

Negotiating multiple motivations in the science and practice of ecological restoration

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Summary In a recent piece in EMR, Burbidge *et al.* discussed some major impediments to linking research and practice in ecological restoration and management. They identified a lack of collaboration between research and practice, poor communication, inappropriate funding and political timelines, change inertia and a lack of capacity as major barriers to improving restoration praxis. They suggest capacity building, communication, collaboration and involving key stakeholders through an iterative cycle of research to management will improve the translation of research into practice (*Ecological Management and Restoration* 12, 2011, 54). While we agree with the barriers and recommendations identified, they did not consider how the multifaceted motivations embodied in the practice and social context of restoration shape the research–practice nexus. Given the diversity of actors involved in conservation activities, and the focus on conservation on private land and landscape-scale connectivity in government policy, this is a significant oversight. We suggest it is vital to draw attention to these multifaceted motivations when discussing implementation challenges. This piece draws on our collective insights from three doctoral research projects examining the science, practice and social dimensions of ecological restoration and management in Australia. Our intention is to outline some of the social and contextual influences shaping restoration practice to demonstrate the importance of dialogue between *researchers, practitioners and landholders* around the goals and expectations of restoration and management interventions. We suggest this is an important aspect of improving the conversation between the actors involved in restoration research, policy and practice.

Key words: *connectivity conservation, private land conservation, research vs. practice, restoration, social science.*

Introduction

Calls for greater integration and collaboration between researchers, practitioners, managers and policy makers are common in ecological management journals (Curtis *et al.* 2005; Carr & Hazell 2006). For example, Knight *et al.* (2008) suggest a number of actions to remedy the gap between research and implementation. In a recent piece in EMR, Burbidge *et al.* (2011) discussed some major impediments to linking research and practice in ecological restoration and management. They perceived the major barriers as a lack of collaboration between research and practice, poor communication, inappropriate funding and political timelines, change inertia and a lack of capacity. They recommend fostering a culture of ongoing dialogue between research and practice along with concomitant monitoring and evaluation.

While we agree with the barriers and recommendations identified by Burbidge

et al. (2011), their focus on the ‘research management cycle’ overlooks the diversity of motivations, justifications and expectations embodied in the practice of ecological restoration. We argue that illuminating this diversity is important, particularly given the increasing emphasis placed on conservation on private land and landscape-scale connectivity as a means to safeguard Australia’s biodiversity into the future. While the interplay between research and practice is shaped by motivations and expectations of all engaged with restoration, we suggest the role of landholders and practitioners is an important and understudied dimension of the research–practice nexus. After all, it is those ‘boots on the ground’ who play a key role in carrying out and shaping management interventions. Understanding why they engage in restoration and their expectations of an intervention are therefore an important element of the research–practice nexus. We use the term

‘practitioners’ to refer to those engaged in the implementation and practice of land management and restoration be they public land managers, employees of the various NGOs or statutory authorities engaged in conservation and restoration.

The Society for Ecological Restoration International Science (2004) defines restoration as ‘...the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed’. While this definition focuses on the ecological system, the expected outcomes or benefits flowing from restoration remain unspecified. As Clewell and Aronson (2006) suggest ‘descriptions of restoration projects frequently ignore the will of the project and imply that the need for restoration is inherently obvious and its intentions are noble. The underlying reasons to restore remain understated and unappreciated’ (2006, p. 422). Our paper illustrates the multifaceted motivations, justifications and expectations landholders and practitioners

bring to restoration practice. We use the term 'motivations' to capture the suite of ideas, perceptions, motivations and expectations of restoration practice. Our paper was inspired by an observation that, beyond a uniform understanding of restoration as active engagement with an ecosystem, people engage in these activities for a diversity of reasons.

We have observed this diversity in our research in private land conservation and restoration and landscape-scale connectivity conservation. In practice, restoration embodies goals and objectives extending beyond narrow conceptualisations of restoration as a simply ecological practice. Moreover, the first study (Jellinek) found that the ecological outcomes of revegetation works failed to live up to the projects initial ecological expectations and that landholder management preferences may have altered the conservation effectiveness of restored areas.

