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THE COSTS AND BENEFITS OF BUFFEL GRASS AND ITS MANAGEMENT: HOW ARE THEY VALUED?

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ABSTRACT

Buffel grass (*Cenchrus ciliaris*) is a contentious species, being valued in many regions of the Australian rangelands for its contribution to livestock production, while also being widely regarded as a threat to biodiversity assets, sometimes within the same region. The development of broad policy relating to the management of buffel grass has not advanced to the extent it might have given the controversy surrounding the species. We believe that impediments to sustainable management are often embedded in social and cultural attitudes. Hence, our approach to improving the management of buffel grass is to consider the environmental, social and economic costs and benefits from environmental and pastoral perspectives. If we can understand the range of concerns and values surrounding buffel grass, we can develop sound recommendations that can help maximise the benefits from buffel grass but minimise any negative impacts and may contribute to policy development.

We report here the preliminary outcomes of workshops with representatives of institutions in three regions and telephone surveys of individual pastoralists in four regions. At workshops, there was widespread acknowledgement of the benefits of buffel grass for animal production and the costs of buffel grass associated with fire and vegetation change, regardless of the institutional affiliation of the participants. There were differences amongst regions in the perception of the extent of benefits and costs of buffel grass and in the amount of support for different management options. Results from the telephone surveys also suggest that pastoralists broadly perceive the benefits and costs of buffel grass both on their property and in neighbouring areas of high environmental value. Regional differences in perceptions of pastoralists were also apparent especially with regard to how costs were assessed. Attitudes towards buffel grass were significantly correlated to aspects of pastoralists' social, economic and environmental relationship with their grazing land.

We suggest that the development of policies targeting particular pastoral and conservation tenures and values should be possible, given the stakeholder views reported here.

INTRODUCTION

Buffel grass is an exotic species that occurs in all Australian rangeland states, and is actively planted for its livestock production benefits where climate and soils are suitable. In regions where buffel grass grows readily, pastoral industries and hence rural communities can be heavily dependent on it for economic well-being (Hall 2000). Its capacities to resist heavy grazing and drought and respond positively to fire have been major assets for production. On the other hand, these capacities and an ability to colonise bare areas (McIvor 2003) have been major hindrances to managing environments where it is not wanted. Buffel grass has been increasingly recognised as a serious environmental weed which puts native ecosystems at risk (Humphries *et al.* 1991, Fairfax and Fensham 2000) and it is now described as a 'transformer' weed with potentially serious implications for biodiversity in Australian rangelands (Bastin *et al.* 2008; see Richardson *et al.* 2000 for a definition of a transformer weed).

These differing views of the value of buffel grass are at times energetically defended to the extent that it appears that there may be no common ground amongst different stakeholders. As a consequence, institutions have been reticent about dealing with the sustainable management of buffel grass or about the development of policy relating to it. We believed that one way to make progress with this issue was to address the diversity of perceptions and collectively develop an understanding of the values of

different stakeholders and the acceptability of different management options. We thus proposed to work with agencies, regional groups and individuals to:

- Document the environmental, social and economic benefits and costs of buffel grass invasion to both conservation and pastoral sectors
- Identify and describe current and potential management objectives, strategies and operational methods and their relative benefits and costs
- Determine the perceptions of key stakeholders to different objectives, strategies and operational methods for dealing with buffel grass
- Identify the potential for change in perceptions, attitudes and values and determine pathways for disseminating information about buffel grass and its management or control
- Develop specific recommendations, based on our findings, on how to improve the management of buffel grass, and disseminate them as effectively as possible
- Provide a general approach to improve management of contentious weed issues that considers both costs and benefits and the sociological barriers to change

We present some preliminary outcomes of activities to the end of March 2008 in several contrasting rangeland regions. The project will deliver its conclusions by mid-2008.

APPROACH

Our approach to determining the environmental, social and economic costs and benefits associated with buffel grass has four elements. The first is a desktop review of literature that documents available information about environmental, social and economic benefits and costs of buffel grass and its control or management. The second engages organisational stakeholders from four case-study regions in a discussion of buffel grass in their region to elucidate the costs and benefits of buffel grass and to document perceptions, values and attitudes of each organisation. The third element assesses costs and benefits of buffel grass as judged by individual pastoralists through surveys in each of the case-study regions. The final element synthesises the results of the study so that researchers, the community and organisations can appreciate the complexity of the buffel grass issue and can recognise the most appropriate pathway toward more effective management.

The four case-studies were based in selected Natural Resource Management (NRM) regions: the Fitzroy region in Queensland, the Alice Springs sub-region, the South Australian Arid Lands region in north-eastern South Australia and the Pilbara sub-region (Natural Resource Management Regions 2008). They were selected to provide contrasting potential for buffel grass due to climate and soils and because key stakeholders were supportive of the proposed activities.

Workshops were designed to engage with as many organisations as possible, although representation was constrained by availability of people at the time. Capturing the diversity of opinions was the goal; there was no intention of achieving consensus or of putting issues to a vote, but we tried to ensure that stakeholder groups were as evenly represented as possible so that participants did not feel 'outnumbered'. Telephone surveys were designed using an established framework from the resilience literature (Marshall and Marshall 2007) that describes the relationship that people have with the resource and that can quantify the costs and benefits of the relationship and any changes to it. Management options were also canvassed. Twenty-five surveys were sought for each region.

