2006 CONFERENCE

Living on the Edge: Coastal Sustainability

15-17 November 2006, Kaikoura



Walkshop in progress at Pekapeka Beach

Two further all-day focus groups confirmed district-wide and local management actions.

Discussion with local Iwi is an on-going part of the Coastal Management Strategy preparation and has included hikoi along the beach and additional workshops to discuss governance roles.

The Draft Strategy will be ready for formal submissions in July 2006.

Erosion Hazard Assessment

In February 2005, as part of the coastal management strategy development, the KCDC commissioned work to assess coastal erosion hazards.

The basis for the hazard calculation includes information and data on:

- Sea level rise from global warming – Komar-based formula using NIWA predicted sea level rise, together with inter-tidal beach slopes derived from KCDC and Horizons Regional Council beach profile surveys.
- Long-term historic shoreline change – using data collected between 1874 and 2005. Shoreline changes were obtained from archived cadastral maps and aerial photographs. Trends were identified every 200 m – 500 m using statistical techniques and predictions of change.
- Short-term shoreline fluctuation – derived using statistical techniques applied to the historical shoreline data. Relevant field observation and analysis of beach profiles were also incorporated.
- The influence of dunes on erosion – used KCDC LIDAR data to calculate dune scarp retreat to the stable slope that occurs following

erosion.

- Error component/safety factor – based on uncertainty values associated with each component.

Sourcing additional data to enable a robust, defensible setback determination proved to be a lengthy process.

Over the years data has been gathered by many entities, some of which no longer exist. It was difficult to track down information thought to have been transferred to new entities when the old ceased and archives in individual organisations often did not have some of the information they were assumed to hold.

However, inconsistency between some sets of reference coordinates had a positive benefit because a greater number of points can now be used.

Ultimately the length of time spent tracking down information helped the project. Extensive use of the wide range of data available, modern electronic data processing and electronic analysis methods meant many more transect points could be included.

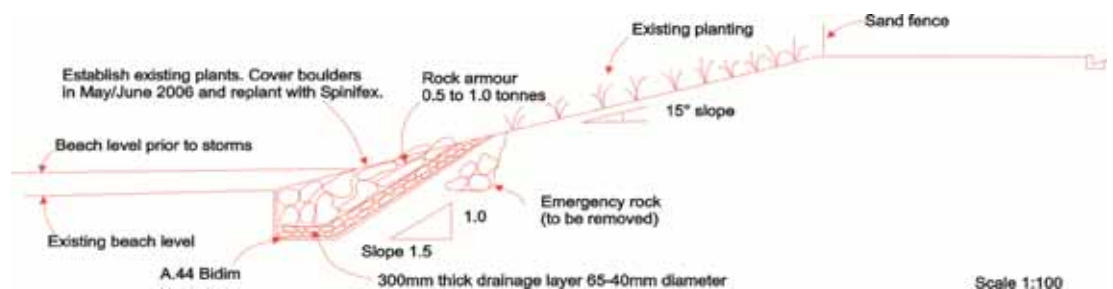
The result will be one of the most modern and comprehensive coastal hazard erosion assessments in New Zealand.



Erosion of car park at Paekakariki

Dune Reconstruction With A Difference

In February 2005 an example of coastal development on the Kapiti Coast commenced at the southern end of Paraparaumu Beach with a major dune reconstruction project. The aim was to deal with the risk of further erosion of a 500-metre stretch of Marine Parade at that point.



A typical cross section of the Marine Parade area where rock has been placed before the dunes

A 2.5 metre high vertical dune escarpment within seven to ten metres of the arterial road also caused a significant wind-blow problem with sand migrating across the road and creating a traffic hazard and nuisance for nearby residents.

The project involved rolling the existing dune over onto the beach and forming a 15° slope. Approximately 1,000 cubic metres of sand was added and the area was fenced and planted with pingao and spinifex.

While this project was experimental, sand binding planting successfully provided a buffer between mean-high water and the road carriageway. Similar projects outside Kapiti had shown varying degrees of success with dunes migrating up to 50 metres seaward being destroyed by high tides and heavy seas.

The project endured a number of storms between September 2005 and January 2006. Constant sand replenishment was needed to protect the planting.

In extreme conditions, sand was being removed daily, with the dune face eroding at a rate of approximately three lineal metres per day.

Emergency consent conditions allowed rock to be placed at the toe of the dune to protect the remaining planting and the road. Some 1,200 tonnes of rock was placed over 180 metres of the site. Several options were considered and discussed with the Greater Wellington Regional Council to ensure the action complied with the consent.

The rock was placed on a 15° slope. As the plants



Storm damage at Paekakariki

establish, they will send out runners and grow seaward. In the long term, the rock will be covered with sand and replanted, so the entire rock toe will be fully covered with sand and plants, and hopefully may only be exposed in severe weather events.

This option is less intrusive and more in keeping with our Community Outcomes than a seawall or full scale rock revetment.

Work was completed in February 2006. Since then there has been a considerable build-up of beach in front of the rock revetment.

Additional planting and sand will be added to the toe revetment in August 2006 to re-establish the plants over the top of the rock.

