Australian Government

AUSTRALIA'S RANGELANDS 2008

At a Glance

Australian Collaborative Rangelands Information System

Summary of the report Bastin G and the ACRIS Management Committee, 2008, *Rangelands 2008 – Taking the Pulse*, published on behalf of the ACRIS Management Committee by the National Land and Water Resources Audit, Canberra.

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Introduction

This summary presents the key findings and management implications from the report *Rangelands 2008 – Taking the Pulse* produced from the Australian Collaborative Rangelands Information System (ACRIS). The reporting period is 1992 to 2005.

PURPOSE OF REPORTING

Change is part of life, but its pace appears to be increasing. It is difficult to manage change for the most desirable outcomes unless we have good data on where and how change is occurring. Monitoring programs are generally used to provide data to assess change over time.

Governments at all levels need to periodically evaluate the effectiveness of policies and programs that affect the use and management of the rangelands. *Rangelands 2008 – Taking the Pulse* assists these state, national and also international reporting and review requirements by synthesising results across jurisdictions, but retaining regional resolution where appropriate.

DATA SOURCES

Much of the data for reporting come from pastoral monitoring programs operated by natural resource management agencies in Western Australia, South Australia, New South Wales, Queensland and the Northern Territory. These data are suitable for reporting change in environmental conditions related to grazing. Other data from a combination of Australian Government and state agency sources allow broader reporting of environmental and socio-economic change.

CONTENTS

This booklet summarises the following areas:

- Introduction to the Australian rangelands.
- Description of change in elements of the environment related to sustainable grazing management (landscape function and long-term forage supply) and biodiversity.
- Change in pastoral land values, as an example of socio-economic change.
- The use of this information by groups with responsibility for managing the rangelands' natural resources.

Profile of Australia's rangelands

The 'outback', or the rangelands, cover some 81 per cent of Australia. The rangelands are home to many of Australia's Indigenous people and are culturally important for most Australians.

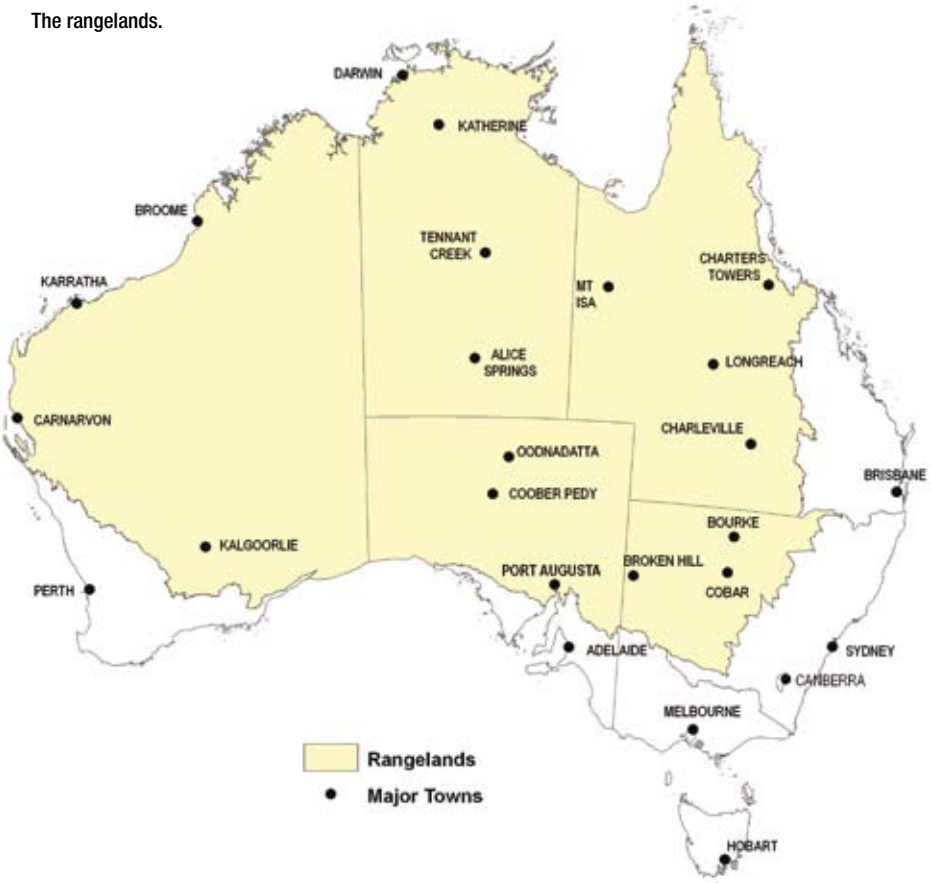
Rangeland revenues generated through mining (in excess of $12 billion each year), tourism (greater than $2 billion per annum) and agriculture ($2.4 billion in 2001) contribute significantly to Australia's national economy.

