CLIMATE COMMISSION

The Critical Decade: Consequences for the New England/Northwest NSW region

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 the New England/ Northwest NSW region.

1. A hotter climate will affect agriculture and natural ecosystems.

- Average temperatures in NSW have risen steadily, by approximately 1˚C, since the 1950s (Figure 1). By 2050, average temperature is expected to increase by a further 1˚C or slightly more across the region, with the higher temperature increases expected in the west (NSW Climate Impact Profile, 2010).
- Droughts will become more severe because of higher temperatures, and the drying soil will lead to further warming. These impacts pose risks for the region's agricultural productivity, including the risk of wind erosion on the western plains.

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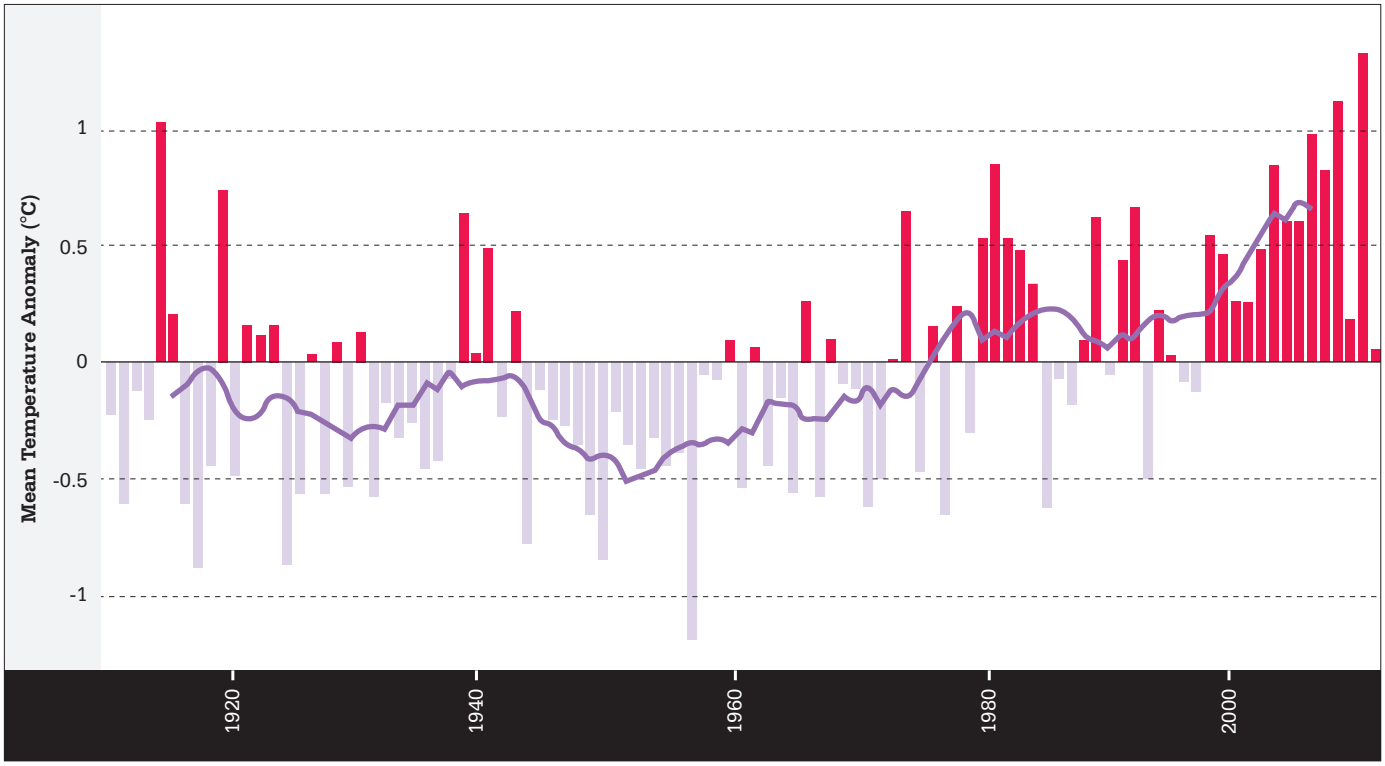
Figure 1. The long term trend in NSW/ACT's average temperature, measured as the difference from the 1961 to 1990 average. The purple line shows the trends in temperature based on a 15 year average period through the record. This graph shows that from around 1950 there has been a steady temperature rise – approximately 1˚C – in NSW. Most human-caused carbon dioxide emissions have occurred since 1950.



