# Contributors

N. Abel, *CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601, Australia.*

S. Archer, *Department of Rangeland Ecology and Management, Texas A&M University, College Station, TX 77843, USA.*

W. Bayer, *Freelance consultant in pasture management, Rohnsweg 56, D-37085 Göttingen, Germany.*

R. Behnke, *Overseas Development Institute, 111 Westminster Bridge Road, London SE1 7JD, UK.*

R. Blench, *Overseas Development Institute, 111 Westminster Bridge Road, London SE1 7JD, UK.*

A. Bowman, *New South Wales Agriculture, PMB 19, Trangie, NSW 2823, Australia.*

D.M.J.S. Bowman, *Key Centre for Tropical Wildlife Management, Northern Territory University, Darwin, NT 0909, Australia.*

D.D. Briske, *Department of Rangeland Ecology and Management, Texas A&M University, College Station, TX 77843, USA.*

S. Campbell, *Norwood, Blackall, QLD 4472, Australia.*

S. Christiansen, *United States Department of Agriculture Agricultural Research Service, Office of International Research Programmes, Beltsville, Maryland 20706, USA.*

J. Davies, *Faculty of Agriculture and Natural Resources Centre, University of Adelaide, Roseworthy Campus, Roseworthy, SA 5371, Australia.*

S. Díaz, *IMBIV & FCEFyN, Universidad Nacional de Cordoba, C. Correo 495, 5000 Cordoba, Argentina.*

G. Fitzhardinge, *PO Box 35, Mandurama, NSW 2792, Australia.*
B. Foran, *CSIRO Sustainable Ecosystems, PO Box 284, Canberra, ACT 2601, Australia.*
C.D. Freudenberger, *Ethics Consultant, 745 Plymouth Road, Claremont, CA 91711, USA.*
D. Freudenberger, *CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601, Australia.*
M. Gachugu, *ANUTECH, Canberra, ACT 2601, Australia.*
B. Gillam, *Department of Rangeland Management, USDA-Forest Service, Washington, DC 20250, USA.*
A.C. Grice, *CSIRO Sustainable Ecosystems, PMB PO, Aitkenvale, QLD 4810, Australia.*
G. Griffin, *CSIRO Sustainable Ecosystems, PO Box 2111, Alice Springs, NT 0871, Australia.*
R.B. Hacker, *New South Wales Agriculture, PMB 19, Trangie, NSW 2823, Australia.*
T. Hatton, *CSIRO Land and Water, Private Bag 5, Wembley, WA 6014, Australia.*
K.C. Hodgkinson, *CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601, Australia.*
S.M. Howden, *CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601, Australia.*
J. Kotsokoane, *PO Box 1015, Maseru 100, Lesotho, Southern Africa.*
A. Langston, *CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601, Australia.*
M. Lonsdale, *CSIRO Entomology, GPO Box 284, Canberra, ACT 2601, Australia.*
T.J.P. Lynam, *Department of Biological Science, University of Zimbabwe, Box MP167, Mount Pleasant, Harare, Zimbabwe.*
S. Marsden, *CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601, Australia.*
M. Martin, *PO Box 35, Mandurama, NSW 2792, Australia.*
S. McIntyre, *CSIRO Sustainable Ecosystems, 120 Meiers Road, Indooroopilly, QLD 4068, Australia.*
N. Milham, *New South Wales Agriculture, Locked Bag 21, Orange, NSW 2800, Australia.*
D. Mills, *Ennisclare, Gore, QLD 4352, Australia.*
S. Milton, *Faculty of Forestry, Private Bag X1, Matieland 7602, South Africa.*
P.E. Novelly, *Agriculture Western Australia, PO Box 19, Kununurra, WA 6743, Australia.*
W.J. Parton, *Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523, USA.*
M. Quirk, *Queensland Department of Primary Industries, PO Box 976, Charters Towers, QLD 4820, Australia.*

E.F. Redente, *Rangeland Ecosystem Science Department, Colorado State University, Fort Collins, CO 80523, USA.*

B. Roberts, *Land Use Studies Centre, University of Southern Queensland, Toowoomba, QLD 4350, Australia.*

G.E. Schuman, *United States Department of Agriculture – ARS, High Plains Grasslands Research Station, 8408 Hildreth R, Cheyenne, WY 82009, USA.*

P. Sloane, *Agricultural and Farming Systems Consultant, Sloane, Cock & King Pty Ltd, Box 1731, North Sydney, NSW 2060, Australia.*

E.L. Smith, *School of Renewable Natural Resources, University of Arizona, Tucson, AZ 85721-0001, USA.*

