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.

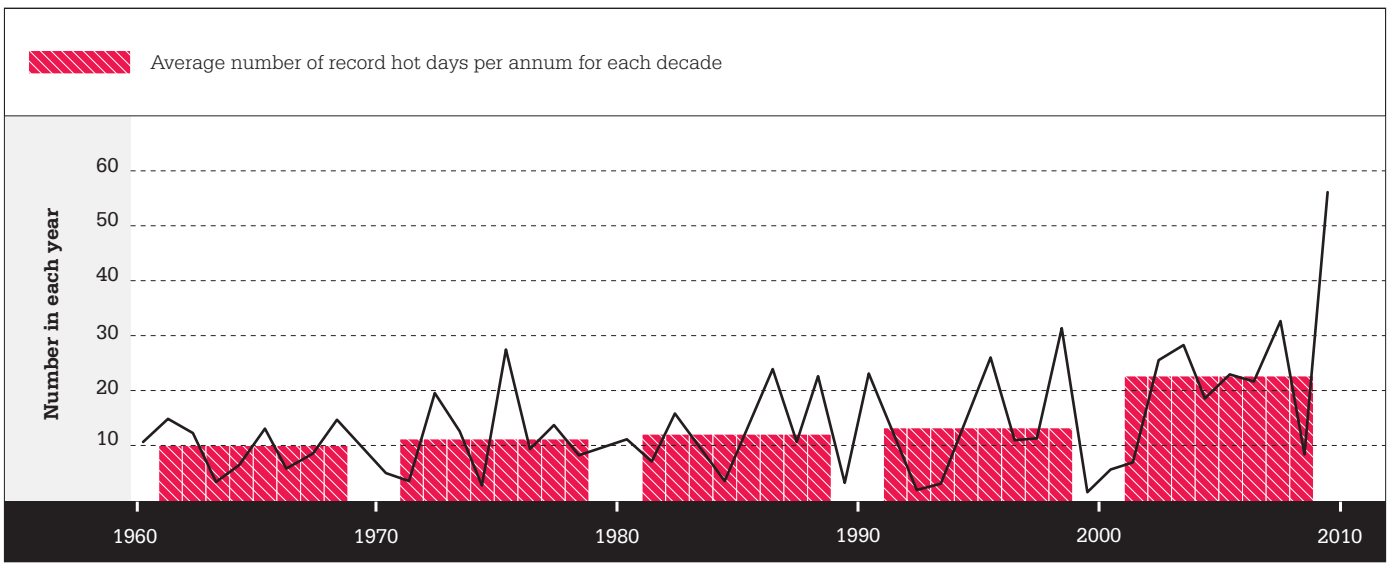
Failing to take sufficient action today entails potentially huge risks to our environment, economy, society and way of life into the future. This is the critical decade for action.

This document accompanies *The Critical Decade* report and highlights the key impacts for the Illawarra and NSW south coast region.

1. Higher temperatures will increase the likelihood of large and intense fires.

- Average temperatures in NSW have risen steadily by approximately 1˚C since the 1950s. The number of high temperature extremes, such as heatwaves and record hot days, has also increased across Australia, especially over the past decade (Figure 1).
- Consistent with the observed temperature increase, the Forest Fire Danger Index rose by 10-40% at many locations in south-eastern Australia in 2001-2007 relative to 1980-2000, including a 30% rise in the Nowra area (Figure 2; Lucas et al. 2007). As temperature rises further, the number of very high to extreme fire danger days will increase. For example, the number of extreme fire danger days in the Nowra area is projected to rise by 2050 from its current value of about 1 per year to a value in the range of 2 to 4 (Lucas et al. 2007).

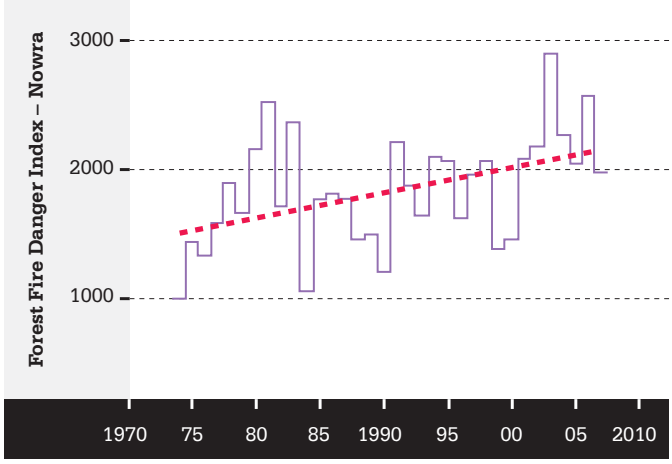
Figure 1. The number of record hot days at Australian climate reference stations is rising.



