

# Australia's Environment in 2016

After three dry years, much of the country received good rains in 2016. This fact sheet summarises indicators of Australia's environment. Full details are available on the Australia's Environment Explorer website ([ausenv.online](http://ausenv.online))

## Tree cover change

- Key drivers of tree cover change are water availability, bush fire, and direct human activities such as planting and clearing.
- Tree cover appeared to have fallen slightly in 2016, but mapping inconsistencies, particularly in sparse forests, make national numbers uncertain.
- Up to 10,000 ha of mangrove forests were lost along 700 km of the Gulf of Carpentaria coast in hot and prolonged dry conditions.



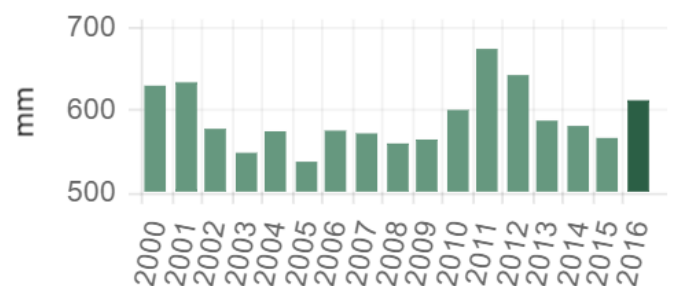
Example of mangrove loss on a short section of Gulf coast

## Bushfire

- Bushfire activity decreased slightly from 2015.
- Nationally, fire activity increased by 11% in woody ecosystems, but fell by 34% in sparse vegetation, particularly in northern Australia.
- Large fire events occurred in southwest Western Australia (>120,000 ha) and Tasmania (ca. 100,000 ha).
- Up to 18,000 ha or 1.1% of the Tasmanian World Heritage Area was burnt, including iconic and ancient alpine vegetation.

## Water availability

- National average precipitation of 599 mm was well above the long-term mean of ca. 465 mm and ended a series of four dry years.
- Against the national trend, parts of Cape York and the Top End experienced a fifth dry year.
- Soil moisture is a measure of water availability, and generally, shows a strong but sometimes delayed response to rainfall.



National average soil moisture availability

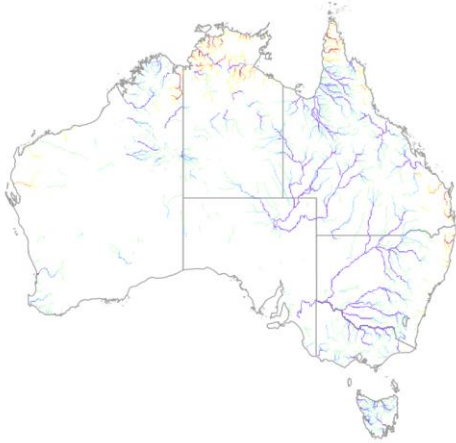
- Water availability improved across most of Australia.
- In Tasmania and inland Queensland, soil moisture was very low at the beginning of the year but increased to high levels over the course of the year. Drought conditions in Queensland eased, though many areas officially remained declared in drought.
- Water availability on the central East Coast returned to normal conditions after a wet 2015.
- Soil moisture conditions continued to decline along much of the north coast.

## Rivers and Wetlands

- Runoff continued to be low in Top End and Cape York catchments.
- Very high runoff volumes were produced in the Murray-Darling Basin, increasing combined water storage from 40% to 80% of reservoir capacity.
- Major flood events occurred in western Queensland in March, northern Tasmania in June, and in north-west Australia in December.

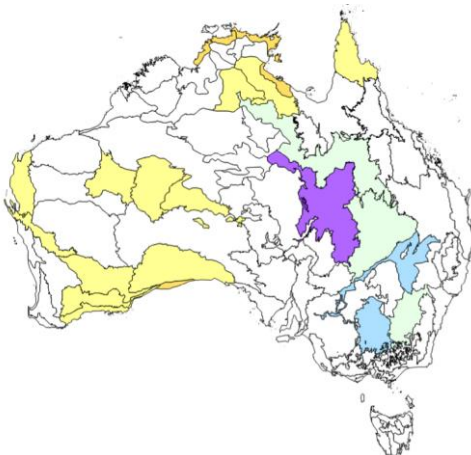
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- Major flooding occurred in northern Tasmanian rivers in June.
- The Lake Eyre system saw multiple inflow pulses over the course of the year.



