

Measuring change in South Australia's native vegetation

with SA Land Cover 1987–2015



Government of South Australia
Department for Environment
and Water

South Australia has new land cover data.

We can for the first time
track changes in native
vegetation across our state.



Our state's native vegetation is important

South Australia's landscapes are diverse, ranging from the arid and semi-arid pastoral systems of the north, to the high rainfall agricultural landscapes in the south.

The native vegetation of these landscapes includes grasslands, shrublands, woodlands and forests, as well as wetland vegetation and coastal seagrass.

South Australia's native vegetation is vital to the health of the South Australian environment and contributes to our social and economic well-being and provides the following benefits:

- critical habitat for South Australia's unique native biodiversity
- Helps protect our land, coastlines and waterways from erosion, salinity, and climatic extremes, and mitigate the effects of a changing climate
- supports agricultural production through the provision of windbreaks, shelter for stock, and habitat for natural pest predators and pollinators of crops
- improves our health and well-being by providing us with a place to connect with nature
- is an important element of our identity as South Australians.

Protection by Native Vegetation Act 1991

Under the *Native Vegetation Act (1991)*, native vegetation includes all naturally occurring local native plants, from small ground covers and native grasses to large trees. It also includes both freshwater and saltwater vegetation and even certain dead trees. Native vegetation may occur as individual plants, or as a vegetation community.

Information about native vegetation is important

Vegetation information is needed to support policies, planning, management decisions, and for reporting.

South Australia's existing information on vegetation extent (eg. Figure 2) is derived from one off mapping and is limited in what it describes.

The mapping is only a single snapshot in time, and the methods for updating are labour intensive and not easily repeatable.



A new method of mapping native vegetation



Figure 1



Figure 2

Native Vegetation
(mapped 1987)



Figure 3: Comparison of aerial photography, existing mapping data and the SA Land Cover in the Murray Mallee.

Woody Native Vegetation
Low Native Vegetation Dryland Agriculture

The new SA Land Cover data set was developed to enable the mapping of changes in the extent of native vegetation and other land cover classes for 6 time periods between 1987 and 2015.

SA Land Cover offers an additional information set that can be used in conjunction with existing information, to provide a more accurate overall picture.

Figure 1: Aerial photograph (2008)

Benefits:

- what we see is real, not a model
- method is repeatable
- dense woody native vegetation can be seen as dark green blocks, sparse native trees can be seen in paddocks and along some roadsides (Fig.1)

Limitations:

- we can't classify and quantify what we see

Figure 2: SA Vegetation mapping (1987)

Benefits:

- what is mapped is spatially accurate
- mapping was done to a documented method
- also provides information on what plant species occur where

Limitations:

- what was mapped was interpreted by different people
- doesn't map everything, shows larger blocks of native vegetation only
- mapped only once
- method is labour intensive

Figure 3: SA Land Cover data (2015)

Benefits:

- consistent mapping method across time and space
- what is mapped is quantifiable
- method is repeatable
- maps dense and sparse woody vegetation, native grasslands, cropped areas and large paddock trees
- tracks change over time

Limitations:

- misclassification can occur
- extent and structure only, does not say what species are there

New understanding of native vegetation in the landscape

New estimates of native vegetation cover

Using SA Land Cover, estimates of the extent of native vegetation cover are higher than previously reported from SA vegetation mapping method (Figure 2). The new data picked up an additional 12 thousand square kilometres of previously unmapped native vegetation in the agricultural zone. This tells us we previously underestimated native vegetation there by 4%.

This is a result of the new mapping methods that capture a broader range of vegetation extent and type, and does not represent a significant increase in the actual extent of native vegetation or improvement in its condition.

For example, this method captures smaller strips of vegetation, such as roadside and creekside vegetation, and types that have not been well captured previously, such as grassland and wetland.

Landscape patterns

SA Land cover describes the landscape patterns across space and through time that are the result of historic and current land uses. This data captures and displays changes in the landscape in a way we have not been able to previously. It allows us to consider changes we have known about but not been able to measure, e.g. the transition of land between native and production uses.

Measures of connectivity

We can now measure over time the physical connectivity of native vegetation such as patch size and structural type, for example 'woody native vegetation' or 'low native vegetation'.

How well patches are physically connected to each other, and how close or far apart they are is important for biodiversity planning and management.

