



New Zealand Climate Change Office
Te Tari Rerekētanga Āhuarangi o Aotearoa

Restoring Natural Dune Resilience to Mitigate Projected Sea Level Rise – The Coast Care Bay of Plenty Community Partnership Experience

Greg Jenks
Coast Care Programme
Environment Bay of Plenty
P O Box 364
Whakatane

The Coast Care BOP Programme is managed by Environment Bay of Plenty in partnership with





Hukuwai Beach, Opotiki

- As early as 1880, the area of drifting sands in New Zealand was estimated to be 40,000ha, rising to over 120,000ha in 1909.
- The total area of NZ dunelands estimated to be 129,500ha.
- So, 95 years ago about 95% of NZ dune lands were degraded sufficiently to allow them to be blown about at the whim of the wind.

“In few places has the impact of people on fragile ecosystems been more damaging than on coasts where local sandy soils lie vulnerable to frequent strong winds.” (McKelvey 1999)

Because the introduced plants like marram and lupins were not able to control sand movement as effectively as our native plants, storm erosion in some areas became more problematic



**Raumati Beach problems
and early responses**





**Do daisies encourage accretion?
- Mt Maunganui 1998**

- *Clearly our human impact has wrought major environmental changes to.. dunefields in New Zealand, and reversal of the destructive trend of the last 600 years is long overdue.” (Hesp 2001)*
- If humans could cause all these problems unintentionally, then with **good intent**, it should be possible to reverse the damage.



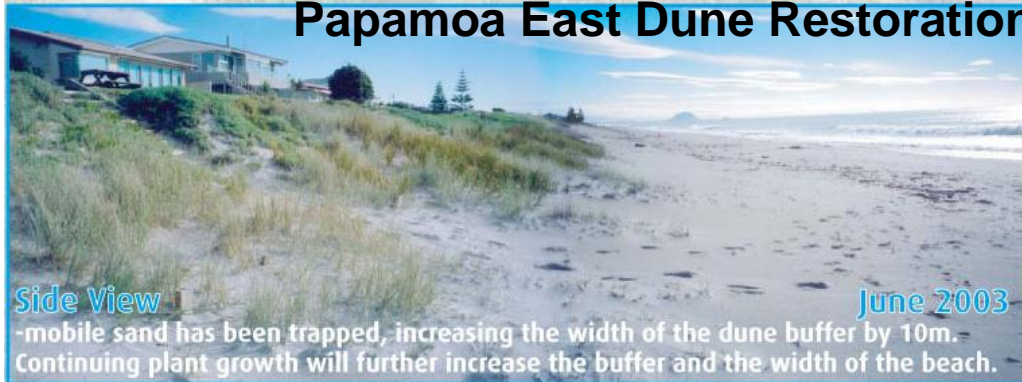
Papamoa East 1999 – Does Kikuyu assist effective dune restoration

However, the scale of this work is so immense, that any one group, ministry, or agency cannot tackle it alone.

Success can be achieved through strong and effective partnerships with passionate members of the affected communities.



Papamoa East Dune Restoration



- However, public enlightenment about scope for restoration is an important step.
- Many people still believe the current condition of our dunes to be natural and normal.
- The damaged state of dunes has been outside of their lifetime experience, and so many people have no reference point to judge the immensity of the change and loss.
- “It all happened so long ago...”

Bryans Beach Coast Care



August 1995

The protective native plants on the original dune were damaged or destroyed, possibly contributing to the erosion of that dune. It was reported that the eroded area had previously been used as a hay paddock!

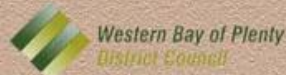


July 2004

A period of natural sand deposition provided an opportunity for the locals. They started planting here in 1999. The restored dunes ensure safe recreation, and natural protection for houses and roads from storm damage.



in partnership
with...



Dune Restoration at Coastlands



working together to care for our coast



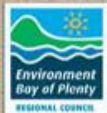
Casual pedestrian impact at Pacific Parade Access.



The original planting is effectively trapping sand. New posts were placed at the base of the steps as old ones became buried.



Continuing sand accumulation is raising front dune height, burying the fence and improving beach width.



in partnership
with...



