

# climatechange in Australia

## Australia's climate has changed.

Since 1950 Australian average temperatures have increased by 0.9°C. Hot days and nights have become more frequent and there are fewer cold days and nights. Rainfall has declined significantly in eastern and south-western Australia, and increased in the north-west. Droughts have become hotter.

From 1920 to 2000, average relative sea level is estimated to have risen around Australia by 1.2 mm per year (10 cm over 80 years).

Most of the warming since the 1950s is very likely to have been caused by increased atmospheric greenhouse gas concentrations as a result of human activities.

## There are more changes to come.

Existing and projected atmospheric greenhouse gas concentrations mean that we are committed to some climate change, so we need to adapt. We also need to mitigate greenhouse gas emissions to slow future changes.

As greenhouse gas levels continue to rise, further global warming, sea level rise and regional climate change are likely.

**Temperature** – Best estimate annual warming by 2030 (relative to 1990) of about 1.0°C, a little less in coastal areas and a little more inland. By 2070, the warming is 1.8°C (low greenhouse gas emissions) to 3.4°C (high emissions).

**Rainfall** – Climate model results indicate that decreases in rainfall are likely in southern areas of Australia annually and in winter, and in southern and eastern areas in spring.

**Sea level rise** – Increase of 18-59 cm by 2100, with a possible additional contribution from melting of ice sheets of 10-20 cm. (Further ice sheet contributions may substantially increase the upper limit of sea level rise.)

Changes expected in Australia are shown for ten regions for the years 2030 and 2070. The range of values depicting likely changes is due to an allowance for uncertainty in future emissions of greenhouse gases and the response of the climate system. The examples of potential impacts that may affect these regions have been drawn from existing studies.

## Top End

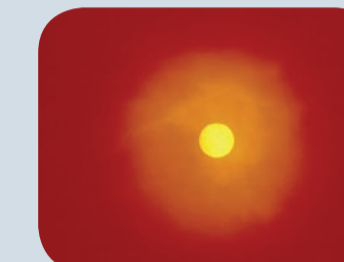
- Remote area communities to face increased exposure to heat stress, fire, diseases, extreme rainfall events and flooding
- 80% loss of biodiversity in Kakadu wetlands for a 30 cm sea level rise



Darwin*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	27.8	28.8 (28.5-29.2)	29.5 (29.0-30.1)	31.0 (30.1-32.2)
No. days over 35°C	11	44 (28-69)	89 (49-153)	227 (141-308)
Annual rainfall (mm)	1847	1847 (1718-1960)	1829 (1644-2032)	1829 (1459-2217)

## Central Australia

- Greater energy demand for cooling in summer, less energy demand for heating in winter
- Remote area communities to face increased exposure to heat stress, fire, diseases, extreme rainfall events and flooding



Alice Springs*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	21.0	22.2 (21.8-22.6)	22.9 (22.3-23.7)	24.7 (23.6-26.2)
No. days over 35°C	90	109 (102-118)	122 (112-138)	155 (132-182)
Annual rainfall (mm)	326	306 (270-342)	297 (241-352)	270 (182-378)

## Southern South Australia

- Sea level rise may increase the cost of sand replenishment on Adelaide beaches
- Farming of marginal land at the drier fringe likely to be increasingly challenging if rainfall declines substantially
- Grape quality in the Barossa Valley likely to decline



Adelaide*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	16.5	17.4 (17.1-17.8)	18.0 (17.5-18.6)	19.3 (18.4-20.5)
No. days over 35°C	17	23 (21-26)	26 (24-31)	36 (29-47)
Annual rainfall (mm)	463	444 (412-472)	430 (379-481)	403 (315-500)

## Tasmania

- 21% of the coast at risk of erosion and recession from sea level rise
- Strengthening of the East Australian Current may result in sub-tropical species moving into temperate waters, altering the habitat of many species
- Changes in grape quality – reduced for cool climate varieties such as Pinot Noir and Chardonnay, but increased for warm climate varieties such as Cabernet Sauvignon and Shiraz.



Hobart*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	13.0	13.6 (13.4-13.9)	14.1 (13.7-14.5)	15.1 (14.5-15.9)
No. days over 35°C	1.4	1.7 (1.6-1.8)	1.8 (1.7-2.0)	2.4 (2.0-3.4)
Annual rainfall (mm)	576	571 (542-594)	559 (519-600)	542 (467-623)

## Northern coastal Queensland

- Sea level rise likely to cause salt-water intrusion and inundation in some Torres Strait Islands
- Significant loss of biodiversity in Great Barrier Reef and Queensland Wet Tropics by 2020
- Cairns area at risk of inundation by a 1-in-100-year storm surge may more than double by 2050



Cairns*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	24.9	25.8 (25.5-26.1)	26.4 (26.0-26.9)	27.8 (26.9-28.8)
No. days over 35°C	3.8	6.6 (5.4-9.1)	12 (8-22)	44 (19-96)
Annual rainfall (mm)	2112	2112 (1943-2281)	2091 (1816-2387)	2091 (1584-2640)