Source: Bureau of Meteorology.

– The conditions for large and intense fires – low humidity, high winds and extreme temperatures, which all contributed to the 1994 and 2001 Black Christmas fires – are likely to become more common in the region by mid-century, with intense fires projected to increase by up to 20% (Williams et al. 2011; Figure 3). Changes in atmospheric carbon dioxide and rainfall are also likely to affect fuel availability, although the magnitude and direction of these changes is uncertain (Williams et al. 2011).

Figure 2. The observed trend in the cumulative Forest Fire Danger Index for Nowra. While there is significant annual variability, there has been an underlying increase in forest fire danger days over the past three decades.



Source: Lucas et al. (2007)

– At particular risk of more frequent and intense fires are areas such as the Royal National Park and the forested escarpment behind Wollongong, including the Woronora Plateau.

– More intense fires in future will pose even higher risks to human health, property and infrastructure. To counteract these risks, we would need to more than double or triple prescribed burning, which is costly and comes with its own risks (Williams et al. 2011).

Figure 3. 2001 Black Christmas fires. NSW fire fighters near the Royal National Park in December 2001.

Source: copyright Newspix/Chris Hyde

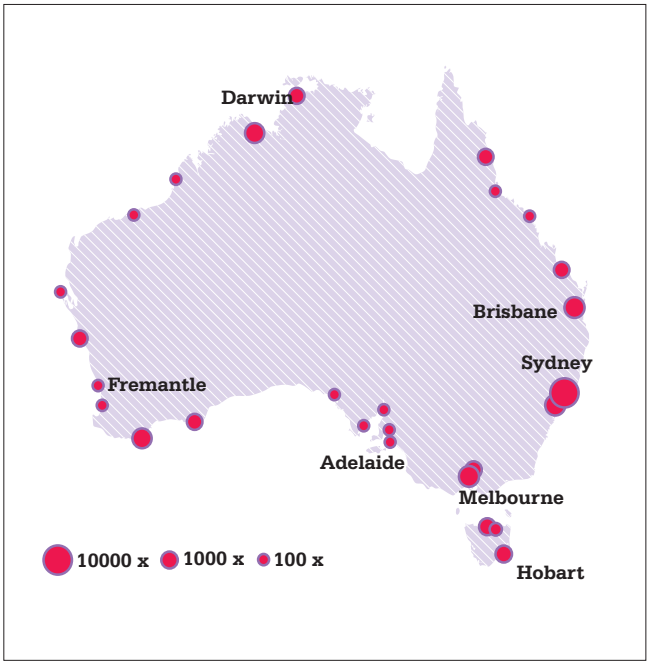
2. Rising sea levels will exacerbate existing vulnerability of coastal towns and infrastructure in the Illawarra/ NSW south coast region.

– Global sea level has risen by about 20 cm since the late 1800s, and is projected to increase by a further 0.5 m to 1.0 m this century. A sea-level rise of 50 cm will lead to very large increases in the frequency of coastal flooding; flooding that is currently considered a 1-in-100 year event could occur every few months (Figure 4).

– These flooding events are likely to damage cities, towns and the supporting infrastructure in low-lying coastal areas and will lead to erosion of sandy beaches.

– Hundreds of commercial buildings in the local government areas of Wollongong and Shoalhaven are threatened by a 1.1 metre sea-level rise. Approximately 100-150 light industrial buildings in the local government area of Shellharbour may also be affected by a 1.1 metre sea-level rise. Second only to Newcastle, Wollongong has the greatest length of rail – about 50 km – exposed to coastal flooding in NSW (DCCEE 2011).

Figure 4. Estimated increase in the frequency of high sea-level events caused by a sea-level rise of 50 cm. A rise of 50 cm will lead to very large increases in the frequency of coastal flooding; in the Illawarra region flooding that is currently considered a 1-in-100 year event could occur every few months.