Matata Coast Care

Restoration of Domain dune and installation of access for 4WD vehicles



July 1998
Community members installing timber access for 4WD vehicles. Excavator is creating a bund to direct vehicles onto the access. Planting started after the fence was completed.



April 2004
Native dune plants are accumulating sand, especially on the seaward margin (see disappearing access fence). Vehicle access is regularly used.



in partnership
with...



Papamoa Domain

This popular area provides easy access to great coastal views and beach, and attracts many people year round.



June 1995

Lack of native front-dune plants meant sand was regularly blown onto the carpark, blocking access on occasion.



August 2000

Coast Care BOP members desinged, installed and planted leaf shaped plots to create multiple access points.blocking access on occasion.



June 2002

The "weather bomb" struck and the spinifex and pingao trapped vast quantities of sand. The bollards and ropes had to be raised to renew effectiveness.



31 December 2002

Just six months later, the plants have emerged completely, ready to trap more sand in the next storm event.



9 January 2003

Nine days later it happened again.



6 May 2004



in partnership
with...



Western Bay of Plenty
District Council



Tauranga City



Whakatane District
Living with the Sun



Otago District Council



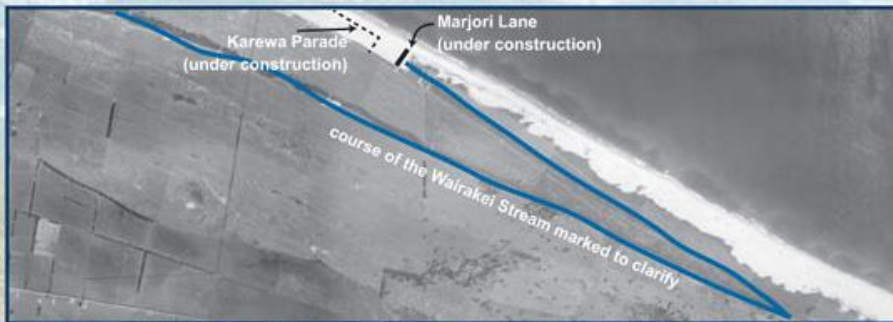
Department of Conservation
Te Papa Atahuri

Papamoa East Coast Care

Impact of subdivision development in 1958



working together to care for our coast



Wairakei Stream used to exit on the beach, but was blocked by developers at Marjori Lane. The front dune was destroyed by being bulldozed back into the stream to create more building sections. Karewa Parade is being formed by machinery in the white sand area to the left of Marjori Lane. Water from the stream system can now only reach the sea by flowing through the sand under the houses.



(low tide photo)

The heavily modified "dune" front is very unstable. The now dominant Kikuyu grass is not able to perform the accretion function of native dune plants. Water from the Wairakei Stream system is visible on the beach in this photo. This water saturates the sand, making it very prone to erosion.

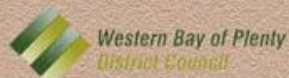


(high tide photo)

The first year plantings did not succeed. Subsequent plantings of vigorous hardened-off plants in 1998 and 1999 have produced these results. Photo was taken after the impact of 10m waves from Cyclone Ivy in February. The restored front dune is now functioning reliably. Remnant Kikuyu will be replaced by native mid and back dune species.



in partnership
with...



COAST CARE CREATING HEALTHY DUNES

It was once a Kiwi tradition to spend lazy summers in the family bach at the beach. However, the small, often shabby, holiday homes of old have now almost gone - giving way to a new breed of glossy, permanent dwellings.

Living a few metres from the sea will always carry a risk - it is, after all, a known hazard zone. But a healthy run of dunes can provide some peace of mind, as Prue Burt knows.

In the late 1980s, Prue and husband Peter built a family home at Papamoa East. At that time, she says, there were a lot of empty sections along the beachfront, "but it's a very different landscape now."

Eight years ago, a series of easterly storms tore at the dunes that helped to buffer their property from the full force of the waves. Directly in front of their house, powerful seas had gouged out the dunes so much all that was left was a steep eroded bank. It made the Burts feel vulnerable.

