



Committee Secretary
Senate Standing Committee on Environment and Communications
PO Box 6100
Parliament House
Canberra ACT 2600
Australia

16 January, 2013

To the Senate Standing Committee on Environment and Communications

Re: Submission to the Inquiry into recent trends in and preparedness for extreme weather events

Environment Victoria is one of Australia's leading, independent environment groups. With over 80 member groups and tens of thousands of individual supporters, we've been representing Victorian communities regarding our environment for over 40 years.

Environment Victoria has been campaigning for action on climate change for 15 years. During this time we have worked extensively with communities who are directly impacted by climate change, and with communities, organisations, businesses, and governments who are working to reduce greenhouse gas emissions and the potential impacts of climate change.

We strongly welcome this opportunity to submit to the Committee on the existing and potential impacts of extreme weather exacerbated by climate change. Climate science shows that Australia will be among the countries first and worst impacted by climate change. Many of these impacts, including increased heatwaves and bushfires, have already started to occur.

We have attached as an appendix to this submission the Victorian Commissioner for Environmental Sustainability's latest report entitled "*Foundation Paper One – Climate Change Victoria: the science, our people and our state of play*". This paper includes extensive information and modelling that will be of use to this Inquiry.

Environment Victoria recommends that in response to this Inquiry the Committee make strong recommendations to the government regarding not only the need for preparation and adaptation to increased numbers and intensity of extreme weather

events, but also the need for further action on climate change to prevent extreme weather beyond what is already locked-in to the climate system.

Please contact me directly should you have any further questions regarding this submission.

Sincerely,

Victoria McKenzie-McHarg
Safe Climate Campaigner
Environment Victoria

1. Human-induced climate change is real, and is already happening

Over the past several decades the world's leading climate scientists have concluded that human generated greenhouse gas emissions will cause significant global warming unless urgent action is taken to greatly reduce greenhouse gas emissions.

This finding is supported by Australia's pre-eminent climate science organisations the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Bureau of Meteorology (BoM), as well as several other leading Australian climate scientists and science organisations.

However, more recently climate scientists have noted that the impacts of climate change are already being observed with warming global temperatures, rising sea levels, and an increase in both the number and intensity of extreme weather events.

Just this month Australia experienced an 'unprecedented' heatwave, according to the Bureau of Meteorology's Manager of Climate Monitoring and Prediction David Jones. In a statement to an Australian newspaper, Mr. Jones said:

"Clearly, the climate system is responding to the background warming trend. Everything that happens in the climate system now is taking place on a planet which is a degree hotter than it used to be.

"We know that global climate doesn't respond monotonically – it does go up and down with natural variation. That's why some years are hotter than other because of a range of factors. But we're getting many more hot records than we're getting cold records. That's not an issue that is explained away by natural variation".

The Convener of the Human Health Division at the Australian National University's Climate Change Adaptation Network went further, claiming:

"Those of us who spend our days trawling – and contributing to – the scientific literature on climate change are becoming increasingly gloomy about the future of human civilisation.

"We are well past the time of niceties, of avoiding the dire nature of what is unfolding, and politely trying not to scare the public. The unparalleled setting of new heat extremes is forcing the continual upward trending of warming predictions for the future, and the timescale is contracting."¹

Extreme weather events and other climate impacts are already being felt across Australia as a result of rising greenhouse gas emissions.

¹ Cubby, Ben., 10 January 2013. *Get used to record-breaking heat: bureau*, in *The Age*. Available at <http://www.theage.com.au/environment/climate-change/get-used-to-record-breaking-heat-bureau-20130108-2cet5.html>

2. Extreme weather impacts of climate change already experienced in Victoria

The January 2013 heatwave and bushfires are not the first experiences of extreme weather in Victoria that have been exacerbated by climate change.

While scientists maintain that they are unable to point to any particular extreme weather event and blame climate change alone, scientists have confirmed that climate change is making extreme weather events worse and more frequent².

