Natural Heritage Trust

Helping Communities Helping Australia

A Commonwealth Government Initiative

RANGELANDS — TRACKING CHANGES

A summary of the proposal for monitoring Australia's rangelands

Australian Collaborative Rangeland Information System

www.nlwra.gov.au/atlas

NATIONAL LAND AND WATER RESOURCES AUDIT

Assessing the condition and capacity of Australia's natural resources

The National Land and Water Resources Audit (Audit) is conducting the first Australia-wide assessments of:

- water availability and quality
- dryland salinity
- vegetation
- rangelands
- agricultural productivity and sustainability
- Australians in natural resource management
- catchments, rivers and estuaries
- biodiversity

It is the first time that the Commonwealth, States and Territories have collaborated on such a broad program.

Rangelands—Tracking Changes defines the key attributes of a comprehensive monitoring, assessment and reporting program for Australia's rangelands. It outlines information on how to provide regular Australia-wide reports on changes in social, environmental and economic aspects of Australia's rangelands. This information will assist managers make decisions.

The proposed *Australian Collaborative Rangeland Information System* provides a model for governments to work together to implement the monitoring, assessment and reporting program.

PROVIDING ACCESS TO INFORMATION

Australian Natural Resources Atlas

The Australian Natural Resources Atlas (Atlas) is a one-start shop for information on Australia's natural resources. The Atlas provides summary data and information on Australia's rangelands at national, State and regional scales as well as providing the framework for recording information collated as part of the proposed rangeland monitoring initiative.

www.nlwra.gov.au/atlas

AUSTRALIA'S RANGELANDS

Australia's outback cover 75% of the continent

Rangelands are broadly defined by a combination of climate, land use and geography. They vary from arid and semi-arid temperate areas to the tropics and include woodlands, shrublands, grasslands and tropical savannas.

Approximately 2.3 million Australians live and work in the rangelands in:

- the mining industry;
- pastoralism;
- tourism;
- conservation;
- indigenous communities; and
- government.

Rangelands are valued for their biodiversity and environmental values, economic contribution, and social and cultural heritage. Rangelands:

- represent the largest group of ecosystems in a natural state
- generate close to $10 billion each year
- provide a sense of place for Indigenous Australians
- contain important groundwater and carbon stores

Monitoring rangelands

No Australia-wide or coordinated monitoring program exists for Australia's rangelands, despite their enormous social, environmental and economic contribution.

The Audit developed and now proposes a monitoring, assessment and reporting program: the *Australian Collaborative Rangeland Information System.*

Why monitor?

Observations over time provide objective information on change. This information assists management decisions and enables the impact of decisions to be assessed.

The *Australian Collaborative Rangeland Information System* recognises the need for:

- an Australia-wide approach to rangeland monitoring, assessment and reporting
- maximum return on investment
- a protective management system for Australia's rangelands and forecasting changes.

Rangeland area and related annual monitoring expenditure across Australia.

	Rangeland area (% of total State area)	**Rangeland annual monitoring expenditure** ($)
New South Wales	57	3 200 000
Northern Territory	100	11 800 000
Queensland	> 90	4 250 000
South Australia	85	1 800 000
Western Australia	87	3 200 000
Total	**75**	**24 250 000**

AUSTRALIAN COLLABORATIVE RANGELAND INFORMATION SYSTEM

Tracking changes

The Australian Collaborative Rangeland Information System is able to track changes in the biophysical, economic and social aspects of Australia's rangelands. It advocates a partnership between the Commonwealth, States and Northern Territory to:

- add value to existing monitoring;
- regularly report on condition and changes in condition; and
- communicate results through the internet-based Australian Natural Resources Atlas (Atlas).

