

Celebrating diversity: people, place and purpose. A synthesis of the 17th Biennial Conference of the Australian Rangeland Society¹

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Abstract. Eight overarching impressions drawn from the 17th biennial conference are presented which are generally compatible with views on future challenges and directions for rangeland science and management expressed independently in a recent international forum. These impressions relate to (1) loss of research capacity, especially in the southern rangelands of Australia, (2) a need for greater collaboration and role clarity in rangelands research and development, (3) the importance of scaling issues in the conduct and application of research, (4) widespread understanding of rangelands as social-ecological systems, (5) complementarity of production and biodiversity conservation, (6) progress in regional planning, (7) policy as a legitimate field of research endeavour, and (8) a need to question the ‘traditional’ perspective on rangeland science.

Additional keywords: rangeland science, socio-ecological systems, scaling issues, regional planning, biodiversity conservation.

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Introduction

This conference set out to celebrate the diversity of interests in Australian rangelands, locally in the first instance but also generally. That diversity was evident in the range of session topics which included global trends and their impact of rangelands; land-use planning for multiple users and uses; livestock production systems; ecosystem function, assessment and monitoring; fire management and carbon sequestration; and policy development and implementation. From the papers and posters presented at the conference and from the plenary papers and discussions, it is possible to discern some overarching themes notwithstanding those which necessarily suggest themselves from the structure that the Organising Committee had established. It is these overarching impressions that are the subject of the present paper recognising, of course, that what is presented is necessarily a personal view.

First impression – a loss of research capacity, especially in the southern rangelands of Australia

An examination of the abstracts submitted to this conference indicates that, while the number of papers with distinct affiliation to either the northern (predominantly summer rainfall) or southern (aseasonal or winter rainfall) rangelands of Australia was about equal, there was a substantial dominance of applied research rather than development papers from the north. About twice as many titles that could be described as applied research –

whether it be biological, economic or social, and experimental or model-based – were submitted from northern Australia compared with the south.

It seems unlikely that this disparity simply reflects the location of the conference venue in northern Australia. Rather, as agricultural Research and Development capacity in Australia, and indeed the rest of the western world (Cribb 2010), has been run down in recent decades, so the impact has arguably been greatest in the least productive or economically important environment – the southern rangelands. In opening the conference, the Hon. Wendy Duncan noted in passing that rangeland research seemed to have ‘fallen off the radar’ in recent years. That is a good description of the parlous state of rangeland research capacity in the southern rangelands. Quirk (2012) identified the decline in Research, Development and Education capacity as a risk for the northern beef industry. While northern Australia is no doubt subject to the general decline in capacity that Cribb (2010) has identified, the situation in the southern rangelands is particularly acute.

It seems likely that publicly-funded agricultural Research and Development capacity will have to be re-established in the foreseeable future, both in Australia and globally, in order to meet the challenges described by Holeček (2013) of the simultaneous increase in global population and standards of living in the context of limitations to oil, fresh water and Phosphorus, and the impacts of climate change.

¹This paper is based on the author’s summary of the conference presented to the closing session.

Second impression – a need for greater collaboration and role clarity in rangelands research and development

It seems unlikely that any long-term trend towards a restoration of publicly-funded agricultural Research and Development capacity will quickly translate into an increase in effort in the rangelands, particularly the southern rangelands. Supporting the evolution of management systems that allow sustainable use and occupation of the Australian rangelands will, therefore, require increased collaboration among stakeholders to use efficiently the few Research and Development resources that are available. Landholders must be encouraged to more actively carry out the sorts of investigations that they can do well, and exchange that information among themselves. Scientists will need to work more collaboratively with land managers where some limited scientific input can add value, and scientists themselves will need to work more collaboratively across Australia where issues of national importance can be identified.

