

The Challenge of Managing the Risk of Disasters arising from Natural Hazards

Kelvin Berryman

GNS Science

General Manager Strategic Relationships, Hazards Division



New Zealand's setting

- In the Roaring 40's westerly wind belt – high winds and rainfall
- On a plate boundary – earthquakes, volcanoes and tsunamis
- Soft rocks & steep topography

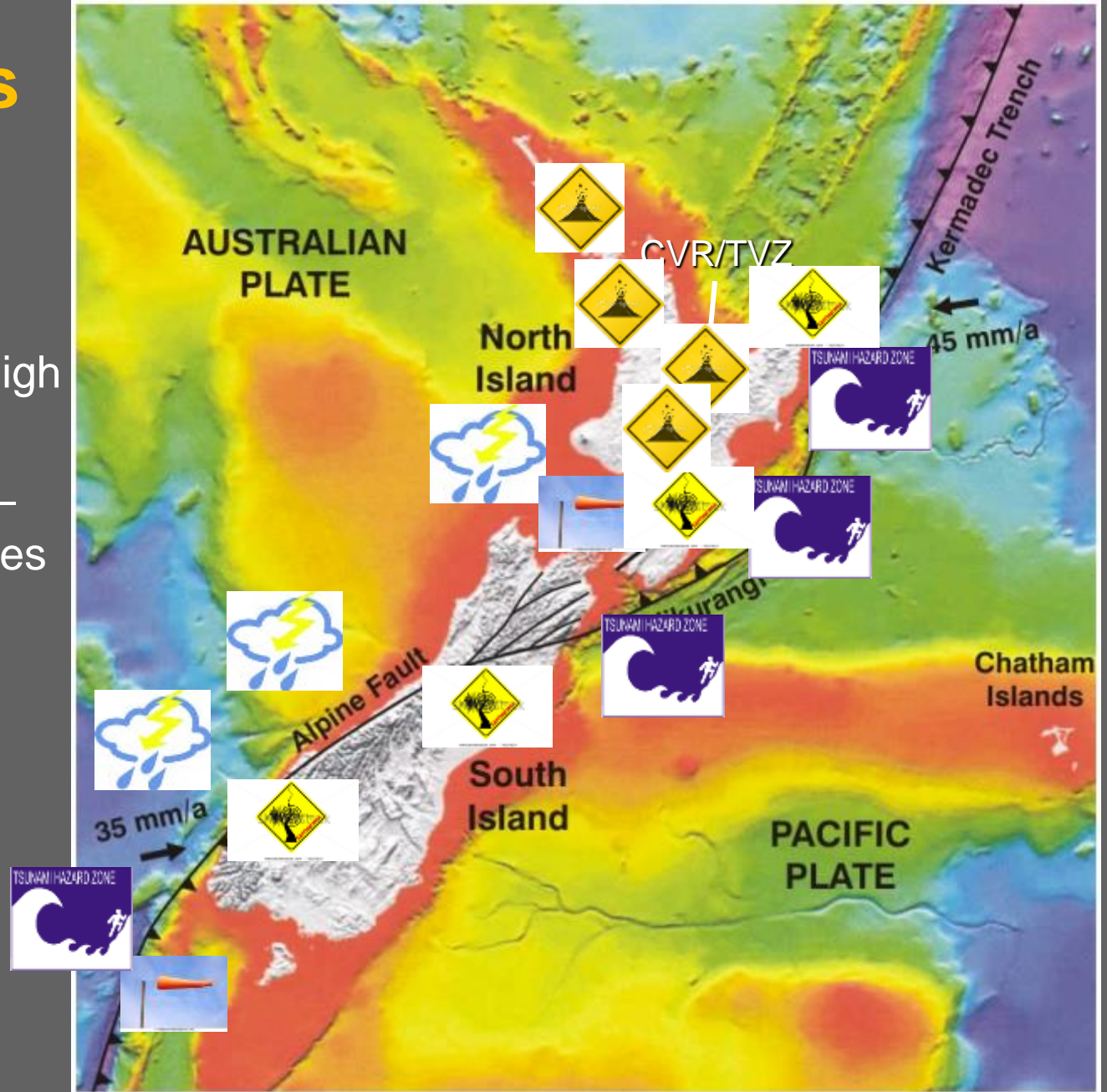
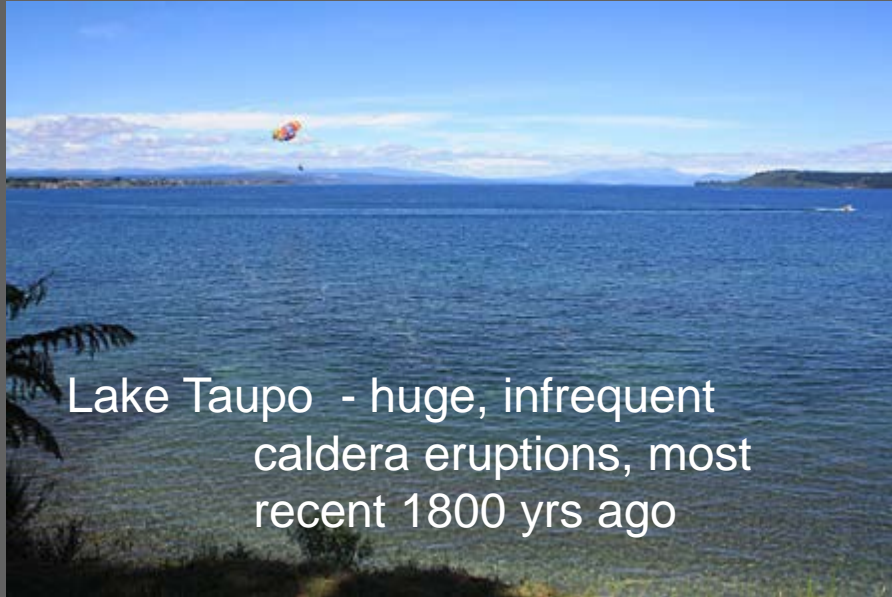