Change in annual river flows by river region, varying from >1000 GL reductions (dark red) and increases (purple)

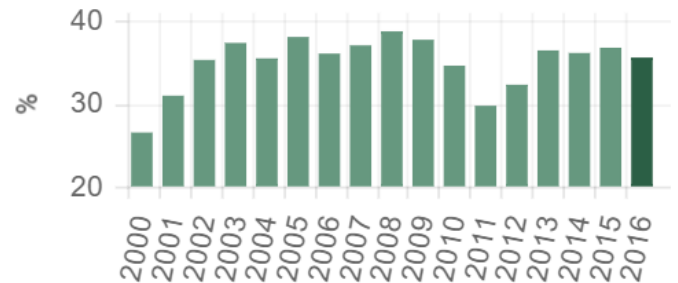
- The total area inundated at least once increased by 12,000 km<sup>2</sup> in 2016 – above average but below 2009-2012 levels.
- The Channel Country and Murray-Darling Basin floodplains saw the most widespread flooding since 2012. Inundation in all Ramsar-listed wetlands combined increased by 50,000 ha or 1% of their total area.
- Inundated area was the lowest since at least 2000 in much of Cape York and the Gulf Coast.



Changes in area inundated at some time during 2016 by bioregion, varying from minus (orange) or plus (purple) 1% of the area

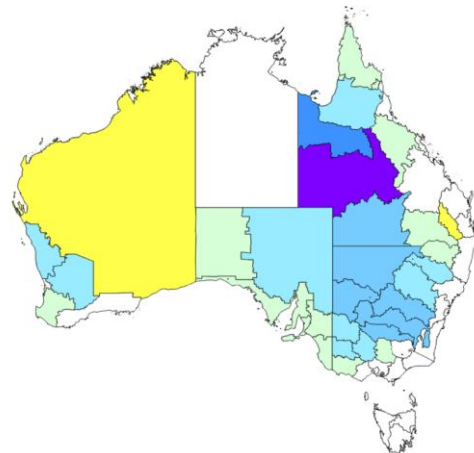
## Landscape condition

- The area of exposed soil decreased by 9 million ha in 2016.



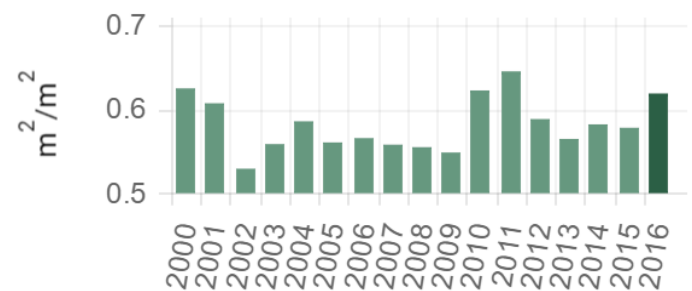
Percentage of national area with exposed soil

- The largest reductions in bare soil occurred in the interior of eastern Australia.
- Soil exposure increased in north-west Australia.



Change in soil exposure by NRM region, showing between 5% reductions (purple) and a 1% increase (yellow)

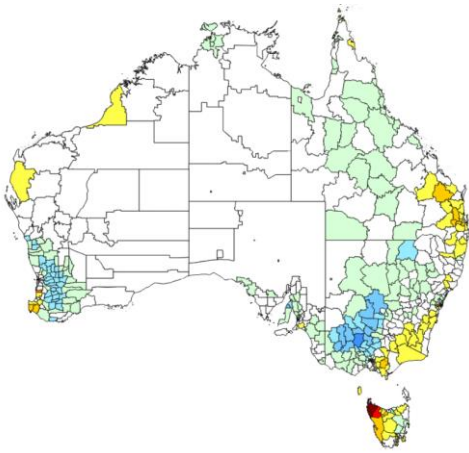
- Total vegetation leaf area increased to levels not seen since 2011.



National average leaf area index

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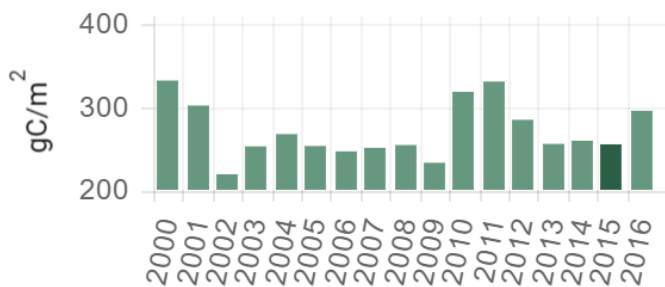
- Particularly good growth occurred in both western and eastern cropping regions and across most of inland Queensland.
- Leaf area returned to about average conditions along the East Coast and south-west Western Australia coast.
- Vegetation density was well below average in north-west Australia.
- Leaf area was the lowest since 2000 in western Tasmania due to dry conditions and bushfire.



