

25 June 2014

## **Initial Response by Dr Wilkinson to the Science Panel's Final Report with respect to the Precautionary Approach and "Best Case Hazard Lines"**

The Panel's final report does not define what it interprets "the precautionary approach" to mean in probabilistic terms, despite its obviously being a statistical concept. On p 34 it baldly asserts that there are "arguments for the maximum projected levels [apparently no matter how implausible] in that they best represent a precautionary approach". Well, in whose opinion and on what basis in terms of mainstream risk analysis? In the very next sentence the Panel attributes to Professor Willem de Lange a contrary view (and fails to acknowledge the similar view of the Panel's own statistician). But it then fails to make any assessment of the contending propositions, or even to provide a framework for making that assessment. It thereby ducks the issue. Yet if there is no agreement about what the precautionary approach means in statistical terms, what use is it?

Similarly, the report commends adoption of "best practice hazard lines" in section ES.6 in the executive summary and in section 5: Recommendations, p 53. Yet the report provides no definition of what part of the probability distribution "best practice hazard lines" are meant to represent, even in principle. Nor does it cite any literature that might make the case for the "extreme worst case" argument accessible.

On a slightly fuller reading of the report, the Panel may be advocating that "best practice" hazard lines should be based on extreme worst case wave height scenarios. (For example, on p 37, see both the second paragraph and the particularly the last paragraph that asserts that an assessment of "*conservative maximum erosion is of interest in management application, serving as the basis for a precautionary approach required in hazard assessments, as recommended in NZCPS 2010*". This proposition is repeated on the second paragraph of page 39. See also the last sentence in the executive summary on the page that has the heading ES.4.)

It seems that the Panel wants to restore Lumsden's (2003) methodology which focuses on extreme wave height possibilities and will presumably thereby produce hazard lines that are further inland than would be produced by an improved Shand report methodology. But this willfully ignores the issue of likelihoods.

Nowhere in the report have I spotted a willingness to distinguish between realistic scenarios and unrealistic ones, remote speculative risks and likely risks, upside possibilities versus downside ones. I drew the Panel's attention to the need to define terms statistically and to take a mainstream approach to risk analysis both in my written statement and in my oral presentation. In particular, I mentioned the logic of a Bayesian approach. (A relevant extract from my written statement follows.) The Panel's final report of does not seem to have respond to these suggestions.

In summary, the Panel's final report appears to have ignored mainstream risk analysis and provided no statistical or scientific basis for its main recommendations concerning "best practice hazard lines" or for making precautionary adjustments. Its legacy will be continuing confusion and dissension in these respects.

## EXTRACT FROM NOVEMBER 2013 SUBMISSION ON RISK EVALUATION

### **The meaningfulness of a precautionary approach**

36. Dr Shand asserts that his adoption of a precautionary approach to existing uncertainties is appropriate. However, he fails to acknowledge criticisms of this approach in the mainstream risk analysis literature, let alone respond to them.
37. In 2010 the respected Organisation of Economic Cooperation and Development (OECD), published a report on risk analysis. It included, in a chapter 3, a lengthy critique of the precautionary principle compared to the mainstream economic approach to risk analysis.[1] (The OECD is a Paris-based government-funded international organisation that specialises in economic issues relating to applied public policy.)
38. One summary conclusion was:

"This principle violates basic principles of the logic of decision-making under uncertainty; it disregards the opportunity cost of precautionary measures; it fails to take the potential benefits as well as the potential losses into consideration; not least it greatly complicates the already difficult problem of setting regulatory priorities."
39. The OECD stressed the superiority of the mainstream approach which takes into account "both the losses and probabilities of all events". Precautionary approaches disregard relevant information "by considering only the worst possible case, disregarding probabilities"... "In particular, the overestimation of low probability events has substantial [adverse] implications for public policy."
40. The OECD's critique considered that the most basic flaw of this approach was the artificial distinction it drew between situations where the level of scientific information is sufficient to permit a formal risk assessment and where it is not. It considered these situations to be differences in degree rather than in kind. It considered that a (subjective but transparent) Bayesian approach to these situations would be much better.
41. It follows that Dr Shand was not justified in terms of mainstream theory in setting accretion to zero on the grounds that it was not well understood. This was not a scientific decision. Nor, as the OECD report has indicated was it a sound statistical decision. There is long-standing evidence of accretion and it should not be treated as being of zero significance. To do so was not a risk assessment; if anything it was a policy decision. The same verdict applies to the KCDC's decision to adopt the MfE's higher recommendation for sea-level rise projections, but not its lower one. Relevant information about possible outcomes should not be ignored.
42. In short, the KCDC's 'precautionary approach' is not consistent with the standard text book economic treatments of decision-making under uncertainty. These treatments do not ignore the likelihood of less adverse events, which is what the KCDC's projected shorelines do. To the contrary, they seek to identify all relevant aspects of the probability distribution. They also seek to assess the consequences of each possible outcome.