*Waverley Parsons (waverley.parsons@kdc.govt.nz),
Emily Thomson, Blair Murray and Tamsin Evans*

Kapiti Coast District Council



Student Scholarships

The New Zealand Coastal Society offers a scholarship to students or recent graduates aimed at supporting their attendance at the Society's yearly conference. The 2006 scholarship, with a value of \$500, will be included in the registration pack to be collected at the NZCS Annual Conference being held in Kaikoura in October 2006.

Applicants must be current members of the NZCS.

Applications should cover no more than one A4 page and contain:

- the applicant's name and contact details (postal address, phone number, email);
- the degree completed or enrolled in;
- date of completion or intended date of completion of the degree;
- the title of the dissertation or thesis and a brief (no more than 200 words) account of how the research relates to the goals of the NZCS;

- an estimated travel budget to the conference; and
- the applicant's supervisor's signature.

The goals of the NZCS and membership forms can be found on the NZCS website www.coastalsociety.org.nz.

The successful applicants must present a poster on their research at the annual conference.

Applications for the scholarship close on 30 June 2006.

Please send applications to:

Dr David Kennedy
School of Earth Sciences
Victoria University of Wellington
PO Box 600
Wellington
New Zealand

Phone: 64 + 4 + 463 6159

Fax: 64 + 4 + 463 5186

Email: david.kennedy@vuw.ac.nz

Double trouble: How often do large waves occur with high water levels?



Coastal inundation and damage to coastal infrastructure is often caused by a combination of hazard variables, for example high sea levels, large waves, or high river flows. However, it is not necessarily the case that the higher an extreme event for a particular single variable, such as sea levels, the higher the level of damage. Often combinations of two, or more, hazard variables of moderate severity can cause more damage than an extreme event from a single source.

When considering coastal inundation, or the design or hydraulic performance of coastal engineering structures, we are interested in determining not only the probability of occurrence of individual hazard variables, but also the probability of the joint-

occurrence (or joint probability) of a combination of variables. The relative importance of each of these variables depends on the particular hazard under consideration. For example, structural damage of a rock armoured revetment is highly dependent on the wave height, whereas wave overtopping is more sensitive to the water level and wave period. In a New Zealand context, the design of coastal structures, or the setting of minimum floor elevations, has traditionally been conducted with a poor knowledge of how these different hazard variables are correlated. For example, the assumption that extreme water levels can occur at the same time as extreme wave conditions has led to both design under- and over-estimates and associated cost implications.

In the case of water levels and wave conditions, if a certain water level always occurs at the same time as a given wave height, then the two variables are completely dependent. Alternatively if they are completely independent then there is no correlation between them. In reality, the assumption of complete independence would lead to underestimation of the joint probability return period with complete dependence being too conservative. The correlation between waves and water levels will usually lie between the two

extremes of complete dependence and complete independence. This is due to two main reasons. Firstly, certain weather conditions, such as the tracking of extra tropical cyclones or low pressure systems close to New Zealand's coast, will potentially produce both high wave conditions and high storm surge. However, as storm surge in New Zealand is relatively moderate compared to the astronomical tidal component of water level (which is completely independent of meteorological conditions), such correlation may not be that high.

The second reason is due to the depth-limiting effect that water level has on wave conditions in shallow water. In such a case there may well be a high correlation between high water level and wave conditions. This is particularly important in the context of future sea level rise, in



Figure 1: Hazards such as coastal inundation are often due to a combination of hazard variables

that increasing sea-levels will also result in higher wave conditions at a particular location (all other things being equal).

An ongoing research programme at NIWA has been investigating, assessing and developing suitable methodologies for conducting joint-probability analysis. The main focus has been on assessing combinations of: a) high sea-levels and waves (of relevance to over-topping and structural damage, coastal erosion and flooding); b) high sea levels and rainfall (of particular relevance to storm-water networks); and c) high sea levels and river flow (of particular relevance to coastal flooding).

To objectively calculate joint probabilities requires accurate data to calculate each of the marginal probabilities (i.e. the probability of a single variable in the context of a joint probability analysis). The two marginal variables must be matched in time, with a minimum record length of about four years.

In many parts of the New Zealand coast there are

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.