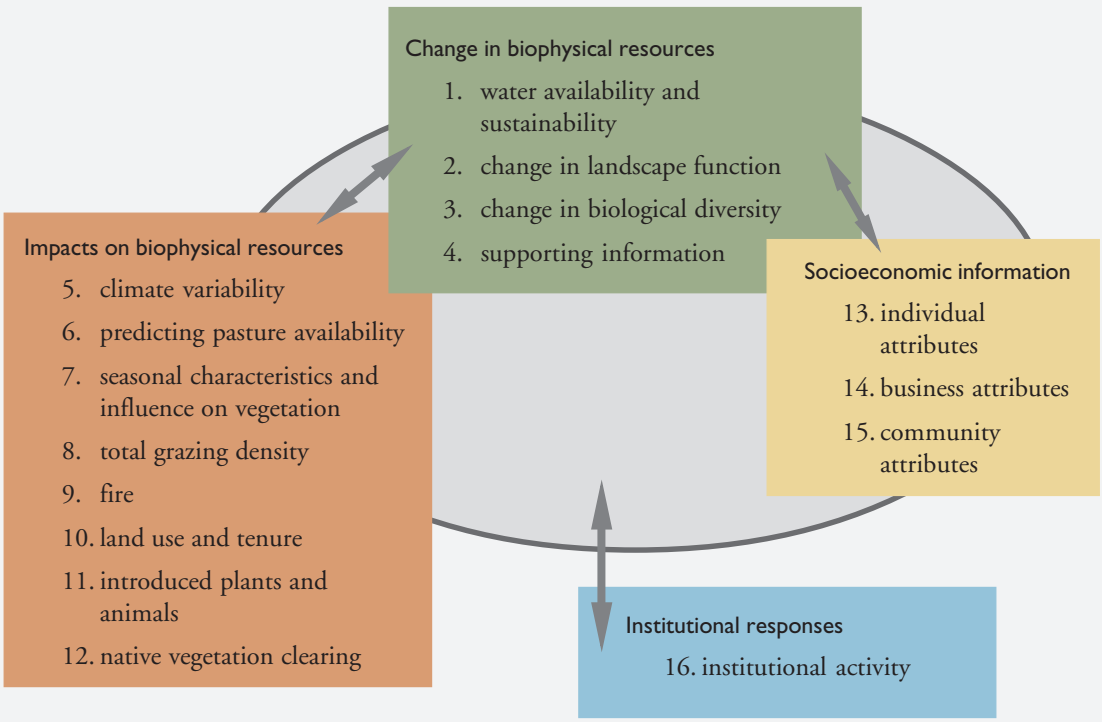
The Australian Collaborative Rangeland Information System would report on:

- biophysical resources
- impacts on biophysical resources
- socioeconomic information
- institutional responses

Each component is made up of key attributes or information products that can be measured over time (Figure 1).

The Audit Rangeland Monitoring theme collated historical information providing a benchmark for determining trends now and into the future.

Figure 1. Components of the Australian Collaborative Rangeland Information System and key attributes.

