The role of local networks in biological control of broom, *Cytisus scoparius*: a case study from the Victorian highlands

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Summary This study summarises the impact and management of the exotic weed broom *Cytisus scoparius* (L.) Link in the Victorian Highlands, and examines the potential for different local network models to implement environmentally sustainable broom management. Biological control is shown to be optimised if researchers work closely with land managers and community groups to harvest and spread biological control agents from sites where agents have established. Management objectives of public land managers can be achieved more easily and effectively if local front-line workers engage with the local community to implement and facilitate biological control across land tenures.

Keywords Broom, *Cytisus scoparius*, biological control, Landcare.

INTRODUCTION

Government agencies responsible for managing the impacts of invasive species must prioritise the allocation of limited resources against increasing numbers of pest animal, plant and disease incursions (DEPI 2010). It is not surprising then that Australian governments at the national and state levels have encouraged greater community involvement in the management of widespread invasive species, particularly weeds (DEPI 2010, AWC 2012). This trend is closely aligned with a broader international move to decentralised governance in rural communities (Herbert-Cheshire and Higgins 2004). The ideal espoused by this movement is that local communities are best placed to identify and understand local needs, and create long-term sustainable solutions to address those needs (Eversole and Scholfield 2006). Considerable debate exists over the best way to empower local communities (McCabe *et al.* 2006). One concern is that a top-down approach by government bureaucracies will be seen as simply a way to cost-shift, or draw local networks into an overarching bureaucratic structure that does not properly acknowledge the role of local communities. Others have highlighted the advantages of semi-formal or informal networks created and driven by local communities; a 'bottom-up' or 'community-led' approach (Coulston *et al.* 2012).

This study summarises the impact and management of the exotic weed broom *Cytisus scoparius* (L.) Link (also known as English broom or scotch broom) in the Victorian Highlands, and examines the potential for different local network models to implement environmentally sustainable broom management. A particular focus was the adoption and implementation of biological control. The study area and subject were selected because they form both a 'community of place' in the Omeo, Benambra and Dinner Plain areas, and a strong 'community of interest' concerned with the management of a serious threat to biodiversity and agricultural production (McCabe *et al.* 2006). The extent to which local networks, and effective weed management, rely on strong leadership and a sound governance structure were also examined.

IMPACT OF BROOM IN THE VICTORIAN HIGHLANDS

Invasive plants such as broom can dominate natural ecosytems, reduce the abundance of native plants, and alter soil characteristics and fire regimes (Hosking *et al*. 1996). Dense persistent broom infestations in the Victorian Highlands bioregions, particularly in and around the Mitta Mitta River and Alpine National Park, replace understory and shrub layers, and inhibit recruitment of canopy species. Broom is also an economically important weed on cattle properties in the area, as it invades and out-competes pasture species (Hosking *et al.* 1996).

MANAGEMENT RESPONSIBILITY

High-level strategies have been developed to guide management of broom at the National and State level (AWC 2012, DEPI 2010).

Responsibility for managing broom in the study area rests with several government agencies and authorities, and numerous individual landholders. Although broom management is a priority in the area, the complexity of land tenure and responsibility has the potential for poorly coordinated action and less than optimal control. Broom control within the Alpine National Park is the responsibility of Parks Victoria (PV), while the Department of Environment

and Primary Industries (DEPI) manages broom infestations on crown land (DCE 1992). DEPI also leads weed and biological control research in the State. Three municipalities manage broom on land under their control, and Goulbourn Murray Water (GMW) controls infestations adjacent to the Dartmouth Dam. A Community-based Natural Resource Management (CB NRM) group, Benambra, Dinner Plain, Omeo Landcare, promotes best practice broom control to private landholders (Merinda Sedgmen pers. comm.). The North East Catchment Management Authority has a coordinating role across the region. The Australian government has also invested in broom control efforts in the study area.

LIMITATIONS OF PAST MANAGEMENT

Traditional controls such as chemical spraying are expensive, and can cause off-target damage. Spraying is also logistically difficult in many remote areas where broom occurs, especially in steep terrain and along waterways such as the Mitta Mitta River. Where chemical treatment is feasible, repeated treatment over many years is necessary. Each mature broom plant produces thousands of seeds per year, and this characteristic, combined with seed longevity, results in a large persistent soil seedbank. Any disturbance, including herbicide treatment and fire, can promote broom seed germination and lead to rapid recovery of the broom population. In areas where spraying is conducted, retreatment over many years may be necessary to exhaust the soil seedbank (Hosking *et al*. 1996).

Retreatment programs can be difficult to resource for more than a few years at a time. One example was an attempt to contain broom infestations in the Glen Valley in the 1990s. A well-resourced and coordinated spray program promised to remove large persistent infestations in the area. However, broom infestations quickly recovered to previous levels after funding ended (ABC Landline 2007).

BIOLOGICAL CONTROL AS A SUSTAINABLE MANAGEMENT OPTION

Difficulty managing broom at the landscape level led to a growing interest in biological control. Biological control uses specialised natural enemies (biological control agents) to damage and suppress weeds without damaging other plants. Biological control is considered to be a sustainable method of weed control because established agents continue to attack the target weed year after year without harm to the environment. Biological control can therefore be an important component of integrated weed management in situations where the use of other controls is constrained. However, research to demonstrate the specificity and safety of new agents can take many years. Furthermore, releasing, establishing and monitoring the impact of biological control can take many more years.