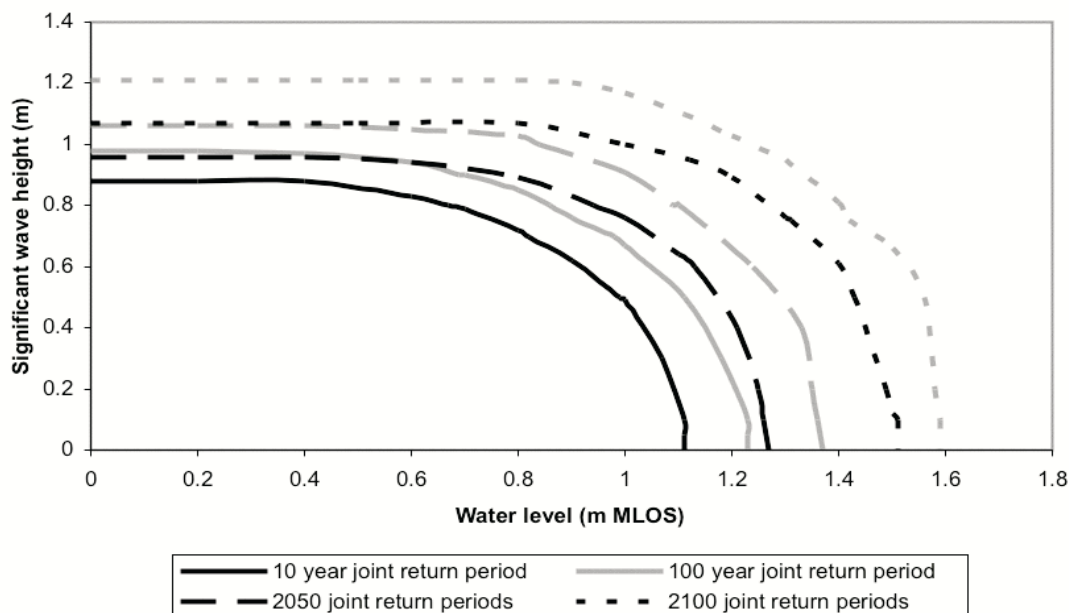


Figure 2: An example of joint probabilities for 10 and 100 year return period combinations of waves and water levels above the mean level of the sea (MLOS). The solid lines are for the present day conditions with the dashed and dotted lines predictions for the years 2050 and 2100 respectively.

accurate open-coast sea-level records, but for other areas we must rely on predictions of the astronomical tides, and use numerical models to infer the spatial variation in storm surge around the coast. Similarly, most major catchments and rivers have adequate rainfall and river flow records for use in such an analysis. Wave records, on the other hand, are very sparse and use needs to be made of hindcast wave models to derive wave statistics at a particular location, for example using nearshore wave models nested within and driven by regional wave hindcast models (see www.niwascience.co.nz/rc/prog/chaz/news/waves#climate).

Once high-quality datasets are assembled and matched, statistical distributions are fitted to the marginal hazard variables. This gives an indication of the return probabilities of the marginal hazard variables by themselves. Based on the overlapping wave and water level datasets, the dependence between the marginal variables can be derived, and the joint probabilities calculated based on this dependence.

This type of analysis has recently been conducted for the Wellington Harbour frontage for Wellington City Council as part of a wider study assessing the potential impacts of climate change on weather and coastal hazards on the city. This involved assessing probability distributions for

both water levels within the harbour and wave conditions at 11 sites along the harbour frontage of the city. The analysis was conducted for both present day conditions, and for the years 2050 and 2100 assuming current IPCC guidance for sea level rise and modelling the changes to wave conditions within Wellington harbour due to expected changing regional wind patterns over New Zealand.

An example of the correlations derived from the analysis is shown in Figure 2 for 10 and 100 year return period conditions for the present day and years 2050 and 2100. Each line shows the various combinations of water level and wave conditions that have the same joint probability of occurrence. Despite these different variable combinations all having the same joint probability of occurrence, it is often the case that a particular combination will provide the worst case for overtopping or structural damage to a coastal protection structure. Such information provides a more accurate and comprehensive dataset for the Council to carry out a range of engineering studies including overtopping and inundation assessments, structural performance of coastal defences, and hydraulic downstream boundary conditions for stormwater network assessments.

Doug Ramsay, NIWA (d.ramsay@niwa.co.nz)
Scott Stephens, NIWA (s.stephens@niwa.co.nz)

The views expressed by the authors of articles published in *Coastal News* are not necessarily those of the New Zealand Coastal Society (NZCS), or those of the Institution of Professional Engineers New Zealand (IPENZ).

The *Coastal News* merely provides a forum for discussion. We appreciate all contributions and would like to thank all of the authors in this edition.

If you would like to contribute an article, news item or conference announcement to *Coastal News*, see the guide for contributors on page 15.

Mangroves in New Zealand

Mangroves in New Zealand? New Zealand must be far too cold for such things, surely? And they want to get rid of them? How curious. Surely there's a PhD thesis in that?

Locals residing near or visiting the shores of many of the embayments within Tauranga Harbour have seen significant change over the last 20-40 years. Older folk remember their estuaries as a different place 20 or more years ago, with sandier bottoms and an abundance of kaimoana, such as pipi and titiko. Since then mangroves have been marching forward, rapidly increasing their coverage. The mangrove stands in Tauranga Harbour are all sites of mud deposition. The input and trapping of mud in estuarine systems is a physical change. And with physical change often comes ecological change.

Estuaries are naturally changing all the time, and at the moment mangroves are thriving in the current 'status' of some New Zealand estuaries.

Estuaries are ephemeral landforms that lie between land and sea. They act as sinks for incoming sediment. It has been suggested more than once that increased sedimentation into these systems corresponds to increased land clearing for activities such as forestry and urban development. It would appear mangroves are simply taking advantage of these land-use changes. It is their time to flourish.

Everyone would agree there have been huge changes in the embayments of Tauranga Harbour. Where the debate stems from is what to do about it. Many local residents are calling for the mangroves to be removed. Some of the opposition to such an action comes from concern over the impact it will have.

