Case study:

Paraway Farm Landscape Rehydration

Project location:	Bibbulman Country, Boyup Brook, South-West WA
Country:	Kaniyang
Size:	664Ha
Participants:	Warren and Lori Pensini operate Blackwood Valley Beef on Paraway

This farm-scale project aims to repair and enhance natural landscape function and terrestrial water cycling in order to improve ecological and productivity outcomes across Paraway Farm. The project provides a demonstration of landscape rehydration techniques, with a particular emphasis on solutions that mitigate and improve salinity and waterlogging issues typical of agricultural regions in the South-West region of Western Australia.

The Paraway Farm Landscape Rehydration project provides a model for approaching landscape repair in the Western Australian context, incorporating carbon farming opportunities and monitoring of soil health and water quality. The project demonstrates the synergies between effective landscape rehydration techniques and regenerative management systems within a profitable farming enterprise.

Above – Aerial view of a Paraway site visit, 2023
Right – Earthworks at Paraway, 2022

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Problem

As with much of the south west corner of Western Australia, extensive clearing of forests over the last century has resulted in a range of environmental issues across the landscape. Specifically, at Paraway Farm, the main issue was waterlogging of lowland and valley areas, as well as increasing outbreaks of salinity. Further exacerbating these issues is declining rainfall, which was leaving the middle and upper landscape dehydrated. The terrestrial water cycle had been broken. Further to this, the Pensinis wanted to restore biodiversity to the farm, recognising that a thriving ecosystem requires a diversity of plants, animals, birds, insects, fungi and soil microbes.

Warren and Lori have employed a range of ecologically aligned management practices over the years, however, felt that a more significant landscape change needed to occur to reset the environmental decline and losses in productivity they were witnessing.

Solution

The Mulloon Institute is working with Warren and Lori Pensini to implement farm-scale solutions that will rehydrate productive areas of their farm and slowly reduce the ongoing deleterious impacts of waterlogging and salinity. The main technique employed was constructing contour banks to intercept and divert rainfall runoff away from eroding gullies and creeks, and redistributing the water by allowing it to slowly infiltrate back into the soil across the drier upper landscape. The contour banks were carefully designed to ensure they would function in the heaviest rainfall events, with primary sills that spill water out of the contours onto ridges as well as secondary sills that allow excess water to safely flow over the contour and back into the major creek lines in extreme rainfall events.

Above – Contour work completed, 2022
Left – Installation of gully interventions, 2022

Salinity and landscape rehydration

In the Western Australian context, where salinity on the floodplains is a major problem for agricultural producers, many of the well-known techniques for landscape rehydration such as leaky weirs and the chain of ponds would exacerbate existing salinity issues by concentrating salt water in the valleys and floodplains.

In this context, Mulloon Institute's focus is on keeping the fresh water from rainfall separate from the salt contaminated water, and redistributing this fresh water away from valleys and onto the ridges. Our methods hold onto fresh water in the upper landscape where it can rehydrate soils and increase productivity, thereby slowly reduce waterlogging and salt concentrations in the valleys and floodplains. We also focus on re-establishing perennial vegetation in key areas to repair the terrestrial water cycle, improve fertility and lower the water table in waterlogged areas.

Revegetation through planting native trees and shrubs on ridges and below contour banks was also employed to improve cycling of nutrients in the landscape, capture carbon from the atmosphere and create ecological corridors to connect remnant forested areas throughout the farm. The 2022 seedling plantings were immensely successful, with around 90% survival across most of the farm. These seedlings will provide habitat for future generations of animals, birds and other wildlife, all playing their role in creating a resilient ecosystem across the farm.

Establishment of perennial pastures and holistic grazing management on the productive areas of the farm is also an important technique for landscape rehydration. The ground surface roughness created by perennial pastures slows water runoff during heavy rainfall and improves infiltration. The increased moisture stored in the soils and improved water cycling reduces ensures the perennial pasture plants can access water for longer, increasing the growing season and improving drought resilience.

Gully interventions, such as spreading mulch, hay bales and brush mattresses were employed in small, eroded gullies and salt scalds. These measures are supplementary to the tree plantings and work by slowing the flow of water and causing deposition of sediment and organic material in the gully, which encourages soil development and revegetation. The intervention techniques proved to be simple solutions targeted to very specific areas and were able to be implemented by the Pensinis themselves.

Right – Inspection of gully interventions, 2023

Services provided

Site assessment

Farm visit discussed salinity, waterlogging, erosion and productivity issues that landowners wanted to improve.

Farm plan & design

Landscape rehydration and repair works designed using GIS software. Thorough farm plan produced.

On-ground works

Site survey conducted and construction and earthworks supervised to ensure a quality project outcome.

Landscape rehydration solutions included:

- Contour banks
- Brush weirs
- Brush mattressing
- Revegetation.

Vegetation

Range of native tree and shrub seedlings planted across the farm to improve water cycling and ecological outcomes for the project.

Materials

- Brush & wooden pegs – obtained on-site
- Hay bales – provided by landowners
- Seedlings – local native nursery
- Earth – obtained on-site.

Education

A 'Landscape Rehydration Essentials' workshop and a two-day bootcamp were held to help community members learn about the theories and techniques of landscape rehydration in a Western Australian context. More than 60 participants took part in these events.

Partners

Commonland and the WA Government's State Natural Resource Management program.

Below: Bringing the community along for a tour of the revegetation works.

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