So, when Prue heard about a dune-planting initiative called Coast Care, she was one of the first to sign up for it. Set up by Environment Bay of Plenty and the local coastal councils, Coast Care BOP works with volunteers to plant the

region's dunes with native plants in a bid to restore them. The programme now has 25 groups, including the one at Papamoa East.

Since joining Coast Care, Prue and her neighbours have planted hundreds of native dune plants along a kilometre-long stretch of coastline. Each resident was designated an area to fertilise just before it rained to ensure good growth. In front of Prue's home, an initial three-metres-wide swathe was planted and fenced. That has now spread to 10 metres, binding more and more sand. Because of this, the dunes are now a wide, gentle slope.

Native plants (unlike exotic ice plants and kikuyu grass) trap sand, so the Burts no longer have to wheel away barrow loads of the stuff from their lawn after strong winds. Earlier this year, a cyclone threw logs up high on the beach, but the dunes stayed strong. As did the plants - smothered by sand, they simply popped up again.

It's working so far and Prue's happy. As dune-care converts, people in the neighbourhood tend to keep a watchful eye on their dunes. "Yes, we get a bit tetchy when people walk or picnic on them," Prue says.



DUNE plantings on the beach in front of her home at Papamoa East have given peace of mind to Prue Burt, here with her son.

Solving Problems by Restoring Dunes Motiti Road, Papamoa East



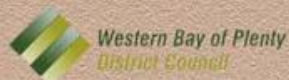
June 1997
Dune front erosion had been problematic for decades. In 1978 the BOP Catchment Commission advised residents there were no simple or cheap answers to address their erosion concerns at Papamoa East.



March 2004
Inexpensive planting of native dune species has re-created an accreting front dune, by Papamoa Coast Care helping to solve the erosion problems. This photo was taken the day after the impact of 10m waves from Cyclone Ivy.



in partnership
with...



Yale St Dune Repair Project, Mt Maunganui



Planting September 1997, Maungatapu School

Original fence posts buried by newly trapped sand



February 2002

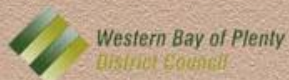
Sand about 1 metre deep has been accumulated over the entire planted area, forcing the sea out by over 10 metres



New fence posts had to be added



in partnership
with...



Dune Restoration at Coastlands East



Before planting commenced.

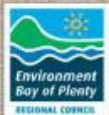


Four years after planting, the fence disappearing.



*Circles show changing
wave run-up limits*

Sand accumulation by the native dune plants continues, improving the width, height and function of the dune buffer.



in partnership
with...



Western Bay of Plenty
District Council



Tairānga



Whakatane District Council



Opoitiki District Council



Department of Conservation
Te Papa Atahua

Coast Care BOP



Coast Care BOP is a community partnership programme

In the Bay of Plenty, the means of remedy is the Coast Care BOP Programme, established in 1994.

VS

's time we started to look after beaches

ORAL MATTERS

N Bay of
strict Coun-
inished the
or its Annual
Budget and
w go into
-making
all the points
p by various
s.



Mr Weld

decisions
ill be operat-
are made
he Long Term Community Plan,
1 consultation took place 18
go. This is more fine-tuning and
be confused with the Te Puke
Plan, which has been consulted
sively and will be put up for
making shortly.
ouncil is very busy at the
trying to evaluate the various
ns from submissions.

the pinnacle issues is outside
ict — beachfront erosion at
ach. An interesting factor devel-
of that is how people value an
The problem the council faces is
y work has to be done such as
1 and beach nourishment, who
he bill?

got a major issue in the Western
at Pukehina. We can't take our
or granted any longer. It's most
council support Environment
enty's Coast Care programme,



FILE PICTURE

DUNES are an asset and we must do more to protect them. Coast Care officer Suzy O'Neill points out a sign urging people not to walk over dunes.

which is also supported by Tauranga City Council.

It's essential we make sure we look after the sand dunes because they are the reservoir for sand that storms take away. Our dunes are our first line of defence.

It's been proven beyond a doubt that spinifex and pingao are the only plants that can hold the sand in place. With the impact of people and vehicles on the dunes, a big education programme is needed for residents to make sure they look after the dunes so we can enjoy our beaches.