In other parts of the world mangroves have been found to host a vast number of associated organisms, either living in the mangrove sediment, on the tree itself, or simply passing through the mangrove forest for protection or food. Mangroves are also known to provide erosion



Mangroves in the Waikareao Estuary form a brittle low lying dense forest spreading its branches out into the Tauranga Harbour



The mangrove plants in the Waikaraka estuary have thick branches which lie close to the ground – just the right height for tripping up researchers

protection. But mangroves in New Zealand are a little different to the tropical counterparts. And as yet, not a whole lot is known about the specific ecological value our mono-species mangrove stands offer. Even less is known about what will happen once the trees are gone.

With this in mind, my PhD objectives were outlined. Following meetings with my chairperson (Dr Megan Balks) and supervisor (Professor Terry Healy), and visits to Tauranga City Council, a plan was hatched. My study sites were to be Welcome Bay, and the Waikareao and Waikaraka estuaries.

The sites were chosen because mangrove removal had already commenced in these locations. Tauranga City Council was granted a coastal permit to control mangroves to the 2002 extent in Welcome Bay and Waikareao Estuary (as well as Waimapu and Matua). Waikaraka Estuary Managers, a group of interested and organised residents, hold a coastal permit to remove mangroves that have appeared since 1986.

The leading research questions are based around what will happen after mangroves are removed:

1. Will the mud go? In what time frame? Under what hydrodynamic conditions?
2. How much does the estuary floor accrete/erode once the trees have been removed?
3. What happens below the surface? The root system is left intact, so what is the relationship between this root decomposition, sediment resuspension and recolonisation of benthic fauna?

Conversely, where mangroves remain:

1. How important is the mangrove structure on sediment accretion?
2. What is the relationship between sedimentology and forest structure?

I am halfway through my project, with sampling





In Tauranga's Welcome Bay the mangrove trees on the northern shores are tall healthy plants with thick lush foliage

to be done again this winter and summer 2007. This will give almost two years of data. As much of my research is based on temporal changes, meaningful results can only be passed out at the end of the PhD. I can get back to you in September 2007. There should be some interesting findings to discuss by then.

There is, however, one point of curiosity I can share with you now. It has been with great interest that I return from a day in the field and assess the location of my bruises. Different estuary, different positioning of bruises. At Welcome Bay, the trees on the northern shores are quite lush and healthy. They bend as you force your way through and there is some distance between substrate and branching. Injuries there are more likely over the arms. Waikareao Estuary gives me bruised shins every time; usually mid-shin. There appears to be less give in the vegetation here, and brittle and sharp branches extend out to take you by surprise.

Then there's Waikaraka Estuary. These trees are determined to trip you up. Thick branches lie close to the ground, the forest quite dense. Bruises develop a little above the ankles, accompanied by sore spots just above the knees from the next cluster of brittle branches.

Mangrove field work is a hard and muddy business. Finding enough volunteers willing to get out and grubby on a regular basis requires considerable bribes with great muffins and real coffee. If my findings add to the mangrove debate and assist in the coastal management decision process, it will be worth every early morning triple-choc muffin run, scratch and bruise.

*Debra Stokes
Coastal Marine Group
Earth & Ocean Sciences
University of Waikato
djs34@waikato.ac.nz*



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Whangarei Coastal Management Strategy

News From The Regions

Bay Of Plenty Region

Aileen Lawrie, NZCS Bay Of Plenty Regional Coordinator

Tauranga Harbour Recreation Strategy

Environment Bay of Plenty (EBOP) recently started working on the Tauranga Harbour Recreation Strategy. The objective of the strategy is to improve the integrated planning of recreation in Tauranga Harbour and provide strategically for future growth. It has been initiated in response to an identified lack of knowledge about the scale and extent of current recreational use on the harbour, and the need to consider implications of the future population growth on the harbour resources and people's access to marine recreational opportunities.

Although the strategy is being led by EBOP, it is in collaboration with Western Bay of Plenty District Council and Tauranga City Council. The recreation strategy will be a non-statutory document. Therefore, the outcomes will be recommended actions, which will feed into each council's relevant planning and regulatory documents for action (e.g. navigation and safety bylaws, LTCCP, District Plan).

Currently, the project is in the initial information-gathering phase. It is anticipated that a draft will be released for public comment by October this year.

For more information contact Ben Lee (benl@envbop.govt.nz) or Robin Britton (rbritton@wave.co.nz).

Estuary Care for Tauranga Harbour

Environment Bay of Plenty in conjunction with partner agencies has recognised the importance of Care groups in caring for the environment and is investing new resources into this important partnership. Suzy O'Neill, formerly a Coast Care Officer with EBOP, has recently been appointed as the Estuary Care Officer (ECO) for Tauranga Harbour.

The role of the ECO is to assist Estuary Care Groups to achieve management objectives for their estuaries within the environmental legislation of the Bay of Plenty as well as educate the wider community on the importance of the estuarine environs and their contributing catchments. So far three of a potential nine successful Estuary Care Groups have been granted resource consent to manage mangroves within their local estuaries. The ECO will also help groups prepare management plans, undertake base line monitoring, and learn to observe and monitor estuary wildlife. Management plans will include consultation with communities and other groups when preparing applications for resource consent to manage mangroves in each estuary. Resource consent support will be forthcoming to groups

whose intent is holistic in preserving and enhancing estuary and estuarine margin ecosystems.

