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BIODIVERSITY MONITORING OR BIODIVERSITY MANAGEMENT SYSTEMS: WHICH IS THE CART AND WHICH IS THE HORSE?

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ABSTRACT

The National Land and Water Resources Audit was initiated in order to assess the state of Australia's living natural resources, to better inform decision-makers, and to underpin further investment programmes to address the degradation of the country's living natural resources that has occurred since European settlement. For the rangelands, it was felt that an assessment was not feasible, and effort was focussed on developing an auditing framework. The Australian Collaborative Rangelands Information System (ACRIS) emerged as a result.

The major thrust of ACRIS involves consolidation of existing efforts across jurisdictions. However, ACRIS lacks information about biodiversity - apart from the information collected for pastoral resource monitoring, there is no regionally-consistent biodiversity monitoring over the *c* 75% of the continent referred to as the rangelands. Filling this identified gap is the focus of some of the work under ACRIS.

Present efforts to develop the biodiversity monitoring component of ACRIS have a strong research and science base. We suggest, as an alternative, an approach that is closely aligned with day-to-day management of the rangelands, and the use of Environmental Management Systems to guide that management. A nested hierarchy of EMSs from the regional through the catchment to the individual enterprise scale provides a suitable framework for achieving improved biodiversity management of the rangelands, including monitoring and reporting. We describe this framework and the approach being adopted in Western Australia to develop the regional-scale EMS components that provide the context for the operational-scale EMSs.

INTRODUCTION

The emergence of the conservation of biodiversity as a major issue and land management objective in the rangelands occurred at a time of paradigm shifting in the 1980s. This shift recognised the limitations of the maximum sustainable yield approach to the use of natural resources at the time of emergence of the concept of ecological sustainability (Anon. 1999, Morton *et al.* 1995, Pringle 1998).

Steve Morton and his colleagues broke through the initial confusion as to how biodiversity and maximum sustainable yield could be reconciled in rangelands with their landmark stewardship paper (Morton *et al.* 1995). CSIRO then undertook a series of major research projects to assess exactly how biodiversity's more easily measured components in more common habitat types were affected by the structure and history of pastoral development (James *et al.* 2000, Landsberg *et al.* 2002). They found that there are organisms that benefit, organisms that are adversely affected, organisms that show little response, and organisms that cannot persist in paddocks with artificial watering points and livestock. It is possible that the results were surprisingly positive: most species appeared capable of persisting in the paddocks sampled (Landsberg *et al.* 2002). However, it should be noted that the requirement for water remote areas in these paddocks made them unrepresentative of the rangelands as a whole; for example, by not including moist, drought buffering habitats amongst the water remote habitats. It is, therefore, almost certain that the findings were conservative (Pringle 2002) because important, less common habitats are invariably far more degraded (Pringle and Tinley 2003).

The National Land and Water Resources Audit (The Audit) identified that the rangelands' focus should be on developing the processes and information system such that, in future audits, the rangelands could be assessed with more rigour (Anon. 2001). The Audit may have inadvertently diverted attention from how to manage rangeland biodiversity, to how to monitor it, partly because there is a relatively small community of ecologists dealing with such rangelands issues.

MONITORING OR MANAGING BIODIVERSITY?

Steve Morton and his colleagues in Alice Springs gave us a path to explore that should have led to widespread improvement in the way that biodiversity was managed in the rangelands. And some of us took up the challenge of working out how stewardship could work locally and regionally with the rangelands communities and their representatives (Pringle *et al.* 2003). However, it seems that a preoccupation with reporting, for example, for national State of Environment reporting and for The Audit, diverted attention away from how to manage biodiversity better, to an elusive pursuit of a possibly never-to-be-funded rigorous national rangeland biodiversity monitoring programme. Similar experiences (from which we could learn) have already been had in the United States (Kepner and Fox 1991, West *et al.* 1994).

It would be wonderful to imagine that we could develop and then sustain a scientifically rigorous, national rangeland monitoring system that included biodiversity prominently (Anon. 2001, Watson and Novelly 2004). However, at this juncture, we lack the prerequisite visions, objectives, targets and key performance indicators that might justify a national rangelands biodiversity monitoring system being developed. We also lack the overarching management system into which the monitoring system would provide intelligence. We have failed to have the critical discussions of how to manage biodiversity in the rangelands, though some different approaches have been proposed (Fisher 2001, James *et al.* 2000, Pringle *et al.* 2003). And the people who manage most biodiversity are yet to be genuinely involved in most approaches.