For example, the January and February 2009 heatwaves were at the time unprecedented. Due to a lack of planning for such extreme temperatures, the impacts of the heatwaves were significant, with 374 people dying due to heat related symptoms in Victoria, and a 2.8 fold increase in cardiac arrest during this time³.

South Australia experienced contemporaneous heat events, and Perth had experienced eight heat events in the period November 2011 to March 2012⁴.

The 2009 Victorian bushfires that immediately followed the heatwave terrified the Victorian community. 78 communities were directly affected, 388,000 hectares were burnt, 2,298 houses destroyed, 173 people killed along with countless animals⁵.

The recent drought, known as 'The Big Dry' or the 'Millennium Drought' was Victoria's longest and driest ever. According to the Victorian Commissioner for Environmental Sustainability⁶, it lasted many years longer than previous extreme droughts. It was also the driest in that it did not have a single wet month during the full 14 year period. The previous longest drought – the WWII drought – lasted 10 years and included nine wet months.

In contrast to the above, 2010 was the fifth wettest year on record in Victoria. The summer of 2010-11 was the wettest in Victoria since records began. It was followed by record-breaking rainfall at the start of 2012, with the highest observed rainfall at many points across the state. The 2010-11 floods resulted in \$836 million in insurance claims, killed 345,645 head of livestock, and affected 239 schools. During the 2012 record-breaking event Victoria experienced the wettest seven day period on record for any month⁷. Floods like this push food prices up, destroy crops and infrastructure, and significantly impact local businesses and residents.

² Climate Commission, 2013. *Off the Charts: Extreme Australian summer heat*, available at http://climatecommission.gov.au/wp-content/uploads/CC_Jan_2013_Heatwave8.pdf Accessed on 16.1.2013

³ Commissioner for Environmental Sustainability Victoria, 2012. Foundation Paper One. *Climate Change Victoria: the science, our people, and our state of play*, pg. 118.

⁴ *Ibid*, pg. 117.

⁵ *Ibid*, pg. 21.

⁶ *Ibid*, pg. 84.

⁷ *Ibid*, pg. 21.

Extreme rainfall, wind and hail have also caused chaos in the city of Melbourne on numerous occasions in recent years.

The Victorian Commissioner for Environmental Sustainability's recent report gives this example:

"In Melbourne on 6 March 2010, roofs collapsed, houses were flooded, trains failed to run, and 100,000 houses in the city lost power. The insurance bill was calculated to be over \$1 billion – essentially the same as the Black Saturday bushfires. All this was caused by 26mm of rain and hail falling in less than an hour."

"An event of this intensity is considered a one-in-ten-year storm – put another way, it has a 10% chance of occurring every year. A similar storm occurred in Melbourne in February 2011 and resulted in insurance claims of \$384 million."⁸

3. The impacts of extreme weather events are far reaching and interconnected

The impacts of extreme weather events extend far beyond the immediately obvious direct impacts. Hectares burnt and insured costs are comparably easy to assess. Other impacts are less obvious, but just as serious. If governments are to make a proper assessment of the risks and consequences of extreme weather events the full breadth of impacts over the long term need to be accounted for. This will assist governments make informed decisions about their ability to respond to certain events and invest appropriately in adaptation and mitigation of climate change impacts.

For example, the health impacts of heatwaves extend far beyond the cardiac arrest increases on extreme temperature days, and increased deaths. Heatwaves can lead to restless sleepless nights, resulting in tiredness and diminished productivity. People become grumpier and more strained during heatwaves. Tempers flair, road rage is amplified and domestic disputes become aggressive more easily. This impacts law enforcement, hospitals and other critical services. With increased anti-social behaviour during heatwaves – aided by binge-drinking and drug use – the risk of accidents, violence and self harm increases⁹.

Evidence is beginning to emerge that drought and heatwaves lead to higher rates of self-harm and suicide – as much as eight percent higher¹⁰.

⁸ Ibid. pg. 64.