Third impression – scaling issues will assume greater importance in the conduct and application of rangeland research and development

A more active collaboration between scientists and land managers will inevitably mean that research will increasingly be conducted at larger scales than the conventional experimental scales, without the refinements of experimental design that have served the research effort well in the past (and will continue to do so for those programs that can justify a reductionist approach). Fundamental to such collaboration will be agreement on mutually acceptable standards of evidence and the roles that each party will need to play to acquire the necessary data. A feature of the Conference was a dichotomy of views regarding the value of case studies that presented valid producer experience but left unanswered many questions of cause and effect. Future collaborative research and development will need to address this issue at the outset, recognising that rigid statistical standards cannot be met but ‘necessary and sufficient’ evidence can be produced with adequate forethought and planning. Even where reductionist approaches can be retained there is a need to develop tools to permit the scaling-up of results to commercial or landscape scale, of which the work described by Scanlan *et al.* (2013) is among the few examples currently available. In a different context Higgins *et al.* (2013) provided an example of the potential of current computing capacity to address supply-chain issues for beef at scales ranging from the enterprise to the region and wider geographical scales.

Fourth impression – widespread understanding of rangelands as social-ecological systems

An understanding of rangelands as social-ecological or complex adaptive systems was clearly reflected in many of the papers and posters presented. Either explicitly or implicitly, these contributions recognised the importance of the human dimension, of learning by doing and of making the connection between management and landscape change. An emphasis on the human dimension has, in fact, been to the forefront in Australian thinking for some time, and has been reflected in biennial conference programs and papers at least from the time of the 9th Conference of

the Australian Rangeland Society held in Port Augusta, South Australia in 1996.

In one of the more significant developments in the interval between this (17th) conference and the last, Briske *et al.* (2011) added a postscript to a major review (Briske *et al.* 2008) of the long-standing controversy over continuous and rotational grazing, a subject that was touched on marginally at this conference. They concluded that ‘the rotational grazing debate can best be resolved by understanding grazed rangelands as complex adaptive systems, and that viewed in this way, the evidence supporting and refuting the benefits of rotational grazing can be seen as complementary not contradictory’. In essence, the understanding of the system cannot be divorced from the situation in which the human participant is operating. Their postscript emphasised that ‘social sciences need to become an integral component of the rangeland profession, and the role of the human dimension needs to become a central component of rangeland research’. The questions remains, however, as to whether the techniques are adequately developed that will allow the effective incorporation of this dimension, an issue obviously related to both the second and third impressions above.

A notable aspect of this Conference, and one which developed a theme initiated at the last Conference, was the number of examples of the incorporation of indigenous knowledge into regional planning and on-ground land management (e.g. Dobbs *et al.* 2012). The importance of local knowledge is a distinguishing feature of social-ecological systems and, in the north-west of Australia, indigenous knowledge is surely a large component of the local knowledge that can be brought to bear on land management.

Given the general understanding of rangelands as social-ecological systems, it was somewhat surprising that only a few papers dealt with rangeland monitoring since monitoring and feedback to management is a fundamental component of such systems. Only one paper (Page and Grierson 2012) dealt with this issue at a technical level, although some others described projects in which monitoring was an integral component. While the subject has received considerable attention in previous conferences and might now be considered a little passé its importance for the promotion of resilience in social-ecological systems cannot be underestimated. Indeed, a challenge still remains of incorporating monitoring information effectively into resource management at a variety of scales

Fifth impression – production and biodiversity conservation seen as complementary rather than competitive

The conference was notable for the progress being made at both technical and philosophical levels in the reconciliation of livestock production and biodiversity conservation objectives. This progress was exemplified by the explicit incorporation of biodiversity measures into a major livestock production-oriented research program (Petty *et al.* 2012), recognition by an executive of an industry Research and Development corporation that achievement of non-production values should be one of the criteria for judging future success of the northern pastoral industry (Quirk 2012), and acknowledgment, in discussion, by executives of two pastoral and conservation organisations that there is

essentially no conflict between their primary interests. Perhaps in retrospect this Conference will be viewed as the milestone at which ‘them’ and ‘us’ attitudes were put aside.

