PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY BIENNIAL CONFERENCE

Official publication of The Australian Rangeland Society

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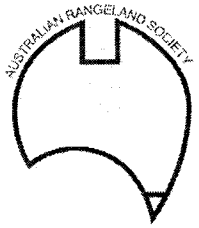

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HOW MUCH BIODIVERSITY CAN A PASTORALIST AFFORD?

Neil D. MacLeod and John G. McIvor

CSIRO Sustainable Ecosystems Long Pocket Laboratories 120 Meiers Rd Indooroopilly Q 4068

ABSTRACT

The need to preserve biodiversity in privately managed rangelands is acute and well recognised. The best way to achieve this is to introduce better landscape design and vegetation management in contemporary production systems. The challenge remains to achieve wide-scale adoption of modified systems. We review findings of a case study that explored the application of design principles to promote biodiversity in grazed woodlands. Poor economic prospects, management difficulties, and equity issues emerged as major barriers to changing present practice. Suggestions are offered on how pastoralists may address these issues to move forward. Public initiatives to support this management shift are canvassed.

INTRODUCTION

Problems of biodiversity decline in rangeland ecosystems are well known. Formal reserves have an important role in retarding this decline but their limited effectiveness requires that biodiversity also be conserved on privately managed rangelands (Pressey 1995). The best way to achieve this goal is to introduce better patterns of landscape design and vegetation management into contemporary production systems (McIntyre 1994). A challenge, however, will be to promote the wide-scale adoption of these modified production systems. Central to this is the question of whether pastoralists can afford to implement them, and who will gain from the effort?

The paper draws on a case study in the grassy woodlands of Queensland that explored the potential application of landscape design principles developed to optimise ecological sustainability including conservation of biodiversity (McIntyre et al. 2000). Poor economic prospects, compounded by difficult management issues and equity, emerged as barriers to changing present practice. These issues are canvassed and some positive suggestions made on how pastoralists might address these issues in order to move forward. Only some of the benefits of conserving biodiversity will accrue to pastoralists. Equity is an important issue for adopting new practices with resource conservation outcomes.

LANDSCAPE DESIGN PRINCIPLES

The Grazed Landscapes Management Project explored options for sustainable use of grazed woodland ecosystems using 4 case study properties in south-east Queensland (size range 900-10,000ha). An integrated set of landscape design principles (McIntyre et al. 2000) was developed and tested against the present management systems. These principles included:

- maintenance of a perennial tussock grass structure across the landscape (70% minimum for pasture area)
- minimum levels of tree cover across the landscape (30% minimum woodland structure)
- viable stands of trees/shrubs (5-10ha) on all major land types
- limiting intensive land uses (»30% maximum area)
- riparian buffers (40-100m), preferably fenced for controlled stock access
- protection of vegetation on potential recharge areas where a salinity hazard exists
- protecting critical habitat (10% area for dedicated reserves)
- linkages of vegetation established between these elements across the landscape

COMPARISON OF CASE STUDY PROPERTIES AND PRINCIPLES

Resource assessments were made for the 4 properties against the principles (Martin *et al.* 1999) and the economic task of rehabilitating the landscapes was estimated by simulation modelling (MacLeod and McIvor 1999). The economic cost has two components: (a) opportunity income losses of foregone grazing due to changing tree/grass balance, and (b) the capital cost of any rehabilitation works.

The major re-vegetation tasks required to meet the design targets were to address potential salinity risks and to restore vegetation buffers in riparian areas. Two properties were assessed to have salinity risks and required 145 ha and 1707 ha of extra woodland respectively. All 4 properties required extra woodland in the riparian areas (range 41 to 333ha). Provided this amount of woodland was restored, little extra woodland was needed to meet the needs for viable patch sizes or overall woodland cover.

Current pasture production on the properties was estimated using the GRASP pasture growth simulation model (McKeon *et al.* 2000). The tree basal areas were then changed to reflect the woodland cover on the properties if the principles were applied and the simulations re-run. The pasture utilisation rate was kept constant and the impact of the reduced forage production on carrying capacity was calculated (McIvor and MacLeod 1999). The additional woodland was estimated to reduce carrying capacity by 8-23%. The effect of implementing the required landscape restoration tasks on the profitability of the 4 case properties was to reduce gross margins (revenue – direct costs) by 10-25% and after overhead costs are accounted for, further reduce net profit by 30-80%.

The effect of small changes in gross margins on profit is amplified when profit margins are already low, a common case for rangeland grazing enterprises. Conservation management systems that require income sacrifices of the projected order are not likely to be implemented very rapidly. These sacrifices do not include the projected capital cost of implementing the systems that are estimated to be between $65-120 per hectare across the 4 case properties. The projected outlays may understate the actual rehabilitation task. Fencing and planting strategies may require a major relocation and redesign of infrastructure and additional labour to maintain the conservation works, a further disincentive to undertake such rehabilitation work.