The rangelands encompass tropical woodlands and savannas in the far north; vast treeless grassy plains (or downs country) across the mid north; hummock grasslands (spinifex), mulga woodlands and shrublands through the mid-latitudes; and saltbush and bluebush shrublands towards their southern extent.

Rainfall variability is one of the major drivers of change in the rangelands. In different regions and at different times, other pressures contribute to change – inappropriate fire regimes, the spread of weeds, large numbers of native and feral herbivores and water extractions and diversions.

Notwithstanding these pressures, the rangelands, with their characteristically varied landscapes, still contain relatively intact ecosystems and much of Australia's biodiversity. It is critically important that future land management, and the policies and programs supporting this management, continue to preserve these intact ecosystems.

The rangelands.



Achievements of this report

Rangelands 2008 – Taking the Pulse, for the first time, brings together disparate data sets at a national and a regional scale. It documents change in status for a number of environmental and socio-economic themes between 1992 and 2005 (see table below). Where possible, it identifies the extent to which major drivers of change are important.

Reporting at a national level is useful for developing and evaluating national policies and programs.

This report has also aggregated data to the regional or sub-regional level, based on the Interim Biogeographic Regionalisation for Australia (IBRA) so that regional differences, where present, are apparent. Thus, it is possible to examine regional and jurisdictional differences, for example, in the management of the tropical savannas in northern Australia.

Themes and information types reported in *Rangelands 2008 – Taking the Pulse.*

THEME	INFORMATION TYPE
Environmental:	
Climate variability **Landscape function** **Sustainable management**	• seasonal quality as context for interpreting change • change in landscape function • change in critical stock forage • change in pastoral plant species richness • invasive weeds • fire regime; dust storm index
Biodiversity	• changes in the population of livestock, kangaroos & feral herbivores • change in protected areas • change in number and status of threatened species/communities • habitat loss by clearing • effects of stock waterpoints on biota • fauna & flora records and surveys • transformer weeds • wetlands: condition and change • habitat condition derived from remotely sensed groundcover • bird population composition
Socio-economic:	• socioeconomic profiles of rangeland regions • value of non-pastoral products in the rangelands • change in land use • change in pastoral land values

Climate variability

The rangelands are characterised by considerable climatic variability – dry years are normal but infrequent wetter periods can have a profound effect on the vegetation. This variability makes it very difficult to distinguish the effects of grazing management from year-to-year variation in rainfall. The photos below show changes in the amount of vegetation following different rainfalls. The differences were entirely seasonal with grazing having little effect.

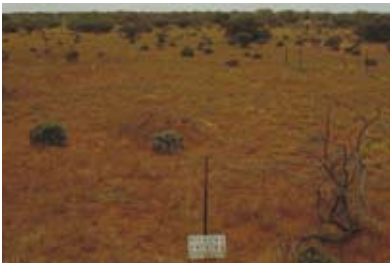
The term 'seasonal quality' is used in the 2008 Australian Collaborative Rangelands Information System (ACRIS) report to describe the relative value of recent rainfall for vegetation growth. Seasonal quality is quantified as an index by relating the amount of rainfall received prior to an assessment (e.g. the photo point below) to the long-term record. It is typically expressed as a decile (e.g. decile 2 means that recent rainfall was in the lowest 20% of all recordings).