Achieving the practical integration of biodiversity conservation into landscapes used primarily for production, however, will require some evaluation of the trade-offs involved and an objective basis for assessment of investment options for either private or public capital. The approach outlined by Waters *et al.* (2013) may offer considerable promise in this regard, especially if the investment of private capital in rangeland conservation can be encouraged by legislative support for the conditions described by Salmon and Gerritsen (2013). Development in these fields must be seen as a necessary adjunct to the continuing progress in the technological basis for rangeland regeneration and conservation (e.g. Chapman 2013; McIlwee *et al.* 2013; Whalley *et al.* 2013).

Sixth impression – progress in regional planning

The State of Western Australia arguably has the longest tradition of systematic rangeland inventory and condition surveys, and State-sponsored rangeland monitoring programs, in Australia, the former commencing (in its present format) in 1970 and the latter shortly thereafter. Rangeland inventory and condition surveys have now been completed over most of the areas covered by pastoral leases in this state. This knowledge base now has enormous potential to underpin sound land-use decisions and revitalise regional economies if combined with enabling land tenure legislation (Duncan 2012; Safstrom and Waddell 2013). Establishment of this knowledge base has only been possible because of long-term institutional commitment which remains a prerequisite for sustainable land use throughout the rangelands but one which unfortunately is not always mandated by legislative requirements.

Seventh impression – policy as a legitimate field of research and development

Both the fifth and sixth impressions above have highlighted the importance of the legislative or policy framework in enabling the technical progress made through research and development, survey and monitoring to be translated into sustainable land-use systems. Marshall and Stafford-Smith (2010) have argued for the importance of appropriate (polycentric) governance arrangements in allowing the effective functioning of social-ecological systems. The introduction at this Conference of a session on policy development and implementation is, therefore, a welcome initiative which appropriately recognises policy (and governance) support as a legitimate field of Research and Development. Papers by Khairo *et al.* (2013), Safstrom and Waddell (2013) and Tozer and Leys (2013) all have potential to make useful contributions to policy development across a wide range of issues.

Eighth impression – a need to question the ‘traditional’ perspective?

Few major issues relevant to rangeland use and management did not receive at least some airing at the Conference. From a ‘traditional’ perspective, the meeting, therefore, succeeded in addressing the theme of diversity selected by the organising

committee. However, given the shift in understanding of rangeland systems from ecosystems to social-ecological systems, now well entrenched, it may also be time to reconsider some of the other bases on which the rangeland profession has been built. In Australia, as in the United States, scientists only started to study the rangelands after much ecological damage from exotic animals, both livestock and other introductions such as the European rabbit, had already been inflicted - and indeed largely in response to that situation. It is hardly surprising that rangeland scientists have defined their role in terms of finding ways to reverse that damage or allowing some economic rent to be extracted from the land by exotic livestock species without disrupting the processes of the original ecosystem – the pristine state. In retrospect, it is essentially this line of thought that has underpinned the author’s own career. Arguably, rangeland scientists in Australia have not accepted that they are actually dealing with a new ecosystem, in which a new factor - exotic livestock - offers new opportunities for manipulation of ecosystem processes, while also posing some threats, and that an emphasis on functional landscapes might be more appropriate than on the pristine state (itself the product of human intervention over millennia). Had the profession taken the broader view many of the same questions would still have required answers, e.g. the response of plant species to grazing and fire, but other questions would also have been raised, e.g. the potential of livestock to contribute to nutrient cycling and landscape function. Rangeland management today is disadvantaged by the lack of clear answers to those questions.

