People as the forgotten ecological element of lowland grassland ecology – new perspectives on values and management

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Summary

Lowland grasslands no longer exist in Australia separate from humans. The composition and ecology of native grasslands has, and will continue in future, to be unavoidably affected by humans in major ways – positively or negatively. Humans have become an integral and significant part of grassland ecology; for example by removing weeds, planting in new populations and species of plants, moving animals around. We need to decide what goals we have for grasslands. This will be determined in part by what influences we are able to exert, both ecologically and socially – we need to recognize that humans cannot 'manage' grasslands, in the sense of control. Because each remaining grassland remnant is a distinct and unique outcome of history, compositional interactions and social context, each area needs a unique set of management influences, built as a set of localized relationships with people. We need to actively perceive humans as part of the future of grassland ecology, and human-human interactions as integral to grassland ecology. There are numerous possible advantages in humans engaging as part of grassland ecology. These are discussed, along with possible ways that human interaction with other grassland ecology elements might be optimized.

Introduction

In recent years there has been a small but steady output of studies on Australian lowland native grasslands (for example, see the collection of papers in Craigie and Hocking 1998). Most of these have focused on the biology and ecology of the species that remain in these remnants. As Lunt (1997) has eloquently pointed out, each remnant area is a unique result of what history and management that has been imposed on the remnant area, either directly or indirectly. This human influence on grassland composition, while widely recognized, has not been adequately highlighted either as a component of grassland history or a feature of their future.

When grassland management is discussed, it is frequently framed in terms of 'restoration', with an underlying assumption of 'putting the grassland back how it was', or as close to this as possible. This not feasible – for two very different reasons:

1. Many of the elements in original grasslands ecosystem are missing or highly modified.
2. We are not going backward in time – we and all other species occupy a present and are heading to a future – this seems an obvious point, but it raises possibilities and imposes restrictions on what we do now to influence the future.

Fragmentation and modification – implications for management

Most grasslands remnants are isolated, modified and have habitat elements missing. What should we manage them for, and how should we go about management? What are the attributes that we want to protect and repair? Because humans are now central to the future of grassland survival and composition, we need to look at both the inherent attributes of grasslands, and what humans might derive from these (Table 1).

Which of these do we rate most highly? As we are in a market economy, and tend to be anthropocentric in focus, even if we would wish otherwise, the future genetic assets and ecological processes stand out. Yet even in our focus on genetic conservation we are skewed – what little effort there is tends to focus on species conservation, rather than conservation of genetic diversity.

Currently decisions about protection and management of native grasslands are made largely on the basis of species continuation – how many of a species there are is not included in the equation, when it comes to deciding on priorities for protection. For most threatened species, both the number of populations and the total number of organisms has plummeted over the past twenty years – since the introduction of the Flora and Fauna Guarantee Act (1988) in Victoria, which is meant to protect species *and* their genetic diversity. It seems that as long as there are a few individuals left of each species; that constitutes protection according to current practice. Yet the genetic diversity of species is likely to be at least equally of use in a utilitarian sense for us in the future. It may well be the diversity built into the genome of a species that makes it valuable, for example as a grass that can counteract salinity, or as a rust fungus that can attack intractable exotic grassy weeds.

Neither do we give priority in conservation to the important ecological relationships, worked out over millennia in our regional soil and broad climate conditions – which may yield important insights into how to deal with changing relationships between species, including weeds, and with changing soil and climate conditions.

What is the feasibility of protecting this genetic diversity and ecological processes?

Recent research and observation has demonstrated that even small patches of native grassland can maintain continuity and some level of functional integrity, even when surrounded by a sea of exotics (Lunt and Morgan 1999, Williams 2005). There are issues of invasive weeds, which are addressed further on.

These isolated remnants are now not separate from people. We are now intimately part of their ecology, and we need to sort through what this means. The burning, grazing or other biomass reduction that these grassland remnants need to undergo is now inter-related with humans; as are the control of intractable weeds. We know that populations of plants and animals in these remnants are likely to undergo local extinction in some cases, and will need to be re-plenished by humans. We need to get used to the idea that

Table 1. Inherent attributes of grasslands, and what humans might derive from these.

Inherent attributes	Anthropocentric attributes
Species continuity	Future genetic assets – complex e.g. fungi
Genetic diversity	Future ecological process uses
Ecological processes and interactions	
Cultural and historical significance	
The right to exist	Markers and reminders of change
Contributions to landscape level ecology	Places to assist ecoliteracy development

humans will be one of the important vectors of dispersal and re-colonization between remnants, now that the sea of exotics that surround them make impossible what was once natural dispersal. The proposal for managing remaining populations of species, and grassland remnants in general as regional clusters is one way of illustrating this point (Smith and Robertson 1999).

We are starting to move beyond the notion that these grassland remnants are naturally wild, and can be locked up and left alone. We need to take the next step towards envisioning, in the future, the ways in which humans will be an integral part of the functioning ecology of these remnant communities.