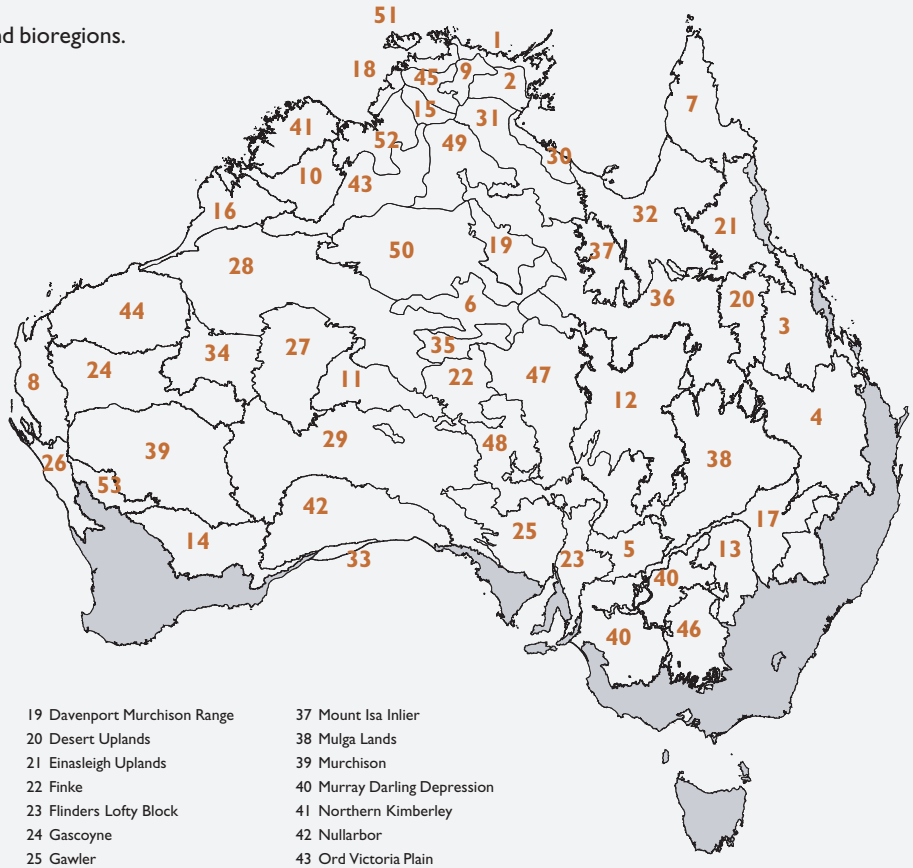


AUSTRALIAN COLLABORATIVE RANGELAND INFORMATION SYSTEM

Detailed information

Information is collected from regional to Australia-wide scales to report trends. Australia's rangelands are divided into 53 bioregions using the Interim Biogeographic Regionalisation of Australia. The Australian Collaborative Rangeland Information System proposes bioregions as a unit to compare and describe parts of the rangelands.

Figure 2. Rangeland bioregions.



1 Arnhem Coast
2 Arnhem Plateau
3 Brigalow Belt North
4 Brigalow Belt South
5 Broken Hill Complex
6 Burt Plain
7 Cape York Peninsula
8 Carnarvon
9 Central Arnhem
10 Central Kimberley
11 Central Ranges
12 Channel Country
13 Cobar Peneplain
14 Coolgardie
15 Daly Basin
16 Dampierland
17 Darling Riverine Plains
18 Darwin Coastal
19 Davenport Murchison Range
20 Desert Uplands
21 Einasleigh Uplands
22 Finke
23 Flinders Lofty Block
24 Gascoyne
25 Gawler
26 Geraldton Sandplains
27 Gibson Desert
28 Great Sandy Desert
29 Great Victoria Desert
30 Gulf Coastal
31 Gulf Fall and Uplands
32 Gulf Plains
33 Hampton
34 Little Sandy Desert
35 MacDonnell Ranges
36 Mitchell Grass Downs
37 Mount Isa Inlier
38 Mulga Lands
39 Murchison
40 Murray Darling Depression
41 Northern Kimberley
42 Nullarbor
43 Ord Victoria Plain
44 Pilbara
45 Pine Creek
46 Riverina
47 Simpson Strzelecki Dunefields
48 Stony Plains
49 Sturt Plateau
50 Tanami
51 Tiwi Cobourg
52 Victoria Bonaparte
53 Yalgoo

KEY COMPONENT—BIOPHYSICAL RESOURCES

water • landscape function

Biophysical resources include soil, nutrients, water, plants and animals. Information on biophysical resources helps assess landscape condition and responses to land management practices. Changes in biophysical resources need to be monitored across four key areas.

Product 1. Water availability and sustainability

Most water used in the rangelands comes from local run-off or groundwater. Sustainability means setting a level of water use that considers economic, social and environmental needs.

Key attributes:

- Defining surface water and groundwater resources: availability and quality
- Assessing sustainable yield of surface water and groundwater (e.g. *Australian Water Resources Assessment 2000* provides the most up-to-date review of groundwater and surface water resources in terms of availability, use and quality)

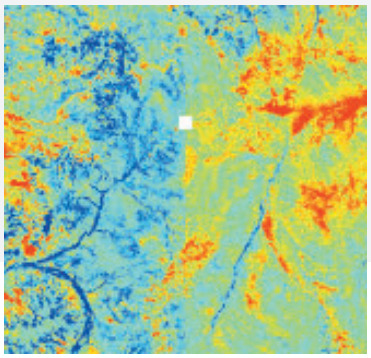
Product 2. Changes in landscape function

