Ecological, economic and social challenges, restoration filters and planning for the unknown

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Introduction
Since European settlement, large areas of public lands in Australia have been degraded by various anthropogenic disturbances. An example is the Ludlow Tuart Forest (2049 ha), located approximately 200 km south of Perth in Western Australia. This forest is also representative of many of the Tuart (Eucalyptus gomphocephala) forests and woodlands in the region, which were logged in the nineteenth and early twentieth century, subject to cattle grazing since the early 1900s and to mining since the early 2000s. These, and other threatening processes have led to invasion by non-endemic species such as Arum Lily (Zantedeschia aethiopica) and Annual Veldt Grass (Ehrharta longifolia), poor levels of Tuart recruitment, and low levels of understorey diversity and abundance (DEC 2007).

This large-scale degradation has led to a growing desire from the community, conservationists, scientists and land managers to develop techniques to restore public lands such as the Ludlow Tuart Forest. However, restoration faces some interesting challenges, many of which can be explained though ecological, economic and social challenges.

Restoration at Ludlow
Restoration within the Ludlow Tuart Forest is now in its fourth year. The first year began with small scale restoration trials (Ruthrof et al. 2010) and has now expanded to restoration of 10–20 ha per annum with simultaneous restoration research trials being embedded within the broadscale restoration to inform and drive the following year of restoration activities. This adaptive, integrated and evidence-based process has been both rewarding and steadily increased our understanding of the system and methods of increasing the success of restoration in degraded forest areas. Even so, we have encountered a range of challenges during this time.

Ecological and economic challenges
Ecological challenges encountered in broadscale restoration include the availability of propagules, the ability to germinate a large range of species, control techniques for invasive species (pre- and post-restoration), and choice of species (functional types, keystone species, faunal requirements, palatability and competitive ability). There are also the emerging challenges of a reduction in rainfall, higher temperatures, and perhaps a higher risk of frost. Lack of available propagules is one of the major hurdles that many restoration programs face. For example, in 2007 when work began in Ludlow, enough seed was available from only six species at the time. This, however, was seen as an opportunity to establish a trial to inform the broader-scale restoration the following year. We continued embedding a restoration trial within the broadscale restoration every year to continually increase our understanding of the system and restoration techniques that would be more successful in terms of establishment and growth. Such ecological challenges are technical constraints, and although significant, are only part of the problem (Geist and Galatowitsch 1999).

Financial resources made available for restoration are often quite limited. Therefore, expensive machinery or propagules (e.g. some species can reach prices of $4/gm) may be out of reach of some projects. The longer term significance of some species—the use of cheap annual species versus more expensive perennials—is also important, and the restorationists must determine the best long-term ecological ‘bang for your buck’. In the case of the Ludlow Tuart Forest, the restoration project had access to off-set funding from mining activities within the adjacent State Forest. Most public lands, however, do not have access to such funds, and is difficult to undertake even small-scale restoration there.

Given these ecological and economic challenges, the resultant vegetation community may be very different from the one practitioners had in mind at the planning stages of the project. For example, the ideal plant species list we started with for Ludlow (approximately 200 species collated from local lists and reference sites) has been reduced to the ones we can acquire and afford, that are resilient (i.e. can compete with the high weed loads), and that have multiple functional and structural characteristics.

Social challenges
Restoration projects face an additional array of social-political challenges. These include which site will be restored, the goals and values for that site, the amount of community support, personal preferences, and the amount of time and labour available to the project, especially in the long term. These are primarily human challenges, and unless overcome, ongoing commitment from land managers, practitioners and the community to restoration projects will likely be limited and it will not be possible to undertake larger scale restoration on public lands.
The community is often seen as a group of individuals for use as cheap labour. However, commitment to, and success of, restoration projects could be increased by development of a beneficial relationship between humans and the natural environment (Geist and Galatowitsch 1999). There are various benefits of community involvement in restoration, including the involvement of hard working, enthusiastic people with a depth of local knowledge, experience and a sense of stewardship that can drive the sustained support for restoration. Benefits of restoration to the community are also broad-ranging and include restoring community spirit and improving agency-community relations (Ryan and Hamin 2008) as well as providing psychological and physiological benefits (Geist and Galatowitsch 1999).

A number of community groups are involved in restoration at Ludlow (Figure 1). However we believe this could be expanded to include higher levels of involvement in all aspects of restoration, given that there is a large amount of local knowledge, enthusiasm and on-going commitment that would be beneficial to restoration planning and implementation.

Reciprocal restoration model

The beneficial relationship between humans and restoration activities is often overlooked. Geist and Galtowitsch (1999) state that the ecological needs of the restoration area have the greatest potential to be met when human contributions are greatest and humans benefit increasingly as the restored ecosystem recovers (Figure 2). Humans contribute to restoration (C1 in Figure 2) through, for example, ecological knowledge, which provides for the needs of the restoration area (N1). This depends on the level of community support of the restoration project (filter) that itself can contribute, for example, to physiological and psychological benefits for humans (C2) which contribute to their needs (N2).

Restoration projects, particularly on public lands, may be more successful in the long term when the community, restoration ecologists, managers and practitioners create an evolving restoration plan together. Perhaps working together in the early stages of planning a restoration project will enhance the filter (Figure 2) for the benefit of both the restoration area and the community involved.

Conclusions

There is an array of ecological and economic challenges to ecological restoration; they are technical constraints and only part of the problem. Social challenges also need to be overcome for increased community involvement in restoration. The community needs to be seen much more than just cheap labour. The reciprocal ecosystem restoration model clearly shows the beneficial relationship between humans and restoration activities. Restoration planning for an uncertain future may benefit from working on restoration plans together. Without joint restoration planning, large-scale restoration of public lands may not be possible.

References