⁹ The Climate Institute, 9 January 2013. Media Brief, *The human impact of heatwaves and extreme weather*, available at http://www.climateinstitute.org.au/verve/resources/TCI_HeatwavesHumanToll_MediaBrief_9January2013.pdf

¹⁰ Ibid.

It's not just heatwaves that have such adverse mental health impacts. All extreme weather events can cause significant physical and mental health risks. The Climate Institute states that:

“Following a severe weather event, as many as one in five people will suffer the debilitating effects of extreme stress, emotional injury and despair. An increasingly hostile climate will spell a substantial rise in the incidence of post-traumatic stress, anxiety and depression.”¹¹

The Climate Institute also notes that one in 10 primary school children were suffering from post-traumatic stress disorder the three months following Cyclone Larry in Northern Queensland in March 2006. Common symptoms included flashbacks, nightmares, and a general state of distress. Following the 2009 bushfires in Victoria, the population of Kinglake has reported higher-than-normal levels of drug and alcohol abuse¹².

Infrastructure that isn't entirely wiped out is often overlooked in tallies of the damage in the aftermath of an extreme weather event. The community is aware that well over 2,000 houses were destroyed in the 2009 Victorian bushfires. Many Melbournians will remember being stranded in the city in well-over 40°C weather as train tracks buckled and trains were cancelled for hours on end. But the bushfires also destroyed V-Line train tracks, disrupting train services to regional and rural communities for days following the fires¹³. The burnt wooden sleepers were eventually replaced – with wooden sleepers – until the next bushfire wipes them out too. This disruption caused to regional travellers is an example of follow-on impacts that are rarely accounted for.

Infrastructure that is not obviously damaged in a singular extreme weather event can be weakened, with the effects of more frequent and intense extreme weather emerging over time.

Underground pipes crack during droughts, and bridges, roads and tunnels degrade faster due to changing water levels. Foundations of buildings shift, with the potential to significantly impact commercial and residential buildings across entire suburbs as was the case in the suburb of Carlton in Melbourne or the City of Albury during the recent Victorian drought¹⁴. In fact, Archicentre estimated in 2006 that 750,000 Australian homes suffered some sort of cracking, causing \$400 million worth of damage¹⁵. This will have inevitably increased by the end of the drought.

¹¹ Ibid.

¹² Ibid.

¹³ Kelly, Brooke., 8 February 2009. *Bushfires cancels trains, cuts roads*, featured in news.com.au, available at <http://www.news.com.au/news/bushfires-cancel-trains-cut-roads/story-fna7dq6e-1111118789853>, and V-Line Passenger Corporation, 2009. V-Line Annual Report, pg. 10/11, available at <http://www.vline.com.au/pdf/publications/annualreports/annualreport08-09.pdf>

¹⁴ Tkaczuk Sikora, Natalie., 23 November 2007. *Drought Hits Terrace Houses*, featured in The Herald Sun, available at <http://www.heraldsun.com.au/archives/old-news-pages/homes-cracking-up/story-e6frf7ro-1111114941578>

¹⁵ Radio National Breakfast, 20 June 2006. *Houses Cracking*, available at <http://www.abc.net.au/radionational/programs/breakfast/houses-cracking/3329264>

Higher temperatures and heatwaves cause building materials and structures to degrade faster and even cause corrosion of pipes from more hydrogen sulphide in sewers¹⁶. Degradation of building materials in residential homes, commercial building and major infrastructure will lead to significantly higher maintenance and repair costs and will require greater investment in rebuilding more frequently. Safety of structures could also be seriously compromised.

Climate change is simultaneously impacting Victoria in ways beyond extreme weather events. Rising sea levels are eroding shorelines and eating away at roads. They inundate contaminated sites and landfills causing toxic chemicals to leach into waterways.