M. Stafford Smith, *CSIRO Sustainable Ecosystems, PO Box 2111, Alice Springs, NT 0871, Australia.*

D. Tongway, *CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601, Australia.*

B. Walker, *CSIRO Sustainable Ecosystems, GPO Box 284, Canberra, ACT 2601, Australia.*

W. Whitford, *US Environmental Protection Agency, Office of Research & Development, NERL, Environmental Sciences Division, Box 30003, Las Cruces, NM 88003, USA.*

L. Woodhams, *PO Box, Gore, QLD 4352, Australia.*

# Preface

The Townsville meeting of global rangeland stakeholders was a significant milestone in the series of International Rangeland Congresses. This sixth Congress drew over 1000 participants from 78 countries including 280 delegates from many developing countries in Africa, Middle East, Asia and South America. It concentrated on rangeland people and their future.

This publication is the result of an attempt to obtain and distil the most important concepts, findings and suggestions for future directions that arose from the various scientific sessions. Summaries are provided by many of the session coordinators. This major distillation covers at least 18 subject areas and represents the most up-to-date description of the state of the art in the global rangeland situation.

The Congress Organizing Committee attempted to include rangeland research, education, extension and development as major building blocks of the Congress. The result was a balanced programme of the science and art of rangeland planning and management: a programme that was based on feedback from our original questionnaire to over 300 international contributors to previous rangeland congresses, including members of the Continuing Committee chaired by Margaret Friedel of Australia.

This publication aims to crystallize out the main streams of thought and discussion subsumed in the two-volume proceedings of the Congress. The hard work and efficiency of our editorial committee of David Freudenberger and David Eldridge produced these volumes. They were ably supported by our production editor, Ann Milligan, who

went far beyond the call of duty to produce the full-published proceedings available to delegates on arrival in Townsville on 17 July 1999 – a major achievement for which the organizing committee records its deep gratitude.

It is my sincere hope that this publication will act as an important 'snapshot in time' of the global rangeland position. It can be used as a benchmark which helps us all identify not only what needs to be done, but the priority actions and resources for ensuring a future for rangeland communities and the resources on which they depend. The following chapters draw together the main points and significant outcomes of each Congress session.

It is my earnest hope that this compilation will make a substantial contribution to publication in global rangelands literature and provide a basis for further advances.

*Emeritus Professor Brian Roberts*
Chairman, Organizing Committee,
VI International Rangeland Congress

# Challenges for Rangeland People

1

Anthony C. Grice and Kenneth C. Hodgkinson

## The People of Rangelands

According to Leakey and Lewin (1992) the human species evolved in the rangelands of Africa about 7 million years ago and began spreading around the world around 1 million years ago. Thus people have lived in and exploited lands that we now categorize as rangelands for varying but substantial lengths of time. The ecosystems that typically constitute rangelands – grasslands, savannas, shrublands and woodlands – would have shaped early human development. Rangelands were first used by hunter-gatherer societies that depended on the natural environment for most, if not all, of their needs and this lifestyle prevailed for much of human history.

By around 11,000 years ago, isolated groups of rangeland people began to domesticate animals and plants and to set up subsistence pastoral systems (Diamond, 1998). While depending very strongly on the natural resources of rangelands they increasingly interchanged goods with people developing specific skills and living in non-rangeland areas.

During historical times, rangelands began to be exploited by commercial pastoralists (Walker, 1996) who, like subsistence pastoralists, relied upon domestic livestock to exploit the resources of the rangelands, but who had a much stronger reliance on goods and services from outside the rangelands. Likewise, non-rangeland communities now have very little dependence on the products of commercial rangeland livestock industries. Food and fibre are produced for them from

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high intensity production systems, often in other parts of the world, and only a few urban people venture into rangelands for recreation.

Hunter gathering, subsistence pastoralism and commercial pastoralism thus represent three human lifestyles that continue to utilize the resources of lands that we now recognize as rangelands. Although all three still exist, there has been a tendency for subsistence pastoralists to replace hunter-gatherers and for commercial pastoralists to replace both as the major (in terms of area utilized) occupiers of rangelands. Indeed, the establishment and development of commercial pastoralism has been the principal means whereby Europeans colonized and then exploited the natural resources of sub-Saharan Africa, Australia, North and South America. The establishment of commercial pastoralism severely weakened most, if not all, indigenous societies.

