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Barossa water security strategy: A demonstration of community leadership, strategic foresight, climate resilience and systems modelling

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Abstract: Securing water supply in the face of climate change requires an integrated response which incorporates perspectives and methods from a range of stakeholders and sectors. To illustrate the development of such an integrated response, a regional water security strategy was developed for the Barossa region for the period from the present to the year 2050. South Australia's Barossa is known for its premium food, wine and agricultural sector, and has recently experienced water scarcity due to several consecutive dry years. Climate change is projected to result in a decline in natural water sources and growing irrigation demand in the future. Water is a key economic input to agricultural production, as well as being vital for the region's environmental, cultural and amenity value.

In order to achieve an integrated response to regional water security, it is necessary to consider diverse stakeholder interests and take into account water planning, policy, infrastructure, and demand considerations. to this end, the strategy was informed by a qualitative strategic foresight and resilience-based planning approach (Helfgott, 2018), as well as quantitative systems modelling, which included climate stress testing.

The actions contained within the 2050 strategy were identified by community members and stakeholder organisations through a series of participatory workshops. Workshop participants identified actions to address water security and explicitly considered their effectiveness under diverse, yet plausible futures. These scenarios were developed by stakeholders to take into account key important and uncertain factors that may affect the future of the region (Lord et al., 2016). The strategy includes six strategic pillars, with each pillar setting out actions to achieve a shared vision for the future.

In parallel with the participatory workshops, quantitative modelling was undertaken to 'stress test' some of the actions identified. This was achieved through the development of a system dynamics model that was used to evaluate the impact of climate change and a range of adaptive pathways on water security and environmental metrics. The system dynamics model was trained on more detailed component models (surface water, groundwater, and irrigation demand models), as well as various other sources of information (details in Westra et al., 2022). Under a mid-range estimate for the 2050s, the modelling showed that an additional 8 GL per annum of imported water is projected to be required to ensure there is no irrigation shortfall in the driest years (assuming the existing planted area is maintained).

The strategy is designed to increase business and community confidence that long-term water security is being planned for. This analysis supports a systemic understanding of water security and the case for future investment, so that the region is empowered to achieve its vision, particularly in a changing climate. The opportunity exists for the Australian water industry to build on the strategic foresight, systems analysis and bottom-up climate assessment methods to improve water security and support thriving regions into the future.

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