The approach that we have attempted to develop in Western Australia involves directly the pastoralists who manage the *c* 980,000 sq km of pastoral leases, and managers of other land tenures in the rangelands. First, and in collaboration with a wide range of individuals, we have developed the basis for an enterprise-scale Environmental Management System for the rangelands. As a result of a pilot project in the Gascoyne-Murchison sub-region of the WA rangelands NRM region, there are now three pastoral enterprises in that sub-region (one cattle, one goat and one merino sheep) that have Environmental Management Systems and are internationally certified; all three have been re-audited recently (Taylor 2002). Each EMS is developed following completion of the Ecosystem Management Understanding (EMU) process, which identifies issues to be dealt with in the EMS and provides solutions (Pringle and Tinley 2001). The EMU-based EMS provides a sound model for the rangelands as a whole.

Second, we have developed a range of monitoring tools and protocols for use by pastoralists and other land managers that can inform management planning and decision-making. While these are mainly directed at specific management issues such as erosion and pastoral production, they provide a sound basis for engaging the pastoralists in monitoring a broader range of issues including particular biodiversity values and native vegetation condition as a general biodiversity indicator (www.emuproject.org).

A key issue that has arisen in developing the enterprise-scale EMSs is a lack of context. For example, how does one determine the biodiversity conservation outcomes to be included in each enterprise's EMS when there is no overarching, regional biodiversity conservation plan? If there was such a plan, with the [hypothetical] goal of "no further loss of biodiversity from the sub-region," it would be appropriate to include in the enterprise-scale EMS the protection and conservation of all populations of any rare and threatened species (as happens, but in a somewhat *ad hoc* manner).

In response to this emerging conundrum, we developed a conceptual planning framework for the rangelands involving a nested hierarchy of EMSs, as illustrated in Figure 1. The next challenge is to develop the higher level EMS in a manner that is inclusive yet produces useful and meaningful results that provide the context required at the enterprise scale. An initiative of the Rangelands Region NRM Coordinating Group which we describe below will inform assessments of regional priorities that will deliver the required context to enterprise-scale EMSs as well as the opportunity to develop similarly rigorous and accountable processes at a regional level (see below). A coherent, holistic and hierarchical framework for regional NRM is within our grasp for Western Australia's rangelands.

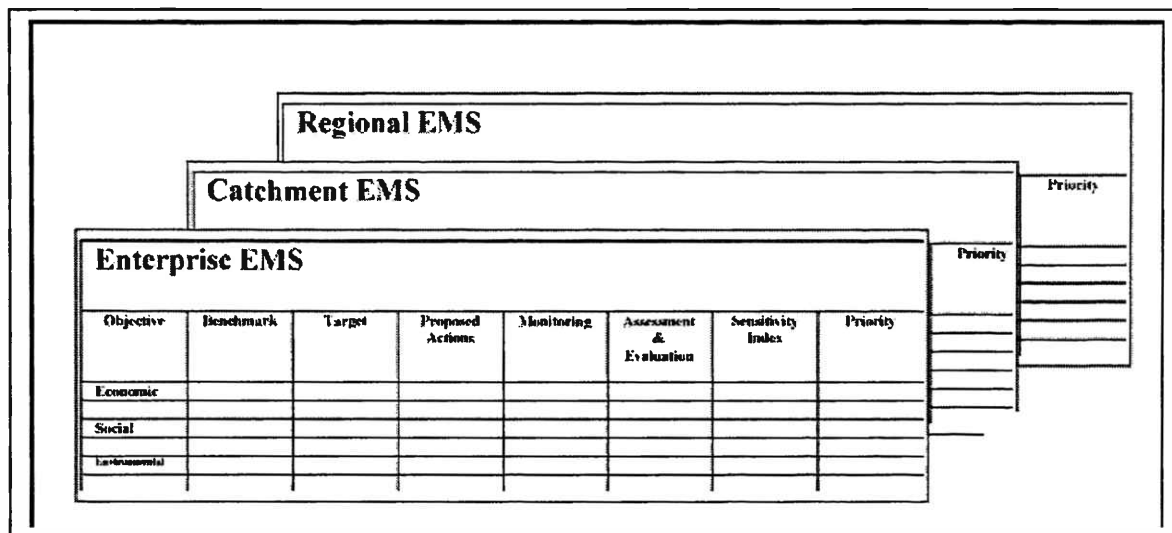


Figure 1. The nested hierarchy of EMS identified as the ideal model for planning and managing the rangelands.

THE EAGLE PROJECT: A PARTICIPATORY, VERTICALLY INTEGRATED AND INFORMAL EMS APPROACH

The Rangelands Region NRM Coordinating Group established to deliver investment funds under the Natural Heritage Trust II approached the EMU Team and asked if we could build some EMU principles and processes into the regional NRM planning initiatives currently underway. The hope was that we could develop some common ecological understanding of sub-regions with regional stakeholder representatives and support staff and provide a framework with which to develop integrated, rather than thematic and disintegrated priorities, management plans and investment strategies. This was timely, as we had been working conceptually on a participatory model for "paddock to parliament" Environmental Management Systems (Pringle *et al.* 2002, Pringle *et al.* 2003), and Angus Hopkins had recently been appointed co-ordinator for the State Biodiversity Strategy development project. Now we had some specific demand and resources to start on implementation. Our funding submission to do this work has been recommended by the W.A. Joint Steering Committee and we await an anticipated favourable outcome. The project will be underway at the time of the conference in Alice Springs in July and progress will be reported there.

