

RESEARCH DIRECTIONS

Water Use in Forest Ecosystems

Professor David Ellsworth and Dr Charles Morris from the Centre for Plants and the Environment with Dr Belinda Medlyn from Macquarie University and Mrs Danelia Drewry of Penrith Lakes Development Corporation Ltd., (PLDC) are investigating the water-use of various tree species within a plantation. This research is funded by PLDC and the Australian Research Council through its Linkage Program.

'It has been assumed - without evidence - that it doesn't matter, in terms of water use, which tree species is planted', says Professor Ellsworth. 'Currently in Australia, plantations mostly consist of monocultures of trees such as introduced pine or native eucalypt. There is also no research on what effect a diversity of species in a plantation has on overall water use and whether the diversity creates more competition for water and stress in some species, or whether there is an overall economical use of water by all the plants. This research aims to measure water usage, soil moisture and tree growth of mixed and monoculture plantations in order to see if mixing tree species makes a difference to tree growth, soil health and efficient use of water.'

Test plantations will be grown in similar soil conditions but with monocultures for experimental comparison along with mixtures of species of eucalypt in separate "stands". Measurements will be made of the fluctuating tree sap levels, indicating each tree's water use, as well as measurements of water loss to the atmosphere from the tree canopy. Evaporative water loss from the soil will be determined at a variety of soil depths and the overall growth of the trees will be monitored. Results will be compared with a predictive computer model which will compare water use between monospecific and mixed species tree stands.



Understanding how tree varieties use available water will allow informed decisions on the optimal varieties to be planted in an area given its soil conditions and water availability, potentially changing current reforestation practices. This will enhance the benefits already reaped from reforestation projects, including better drought-hardiness, reduced water usage, enhanced biodiversity and improvement of soil recovery after activities such as mining. Efficient, biodiverse and water-conservative forest plantations are vital for environmentally sustainable forest management, carbon sequestration and land and water management in Australia.

Project Title: Forest ecosystem water use: Does species diversity matter?

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