## The Term Rangelands

Explicit recognition of the notion of rangelands occurred only relatively recently. The term 'range' has been used since the 1400s in England to describe extensive areas of land that were either grassed or wooded (*Oxford English Dictionary*, 2000). Early colonists took it to the USA where it came to be associated with extensive, often unenclosed areas of 'natural' lands that were exploited for the grazing of livestock. 'Rangeland' is now an international term but within a country there is a host of substitute terms such as 'wild lands' (USA) and 'outback' (Australia), which mean much the same thing. Rangelands occur in areas of relatively low rainfall or where winters are long and cold. The vegetation is always dominated by natural plant communities rather than by sown pasture.

In general, the human populations of these lands occur at low densities though the large areas of rangeland mean that the total population of humans living in rangelands is significant. On this basis, there are some large differences between so-called 'developed' and 'developing' countries. Human populations of rangelands in developed countries tend to be of lower density than in comparable lands in developing countries (though there may be large urban centres). Furthermore, increasing urbanization at the margins of rangelands is occurring in both the developed and developing parts of the world – a situation that is having major impacts on the use of rangeland resources, especially where people hunt wildlife for recreation.

Currently, the term 'rangelands' focuses on biophysical and land use aspects. This restriction emerged during the 20th century as areas of natural vegetation were increasingly used by people for the production of livestock products from extensive grazing systems. For example, rangelands have been identified as 'uncultivated land

that will provide the necessities of life for grazing and browsing animals' (Holechek *et al.*, 1989) and as 'semi-natural ecosystems in which man seeks to obtain a productive output by simply adding domestic stock to a natural landscape' (Harrington *et al.*, 1984). Under commercial pastoralism, the rangelands have provided products that in the main are used by communities of people that live outside the rangelands.

As such, rangelands do not comprise a distinct ecosystem. They have been shaped and defined in large measure by the way humans have used them. Importantly, as described above, human use is always evolving so that during the 20th century the dominant land use over large tracts of rangelands in Australia, USA, Argentina, etc., was commercial pastoralism. In many rangelands, the initial phase of colonization for commercial pastoralism gave way to a phase of consolidation involving increasing refinement of rangeland management. Technologies that helped increase animal production from rangelands were developed and implemented. Fencing, for example, gave greater control over animal movements together with the provision of reliable water supplies for livestock. Typically, degradation of natural resources occurred as a result of this intensification. Re-organization of pastoral businesses and institutions then occurred and the cycle began again (Holling, 1992).

However, there still exists a very broad spectrum of systems for exploiting rangelands – people may have personal preferences that lower the efficiency of resource use and may even degrade the natural resources.

Eventually, commercial pastoralism in rangelands prompted the emergence by the mid-20th century of a formal science to deal with the management of rangelands. Range science departments were established in many universities, professional societies were formed and the publication of range management journals together with national and, later, international rangeland conferences. These developments were centred in, though not exclusive to, the USA. For example, the US-based Society for Range Management was formed in the late 1940s, and its journal, the *Journal of Range Management*, was first published in 1948. Comparable developments took place later in Australia. The Australian Rangeland Society was formed in 1975 and it published the first volume of *The Australian Rangeland Journal* (subsequently *The Rangeland Journal*) in 1976.

The inclusion of both biophysical and land use aspects in the definition of rangelands was integral to the emergence of the science of rangeland management. For example, range management has been defined as 'the science and art of obtaining maximum livestock production from range land consistent with conservation of land resources' (Stoddart and Smith, 1955). The strongest emphases of publications in

rangeland journals have related to grazing and grazing management, particularly by domestic livestock, and much of the work reported sought to understand and devise ways of overcoming the biophysical constraints to animal production in rangelands. Research on the social and economic systems of rangelands has, in comparison, received only very minor attention (Walker, 1996).

## Four Growing Themes

Against this general background of rangelands as principally constituting a pastoral resource, and of rangeland science aiming at a better understanding of how that resource may be more sustainably and efficiently utilized by domestic livestock, four themes are paramount. These are increasingly challenging traditional definitions of rangelands and are enlarging the scope of rangeland science and management.

The first theme is *multiple uses*. In spite of the strong emphasis on pastoral use, there is a growing recognition that rangelands are used by people in many ways in addition to production of animal products by pastoralism. A number of examples can be given. Mining industries are prominent in many of the world's rangelands. Although utilizing only a very small proportion of the world's rangelands, the mining industries are economically very important, directly and indirectly, for the sustainability of rangeland people and their businesses. Mining does not specifically require a rangeland environment, but where it occurs there may be substantial direct and indirect economic benefits to rangeland people.

Another example is tourism. Today there are pastoral businesses in many countries, both developed and developing, where tourism is an important business component. Sport hunting of various wildlife species, an important tourist activity in the USA and southern Africa, has been culturally and commercially important there and may become increasingly important in other countries.