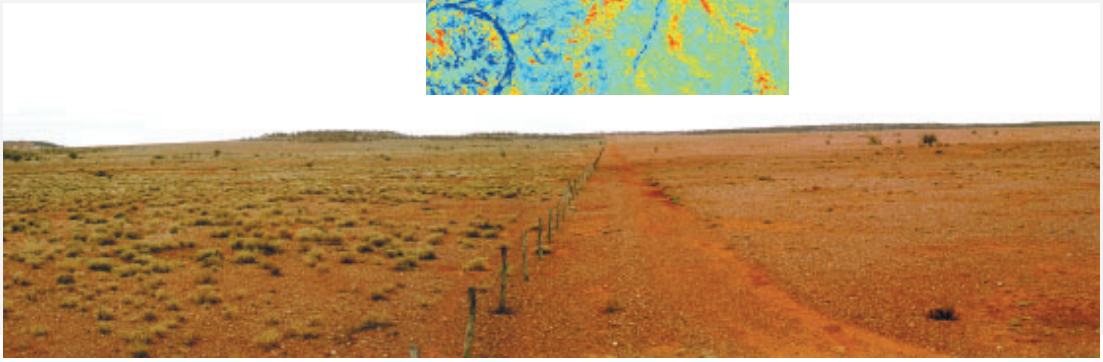
Landscape function is the ability of a landscape to conserve and use scarce water and nutrients. Assessing the changes in landscape function requires looking at processes rather than outputs, for example, looking at changes in nutrient cycling rather than species composition. Broad indicators of landscape function include:

Key attributes:

- Vegetation cover (using satellite imagery)
- Landscape function (satellite and onground monitoring) including vegetation patchiness; woody plant density; frequency of perennial grasses (Figure 3)

Figure 3. Satellites can provide information on landscape function. This Landsat-derived vegetation map of Stony Plains bioregion highlights on-ground differences evident in the photograph of the same area.





KEY COMPONENT—BIOPHYSICAL RESOURCES

biological diversity • supporting information

Product 3. Changes in biological diversity

Native plant and animal populations are affected by domestic and feral animals, exotic plants and habitat changes. Native mammals have fared particularly poorly since European settlement.

Key attributes:

- Perennial plant species composition, and invasive, fire sensitive, threatened and grazing-sensitive species
- Ant communities
- Distribution and abundance of threatened vertebrates

