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Linking past, present and future: restoration genetics in a climate change context

Linking past, present and future: restoration genetics in a climate change context (#29)

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Restoration is a major conservation and land management activity that needs to be undertaken in a climate change context in order to ensure sustainable and productive ecosystems. Traditionally, restoration strategies have been quite conservative with local provenance dominating seed sourcing practice, even in forestry where global use of species is common. More recently, patterns of genetic structure that provide insight into evolutionary history and current connectivity, and as surrogates for potential underlying adaptive variation, have been used to guide seed sourcing strategies. In WA, patterns of genetic structure in a suite of species identified for restoration in south-west forests and in the Pilbara are being evaluated to inform policy statements relating to forest management through the WA Forest Management Plan and mining rehabilitation in mine closure plans required under Environmental Protection Authority conditions.

Climate adjusted seed provenancing, and assisted gene migration, are effective climate change strategies if species are adapted to climatic niche. The scale of local adaptation has been debated for some time, and evidence is equivocal. Genomic tools are providing greater capacity to investigate adaptation, and recent studies in eucalypts have shown evidence of both adaptation and plasticity. This plasticity suggests species have broader tolerances than current climate, but also have developed some adaptation to climatic conditions. Climate adjusted seed provenancing where seed is sourced from populations in the direction of predicted climate change will account for this adaptation and may be particularly important in long lived woody species that are key elements of many vegetation communities.

Authors contributing to this presentation.

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Margaret Byrne is Director of the Science and Conservation Division where she is active in the interface between science and policy in biodiversity conservation and management. Margaret has a strong interest in effective leadership and management and sees the integration of good people management and strategic business development as critical to the achievement of corporate goals. Margaret is recognised as a leading biological scientist in Australia and has over 170 publications. She obtained a PhD from The University of Western Australia and was a Post Doctoral Fellow at CSIRO in Canberra before returning to Perth to develop and manage a conservation genetics program in the then Department of Conservation and Land Management. Her research has focused on plant genetic research to inform conservation strategies for rare and threatened plants as well as biodiversity conservation at landscape scales in relation to remnant viability, revegetation and adaptation to climate change. Her phylogeographic studies have provided a greater understanding of the evolutionary history of the biota, and its influence on current distributions, patterns of genetic diversity and location of refugia. Her current research interests are directed towards application of genomics in plant conservation and climate change adaptation strategies.