The focus of the pilot project will be the Gascoyne-Murchison sub-region, but support will also be given to key NHT and State Government staff in the Goldfields-Nullarbor, Pilbara and Kimberley regions. They can either run with the project with some assistance from us, or will conduct their sub-regional planning in a way consistent with future adoption of the Eagle process.

The project has four major components:

1. Preparation, preliminary evaluation and planning.

Preliminary work will be undertaken by the EMU Project Team to develop locally relevant workshop materials, information products and to identify study sites for sub-regional familiarisation.

2. Sub-regional Workshops.

Workshops' content will include:

- i) Landscape concepts and processes – and introduction (also introduction to the map data sets).
- ii) Overview videos and discussion of ecosystem pattern and process within each major geo-ecological unit in the sub-region. For instance, in the Gascoyne-Murchison sub-region we would address at least one major westward flowing river, one major salt lake / internal drainage catchment and one major coastal / marine area.
- iii) On-ground visits to sub-regional priority entities and issues, with discussion on each.
- iv) Integration / consolidation of understandings, discussion of ecosystem management and landscape ecology principles and approach, and what that means for the planning processes in each sub-region.

3. Training for sub-regional NRM human resources.

For support staff in the Gascoyne-Murchison Sub-region, as well as key staff from other sub-regions (and any members of the Rangelands Group who are interested and available), we will hold a four to six day field course. It will include two days of assessment of regional data sets, remotely sensed images and so forth to provide background to fundamental information and processes for each sub-region.

4. Follow-up workshops for sub-regions.

Workshop focus will include:

- i) Opportunities for integrated asset management, bringing together the different priority sub-regional assets identified by different stakeholder groups (two days), and
- ii) Integrated asset management planning – to include developing projects that provide the desired level of integration and linking to investment program (two to three days).

We hope to reveal the major synergies available from working on multiple assets together within integrated projects and in so doing, develop an ecosystem management capacity within sub-regions.

Just as participants in the EMU Process focus their resources and management on local and catchment assets and threats to them within an overarching ecological model and appreciation of wider context (including on private and government conservation lands), so too will key stakeholders within sub-regions, but at a much broader scale. This nested consistency of prioritising investment and activity cognisant of wider context will enable vertical cohesion for “paddock to parliament” management of natural resources, including biodiversity. Funding will be allocated to projects within sub-regions based on the extent to which they address a hierarchy of asset values (including abstract values such as land literacy). Investment may differ substantially between integrated projects addressing internationally and nationally important (and threatened) assets to those whose significance is primarily part of maintaining biodiverse and productive local ecosystems.

Importantly, the process will look beyond thematic silo projects (e.g. Bushcare, Landcare, Coastcare and Rivercare) that can be inefficient and often suffer from lack of wider context. For instance, and we use an eastern coast example so as not to compromise the ethical processes before the project has even started in W.A., imagine a coral reef system that is being smothered in sediment. In this project, we would recognise this not simply as a marine issue, but one of catchment management as well. Quite conceivably, the bulk of funding would be invested many hundreds of kilometres away from the precious, threatened and degrading asset in the form of catchment restoration and reticulation of watering points away from critical control points for catchment function (Pringle and Tinley 2003). Our monitoring would focus on adaptively ameliorating the causes of degradation as much as the responses of the assets.

Local management systems will acknowledge sub-regionally or even globally important local assets, while sub-regional management systems will be responsive to, and encourage positive outcomes at, local levels. Tenure boundaries will be seen as artefacts that need to be accommodated, rather than as the boundaries for natural resource management objectives and projects. It is hoped that the integrated, community-based natural resource management that has emerged through the EMU Process (Murchison Land Conservation District Committee and the Ecosystem Management Unit 2002), will now blossom at higher levels based on similar attention to ecological context and ethical engagement and empowerment.

Together, the Eagle and the EMU processes will provide consistency of approach from “paddock to parliament”, based on the following critical features:

1. Ethical, participatory processes as the basis for progress,
2. Linking resources to priorities from paddock to parliament,
3. Monitoring in many ways and places for many different reasons, but always to provide intelligence for better management first, and for generating rigorous reports second, and
4. Vertical interchange of contextual and outcome information to stimulate better management and policy.

Biodiversity will be managed better, more systematically, and we will document this progress. Managing, including monitoring, will be our focus.