A photo sequence from a fixed site in the Carnarvon bioregion, WA, illustrating the effects of rainfall variability on plant growth.

October 1983

September 1984

October 1987



September 1988

Source: Department of Agriculture and Food, WA.

DATA

Two types of long-term data are used to describe seasonal quality:

SILO gridded rainfall (see http://www.bom.gov.au/silo, accessed 24/4/2008), or

AussieGRASS simulation of pasture growth (see http://www.longpaddock.qld.gov.au/AboutUs/ResearchProjects/AussieGRASS/, accessed 24/4/2008).

OVERALL ASSESSMENT

Seasonal quality between the early 1990s and 2005 was generally above average in the north and north-west and variable in much of central Australia. Over most of the Western Australian and South Australian shrublands, seasonal quality was initially above average, followed by drier than average conditions, while in the eastern grasslands and mulga lands it was below average, followed by drought conditions.

MANAGEMENT IMPLICATIONS

Seasonal quality will continue to vary in the rangelands. Under climate change scenarios, pastoralists and other rangeland managers will need to anticipate and prepare for greater climatic variability. This includes increased rainfall intensity and cyclone incidence across northern regions, and decreased rainfall amounts and changing seasonal patterns across southern and south-eastern regions.

At a more local and applied level, the ACRIS definition of seasonal quality, provides a useful method for reporting where change is beyond seasonal expectations. This highlights where other possible drivers of vegetation change (grazing and/or fire) may be important.

For individual bioregions, reporting is focused on monitoring sites that show change beyond seasonal expectations. The dark-shaded cell (in the framework below) highlights those monitoring sites that declined for the attribute measured when recent seasonal quality was above average (an increase would be expected at this time). The less intense shading emphasises sites that improved following below-average seasonal quality (a decrease would be expected at this time).

The ACRIS framework that interprets regional trends in vegetation change relative to recent seasonal quality

Seasonal Quality	For a measured vegetation attribute, the percentage of re-assessed monitoring sites showing		
	a decrease	no change	an increase
Above average			
Average			
Below average			

Pastoral production and environmental change

LANDSCAPE FUNCTION AND GRAZING PRESSURE

Landscape function provides a measure of the landscape's capacity to capture rainfall and nutrients that are essential resources for plant growth. It provides an assessment of landscape condition and resilience. A key component of landscape function is the cover and spatial arrangement of perennial plants.

These two photos from the same site in the Victoria River District (NT) show how landscape function can improve. In 1973 (left), the soil was largely bare, with most wet-season rainfall lost as runoff, taking with it precious soil-borne nutrients for plant growth.

The bare surface meant that the topsoil was exposed to erosion by wind and water. The dense cover of perennial grasses in 2002 (right hand photo) trapped most of the rainfall, thus allowing it to infiltrate into the soil.

DATA

Pastoral country in WA, SA, NSW and the NT is monitored at fixed sites. Queensland reporting is based on vegetation and land condition data collected along road traverses. As available data varies amongst jurisdictions, consistently reporting change is somewhat difficult.

Source: CSIRO, Alice Springs.

OVERALL ASSESSMENT

Data collected at the majority of pastoral monitoring sites in 26 bioregions in WA, SA, NSW and the NT suggest an increase or stability in landscape function given the trends in seasonal quality and known stocking densities from 1992-2005.

Five bioregions in Queensland showed seasonally adjusted stability or increase in landscape function while a further six Queensland bioregions had decreased landscape function.

Reported change is for the local area of pastoral monitoring sites, not the whole of each bioregion. Additionally, baseline condition is often unknown and a 'no change' (stable) result may not be favourable for sites in degraded landscapes.

