

# old forests NEW MANAGEMENT

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## FORESTS ON THE MARCH

A leading international forest scientist today warned the wholesale relocation of the world's temperate forest tree species may take place under climate change.

However today's trees may have to migrate a lot faster than the 100 metres a year which some forests achieved naturally as the earth's climate warmed towards the end of the last Ice Age - if they are to keep up with currently changing conditions, says Professor Sally Aitken of the University of British Columbia's Centre for Forest Conservation Genetics.

As a result, Prof. Aitken will tell the Old Forests, New Management conference in Hobart today, some forests may need "facilitated migration" in the form of human assistance to relocate them to suitable environments more rapidly than they can do so unassisted, while others may prove resilient enough to remain where they are.

"Tree populations of widespread species with high levels of genetic variation and no particularly severe insect or disease problems should be able to adapt over a few generations through the process of natural selection," she says.

"However, they will likely go through a period of worsening health and lower fitness as climatic conditions become less suited to the particular trees in a given location, and may become more vulnerable to injury or mortality from extreme climatic events, introduced pests, or competition from invasive plants. But all species will be suffering such 'adaptational lag' - so competition among tree species will likely decrease."

Forests should be closely monitored for changes in mortality and seedling establishment rates, Prof. Aitken says. In that way we can learn when these ecosystems start to change, and be able to do something before those changes reach critical levels.

"I think actively moving species will become necessary in some situations, particularly for infrequent species with low reproductive rates and short seed dispersal capabilities."

However, she cautions, facilitated migration will be controversial as it will result in moving tree species into some environments in which they are not currently native, and this will require careful thought, planning and monitoring.



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Moving populations for reforestation will be less controversial. For a given species, seed could be collected from a warmer environment and planting it in a cooler one that is still within the species range but is predicted to become warmer. This will keep planted forests healthier in the longer term.

Global warming has profound implications for old growth forests, she says. “Certainly the old growth forests themselves cannot relocate, although the species that comprise them probably will. So we really don’t know how long old growth forests will be able to persist as the climate changes.

“Mature trees can be remarkably resilient across a wide range of conditions; however, insects, diseases, fire, or other major disturbances could cause extensive mortality in short periods of time. Using global circulation models (GCMs) in conjunction with current species distributions, we can predict where future habitat is likely to exist for particular species or ecosystems – but forecasting what will happen to existing forests or whether species will successfully disperse to potential new habitat is very difficult.

“The rate at which individual species will migrate will depend upon seed dispersal, habitat availability and extent of habitat fragmentation. Different species will have different abilities to migrate and thus current species associations in old growth forests may not be mirrored in future forests.”

Whether or not there is anywhere for the trees to go may depend to a great extent on human factors, she adds. “It will depend on the particular location, the local geography, the extent of local habitat fragmentation due to agriculture, urban development, etc. and on whether disturbances create habitat appropriate for seed germination and seedling establishment. There are many factors at play.”

The Old Forests, New Management Sir Mark Oliphant Conference is at Hobart’s Hotel Grand Chancellor. It features more than 160 scientific presentations and papers about advanced temperate forest management.

The conference is hosted by the CRC for Forestry, Forestry Tasmania and the International Union of Forest Research Organisations and sponsored by the Department of Innovation, Industry, Science and Research (DIISR) under the International Science Linkages Programme, the Australian Academy of Technological Sciences and Engineering and the Australian Government Department of Agriculture, Fisheries and Forestry.

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