Image from NIWA
National Institute of Water and Atmospheric Research Ltd



NZ volcanoes have a large range of style, size, recurrence, and impact



Lake Taupo - huge, infrequent caldera eruptions, most recent 1800 yrs ago



Auckland volcanic field – small, but large impact, most recent 500-700 yrs ago



1974 eruption of Mt Ngauruhoe



White Island – almost continuous low level activity, but!

Looking Forward – what should we be preparing for ?

<u>Event</u>	<u>Likelihood in next 50 yrs</u>
• Alpine fault - M8 earthquake	30%
• Ruapehu/Tongariro/Ngauruhoe White Island major eruption	almost certain
• Taranaki eruption	20%
• Hikurangi subduction zone M8+ and tsunami	10%
• Hope fault M7.2 earthquake	50%
• South America M9+ earthquake & NZ tsunami	50%
• Taupo region major eruption	10%
• Auckland volcanic eruption	5%
• NZ earthquake sequence like 1929-1942 (6 M7+ EQ's in 13 yrs)	50%

- Estimates of economic losses are poor at present but another 'Canterbury' event is likely within the next 50yrs

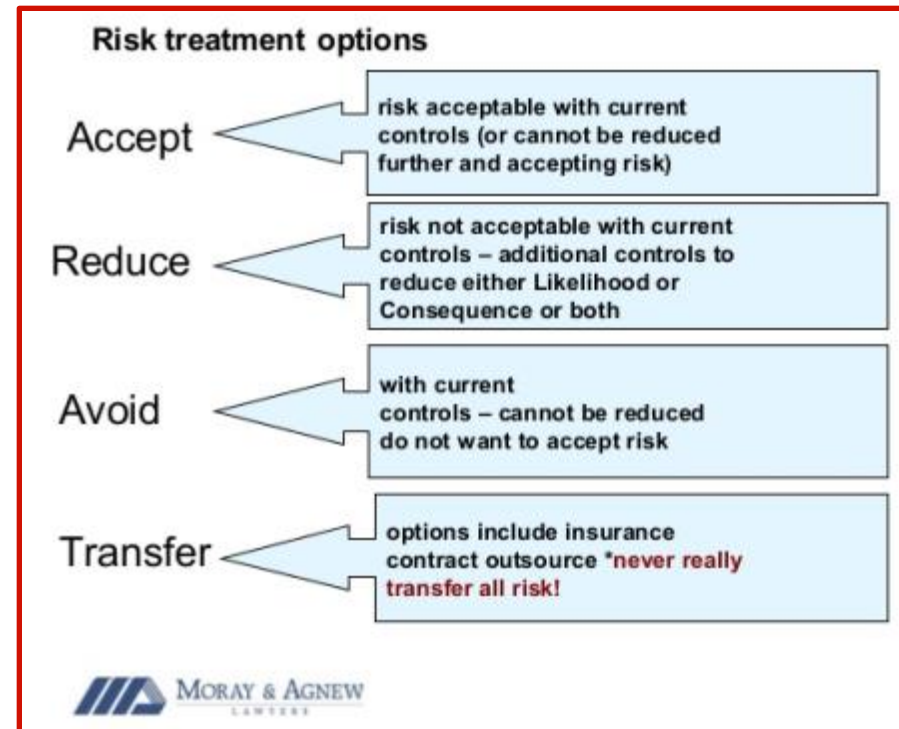
What are the Risks?

- Negative impact on social well-being
 - psychological and economic
- Loss of social cohesion
- Loss of infrastructure services
- Regional if not national economic impact – debt levels, taxes, reduction in credit rating



How to manage the risk appropriately?