There are a lot of other issues important to individuals and groups and we will give them due respect.

Leisure activities in the form of sports fields is one issue but it's not just sportsfields, it's parking. Any major sporting event means masses of cars, especially on Saturday mornings with children's sports.

Parking is becoming an issue and is something councils will have to give serious consideration to. In Te Puke, when children turn up for soccer at Fairhaven Park, haphazard car parking is causing concern to residents. The problem is exacerbated by changing lifestyles — people use their cars a lot more today. The council must recognise that carparks are not easy to put in place and come with a major cost attached.

Funding of the programme is a cooperative venture with all partners contributing from annual budgets.

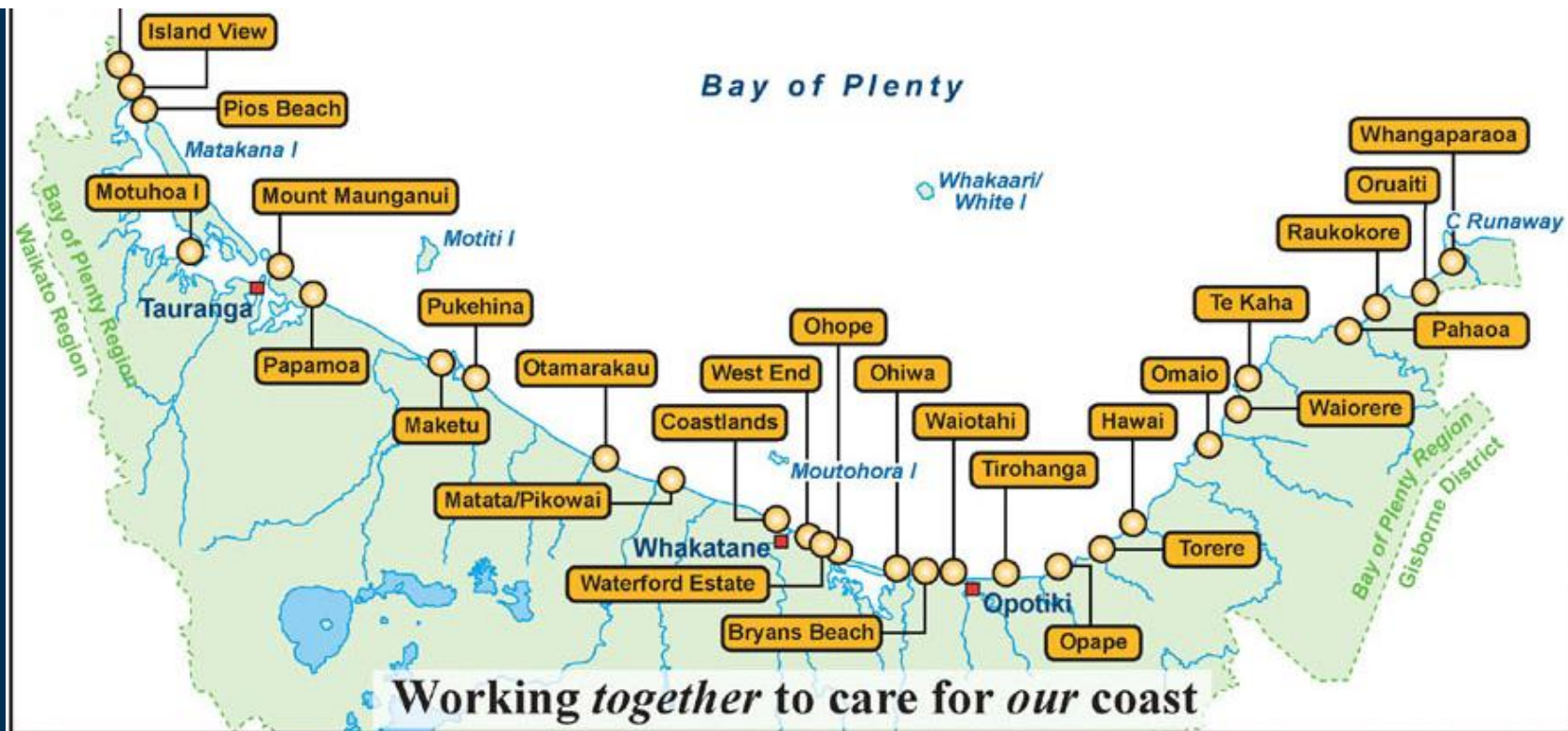


One of the strengths of the Coast Care E program is its operation by and through local community members taking an active role in managing their own beaches, i.e. local solutions for local problems.

