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# Groundwater decline drives riparian woodland dysfunction in a northern Murray-Darling intensive production landscape

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Altered hydrological regimes are significant drivers of ecosystem change in riverine, riparian and floodplain ecosystems; invasive weeds and broader landscape change are also known to impact native ecosystem condition. This research takes a multivariate approach to investigate changes in the composition, structure and condition of *Eucalyptus calmaldulensis/E. tereticornis* riparian woodlands of the highly-modified Upper Condamine floodplain, southern Queensland. The major driver of change in these woodlands is chronic groundwater decline associated with unsustainable levels of water resource extraction to support irrigated agriculture. Evidence of canopy tree dieback increases significantly where groundwater depth falls below 13-16 m, and floristic composition in these woodlands is strongly associated with both groundwater depth and tree condition. Results are summarised in a resilience-based State-and-Transition model which identifies critical thresholds for the persistence of this groundwater-dependent ecosystem type.

These findings contrast with studies in Murray River floodplain woodlands in southern Australia where poor tree health and ecosystem condition in riparian woodlands is associated with rising water tables, soil salinisation and/or altered flood regimes. As such, they have significant implications for the delivery of environmental water to support ecological processes in this region. Improved understanding of these systems also contributes to our ability to predict how additional hydrological disturbances such as climate change, and new developments such as the coal seam gas industry, may play out across landscapes in which ecological systems are close to ecological tipping points.

Keywords: groundwater riparian floodplain resilience threshold