The data allows us to consider changes we have known about but not been able to measure, e.g. the transition of land between native and production uses.

Cover does not equal condition

This data captures the amount of native vegetation present, but does not indicate the quality or condition of that vegetation.

For example, it doesn't indicate how dense or sparse the vegetation is, the composition of plants for that ecosystem, or whether there are understorey layers. (e.g. Figure 4)

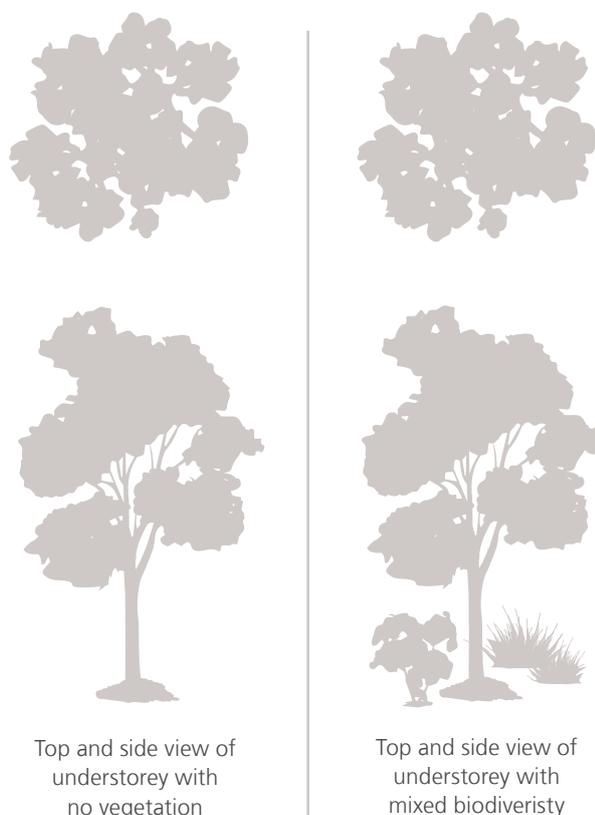
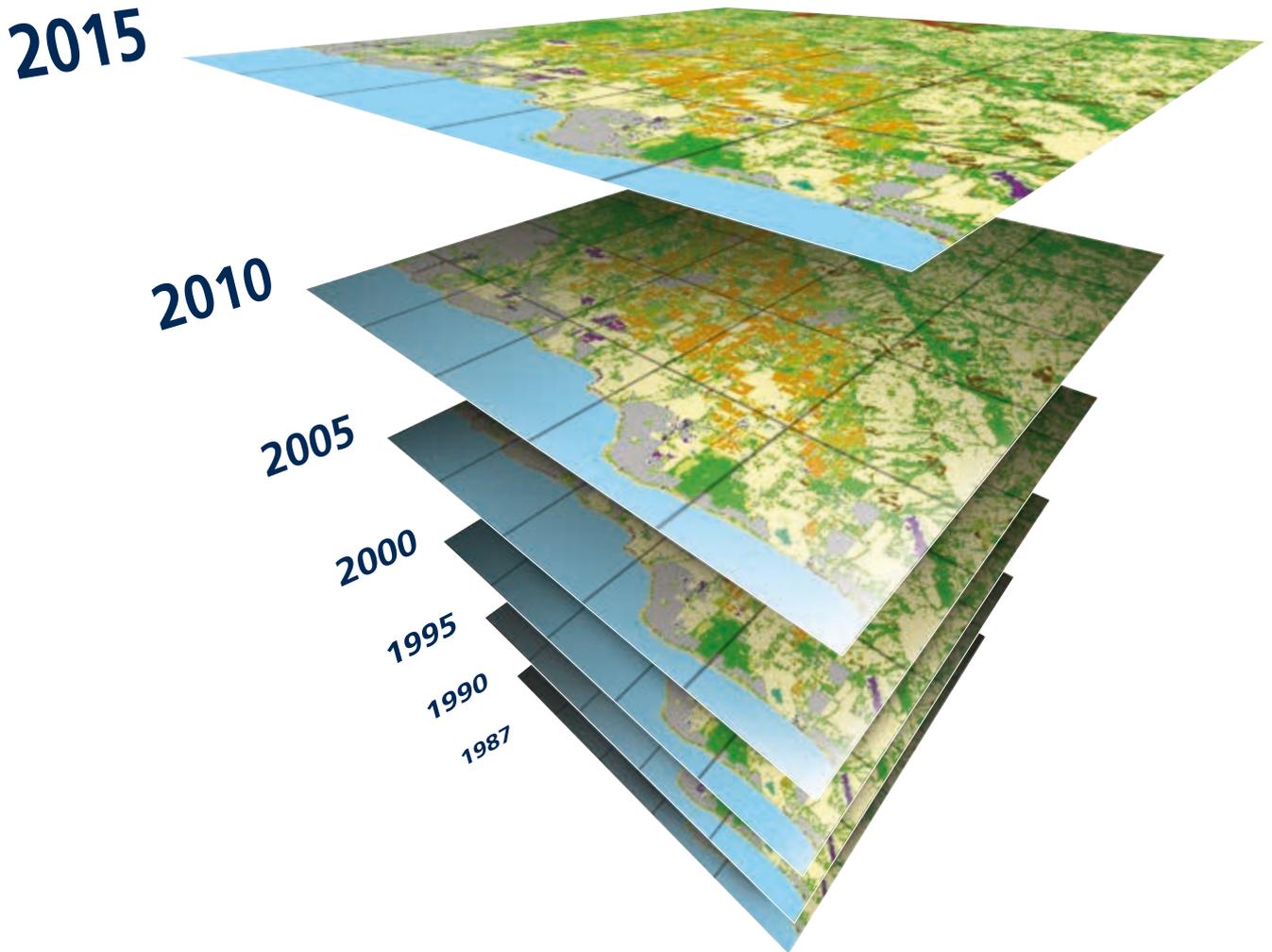