Groups decide the way in which they wish to operate, including whether or not to have formal structures like committees.

Group members make decisions about plants and materials required for projects which are made available through Coast Care acquisition and supply.

Providing materials in this manner avoids excessive bureaucracy and the auditing that might be necessary if funds were supplied.



The list of achievements to date is a testament to the vision of those who initiated programme.

Foredunes on some beaches have been fully restored, which is providing confidence for more difficult sites yet to be tackled.

There are currently 28 continually active Coast Care groups operating throughout the region over our nearly 350km regional coastline.

Our database of Coast Care volunteers contains nearly 1,000 members who receive regular information about Coast Care projects and events.

The A Team from Whangaparaoa



- The Coast Care BOP programme partners are again funding nearly 40,000 native dune plants this year.
- The grand total is now over 240,000 plants (equivalent to about 30km of front-dunes), all planted by community volunteers.

PLEASE KEEP OFF THE GRASS



VEHICLES DESTROY DUNE
PLANTS, ANIMALS AND BIRDS

You can help by driving on
the bare sand only

COAST CARE BOP

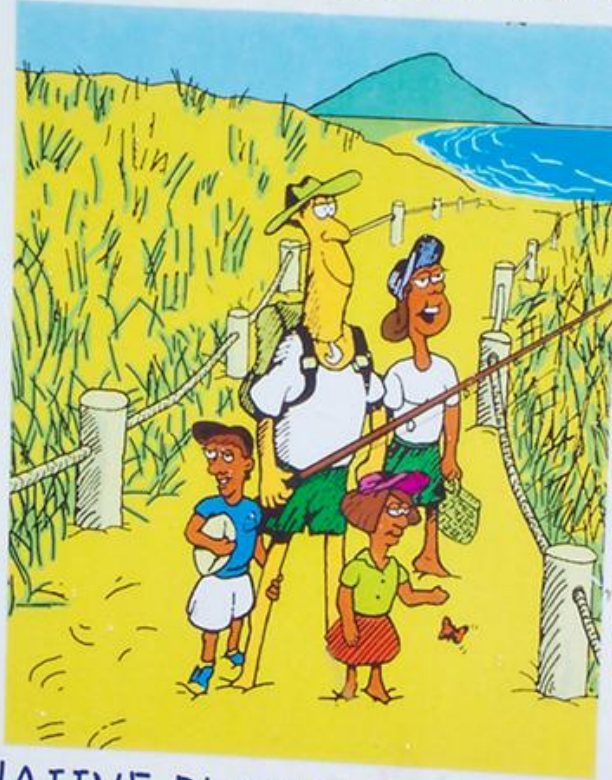
Working together to care for our coast

For More information Please Phone

07 306 0500 or 0800 368 267



FENCES HELP PROTECT PLANTS



NATIVE PLANTS PROTECT
OUR DUNES

COAST CARE BOP

Working together to care for our coast



For More information Please Phone

07 5777 000 or 0800 368 267



- Innovative Coast Care signs are liberally displayed at restoration sites.
- This helps to ensure people realise that enhanced dune stability is a result of this volunteer programme, and everyone can help.

Working together to care for our coast

Life's A Beach Kit

kit for the latest Social Studies curriculum. Includes the "Life's a Beach" video. Lesson plans, assessment exercises, field trip activities, and teacher fact sheets. Great summer activity for all schools.