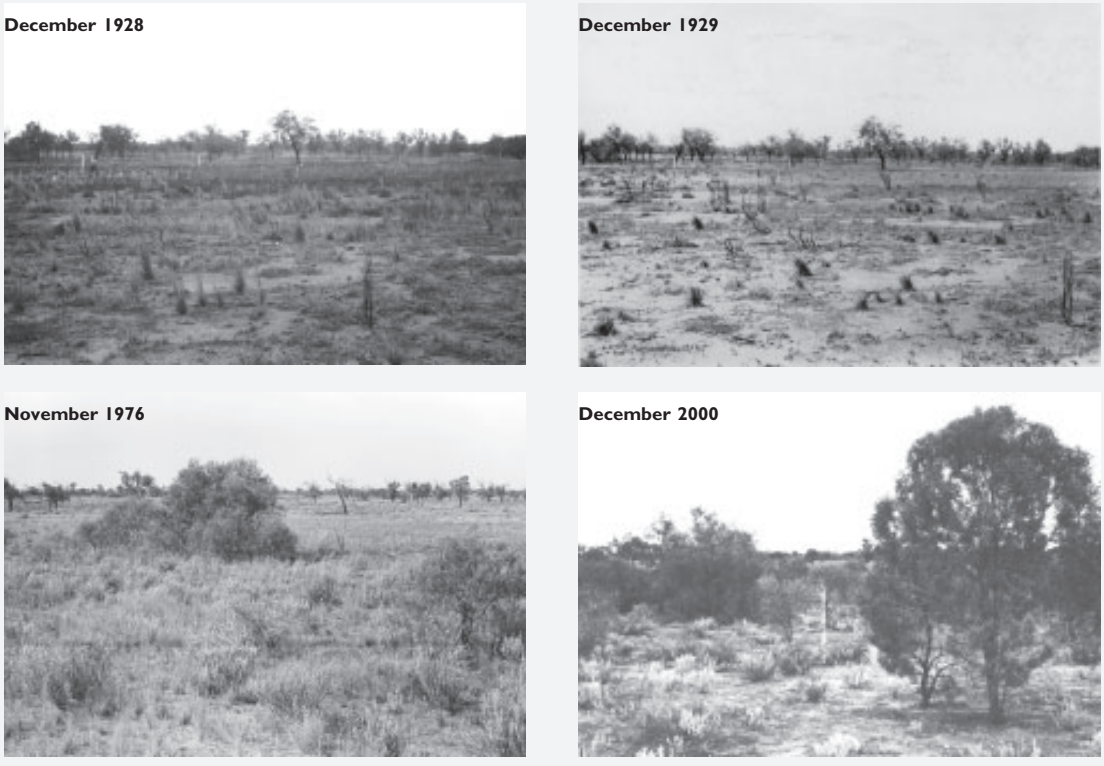
Product 4. Supporting information

Photographic sequences provide a local record of change and are particularly useful for developing community understanding of change, condition and trends.

Key attributes:

- Long-term photographic records of landscape change (Figure 4)
- regional resource condition assessments

Figure 4. Koonamore Station in South Australia has photo records dating back to the 1920s.



KEY COMPONENT—IMPACTS ON BIOPHYSICAL RESOURCES

climate variability • pasture availability • seasonal characteristics • grazing

Both natural events and human activity have an impact on the biophysical resources of Australia's rangelands.

Product 5. Climate variability

Rainfall in Australia's rangelands is highly variable. Rainfall and its effectiveness affect rangeland grass production.

Key attribute:

- Seasonal climate outlooks (e.g. provided by the Bureau of Meteorology) assist predictive management and provide a context for assessing vegetation condition

Product 6. Predicting pasture availability

Combining climate forecasts with information on numbers of grazing animals enables projections of grazing pressure and feed alerts—information to help manage stocking rates.

Key attribute:

- Pasture growth and cover predictions (e.g. *Aussie GRASS* incorporates interactions between climate, soils, vegetation, fire, animals and management responses)

Product 7. Seasonal characteristics and influence on vegetation

Changes in rangelands need to be interpreted within a seasonal context and is measured using a variety of remote sensing and on-ground techniques.

Key attribute:

- Seasonal characteristics and extent and duration of exceptionally dry and wet seasons

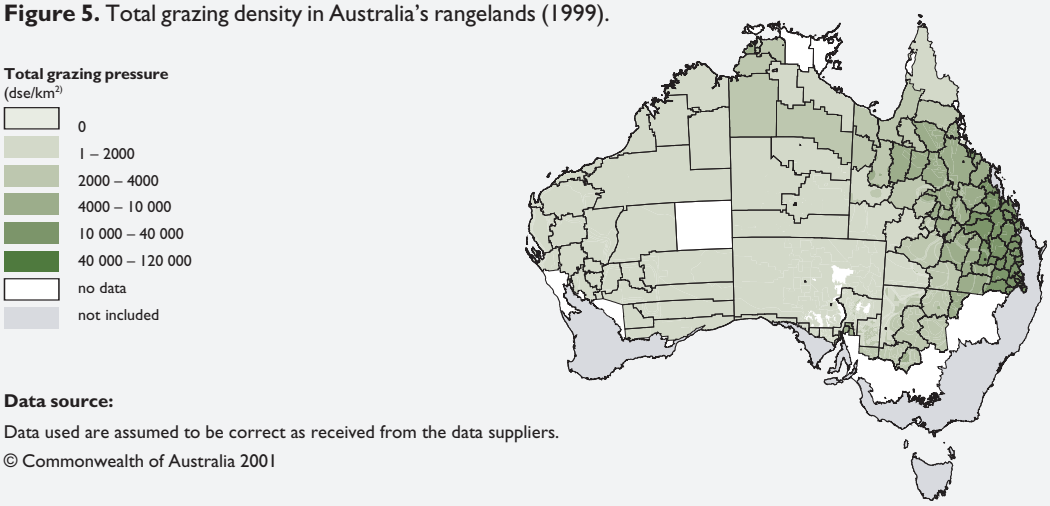
Product 8. Total grazing density

Total grazing density provides context to interpret outputs from other products. Estimates consider the combined effects of native macropods, domestic stock and feral animals and vary greatly with land tenure and location.

