

Ecological engineering for biodiversity adaptation to climate change

Background

Managing contemporary environmental needs whilst ensuring Natural Resource Management (NRM) investment is future-proofed to withstand climate change is a key challenge for environmental managers in the 21st century.

To address this challenge, the Department of Climate Change, Energy, the Environment and Water and the CSIRO are collaborating to identify and develop a new generation of climate-ready 'ecological engineering' approaches.

What is ecological engineering?

The project defines ecological engineering as 'the design, manipulation or construction of self-sustaining ecosystems for the mutual benefit of humans and nature'. We use this term in place of 'ecological restoration', because restoring characteristics from pre-existing communities may not be viable in a changing climate. Rather, we may need modified designs and approaches, informed by forecasting tools, to maximise future climate-resilience.

Why would we need to engineer Australian ecosystems?

Governments across Australia have invested billions of dollars in ecosystem restoration through national and state and territory Natural Resource Management (NRM) programs. These investments are occurring in an environment of accelerated climatic change. For example, significant ecological restoration is being undertaken in Australia's southern agricultural zones to sequester carbon, restore landscape connectivity and habitat for native biodiversity, ameliorate salinisation and provide other ecosystem services. Climate projections suggest substantial warming and drying across southern Australia, jeopardising the viability of these restoration investments and threatening the persistence of many species. New approaches are urgently needed to optimise the resilience of restoration efforts and abilities of species to adapt to climate change.



Image credits: Jacqui Stol

How will this project further ecological engineering on-ground readiness?

The three year project, to June 2018 has three components:

1. A *synthesis* component to review established and emerging ecological engineering options.
The *synthesis* component will identify the most cost-effective 'levers to pull' to increase biodiversity resilience to climate change. The synthesis will inform current practice and enable targeted investigation of the effectiveness of these approaches for this, and future projects.
2. A *discovery* component which will progress research into a promising ecological engineering approach. Climate-adjusted provenancing for vegetation restoration has been chosen for the discovery element.
The *discovery* component will deliver informed strategies for choosing seed sources (provenancing) to support long-term persistence of revegetation plantings under climate change. It will achieve this by investigating the ability of different species to adapt to climate change, by comparing individuals provenanced from locations along a climate gradient.
3. A *science infrastructure* component, that will support the ongoing evaluation of ecological engineering approaches into the future.

The project team will work collaboratively with key practitioners to build science infrastructure that enables systematic experimentation of ecological engineering approaches through their on-ground works. Partnering with delivery agents will provide an unprecedented opportunity for the scientific community and environmental managers to build knowledge over the longer term.

Outputs from the project

Output products will include:

- a scientific publication providing a typology of ecological engineering tools to facilitate biodiversity adaptation to climate change
- advancement in next generation ecological engineering tools towards applications in climate adaptation
- established on-ground infrastructure for future empirical evaluation of the effectiveness of ecological engineering methodologies.

How the project will engage stakeholders

The project team, comprising representatives from the Department of Climate Change, Energy, the Environment and Water and CSIRO, will seek to engage and collaborate with the restoration providers and the scientific community throughout the project.

The project team will hold public seminars and prepare lay articles to communicate about the project as it progresses. If you're interested to know more, please contact us.



Australian Government

**Department of Climate Change, Energy,
the Environment and Water**

Image credit: Suzanne Prober



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