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Climate, weather and national security

The serious bushfires in New South Wales in October have led to the link between severe weather events and climate change being raised in the media again, with much of the comment revealing a poor understanding of the underpinning science.

Climate is the meteorological pattern in a given region over long periods (30 or more years). Climates can be classified according to a region's average temperature and precipitation. We say, for example, that the climate of the east coast of Cape York is wet tropical, whereas that of southern and south-western Australia is mediterranean, characterised by cool wet winters and hot dry summers.

In contrast, weather is the condition of the meteorology locally over short periods (a day to several years); and can include droughts, floods, cyclones, thunderstorms, and the like.

Australian weather tends to be driven by sea temperatures in the Indian and Pacific Oceans – phenomena such as the Indian Ocean Dipole and the El Niño-La Niña Southern Oscillation – which determine whether we experience wet periods or droughts; whereas the underlying climate tends to be controlled by atmospheric circulation cells. The Hadley cells, for example, produce global belts of tropical rain and subtropical desert.

There is incontrovertible evidence that the climate globally has been warming very gradually over the last two centuries and this upward temperature trend is continuing (notwithstanding that the trend line can 'wobble' a bit from year to year). When the climate warms, increased energy is injected into climate and weather systems. This intensifies weather phenomena, such as the Southern Oscillation and the Dipole, and droughts, floods and cyclones – hence the hypothesis that the increased incidence of severe weather phenomena in recent years is linked to climate change.

It seems that increased energy also expands the Hadley cells towards the poles. One effect is that the desert belt across central Australia is slowly expanding southwards and some of the autumn rain which previously would have fallen on our southern wheat belt now falls in the Southern Ocean. The resulting more arid climate is making the wheat belt more marginal for winter cereal production.

These climate and weather changes not only impact on food production but on other aspects of our national security as well. Australia's 2013 National Security Strategy¹ states that: "The more severe effects of climate change, in particular the increase in frequency and severity of natural disasters, compounded by competition over scarce natural resources, may contribute to

instability and tension around the globe, especially in fragile states". This has placed greater emphasis on the role of the Australian Defence Force (ADF)² and other government and non-government agencies in provision of humanitarian assistance and disaster relief at home, in our neighbourhood and further afield. One government response has been to greatly enhance the ADF's amphibious capability to facilitate delivery of such aid, especially in parts of our region which are (or have been rendered by a disaster) otherwise difficult to access. Such phenomena can also increase pressure on migrant flows towards Australia and hence on border security, which is also being strengthened.

Sea level rise consequent on climate change and/or land subsidence in low-lying places such as the Bangladesh delta, the Maldives and some Pacific islands is affecting their habitability. In Kiribati, for example, certain coral islets have already become uninhabitable and the Kiribati government has begun a programme to progressively acquire land for its people in neighbouring Pacific states. Australia and New Zealand are seen as a planned permanent location for many I-Kiribatis.

Returning to bushfires, the eucalypt forests of south-eastern Australia have been prone to severe fires for millennia – indeed, they are adapted to them and need them for survival. Recent research by Professor Mark Adams³ of the University of Sydney, however, has shown that before the climate began to warm a century ago, catastrophic wildfires only occurred once in every 50 to 200 years. Over the last 75 years, though, we have had three of them – in 1939, 1983 and 2009. Another was possibly averted in October 2013 only by the magnificent response of the civilian emergency services. This increased frequency of catastrophic wildfires is an outcome of a warmer, drier climate. So climate change is not an issue just for future generations; we are living with its effects now.

In coming years, the global climate will continue to warm with consequential effects like those outlined above. Accordingly, it is incumbent on governments and peoples to carefully prepare and implement plans to adapt to those changes, regardless of steps that also may be taken to reduce the long-term extent of that warming, such as converting to low-carbon economies.

David Leece⁴

¹Department of Prime Minister and Cabinet (2013). *Strong and secure: a strategy for Australia's national security* (Commonwealth of Australia: Canberra), p. 31.

²For a recent detailed analysis of the implications of climate change for the ADF see: Anthony Press, Anthony Bergin, and Eliza Garnsey (2013). *Heavy weather: climate change and the Australian Defence Force*. Special Report Issue 49, Australian Strategic Policy Institute, Canberra.

³Mark A. Adams (2013). Mega-fires, tipping points and ecosystem services: managing forests and woodlands in an uncertain future. *Forest Ecology and Management* **294**, 250 – 261.

⁴David Leece, Editor of *United Service*, is President of the Institute and is a former Chief Scientist of the New South Wales Environment Protection Authority. These are his personal views.