Sea level rise is also causing planning headaches for local councils and property price threats to residents and investors. The local community group *Global Warming Group Queenscliff* noted in a submission to the Enquiry into Climate Change and Environmental Impacts on Coastal Communities in 2008 that:

“Home owners living on or below flood levels are likely to experience the effects of climate change financially through a decline in property values and increased insurance premiums.”¹⁷

The issue of property prices has been a contentious one locally in Queenscliff and Point Lonsdale. The Borough of Queenscliff faced significant community pressure following release of an interim floodplain management strategy intended to respond to the local threat of rising sea levels which real estate agents said had affected property prices¹⁸. While real estate agents and some locals labelled the Borough’s strategy document an ‘over-reaction to the climate change threat’, the threat of rising sea levels has only continued to grow.

At the same time, these climate impacts are further exacerbated by extreme weather events.

For example, sea-level rise due to climate change is likely to cause erosion along much of the Victorian shoreline. This increases the vulnerability of our shoreline to erosion from extreme storms and king-tides and increases the threat to property prices and structural integrity. The Seaspray Surf Life Saving Club in West Gippsland is built on coastal dunes, and following storms in 2007 the Life Saving Club is now relocating to prevent it toppling into the ocean. Similar threats are likely to face other surf life saving clubs, community infrastructure and coastal residences with rising sea levels.

¹⁶ Commissioner for Environmental Sustainability Victoria, 2012. Foundation Paper One. *Climate Change Victoria: the science, our people, and our state of play*, pg. 66.

¹⁷ Global Warming Group Queenscliff, May 2008. *Submission to the Enquiry into Climate Change and Environmental Impacts on Coastal Communities*, available at <http://home.vicnet.net.au/~gwgg/pdf/sub042.pdf> Accessed on 9.1.2013.

¹⁸ Prytz, Tony., 19 January 2010. *Queenscliff Borough’s floodplain management strategy hits property prices*, featured in Geelong Advertiser, available at http://www.geelongadvertiser.com.au/article/2010/01/19/138831_news.html Accessed on 9.1.2013.

Warmer temperatures are causing changes in the natural environment, impacting species vulnerability. Agriculture, tourism and community health are also significantly impacted by both warmer temperatures and changing natural environments. These impacts will again be further exacerbated by extreme weather events.

4. Planning for extreme weather in a much warmer world

Numerous organisations have undertaken extensive research and planning into the processes, redesign and rebuilding, and investment required to adapt to particular impacts of climate change, including extreme weather events. Such organisations include the National Climate Change Adaptation Research Facility (NCCARF), the Victorian Centre for Climate Change Adaptation Research (VCCCAR), the Climate Commission and the Victorian Commissioner for Environmental Sustainability. Further, local government organisations and health care providers have already developed a number of specific adaptation plans for communities in which they work.

However, the majority of these reports and recommendations fail to take into account the full and varied impacts of any one climate impact, yet alone the mounting impacts of climate change and the way in which they will exacerbate one another. This is due largely to the fact that many of the future impacts of climate change remain unknown or uncertain.

In order to develop a strong and comprehensive approach to planning and funding for adaptation to extreme weather events, governments should seek to engage all sectors impacted by anticipated outcomes in developing an approach. This should include business, industry, farmers, various levels of government, civil society organisations, and the community.

There is a significant risk in the approach to adaptation that planning is undertaken for the *average* outcomes of prediction models in regards to future climate change impacts. While average temperature increases and the average of sea level rise predictions are very useful, adaptation planning for extreme weather events should also be based upon the more extreme predicted outcomes.

For example, the 2009 Victorian bushfires shocked the community, emergency services and all levels of government. No-one was prepared for such an extreme event and the result was hundreds dead through heatwave or fire, mass confusion in communication between emergency service providers and the community and uncertainty throughout government agencies in regards to levels of responsibility.

Since then, planning for such extremes has improved across emergency service providers. The recent Australian heatwave of January 2013 has required the Bureau of Meteorology introduce a new band of colours to represent temperature ranges above

50°C given the unprecedented extreme heat¹⁹. While there has been no adverse impact of the Bureau not having previously been prepared for such an outcome, the same cannot be said if our emergency services are unprepared for such unprecedented heat.

