



Over many decades thousands of scientists have painted an unambiguous picture: the global climate is changing and humanity is almost surely the primary cause. The risks have never been clearer and the case for action has never been more urgent.

Our Earth's surface is warming rapidly and we can already see social, economic and environmental impacts in Australia.

Failing to take sufficient action today entails potentially huge risks to our economy, society and way of life into the future. This is the critical decade for action.

This document accompanies The Critical Decade report and highlights the key impacts for South Australia.

1. Rising temperatures will affect health.

- Average yearly temperature in South Australia has risen by almost 1°C over the past century (**Figure 1**) and the last decade was South Australia's warmest on record (BoM 2010).
- Temperatures will continue to rise. At present, Adelaide experiences, on average, 17 days out of the year with uncomfortably hot weather (above 35°C). By 2030 the number of extremely hot days could rise to about 23, and by 2070 further increase to as much as 36 in a year (CSIRO 2007).
- More record hot days and associated heatwaves increase the risk of heat-related illnesses and death, particularly in the elderly.

Figure 1. The long-term trend in South Australia's average temperature, measured as the difference from the 1961 to 1990 average. This graph shows that from around 1950 there has been a steady temperature rise – approximately 1°C – in South Australia. Most human-caused CO₂ emissions have occurred since 1950.

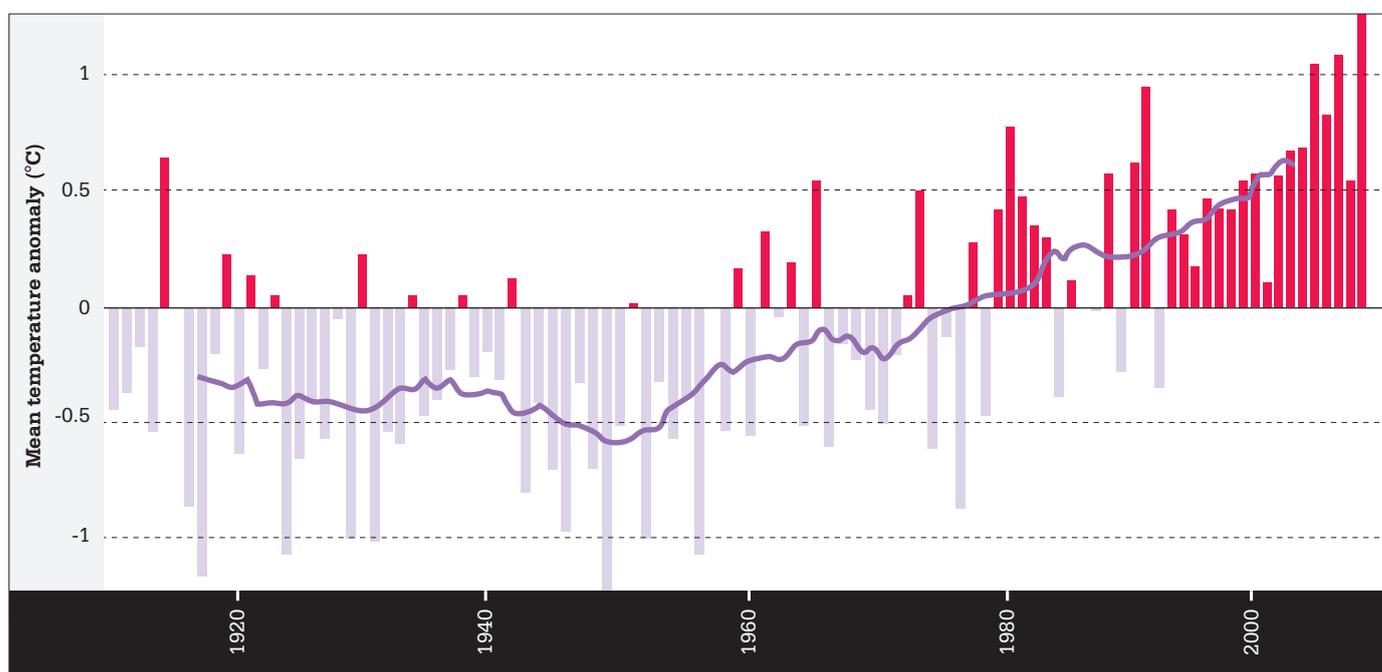
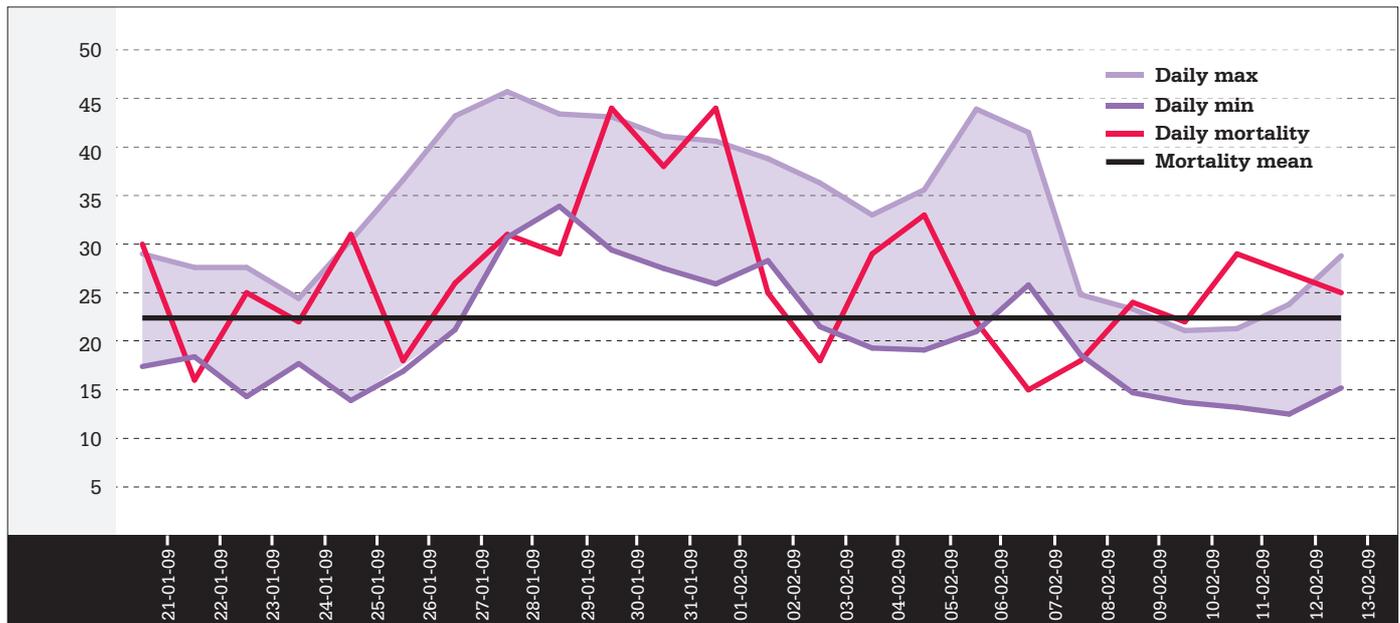
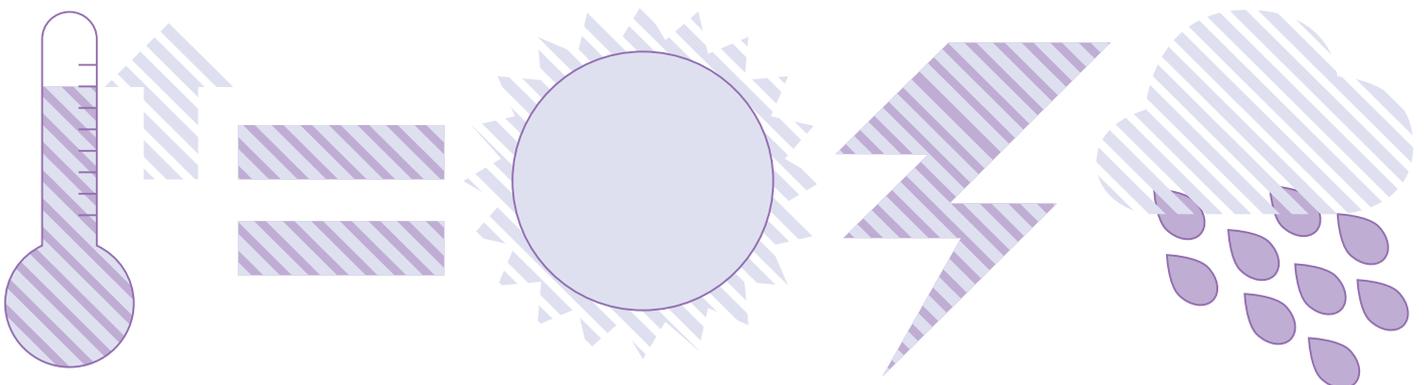


