# Young forests pack a mean thirst

In terms of water supply, the city of Melbourne has been fortunate. Its primary catchment, in 155 000 hectares of forested highlands to city's north-east, delivers water so pure it needs only minimal disinfection.

Most of the water comes from the mountain ash (*Eucalyptus regnans*) forest. Bushfires killed 80% of the forest in 1939, making way for dense regrowth. A few years later, streamflows declined markedly, (ultimately by about half) indicating a link to forest age. A recent study by the Cooperative Research Centre for Catchment Hydrology investigated this link, and developed a computer model (Topog) for predicting the impacts of fire, logging, climate change and natural ageing on water yield from the mountain ash forests.

Dr Rob Vertessy of CSIRO Division of Land and Water worked on the project with Dr Richard Benyon of Melbourne Water and Dr Mike Papworth of Victoria's Department of Natural Resources and Environment, and five post-graduate students from Monash University and the University of Melbourne.

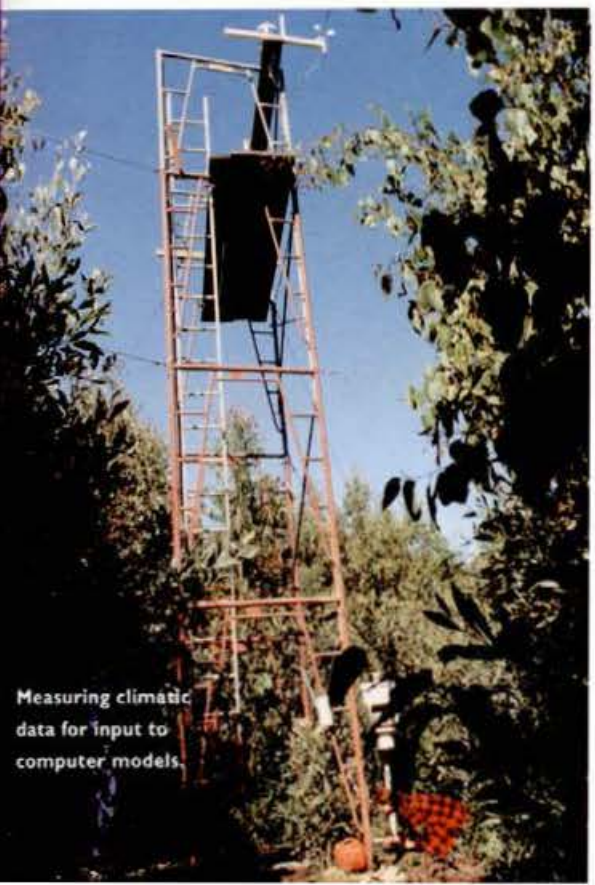
'Earlier studies had suggested that changes in forest structure over time caused changes in evapotranspiration and hence water yield from the catchments,' Vertessy says. 'But this process had never been quantified or explained. 'Working across several experimental catchments in the water supply area, we examined the relationship between tree stocking rate, stem diameter, sapwood area, leaf area and transpiration in different age classes of mountain ash trees.

'By going into different age classes of forest and measuring the number of trees per unit area and their various stem diameters, we were able to estimate the leaf area index and transpiration of each stand. We found that tree stem diameter was a powerful predictor of sapwood area, leaf area and tree water use.'

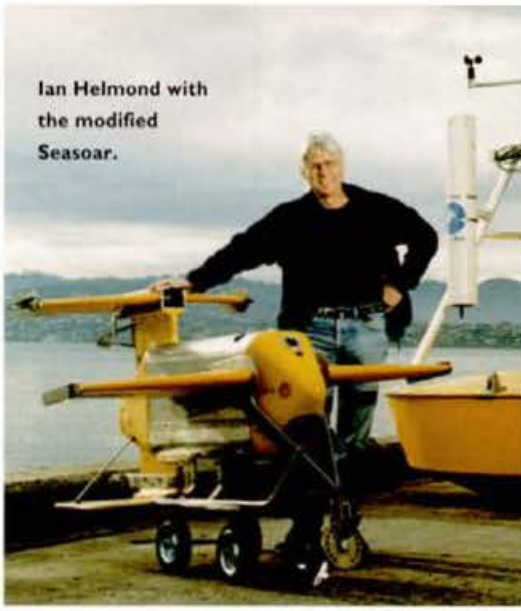
The study found that as the forest aged the number of mountain ash trees per unit area declined exponentially, resulting in declines in leaf area and sapwood area and hence rainfall interception and transpiration. This explains why old-growth catchments yield more streamflow. 'Understorey vegetation filled the gaps in the ageing and rapidly thinning forest, but we found that this transpired far less than the overstorey,' Vertessy says.

Field data from this research project were used to test the CSIRO Topog model, and results have been encouraging. The model can now provide managers with accurate predictions about the effects on streamflow (and hence water supply) of logging and wildfire, as well as natural occurrences such as climate change or forest ageing. Such information is vital to efficient management of water resources. The team's next goal is to apply Topog to other types of forest catchments to see whether water yield changes with forest age in those systems.

*Contact: Dr Rob Vertessy, (06) 246 5790, fax (06) 246 5800, email: rav@cbr.dwr.csiro.au. Topog can be accessed from mid 1997 through the World Wide Web at http://www.dwr.csiro.au/topog/*



Measuring climatic data for input to computer models.



Ian Helmond with the modified Seasoar.

# Soaring down, down and away

IT MAY look like a cartoon aeroplane, but really it's a sophisticated submarine. This deep-ocean measuring device, known as Seasoar, used to have a 400-metre underwater limit. But thanks to a new wing and tailplane design and a new wing control unit, it's range has more than doubled, greatly increasing its value as a workhorse for Australian oceanographers.

Seasoar, originally designed in England, was modified by the Moorings and Special Projects group at CSIRO's Marine Laboratory workshops in Hobart. This facility provides technical advice on specialist ocean, continental shelf and estuarial measuring equipment.

Manager of the group, Ian Helmond, says the new Seasoar provides a relatively inexpensive option for scientists to measure the ocean down to 1000 metres. The instrument can be towed through the water at up to eight knots, feeding temperature and salinity information back to the mother research vessel.

Other devices developed by the group include a research trawl net which can sample ocean catches at five designated levels, and deep ocean moorings from which upward-looking sonars measure ice thickness in the Antarctic ice shelf, a joint project with the Antarctic Cooperative Research Centre and Western Australia's Curtin University. Also developed by the group is an underwater camera frame which can be towed at fixed height above the sea floor, and a spectral radiometer to measure sunlight distribution in the ocean relevant for phytoplankton growth.

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