Posters

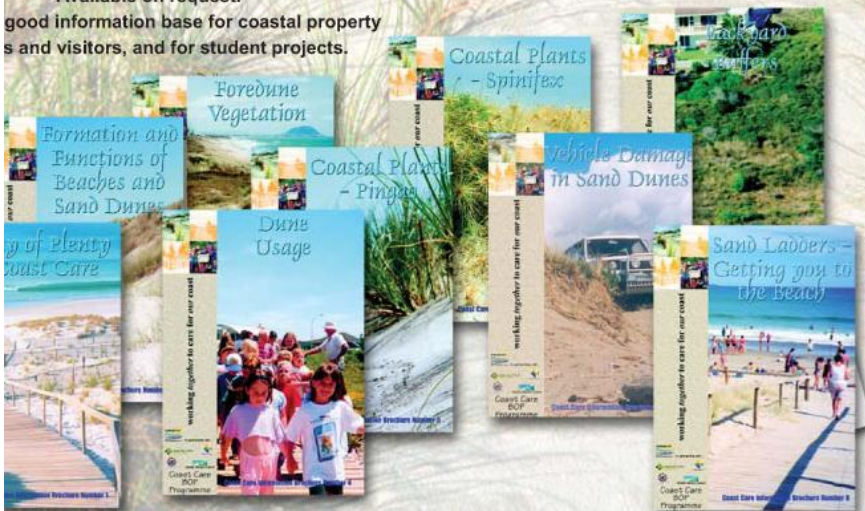
Available on request, in either A5 or A1 sizes.



Pamphlets

Available on request.

Good information base for coastal property owners and visitors, and for student projects.



For further information contact Environment Bay of Plenty
Telephone: 0800 ENV BOP (368 267)
Email: info@envbop.govt.nz

Production and distribution of 900 copies of the "Life's a Beach" education kit to all high schools in New Zealand.

A series of ten informative brochures and many posters have been produced to aid public understanding of the important role of natural dune systems.

Life is a beach . . . with needy sand dunes

Unsung heroes

BY VABOWDEN

Someone who has spent 12 years planting the sand dunes you think Joye Adams would be quite at home about the beach.

It's not, in fact, she hates the sand and hates swimming. However, her mission to reduce the effect of erosion on the beach outweighs the unpleasant feel of sand on her toes.

As part of the Coast Care Bay of Plenty programme, she is one of 900 volunteers who plant Spinifex plants along the dunes.

She was nominated as a Bay of Plenty Times "unsung hero" for her commitment to the scheme. Adams began her involvement in 1992.

Coast Care BOP is a partnership between the Government Bay of Plenty, local councils and the Department of Conservation. Although Mrs Adams has not been able to help with the last few years because of problems with her hip, she said it would not be long before she was out digging. "I just crawl along with my shovel and plant away," she

her motivation stemmed from similar sources, including similar memories she had heard about California and Australia.

So, she was sick of being buried by sand at her house.

Her childhood, Mrs Adams said summer days chasing her on Tauranga beaches armed with rabs.

Those fond memories live on, she said fighting erosion here as in the community so the beach will remain as it used to be.



PICTURE: JOHN BORREN 140404JBC380P

DIGGING IN: Joye Adams has helped to restore the sand dunes along Bay of Plenty beaches for more than 10 years.

Mrs Adams moved to Tauranga in 1974 and, for her, the Bay's beaches are "the longest garden in New Zealand".

Luckily, she's a keen gardener. Mrs Adams says there are usually two plantings each month with the busiest season being autumn.

Her last planting was on Mount Maunganui Main Beach. She was one of 44 volunteers who put in 1600 plants.

The input of all the Coast Care volunteers has seen a century of neglect and damage to the coastline healed by hard work.

There are 25 volunteer groups for Coast Care covering 350km of coastline from Cape Runaway to Waihi Beach.

Last year, Coast Care agencies provided 36,000 native dune plants that were all planted by community volunteers.

About 200,000 plants have been planted in the past nine years.

• If you know of a volunteer who deserves recognition, please let us know by phoning the chief reporter on 577-5154 or emailing your suggestion to news@bopn.co.nz

Frequent positive media stories provide good public information about Coast Care activities and objectives, and highlight community empowerment and participation.

Informative newsletters mailed twice annually to our network of community volunteers.

Coastal and Storm Hazards Workshop

The National Institute of Water and Atmospheric Research (NIWA) hosted this informational workshop in Hamilton last March. The main aims were to inform people about existing natural hazards, and the research that is being undertaken to help cope with the new problems that are developing, especially those involving global warming. We now have to live with the fact that global warming **is** happening; the debate now is over the extent of the effects.