Figure 2. Mortality and temperature during the 2009 South Australian heatwave. This graph shows the correlation between prolonged periods of higher temperatures, and the impact on mortality rates.



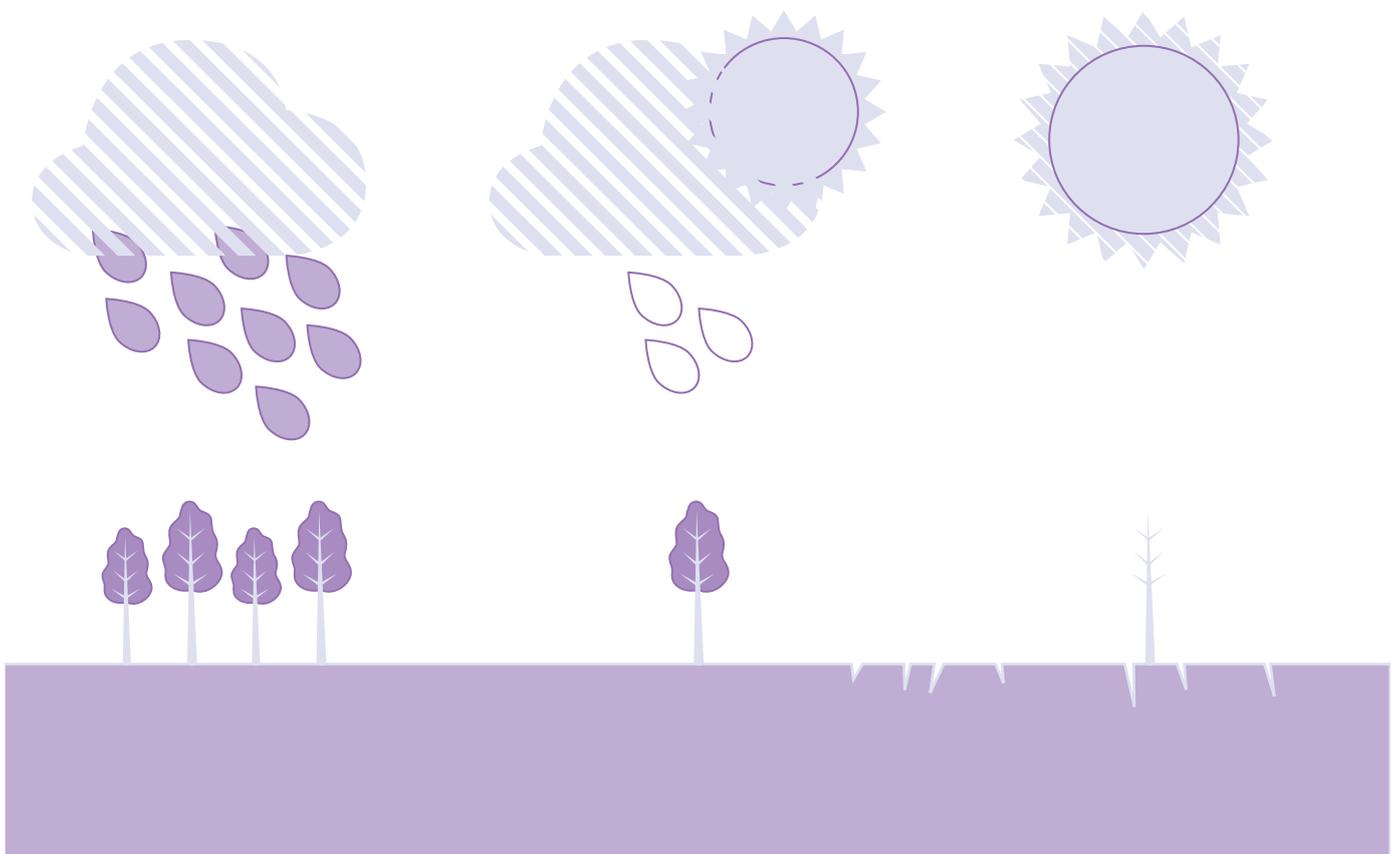
Source: Modified from Nitschke et al (2011).

