University of Western Sydney
Bringing knowledge to life

RESEARCH DIRECTIONS

Woodland response to elevated CO_2

Professor David Ellsworth and Professor David Tissue of the UWS Hawkesbury Institute for the Environment, in association with Professor Fernando Valladares of the Spanish Scientific Council (Consejo Superior de Investigaciones Cientificas) are investigating the response of Australian woodland trees to rising atmospheric CO_2. This research is being supported by an Australian Research Council Discovery Project grant.

'Native forests and woodlands are important in Australia,' says Professor Ellsworth. '*Eucalyptus* open forests and woodlands dominate on 15-18% of the continent. So this study is relevant to vegetation that forms the bulk of Australia's forested country and supplies the majority of the nation's wood needs. Of major interest to land managers, forestry catchment management authorities and others who rely on woodlands for various amenities is how this vegetation will respond with rising atmospheric CO_2. In particular, how one of the major soil nutrients that trees rely upon may be affected in these new conditions. The vast majority of the Australian continent is comprised of ancient landforms with highly-weathered soils that are often limited in their capacity to supply the plant macronutrient, Phosphorus. We will explore how functioning of this vegetation changes with rising atmospheric CO_2 and if, and how, it is limited by the availability of Phosphorus.'

This project will utilise the eucalypt forest free air carbon dioxide enrichment (**EucFACE**) facility which has been constructed from Australian government infrastructure funds. Building on preliminary data from the Hawkesbury Forest Experiment, an established site in the Cumberland Plain *Eucalyptus* woodland near the UWS campus, this project will undertake a comprehensive study of the relationships between carbon assimilation, carbohydrate accumulation and growth in the

context of low phosphorus pools. The project will determine if the growth of Australian woodland trees is limited by phosphorus and if that limitation means the woodland carbon sink is constrained from responding to rising atmospheric CO_2.

This research has broad significance for understanding how a native forest ecosystem in Australia will adapt to rising atmospheric CO_2 in a low-nutrient, seasonally dry context. Assessing the CO_2 sink capacity of a native eucalypt woodland will be central to meeting Australia's domestic and international carbon accounting commitments.

Project Title: Woodland response to elevated CO_2 in FACE: Does phosphorus limit the sink for C?
Funding has been set at: $300,000 over 3 years.
Contact Details: d.ellsworth@uws.edu.au
http://www.uws.edu.au/hie/davidellsworth
August 2012