This heatwave and the associated above 50°C temperatures have occurred with an increase in global temperatures of just 0.8°C above pre-industrial temperatures. Climate science is now pointing to a future of at least 4°C of warming²⁰. A 2008 report by the Royal Netherlands Meteorological Institute found that with just 3.5°C of warming, we could see one-in-100-year temperatures of 50°C in **most*** of Australia by the end of the century²¹. The consequences of this are almost unimaginable. Our natural environment, our infrastructure, our economy and the human body are not designed to operate in such extremes. Adaptation planning will need to consider the implications of such extremes.

To fail to fund and prepare adaptation plans for the most extreme outcomes would be to fail to understand the significant likelihood of such extreme events occurring and seriously compromise the health and safety of the Australian population.

5. Mitigation versus adaptation

With 0.8°C of global warming already, and further temperature increase already locked-in to the climate system, the need to adapt to a changing climate is clear.

The impacts of extreme weather events are often so severe that planning for their occurrence should happen as a matter of priority at all levels of government.

However there are some things to which human populations as we know them simply cannot adapt. Some of the more catastrophic projected impacts of climate change will generate such significant impacts that no amount of adaptation can protect our communities, our economy or our environment.

Key to developing any approach to extreme weather events must be an agreement that adaptation to the worst impacts of possible future climate change is either too expensive, impossible or unthinkable. In reaching that agreement, the government should then agree that Australia must take all necessary action to cut our national greenhouse gas emissions in line with both the levels and the timelines that climate science tells us is necessary in order to avoid these outcomes. Put simply, we must

¹⁹ Bureau of Meteorology, 3.52pm 8 January 2012. Announced in a Facebook post available at <http://www.facebook.com/photo.php?fbid=472388816158357&set=a.171427712921137.44816.170992086298033&type=1&theater>

²⁰ The World Bank, November 2012. *Turning Down the Heat: Why a 4oC Warmer World Must be Avoided*, available at <http://climatechange.worldbank.org/> Accessed on 9.1.2013.

²¹ Sterl, A., C. Severijns, H. Dijkstra, W. Hazeleger, G.J. van Oldenborgh, M. van den Broeke, G. Burgers, B. van den Hurk, P.J. van Leeuwen and P. van Velthoven, *When can we expect extremely high surface temperatures?* Geophys. Res. Lett., 2008, 35, 14, L14703, [doi:10.1029/2008GL034071](https://doi.org/10.1029/2008GL034071).

* Authors own highlighting.

take comprehensive and urgent action to prevent the worst scenarios from becoming a reality.

Without such a commitment, any adaptation strategy is destined to become no more than a bandaid over an increasing level of risk to our communities, economy and environment.

Recommendations:

Environment Victoria recommends:

1. That planning for the occurrence of extreme weather events should happen as a matter of priority at all levels of government due to the often severe nature of the event's impacts.
2. The government should make a proper assessment of the risks and consequences of the full breadth of impacts over the long term that stem from extreme weather events. This will assist governments make informed decisions about their ability to respond to certain events and invest appropriately in adaptation and mitigation of climate change impacts.
3. That the government include the risk of extreme weather events exacerbating other climate impacts as part of a climate change risk assessment and adaptation and mitigation plan.
4. That the government should seek to engage all sectors impacted by anticipated outcomes in developing an approach to planning and funding for adaptation to extreme weather events. This should include business, industry, farmers, various levels of government, civil society organisations, and the community.
5. Key to developing any approach to extreme weather events must be an agreement that adaptation to the worst impacts of possible future climate change is either too expensive, impossible or unthinkable. In reaching that agreement, the government should then agree that Australia must take all necessary action to cut our national greenhouse gas emissions in line with both the levels and the timelines that climate science tells us is necessary in order to avoid these outcomes.