Tauranga City Council has recently appointed Emily McNie to the newly-created position of Ranger, Coasts and Harbours, to deal specifically with coastal issues. Newly appointed also is Andrea Mills, of the Tauranga Environment Centre, working with community groups on urban gullies which form native bush corridors right down to the harbour in the Urban Green Space Project. The focus of the position will be to assist care groups with erosion and plant and animal pests within the bush gullies. These three new positions have created an excellent opportunity for liaison between councils and communities for a team approach dealing with the contemporary and vexed issues estuaries present.

Opotiki Mussel Farm

An interim decision has been made by the Ministry of Fisheries regarding the Eastern Sea Farms' application for a mussel farm located 6 km off Opotiki in the Eastern Bay of Plenty.

The resource consent application was for a 4750 hectare farm. The area is split in two - an inner area of 950 hectares, and an outer area of 3800 hectares. Environment Bay of Plenty's resource hearing committee recommended that consent be granted for staged development for both areas. A number of appeals were made to the Environment Court on the council's recommendations. They have yet to be heard by the Environment Court.

Unusually, an application was made to the Ministry of Fisheries for the marine farm before the consents were granted. Many of the issues raised relate to the impacts the farm would have on commercial fishing. By making the application to the Ministry of Fisheries for the marine farming permit, it allows for those issues to be specifically considered. Obviously, the resource consents would need to be granted before the marine farming permit could be granted.

The interim Ministry of Fisheries decision has recommended that a marine farming permit be granted for the 3,800 ha outer area and not the inner 950 hectare area. Included in the reasons for the reduced size is the uncertainty of the effects of this untried form of large-scale mussel farming; likely significant levels of phytoplankton; and the impact on the sustainability of fisheries resources.

Waihi Beach Seawall

A joint hearings committee for Environment Bay of Plenty and Western Bay of Plenty District Council (WBOPDC) has made a decision to grant resource consent for extensive coastal protection works along the Waihi Beach shoreline.

Coastal
News



The application was made by WBOPDC, and included 1050 m rock revetment to replace an existing seawall and gabion baskets; beach replenishment and dune care along 600 m of beach; and training groynes to train the flow from Three Mile Creek.

In its decision, the hearing committee suggested that the proposal will provide protection from coastal hazards and improve the natural character and public access to the coastal marine area.

One of the more significant areas of the decision was the discussion surrounding policy 3.4.6 of the NZCPZS – “Best Practicable Option”. Many parties at the hearing suggested the policy should be applied to the rock revetment itself as the best practicable option. The hearings committee took the view that it related to coastal protection works as a whole. This, however, has been one of the main appeal points.

Otago Region

Paul Pope, NZCS Otago Regional Coordinator

Removal of trees divides community

The illegal removal of trees from a small coastal reserve in Kaka Point, near Balclutha has divided the community, and has been very acrimonious. There appears to be some history between certain residents and the Clutha District Council over the trees, and these residents took action into their own hands and removed 19 pines from the reserve in December 2005. It was done for “safety & aesthetic” reasons, but one suspects that coastal views were a motivating factor.

The repercussions within the community have been widespread, and conflicts of values in coastal communities brought about by development pressures can prove bitterly divisive at any scale. The Clutha District Council has sought \$12,000 reparation for restoration.

Discharge application causes distress

The Dunedin City Council and the Peninsula Trust have been required to undertake a submission period for the discharge application for the Taiaroa Head and Otekiho Reserve, along with other land owned by Land Information New Zealand.

Locals from the nearby settlement at Otakou were initially distressed that a wider public consultation period was required for members of the public to examine the application and its consequences. Issues of stabilisation, smell and pollution were raised, as the Peninsula Trust looks to find a solution to its older, outdated grey water discharge whose consent is near expiration.

The application seeks to discharge through a series of horizontal filters over a significant area of coastal cliffs that are unique to the peninsula and the harbour entrance. Natural character? I wonder.

Seawall damaged

The St Clair seawall continues to be an ongoing

issue, with debate over recent damage to the pedestrian access points which required considerable repair after several storm events.

All Black tackles penguins

Anton Oliver has agreed to tackle the patronage of the Yellow-eyed Penguin Trust (YEPT). Anton sees the role as being responsible for promoting the yellow-eyed penguin and educating people about the environment and its importance.

For more information about the YEPT visit www.yellow-eyedpenguin.org.nz.

Hawkes Bay Region

Gary Clode, NZCS Hawkes Bay Regional Coordinator

Environment Court Decision regarding Foreworld Developments v Napier City Council

Earlier this year Foreworld Developments and Napier City Council (NCC) went to the Environment Court over NCC's Coastal Hazard Zones (CHZ). Leading into the hearing, Foreworld sought a deletion of NCC's CHZ and replacement with CHZ 15 m from the average vegetation line.

At the hearing, Foreworld sought:

- A CHZ 18 m inland from the barrier scarp.
- Rezoning of land from rural to "residential".
- Graduated hazard zones based on 20 and 50 year planning horizons.

A private body corporate beach renourishment scheme was also proposed as a 'failsafe' method to mitigate erosion of Foreworld land if erosion did occur.