Source: Bureau of Meteorology

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- The impacts of climate change are especially significant for the region's natural ecosystems, and will place additional stress on biodiversity.
  - High altitude forests west of the tablelands, such as the Liverpool Ranges and Mt Kaputar, are likely to contract to the east and to higher altitudes (NSW Climate Impact Profile, 2010).
  - Ecosystems that are already stressed by other factors will be particularly vulnerable. For example, only 30% of the original grasslands and grassy woodlands, and 10% of the original wetlands remain, and what is left is highly fragmented (NSW Climate Impact Profile, 2010). These vulnerable ecosystems will be subject to further stresses caused by climate change, such as altered water regimes.
  - Koalas and other plant-eating animals depend on nutritious plant food. High levels of carbon dioxide reduce the quality of their food by decreasing the protein content and digestibility of plants, making them less nutritious (DeGabriel et al. 2010). Koalas and other species are also likely to be affected by long periods of very high temperatures, which may lead to dehydration and heat stress.
- The bushfire season may become longer and fires more intensive. As temperature increases, very high to extreme fire danger days will increase. The conditions for large and intense fires – low humidity, high wind, extreme temperature – are likely to become more common in the more inland parts of the region. Changes in atmospheric carbon dioxide and rainfall are also likely to affect fuel availability but the magnitude and direction of these changes is uncertain (Williams et al. 2009).

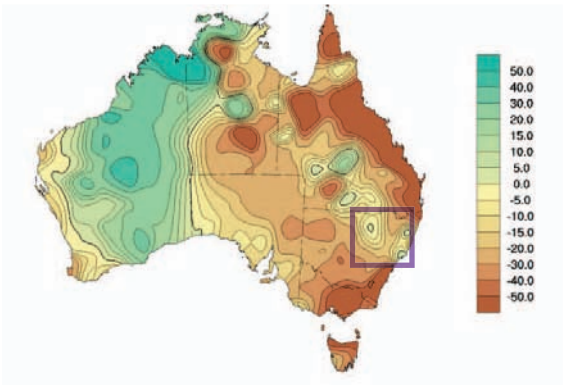
Figure 2. Koala nutrition may be affected by climate change

Source: Tourism Australia

2. Changing rainfall patterns and the risk of more intense rainfall events pose challenges for land management in the New England/Northwest NSW region.

- The region has experienced an overall drying trend over the past 40 years (Figure 3), with the trend more pronounced towards the coast.
- There is considerable certainty that rainfall patterns will change as a result of climate change, but often in ways that are difficult to predict, creating large risks for water availability. Future changes to annual rainfall are still uncertain, however a shift in seasonality towards more summer and less winter rain is likely.
- Droughts and floods are important features of the natural variability of eastern Australia's climate. In addition to more severe droughts, 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. Urban centres will become increasingly vulnerable to flooding.
  - The resulting poorer growing conditions would reduce vegetation cover and increase soil erosion, especially in the vulnerable sodic soils of the western clay plains of NSW. The consequent soil erosion will heighten the need to increase the resilience of water infrastructure and land management systems.

Figure 3. Trend in annual total rainfall (mm/10 years) for the 1970–2010 period. The New England/ Northwest NSW region is shown by the box.