Some parallel perspectives

A few months before the 17th biennial conference convened in Kununurra, a group of 56 researchers from seven countries met in New Mexico for a symposium to mark the centenary of the Jornada Experimental Range (Bestelmeyer *et al.* 2012). The papers of this symposium (published after the impressions above were presented to the Kununurra conference) summarise the challenges that the participants identified for rangeland science in the 21st century. Bestelmeyer and Briske (2012) summarised these ‘grand challenges’ as (1) development of knowledge systems to support resilience-based management (2) improvement of ecological models supporting science and management (3) protocols to assess and manage trade-offs among ecosystem services (4) use of models of social-ecological systems to integrate diverse knowledge sources and (5) reorganisation of institutions to support resilience-based management. Among the presented papers, Sayre *et al.* (2012) reflected on the features of an ‘emerging science’ that is moving from reductionist experimentation to landscape-scale research that incorporates local knowledge and supports ongoing, adaptive application in collaboration with managers. Brunson (2012), recognising the criticism that ‘resilience-based frameworks for social-ecological systems’ may ‘promise more than they deliver’ emphasised the need for ‘better tools and concepts for understanding interconnected systems’. Karl *et al.* (2012) proposed the development of ‘integrated knowledge systems’ to provide access to a wide variety of information relevant to specific management issues and Fuhlendorf *et al.* (2012) proposed that rangeland management should seek to conserve ‘pattern and

process' at landscape scales rather than view a single 'potential natural community' as the appropriate aim of management.

It is not difficult to see numerous parallels between these perspectives and the impressions described above. Rangeland science and practice are changing. The 17th biennial conference should allow members of the Australian Rangeland Society to take heart that they are at the forefront of this change.