PRELIMINARY OUTCOMES

At the end of March 2008, three workshops for institutional representatives had been held and data analysed for two. The top perceived benefits and costs for Fitzroy and Alice Springs were as follows:

Fitzroy	Alice Springs
<u>Benefits</u>	
1. Animal production	1. Animal production
2. Weed control	2. Land rehabilitation
3. Erosion control	3. Water erosion control

4. Carbon sequestration.

4. Wind erosion control

5. Dust management

Costs

1. Monoculture in pasture

2. Effect on fire sensitive areas (on park)

3. Depletion of soil nutrients

4. Monoculture in environment

5. Livestock diseases (bighead)

1. Fire (for conservation)

2. Monoculture (for conservation)

3. Plant species composition change

4. Native animal species change

5. Habitat change

The South Australian Arid Lands region (SAAL) also listed livestock production and soil stabilisation as key benefits, and fire risk and impacts on native species as key costs. When rankings of benefits and costs were compared amongst pastoral and conservation stakeholder groups, there was a considerable degree of overlap in rankings for some but not for others. In the Fitzroy region, it was generally agreed that animal production and weed control were benefits of buffel grass, and that the impact on fire sensitive areas 'on park' and monoculture in pasture and in an environmental setting were costs. There was no overlap in opinions in regard to erosion control, susceptibility to disease (e.g. dieback) and carbon sequestration. In the Alice Springs region, while there were differences in degree, the ranges of scores for different groups overlapped and there was considerable agreement amongst all institutions as to the benefits and costs of buffel grass for different land uses. Interestingly, pastoralists in both regions did not score monoculture as of any benefit to production whereas others did.

Four separate management objectives which might be applicable in environmental and pastoral tenures were identified: eradication (if very localised), reducing spread into clean areas, suppression below 50% of pasture or ground layer, and managing for dominance (either reducing from a monoculture, i.e. 90%+, or bringing buffel grass up to dominance, i.e. >50% and <90%). Pastoral and conservation interests did not necessarily agree on where the objectives were applicable, particularly where both production and conservation values were high on pastoral land. However, there was considerable agreement regarding these objectives for low production/high conservation and high production/low conservation value pastoral lands and for environmental reserves.

Management options for each of the objectives in various pastoral and conservation settings were identified and rated for both feasibility and desirability. In the Fitzroy region support for options for eradicating buffel grass was limited. The most broadly supported means of reducing spread across all tenures were education, maintaining healthy cover and minimising soil disturbance, although in general there was less support for these methods on pastoral land than on reserves. Buffer zones were favoured more by the production organisations, while herbicides and fire were supported more by the conservation organisations. Where buffel grass was prevalent, strategic grazing/grazing management, controlled fire, fencing for soil type, stock water management and water and infrastructure placement were most widely supported, depending on whether management was for production or environmental values. In the Alice Springs region a number of methods were generally supported by all institutional groups for each management objective, for environmental, pastoral and indigenous land tenures. These included catchment management, road verge management, use of clean gravel, vehicle hygiene and best practice guidelines. Methods for 'getting up to dominance' on pastoral lands of high environmental and production value were not widely supported by the conservation group but, interestingly, nor were eradication methods. Measures like use of biocontrol or soil sterilants received little or no support in any of the three regions.

Through telephone surveys, pastoralists listed the benefits of buffel grass as ranging from improving feed quality, responding quickly to rain, providing a reliable pasture and increasing carrying capacity, to restoring degraded soil and being drought tolerant. Pastoralists listed the main costs of buffel grass as ranging from establishment costs and unpalatability at full height to destroying native grass diversity, clogging waterways, impeding mobility and creating fire risk. Regional differences were apparent, especially in the description of the costs of buffel grass. For example, few pastoralists identified any costs of buffel grass in South Australia. In the Pilbara only production costs were

mentioned, whereas in the Fitzroy and Alice Springs regions, both production and environmental costs were noted. Attitudes and perspectives were correlated to pastoralists' characteristics and circumstances. Social characteristics included their attachment to their occupation and place, family dependents, age and education. Financial circumstances were recorded as business turnover. Environmental characteristics included land tenure arrangements, history with buffel grass, property size and business approach. Pastoralists' likely resilience to change in pasture management strategy was also recorded as attitude towards risk, capacity to plan and reorganise, level of flexibility and interest in changing pasture management practices (Marshall and Marshall 2007). Pastoralists were also asked about their current management of pasture species and in particular whether they keep buffel out of areas of high environmental value on their property. Most (97%) did not, and described their reasons largely in terms of not seeing buffel grass as an environmental problem and/or that buffel grass was too hard to manage. They suggested that fencing to keep stock out and maintaining healthy pasture cover would be/are the most feasible and acceptable strategies. About half of the sample (44.8%) thought that managing buffel grass in national parks was important.

CONCLUSIONS

Preliminary indications are that perceptions amongst stakeholder groups are less polarised than people might think, and that there is a wide diversity of views within stakeholder groups. Production benefits and environmental costs are widely acknowledged, and there are some generally agreed management objectives and tools for different circumstances. As a consequence, the development of policies targeting particular pastoral and conservation tenures and values seems possible. Our conclusions may change with the incorporation of further results.

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