

RESEARCH DIRECTIONS

Forest responses to climate change

Professor David Ellsworth and Professor David Tissue of the UWS Hawkesbury Institute for the Environment, in association with Dr Anthony O'Grady and Dr Tim McVicar of CSIRO are investigating the water balance of a native forest exposed to elevated atmospheric CO₂. This research is being supported by the CSIRO Flagship - Water for a Healthy Country.

'Australia is the driest permanently inhabited continent on earth', says Professor Ellsworth. 'In excess of 90% of our rainfall is lost as evaporation and plant transpiration, leaving only a small proportion to go into streams, for human use and for maintaining ecosystems processes. So we need to increase our understanding of the processes that control this "evapotranspiration" now and into the future, and incorporate it into our water resources planning framework. We've been operating on the basis of earlier understandings which haven't considered that forests actively and dynamically regulate water use. We now have an opportunity to improve our knowledge of forest responses to global climate change and rising atmospheric CO₂.'

This project will utilise the Institute's eucalypt forest free air carbon dioxide enrichment ([EucFACE](#)) facility which has been established with Australian Government funding and international support. The study is the first-ever opportunity for highly accurate water balance measurements in a native forest exposed to elevated atmospheric CO₂. In order to understand the vegetative responses it will be necessary to disentangle the CO₂ effects from the natural, long-term variation in water availability. This will be achieved by a combination of approaches, including accessing historical data and undertaking detailed site measurements of the key components of water balance in control and treated plots before and after a change in CO₂ concentrations.



This research will form the basis for future modelling of the hydrological impacts of increasing concentrations of atmospheric CO₂. It will provide new insights into how the water balance of Australian woodlands will be affected by global climate change.

Project Title: What will be the hydrological consequences of elevated CO₂? An experimental test of the impacts of elevated CO₂ on evapotranspiration in a mature Australian Woodland.

Funding has been set at: \$200,000 over 2 years.

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