mulga fodder harvesting

Economic and *environmental*

analysis of fodder harvesting practices associated with mulga (*Acacia aneura*) and fire management practices in the mulga lands of south western Queensland

<u>Summary</u> accompanying the final report by:

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Final report to:

Department of the Environment, Water, Heritage and the Arts

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THE UNIVERSITY OF QUEENSLAND
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Executive summary

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Executive summary

The utilisation of mulga trees (*Acacia aneura*) to provide fodder for domestic stock during drought has been part of routine management on many grazing enterprises in south west Queensland's mulga lands for over 100 years. Recent vegetation management legislation and regulation in Queensland (*Vegetation Management Act* (1999) Qld) generated debate about fodder harvesting, specifically the lack of knowledge regarding both economic and environmental implications of the practice. Consequently, this project which analyses economic and environmental aspects of fodder harvesting practices in the mulga lands of south western Queensland emerged.

The project was funded by the Australian Government, Department of the Environment, Water, Heritage and the Arts, and was bounded within the 18.1 million hectares of Queensland's mulga lands. The time frame of the project was 18 months. Consequently, long term real-time approaches to data collection were not possible. A natural experiment model was adopted investigating a representative range of recent and historical practices using 'time since action' as a temporal surrogate.

An initial stage of the project identified and detailed the current and historical range and extent of management practices associated with mulga fodder harvesting in the region. Local landholders were recruited and participated in group interviews to draw on experiential local knowledge. Outcomes of group interviews were used to develop a clear understanding of fodder harvesting practices in the region and classify the range of practices into a manageable number of scenarios for further site specific investigation.

The financial costs and returns associated with different methods of fodder harvesting were modelled and compared to alternative management strategies that landholders may employ if fodder harvesting was not an option. The strategies compared were harvesting, agistment of stock elsewhere, and selling (and re-purchasing) stock. The economic modelling was based on six case properties that were derived from survey data provided by landholders.

The cost of fodder harvesting can vary considerably between properties and is dependant on the type of method used (i.e. pushing or pulling) and the type and mix of stock and their production purpose (i.e. cattle, sheep, breeders etc.). Mulga fodder harvesting with nutrient supplementation is the most cost effective way to maintain stock during drought especially if mulga is both abundant and easy to access. Agisting stock is the least cost effective way to maintain stock for long periods and on average costs three to four times more than harvesting mulga.

Selling stock during a drought period and repurchasing stock after the drought performed poorly in the analyses, and in most cases is less attractive than fodder harvesting. In this scenario landholders generally are selling into a depressed market and then repurchasing stock when prices as likely to be at their highest, with no income stream in between. In addition, the enterprise looses its breeding stock which has often been built up over time to suit local conditions. There are significant risks associated with this strategy in terms of decisions about when to sell and when to repurchase.

The economic modelling results also indicate that for the case properties modelled that they would remain financially viable if they used mulga fodder harvesting techniques with

the lowest post drought equity being 70%. Drought subsidies were not factored into this analysis but would provide a significant contribution to this viability. Although economically attractive, it must be acknowledged that the retention of some stock during drought and fodder harvesting will place pressure on ground cover biodiversity and pasture values.

It is clear from this research that graziers in south west Queensland cannot be economically sustainable during dry period without access to fodder harvesting. Concerns for the environmental implications of land use in the pastoral zone are rarely discussed in the context of economics and livelihoods yet fodder harvesting is inextricably linked to both enterprise and resource management. Therefore, both economic and environmental implications must be recognised and incorporated into policy decisions. If different landscape outcomes are desired, then it must be determined who will pay for it.

Landholders perceive the current regulatory environment as creating sub-optimal landscape management outcomes. They felt that regulations need to be monitored and evaluated to determine if they are assisting in achieving biodiversity conservation objectives. They believe that fodder harvesting is an economically efficient practice that achieves the dual goals of maintaining essential stock and some production during dry periods and assisting in the regeneration of mulga and other desirable pasture species. Landholders feel that current regulations are designed to conserve mulga as an overstorey species, a policy that in their view is difficult to understand given periodic disturbances such as fodder harvesting favour the species. A local decline in mulga is only likely to occur in a situation of over reliance on it as fodder for extended periods.