Ehrenfeld (2000) identified four strands of restoration ecology that, as a product of their evolution, seek different outcomes through restoration practice: conservation of endangered species or communities; ecosystem management; ecosystem services and the restoration of ecological function. Our research collectively led us to question the social context of restoration practice and ponder whether simply viewing restoration through the lens of ecological science captures the rich tapestry of motivations found among landholders and practitioners. We suggest that given the diversity of views and goals of ecological restoration the overarching focus of a project should be determined in context. Specifically, the social dimensions of a project are central to restoration success (Williams 2007), yet under-reported in discussions of the interface between ecological science and practice. Perhaps, this is because traditionally, ecologists have not considered human subjects and social science in their work (Lowe *et al.* 2009). While this is changing, as evidenced by the inclusion of social science in ecological research (Carr & Hazell 2006), we believe this is the exception, rather than the rule.

A better appreciation of the social context of restoration practice will improve the interplay between science and

practice. Given the diversity of perspectives among those who engage in restoration research and practice, we agree two-way communication is critical to improving this nexus (Gibbons *et al.* 2008; Lake 2001; Williams 2007). Without dialogue on these diverse goals and expectations, biodiversity benefits arising from effective conservation management are unlikely to be evident.

Restoration Effectiveness and Landholder Preferences

Despite the prominence of restoration and revegetation activities, the effectiveness of these actions in maintaining native faunal communities remains largely unknown (Miller & Hobbs 2007). When restoration occurs on private land, the preferences of landholders will determine the types of restoration interventions. Thus, landholder preferences are critical to the interplay between restoration science and practice. The relationship between landholder preferences and restoration effectiveness was explored in two agricultural regions of south-eastern Australia (Jellinek 2012). Jellinek's study focused on how landholder perceptions and management actions influenced the persistence of native animal communities in restored and remnant areas on private land. Overall, the expected ecological outcomes arising from agricultural restoration were not met for reasons that, in part, can be attributed to the choices made by landholders.

This interdisciplinary study used ecological surveys of reptiles and beetles to determine how effective habitat restoration was in maintaining these communities and quantitative questionnaires to examine landholder perceptions. Ecological surveys were undertaken using pitfall traps in revegetated, remnant and cleared habitats. The landholder survey ($n = 184$) revealed that three quarters of respondents preferred to replant trees and shrubs over ground layers. Landholders were also less likely to manage revegetated and remnant areas for ecological benefits than for actions that benefited their property, such as reducing weeds, pest animals and fire risk. Similar findings have been reported by other studies (Smith 2008).

Socio-cultural factors played an important role in shaping restoration actions. Membership of a Landcare group and off-farm employment increased the likelihood that landholders had undertaken revegetation in the past or would revegetate in the future. This finding supports previous research identifying stronger environmental values among landholders with an off-farm income than those dependent on the income produced from their properties (Schrader 1995). Similarly, Landcare members are more likely to undertake conservation works than landholders not in a Landcare group (Curtis & Cook 2006). Moreover, landholders who experience the benefits of conservation actions are usually more likely to undertake restoration actions in the future (Fielding *et al.* 2005).

These results suggest that habitat quality of restoration on private land is mediated by landholder preferences for particular species types. Moreover, current restoration activities in this region do not provide adequate habitat for rare faunal species. Further examination of the link between landholder choices and management actions is needed to understand how social drivers and personal attachment influence behaviour (Sherren *et al.* 2011). Without greater dialogue and incentives for alternative restoration activities, this disjunct between landholder preferences and effective restoration practice could undermine potential conservation outcomes on private land.

Diverse Restoration Objectives in Rural Landscapes

Given the potential for restoration to fall short of ecological objectives, it is useful to consider how landholders conceptualise restoration. Reflecting on insights from rural areas in Victoria subject to in-migration from lifestyle-orientated property owners, Cooke examined how alternative notions of restoration emerge through landholder interactions with the environments on their property and other social actors through time. While strong pro-conservation ideas of 'bringing back' nature or managing remnant bushland property for biodiversity were evident, landholders also

conceptualised restoration in very different terms. This included restoration based on aesthetic aspirations, recreational motives or activities with dual aims, like improving biodiversity while providing utility benefits like firewood.