NCC, and HBRC, opposed Foreworld's applications/ appeals on the grounds that:

Identification of CHZ, and prohibiting further development (new buildings, structures and additions to existing buildings, with some exceptions) and a 100 year planning horizon in CHZ is necessary and appropriate.

Private beach nourishment schemes should not be allowed as of right. Proper assessment of environmental effects is warranted before any such works are undertaken - particularly if works are to serve as mitigation of hazard risk to NEW development - whereas Westshore Renourishment Scheme mitigates risk to EXISTING developed area.

On Thursday 13 April, the Environment Court issued its decision in the Foreworld -v- NCC case.

The Court upheld the provisions of Napier's Proposed District Plan in all respects that Foreworld challenged, except that the CHZ is reduced in width over Foreworld's land between approximately 14-30 metres.

Further information on this case can be found under:

Environment Court Decision Number:
W029/2006-05-05



News from the UK

An East Yorkshire Perspective on Coastal Management in the UK

Coastal News



The rapidly eroding Holderness Coastline at Aldbrough on the East Yorkshire coast of Britain

England's predominantly rural East Yorkshire coastline is one of the fastest eroding coastlines in Europe, with soft cliffs receding at a rate of almost two metres per year for much of the length of the coast. The nature of the coastline is such that it lends itself to rapid coastal erosion. This is largely due to the combination of loosely consolidated post-glacial sediments and a locally rising sea level.

These facts together with a long recorded history of human habitation stretching back at least as far as Roman times have led to the loss of numerous villages and communities into the sea. In the last 2000 years, at least 32 villages have been lost to the ravages of the North Sea. Despite this history people and communities persist in living right on the edge – perpetuating the hazard.

In terms of coastal hazard management the only realistic option is one of managed retreat. The traditional seawall approach is costly and unsustainable, and can not be justified for the entire coastline. Therefore some tough decisions have to be made.



The house in this photo taken at Aldbrough at the end of 2005 has since been demolished for safety reasons when its front room was lost to the sea!

The method currently employed to make decisions regarding coastal defence in the UK is the centrally funded Shoreline Management Plan (SMP). This prioritises sea defence for coastal communities and landowners along a length of coast through the use of cost-benefit analysis. SMPs were first introduced during the mid 1990s, and are divided up around the coastline of the UK on a sediment cell basis. Each sediment cell is managed by a coastal group consisting of all those authorities or agencies in the area with a responsibility for coastal defence management.

However, these first SMPs were inherently engineering/economic biased and failed to deliver the necessary alternatives to hard line policies that frequently left small, economically deprived coastal communities on eroding coastlines with those unhelpful words, "do nothing".

Some second generation SMPs are now beginning to get underway around the UK. There are a number of lessons that have been learned from the past. Particularly it is intended that these second generation SMPs will integrate more closely with the terrestrial planning system (and seek to avoid developmental risk in the first



Chalk cliffs sculptured by the ocean waves at Flamborough Head on the East Yorkshire coast

instance). It is also especially important that they offer more sustainable solutions to coastal hazard issues whilst still being realistic and pragmatic about the realities of coastal hazard management.

The local council in East Yorkshire has attempted to address some of these realities and was one of the first around the UK to try and implement the 2002 EU directive regarding Integrated Coastal Zone Management (ICZM). One of the major drivers for the adoption of this ICZM Plan was to promote what is known locally as the 'rollback policy' - or managed retreat.

The rollback policy seeks to provide a measure of assistance to those directly in the path of the retreating coast. This was initially trialled achieving some success with caravan parks, and has recently been extended to now include individual homesteads and farmsteads. However, these policies, whilst being more proactive, have largely been forgotten about, ultimately because the required funding and necessary promotion to ensure uptake has not perpetuated.

Currently there is no common approach to coastal zone management in the UK. The most important work in beach and estuarine management is often left to under-funded project based (as opposed to long-term) community partnerships with voluntary members and little if any legal clout.

The Department for the Environment, Food and Rural Affairs (Defra) is currently in the process of consulting on a proposed Marine Bill to consolidate existing legislation for the UK's marine environment. The draft legislation is due to be released later this year, and it is likely to cover fisheries management, licensing, a new system of marine spatial planning, and a possible new marine management organisation of some form. A national strategy for ICZM is also being prepared this year and will combine with the proposed Marine Bill to offer a more holistic approach to coastal zone management for the UK.

*Tom FitzGerald, Principal Coastal Management and Sustainable Communities Officer, East Riding of Yorkshire Council, Beverley, UK
tom.fitzgerald@eastriding.gov.uk*



When the *big* one hits

Maximum height (m)

6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1

NIWA's range of tsunami services has been developed specifically for regional councils and territorial local authorities to assist in determining the effects of tsunami inundation and developing effective mitigation countermeasures. Our range of integrated tsunami services includes:

- Multibeam surveys of underwater faults and identification of potential tsunami sources
- Surficial tsunami deposit surveys
- Identification of past tsunami surfaces from LIDAR data
- Identification of palaeotsunami deposits from wetland cores
- Regional and local palaeotsunamis, reviews of historical evidence, and Māori oral traditions
- Tsunami generation, propagation, and inundation modelling
- Regional and local tsunami hazard, vulnerability, and risk assessments
- Physical, economic, environmental, and human impacts of tsunami inundation
- Tsunami early warning and forecasting
- Tsunami preparedness and optimisation of tsunami mitigation measures
- Development of educational and public awareness materials

For more information contact: Dr James Goff, NIWA, PO Box 8602 Christchurch, New Zealand, Ph. +64 3 343 8033, Fax: +64 3 348 5548, j.goff@niwa.co.nz

When is a Lagoon an Arm of the Sea?