Figure 4 Comparison of top and side view, top views can be the same despite different understories.

SA Land Cover data sets



SA Land Cover is made up of a series of spatial layers. Each layer is made up of 25m pixels. These layers enable catchment to state-scale analyses. The dataset is based around six time periods enabling analysis of trends over time. For each time period there are:

- ‘Most likely layers’: 17 land cover classes (see right)
- ‘Continuous layers’: more detailed data that sits behind the most likely layers (available for deeper analysis and research projects)

Native vegetation



Woody native vegetation



Mangrove vegetation



Non-woody native vegetation



Saltmarsh vegetation



Wetland vegetation



Natural low cover

Non-native vegetation



Dryland agriculture



Exotic vegetation



Irrigated non-woody



Orchards / vineyards



Plantation (softwood)



Plantation (hardwood)

Other



Salt lake / saltpan



Urban area



Built-up area

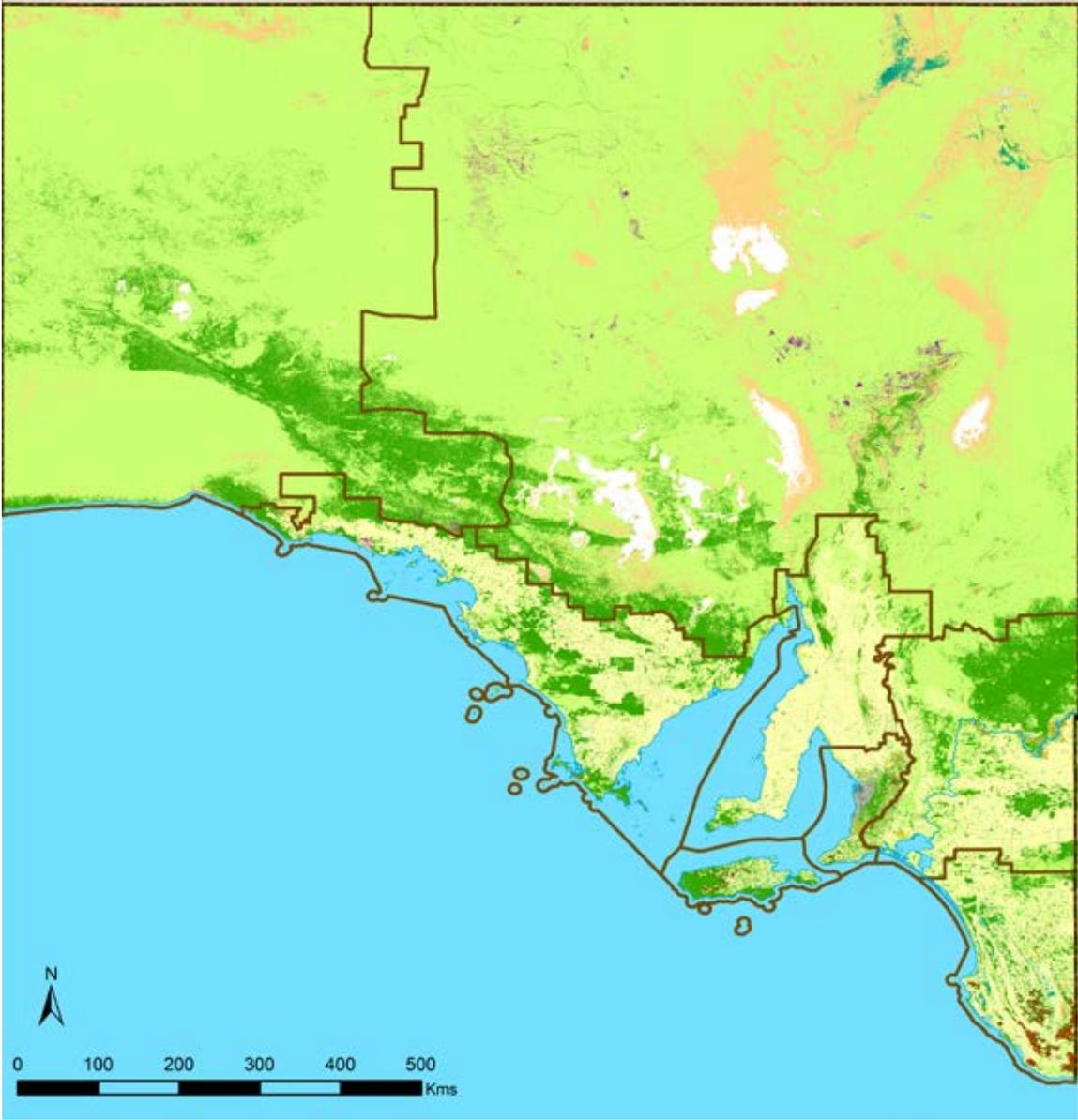


Disturbed ground / outcrop



Water unspecified

Satellite map of SA Land Cover in 2015



Class Name		NRM Regions
	Woody Native Vegetation	 NRM Regions
	Mangrove Vegetation	 Plantation (Hardwood)
	Non-Woody Native Vegetation	 Urban Area
	Saltmarsh Vegetation	 Built-up Area
	Wetland Vegetation	 Disturbed Ground / Outcrop
	Natural Low Cover	 Water Unspecified
	Salt Lake/ Saltpan	
	Dryland Agriculture	
	Exotic Vegetation	
	Irrigated Non-Woody	
	Orchards/ Vineyards	
	Plantation (Softwood)	

Figure 5 SA Land Cover Map 2015. At state scale, only the largest area land covers are visible. To view dynamic maps online, go to naturemaps.sa.gov.au.