Fodder harvesting practices are diverse in their physical nature and at multiple spatial and temporal scales. Though the decision to harvest is driven almost solely by climatic events and economic pressure, the practice varies greatly between properties. Variables include infrastructure and labour availability, financial circumstances, animal production criteria and enterprise objectives. Broad categories of key variables that were identified in the early stages of this study, and assisted with further site investigation of environmental outcomes, were the type of harvesting (pushing, pulling or cutting), the predominant grazing animal and the time since harvesting.

Indicators for environmental performance measures were selected and designed to assess the composition, structure and function of the ecosystem and included flora, invertebrate and biological soil crust abundance and composition, habitat structure, landscape function analysis (LFA) and carbon (soil and above ground woody biomass). Forty-two one-hectare sites were measured, over 12 properties.

The results reflected the known east to west gradient of the mulga lands which is driven mostly by rainfall. There were no clear trends that could be attributed to the type of harvesting (pushing or pulling). The predominant grazing animal influenced grass:shrub:tree ratios to some extent. The majority of differences detected in the indicators measured were associated with the time since harvesting variable. This indicates that fodder harvesting can be likened to ecosystem disturbances such as fire.

This study shows similarities between sites harvested in the 1970s and sites never harvested in terms of indicators such as biological soil crusts and LFA. However, differences occur in other variables. Sites harvested in the 1970s showed increases in tree densities and fauna activity and invertebrate diversity compared to never harvested sites. Recently harvested

sites (<15yrs) exhibited lower tree density, greater shrub densities, and greater fauna evidence than never harvested sites.

The conclusion drawn was that none of the broad categories assessed could be identified as being the best for all biodiversity (based on the indicators used) and thus a mosaic approach to fodder harvesting (similar to historical practice) could be considered to give the best biodiversity outcome provide that it is restricted to mulga ecological communities.

This study provided insights into the selection of ecological indicators with ant functional groups and the diversity and function of biological soil crusts showing potential that will require further investigation.

Given that mulga wood has a very slow decomposition rate and that the fallen timber is not removed from the site after fodder harvesting, there are important implications for carbon balance and resource protection associated with this practice. Soil sampling was undertaken and samples are being processed by the CSIRO and the Australian Greenhouse Office. Because of equipment failure the results will be reported in a forthcoming report but related to the practices of fodder harvesting.

The highly variable nature of the mulga lands of south west Queensland were key contextual issues realised in this study. The highly modified landscape is variable in space and time and reflects historical utilisation. Therefore, a study such as this can measure a range of sites and describe their attributes in terms of their known management history but not draw clear conclusions in relation to one aspect of management. This is further confounded by the notion of desired states being somewhat subjective and defined differently by various stakeholders.

There are no large 'pristine' areas available that have been protected from domestic and introduced grazing pressure in the mulga lands. Thus there is no baseline to allow informed speculation about the most desired state. Attempting to manage the landscape so that it is similar to a 'natural' state or remnant ecosystem is a flawed concept, particularly because it is widely accepted that the mulga lands exists in multiple states with transitions between them being related to seasonal serendipity, grazing, fire and mechanical disturbance in a complex interaction. These are fundamental issues confronting vegetation management in the mulga lands and must be realised when regulating for practices such as fodder harvesting.

This study has shown that there are both positive and negative responses to changes in tree cover. Tree cover *per se* does not necessarily correlate with higher biodiversity values and should not be considered a surrogate. Sites harvested in the 1970s are now likely to be considered remnant yet there were differences detected between these and never harvested site, and these were both positive and negative in terms of the biodiversity indicators assessed. Fodder harvesting is often not distinguished from clearing but is very different in terms of the implications for biodiversity, particularly due to fallen trees remaining on site, retaining carbon over many decades, providing habitat and allowing soil and nutrients to be trapped.