When landholders conceptualised restoration as a partly recreational or aesthetic pursuit, the planting of non-indigenous and indigenous vegetation in concert was common. This 'best of both worlds' approach provided aesthetic benefit to the landholder by planting a species deemed visually amenable, while providing benefits 'for nature' by including species that were good habitat. Notions of good habitat formed through observation of the types of trees that birds occupied or through recommendations by local Landcare groups and nursery staff. This process was seen on small bushland blocks, with the planting of ornamental trees among remnant bushland, and on larger farming properties, where callistemons (spp) were scattered through linear plantings for their visual appeal. Landholders pursuing these 'hybrid' landscapes were expressing lifestyle aspirations for their property through their restoration efforts.

The existing suite of species can also influence ideas of restoration. As Beilin (2007) noted, trees planted by a previous generation of farmers can act as a tangible linkage between past and present landowners. Two landholders in western Victoria discussed how their ideas of what types of nature 'belonged' in the landscape were linked with observations of species that survived persistent drought rather than notions of indigeneity. This applied specifically to the non-indigenous sugar gum (*Eucalyptus cladocalyx*), which was extensively planted as windrow buffers from early last century. Having observed the hardiness and longevity of their growth, they planted sugar gums in their restoration projects. Observations of die back in indigenous yellow gum species (*Eucalyptus leucoxylon*) meant neither landholder wanted to plant species viewed as lacking resilience. Similar attitudes to restoration were evident among other landholders, who had witnessed certain indigenous species fail to establish in initial revegetation sites.

Restoration on private land is shaped by existing beliefs regarding restoration, born out of personal interactions with the landscape. Rather than viewing this as an obstacle, supporting landholders to pursue restoration that meets multiple objectives may present a point of entry for engagement between managers/researchers and private landholders. This could encourage wider collaboration and participation in conservation initiatives beyond those who already possess strong environmental stewardship motives.

Multiple Perspectives in Landscape-Scale Connectivity Conservation

Large-scale ecological connectivity initiatives have gained increasing prominence in Australia. These initiatives draw diverse participation from across the public-private spectrum as seen in the groundswell of initiatives providing the platform for the recent draft National Wildlife Corridor Plan. 'Connectivity conservation' seeks to protect, enhance and restore natural connections in the landscape across large spatial scales (Worboys 2010). These initiatives operate on very large spatial scales (hundreds to thousands of square kms), and can be used to prioritise conservation and production across a landscape (Sanderson *et al.* 2006). Undertaking conservation and restoration planning on a larger spatial scale should enable different land-use practices to be located in the most socially, ecologically or economically beneficial area. The success of these initiatives requires collaboration across multiple scales, land tenures and land uses (Wyborn 2011). However, like the diversity of motivations for landholders to undertake restoration, these actors do not share a uniform perspective on what connectivity conservation entails. Understanding this diversity is particularly important if we are to navigate a productive path through current debates around the efficacy of connectivity conservation (see Hodgson *et al.* 2009; Possingham 2009).

Wyborn examined the emergence of connectivity conservation in Australia and the institutional dimensions of cross-scale collaborative conservation. This research

illustrates how, in practice, 'connectivity' has become a catchall term encompassing many and diverse practices seeking to improve landscape-scale conservation outcomes (Whitten *et al.* 2011). Practitioners largely (but not exclusively) see the practice of connectivity conservation to include the protection of remnants; threat abatement; invasive species management; large-scale restoration; protection and provision of ecosystem services; conservation on private land and integrated resource management. This is very different to understanding connectivity as facilitating the movement of organisms across a landscape. Despite this disconnect, connectivity conservation has inspired collaborative, integrated landscape-scale conservation initiatives, imperatives that have been called for in conservation and resource management for quite some time (Saunders & Briggs 2002; Lowe *et al.* 2006). Moreover, the promise of connectivity conservation to 'connect people and connect landscapes' in the face of climate change is an important hook to inspire and motivate participation in conservation on private land. Evaluating these initiatives from a purely ecological standpoint misses the broader aims, motivations, perspectives and institutional benefits found in the connectivity space.