New estimates of native vegetation in South Australia

An analysis of the SA Land Cover data was completed and a full technical report is available at Enviro Data SA.

The analysis shows there are 866,632 km² of native vegetation in South Australia overall, comprising 88% of the total land area of the state. 32% of this native vegetation is located in Protected Areas (PAs).

Protected areas and reserve systems conserve some of the best quality and representatives of remnant native vegetation. This includes both public and private land such as the National Park system (which includes conservation parks, wilderness protection areas, regional and game reserves), heritage agreements and conservation land held and managed by non-governmental organisations.

Region	SA Veg	SA Land Cover		
	Previous % area	New % area	New area (km ²)	New % in PAs
Adelaide and Mt Lofty Ranges	13%	32%	2,123	12%
Alinytjara Wilurara	100%	100%	279,542	52%
Eyre Peninsula	46%	51%	26,434	39%
Kangaroo Island	52%	59%	2,607	57%
Northern and Yorke	37%	36%	12,552	6%
South Australian Arid Lands	94%	96%	500,562	21%
South Australian Murray-Darling Basin	53%	61%	34,435	34%
South East	17%	31%	8,376	35%
Arid Zone	94%	97%	780,095	32%
Agricultural Zone	44%	48%	86,527	32%
Statewide	86%	88%	866,632	32%

Table 1. The amount of native vegetation varies across regions, as does the area of native vegetation within the protected areas network

We've picked up an additional 12 thousand square kilometres of previously unmapped native vegetation across the agricultural zone.

