A spatially explicit approach to support the decision-making process for seed provenance for ecological restoration in a climate change context

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Abstract

Ecological restoration is recognized as a strategy for climate change adaptation. Yet, ongoing and projected environmental changes are seldom considered in seed provenance planning, which is likely to undermine the long-term success of restoration efforts. In this study, we used species distribution models (SDM) to, first, understand the potential impacts of climate change on plant distributions and, second, facilitate the decision-making process for selection of seed provenance strategies to be used in ecological restoration, as applied to five south-western Australian riparian species as a case study. We advocate that SDM can be used in a structured, spatially explicit fashion to provide a foundation where different lines of evidence relevant to seed provenance can be transparently analyzed, and more intuitively understood by land managers and practitioners. The spatial insights gained on species current and projected distribution ranges, climate change rates and directions, can be supplemented with other key information, such as the species adaptive genetic variation, and field-collected or remotely sensed data of climate-driven plant health decline, to help choose the provenancing strategies most adequate for each species and restoration project in a climate change context.

Atlas of Living Australia Science Symposium

Tuesday 10 May 2016

To

Friday 13 May 2016

Keiran McNamara Conservation

Science Centre, Kensington, WA