- In January-February 2009, south-east Australia experienced record-breaking prolonged temperatures and Adelaide reached its third highest temperature ever recorded of 45.7°C. During the 2009 heatwave, direct heat-related hospital admissions increased 14-fold and there was a 16 per cent increase in ambulance call-outs. During the 2009 heatwave, there were an additional 32.4 deaths (**Figure 2**), with 23 of these in the 15-64 age group (Nitschke et al 2011).
- In just a decade, without effective adaptation, heat-related deaths are projected to double, and by 2050 there are likely to be three times more heat-related deaths (McMichael et al 2002). This poses substantial challenges for hospitals, morgues and ambulance services.



2. Changing rainfall patterns, combined with higher temperatures, pose significant risks to South Australia's agricultural areas and urban water supplies.

- There has been a clear decline in rainfall in southern South Australia since 1970. There is some evidence that this decline in rainfall is linked to climate change, and it is more likely than not that the drying trend will continue.
- Droughts will become more severe because of higher temperatures, and the drying soil will lead to further additional warming. This will have significant impacts on South Australia's agricultural belt.
- A continuation of the drying trend would also have large risks for drinking water availability. Research so far suggests the southern Murray-Darling Basin is drying – which has clear implications for water availability in Adelaide and other parts of South Australia. A prolonged drought in south-eastern Australia from 1997 to 2009 resulted in extremely low river flows in the Murray Darling basin, less than 50% of the long-term average (Chiew et al 2011, Potter et al 2010). The dry conditions have been attributed, at least in part, to climate change (CSIRO 2010, Murphy and Timball 2008).
- In summary, while much uncertainty remains about specific details of rainfall changes in future, we can say with considerable certainty that rainfall patterns will change as a result of climate change and often in unpredictable ways, creating large risks for water availability.