MANAGEMENT IMPLICATIONS

The number of livestock (cattle and sheep) and other grazers (kangaroos, goats, donkeys, horses, camels) affects landscape function. Kangaroo numbers vary with season and available data show that in the southern and eastern rangelands, they can contribute between 20 and 40 percent of livestock grazing pressure.

There is evidence for some bioregions that recent livestock densities have remained high as seasonal quality has deteriorated. This raises a concern that landscape function could be declining, particularly where pastoral leases are stocked more heavily than a regional average. Continued monitoring of landscape function will indicate changes under variable seasons and different stocking levels in the future.

Pastoral production and environmental change

CRITICAL STOCK FORAGE AND LIVESTOCK DENSITY

Critical stock forage describes the abundance of those plants vital for sustaining livestock production.

The two photographs below demonstrate improvement in critical stock forage over time in the chenopod shrublands of southern Australia (Gawler bioregion). By 1992 there had been significant establishment of saltbushes valuable for grazing

DATA

Reporting for WA, SA, NSW and the NT is based on a subset of the data collected at the pastoral monitoring sites used for reporting change in landscape function. For Queensland, change over time in AussieGRASS-modelled pasture utilisation is used to infer the sustainability of grazing management.

OVERALL ASSESSMENT

Critical stock forage remained stable or improved at the majority of sites in 28 bioregions with suitable data for reporting, despite periods of low seasonal quality and variable stocking density. Reported change is for the local area of pastoral monitoring sites, not the whole of each bioregion. A 'no change' result could be unfavourable for sites located in degraded landscapes.

Based on modelled levels of pasture utilisation, grazing management was assessed to be sustainable for much of three Queensland bioregions. For parts of remaining bioregions, pasture utilisation for much of the 1992-2005 period was close to a threshold safe level and was considered marginally sustainable.

1955 **1992**

Source: Pastoral Land Management Group, SA Department of Water, Land and Biodiversity Conservation.

MANAGEMENT IMPLICATIONS

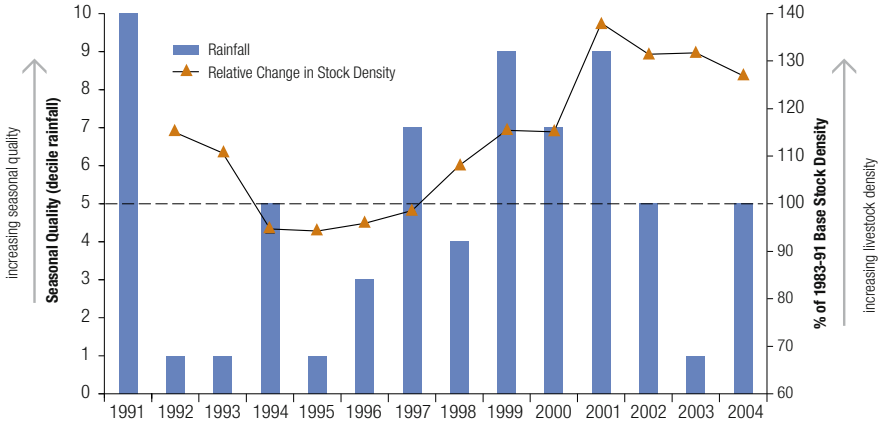
Adjusting livestock numbers according to seasonal quality is important for maintaining or improving critical stock forage.

The following example illustrates, for one bioregion, how livestock density initially changed in response to seasonal quality but more recently, remained high as seasonal quality declined.

This graph illustrates change in the density of livestock and seasonal quality for the Desert Uplands bioregion. The dashed line shows both median rainfall and stocking density equal to the average for the 1983-91 period (as a base for reporting change). In the latter part of the reporting period, regional livestock density remained high as seasonal quality declined.

These trends reinforce the need for continued monitoring of critical stock forage as one of the important indicators of sustainable grazing management. Monitoring all the components of total grazing pressure, livestock and kangaroo densities, and the distribution and relative abundance of feral herbivores is necessary to place stocking density into context.