Regional landscape patterns 1987–2015

High rainfall agriculture regions (AMLR, KI and SE)

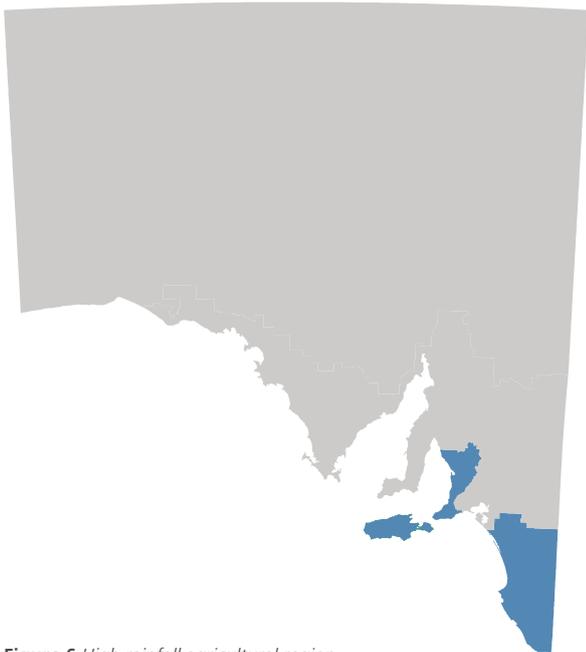


Figure 6 High rainfall agricultural region

The data shows that since 1987, in higher rainfall agricultural regions of South Australia (AMLR, KI and SE), there was a reduction in area of native vegetation land cover classes of 1030 km² (approximately 3% of the total land area).

The key changes in native vegetation across these regions are reduction of wetland vegetation, and an increase in the area of irrigated pastures, orchards and vineyards, and plantation timbers.

There is some variation in these patterns:

- Kangaroo Island has seen a conversion of dryland agriculture to plantation hardwood timber;
- AMLR has seen a conversion of dryland agriculture and low native vegetation to urban and built up areas

LAND COVER TYPE	TRENDS
 Woody native vegetation	—
 Mangrove vegetation	—
 Non-woody native vegetation	↙
 Saltmarsh vegetation	—
 Wetland vegetation	↙
 Natural low cover	—
 Dryland agriculture	↙
 Irrigated non-woody	↗
 Orchards or vineyards	↗
 Plantation (softwood)	↗
 Plantation (hardwood)	↗
 Salt lake or saltpan	—
 Urban area	↗
 Built-up area	↗

Regional landscape patterns 1987–2015

Low rainfall agriculture regions (EP, NY and SAMDB)

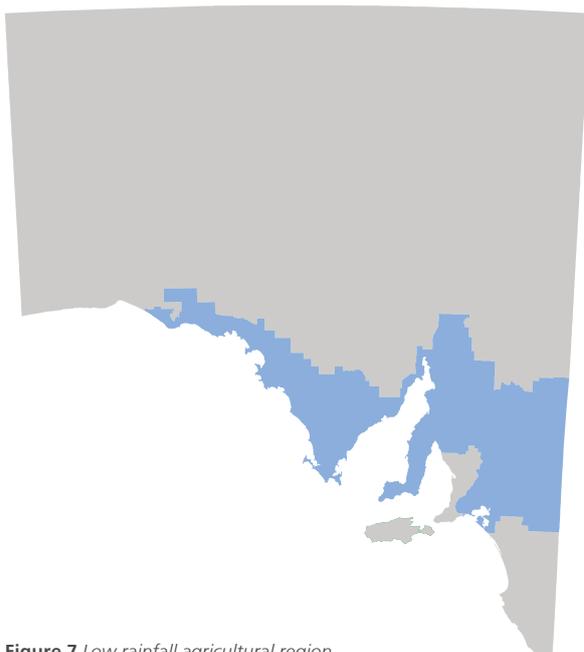


Figure 7 Low rainfall agricultural region

The data shows that since 1987, in lower rainfall agricultural regions of South Australia (EP, N&Y and SAMDB) there was a reduction in area of native vegetation land cover classes of 3,937 km² (approximately 3% of the total land area).