References

- Bestelmeyer, B. T., and Briske, D. D. (2012). Grand challenges for resilience-based management of rangelands. *Rangeland Ecology and Management* **65**, 654–663. doi:10.2111/REM-D-12-00072.1
- Bestelmeyer, B. T., Estell, R. E., and Havstad, K. M. (2012). Big questions emerging from a century of rangeland science and management. *Rangeland Ecology and Management* **65**, 543–544. doi:10.2111/REM-D-12-00112.1
- Briske, D. D., Derner, J. D., Brown, J. R., Fuhlendorf, S. D., Teague, W. R., Havstad, K. M., Gillen, R. L., Ash, A. J., and Willms, W. D. (2008). Rotational grazing on rangelands: reconciliation of perception and experimental evidence. *Rangeland Ecology and Management* **61**, 3–17. doi:10.2111/06-159R.1
- Briske, D. D., Sayre, N. F., Huntsinger, L., Fernandez-Gimenez, M., Budd, B., and Derner, J. D. (2011). Origin, persistence and resolution of the rotational grazing debate: integrating human dimensions into rangeland research. *Rangeland Ecology and Management* **64**, 325–334. doi:10.2111/REM-D-10-00084.1
- Brunson, M. W. (2012). The elusive promise of social-ecological approaches to rangeland management. *Rangeland Ecology and Management* **65**, 632–637. doi:10.2111/REM-D-11-00117.1
- Chapman, T. F. (2013). Relic bilby (*Macrotis lagotis*) refuge burrows: assessment of potential contribution to a rangeland restoration program. *The Rangeland Journal* **35**, 167–180.
- Cribb, J. (2010). 'The Coming Famine: The Global Food Crisis and What we can do to avoid it.' (CSIRO Publishing: Melbourne.)
- Dobbs, R., Cossart, R., Close, P., and Davies, P. (2012). Strengthening scientific research and management across northern Australia through Indigenous rangers and community collaboration. In: '17th Biennial Conference, Australian Rangeland Society'. 23–27 September. Abstract available at: www.austrangesoc.com.au/userfiles/file/2012%20ARS%20Conference/ARS%20Proceedings%20v4.pdf
- Duncan, W. The Hon. (2012). The Rangelands Reform Program: implementing a plan for economic diversity in the Western Australian rangelands. In: '17th Biennial Conference, Australian Rangeland Society'. 23–27 September 2012. Abstract available at: www.austrangesoc.com.au/userfiles/file/2012%20ARS%20Conference/ARS%20Proceedings%20v4.pdf
- Fuhlendorf, S. D., Engle, D. M., Elmore, R. D., Limb, R. F., and Bidwell, T. G. (2012). Conservation of pattern and process: developing an alternative paradigm of rangeland management. *Rangeland Ecology and Management* **65**, 579–589. doi:10.2111/REM-D-11-00109.1
- Higgins, A., Watson, I., Chilcott, C., Zhou, M., García-Flores, R., Eady, S., McFallan, S., Prestwidge, D., and Luis Laredo, L. (2013). A framework for optimising capital investment and operations in livestock logistics. *The Rangeland Journal* **35**, 181–191.
- Holechek, J. L. (2013). Global trends in population, energy use and climate: implications for policy development, rangeland management and rangeland users. *The Rangeland Journal* **35**, 117–129.
- Karl, J. W., Herrick, F. E., and Browning, D. M. (2012). A strategy for rangeland management based on best available knowledge and information. *Rangeland Ecology and Management* **65**, 638–646. doi:10.2111/REM-D-12-00021.1
- Khairo, S. A., Hacker, R. B., Atkinson, T. L., and Turnbull, G. L. (2013). Alternative strategies for management of feral goats: implications for natural resource management policies in New South Wales rangelands. *The Rangeland Journal* **35**, 201–210.
- Marshall, G. R., and Stafford-Smith, D. M. (2010). Natural resources governance for the drylands of the Murray-Darling Basin. *The Rangeland Journal* **32**, 267–282. doi:10.1071/RJ10020
- McIlwee, A. P., Rogers, D., Pisanu, P., Brandle, R., and McDonald, J. (2013). Aridlands Landscape Assessment Framework: a tool to assist biodiversity conservation in South Australia's Arid Lands. *The Rangeland Journal* **35**, 211–224.
- Page, G. F. M., and Grierson, P. F. (2012). Designing new monitoring programs for the Mulga woodlands – lessons learnt from the Pilbara. In: '17th Biennial Conference, Australian Rangeland Society'. 23–27 September. Abstract available at: www.austrangesoc.com.au/userfiles/file/2012%20ARS%20Conference/ARS%20Proceedings%20v4.pdf
- Petty, S., Hunt, L., Cowley, R., Fisher, A., White, A., MacDonald, N., Pryor, M., Ash, A., McCosker, K., McIvor, J., and MacLeod, N. (2012). Sustainable development of VRD grazing land. In: '17th Biennial Conference, Australian Rangeland Society'. 23–27 September. Abstract available at www.austrangesoc.com.au/userfiles/file/2012%20ARS%20Conference/ARS%20Proceedings%20v4.pdf
- Quirk, M. (2012). The livestock industry and its future in the Australian rangeland. In: '17th Biennial Conference, Australian Rangeland Society'. 23–27 September.
- Safstrom, R. D., and Waddell, P.-J. (2013). Using economic, social and ecological spatial patterns to guide policy development in the Pilbara and Southern Rangelands of Western Australia. *The Rangeland Journal* **35**, 231–239.
- Salmon, M., and Gerritsen, R. (2013). A more effective means of delivering conservation management: a 'New Integrated Conservation' model for Australian rangelands. *The Rangeland Journal* **35**, 225–230.
- Sayre, N. F., deBuys, W., Bestelmeyer, B. T., and Havstad, K. M. (2012). "The Range Problem" after a century of rangeland science: new research themes for altered landscapes. *Rangeland Ecology and Management* **65**, 545–552. doi:10.2111/REM-D-11-00113.1
- Scanlan, J. C., MacLeod, N. D., and O'Reagain, P. J. (2013). Scaling results up from a plot and paddock scale to a property – a case study from a long-term grazing experiment in northern Australia. *The Rangeland Journal* **35**, 193–200.
- Tozer, P., and Leys, J. (2013). Dust Storms – what do they really cost? *The Rangeland Journal* **35**, 131–142.
- Waters, C. M., Penman, T. D., Hacker, R. B., Law, B., Kavanagh, R. P., Lemckert, F., and Alemegegn, Y. (2013). Balancing trade-offs between biodiversity and production in the re-design of rangeland landscapes. *The Rangeland Journal* **35**, 143–154.
- Whalley, R. D. B., Chivers, I. H., and Waters, C. M. (2013). Revegetation with Australian native grasses – a reassessment of the importance of using local provenances. *The Rangeland Journal* **35**, 155–166.