



State of the Climate 2018 Report: Key Findings

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In late 2018, the Bureau of Meteorology (<http://www.bom.gov.au/>) and CSIRO (<https://www.csiro.au/>) jointly published a report on the State of the Climate. It showed data trends in several factors in our environment including the interaction of these elements with natural variability. The conclusions which can be drawn from the data are alarming. Globally and locally in Australia, the damage to our environment has reached extreme proportions, with further projected dire outcomes. A consideration of this data leads us to not only plan for disaster management should it occur, but also to creatively consider a variety of solutions to mitigate the current situation.

“The science underpinning this report will help inform a range of economic, environmental and social decision-making and local vulnerability assessments, by government, industry and communities.”
(Commonwealth of Australia 2018, p.2).

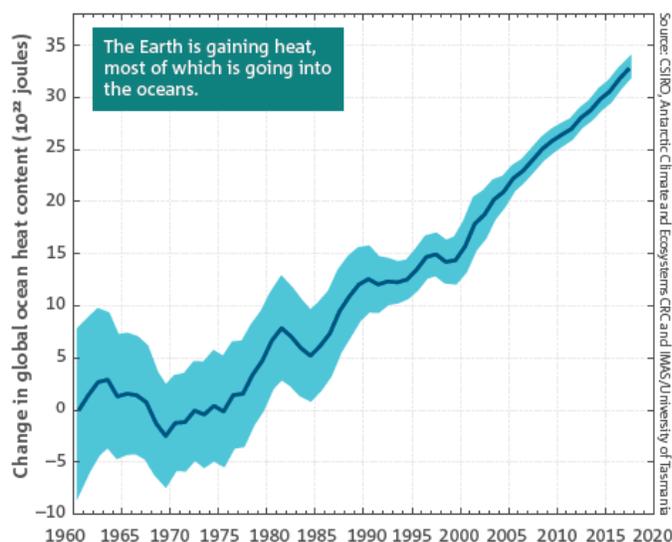
Greenhouse effect

Earth receives heat from the sun and radiates an equal amount back. When certain gases such as carbon dioxide and methane are released into the atmosphere by burning fossil fuels, less heat is radiated back to the sun. This excess heat then heats the earth's surface, ocean and atmosphere, creating the “greenhouse effect”. These increased “greenhouse gases” last for hundreds of years, making further increases in temperature inevitable. The rate at which these gases are being released, is also increasing.

Global

Oceans

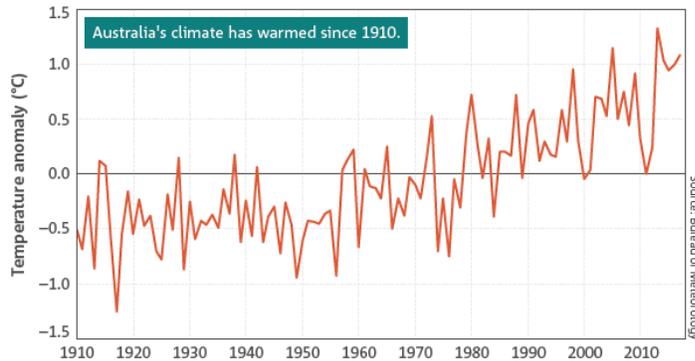
Oceans absorb 90% of global heat to protect the earth's land mass. Although this is initially absorbed at the surface, it travels to the deeper parts of the oceans. This is then shifted by currents; due the direction of current movement, most heat is transferred to the southern hemisphere. Global sea levels have increased over 20cm since 1880 due to the expansion of water as it heats and also the melting of polar ice sheets and glaciers. This increase is accelerating, now by over 3cm per decade. Melting at the poles and Greenland in response to sea warming has destabilized many glaciers.



Australia

Temperature

Australia's temperature has risen by just over 1°C since 1910. This slight rise has led to a major increase in extreme heat events and droughts. Although annual variability can partially be accounted to natural La Nina and El Nino events, global warming interacts with these inherent differences and intensifies them. Fire events have also increased in severity and the length of the fire season itself has also increased.



Rainfall

Although natural variability accounts for some disparity, rainfall has tended to respond to global warming by drought in the southern regions of Australia and heavier rainfall in the northern regions. This is the longest sustained change in rainfall since measurements commenced in 1900. This has significant agricultural and hydrological implications. Compound extreme events can create hazardous events: for example, heavy rainfall and rising sea levels can culminate in a flash flooding event. Planning for such disasters is complicated and not always possible. Directly related to rainfall is streamflow, with lower rainfall leading to reduced streamflow, such as in the Murray-Darling basin.

Oceans

Surface ocean temperature has increased at the same level as our continent, which has extended many marine species habitat range south. Marine heatwaves are more frequent, which affects species such as coral, causing bleaching. Sea levels have also risen around Australia as is occurring on a global level. Ocean acidification is caused by the uptake of CO₂, which is released by burning fossil fuels. This then changes the entire ecosystem of marine life and causes difficulty in calcification, which is necessary for coral and for shellfish.

FUTURE

Based on their findings, CSIRO and the Bureau of Meteorology predict an increasing interaction of natural variability in Australia's weather events and environmental extremes. This includes: greater increase in temperature, increased sea levels, warming and acidification of oceans, extreme marine heatwaves, increased drought in southern Australia, extreme heavy rainfall events, increased extreme fire danger for a longer season and higher-intensity storms. The data paints a grim picture. Our role in this must be not only to prepare for disaster mitigation, but also to take a proactive stance on our response.

REFERENCE

Bureau of Meteorology and CSIRO '2018 State of the Climate' Report, *Commonwealth of Australia*, - <http://www.bom.gov.au/state-of-the-climate/State-of-the-Climite-2018.pdf>