Te Whaanga is a 185 km², shallow lagoon that occupies about 20% of the landmass of Chatham Island. It has four compartments: a northern basin that is separated from the remainder of the lagoon by a shallow region that was used as a ford at one time; central and southern basins that are separated by a shallow region; and a mouth region located on the coast between the central and southern basins. There is one major inflow, from the Te Awainanga River, which flows into the southern basin. The outlet is the Hikurangi Channel, which is open for only some of the time. Te Whaanga is generally shallow (a few metres in depth at most), with extensive regions that are dry when the water level is low.

In 2003, a study was undertaken to determine, from a physical point of view, whether Te Whaanga was either an arm of the sea or a terrestrial lake. The idea was based on “the tide test” from ancient English and Scottish law. Basically, if the body of water receives tidal flow, it is part of the sea, otherwise it is terrestrial. Subsequently, the Foreshore and Seabed Act 2004 has come into force which designates Te Whaanga as part of the sea by statute.

In the study, three recording stations were established in the North Basin, the South Basin and near the mouth. Each recording station contained a water level recorder and a conductivity probe (for measuring salinity). The station shown in Figure 2 is typical. The data were sampled every 15 minutes and recorded in a datalogger that was downloaded manually every three months. We leveled the recorders into each other by comparing water levels for a few days when there was no wind and the mouth was closed.

Over the 9-month period of record from March 2003 to January 2004, we were fortunate to have a complete range of water levels from some of the highest to some of the lowest. At the start of the period, the mouth was closed and the level water steadily built up over the autumn and winter. By October the high levels were causing flooding around the edges, so the Chatham Islands Council opened the mouth manually using a hydraulic excavator.

Over the 187 days when the mouth was closed, the water balance went like this:

Contribution	Volume (in millions of m ³)
Rainfall	73
River Flow	37
Evaporation	5
Net Inflow	105
Change in Lagoon Volume	104



Figure 1: Map of Te Whaanga showing the location of recording stations (black dots)

You can see that the inflow and change in volume have a very good match, in spite of several assumptions:

- Seepage and groundwater flow completely neglected.
- Rainfall assumed uniform across the lagoon.
- Lagoon area assumed constant with water level.
- River flows other than Te Awainanga ignored.

After the mouth was opened, the regime in the vicinity of the mouth changed completely from a lake environment to that of a tidal inlet, with twice daily cycles in water level and salinity.



Figure 2: Recording station at the mouth



Figure 3: Hikurangi Channel on the ebb, near low tide. Locations of the gauging section and the recorder shown in Figure 2 are indicated.



In January, the outlet had established itself as an 80 m wide channel. We gauged the flow at low tide on 6 January and found the flow to be 60 cumecs. Using this, and the hydraulics of the outlet, we estimated that the tidal flow varies between -200 cumecs (flood tide) and 120 cumecs (ebb tide). These flows are very large compared with the inflow from the Te Awainanga River, which is usually around 1 cumec and has an historical peak flow of 77 cumecs.

The influence of the tide extends only to between 5 and 25% of the total lagoon area. For the majority of the lagoon, whether the mouth is open or not has no effect on either salinity or water level, apart

from an initial drop in water level when the mouth is first opened.

So, as to whether Te Whaanga is a lake or an arm of the sea, the physics are equivocal. In some places it is always a lagoon, having no salinity and no tidal influence. In other places it is a lagoon when the mouth is closed, but a tidal inlet when the mouth is open.

For further information you can retrieve the full report (2Mb) from www.tideman.co.nz/DGGTeWhaanga_files/TWFinal.pdf

*Derek Goring, Mulgor Consulting Ltd
(goring@mulgor.co.nz)*

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	Paul Pope	popey@xtra.co.nz
Southland	Ken Murray	kmurray@doc.govt.nz

Conferences and Workshops

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7th Natural Hazards Management Conference 2006 – Science to Practice: Managing Natural Hazards in New Zealand

23-24 August, 2006, (with optional workshops and field trips 22 and 25 August), Town Hall, Christchurch, New Zealand

The conference will provide a forum to discuss the integration of hazard information into effective risk management, including:

- Applying hazard information to best practice planning.
- Exploring new technologies and advances in science applications.
- Natural hazard mitigation for industry.
- Creating resilient communities through integrating science into practice.

The conference is targeted at emergency managers, planners, risk assessors, asset and utility managers, natural hazards researchers and scientists.

For a programme and registration form visit www.naturalhazards.net.nz/courses or contact Daryl Barton at d.barton@gns.cri.nz.

Coastal Zone Asia Pacific 2006

August 29-September 2, 2006, Batam Island, Kepulauan Riau Province, Indonesia (near Singapore)

This international conference aims to review the state of coastal management in the Asia-Pacific region.

