CLIMATE EMERGENCY NETWORK

"We are just at the beginning of the warming process … that first degree is just the beginning, so if we are seeing an intensification of extreme weather events now, you ain't seen nothing yet."

Professor Ross Garnaut
3rd February 2011

The Climate Emergency Network is a network of individuals and community organizations who believe we have no right to bargain away the lives of others. Our goal is a safe climate for all people, all species and all generations. We are calling on Australian and international governments to

- work together to restore a safe climate,
- transition to safe climate economies at emergency speed,
- urgently and effectively address the climate and sustainability emergency.

We aim to engage the community in recognising and responding to the climate emergency and in ensuring our elected leaders do so.

For more information, to join CEN, or to make a donation, please go to

www.ClimateEmergencyNetwork.org

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What is a Safe Climate?

The Earth's climate system is affected by a complex range of ever-changing factors, including the mix of gases in the air. Over very long periods climate achieves a balance in which it continually shifts but only within certain natural lower and upper limits.

Throughout human history the concentration of carbon dioxide in the atmosphere has not exceeded 300 parts per million. Before the industrial period began the level was 280 ppm. Burning of fossil-fuels has raised it to around 390 ppm and it's still rising.

Now we have entered the zone of dangerously unstable climate with dramatically increased occurrences of climate-related natural disasters. To restore a safe balance, and reduce the future impacts of extreme weather events, climate scientists say we need to rapidly get back down to **less than 350 ppm**.

Technology is already available that could help move us to a Safe Climate Economy but most governments lack the political will to mandate effective action. **Current targets will lead to more frequent and severe extreme weather events, threatening the lives and security of millions of people and the extinction of many species.**

EXTREME WEATHER AND THE CLIMATE EMERGENCY

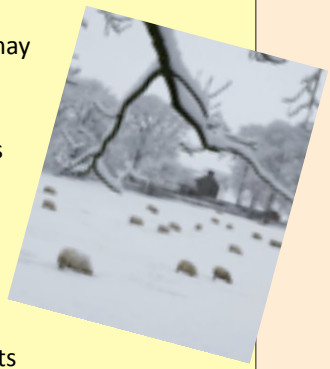
Every day we seem to hear new reports of extreme weather events from around Australia and the globe - droughts, bushfires, cyclones, hailstorms, floods and snow. For more than two decades climate scientists have been warning that this is exactly what we can expect as the planet warms and the climate changes. But how can climate change cause droughts and floods, heat-waves and snowstorms? Climate science reveals that they are actually opposite sides of the same coin.

Warming increases droughts and floods

As the climate warms, evaporation of moisture increases, drying the land. More water vapor in the air increases the likelihood of heavy precipitation events–the ones most likely to cause flash flooding.

Winter wonderland?

When it is cold enough for snow, extra moisture in the air will tend to produce heavier snowstorms. Record melting of sea ice in the Arctic may have altered wind patterns, leading to cold air masses moving across Europe and blocking warmer flows. In this frigid weather the increased water in the air has produced heavy snowfalls in recent winters.



When it is very cold the air may hold too little water for any precipitation to occur. It can be too cold to snow! In areas that usually have very cold winters, warming can actually increase the likelihood of snow.

Even though Europe and parts of the USA have recently had severe winters with heavy snowfall, other areas have been abnormally warm, (for instance, the Hudson Bay area of Canada has recently experienced a month of midwinter temperatures 21°C above average). Overall, in spite of some cold local weather, on a global basis 2010 was the warmest year on record.

As the air around us warms, the amount of water it can hold increases - that is why it tends to be more humid in summer than winter. In fact the atmosphere can hold about 7% extra water for every 1°C rise in temperature (this physical law is called the Clausius-Clapeyron relation). Since 1970, it is estimated that water vapour in the air has increased by about 4%. This means there is now enough extra water in the global atmosphere at any moment to fill Sydney Harbour more than 900 times.

The increased capacity of the air to hold and retain moisture can have a number of effects including

- increased drying at the Earth's surface as water evaporates, and
- less frequent precipitation (rain, hail, snow and all forms of water falling from cloud).

Together, these effects raise the potential frequency, duration and severity of droughts, as has been seen in many places worldwide, including much of Australia.

As well as the warmer air taking more water from the land, there is increased evaporation from oceans, lakes, rivers and other wet surfaces, where moisture is always available, transferring more water into the air.

Precipitation occurs mainly when water vapour stored in the atmosphere cools and condenses; thus more water vapour in the air can lead to more intense precipitation. This increases the risk of unusually heavy rain and snow events especially when moisture-laden air from the sea moves over land.

Basic theory, computer simulations (models) and real-world observation all agree that owing to this increased water vapour content, warmer climates lead to more intense precipitation events even though there might be slightly less precipitation overall. Shifts in storm tracks can make some areas wetter and others, often nearby, drier.

Warmer climates can therefore mean that it rains less often. But when it does, it rains harder, increasing risks of both droughts and floods, at different times and/or places.

The distribution and timing of floods and droughts in Australia (and other Pacific-rim countries), are most strongly affected by the cycle of El Niño/La Niña events known as the Southern Oscillation (ENSO). Affected by the El Niño phase as well as warmer temperatures, eastern and south-eastern Australia, have suffered many years of drought, including periods of record heat-waves and devastating bushfires. In the summer of 2010/11 a strong La Niña led to wet weather. Widespread and catastrophic flooding, due to intense rainfall events drawing on increased water vapour in the atmosphere, is entirely consistent with scientific projections. Australia's droughts, fires and floods are all influenced by the changing climate.