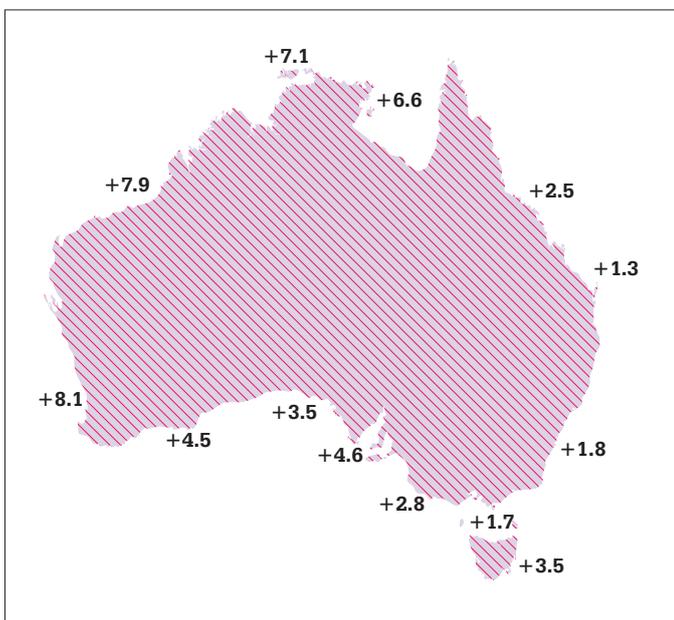


3. Rising sea levels will exacerbate existing vulnerability in South Australia's coastal towns and infrastructure.

- On average sea level has risen globally by 3.2 mm a year since the early 1990s, affecting many coastal communities. Sea levels in South Australia have been rising at a rate higher than the global average – approximately 4.6 mm per year since the early 1990s, with much variability from year to year (**Figure 4**).
- Globally, sea level has risen by about 20 cm since the late 1800s. Another 20 cm increase in sea level by 2050, which is feasible at current projections, would more than double the risk of coastal flooding in Adelaide. A rise of 50 cm, which is likely later this century, will lead to very large increases in the frequency of coastal flooding; flooding that is currently considered a 1-in-100 year event would occur every year (**Figure 5**).

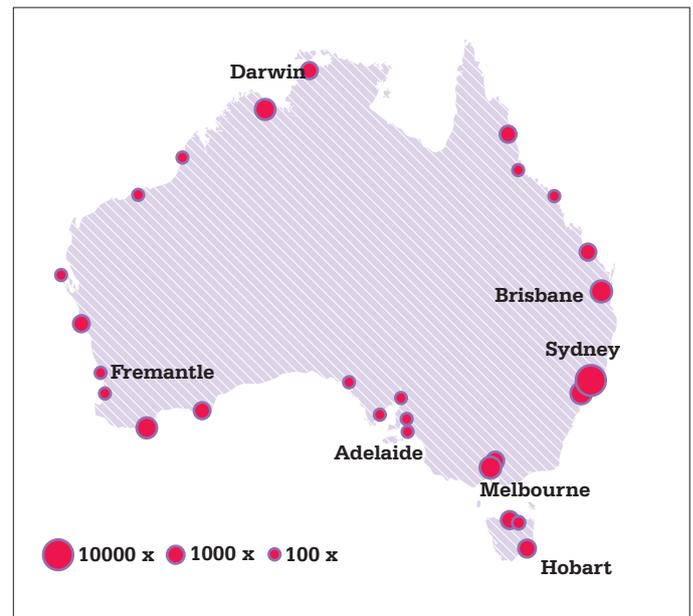
- Many of the risks due to sea level rise are associated with these flooding events, which damage cities, towns, and the supporting infrastructure in low-lying coastal areas. These flooding events can also lead to erosion of sandy beaches and soft coastlines.
- Between 25,200 and 43,000 residential buildings in the state of South Australia may be at risk of flooding towards the end of this century – with a value of between \$4.4 billion and \$7.4 billion (DCC 2009) (**Figure 8**). South Australia has the second highest value of total assets at risk – with over \$45 billion dollars worth of houses, buildings and roads at risk of flooding (DCCEE 2011).

Figure 4. Local sea-level rise (mm/year) around Australia from the early 1990s to 2008.