## South-east Queensland

- Less water for cities, industries, agriculture and natural ecosystems
- Less frost damage to crops, higher wheat yields but lower wheat quality, increased pest and disease risk
- 20% increase in the intensity of the 1-in-100-year rain-storm could flood 7000 properties in the Nerang catchment



Brisbane*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	20.5	21.5 (21.2-21.9)	22.1 (21.6-22.8)	23.6 (22.6-24.9)
No. days over 35°C	1.0	2.0 (1.5-2.5)	3.0 (2.1-4.6)	7.6 (4-21)
Annual rainfall (mm)	1192	1109 (978-1230)	1133 (978-1300)	1085 (799-1395)

## New South Wales

- Average streamflow decreases by 2050 across the Murray-Darling Basin
- 10-40% increase in the number of extreme fire danger days in Canberra by 2020
- Annual heat-related deaths in Sydney rise from 176 (today) to 364-417 by 2020



Sydney*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	18.3	19.2 (18.9-19.6)	19.9 (19.4-20.5)	21.3 (20.5-22.6)
No. days over 35°C	3.5	4.4 (4.1-5.1)	5.3 (4.5-6.6)	8.2 (6-12)
Annual rainfall (mm)	1277	1238 (1162-1315)	1225 (1098-1340)	1174 (957-1404)

## Victoria

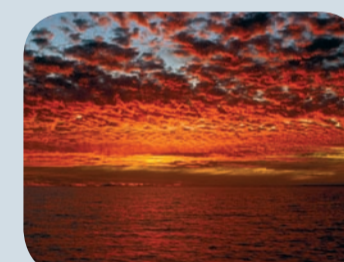
- Streamflow into Melbourne dams may decline by 7-35% by 2030
- Area inundated by a 1-in-100 year storm surge in Gippsland may increase 15-30% by 2070
- Snow covered area shrinks 10-40% by 2020 and 20-85% by 2050
- 20-65% increase in the number of extreme fire danger days in the Bendigo region by 2020



Melbourne*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	15.7	16.6 (16.3-16.9)	17.1 (16.7-17.7)	18.5 (17.6-19.5)
No. days over 35°C	9.1	11.4 (11-13)	14 (12-17)	20 (15-26)
Annual rainfall (mm)	654	628 (596-661)	615 (563-668)	582 (491-674)

## North-western Australia

- Greater energy demand for cooling in summer
- Southward spread of mosquito-borne diseases
- More frequent bleaching of coral reefs



Broome*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	26.7	27.8 (27.5-28.3)	28.5 (28.0-29.3)	30.2 (29.1-31.7)
No. days over 35°C	54	86 (71-107)	119 (89-173)	220 (147-281)
Annual rainfall (mm)	664	649 (588-705)	639 (543-732)	616 (448-795)

## South-west Western Australia

- Decline in annual runoff of approximately 14% by 2030
- Wheat yield significantly reduced by 2070
- Some species may become vulnerable to extinction



Perth*	Present average (1971-2000)	2030 average (mid emissions)	2070 average (low emissions)	2070 average (high emissions)
Annual temperature (°C)	18.5	19.3 (19.1-19.7)	19.9 (19.5-20.5)	21.2 (20.4-22.3)
No. days over 35°C	28	35 (33-39)	41 (36-46)	54 (44-67)
Annual rainfall (mm)	747	702 (650-754)	665 (590-754)	605 (471-762)

[www.climatechangeinaustralia.gov.au](http://www.climatechangeinaustralia.gov.au)

\* Estimates for periods centred on 2030 and 2070 are shown as a best estimate, with a likely range (10th to 90th percentile) in brackets. Values for 2030 are shown for an IPCC mid-range emission scenario (A1B) since results are relatively insensitive to the choice of scenario over the next few decades. Values for 2070 are shown for two IPCC emission scenarios – low (B1) and high (A1FI) – since results are sensitive to the scenarios later in the 21st century.

## Climate data

Information on current climate used in this poster is from the Bureau of Meteorology's Climate Data Online: [www.bom.gov.au/climate/averages](http://www.bom.gov.au/climate/averages)

Climate change projections are from an assessment of 23 international climate models driven by a range of greenhouse gas and aerosol emission scenarios. A full technical report, summary brochures and regional maps are available at [www.climatechangeinaustralia.gov.au](http://www.climatechangeinaustralia.gov.au).



## More information:

Department of Climate Change: [www.climatechange.gov.au](http://www.climatechange.gov.au) • Bureau of Meteorology: [www.bom.gov.au](http://www.bom.gov.au)  
CSIRO: [www.csiro.au](http://www.csiro.au) • Intergovernmental Panel on Climate Change: [www.ipcc.ch](http://www.ipcc.ch)