

RESEARCH DIRECTIONS

Rising CO₂ and Eucalypts

Professor David Ellsworth from the Centre for Plants and the Environment is leading a research team that will investigate the interactive effects of elevated CO₂ and increasing temperatures on Eucalypts to enable the future management of forests under conditions of global warming. The project is supported by funding from the Department of Agriculture, Fisheries and Forestry under its Forest Industries Climate Change Research Fund program.

'In the past 10 years Australia's national forests have increased, primarily through hardwood plantings largely comprising Eucalypts', reports Professor Ellsworth. 'But there are opportunities to further expand the size and scope of these forests, particularly with the increased demand for "carbon-offset" plantations. In order to capitalise on this opportunity, we need detailed scientific evidence to help make the best location choices for plantations and to develop appropriate management plans for them. Of course trees don't exist in isolation and there can be significant losses of carbon through plant respiration in a warmer climate, and insect feeding on trees. In an elevated CO₂ environment the nutritional composition of leaves will change and this may alter plant function as well as insect feeding – although we don't know much about these "interactive effects".'

This project will involve a substantial enhancement of the **Hawkesbury Forest Experiment (HFE)** – a unique field-based CO₂ enrichment experiment, comprising chambers that house trees up to 10m tall and can accurately measure whole tree CO₂ uptake and water loss. An upgrade to the HFE has been funded as part of a \$40 million package awarded to UWS for climate change and energy infrastructure through the Education Investment Fund. As a result, the HFE will be able to control both air temperature and vapour pressure deficit, resulting in more complex and accurate data interpretation. Experiments will focus on the adaptation of Eucalypts to different temperature environments and adaptation to climate warming in conjunction with higher carbon dioxide, leading to many changes in plant function. Such warming experiments have before only been possible in small enclosures, so the large tree chambers greatly extend the possible duration of the experiment.



This project is crucial to ensure plantations with desirable characteristics in the future. It will provide models that can be successfully integrated into decision support systems and be used by forest managers to reduce risks arising from climate change.

Project Title: The Hawkesbury Forest Experiment: providing the missing information for decision support systems to manage forests under rising CO₂ and global warming

Funding has been set at: \$400,000

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