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Towards achieving community sustainability in the face of natural hazards: integrated lahar warning system design on Mt Ruapehu, New Zealand

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Community sustainability and resilience requires minimising and/or accepting natural hazard risk. For Mt Ruapehu, New Zealand, two significant lahar dangers exist: 1) eruption-generated lahars down ski runs and 2) lahar threat, within 24 months, resulting from the collapse of a tephra barrier restraining the rising Crater Lake. At risk communities have decided that neither (a) discontinuing activities that interact with these lahar processes nor (b) modifying the environment is desirable and/or feasible.

The solution has been to install Early Warning Systems (EWS) in both cases. In the case of the ski area, the EWS involves real-time telemetry of sensor data to automatically trigger alarms. In the case of the Crater Lake barrier collapse, the EWS activates pagers leading to emergency response plan implementation. Both EWS are monitored and are kept close to 100% reliability in terms of minimising equipment failure.

This study presents evidence from these two cases showing that for community sustainability and resilience a technically reliable and effective EWS is not enough in isolation. An integrated system of (a) warning system maintenance, testing and enhancement, (b) education based on issues perceived as salient by communities and response agencies, (c) research and (d) response planning developed through consultation with stakeholders is necessary. We present a framework for an integrated system that we are now testing and which is seen as an essential model for EWS development for a wide range of potential hazards.

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