- Evidence-based decision support tools
- Impact models and alternate scenarios depending on mitigation
- Balance treatment between accept, reduce, avoid, transfer



ERI Research Programme

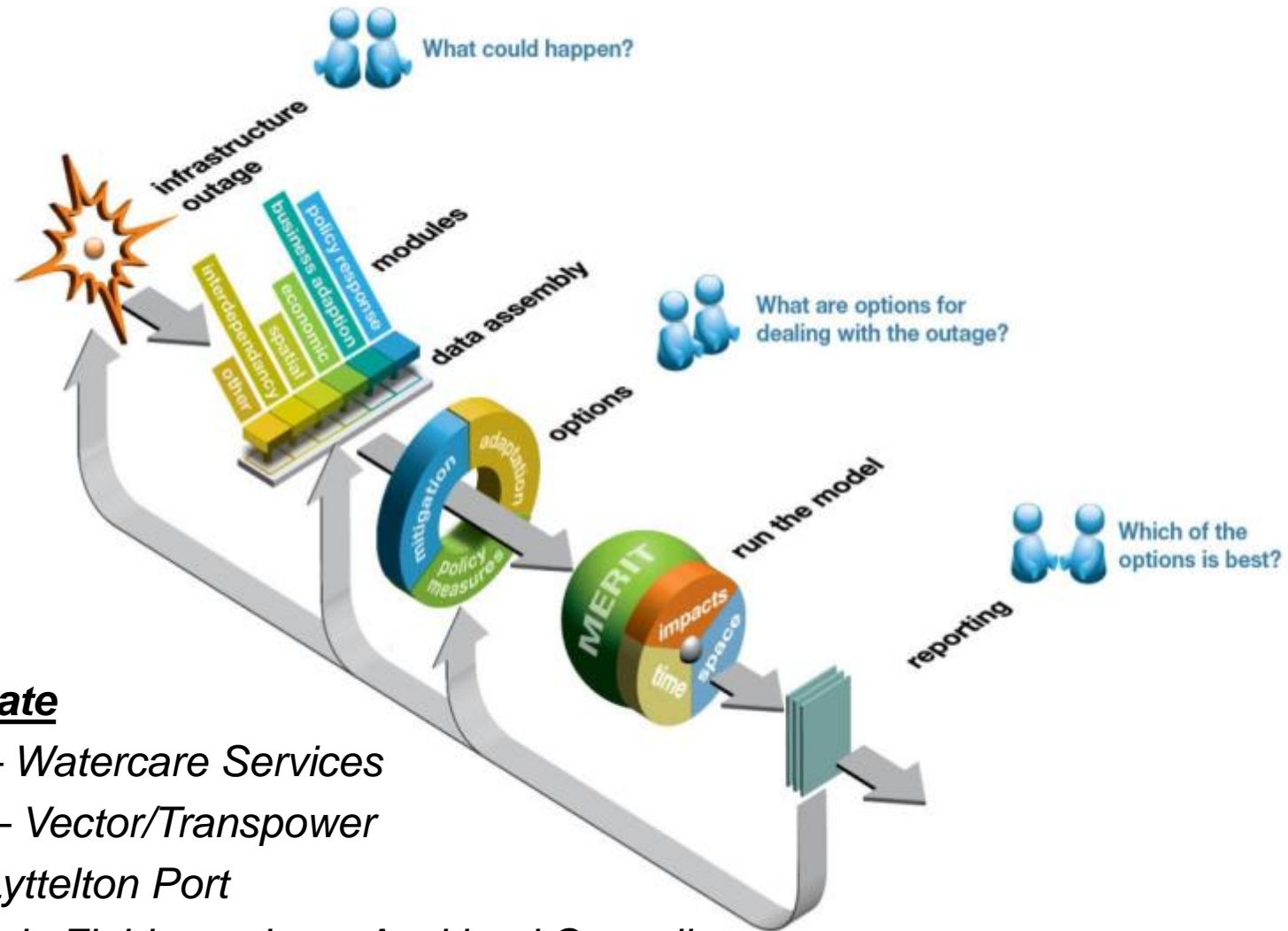
“Develop understanding of the economic impacts of infrastructure failure in a post disaster context”

Identify and explore:

1. Temporal and spatial changes in GDP, employment, income, labour/capital markets etc. from different types of failure
2. Causal mechanisms through time (interdependencies, cascading effects, feedbacks and lags)
3. The effect different mitigation (pre-event) and response (post-event) options (policy, infrastructure, business) have on the economic impacts



ERI Research Programme with embedded MERIT model



Case Studies to date

- *Water Outage – Watercare Services*
- *Power Outage – Vector/Transpower*
- *Port Outage – Lyttelton Port*
- *Auckland Volcanic Field eruption – Auckland Council*
- *South Island Alpine Fault – CDEM sector*