Lake Taupo occupies the crater of a complex caldera system in the North Island of New Zealand, on the shores of which live over 20,000 people. The most recent eruption in 232AD was caldera-forming, and was preceded by eruptions with varying magnitudes and lengths of quiescence. Whilst an eruption has not yet been witnessed at Taupo, episodes of unrest have been recorded over the past 160 years. Research into this historical unrest is required to develop an understanding of Taupo caldera processes and improve the management of future unrest crises.

Historical newspapers were searched for records of unrest phenomena at Taupo; seismicity, self evacuations, economic losses and property damage are reported. This research has increased the number of historical unrest episodes from four to at least twelve, indicating a more active system than previously realised.

As these events will inevitably occur again, how will the scientific and emergency management officials manage the crisis? At what stage do the observed phenomena indicate 'unrest' and when should the Volcanic Alert Level be raised or lowered?

Changes to the five-stage Volcanic Alert Level in New Zealand are the statutory responsibility of GNS Science (New Zealand’s geological survey). The use of thresholds as guidelines for changing the Volcanic Alert Level at calderas will be assessed in a series of experiments, complemented by the new knowledge of historical unrest at Taupo and other similar volcanoes. The research aims to contribute to improved caldera unrest management.