For broom, several specialised natural enemies were released in Australia, but further research is needed to assess their impact. Recently, a promising new biological control agent, the broom gall mite, *Aceria genistae* (Nalepa), has established at a number of sites in south east Australia (ALA 2014). Broom gall mites are microscopic, but they induce the formation of large galls that contain several hundred mites in each gall. Galls inhibit broom growth and reduce the reproductive potential of the weed. Early releases of the mite occurred from galls cultured on potted broom plants grown in a laboratory or shade-house. Whole plants were then transferred to suitable broom infestations and maintained by regular watering (Sagliocco *et al.* 2011). Biological control agent populations are typically low in the early stages of a release program, and labour intensive release techniques such as this are justified if they improve mite survival and the likelihood of establishing viable populations. Once field populations are large enough to be sustainably harvested, ease of redistribution becomes increasingly important, and the failure of individual sites to establish is less critical to the success of the program.

FEASIBILITY OF COMMUNITY-LED BIOLOGICAL CONTROL

Field officers have recently conducted gall mite releases using a simpler method that involves cutting gall-infested branches from sites where the mite is well established, and transferring the branches to new locations (Sagliocco *et al.* 2011). A 'bunch' of gall-infested branches is simply tied onto broom at the new site, and mites leave the old galls and infest the new plant.

Innovative techniques such as this can facilitate the spread of agents across the landscape by making biological control easier to implement and more readily available to land managers and community groups. The impact of biological control is therefore optimised if researchers work closely with land managers and community groups to harvest and spread biological control agents from sites where agents have established (Lefoe and Longmore 2007). In this way, community participation can accelerate the rate of spread by enabling many releases across a wide area. Increasing the number of releases across the landscape minimises the impact of losing individual sites (due to fire, for example), and brings forward the benefits of biological control. Local land managers and community groups are also well placed to identify sites suitable for biological control, and ensure biological control is integrated with local and regional weed

management planning. Under these circumstances, local land manager and community participation can make a valuable contribution to the implementation of biological control and effective weed management.

GOVERNANCE AND LOCAL NETWORKS

To achieve effective landscape level planning and management, cooperation between public and private land managers, government agencies, and local communities, acting across the complex of land tenures, is necessary. However, the nature of relationships and interactions between these players can vary considerably, and no single governance model can be applied to all situations. Considine (2005) described the heterogeneity of network governance, including forms of inter-agency and individual (i.e. leaders) networks, while Eversole and Scholfield (2006) proposed three dimensions of a participatory governance structure, namely; inclusivity, influence, and the degree of formality and informality. There are, however, precedents for coordinated community action against individual weeds species in Victoria.

Community weed model and the community-led approach The Victorian government sponsors three Community Weed Model groups targeting the weeds blackberry, gorse and serrated tussock. Under this governance model a species-specific group (either a task force or working party) is formed with community and government agency representation. These groups promote weed management through extension activities, provision of technical expertise and funding, and property-level agreements negotiated with individual landholders. The groups' work closely with regulatory officers in DEPI, to ensure landholders fulfil their legal obligations (Coulston *et al*. 2012). Implementation of this model has seen an improvement in weed control for these species, although it can rely heavily on a top-down approach to community engagement (Coulston *et al*. 2012). One of these groups, the Victorian Blackberry Taskforce (VBT), has moved away from this governance model to a more participatory community-led approach. The VBT advocates the formation of local networks and a landscape (as opposed to individual property) approach to weed management, and increasingly views its role as one of support for local networks and an advocate of the community-led approach to government (Coulston *et al.* 2012).

Informal local networks An informal local network is a form of participatory governance that is genuinely community-led, and agency representatives are often front-line workers with close ties to the local community. This form of governance is strongly focused on 'getting things done' in the local area (Eversole and Scholfield 2006).

Biological control of the environmental weed bridal creeper benefited from the actions of informal networks established in several areas of Victoria, including the Bellarine peninsula (Lefoe and Longmore 2007). Like broom, efforts to control bridal creeper were often expensive, unsafe, and ineffective, prompting research into biological control. One agent, a rust fungus, was found to be particularly damaging to bridal creeper. A community weed management group in South Australia developed an innovative technique for the rapid and easy release of the rust fungus across large areas. The technique was quickly adopted by land managers, and CB NRM groups such as Landcare, who recognised the advantages of establishing informal networks to coordinate the implementation of an inexpensive, safe and effective control measure (Lefoe and Longmore 2007).

LEADERSHIP AND LOCAL CHAMPIONS

Each of the previous forms of governance relies to some extent on leadership at the local level. Informal local networks in particular are often driven by local champions such as Landcare coordinators or members, or locally-based agency staff. In these situations governments can play an important supporting role, by funding research and providing technical expertise to support local initiatives, as was the case with biological control of bridal creeper.

A characteristic of stakeholders in the study area is the presence of active community leaders with a comprehensive knowledge of broom ecology and the principles of integrated weed management. The local Landcare group has an enthusiastic, inter-generational membership that understands the need for a long-term sustainable approach to broom management. The remoteness of the area means that public land management staff from PV, DEPI and GMW live and work locally, and are committed to the well-being of their local community.

An occasional criticism of informal local networks is an apparent lack of influence on higher level strategic direction and policy, however the Benambra Dinner Plain Omeo Landcare group made an important contribution to the draft National Broom Strategy (Matt Springall pers. comm.).

CONCLUSION

Biological control is not a 'silver bullet' and other controls, including chemical control, will continue to be necessary. However, preliminary observations of the impact of a new biological control, the broom gall mite, indicates that the agent has considerable

potential as an environmentally sustainable control for broom in sensitive native vegetation and difficult terrain. The development of an easy to implement release technique has made biological control accessible to land managers, CB NRM groups and individual property owners. The situation is not unlike that for bridal creeper, where a community-led response by informal local networks resulted in the dramatic decline of a widespread and damaging weed (Lefoe and Longmore 2007). Conditions seem to favour a similar response by informal local networks in the study area. Management objectives of public land managers can therefore be achieved more easily and effectively if local front-line workers engage with the local community to implement and facilitate biological control across land tenures.

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