NIWA scientists presented background data on the effects of warming so far, and then the best possible estimates of the likely changes over the next 100 years. This is not an exact science, as it also must include future projections of how the global village will function and use energy, but estimates will be continually updated, as new information is available. For the rest of this century, the effect of warming on our surrounding oceans is expected to be due to two factors: thermal expansion, i.e. water volume increases when heated, and to a lesser extent, more water mass from melting glaciers and non-polar ice caps. However by next century, melting or calving of land based ice sheets in Antarctica and Greenland are expected to contribute to

ongoing sea level rise for centuries, so sea level rise is here to stay.

Sea level is already rising around New Zealand, having gone up by around 0.18 m last century. This past trend and the "most likely" projections of sea level out to 2100 for New Zealand are shown below. By 2100 the "most likely" range should see sea levels rise 0.3 to 0.5 m above 1990 levels. Further info is available from NIWA's web site: <http://www.niwa.co.nz/m/prog/cha2/news/hazard>

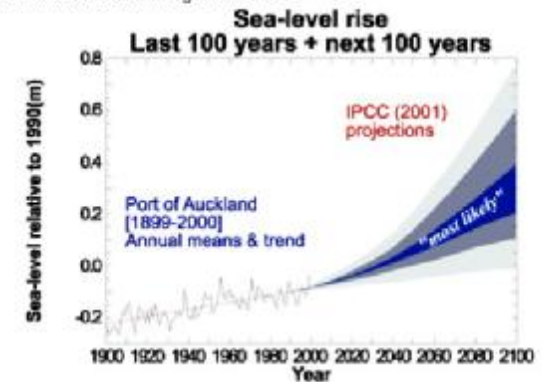
So how can coastal communities cope with these changes? The workshop report reinforces the good work of Coast Care volunteers, highlighting that looking after dunes **is** a good investment. Dunes provide natural protection from the occasional wild moods of the sea. And naturally, larger functional dunes provide better protection from the next big storm than

smaller damaged dunes. The poster on page 4 illustrates how careful dune restoration can build up "natural protection" before the next "big one" strikes. Of course, where houses are too close to the sea, dune management must be complemented by other measures such as development setbacks, to ensure houses are sensibly out of reach of the worst erosion. Looking after sand dunes and having development well back from the sea are by far the cheapest and most effective ways of managing erosion and minimising damage to our popular beaches. So, keep up the good work everybody; the obvious improvement in dune function from your efforts could make a significant and positive difference to your beach into the future

[Thanks to Rob Bell, NIWA and Jim Dahm, Coastline Consultants, for great assistance in preparing this article]

What's Inside

- 1 NIWA
- 2 Euphorbia glauca/Suzy O'Neill
- 3 Back Yard Buffers
- 4 Back from the Brink/Coastal Website/CDVN News
- 5 CDVN Conference 2002
- 6 Beach Buddies
- 7 New Beginnings/Hot Tips
- 8 Winter Projects



Relative sea-level trend for Auckland since 1899, and the "most likely" trend for the next 100 years, all relative to the 1990 sea level.

[Source: Bell et al. (2001) NIWA]



Waihi Beach 1995

Working together with a common goal, management agencies and caring community members have taken many local beach systems from disaster to restoration.



Waihi Beach 2003

unganui, beach accessways are located every 100-m markers at both the road side and beach end of access. The numbers on the markers relate to the distance in km (1.44km in this case) from Mauao, the Mount.



- Refinement of the programme direction, through increasing biodiversity enhancement work and sensible control of vehicle damage to dunes, will result in arguably one of the most natural and sustainable regional coastal ecosystems in New Zealand.
- The mechanisms and policies employed in this successful programme can, and should, be utilised in every region of New Zealand.

Relatively low population pressures in New Zealand have resulted in opportunities to successfully reverse most of our past excesses on the coast. Other more populous nations may have moved beyond that point.