Source: ACE CRC 2008

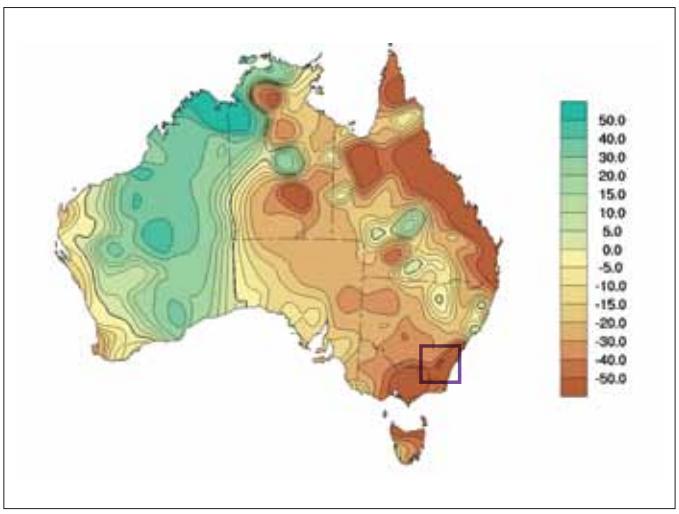
3. Changing rainfall patterns and the risk of more intense rainfall events pose challenges for low-lying urban centres in the Illawarra/NSW south coast.

- The Illawarra/NSW south coast region has experienced a drying trend over the past 40 years (Figure 5), although the naturally-high variability of rainfall in the region makes it difficult to attribute this observed trend to climate change.
- In the longer term, rainfall patterns will change as a result of climate change, creating large risks for water availability. However, the magnitude and even the direction of change – wetter or drier – are often difficult to predict.
- Droughts and floods are important features of the natural variability of eastern Australia's climate. Droughts are becoming more severe because of the rise in temperature. In addition, the frequency and intensity of heavy rainfall events is likely to increase as the climate continues to warm.
- A pattern of more severe droughts and more intense rainfall events would increase the risk of severe flooding when rain does occur, particularly in the low-lying areas of the region. Urban centres along the coast are likely to become increasingly vulnerable to flooding because of both rising sea level and an increase in intense rainfall events.

4. Biodiversity will be at risk.

- The NSW south coast is known for its rich biodiversity and the many vulnerable species its ecosystems support. For example, the Illawarra region is home to 69 threatened animal species, including the southern brown bandicoot and the green and golden bell frog, and 31 threatened plant species, including the Illawarra *Zieria* (Figure 6; Illawarra Biodiversity Strategy 2011).
- Climate change poses a real threat to the region's biodiversity. Rare and threatened species, and those with small geographical ranges, will be particularly vulnerable to additional stresses from climate change, such as high temperature extremes, increased and more intense bushfires and changes to rainfall patterns. In addition, rising water tables and saltwater intrusion (flow of saltwater into fresh groundwater) are likely to affect lowland ecosystems in the coastal zone (NSW Climate Impact Profile 2010).
- Such climate change stresses will add to the pressures already placed on biodiversity by population growth and expansion of urban development in the region.

Figure 5. Trend in annual total rainfall (mm/10 years) for the 1970–2010 period. The Illawarra/south coast NSW region is shown by the box.



Source: Bureau of Meteorology

Figure 6. Rare and threatened species, such as the green and golden bell frog and the southern brown bandicoot, will be particularly vulnerable to climate change stresses.

Photo credit: A. Sparrow; Stephen Carter

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 is taken from the Climate Commission's report *The Critical Decade* unless otherwise noted below.

Department of Climate Change and Energy Efficiency (DCCEE; 2011). *Climate Change Risks to Coastal Buildings and Infrastructure. A supplement to the first pass national assessment.*

Lucas, C., Hennessy, K., Mills, G. and Bathols, J. (2007). *Bushfire weather in Southeast Australia: recent trends and projected climate change impacts.* Bushfire CRC and Australian Bureau of Meteorology

Illawarra Biodiversity Strategy (2011). Wollongong City Council

NSW Climate Impact Profile (2010). *The impacts of climate change on the biophysical environment of New South Wales*, DECCW. Available: http://www.environment.nsw.gov.au/climatechange/20100171ClmtChngNSW.htm.

Williams, R.J., Bradstock, R.A., Cary, G.J., Enright, N.J., Gill, A.M., Liedloff, A.C., Lucas, C., Whelan, R.J., Andersen, A.N., Bowman, D.J., Clarke, P.J., Cook, G.D., Hennessy, K.J. and York, A. (2011). *Interactions between climate change, fire regimes and biodiversity in Australia: A preliminary Assessment.* Department of Climate Change and Energy Efficiency and Department of the Environment, Water, Heritage and the Arts.

GPO Box 854 Canberra ACT 2601 Australia
P: +61 2 6159 7624 E: info@climatecommission.gov.au
www.climatecommission.gov.au