Provision of ecosystem services for people is another use (United Nations Development Programme *et al.*, 2000). The provision of clean water for human consumption and the natural occurrence of plants, animals and other organisms meet aesthetic and cultural values of rangeland people and are examples of ecosystem services. Large areas of rangelands have also been set aside or reserved specifically to meet conservation, aesthetic and recreational needs.

Finally, many areas of the world's rangelands are home to indigenous peoples. Despite the development of commercial pastoralism, some indigenous human populations continue to use rangeland resources with something resembling their traditional lifestyles and economies.

The theme of multiple uses is not new. For example, its impact on the traditional pastoral use of Australia's rangelands was stressed by Vickery. He wrote:

> Australian rangelands have hitherto been the exclusive domain of the Pastoral Industry, but during the past decade pressures for multiple use embracing recreation, conservation, public works and Aboriginal occupation have emerged, particularly in the Arid Zone, and it is clear that the Pastoralist must be prepared to share the rangeland resource with these land-users on a mutually co-operative basis and without confrontation.
>
> (Vickery, 1976)

Similarly, Box (1986) criticized the II International Rangeland Congress when he said:

> It did not adequately address rangeland products other than livestock. To focus on commercial pastoralism, a human lifestyle of developed nations, is to further marginalize the people issues of rangelands. More attention to other goods and services will help develop the flexibility needed for the proper use of rangelands.
>
> (Box, 1986)

In spite of public declaration of the importance of multiple uses of rangelands, subsequent Congresses failed to strongly develop this theme.

The second theme is the *maintenance of the basic resources* upon which all rangeland uses depend. Stoddart and Smith (1955), in their authoritative text on rangeland management, argued that the level of production from rangelands must be commensurate with the long-term maintenance of the resource base. In the language of the late 20th century, this is an issue of sustainability, highlighted by its thematic status during the V International Rangeland Congress held in 1995 (West, 1996). Although self-evident, there are still many rangeland areas that are not routinely monitored in terms of the status and trend in condition of their resources. In many rangelands there is an inadequate understanding of how specific landscapes function and, often, poor commitment by various jurisdictions to monitoring.

The third theme is the importance of *social and economic processes* in resource management. Rangeland science has commonly only dealt with the biophysical constraints of livestock production in rangelands. There have been numerous reminders that factors, other than biophysical ones, also limit management options and the sustainability of rangeland enterprises, industries and communities. It is now recognized that socio-economic factors are often crucial in determining whether particular technical solutions to rangeland problems can be employed in practice (Walker, 1996). Consilience, defined by Wilson (1998) as 'a jumping together of knowledge by the

linking of facts and fact-based theory across disciplines to create a common groundwork of explanation', is now required.

The fourth theme concerns *interrelationships*. Rangelands do not exist in isolation from non-rangeland systems. This is true in biophysical terms because of the natural and anthropogenic interchange of materials and energy between rangelands and non-rangelands. It is also true in socio-economic terms because of the cultural and economic interchanges between rangeland and non-rangeland human communities and societies. Rangelands cannot be managed in isolation from the non-rangeland systems with which they interact. Increasingly, rangelands and the human communities of rangelands are influenced by decisions made principally by communities living outside the rangelands.

This is due to a number of factors. In many countries, increasing urbanization means that smaller proportions of people are directly reliant on the rangelands for their livelihood. On the other hand, the markets for many of the traditional rangeland livestock products have always been outside the rangelands. Further, at least in the so-called 'developed' world, urban populations have a considerable stake in the non-traditional products of rangelands such as water resources and recreational space. Moreover, they express an interest in the condition of the natural resources of the rangelands, often expressed in terms of political pressure. These demands and expectations have the potential to powerfully influence the ways in which rangelands are utilized. Moreover, the influences of non-rangeland peoples upon the uses of rangelands extend across national boundaries as the forces of globalization come to bear on rangeland and urban people alike. Moving geographical boundaries between rangelands and non-rangelands further complicates this. Boundaries shift in response to changing human needs, technologies and climatic circumstances.

## The Challenge

The study of rangelands has, since its inception in western USA in the early 20th century, been driven by productivity decline and associated accelerated soil erosion (Young, 2000). It has recognized that rangeland people and their distant 'urban cousins' are somewhat dependent upon the complex, more-or-less natural ecosystems for products of pastoral industries, for recreational opportunities and spiritual enlightenment. Living with this complexity continues to challenge people who live and work in the rangelands. The modern challenges that confront rangeland people are captured in the four growing themes outlined above: multiple uses, sustainability, importance of socio-economic versus biophysical factors, and interactions with non-rangeland systems.