BARRIERS

The ecological theory behind the principles and their practical application were canvassed with 3 landholder panels. Numerous management and equity issues were identified as major barriers to adoption. These included (a) economic – benefits compared to costs and effort; (b) technical – treatment efficacy, pest, weed or fire hazards; (c) strength of conviction - incomplete acceptance of a need to act – part related to doubt on technical effectiveness and to acceptance of the claimed extent of landscape dysfunction; (d) time scales – hazard emergence and repair effectiveness (needs more explanation); (e) situation – age of owners, farm size and plans for property retention/disposal; (f) equity - distribution of benefits and costs; (g) loss of freehold rights and sovereign risk; and (h) limited agro-forestry alternatives. Suggestions from the landholders to resolve some of these issues generally related to smaller local initiatives (e.g. fire control in a remnant, more off-stream waters, retaining a few more trees) and rarely to wide-scale options to fully accommodate the principles. The task was simply seen as too big, too expensive, inconsistent with commercial practice or an unreasonable impost to provide non-compensated public benefits.

MOVING FORWARD

The imperative to protect biodiversity is urgent and the impasse on adoption must be broken. Key issues to be resolved are to clearly define pastoralists' "duty of care" for land management, and finding cost-effective "Pareto" type options for sharing benefits and costs equitably between pastoralists and the broader community.

Duty of Care

The boundary between a reasonable expectation of pastoralists exercising a "duty of care" and making a public good sacrifice is ill-defined. Many pastoralists consider it inequitable to have to provide non-compensated public benefits. This is important because a mandated duty of care is central to policy thinking on sustainable land management (Industry Commission 1998). Binning (1997) draws a "line between practices that are required to achieve land use objectives at a landscape or regional scale and additional practices or investments to sustain local sites of unique conservation value". The former is argued to represent a legitimate expectation by the community of private landholders fulfilling a duty of care, while the latter is seen to be a clear case of making a significant commitment to the public good. Compensation under this particular viewpoint is justified only in the latter case. Many pastoralists would reject this distribution of responsibility for conservation; and the components of landscape function included in "regional scale land use objectives" are contentious. A resolution is required as a matter of urgency.

Pareto options

The Pareto "20:80" rule, where the initial commitment of resources and effort (20%) gives most of the desired result (80%), is well-recognised. It may be cost-effective to strategically apply elements of the design principles to gain a large proportion of the desired biodiversity outcome without incurring all the large projected income and capital losses mentioned above. Examples are conservative management of riparian vegetation, wider provision of off-course waters, and active protection of woodland remnants. There may be scope to fence out larger waterholes to recreate viable riparian reserves along the main channels. While the ecological performance of these multiple-purpose reserves for wildlife conservation and watercourse protection is unclear, it is a step forward. The capital costs should be considerably lower.

Institutions and Market Mechanisms

Working with the 3 landholder panels yielded valuable insights on how new institutions and market instruments might impact on decision-making. Options to promote biodiversity include: (a) information and motivational programs - education, training, information, networks; (b) management agreements - contracts/covenants; (c) revolving funds – land exchanges with attached conditions; (d) financial incentives – subsidies, cost reimbursement, tax deductions, rate rebates; and (e) regulatory mechanisms – rights, obligations, and proscribed practices. The panels acknowledged that these mechanisms might be important in some contexts. Compensation is a necessary, but insufficient step, for easing the barriers. Rate rebates and subsidies are "sweeteners", but insufficient inducement for large-scale action. Tax concessions demonstrate a direct public contribution to on-farm works, notwithstanding the limited compensation to small enterprises. Regulations (especially tree clearing) are usually rejected.

Most incentives are seen to not be sufficiently attractive to overcome the economic, technical and other barriers to implementing additional biodiversity conservation measures, much beyond those already in place. These views are consistent with the large economic gap between the existing profitability of the case properties and that projected with adoption of the design principles. Even if capital works were fully underwritten by the community, there remains the prospect of a sizeable and ongoing income loss. It is hard to see a situation emerging in which the community would seriously meet both the up-front costs and an annual compensation payment for lost income opportunities consistent with the scale of the task at hand.

CONCLUSION

Biodiversity conservation is a classic `public good' that will not be provided in the quantities that would be traded in informed markets. Public provision could involve dedicated conservation reserves maintained at public expense (e.g. national parks, state fauna reserves). It could also be accomplished

through direct payments to private landholders for providing conservation services, in much the same way as they are rewarded for contemporary range products (livestock, crops and limited eco-tourism). However, this is not presently happening to any great degree. Efficient and equitable market mechanisms and institutions do not exist to facilitate the necessary cost-sharing required to compensate landholders for their efforts and income losses from foregone agricultural production. There is a long way to go in developing and implementing these types of mechanisms and the size of the gap between private and public benefits and costs is large. In the meantime, limited Pareto type options on private lands may be the best that can be hoped for as cost-effective, stop-gap measures. It really comes down to how much biodiversity a pastoralist either can or is willing to afford.

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ACKNOWLEDGEMENT

The work reported in the paper was funded by Land and Water Australia and the Biodiversity Unit of Environment Australia, as project CTC9 within the National Remnant Vegetation Program.