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Wine: the increasing risk of a highly vulnerable industry globally to natural disasters and climate change (NH Division Outstanding ECS Award Lecture)

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Globally, well over $10 trillion in economic losses and over 10 million deaths can be attributed directly to natural disaster events from floods, earthquakes, storms, volcanoes and climatic effects historically (CATDAT - Daniell et al., 2016). When looking at the most vulnerable industries to natural disasters for each dollar invested the wine industry rates very highly, thus showing the risky and vulnerable nature of the wine business.
Some effects of climate change will be shifting climates so that new grape growing areas are discovered and some traditional locations will require a change of grape variety to be planted, or will unsatisfactory for quality grape production. As new grape types are developed, some other grape types will become less viable leading to a global shift relative to the current state of the industry.
The wine industry has been shown to have major losses via sudden shocks such as earthquakes in Chile (2010), Christchurch (2011) and Napa (2014) and hail through Burgundy (2012-2014). Wineries are often prone to other major disasters such as flood, storms, frost, fire or disease causing structural failure of assets, and significant production losses. Natural and man-made disasters play a key role in wine industry losses, and the variability of seasonal shifts and sudden natural shocks can often play a major role in the lifecycle and indeed the lifetime of wineries.
Lessons learnt from winery disasters and climate impacts in Australia, Chile, New Zealand and USA are used as well as a comparison with those in Europe and other vulnerable centralised industries, such as cheese in Italy (2012 earthquake). For various natural disasters the structural engineering issues associated with wineries are examined with respect to infrastructure such as elevated steel tanks, as well as the importance of planning for earthquakes. The potential risk mitigation solutions are often simple to implement and are cost-effective in reducing significantly the risk potential of wineries.
A risk index is produced for comparing wine regions and wineries globally by assessing the comparative risk of loss of grapes and production as well as business interruption due to various natural disasters and climate change based on stochastic and historic hazard models, as well as semi-empirical vulnerability models. Earthquake, flood, storm, climatic, hurricane and fire models are investigated.
This index is of use for: wineries wanting to reduce their potential losses, to create sustainable infrastructure or to know their risks; insurance companies wanting to insure wineries; governments concerned about the loss of industry and the potential for employment loss; and simply those people worried about having a glass of their favourite wine in a few years time.

Daniell, J.E., Wenzel, F., Schaefer, A.M. (2016) The economic costs of natural disasters globally from 1900-2015: historical and normalised floods, storms, earthquakes, volcanoes, bushfires, drought and other disasters, Geophysical Research Abstracts Vol. 18, EGU2016-1899.