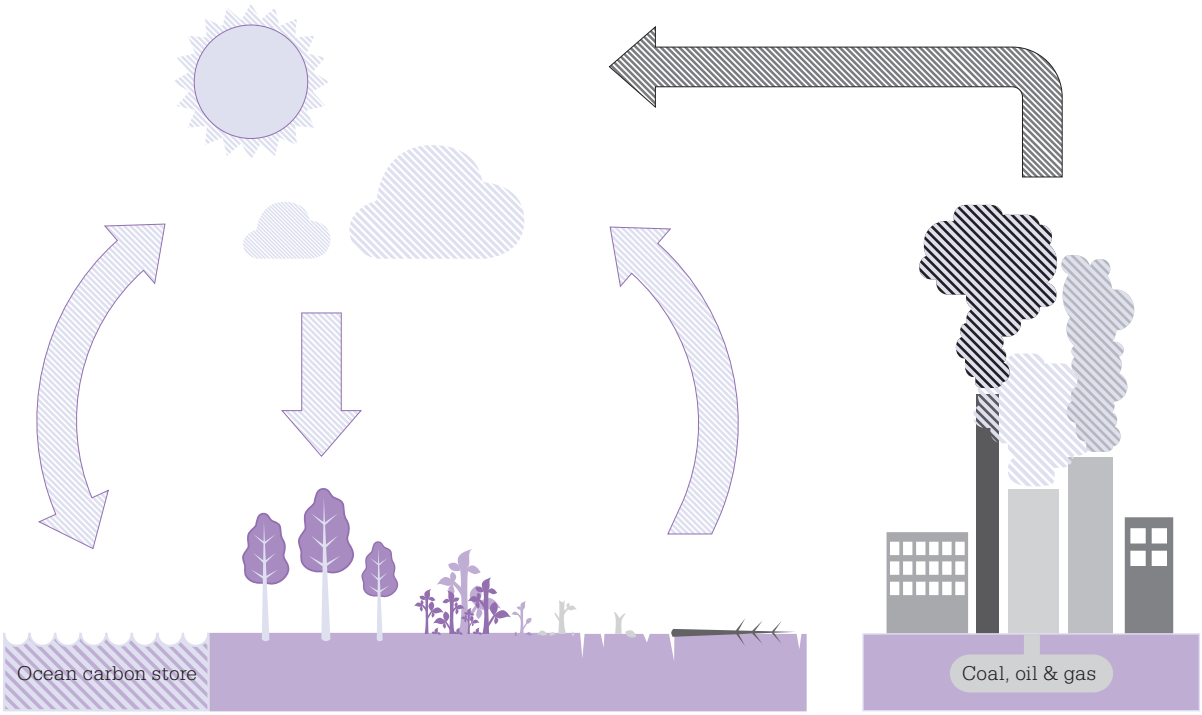


Source: Bureau of Meteorology

3. Storing carbon in land systems offers a rapid, but short term, way to reduce emissions with significant co-benefits.

- Although total human emissions of carbon dioxide are dominated by the burning of fossil fuels, emissions from land systems are also important. We can reduce emissions from land systems and use land systems to absorb carbon from the air. This will contribute to the mitigation of climate change.
- Storage of carbon in land systems involves the uptake of carbon dioxide from the atmosphere into soils, crops, trees and other plants. If done carefully, this can enhance soil condition, increase the productivity of agricultural systems and lead to better biodiversity outcomes.
- Old growth forests and other natural ecosystems store large quantities of carbon within their plant and soil matter. Destruction of these ecosystems releases this carbon into the atmosphere. Therefore, protection of such ecosystems and forests is an important and immediate measure that can be taken to reduce emissions from land systems.
- Unlike fossil carbon stored underground, carbon stored in land systems is vulnerable to drought, bushfire, deforestation and other types of land-use change. These events release some of the stored carbon back into the atmosphere (Figure 4). Unless the stored carbon is made inert and locked away from the atmosphere (deep underground) for a very long time, storage of carbon in land systems cannot 'offset' emissions from fossil fuels.
- While carbon storage in land systems offers short term emission reductions with significant co-benefits, it cannot alone reduce Australia's emissions enough. It is a small but important part of a more holistic solution in which rapid and deep reductions of fossil fuel emissions must be the primary focus.

Figure 4. Carbon cycle and human produced emissions



- The natural carbon cycle consists of carbon stored in the atmosphere, the land and ocean, and the continuous cycling of carbon between these stores.
- Carbon from the atmosphere is taken up by plants, and is stored in plant material and soils. Some of this carbon is then returned to the air naturally through respiration and decomposition. In the undisturbed carbon cycle, these two flows are in balance. Similarly, flows into and out of the ocean are also in balance.
- Deforestation disturbs this balance, putting more carbon into the atmosphere and retaining less in the land. However, burning of fossil fuels is fundamentally different. It puts *additional* carbon (from underground) into the atmosphere-land-ocean carbon cycle.
- For carbon stored in the land to be considered an 'offset' to the additional carbon from fossil fuel emissions, it needs to be stored away from the air and the natural cycle (deep underground) for a very long time (millions of years).

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.

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Sources

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

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