

Robyne Cranshaw
Project Administration Officer
Kapiti Coast District Council
Paraparaumu
By email to: Robyne.Cranshaw@kapiticoast.govt.nz

11 April 2014

Thank you for your email of 6 March advising of the opportunity to comment on any factual errors or matters of detail the Coastal Expert Panel's draft report last month on its review of the science and assessments undertaken for the proposed Kapiti Coast District Plan 2012.

I limit my response to matters of detail relating to statistical issues and risk analysis. However, I am aware of, and endorse, the wider ranging responses by CRU.

My response covers the following aspects:

1. No mention of the results from formal statistical testing of the acceleration hypothesis;
2. No statistical definition of a hazard zone or line.
3. The disjuncture between sections 10 and 7 concerning the treatment of risk.
4. The need for greater clarity in section 10 – best estimate of what?
5. Implications of taking a decade to undertake probabilistic assessments.

Science does not recognise consensus as a scientific argument, even if a consensus exists (and no authority is provided, other than in the minds of those who are asserting that there is one.

The word "likely" implies statistical hypothesis testing. After all, scientific progresses by testing speculative hypothesis against independently verifiable data.

The last sentence on page 3 of the report refers to recent statistics "suggestive" of an acceleration, but does not put this evidence into a statistical hypothesis testing context. In my view this is a serious omission that could and should be easily rectified.

For example, the IPCC's report released in September last year did document that two papers had subjected the historical global sea level record to statistical hypothesis testing of the acceleration hypothesis advanced in section 3 of the Panel's report. What the IPCC reported was that in 2011, one study found zero acceleration in sea level rise between 1900 and 2010, and another found only a near-trivial rate of acceleration of 0.012mm a year. Both findings were statistically significant at the 90% confidence level.

It would also be easy for the Panel to cite NIWA's June 2012 report for the Greater Wellington Regional Council on this matter. (Extract below).

Turning from statistics to science, in correspondence with NIWA, I have been unable to uncover any scientific theory as to why a major, non-trivial, acceleration in sea level rise, globally or locally, should start from the point projected in the chart on page 4 of the draft report rather than in some earlier or later decade.

Yet if there is no scientific or statistical basis for starting the posited acceleration at that point, the starting proposition embodied in the chart is purely hypothetical. If so, its use in section 3 is could seriously mislead lay readers.

I appreciate that the Panel includes a statistician and suggest that it relies on his statistical expertise on the matter of hypothesis testing in relation to the posited acceleration when finalising its report.

To help the community better interpret Figure 3 on page 4 of the report I also suggest that the scientists on the Panel focus on identifying any scientific theory that explains why it is credible that the posited acceleration in Figure 3 on page 4 of the report would start at the date indicated on that chart rather than at an earlier or later date. If it does not know of any such theory, it should just report that fact.

It is a truism to say that scientists can't expect to measure something accurately if they don't know what they are trying to measure. Yet the draft report does not define what point on the probability distribution for the shoreline equations (1) and (2) are intended to estimate.

Again the statistician on the Panel should be relied upon by other Panel members to assess the utility for risk analysis of an estimate of an unknown point on an unidentified probability distribution.

Either the Panel should define what a point estimate of a coastal hazard zone or line is meant to represent in statistical terms or it should comment on the implications for risk analysis of the omission.

The same comments as in 2 above apply to the adjustments for uncertainty (CU) and (F) in these equations and the associated discussion in section 7.

I can't see any point in safety or uncertainty adjustments that move a point estimate for future sea-level an unknown distance along an unidentified probability distribution. Such adjustments are formally useless as inputs into a risk analysis.

The statistician has made his view clear in section 10, that the most important output required from the coastal hazard scientists is their best estimate, but sections 4 & 7 do not seem to respond to that view.

Section 10 leaves readers to guess what the answer is to the question "best estimate of what?"

My guess is that it means best estimate of the expected value of the assessed probability distribution for the assessed probability distribution at some future date. But readers should not be left to guess about such an important matter.

Clarifying this in conjunction with clarifying the issue raised in point 2 above would, in my opinion, markedly increase the utility of the report. Readers should not be expected to guess.

The draft report lacks guidance as to how a coastal hazard analysis could be performed on a probabilistic basis. In section 11.3.1 it suggests that probabilistic method be developed over the next decade. No reason is given why it should take so long. Again the statistician on the panel should be able to fill in this gap.

Critically, the draft report does not identify how any coastal hazard analysis done in the next decade without such an analysis can usefully inform a risk analysis based on likelihoods and consequences.

The report should close this gap. Otherwise it gives the community no guidance as to how the outputs of such analyses should be interpreted for risk analysis purposes.

Yours sincerely

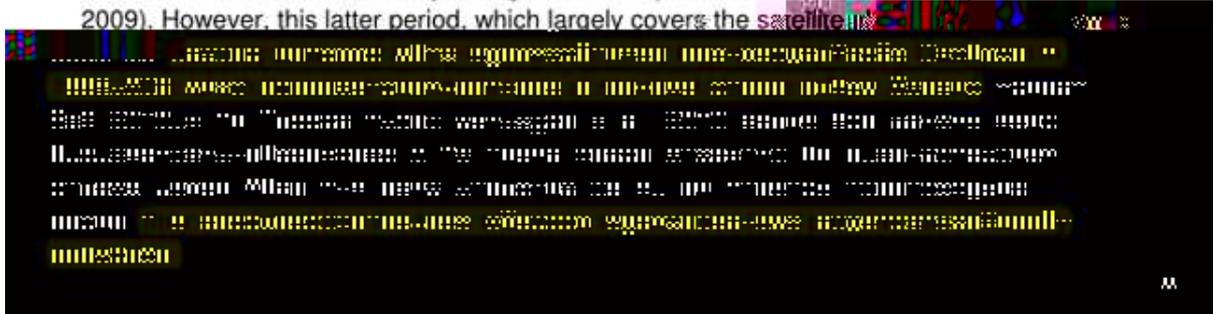
B Wilkinson

Bryce Wilkinson (PhD)
Director
Capital Economics Limited
PO Box 10927
Wellington

Section of NIWA

The critical and hotly-debated issue for the present is whether the rate of change in sea levels over the past several decades is increasing or remaining at a linear rate of rise, as it has implications for the magnitude of future sea-level projections.

Merrifield et al. (2009) extracted global-average accelerations of 0.09 mm/yr^2 since the late 1970s increasing to 0.12 mm/yr^2 since 1990, but cautioned that these accelerations are not significantly different from zero, given the short analysis periods. Most of this apparent acceleration is accounted for by changes in the tropical and southern oceans (Merrifield et al. 2009). However, this latter period, which largely covers the satellite



An assessment of likelihood is also necessary for any risk assessment based on risk = likelihood x consequence.

As it happen