

# TOWARDS UNDERSTANDING PERCEPTIONS AND RESPONSES TO CLIMATE CHANGE IN THE NEW ZEALAND WINE INDUSTRY

Nicholas Cradock-Henry, Manaaki Whenua Landcare Research, Lincoln, New Zealand  
Joanna Fountain, Lincoln University, New Zealand

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Wine regions globally are exposed to ongoing shifts in climate variability and extremes, including changes in temperature and precipitation, and more frequent high-impact events such as floods, storms and drought. Furthermore, regional vulnerability to these stresses is strongly influenced by characteristics of *terroir*: soils, topography, microclimate and varietal. Unlike arable crops which can be changed relatively quickly in response to changing growing conditions, vines take years to be established and have productive lifespans lasting decades, with planting decisions having long-term industry implications. Understanding the degree to which the industry is exposed and sensitive to climate change, therefore, is essential to designing and implementing successful adaptation strategies.

Recent advances in modelling future climatic conditions, and their integration with socio-economic futures, is enabling new ways to explore national and regional climate change implications for the wine industry. A resilient wine industry – one that is able to adapt and thrive regardless of the direction or severity of future climate change – depends in part on winegrowers' and supporting industries' capability and capacity for adaptation. Despite the widespread availability of modelled projections of future climate, for example, there is little work to date, however, on understanding how the wine industry receives, interprets, and acts on climate-related information, frames adaptation decisions or coordinates action. Wine stakeholders vary in their desire to learn how to manage these impacts, and in their responses; crucial to the adaptive capacity of a regional wine industry. Attitudes and perceptions of risk are also affected by non-climatic factors such as size and scale of operation, ownership and management structures and growers' motivations, which may not be profit-maximization. There are also multiple drivers of vulnerability in a region which originate beyond the wine industry itself – at the scale of the national regulatory environment, international markets or global trade agreements.

A resilient wine industry is important to New Zealand – it is one of the country's fastest growing industries, worth over \$1.7 billion (2018) – the sector remains under-researched. This paper explores the adaptive capacity of New Zealand's diverse wine regions by analysing wine stakeholders' perceptions and experiences with climate risks, in the context of the suite of forces (socioeconomic, environmental) that may also affect production. The participatory approach includes semi-structured interviews with industry stakeholders, which is complemented by documentary analysis of secondary data, including the published scientific and grey-literature, comprising reports from government agencies and academic research. Results show a limited body of research has been done for the New Zealand wine industry. This work has focused on probabilistic and biophysical modelling of climate change and varietals' suitability under different scenarios of future change. There is very little understood about the potential for changes in management practices to adequately cope with future changes, including the development and adoption of new varietals, changing location for vineyards, or upgrading infrastructure to cope with compressed harvests. The recent experiences of growers and winemakers with climate variability may be influencing views of the likely impacts of climate change, however there is little relevant data on perceptions of these risks amongst wine industry stakeholders. Thus, there

is an urgent need to understand decision-making processes and adaptation intention around climate and weather-related risk, and how these are weighed up against risks from other natural hazards or economic and market forces. Future changes in climate will be experienced in the context of these multiple, interacting forces, and adaptation initiatives will need to be designed in light of these.