Key attribute:

- trends in total grazing density (Figure 5)

Figure 5. Total grazing density in Australia's rangelands (1999).



Data source:

Data used are assumed to be correct as received from the data suppliers.

KEY COMPONENT—IMPACTS ON BIOPHYSICAL RESOURCES

fire • land use and tenure • introduced biota • clearing

Product 9. Fire

Fire is a major natural influence as well as a management tool across much of Australia's rangelands and converts available biomass to carbon and nutrients.

Key attribute:

- Extent, timing and frequency (e.g. remote sensing provides information on fire frequency and occurrence)

Product 10. Land use and tenure

The economic returns and administrative structures from different types of land use and tenure affect how the land is managed.

Key attribute:

- Change in land tenure (information has been collated on tenure classes from the 1950s including freehold, leasehold; unassigned crown land, Indigenous land [Figure 6])

Product 11. Introduced plants and animals

Weeds and feral animals affect biodiversity and productivity by competing with, or killing or displacing native species and livestock.

Key attribute:

- Distribution and abundance of weeds and feral animals

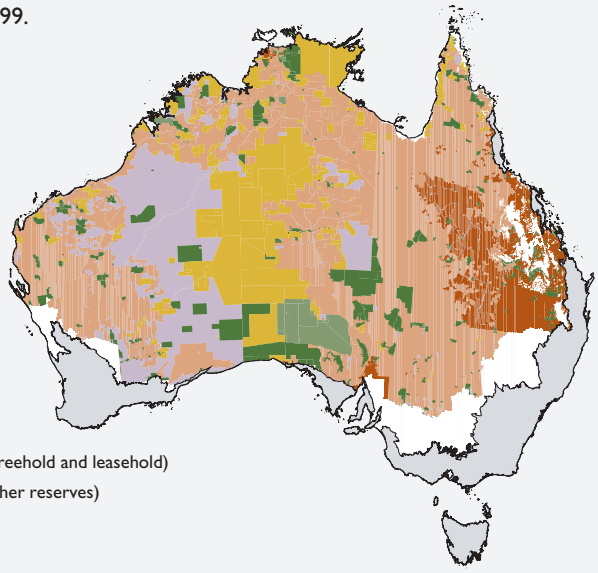
Product 12. Native vegetation clearing

Clearing affects biodiversity, land condition and soil erosion. Monitoring changes in vegetation cover contributes to biodiversity monitoring and assessment.

Key attribute:

- Extent of clearing

Figure 6. Land tenure across Australia's rangelands in 1999.



Data source:

Data used are assumed to be correct as received from the data suppliers.

KEY COMPONENT—SOCIOECONOMIC INFORMATION

individuals • business • communities

To adopt sustainable resource management practices, managers need to:

- understand problems and identify opportunities and management practices;
- be motivated to adopt sustainable management practices; and
- have the capacity to adopt sustainable management practices.

These abilities are influenced by knowledge, information, attitude, security, skills and access to infrastructure. Much of this information is already collected and interpreted via the Australian Bureau of Statistics Population Census and the Australian Bureau of Agriculture and Resources Economics Farm Survey.

Product 13. Individual attributes

Age statistics can help to explain management decisions.

Key attribute:

- Median age of farmers and farm managers (median age divides a population in half).

Product 14. Business attributes

Income is a determinant for adoption of different management techniques; property management plans reflect management motivation and access to and use of different information.

Key attributes:

- Total farm family income
- Farms with property management plans

Product 15. Community attributes

Key attributes:

- Net migration of young Australians (difference between those moving into an area and those moving out)
- Population structure to age dependency ratio (proportion of children and elderly people dependent on the working age population)

KEY COMPONENT—INSTITUTIONAL RESPONSES

Product 16. Institutional activity

Much of Australia's rangelands are under either public or corporate ownership and administration. Institutional policies have a wide and varied impact on rangeland management.