Source: NTC 2008

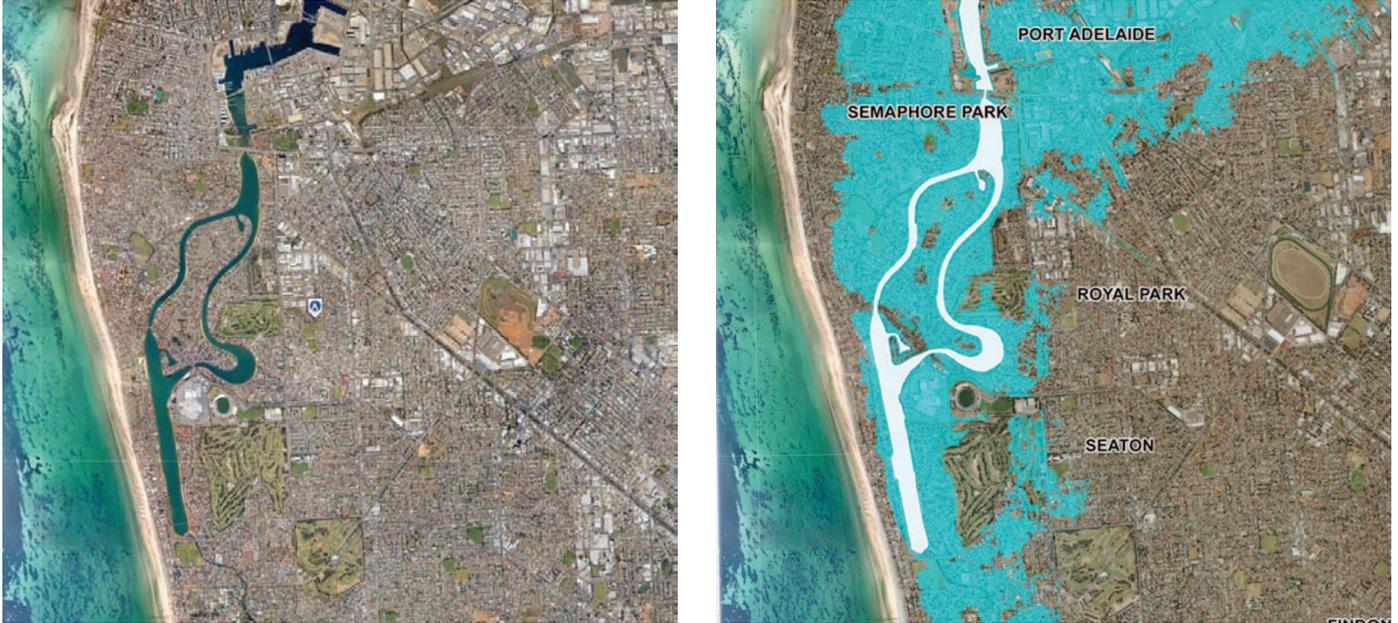
Figure 5. Estimated multiplying factor for the increase in the frequency of occurrence of high sea-level events caused by a sea-level rise of 0.5 metres. High sea-level events are very sensitive to small increases in sea level.



Source: ACE CRC 2008.