This study was not able to provide prescriptive recommendations on how fodder harvesting could be undertaken to ensure biodiversity values are maintained. What is clear is that differences in the harvesting method are not likely to be important. In addition, fodder harvesting is a low order variable and unlikely to be the root of the problem in relation to

biodiversity conservation in the mulga lands. Total grazing pressure in time and space, including that by domestic, feral and native animals, has far greater implications for both the environment and the economic sustainability of the area.

What is clear is that recent and current fodder harvesting practices (in compliance with regulations vs. historical practices) need to be monitored in order to ensure that policy is achieving the biodiversity objectives it was set out to achieve. In addition, current and future policy needs to be able to adapt to new information as it is acquired. Monitoring of this type of land management activity in a landscape that is highly variable in time and space must, by necessity, be long term, integrated with other environmental monitoring, and relevant to both management and policy. In addition it is important that an adaptive management approach is adopted in relation to policy and management. Flexibility in management, regulations and policy to adapt to new information is vital. What is absolutely clear is that the status quo in regulatory and management terms is an unlikely formula for achieving the wellbeing of the local community, the biodiversity of ecological communities or other objectives such as improved natural carbon balance.

This study has generated the following recommendations for all levels of government and stakeholders with an interest in the sustainable management of the mulga lands.

Recommendation 1: Recognise explicitly and where possible integrate both economic and environmental considerations when developing policy and regulation regarding fodder harvesting,

Recommendation 2: Consider what social and economic policy mechanisms are most appropriate to change land management practices (if they are demonstrated to erode biodiversity values) and how they can be funded,

Recommendation 3: Recognise and reward land management that is demonstrated to provide biodiversity and other social benefits beyond what could be considered a reasonable duty of care (see Beeton *et al*. 2005 pp. 87-96 for attributes of a workable system),

Recommendation 4: Recognize that there are positive and negative impacts on biodiversity of fodder harvesting,

Recommendation 5: Identify, develop and test suitable indicators for biodiversity studies in mulga land environments that are sensitive to a range of spatial and temporal scales, and that can inform management and policy decisions. This will be vital in the context of environmental reporting and any future trends in the area of environmental service provision or direct investments designed to improve environmental performance in the region. This would be best tested *in situ* on properties where there is an agreed management plan (see Recommendation 3),

Recommendation 6: Undertake a critical review and analysis of definitions and assumptions of 'remnant' vegetation as a surrogate for biodiversity capture in the context mulga land and similar ecosystems that are highly modified and able to occur in multiple stable states,

Recommendation 7: Develop immediately appropriate monitoring regimes to inform the current policy so that it can be adapted to new information,

Recommendation 8: Commit to long term monitoring of fodder harvesting that can be integrated where possible with other environmental monitoring and reporting in the region,

Recommendation 9: Actively review and evaluate policy relevant to fodder harvesting and vegetation management in the region so that it can adapt rapidly if necessary to new opportunities and trends such as environmental services markets or direct investments,

Recommendation 10: Initiate a participatory process to develop transparent, applicable and useful indicators that suit management and policy at a range of scales (property to policy), and recognise these indicators may or may not be interchangeable,

Recommendation 11: Acknowledge that fodder harvesting is not tree clearing and consider alternative policy mechanisms to deal with routine property management activity,

Recommendation 12: Initiate an ongoing participatory dialogue with relevant stakeholders, experts, and policy makers to identify better ways forward for the regulatory systems and policy environments that overlay management in dynamic, highly modified ecological communities, and

Recommendation 13: Develop a process that allows the ongoing identification of information and knowledge gaps affecting mulga lands ecology, management and policy information needs, and identify the mechanisms to capture, preserve, share and update information.

Disclaimer

This is a summary of the final report and is not government policy. The report and summary reflect the interpretation of data by the authors. While every reasonable effort has been made by the authors to ensure that the data and interpretation of those data in this summary and report are accurate, the authors do not accept responsibility or liability for any loss or damage that may occur directly or indirectly through the use of, or reliance on, the contents of this publication. The views and interpretation of data are that of the authors and do not represent the views of The University of Queensland, the University of Southern Queensland or the Australian Government.

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