ENVIRONMENTAL IMPACTS OF 2010-2011 CANTERBURY & 2016 KAIKOURA EARTHQUAKES:
Lessons Learned to Inform Resilient Strategies

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INTRODUCTION & OVERVIEW

• New Zealand Civil Defence & Emergency Management (CDEM)
INTRODUCTION & OVERVIEW

• Observations from 2010-2011 Canterbury and 2016 Kaikoura Earthquakes
  • Context of environmental resiliency

• General recommendations for resilient communities
LIQUEFACTION IN CHRISTCHURCH

- 900,000 tonnes of surface ejecta
  - Air quality degradation

*after Beyzaei et al. (2018)*
LIQUEFACTION IN CHRISTCHURCH

• 900,000 tonnes of surface ejecta
  • Air quality degradation

• Land use & Amenity Value: Red Zone to Green Space?
LIQUEFACTION IN CHRISTCHURCH

• 900,000 tonnes of surface ejecta
  • Air quality degradation

• Land use & Amenity Value: Red Zone to Green Space?

• Sedimentation and sewage line ruptures
  • 2-month boil-notice
  • Severe disruptions to aquatic ecosystems
LANDSLIDES, ROCKFALLS, & FAULT RUPTURE IN KAIKOURA

- Impacts on farming community
  - Destruction of water distribution system
LANDSLIDES, ROCKFALLS, & FAULT RUPTURE IN KAIKOURA

- Impacts on farming community
  - Destruction of water distribution system

- Coastal impacts
  - Seal populations and other marine life
RECOMMENDATIONS FOR RESILIENT COMMUNITIES

• Understand hazards, consequences and uncertainties

RECOMMENDATIONS FOR RESILIENT COMMUNITIES

- Multi-hazard
RECOMMENDATIONS FOR RESILIENT COMMUNITIES

• System approach
RECOMMENDATIONS FOR RESILIENT COMMUNITIES

Protection of Fauna

• How do infrastructure vulnerabilities impact local wildlife populations?

• What vulnerabilities exist in wildlife sanctuaries and reserves?
RECOMMENDATIONS FOR RESILIENT COMMUNITIES

Natural Resources

- Understanding critical lifeline vulnerabilities
- Implementing redundancy in resource infrastructure
- Short- and long-term resource impacts
- Planning for debris disposal
RECOMMENDATIONS FOR RESILIENT COMMUNITIES

Inter-agency coordination

Finding opportunity in the face of adversity

Continuously improving scientific literacy
RECOMMENDATIONS FOR RESILIENT COMMUNITIES

Inter-agency coordination

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Maori worldview and its role in resilience – *Kaitiakitanga*