Rangeland Rehydration: Collaboration between Land Managers, Government and Private Experts

P. Theakston
Western Local Land Services, Australia

H. J. R. Pringle
Ecosystem Management Understanding, Australia

L. Mashford

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Theakston, P.[*]; Pringle, H.J.R[†]; Mashford, L.
* Western Local Land Services; † Ecosystem Management Understanding™; Katalpa Station
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Abstract
In the rangelands of New South Wales, Australia, many successful soil erosion control techniques have been developed. These techniques have been implemented by the Western Local Land Services (WLLS), rehabilitating 23,000 ha since 2004. However the focus was on degraded land with little regard to catchment dynamics and the threatening processes that were causing the degradation.

With the introduction of Ecosystem Management Understanding (EMU)™ in 2016, the focus was broadened to address grazing properties in a drainage ecosystem context. There is a focus on understanding landscape function and designing projects that address threatening processes.

With the integration of the WLLS and EMU approaches, effort is now put into saving threatened landscapes and resurrecting degraded landscapes. Both approaches have been integrated to restore soil moisture, reduce grazing impacts, restore calm water and save productive landscapes. In this process, landscape objectives and outcomes are identified and priority projects developed. A major benefit is the increased capacity of land managers to understand landscape processes and then to design and implement projects on their properties. This knowledge is allowing land managers to focus on being rain ready during droughts. The level of ownership has provided a forward looking focus for land managers, building resilience during drought.

Each grazing property will approach the same issue differently, depending on resources and preferences. Some approaches use earthworks while other approaches use soft filters to improve rainfall management. Earthwork techniques include champagne banks, waterponding, waterspreading, contour furrows and erosion control structures across roads. Soft filters are placed in flow lines to slow water and can be constructed from mesh, branches or rocks.

We tell this story through examples of projects and demonstrate the success of a collaborative approach to landscape rehydration.

Introduction

In the semi-arid rangelands of New South Wales (NSW), Australia, soil erosion control techniques have been developed to rehabilitate specifically degraded land. These techniques have been used successfully since the 1960s until present time and include contour furrowing, waterponding (Green, 1989), waterspreading (Quilty, 1972a) and erosion control along tracks/fencelines (Jolley, 2009).

The Western Local Land Services (WLLS) has been implementing these techniques, rehabilitating 23,000 ha since 2004. Due to this involvement, WLLS strengths are: 1) Expertise in layout of broad-scale rehabilitation projects, 2) Experience in numerous rehabilitation techniques, 3) Established landholder networks. Despite the success of the WLLS rangeland rehabilitation program, it was recognised within the organisation that it could be more effective in addressing large-scale degradation by improving its efforts in key areas. These included: 1) improving strategic planning and priority setting at a property level, 2) expanding focus to include drainage ecosystem dynamics, 3) expanding focus to include remnant highly productive landscapes rather than focussing on degraded landscapes, 4) building local capacity and community inter-dependence.

It was on this basis that WLLS approached Hugh Pringle of the Ecosystem Management Understanding (EMU)™ (Tinley & Pringle, 2014a) approach to help upgrade the Rangeland Rehabilitation Program. EMU was developed in Western Australia based on Ken Tinley's empowering approach to consultation with land managers developed in southern Africa (Tinley & Pringle, 2002) and a shared training in physical earth sciences as well as biological sciences by its developers (Pringle & Tinley, 2003). The approach to rehabilitation is encapsulated in Key Principles and Steps in Catchment Repair in Arid Rangelands (Tinley &

Pringle, 2006). Hugh Pringle has been working on landscape rehydration in NSW since 2016 with key strengths being: 1) focus on landscape dynamics and the importance of drainage ecosystems, 2) addressing degradation in a landscape and land manager directed, strategic manner, 3) building land manager capacity both on-property and as local knowledge networks. The inclusion of aspects of the EMU approach complements the WLLS approaches already established during decades of the NSW Soil Conservation Service. The enhancement has not been unidirectional and EMU has been enhanced by involvement with WLLS in improving historically degraded lands with inert but potentially productive soils.

This paper narrates the successful and innovative journey of the three-way partnership.

Methods and Study Site

WLLS is a government agency concerned with improving agricultural productivity and management of natural resources. The rangeland rehabilitation program, within WLLS, works with land managers and focusses attention on erosion control and improving water infiltration. It was recognised within the agency the rangeland rehabilitation program could be more effective in addressing large-scale degradation. WLLS contracted EMU to work closely with the program to improve and strengthen its effectiveness.

To start the collaboration within western NSW, WLLS organised a group of land managers to participate in the EMU approach. This group proceeded through the EMU process and developed priority projects. These priority projects aligned with the rangeland rehabilitation program's objectives. Consequently WLLS offered funding to implement one of the priority projects. Implementation of the projects involves: project design, layout of works and construction. Implementation is a collaboration between all three parties (WLLS, EMU & land managers), each member specialising in different techniques.