Themes of the conference are tsunami rehabilitation and reconstruction, the state of coral reef management, coastal fishing and community empowerment, marine conservation and MPA networks, sea partnership and policy, small island management, and coastal and ocean governance.

For further information contact: Sapta Putra czap06@dkp.go.id or visit www.coastal.crc.org.au/czap04

New Zealand's ocean and its future—knowledge, opportunities, and management

16 November, 2006, Hilton Hotel, Princes Wharf, Auckland, New Zealand

New Zealand, as a small country with a large EEZ, faces a number of strategic issues and challenges over the next 20 years arising from scientific, economic, social, cultural, environmental, technological and political trends. Debate on these issues must be informed by current scientific and technological knowledge, and strategic investment made in expanding the knowledge base from which future opportunities and rational management will arise.

The Royal Society of New Zealand is organising a one-day workshop covering a full range of marine issues and evaluating their status, knowledge gaps, future opportunities, and management issues.

The NZCS invites you to attend the

NZCS 2006 Conference

15-17 November 2006,
Kaikoura, New Zealand

"Living on the Edge: Coastal Sustainability"

The conference will provide a platform for a national dialogue on topical issues of coastal management for all those with a special interest in New Zealand's coastline.

Registration and abstracts for oral and poster presentations are invited now.

For more information visit:

www.coastalsociety.org.nz

or contact Justin Cope at
justin.cope@ecan.govt.nz.

This meeting is aimed at policy-makers, environmental managers, advocates for environmental protection, scientists, and enterprises deriving wealth from the sea.

Programme

- 9.00 am How we see the sea; mental models and management paradigms - Dr Morgan Williams
- 9.40 am The changing ocean - Dr Phil Sutton, Victoria University
- 10.15 am Living resources - Professor John Montgomery, University of Auckland
- 11.15 am Living resources II - Dr John McKoy, National Institute of Water and Atmospheric Research
- 11.50 am Mineral resources - Ray Wood, GNS
- 12.25 pm Developing the marine infrastructure - George Hooper, Centre for Advanced Engineering, University of Canterbury
- 2.00 pm Technology and viewing the ocean - Dr Alex Malahoff, Geological and Nuclear Sciences
- 2.35 pm Managing human interaction with the ocean - MfE
- 3.10 pm Strategic issues—Panel discussion.

For further details contact Gill Sutherland (gill.sutherland@rsnz.org) or visit www.rsnz.org/secure/events/ocean2006.php

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 Organising Committee invites you to submit an abstract using the details found on www.griffith.edu.au/school/eng/ics2007

The ICS2007 proceedings will be published in a special issue of the *Journal of Coastal Research*.

For further information please visit the ICS2007 WWW site and/or contact ICS2007@griffith.edu.au.

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.

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.

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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)**

NZCS Management Committee

Chairperson	Lucy Brake (lucy.brake@beca.com)
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Website Manager	Charles Hendtlass (c.hendtlass@cae.canterbury.ac.nz)

For any enquiries regarding Coastal News articles or advertising please contact
NZCS Editor Alex Eagles (penguins@clear.net.nz).

New Harbour Reserves Plan for Tauranga

The Tauranga City Council is currently developing a Reserve Management Plan for all its Harbour Reserves. This includes all esplanades, local purpose recreation and road reserve areas that border onto the tidal margins of Tauranga Harbour, as well as Marine Park/Sulphur Point and Matua Saltmarsh.

This comprehensive management plan will provide the long-term goals, policies and vision on how the Council will manage, protect and develop the network of Harbour Reserves for the next ten years.

The Reserves Act 1977 requires the Council to prepare reserve management plans for nearly all parks classified as reserves under Council control. These Reserve Management Plans outline the Council's general intentions for the use, development, maintenance, protection and preservation of its reserves through a series of objectives and policies.

Each management plan seeks to balance the protection of natural resources with the provision of appropriate recreational opportunities for the local and wider community.

The preparation of a comprehensive Reserve Management Plan allows the Harbour Reserves to be considered as a network and the management and development of the reserves to be undertaken in an integrated manner. In particular, weed and pest control, ecological and biological restoration, along with walkway development and park infrastructure will be considered.

Council notified its intent to prepare the management plan, calling for suggestions from the community on issues and opportunities that faced the reserves network in February 2006.

At the close of the suggestion period Council had received over 150 suggestions relating to many issues that affected the Harbour Reserves. The suggestions received, and further consultation work, will be used to develop the objectives and policies in the management plan.

These will set the parameters for the development and use of the reserve, highlighting items that need further consideration or addressing. The emerging key themes at this stage of the process include vegetation managing, access protection of cultural heritage and erosion management and control.

A series of drop in days have also been set up whereby members of the community or organisations can come to speak to Council staff who are developing the plan. The purpose of these meetings is to further tease out the issues, opportunities and needs for the network, as well as each reserve that is being looked at in the development of this plan. These will occur between the months of May and June.

All information received will be considered in the development of the management plan and specific concept plans for each reserve which will show how they are proposed to be managed and developed over the next ten years.

It is proposed to have a draft management plan for public consultation in March 2007 for further public consultation.

*Campbell Larking
Recreation Planner
Tauranga City Council
campbell@tauranga.govt.nz*