Livestock density and seasonal quality for the Desert Uplands bioregion.



Environmental change

BIODIVERSITY

Biodiversity is important in the rangelands because many areas remain 'natural' or intact and the most extensive land use, grazing, is largely based on native vegetation. As biodiversity provides important ecosystem services for the grazing industry, maintaining the integrity of existing biodiversity becomes vital for this land use. Biodiversity is also an integral part of other rangeland uses such as harvesting of bush foods and outback tourism.

DATA

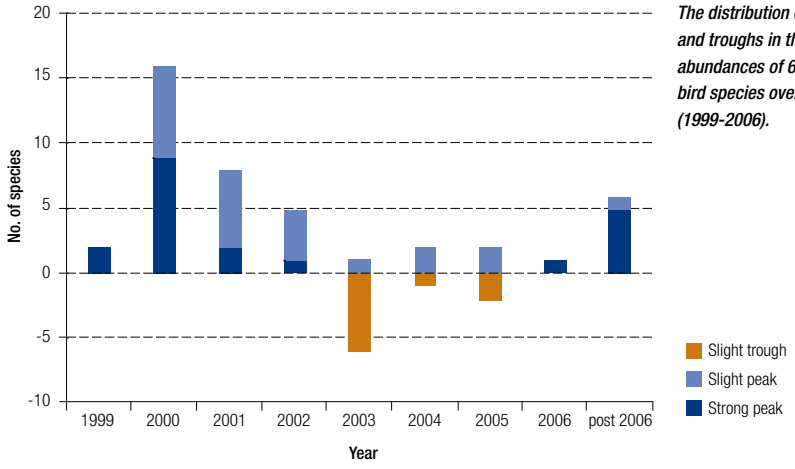
As yet, comprehensive, broadscale and collaborative monitoring data to report change in biodiversity are not available. In the absence of such data, ten indicators are used for reporting in the 2008 ACRIS report. Indicators were selected on the basis of data availability across most jurisdictions and information content at landscape scale.

Over recent years, the numbers of systematic biological surveys and associated records for fauna and flora taxa have increased markedly in most rangeland jurisdictions.

OVERALL ASSESSMENT

There have been substantial declines in rangeland biodiversity historically and there is no reason to believe that these have ceased, given current land uses and the time lags in the biological responses.

This assumption is backed by documented declines in the detection rates of some bird species in the rangelands by the Birds Australia volunteer network (see graph). However, some of the recent decline in bird observation is due to drier years since 2000 and 2001.



The distribution of peaks and troughs in the relative abundances of 60 rangeland bird species over seven years (1999-2006).

The Budgerigar was one species that peaked (because of the number of times it was observed) during the 2000–2001 wetter period.

(Source: Robert Ashdown).

The Collaborative Australian Protected Areas Database (1997-2004) documents significant changes in management intent for some areas, most notably in the Great Victoria Desert and Central Ranges bioregions where Indigenous communities have agreed to manage very large areas for biodiversity conservation.

There has been a significant reduction in the extent of woody cover due to broad-scale clearing in a limited number of bioregions on the eastern margin of the rangelands (Queensland and NSW). Case studies show that loss and fragmentation of habitats has affected several rangeland species.

In many pastorally productive regions, increased numbers of water points have reduced the area that is remote from water. Water-remote areas, where appropriately managed, could make a contribution to biodiversity conservation, by providing refugia for biodiversity.

MANAGEMENT IMPLICATIONS

There is a need for a comprehensive, broadscale and collaborative monitoring program to adequately report on trends in rangeland biodiversity across all jurisdictions. Four main elements are envisaged: targeted monitoring of selected significant species; surveillance monitoring of a broad range of taxa at both representative and biodiverse sites; meaningful landscape-scale surrogates for biodiversity (including using remote sensing); and site-based metrics for habitat condition appropriate to rangeland ecosystems and biota. Such a monitoring program would require long-term investment to enhance existing capacity in the States and the Northern Territory.