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REFERENCE LIST

Anon. (1999). *National principles and guidelines for rangeland management*. Australian and New Zealand Environment and Conservation Council ANZECC and Agriculture and Resource Management Council of Australia and New Zealand ARMCANZ, Canberra.

Anon. (2001). *Rangelands - Tracking Changes*. Australian Rangeland Collaborative Information System. National Land and Water Resources Audit, Canberra.

Childs, J., Whitehead, P., Woinarski, J., Fisher, A., and Verhagan, C. (2001). *Developing an adaptive framework for monitoring biodiversity in rangelands*. A report for the National Land and Water Audit Rangelands Project Report. Tropical Savannas Co-operative Research Centre, Canberra.

Fisher, A. (2001). *Biogeography and conservation of Mitchell grasslands in northern Australia*. PhD Thesis, Northern Territory University, Darwin.

Freire, P. (1972). *Pedagogy of the Oppressed*. Pelican.

James, C.D., Stafford Smith, D.M., Landsberg, J., Fischer, A., Tynan, R., Maconochie, J., and Woinarski, J. (2000). Biograzing - melding off-reserve conservation of native species with animal production in Australian Rangelands. *In Nature Conservation 5: conservation in production environments, managing the matrix*. pp. 290-300. Surrey Beatty and Sons Pty Ltd, Chipping Norton, NSW.

Kepner, W.G. and Fox, C.A. (1991). *Strategic Monitoring Plan: Arid Ecosystems*. U.S. Environmental Protection Agency, Las Vegas, Nevada.

Landsberg, J., James, C.D., Maconochie, J., Nicholls, A.O., Stol, J., and Tynan, R. (2002). Scale-related effects of grazing on native plant communities in an arid rangeland region of South Australia. *Journal of Applied Ecology* **39**, 427-444.

- Morton, S.R., Stafford Smith, D.M., Friedel, M.H., Griffin, G.F., and Pickup, G. (1995). The stewardship of arid Australia: ecology and landscape management. *Journal of Environmental Management* 43, 195-217.
- Murchison Land Conservation District Committee and the Ecosystem Management Unit (2002). *The Murchison River Project: Pastoralists restoring health to the Murchison River catchment*. Shifting Camp, Proceedings of the 12th Biennial Australian Rangeland Society Conference, pp. 312-313.
- Pringle, H. and Tinley, K. (2001). Ecological sustainability for pastoral management. *Journal of Agriculture* 42, 30-35.
- Pringle, H.J.R. (1998). Environmental Auditing Beyond 'Range Condition': A Western Australian Perspective. *Journal of Arid Land Studies* 7S, 35-38.
- Pringle, H.J.R. (2002). *Grazing impacts in rangelands: Assessment of two contrasting land types in arid Western Australia from different land management perspectives*. PhD Thesis, Australian National University, Canberra.
- Pringle, H.J.R., Lewis, M., Hopkins, A.J.M., and Curry, P.J. (2002). *A preliminary sustainability framework for the Gascoyne-Murchison Region of Western Australia*. Shifting Camp, Proceedings of the 12th Biennial Australian Rangeland Society Conference. 336-337.
- Pringle, H.J.R. and Tinley, K.L. (2003). Are we overlooking critical geomorphic determinants of landscape change in Australian rangelands? *Ecological Management and Restoration* 4, 180-186.
- Pringle, H.J.R., Tinley, K.L., Brandis, T., Hopkins, A.J.M., Lewis, M., and Taylor L. (2003). *The Gascoyne-Murchison Strategy: A people-centred approach to conservation in arid Australia*. Invited paper, Proceedings of the International Rangelands Congress 2003, Durban, South Africa.
- Smyth, A., James, C., and Whiteman, G. (2003). *Biodiversity monitoring in the rangelands. A way forward. Volume 1*. Centre for Arid Zone Research, CSIRO Sustainable Ecosystems, Alice Springs.
- Smyth, A.K. and James, C.D. (2004). Characteristics of Australia's rangelands and key design issues for monitoring biodiversity. *AustralEcology* 29, 3-15.
- Taylor, L.J. (2002). *Developing an Environmental Management System. A practical guide for pastoralists*. Department of Agriculture Western Australia for the Gascoyne-Murchison Strategy, Perth.
- Tinley, K.L. and Pringle, H.J.R. (2002). *What is the EMU Exercise?*. Shifting Camp, Proceedings of the 12th Biennial Australian Rangeland Society Conference. 349-350.
- Watson, I. and Novelly, P. (2004). Making the biodiversity monitoring system sustainable: Design issues for large-scale monitoring systems. *AustralEcology* 29, 16-30.
- West, N.E., McDaniel, K., Smith, E.L., Tueller, P.T., and Leonard, S. (1994). *Monitoring and Interpreting Ecological Integrity on Arid and Semi-Arid Lands of the Western United States*. New Mexico Range Improvement Taskforce, Las Cruces, New Mexico.