A total of 6 groups have progressed through this process, totalling 30 land managers/businesses.

Results

A total of 30 land managers/businesses, covering 1.51 million hectares, have been involved in the collaborative approach between WLLS and EMU. This collaborative approach is an important part in strategically implementing landscape rehydration projects.

Collaborative Rehydration Projects

Projects are developed and implemented by integrating the key strengths of WLLS, EMU and the relevant land manager. One example of a collaborative project occurred on Katalpa, which is owned and managed by Luke and Sarah Mashford. The EMU approach emphasises land manager understanding of landscape processes, particularly in drainage systems. Through the EMU process, Luke and Sarah identified a dehydrated floodplain. In order to fix this issue, critical intervention points in the landscape needed to be identified. The land manager identified this critical point, which is the point in the landscape where a technique needs to be implemented for maximum rehydration and success. The resulting project used a diversion spreader bank (Quilty, 1972b) and waterponding. Photo 1 shows the project after completed earthworks and rain.

The Katalpa project involved earthworks, however this is not always the case. Projects are developed and implemented in a collaborative manner and accommodate the desires of the land manager involved. Each project has specific resources, preferences and capacity. A variety of techniques have been used, either from the EMU "toolbox" (Tinley & Pringle, 2013), WLL techniques or land manager developed techniques.

Photo 1: This area shows the critical intervention point of the floodplain rehydration project on Katalpa. Water is diverted out of an erosion gully onto the adjacent floodplain using a diversion bank and deposited via a waterspreading bank. The waterponds (U-shaped banks) rehydrate scalds. This project was identified via the EMU process, with the land manager identifying the critical location and constructing the earthworks. Solid blue arrow indicates concentrated flow; dotted blue arrows indicate low energy flow.

Photo 2: A variety of techniques are used in the identified priority projects. This sieve structure on Allandy protects the exit point of an ephemeral wetland. The innovative triangle-shaped design makes it robust and provides a protected niche for plant establishment. Blue arrow indicates flow direction.

Local Community of Practice

A major benefit of the collaborative approach is the increased capacity of land managers. Land managers have built a self-sustaining, local community of practice. This local community of practice is evidenced in several ways. Some land managers have purchased heavy earthmoving machinery to implement projects on their properties. The understanding they have gained in landscape processes and constructing earthworks has enabled them to become project implementation "experts" in their community. They take this skill onto neighbouring properties, becoming part-time earthmoving contractors specialising in rehydration projects. Also, a local aerial mustering pilot has participated in the WLL and EMU collaborative approach. He has gained a good understanding of landscape dynamics and functioning of drainage systems. While in the air mustering for neighbours, he is also conducting an informal aerial survey of key issues. Aerial survey is one of the key stages of the EMU process. In an informal way this pilot is providing an on-going platform for constructive conversations with land managers regarding rehydration projects. Many potential projects have been discussed in this way.

As a way of formalising and strengthening the local community of practice, a group of 20 land managers, covering 730,000 hectares, formed the Far West Rangeland Rehydration Alliance (FWRRA). The FWRRA has given members a forum to discuss land management issues, attract project funding, raise awareness of natural resource management issues and provide peer-to-peer support. This has been a success in building local capacity and community inter-dependence.

Discussion [Conclusions/Implications]

This experience has demonstrated the power of collaboration when all parties combine their strengths. The foremost goal of this collaboration was to improve rangeland rehydration and build land manager capacity. This was successfully achieved and the three-way partnership will continue into the future. Furthermore, secondary beneficial outcomes have also been achieved.

Innovative approaches have been developed and implemented. In particular land managers have been at the forefront in developing innovative solutions. The example from Katalpa (see Photo 1) demonstrates this new approach. The diversion spreader bank, which was used at Katalpa, is a technique used by WLLS predominantly in the marginal cropping areas. The application of this technique at Katalpa was a result of the EMU focus on landscape dynamics and repairing drainage ecosystems. Through the EMU process the critical intervention point was identified, which enabled the diversion spreader bank to be used in a way not traditionally used. This project has been enormously successful, with the diversion spreader bank functioning correctly and causing the rehydration of approximately 1,000 hectares of floodplain. In other instances, land managers have been at the forefront in developing innovative solutions. For example, innovative sieve structures such as the one in photo 2 have been developed by land managers.

Another secondary outcome was the strengthening of local communities. This was evidenced during the recent extreme drought. During such times, community conversations usually centre on drought. The conversations can become depressing and feelings of hopelessness occur. In contrast, participating land managers had a positive focus on becoming "rain ready" for when the drought ended. Conversations were commonly around developing "rain ready" projects which would have immediate, tangible and positive effects. Land managers were talking about and actively supporting each other's projects. The strengthened community continues to progress, even after drought conditions have improved.

The three-way collaboration has exceeded initial expectations and has strong support from all parties to continue into the future.

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