Leaf area index changes by Local Government Area, with declines (red) and increases (blue) greater than 0.5

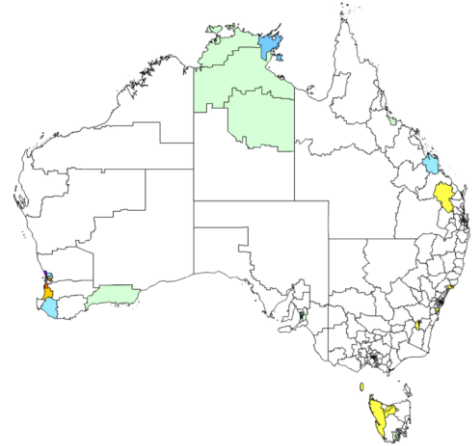
## Carbon uptake and emission

- Total national vegetation carbon uptake was estimated at 2,300 million tonnes of carbon in 2016; 15% or 300 million tonnes higher than in 2015, approaching levels last seen in 2011.
- Spatial changes in carbon uptake largely mirrored changes in leaf area.



National average annual vegetation carbon uptake

- Only a small fraction of carbon uptake is retained in biomass and organic matter. The vegetation itself again releases almost half of absorbed carbon; much of the remainder returns to the atmosphere via decomposition and fire.
- Bushfires released 80 million tonnes of carbon in 2015, 52 million tonnes or 40% less than in 2015 and much less than emissions during the previous wet period 2011-2012.
- The greatest reduction in fire emissions occurred in north-west Australia and was associated with a sequence of dry years and low vegetation cover.
- Extensive forest fires in Tasmania and near Perth released more than 3 million tonnes carbon.



Changes in fire carbon emission rates by statistical region, showing reductions (blue) and increases (orange) of more than 1000 tonnes per ha

## Other notable events

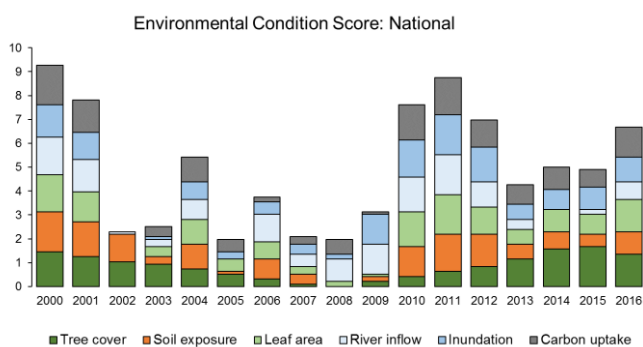
Large-scale coral bleaching occurred on the Great Barrier Reef, with more than half of all coral affected north of Cairns. The event coincided with very high sea surface temperatures and above average solar radiation.

## Headline indicators

- An experimental Environmental Condition (EC) score was calculated by ranking indicator values for the year among those for the years 2000-2016.

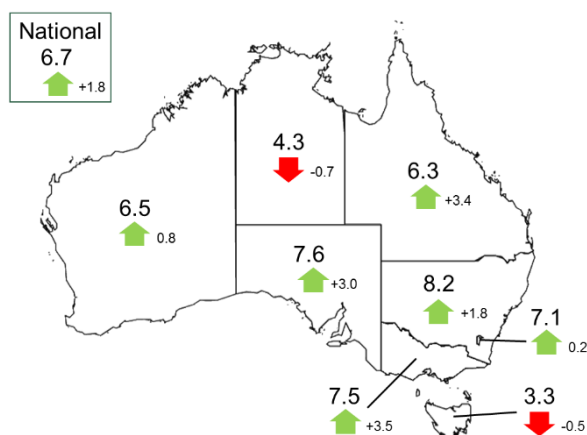
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- EC score was calculated as the average of six indicators: tree cover, soil exposure, leaf area, river inflow, inundation, and carbon uptake.
- While subjective and incomplete, patterns in the different indicators over time are often similar, making the end result less sensitive to the method of calculation.
- National-level ECS increased from below average (4.9) in 2015 to above average (6.7) in 2016.



Time series of national Environmental Condition (EC) score, showing the contribution from the six input indicators

- Scores improved strongly in Victoria, Queensland, South Australia and New South Wales, and to a lesser extent Western Australia and the ACT.
- Scores declined further in the Northern Territory and Tasmania, due to continued dry conditions.



Environmental Condition Score by State and Territory, showing the actual score and change from 2015 to 2016

## How were the data derived?

- Mapping of tree cover, land cover, inundation, bushfire intensity and occurrence, exposed soil and vegetation leaf area was derived through automated interpretation of satellite imagery.
- We estimated the other indicators by integrating ground- and satellite data with spatial environmental models.

## About this report

- This report provides a brief summary of a large amount of environmental information made available through our interactive website.
- Our objective is to make spatial information on environmental conditions easier and faster to access for interested users.
- On the website, data on 13 indicators in 6 themes can be viewed as maps, accounts and charts. Data can be examined by region and land cover type, compared to preceding years, or downloaded for further analysis.
- Lack of national-scale observations means that information is not available for some important aspects, such as biodiversity and soil health.
- Data and summary reports for 2017 are planned for release in January 2018.

## Acknowledgements

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## More information

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