Connectivity conservation is an interesting example of the diversity of perspectives and motivations associated with restoration. Many of these initiatives use The Nature Conservancy's 'Conservation Action Planning' (CAP), a dialogue based participatory approach to planning based on an adaptive management cycle. CAP does not contain a spatial prioritisation element, nor does it enable analysis of effectiveness based on predicted return on investment (Whitten *et al.* 2011). It does, however, provide a platform to bring together the different actors in collaboration. CAP is designed to enable those who implement the plan to create the plan, thus facilitating greater ownership and providing a space for negotiation among the divergent views of practitioners and landholders. In combination, diverse perspectives can create a richer synergy and more complete understanding of a situation (Brown 2010). From our perspective, the

collaborative governance that supports endeavours like Gondwanalink, Habitat 141°, and the Great Eastern Ranges can provide an important space for negotiation and dialogue to facilitate a better understanding of the social context of restoration.

Ways Forward

To better inform future interventions, the social context of restoration practice needs to be better understood. This includes landholder attitudes to restoration, their management actions in revegetated and remnant areas, and the ecological requirements of native faunal species. In broader collaborative efforts, this social context becomes far more complex as the number of participating organisations and individuals creates greater potential for diversity of viewpoints. While we believe significant gains could be made through dialogue between ecologists, practitioners and landholders, dialogue alone cannot ensure effective restoration outcomes. Increased dialogue and collaboration can produce win-win outcomes, although this is far from guaranteed (Layzer 2008). Perhaps, a more realistic expectation is for dialogue to foster an appreciation of differing positions and to generate strategies that result in a 'no loss' situation. In other words, no party loses out to the extent that they gain nothing from the process.

We argue that having an engaged and active cohort of landholders planting vegetation that does not represent 'pure' ecological restoration is more favourable than landholders unwilling to participate in restoration, because the suite of species on offer conflicts with their land-use objectives. Moreover, recent work suggests 'hybrid' ecologies of native and non-native species have an important place in restoring ecosystem function (Hobbs *et al.* 2006). The continued rise of market instruments as a means for encouraging restoration may also provide avenues for encouraging 'no-lose' outcomes. For example, in situations where researchers and managers believe puristic ecological restoration is vital, landholders could be financially compensated for restoration they may not otherwise favour (Langpap 2004).

Our paper highlights two points relating to restoration and the integration of multiple players and multiple motivations. We need (i) to link science with practice in ways that engage landholders, practitioners and scientists throughout planning, implementation and monitoring of ecological restoration. Without the cooperation of these groups, restoration activities from a farm-scale to a landscape-scale are unlikely to provide expected ecological outcomes. This is because (ii) the multiple motivations for restoration are poorly represented or understood. Evaluating restoration from narrowly focused ecological parameters misses the social change dimension of practice and the concomitant ecological changes such social change can bring. We argue that restoration should be viewed as an integrated whole, and as a central part of the research practice nexus. Actively creating spaces where actors can generate shared understandings of restoration goals, motivations and expectations is a good first step. From that platform, participatory planning and monitoring can effectively illustrate the gaps in restoration knowledge and allow adaptive management of restoration actions so they are more effective in the future.

Implications for Managers

- Accounting for the social dimensions of restoration is as important as identifying the ecological benefits of conservation activities. This requires practitioners, landholders and researchers engage in a two-way communication to discuss the goals and expectations of restoration projects.
- Restoration effectiveness is likely to be mediated by landholder preferences, requiring greater dialog between stakeholders, and possibly incentives for alternative restoration actions. Supporting landholders to undertake restoration likely to meet their multiple objectives may encourage other landholders previously not involved in restoration to engage in conservation initiatives.
- The integration of a variety of perspectives and motivations is possible. Collaboration can enable stakeholders to gain a

greater understanding of the social-ecological context of restoration, resulting in more effective ecological and social outcomes.

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