Remnants need friends

One implication of the realization that humans are ecological elements of grasslands is that each remnant needs an inter-related community of humans. This human community association will need to know enough about the composition and ecological functions of the particular remnant to be a positive element in its continued existence. A grassland remnant without a positively interacting group of humans is unlikely to survive with any integrity into the future – I can't think of an exception to this, although the scope and level of human influence is likely to vary with remnants.

These human elements of grassland ecology will need to be more than just weed pullers and supplementary planters. People making up the human element will need to see themselves as part of the overall ecology of the remnants, and progressively become clearer about what positive influences they are able to exert in this ecology. An important part of this approach will be realizing that humans do not manage ecological systems. Most informed people working on the ground are aware of this, but we have a tendency to plan management actions and then expect these to work out according to our pre-conceived plans. In reality, other species have their own 'ideas' about how ecological relationships are going to work out, and often we are not privy to these. The most we can expect is that humans will be able to influence the outcomes of these relationships, under the banner that we call management. Many other organisms (native and exotic) will also exert influences, and we may not get all, or even much, of what we want. Learning what influences we can have, and how best to exert these influences, will be a major part of the functions of a human element to grassland ecology, as will be the related issue of what we want to achieve, given the already modified nature of native grassland remnants.

Conversations with land

Where the above discussion leads is that we need to construct interactive ecological relationships with grassland remnants. Within acceptable parameters of protection we will need to try out various management actions, to see what the influences are, and modify our approaches according to what outcomes our management influences have, and what we think will be positive in the overall context of remnant composition and ecology in the future (talking with land – Bowman 1994) At the broadest scale, this inter-related approach may not dissimilar to the inter-relationships that Aboriginal communities have had with the ecological communities they have lived in for thousands of years, and are consistent with some of the frameworks arising from deep ecology (for example, see Halifax 1990). But the relationships we have, the actions we take, and the influences we exert will not be the same as previous Aboriginal communities – we need to construct them anew – although knowledge about past relationships may be one useful input in a mix as we decide what positive influences we might try out. What may also be valuable to learn from indigenous communities are the types of activities and relationships that are useful for connecting humans with non-human bio-ecological elements.

What will humans get out of this type of ecological association?

A number of important potential outcomes of benefit to humans are incipient in the new ecological relationships suggested above, but are grossly under-developed in the wider community at present. We require a better understanding of the composition and genetic diversity within grasslands, and consequently how these might be useful in the future – and not just of local native species. For example, knowledge of the rusts, smuts and invertebrates that utilize weedy species might prove useful in helping to combat newly emerging and sudden large scale outbreaks of weeds. Likewise we need a deepening understanding of the ecological relationships between species – both native and exotic, which will provide insights into how these species, and their diversity, might be utilized to withstand global climate change, or cope with salinity, or for unwanted species, be prevented via competitive replacement with the appropriate native genotype in future.

The development of ecoliteracy will go hand-in-hand with the deepening of human-grassland inter-relationships, and can contribute to the base of local in-depth understanding of the ecological elements and processes that support us as bio-ecological beings into the future. Ecoliteracy has been well described by Orr (1992) as 'people motivated by a sense that their well-being is linked to that of other life forms'. Ecoliteracy will form an important part of engaging the wider community in the vital process of moving everyone to a sense of themselves as ecological beings, who have ecological impacts and ecological responsibilities. Ecoliteracy can only spread effectively if ecological learnings are consolidated within subregions and their associated human communities – this is where they make the most understandable and comprehensive sense. Likewise human communities will only gain a sense of their ecological selves by being an inter-related part of inter-acting ecological communities, where the relationships have been elucidated.

A sense of connection and place

Joanna Macy (1990) and others (for example, see Berry 1977) have identified the importance to environmental continuity a human well-being of the connection between people and place. There is considerable merit in thinking about relationships between human communities and biodiversity in biogeographical terms. Humans who are functioning as part of grassland ecological communities will also need to develop a sense of the interconnections that exist between these remnants and other ecological elements and systems at the local level. This will include the parts that humans can and should play as connecting elements. For example, people will need to be aware of, and factor into their actions, the inter-connections that birds and insects have in moving between native grassland remnants, local wetlands and creeks, and gardens and parks. Humans will play important roles in these inter-connections, for example by developing water ways and parks in ways that support bird and insect species that are important to grassland remnants, or perhaps by removing weeds in ecologically appropriate ways from areas adjacent to native grassland remnants. Or by developing garden waste removal from urban areas in ways that discourage dumping of these into native grassland areas, or along creeks.

This growing sense of interconnection between humans and the ecological systems that they live in and are part of will also be as useful for strengthening the human communities as it is for protecting and strengthening the native grassland community. There are numerous ways in which seeing our neighbours as part of the same ecological systems that we are a part of can help to forge links between. In developing our sense of ecological connections, we need to be careful not to create 'them and us' notions, based around, for example, 'greenie idealist' versus 'pragmatic realist' or conversely 'those who really care about the environment' versus 'those who don't'.

