

# NIWA Natural Hazards

setting the foundation for a safer future

## Study reveals 166 offshore earthquake sources in Bay of Plenty

The number of known offshore earthquake sources in the Bay of Plenty has been drastically revised.

In a report to Environment Bay of Plenty, NIWA has identified 166 offshore earthquake sources in the region. A national probabilistic seismic hazard assessment published in 2000 incorporated just 14 offshore earthquake sources for the bay.

“We are recommending that the earthquake and tsunami hazard be re-evaluated based on this new information,” says NIWA marine geologist Dr Geoffroy Lamarche. “We suspect our new results mean the earthquake hazard in the central and eastern Bay of Plenty coastal region is greater than previously thought, while the expected hazard in eastern Coromandel is probably lower.”

Bryan Riesterer, Environment Bay of Plenty strategic policy committee chairman, has welcomed the report. “It is important that local authorities have an accurate understanding of the seismic potential of our region, both on-shore and off-shore,” he says. “This understanding will translate into more knowledgeable land use planning, improved security for infrastructure projects, and better informed planning processes for our civil defence functions.”



NIWA’s results are the product of a major five-year study, largely funded by the Foundation for Research, Science & Technology. NIWA collected and interpreted more than 8000 km of seismic reflection profiles, and more than 11 000 km<sup>2</sup> of multibeam bathymetric data. This was supplemented by almost 20 years of archived data.

The maximum credible magnitude for quakes from the offshore earthquake sources range between magnitudes 5.7 and 7.1. The average recurrence interval is about 3000 years.

## How to assess the impact of climate change on flood risk

Climate change is expected to bring more frequent and intense flooding across the entire country, even to regions which are likely to become more drought-prone. NIWA has produced a methodology which local government can use to assess the impacts of climate change on flood risk in their area.

The methodology, commissioned by the Ministry for the Environment, recommends that councils first run a simple screening test to assess whether climate change is likely to significantly alter the flood risk in a region.

If the answer is yes, a six-step process enables detailed analysis of risk for each catchment:

1. Select climate change scenarios (e.g., 1 °C temperature rise and 0.1m sea level rise by 2030)
2. Select representative sample of past storms/rainfall events
3. Determine the impact of projected temperature rise on the rainfall of these storms
4. Translate the projected rainfall into river flow
5. Assess any other relevant changes (e.g., tide or storm surge)
6. Translate the projected river flow & any other factors into projected flooding

A summary & full report of the methodology can be found on the Ministry for the Environment’s website at: [www.climatechange.govt.nz/resources/local-govt/guidance](http://www.climatechange.govt.nz/resources/local-govt/guidance) Scroll down to ‘Technical reports & other resources’



## Nature's double whammy

Coastal inundation, erosion, and damage to coastal structures are often associated with times of both large waves and high water levels. So when planners, property developers, engineers, and others consider coastal inundation, or the design or hydraulic performance of coastal infrastructure, they need to consider both parameters. And that's easier said than done.

In most places, high waves and high water levels occasionally – but not always – coincide.

To assess the likelihood of high waves and high water levels occurring together at a particular site, you need to start with a good knowledge of extremes of waves (alone) and water levels (alone). That requires several years at least of simultaneous water level and wave data. This might involve a high quality sea level record combined with NIWA's wave hindcast statistics. We then use joint probability techniques to make a detailed assessment of the correlation of high waves and high water levels at that location.

NIWA recently applied such an approach for the Wellington City Council as part of an assessment of the potential impacts of climate change on the city. This not only assessed how present day extreme waves and water levels were correlated, but also looked at how such occurrences may be altered in the future by climate change.



## Towards full sea state forecasting

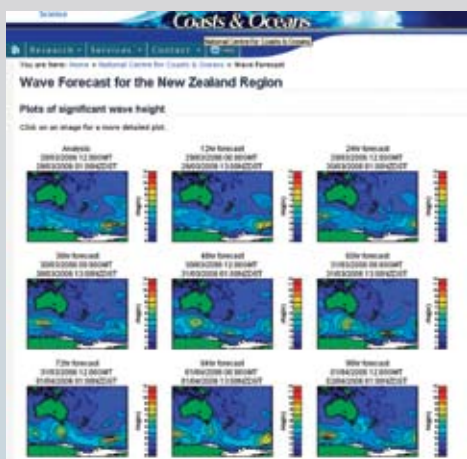
NIWA scientists are steadily working towards full sea state forecasting including waves, storm surge, and tides. This is a very challenging project.

Already, we produce 5-day forecasts of wave height and direction for the New Zealand region, the Southwest Pacific, and the Southern Ocean.

At the moment, we use wind forecasts from the US National Oceanic and Atmospheric Administration, and convert them into wave patterns, taking into account how waves build up, travel, and dissipate. Soon we will be using NIWA's own high resolution wind forecasts, which will enable us to produce finer scale wave forecasts. In addition, we are working on incorporating tide and storm surge forecasts to give a complete picture of sea conditions.

The modelling will be checked against measurements of coastal conditions from sea level gauges and wave buoys, as well as satellite observations of wider ocean conditions.

See examples of NIWA's 5-day wave forecasts from:  
[www.niwascience.co.nz/ncco/forecast](http://www.niwascience.co.nz/ncco/forecast)



## Workshop from the Natural Hazards Centre

**Do you work in local government?  
Do you interact with community groups  
on coastal issues?**

**Community Participation in  
Coastal Hazard Mitigation  
Wellington, Wednesday 26 April 2006**

This one-day workshop will use case studies, and the experiences of participants, to explore the interactions between stakeholders, technical experts, and regulatory authorities in managing coastal hazards. We will analyse concrete examples to identify and discuss what drives 'good' versus 'bad' outcomes from community participation. Workshop participants will leave with a better understanding of how community groups can be best empowered to address coastal hazards.

More information & registration forms:  
[www.naturallhazards.net.nz/courses](http://www.naturallhazards.net.nz/courses)

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