Other management implications are:

The most pastorally productive bioregions remain the most poorly represented within the National Reserve System.

Areas remote from water in pastoral country can contribute to biodiversity conservation, but their value diminishes where they occur as isolated patches and where weeds, feral animals and fire are inappropriately managed.

Environmental change

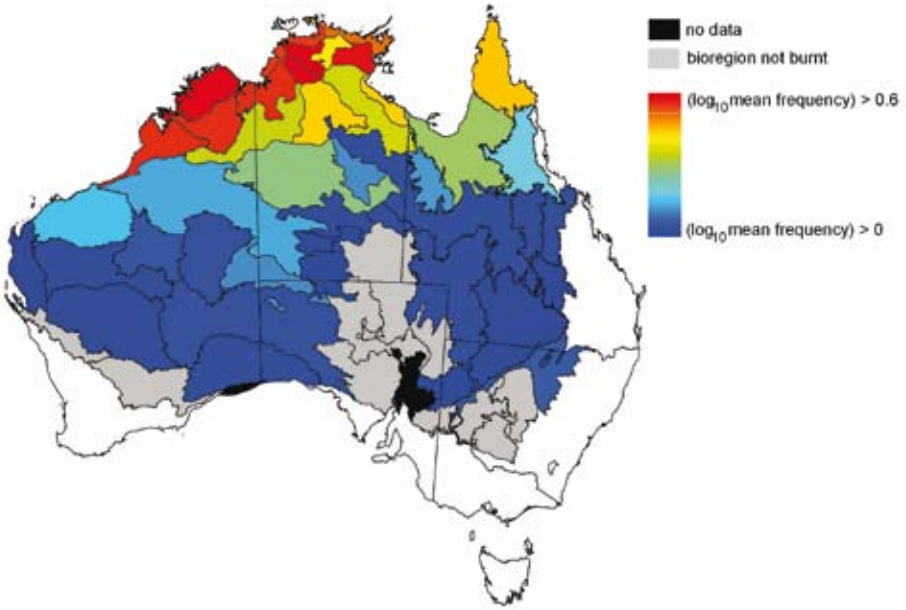
FIRE REGIMES

A 'fire regime' is the extent, intensity and frequency of fire in a landscape. Large parts of northern Australia burn each year (see map) and this has implications for both pastoral management and biodiversity conservation. In other parts of the rangelands, fire has largely been removed from the landscape and this has implications for managing woody vegetation.

DATA

The WA Department of Land Information (Landgate) maps fire scars visible in satellite imagery. They supplied the ACRIS with the monthly and annual areas burnt between 1997 and 2005. Landgate also calculated the mean fire frequency for each rangeland bioregion over the same period.

The mean fire frequency for bioregions between 1997 and 2005



OVERALL ASSESSMENT

Across northern Australia, up to 40 per cent of some tropical savanna bioregions burn each year.

Case studies show that altered fire regimes are having significant impacts on components of the native flora and fauna.

There is evidence from some areas that fire management practices are improving. For example, in the NT, controlled burns are being used early in the dry season to reduce fire hazard in the Sturt Plateau, Pine Creek and Daly Basin bioregions.

There are programs to re-establish Indigenous burning practices across other regions. One example is the West Arnhem Land Fire Abatement Project, which is a partnership between Aboriginal Traditional Owners, the Northern Land Council, the NT Government and Darwin Liquefied Natural Gas.

MANAGEMENT IMPLICATIONS

A major issue across the rangelands is how to manage fire for different purposes, particularly in northern regions where fire frequencies and intensities are high. A key component is managers' understanding of the role of fire for different purposes, and their skills and confidence in managing fire to achieve desired outcomes.

Nationally consistent data on fire extent and frequency is available and is a valuable asset for reporting regional changes in fire regime in the rangelands. However their duration (since 1995) is still too short to determine whether fire management practice, as distinct from wildfire, is changing. The ability of the ACRIS to report such change will improve as the fire record increases.