To achieve this, we need to have new skills and frameworks for engaging within community around issues of environment, including biodiversity and conservation. Our current approaches are not working very well – we need to recognize this. It is important not to disregard what already has been achieved – we need to use our current strengths to build on, but at the same time we need not just keep on doing more of the same, in the hope that others will come on board.

We need to move beyond seeing grassland remnants as wild places which people occasionally assist in managing, to places where people are an integral part of the process and survival of native grassland elements. Places where we can gain a growing understanding, clarity and confidence about our influence in the ecology of native grasslands, and our interconnected place with these remnants in the wider ecological landscape.

What will grassland remnant support groups look like? How will they be different from the friends groups we currently have? How will they foster the sense of linkage between human social community and the ecological linkages we share with other species and ecological systems?

The authentic answers to these questions will need to be built from the ground up. Some of their attributes we might formulate are as follows: /can be drawn from the following areas:

- Taxonomy, ecology and adaptive management
- Environmental education
- Community/group development/engagement
- Advocacy/community change

We need people with knowledge of the composition, ecology and management of native grassland remnants in the region, including weed control, fire, species and system management. Some of these people already exist in friends of grasslands groups, but they do not necessarily have the skills and frameworks for passing this knowledge on. However, we need more people to know more about these elements than currently exist. We need to look at how, when and where people learn these elements and actively organize for people to engage in this learning. We need to find and foster in groups those people who are good at facilitating adult education, and connect these with those who are knowledgeable about grassland composition and ecology.

We also need people who are knowledgeable about engaging with other people and enthusiastic and skilful in introducing the wider community to native grasslands. These people will need to be clear, accepting and unconfused about their place as part of the functioning ecology of native grassland remnants.

In summary, we need to re-vision our relationship to grasslands. For friends groups, this means going beyond thinking of grasslands as in need of repair by a few. We need to see grasslands as opportunities for community connections with surrounds and each other. We need the active participation of those who know how to bring together human and natural communities – these people may not be as knowledgeable as some about the ecology or taxonomy of grasslands, but their knowledge and skills of working with people need to be equally valued. Some practical examples of how the wider community might be encouraged to become part of grassland ecology include:

- Asking for assistance from community building staff in councils and other government agencies,
- Building relations with local historical societies and clubs,
- Using school groups to carry home messages about grasslands, and get parents along to community events,
- Using gardening and seed orchards to link grasslands with current wider community interests,
- Adopt a grassland prizes,
- 'Slide' nights at Rotary, Footy Clubs, etc. and
- Include grasslands as parts of parkland, and form friends groups around open space rather than around ecology or protection of threatened species

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People as the forgotten ecological element of lowland grassland ecology - new perspectives on values and management. TS Chuah, S Salmijah, YT Teng, BS Ismail. Response of glyphosate-resistant and susceptible biotypes of goosegrass (Eleusine indica (L.) Gaertn.) to fertilizer use. Jack Sinden, Randall Jones, Susie Hester, Doreen Odom, et al. The economic impact of weeds in Australia. Between landscape ecology and global ecology, this is the study of large-scale ecological phenomena that cover multiple geographic locations but are not large enough to be considered global. An example of this is continent-wide impacts of effects of a large volcanic explosion. The after effects of the EyjafjallajÃ¶kull eruption in 2010 caused severe delays to air traffic across Western Europe which had knock-on effects for American citizens wanting to cross the Atlantic to Europe and vice versa. The results demonstrated that tremendous amount of lands will be dedicated to future urbanization, and especially urban agricultural lands will be likely to be vulnerable. The metro-level analysis focuses on a group of species that represent urban desert landscape and have different degrees of fragmentation sensitivity and habitat type requirement. It hypothesizes that the urban habitat patch connectivity is impacted upon by urban density. Two underlying propositions were set: first, lower connectivity is predominant in areas with high urbanization cover; second, landscape connectivity will be View Grassland Management Research Papers on Academia.edu for free.Â Recent papers in Grassland Management. Papers. People. A review of wombat diet and nutrition. In this review we investigated the diet and nutrition of wombats and highlight areas for future research.Â Differences in terms of plant diversity, ecological indicator and pastoral values, species functional groups, vegetation types, and indicator species between BPA and CMG were assessed. The BPA harboured a higher plant diversity. They were located in steeper areas, at higher elevations, and characterised by lower soil nutrient content, mowing tolerance, and pastoral value than CMG. Dry meadow species number and cover were higher in BPA, while nutrient-rich meadow species number was higher in CMG. 14 Grassland Ecology. 391. The extent and diversity of grasslands and related habitats is reected in their ecological and economic importance at local, regional, and global scales. For example, grasslands provide critical habitat for a diverse array of plants and animals.Â Grasslands and savannas also occur within the subtropics and tropics, such as the mesic grasslands of Florida, the bushvelds of Africa, and the compos and llanos of South America, and in areas with a Mediter-ranean climate (dry summers and relatively warm, wet winters). Grasslands can be found in coastal areas near sea level, and in montane regions at elevations up to 4,500 m (e.g., neotropical pÃ¡ramos and temperate montane meadows or parks).