Developing an effective community response to the next "Great East Coast Subduction Zone Earthquake and Tsunami"

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Major subduction zone earthquake and tsunami, such as in the Indian Ocean (2004) and Japan (2011), have focused attention on the potential impact of a tsunami of similar size and extent occurring locally to New Zealand. The New Zealand scientific and emergency management communities have directed attention towards the risk from an earthquake and tsunami being generated at the Hikurangi subduction margin, off the east coast of the North Island. Many local emergency management agencies are reviewing their existing arrangements based on observations from Japan and our knowledge of risk reduction options is leading to innovative policy and practice. However, much still remains to be done to reduce the risk to a future "Great East Coast Subduction Zone Earthquake and Tsunami".

Knowledge of the potential for significant earthquakes at the Hikurangi subduction margin has been developed over several years through studies of background seismicity and plate motion (e.g. Wallace et al., 2009). Paleoseismic and paleotsunami studies demonstrate the past occurrence of significant earthquake and tsunami at the Hikurangi subduction margin (Cochran et al., 2006). Previous numerical simulation of tsunami due to various earthquakes sources at the Hikurangi margin has demonstrated the potential for at-shore wave heights of 5m or more, and run-up to double that (Power et al., 2008). Development of a probabilistic tsunami model for New Zealand and high-resolution simulation of the onshore effects of local subduction zone tsunami are underway, as is development of a framework for detailed simulation of evacuation from local tsunami. Much of our understanding of the subduction hazard, particularly regarding frequency, remains uncertain but a significant local earthquake and tsunami is known to be a very real prospect.

Tsunami awareness in New Zealand has evolved over the last 50 years since the 1960 Chilean tsunami, which struck New Zealand without official warning and caused significant damage, despite occurring at low tide (Johnston et al., 2008). From 1960 to 2004 various measures were put in place, such as becoming part of the Pacific Tsunami Warning System, which led to improvements in official warning mechanisms. However, in surveys in 2003 public understanding of risk and correct warning-response action was shown to be limited (Webb, 2005). Following the 2004 Indian Ocean tsunami the New Zealand government initiated an extensive review of tsunami hazard, risk and preparedness (Berryman, 2005; Webb, 2005), which ranked tsunami risk to property potentially on par with that of earthquake and risk to life an order of magnitude greater. The Ministry of Civil Defence & Emergency Management (MCDEM) subsequently developed guidance for tsunami signage, development of evacuation zones and dissemination of warnings (MCDEM, 2008a, 2008b, 2010), and GNS Science produced guidance on how to incorporate tsunami modeling into land use planning (Saunders et al. 2011). These initiatives represent significant steps forward in our preparedness for a

subduction zone earthquake and tsunami, but there is a long way to go to ensure adequate awareness and preparedness of individuals and communities. Arguably the greatest priority is to increase public understanding that local tsunami will not be preceded by official warnings, and that immediate self-evacuation is the best way to preserve life-safety.

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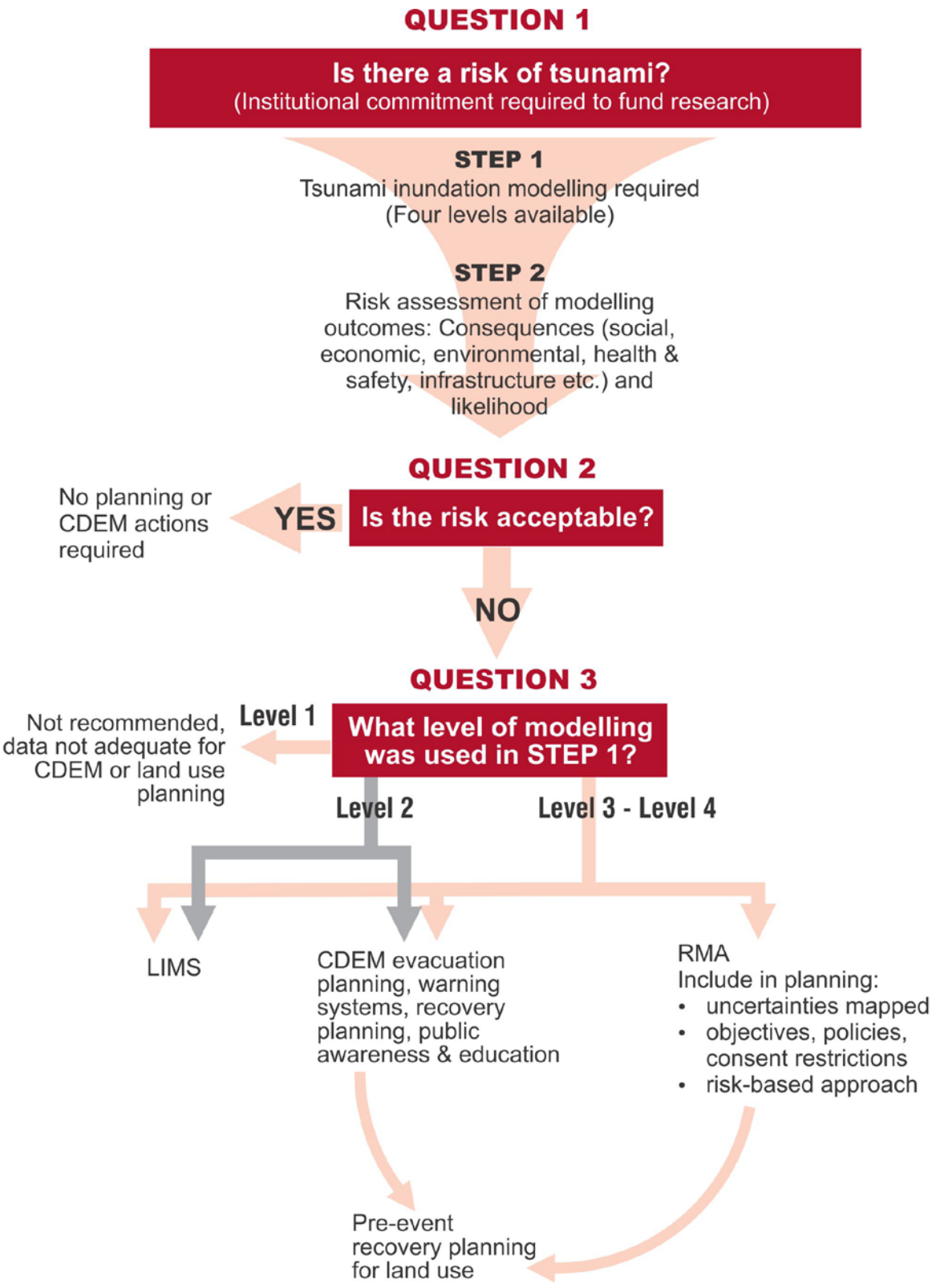

Figure 1. Decision tree for including tsunami risk into hazard mitigation strategies (Saunders et al, 2011)