Burning in the Top End, NT. Photo: CSIRO Sustainable Ecosystems.

Pastoral production and environmental change

WEEDS

Introduced weeds reduce grazing value, may be poisonous to livestock, may contaminate agricultural produce and are expensive to control. They also alter and degrade habitats and thereby threaten biodiversity. Some weed species are so invasive that they have the capacity to permanently alter or transform rangeland ecosystems.

DATA

Available data on the distribution and relative abundance of weed species come from state and territory databases.

There is limited capacity to report the effects of invasive weeds on pastoral production and biodiversity. The occurrence of species is broadly known but precise information on their distribution and relative abundance is lacking.

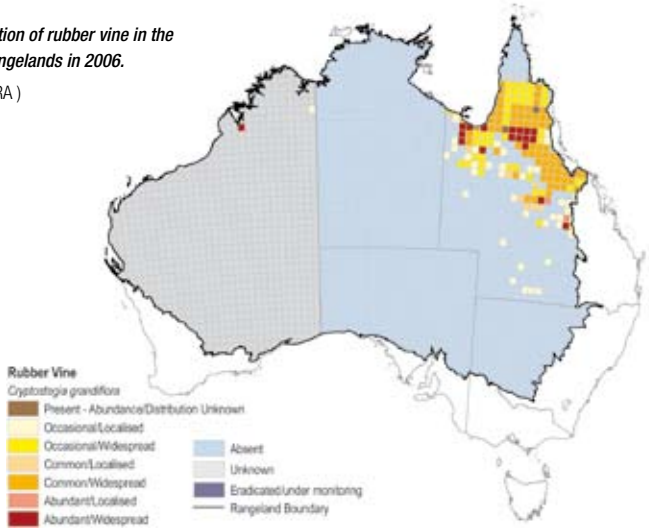
Maps are available that show the distribution and relative abundance of invasive weed species (see the example for rubber vine).

Above: Rubber vine (Cryptostegia grandiflora) smothering trees in a riparian area, north eastern Queensland.

Source: Tony Grice, CSIRO.

Left: Distribution of rubber vine in the Australian rangelands in 2006.

(Source: NLWRA)



OVERALL ASSESSMENT

Weed and pest management is the most commonly reported natural resource management activity on Australian farms. The Cooperative Research Centre for Australian Weed Management estimated that total expenditure on weeds in the rangelands between 1997 and 2004 was approximately $80 million.

Eleven species including four exotic grasses[1] are considered transformer weeds because of their ability to alter or permanently transform a wide range of ecosystems across the rangelands. Rubber vine is one such species. It has invaded many riparian habitats in the savannas of north-eastern Australia where it can smother native vegetation and form dense thickets.

MANAGEMENT IMPLICATIONS

Control of weeds and habitat restoration are costly, so restricting the spread of existing populations and preventing further invasions is a high priority.

The cost of weeds in terms of lost agricultural production and required control is well recognised. Their degrading effects on habitats and threats to biodiversity more generally are harder to quantify. Species such as buffel grass contribute significantly to livestock production in some regions but threaten biodiversity more widely. Conflicting perceptions as to the value of these species affects management actions to limit the spread of these species to new areas and to control them where present.

A system is now in place to track changes over time in the distribution and relative abundance of several rangeland weeds and this should provide improved reporting of change into the future.

[1] Prickly acacia, gamba grass, buffel grass, rubber vine, olive hymenachne, mimosa, parkinsonia, mission grass, mesquite, athel pine, para grass.

Pastoral production and land values

Pastoral land values are a useful socio-economic indicator for rangeland enterprises because they:

- Indicate inherent resource potential and relative profitability between rangeland regions.
- Help identify profitability relative to the asset value of the land. High land values can pose a risk to those expanding or buying into an area to a high debt burden and may influence stocking rates particularly during periods of lower seasonal quality.
- Indicate to what extent land values are being forced up by recent large increases in property prices elsewhere.