In July 1999, the VI International Rangeland Congress, held in Townsville, Australia, focused on the 'people issues' of the world's rangelands by adopting the theme 'People and rangelands: building the future.' This focus on rangeland people and the need to comprehensively address the four growing themes of the rangelands arose from a challenge given at the previous Congress in Salt Lake City (Walker, 1996). Here, Brian Walker's plenary address stressed that the challenges and opportunities confronting rangelands and their people require far more than technical or scientific solutions. Rangeland science is just one of a number of inputs into sound rangeland management; on its own it is not a major driver of change. Moreover, rangeland management is not simply an issue of pastoral management for natural or semi-natural systems but of utilizing complex ecosystems to meet the needs and expectations of complex human societies. Meeting these challenges requires a diverse range of skills and the input of all stakeholders and may require significant modification of the traditional approach to managing rangelands.

Some of the chapters in this book deal with traditional topics about the use of rangelands for raising livestock. Most emphasize some aspect of the ways in which human communities, societies and institutions influence, or are influenced by, the biophysical properties of rangelands. An opening trilogy focuses on the people of rangelands. 'Future Shocks to People and Rangelands' (Mark Howden, Barney Foran and Roy Behnke) identifies the challenges and issues likely to confront the rangelands and their people in the near future. 'Indigenous People in Rangelands' (Graham Griffin) shows the plight of most indigenous peoples and suggests a way forward for them. 'Rangelands: People, Perceptions and Perspectives' (Denzil Mills, Roger Blench, Bertha Gillam, Mandy Martin, Guy Fitzhardinge, Jocelyn Davies, Simon Campbell and Libby Woodhams) considers the importance of individual and community perceptions of rangelands.

The next ten chapters attempt to link the concerns of rangeland people with the major biophysical components of rangelands. A group of five chapters describes progress and the current status in scientific knowledge about soils, plants and biodiversity. 'Desertification and Soil Processes in Rangelands' (David Tongway and Walter Whitford) and 'Understanding and Managing Rangeland Plant Communities' (Steve Archer and Alison Bowman) concentrate on biophysical aspects of rangelands in relation to soil and plant community processes, respectively, summarizing current understanding of the key processes in each case and identifying where further knowledge would be useful to people. 'Range Management and Plant Functional Types' (Sandra Díaz, David Briske and Sue McIntyre) and 'People and Plant Invasions of the Rangelands' (Mark Lonsdale and Sue Milton) address issues of plant vegetation classification and 'People and Rangeland

Biodiversity' (David Bowman) evaluates the issues connected with nature conservation.

Another group of five chapters, 'Managing Grazing' (Mick Quirk), 'Rehabilitation of Mined Surfaces' (Gerald Schuman and Edward Redente), 'Accounting for Rangeland Resources' (Paul Novelly and Lamar Smith), 'Building on History, Sending Agents into the Future – Rangeland Modelling, Retrospect and Prospect' (Timothy Lynam, Mark Stafford Smith and William Parton) and 'Integrating Management of Land and Water Resources: the Social, Economic and Environmental Consequences of Tree Management in Rangelands' (Tom Hatton), discusses concepts and tools for monitoring rangelands, for modelling processes within rangelands and for understanding and managing grazing, mined surfaces and water resources in rangelands.

A fourth group of chapters discusses issues relating to communication and decision-making processes in rangelands. These include 'Land and Water Management: Lessons from a Project on Desertification in the Middle East' (Scott Christiansen), 'International Perspectives on the Rangelands' (Wolfgang Bayer and Peter Sloane), 'Policies, Planning and Institutions for Sustainable Resource Use: a Participatory Approach' (Nick Abel, Mukii Gachugu, Art Langston, David Freudenberger, Mark Howden and Steve Marsden) and 'Economics and Ecology: Working Together for Better Policy' (Nick Milham).

A fifth group of chapters provides personal perspectives on the future of rangeland people: 'Building the Future: Practical Challenges' (Joe Kotsokoane), 'Rangeland Livelihoods in the 21st Century' (Brian Walker) and 'Building the Future: a Human Development Perspective' (Dean Freudenberger).

Finally, the main insights emerging from this international gathering of rangeland people are synthesized into some key take-home messages in 'Synthesis: New Visions and Prospects for Rangelands' (Ken Hodgkinson, Ron Hacker and Tony Grice). We recognize that this synthesis and the knowledge and insights on which it is based are a snapshot of a changing scene. As such, this book will have a short shelf-life as new issues evolve and old ones fade. Whatever the future, humans in the rangelands will need to be adaptive to survive. This remains the major challenge for rangeland people.

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