Key attributes:

- Government investment in sustainable management of rangelands (e.g. information is available on annual spending on natural resource management, conservation, extension and similar programs by the Northern Territory and State governments)
- Progress to a comprehensive, adequate and representative reserve system

PROVIDING ACCESS TO INFORMATION

The natural, biodiversity, cultural and economic values of Australia's rangelands are well recognised. Outback Australia has particular management needs. Through wise and informed management, we can manage loss of biodiversity, land degradation and excessive water use, and support development of rural and remote communities. Strategic investment in rangeland monitoring and assessment activities will provide the necessary information to avoid the mistakes (e.g. vegetation loss, dryland salinity) of more developed parts of Australia and ensure maximum return on the substantial investment by government in Australia's rangelands.

Rangeland information is a part of the Australian Natural Resources Atlas (Atlas)—an internet-based resource for data, maps and links to related sites. The Atlas is organised by subject and geography. Subjects include:

- coasts
- rangelands
- water
- land
- people—Australians and the management of natural resources
- agriculture
- biodiversity

Rangelands topics are:

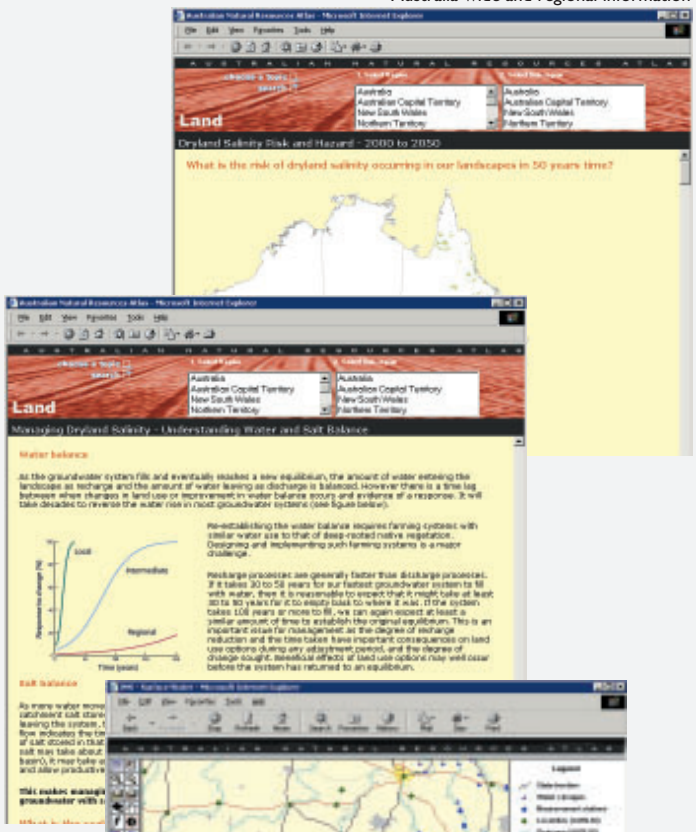
- introduction/description
- biophysical resources
- impacts on biophysical resources
- socioeconomic information
- institutional responses
- monitoring activities

Information products are presented for the whole of Australia, by State and Territory and by subregion.

Make your own on-line map

Rangeland information is linked to information collected as part of the other Audit assessments. These data can be combined to produce your own map.

Australia-wide and regional information



Link to monitoring data

www.nlwra.gov.au/atlas

IN PARTNERSHIP

The Australian Collaborative Rangeland Information System was developed in partnership with:

New South Wales
Department of Land and Water Conservation

Northern Territory
Department of Lands, Planning and Environment

Queensland
Department of Primary Industries

South Australia
Primary Industries and Resources SA

Western Australia
Department of Agriculture

Commonwealth
Agriculture, Fisheries and Forestry – Australia
Environment Australia
CSIRO

Indigenous Land Corporation

National Farmers Federation

Tropical Savannas Management Cooperative Research Centre

National Land and Water Resources Audit

GPO Box 2182
Canberra ACT 2601

Telephone: 02 6263 6035
Facsimile: 02 6257 9518
Email: info@nlwra.gov.au
Homepage: www.nlwra.gov.au/atlas

ISBN 0 642 37127 X

Editing and design: Themeda
Drawings and maps: Marco Wallenius
Photographs: Rochelle Lawson, Murray-Darling Basin Commission
Printing: Goanna Print