DATA

Data to report change in land values (adjusted to 2005 dollars) were provided by the rangeland states and the NT, and vary between jurisdictions. This makes it difficult to directly compare land values across state borders. More comparable land-value data would assist cross-jurisdictional comparisons and improve future reporting of change.

Coral Beebe, Ucharonidge, NT. People on the land are integral to managing the rangeland's natural resources. Land values are an important component of long-term pastoral viability.

(Source: Newspix / James Croucher.)

Source: DEWHA / Lyle Radford

OVERALL ASSESSMENT

Land values have increased in the order of 150-300 per cent for many pastorally important bioregions over part or all of the 1992-2005 reporting period, notwithstanding problems in comparing values derived by differing methods in each jurisdiction.

In most regions, these increases were more than could be accounted for by increases in productivity (turn-off of meat and/or fibre).

MANAGEMENT IMPLICATIONS

Analysis of changes in pastoral land values provides underlying information about relative profitability, asset-to-income ratio and ability to service debt. These all contribute to an understanding of longer-term viability and may also provide insight into regional change in stocking density (i.e. sustainable management).

For established rangeland pastoral enterprises, increase in property value represents a substantial boost in asset wealth. However, those who have recently bought a rangeland property could be under greater pressure to maintain a return on equity, and hence to maximise stocking rates in periods of lower seasonal quality.

Summary

The 2008 ACRIS report has demonstrated that considerable change has occurred in parts of the rangelands between 1992 and 2005. This report provides a sound scientific and technical basis upon which to better inform current decisions by government and to open up a broader discussion about future approaches and policy issues for the sustainable management of Australia's rangelands.

At the jurisdictional level, the Northern Territory and state governments need objective information about change in natural resources, and the reasons for such change, to inform decisions about appropriate land use and administration of pastoral leases. Comprehensive information about change in the rangelands' natural resources at a national level assists the Australian Government to evaluate the effectiveness of current rangeland policies and programs, and to adapt these as required.

EMERGING INFORMATION USERS

There have been significant shifts in management responsibilities in the rangelands in recent years.

As Indigenous people now have primary responsibility for managing 27 per cent of the rangelands, information compiled by the ACRIS could assist this management. There may also be value in exploring additional Indigenous natural resource management needs that the ACRIS could provide.

Regional Natural Resource Management (NRM) groups are responsible for implementing NRM programs to improve land management and biodiversity conservation. The ACRIS can potentially help by providing contextual data at appropriate scales. For example, ACRIS data on recent seasonal quality and fire history and seasonally interpreted changes in landscape function and critical stock

Indigenous people now have responsibility for managing significant areas of the rangelands. This includes fire management in northern Australia.

Source: DEWHA / Yirralka Rangers.

forage are useful for regional NRM planning. In return, data collected by NRM groups could assist the ACRIS in reporting change at the regional scale.

The non-government environment sector (including the Australian Wildlife Conservancy and Bush Heritage Australia) acquired 25 rangeland properties for biodiversity conservation in the 10 years to 2007. Information such as that in the 2008 ACRIS report may assist these groups with their reporting to investors on the effectiveness of their management actions in meeting conservation objectives. Sharing of data from non-government sources would also assist the ACRIS with regional reporting of change.

THE ACRIS IN THE FUTURE

The first attempt, through compiling the 2008 ACRIS report, at bringing together disparate environmental, economic and social data to report change in the rangelands has demonstrated that the ACRIS can identify significant and emerging trends. This success is largely due to the availability of long term, consistent information sets, such as that provided through pastoral monitoring.

For the ACRIS to continue to serve a useful function, existing monitoring programs should continue and be expanded where significant gaps have been identified e.g. change in biodiversity. Both pastoral and biodiversity data are needed to underpin the ability of the ACRIS to interpret and report change in the rangelands. The ACRIS, as the rangelands' information system, also needs to evolve to meet the information needs of all groups with responsibility for managing the rangelands.

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