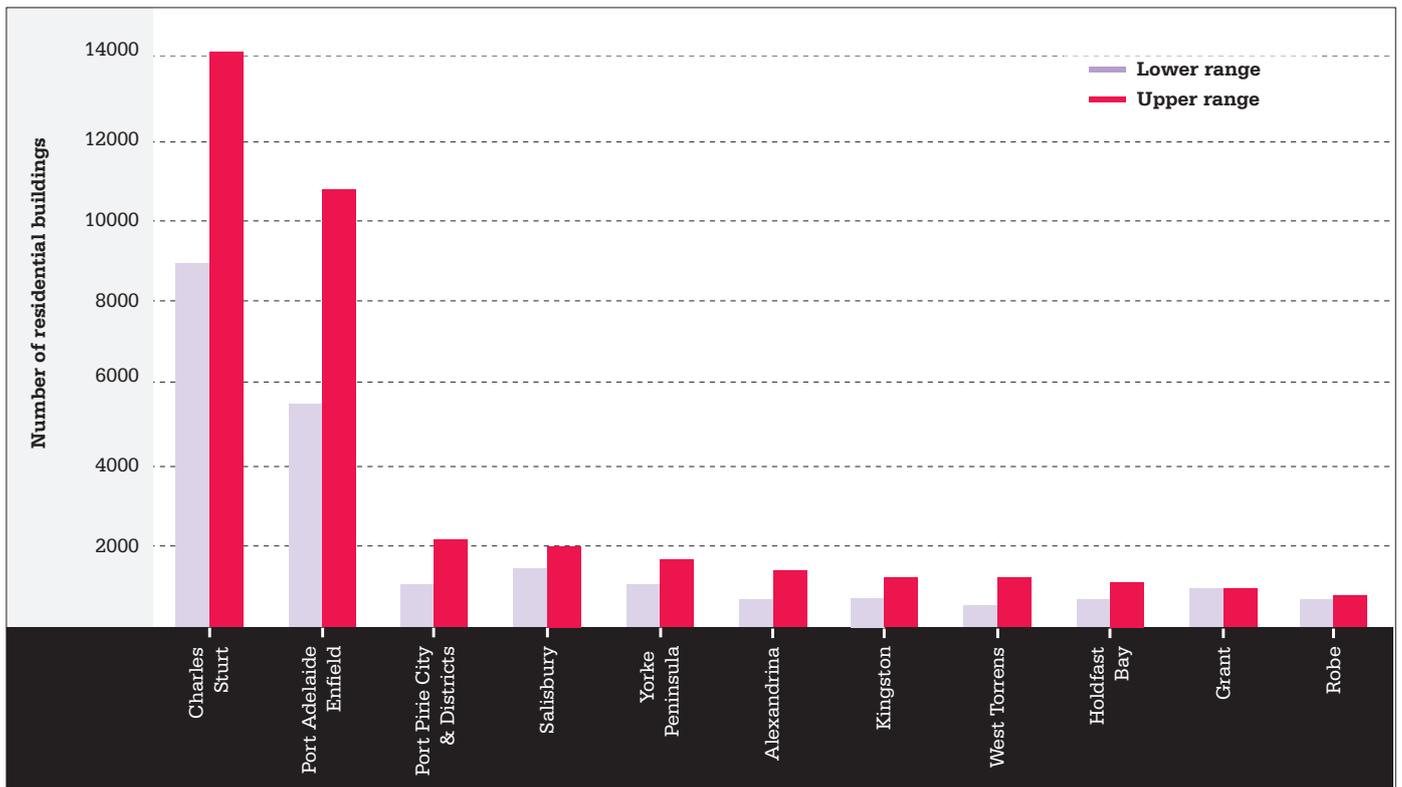
The Critical Decade: South Australian impacts (continued)

Figures 6 and 7. Images of Adelaide in 2009 and with simulated coastal flooding from a sea-level rise of 80 cm.



Sources: Nearmap (www.nearmap.com) and Department of Climate Change and Energy Efficiency (www.ozcoasts.org.au)

Figure 8. Estimated number of existing residential buildings in South Australia at risk of inundation from a sea-level rise of 1.1 metres.



Source: Department of Climate Change (2009).

4. This is the critical decade. Decisions we make from now to 2020 will determine the severity of climate change our children and grandchildren experience.

- Without strong and rapid action there is a significant risk that climate change will undermine our society's prosperity, health, stability and way of life.
- To minimise this risk, we must decarbonise our economy and move to clean energy sources by 2050. That means carbon emissions must peak within the next few years and then strongly decline.
- The longer we wait to start reducing carbon emissions, the more difficult and costly those reductions become.
- This decade is critical. Unless effective action is taken, the global climate may be so irreversibly altered we will struggle to maintain our present way of life. The choices we make this decade will shape the long-term future for our children and grandchildren.



Professor Will Steffen
Climate Commissioner



Professor Lesley Hughes
Climate Commissioner

Sources

Information taken from *The Critical Decade*, unless otherwise noted below.

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