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**ABSTRACTS**

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# Socio-economic impacts of the June 2002 'weather bomb' and the February 2004 storms in New Zealand: challenges in developing an integrated assessment methodology.

David Johnston<sup>1</sup>, Graham Leonard<sup>1</sup>, Mark Walton<sup>2</sup>, Douglas Paton<sup>3</sup>, Kevin Ronan<sup>4</sup>,

Warren Gray<sup>5</sup>, Rob Bell<sup>5</sup>, Ilan Kelman<sup>1,6</sup>

1 Institute of Geological & Nuclear Sciences, Lower Hutt, New Zealand

2 NZ Institute of Economic Research, Wellington, New Zealand

3 University of Tasmania, Launceston, Australia

4 Massey University, Palmerston North, New Zealand

5 National Institute of Water and Atmospheric Research

6 Visiting scientist

E-mail: d.johnston@gns.cri.nz

## 1 Introduction

Extreme weather and climate events form a significant proportion of natural hazards that cause damages and costs to local communities. To plan appropriate response measures that minimise damages at least cost, it is important to both understand the economic effects of extreme events, and to understand the way in which communities understand, perceive and prepare for such hazards. Long-term risk management is particularly important in the context of climate change, which is expected to change and likely increase the intensity and frequency of some extreme weather events such as heavy rainfall leading to flooding. This paper discusses how we measured economic costs and community responses to flood events in the Coromandel area arising from the 2002 'weather bomb' and the recent February 2004 floods in the lower North Island.

## 2 June 2002 floods

The 21 June 2002 Weather Bomb developed from a mid-latitude depression that rapidly deepened as it approached the northern tip of NZ. Severe weather warnings for the storm were issued by MetService on 19 June for heavy rain and strong wind for the region. Anticipating the intensity of the storm the MetService issued media releases and in those deliberately used the term 'weather bomb' to attempt to maximise public attention to a significant event. Heavy rain and strong winds were widespread over much of the northern parts of NZ, with slips and flooding reported in Northland, Coromandel and the Waikato. An intense band of rain occurred at the rear of the main rain area, causing very heavy rain to fall after the catchments were already saturated by earlier rainfall. Significant flooding was recorded in Waikawau, Waiomu, Tapu, Te Puru, Tararu, Te Aroha, Tirau and Putaruru but also occurred in other areas across the region (unrecorded).

Direct costs were limited almost entirely to property damage. The estimated insurance claims made as a result of the event were \$21.5 million, with around \$8 million related to the Thames-Coromandel area. Data from the survey suggests that this was split 0.84/0.16 between households and businesses (\$6.7 and \$1.3 million respectively). Total uninsured losses are estimated at \$2.1 million based on the survey data. In addition, TCDC estimated a \$3.1 million agency response costs with the majority likely attributed to labour. The total direct costs are thus estimated to have been \$13.2 million for the TCDC area. The true loss to the area likely sits somewhere between 0.1 – 0.6 % of the area's asset base (estimated to be around \$1750 million). This somewhat crude estimate provides an indication of the relative size of the event.

In terms of indirect losses the business survey results suggest that the net impact of the weather bomb on business sales was positive (around 30 % more revenue from increased business than the value of lost business). Note that this does not represent a true positive net impact to businesses in the Thames-Coromandel area because many negative impacts, particularly damage to property (a direct loss, quantified above), are missing. The cost borne by insured TCDC households and businesses via excess payments is estimated to total around \$0.45 million. Additional losses as a result of no-claims bonus loss, premium increases and, in some cases, cancellation of policies also exist but are extremely difficult to quantify. These losses are also only partly related to the Weather Bomb event alone. Adopting a longitudinal framework involving assessment of the incremental impact

of successive hazard events is likely to provide a fairer picture of the longer-term cost of repeated events. A regional version of NZIER's computable general equilibrium (CGE) model was used to estimate flow-on effects to those dependent on directly affected parties. These effects were found to be negligible. Industry output, factor demand and household welfare were found to be affected by less than 1 %, probably close to the margin of error.



Figure 1 *Flood affected farm land in the Manawatu region in February 2004. Photo from Ministry Civil Defence and Emergency Management*

### 3 February 2004 floods

The 2004 floods affected a wide area of the lower North Island. The storms that lashed the lower North Island from 14-28 February 2004 were the worst in several decades. They caused the most devastating floods in 100 years in some areas, leaving many families homeless; farms and roads were destroyed by flooding and landslides. By the end of February 2004 the damage bill was estimated to be close to \$300 m (roads \$65 m, farms \$159-189 m, private claims ~\$100 m - Dominion Post 2/3/04).

More than 4-6 times the usual rainfall for February was recorded in areas extending from Wanganui (239 mm cf 40 mm normal) to Feilding (334 cf 57 mm), Palmerston North (299 cf 60 mm), Paraparaumu (361 cf 60 mm), Upper Hutt (403 cf 64 mm), Lower Hutt (482 cf 68 mm), and Wellington (364 cf 62 mm). Much higher rainfall was recorded in the Taraura (1288 cf 300 mm) and Ruahine mountains (621 cf 217 mm). Judging by the severe flooding seen in the lower Wanganui, Whangaehu, Turakina, and Rangitikei valleys, similar high rainfall fell in the steep hill country northeast of Wanganui as far as Raetihi and Taihape. The weather resulted from a deep and complex depression located to the east of the North Island during the period 14-16th February caused much of the damage, bringing very heavy and persistent rainfall and gale force southeasterly winds. The storm is now regarded as the most disruptive in over 40 years.