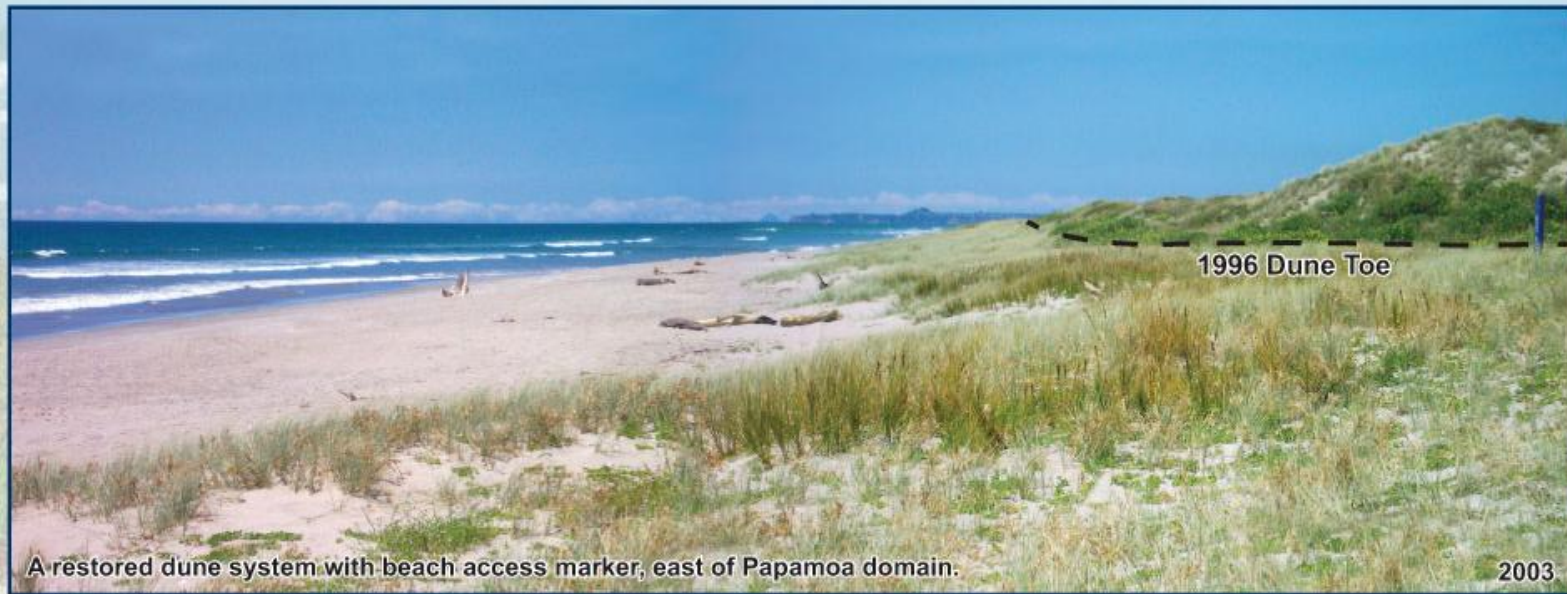


Swells rise in the Bay of Bengal and splash into Nurzahan Bibi's rice field, which—as global temperatures rise and sea level climbs—becomes an ever more precarious means of support for the widowed Bangladeshi.

DHAL CHAR, BANGLADESH

Original article sourced from National Geographic magazine; September 2004

Papamoa Beach



A restored dune system with beach access marker, east of Papamoa domain.

2003

THE LINK: Dune restoration and projected sea level rise

- The BOP dune restoration programme has transformed **dune erosion** into **dune accretion**.
- Restored dunes clearly demonstrate superior abilities to **absorb storm impact**, and to rapidly **self-repair** post storm.
- Dunes display relatively **rapid accretion** in the first 3 – 6 years after successful restoration.
- The rate of accretion slows after the initial rapid phase, but **it does continue**.
- This accretion of restored dunes is occurring during **existing sea level rise** conditions.
- The BOP experience suggests that restoration of dunes with appropriate native species is providing the **most practical, most sustainable** and **least expensive mitigation** option available for coastal communities & infrastructures.
- Dune restoration techniques should be promptly instigated throughout New Zealand, and possibly beyond.



in partnership
with...