The key change in native vegetation across these regions is the conversion of low native vegetation (native pastures) to either woody native vegetation or dryland agriculture, both of which showed a net increase in area.

While widespread clearance of native vegetation has largely ceased, conversion of native pastures to dryland agriculture continues.

The conversion of native pastures to woody native vegetation is occurring through a phenomena called ‘shrub encroachment’, that occurs in response to a combination of climate, grazing pressure, and the pattern, frequency, and intensity of bushfires.

LAND COVER TYPE	TRENDS
 Woody native vegetation	↗
 Mangrove vegetation	↗
 Non-woody native vegetation	↙
 Saltmarsh vegetation	—
 Wetland vegetation	—
 Natural low cover	—
 Dryland agriculture	↗
 Irrigated non-woody	—
 Orchards or vineyards	↗
 Plantation (softwood)	—
 Plantation (hardwood)	↗
 Salt lake or saltpan	↙
 Urban area	↗
 Built-up area	↗

Key change in lower rainfall regions was the conversion of native pastures to woody native vegetation or dryland agriculture.

Regional landscape patterns 1987–2015

Arid regions (AW, SAAL)

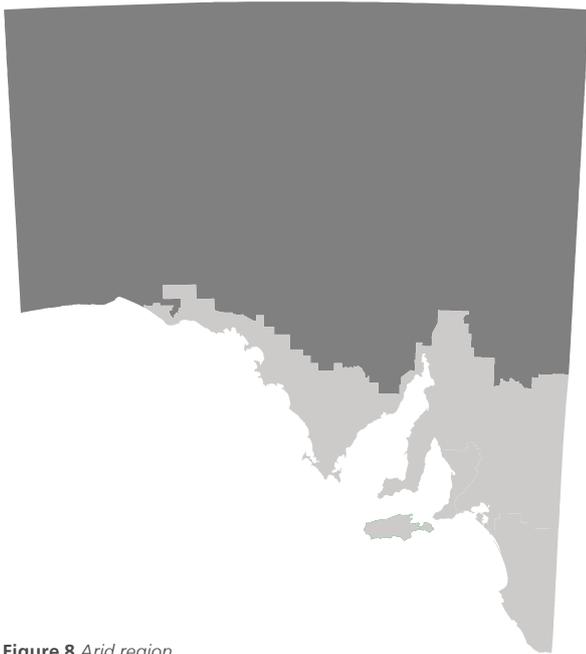


Figure 8 Arid region

The data shows that since 1987, there has been no detectable change in the extent of native vegetation across the arid NRM regions (AW, SAAL) of South Australia. This largely reflects historic and current land uses, which are dominated by pastoral enterprises on native vegetation, conservation reserves, or Aboriginal lands. The extent of native vegetation remained greater than 97% throughout this time period, and comprises the vast majority (90%) of remnant native vegetation in South Australia. While there may have been changes to the condition of native vegetation during this period (e.g. through total grazing impacts and invasive species such as buffel grass), these potential changes could not be detected. Furthermore, these changes in condition are likely to be highly dynamic, reflecting the dynamic, rain-driven nature of these ecosystems.

LAND COVER TYPE	TRENDS
 Woody native vegetation	—
 Mangrove vegetation	
 Non-woody native vegetation	—
 Saltmarsh vegetation	—
 Wetland vegetation	—
 Natural low cover	—
 Dryland agriculture	—
 Irrigated non-woody	
 Orchards or vineyards	
 Plantation (softwood)	
 Plantation (hardwood)	
 Salt lake or saltpan	—
 Urban area	↗
 Built-up area	↗

There has been no detectable change in the extent of native vegetation across the arid NRM regions (AW, SAAL) of South Australia between 1987 and 2015

How to access SA Land Cover

NatureMaps – an on-line mapping view of 6 most likely land cover maps

Data.sa.gov.au – for downloading and off-line use of 6 most likely GIS layers

Technical summary report – for method summary of most likely and continuous layers, as well as initial analysis of trends in native vegetation in SA

Organisations and Researchers may wish to contact DEW to discuss access to the 'continuous layers' and possible applications.

For more information:



Search **SA Land Cover**
on **Enviro Data SA**

data.environment.sa.gov.au



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