

**Senate Inquiry into Recent Trends in and
Preparedness for Extreme Weather Events**

**Submission by the Department of Sustainability,
Environment, Water, Population and
Communities**

18 January 2013

Submission by the Department of Sustainability, Environment, Water, Population and Communities (the department)

The department welcomes the opportunity to provide a submission to the Senate Environment and Communications References Committee inquiry: *Recent trends in and preparedness for extreme weather events*. This submission addresses the following terms of reference of the inquiry:

(b) based on global warming scenarios outlined by the Intergovernmental Panel on Climate Change and the Commonwealth Scientific and Industrial Research Organisation of 1 to 5 degrees by 2070:

...(ii) the costs of extreme weather events and impacts on natural ecosystems, social and economic infrastructure and human health,

Natural ecosystems

The costs and impacts of extreme weather events on natural ecosystems are significant and can last for years, even decades. The diversity of plants and animals is such that different species may respond in opposite ways to the same extreme weather event. For example, bushfires may destroy populations, even whole species, yet result in the rejuvenation or overpopulation of others. Each of these outcomes has its own challenges. Extreme weather events can also result in complete changes in ecosystem functionality¹, an outcome that would have significant financial, economic and social impacts for the management of that ecosystem into the future. Costing these impacts is a challenging proposition, even if only the cost of physical restoration is considered.

Typically, regional natural resource management (NRM) groups play a significant role in supporting local communities to restore their natural ecosystems following extreme weather events. Environmental non-government organisations and state and local government agencies also play a significant role. Due to the significant costs involved in restoring natural ecosystems following extreme weather events, the Australian Government is generally called on to provide funding support. For example, the Caring for our Country initiative invested \$10.5 million following the 2009 Victorian bushfires and \$9.9 million after the floods and cyclones of 2010.

The effects of impacts on natural ecosystems reach far beyond the direct impact on biodiversity. It also impacts on social and economic infrastructure dependent on the health of the natural ecosystems for their continued wellbeing. However, the effect of environmental impacts is rarely reflected in calculations of the cost of severe weather events.

Urban water

The urban water sector includes services provided by water utilities and local governments to deliver potable drinking water, sewerage and drainage services to households and businesses in cities and towns. Urban water service delivery standards can be impacted by events such as storms, bushfires, high winds and heatwaves. Impacts include damage to infrastructure through:

¹ Parmesan, C, Root, TL, Willig, MR. (2000). Impacts of extreme weather and climate on terrestrial biota [part five]. *Bulletin of the American Meteorological Society*. Vol 81(2): 443-450.

fire and flood; loss of electricity to water supply, sewerage treatment plants and pumping stations; and varied water quality impacts.²

Multiple significant weather events, in close succession, can exacerbate the adverse effects of a single extreme weather event.³ For example, the impact of bushfires on water quality largely depends on the timing of subsequent rainfall. This is because the degree of degradation or recovery of water catchments post-fire influences the nutrient concentration, turbidity and catchment erosion that follow from heavy rains.

A 2011 inquiry by the Productivity Commission⁴ examined the economic impacts of drought on the urban water sector in south eastern Australia. It found that pressures from growth in the demand for water and the reduced capacity to supply water during the drought led to substantial economic and social costs through the use of severe water restrictions and consumption targets; prescribed measures or subsidies to reduce the consumption of potable water; and large investments in rainfall-independent supply infrastructure. It also found that some regional areas had inadequate water quality.

The Productivity Commission also recognised that, as a result of the large investments in water supply infrastructure made during the drought, most major metropolitan areas now have security of water supply for at least 10 years, suggesting further augmentation is not needed.⁵ The impact of the drought on the sector continues to be felt, however, through substantial increases in water and sewerage charges in most metropolitan areas of Australia.

Urbanisation of a catchment brings about dramatic changes in hydrology. It also increases the incidence of flash floods and polluted water ways. The volume of run-off water is typically doubled or tripled during a storm, and stormwater flows rates can be up to 20 times higher, than in a non-urban catchment. In addition to property damage, this represents an environmental and health hazard as it impacts on water quality and habitat in rivers, estuaries and coastal waters.

Potential impacts of extreme weather events, other than drought, on urban water include⁶:

- Increased challenges to service delivery, i.e bushfires, floods and sewer spills
- Power outages (affecting supply) resulting from extreme floods, heatwaves and bushfires
- Increased risk of flooding and inundation of low lying and buried assets
- Acute increases in turbidity.

² Fitzgerald, SK, Stanford, BD, Khan, SJ. (2012). *Lessons from a decade of extreme weather events for Australian drinking water suppliers*. Commissioned by the Water Services Association of Australia.

³ Fitzgerald, SK, Stanford, BD, Khan, SJ. (2012). *Op cit*

⁴ Productivity Commission (2011). *Australia's Urban Water Sector*, Report No. 55. Final Inquiry Report, Canberra. Available at: <http://www.pc.gov.au/projects/inquiry/urban-water/report>.

⁵ *Ibid*

⁶ Water Services Association of Australia. (2012). *Climate Change Adaptation and the Australian water industry*. Fact sheet.

(c) an assessment of the preparedness of key sectors for extreme weather events, including major infrastructure (electricity, water, transport, telecommunications), health, construction and property, and agriculture and forestry;

A resilient environment is essential to the maintenance and growth of key sectors of Australia's economy and infrastructure assets. The omission of the environment sector from this Term of Reference is indicative of the general lack of understanding of the role of environmental assets in the broader context of preparedness for extreme weather events. For example, coral reefs and mangroves play a critical role in coastal protection, moderating the impacts of waves on Australia's coastline and acting as an important buffer between land and sea.⁷ The damage bill from Cyclone Larry in 2006 would have been much higher if intact mangrove forests had not been present.⁸

Anecdotally, a number of regional NRM organisations are increasingly well prepared to respond to extreme weather events. For example, a number of Queensland NRM groups were out on the ground working with land holders to restore environmental assets within days of floods passing through their regions in 2010. Terrain NRM⁹, in the Wet Tropics has documented its experiences and lessons learned in cleaning up after both Cyclone Larry and Cyclone Yasi.

Further details of the work being done by the Australian Government to help prepare our natural ecosystems for extreme weather events are at (f) and (h) below.

(f) progress in developing effective national coordination of climate change response and risk management, including legislative and regulatory reform, standards and codes, taxation arrangements and economic instruments;

As identified previously (see ToR (b)(ii)), combinations of extreme weather events can exacerbate the outcomes of single events, leading to greater cumulative impacts. Therefore, the preparation and risk management for extreme weather events should consider the cumulative effect of combinations of weather events.¹⁰

It is essential that environmental assets are included in risk management analyses for extreme weather events. This is particularly important for areas where a more resilient environment would better withstand the impacts of extreme weather events and thereby assist in preventing or reducing damage to natural or built assets. Without preserving environmental assets we risk the loss of the natural capital that provides the basis of key sectors of the economy, and also of social well being in the broadest sense.

Analyses undertaken through the National Disaster Relief and Recovery Arrangements do not directly include environmental assets as assets in their own right. The lack of recognition of environmental assets means that funding to repair environmental damage resulting from extreme weather events is generally drawn from existing environmental program funds. This affects the capacity to achieve a net improvement in environmental health, particularly in those areas already degraded prior to the extreme weather event. In turn, this can lead to ongoing,

⁷ Department of Climate Change. (2009). *Climate Change Risks to Australia's Coast: A first pass national assessment*. Commonwealth of Australia.

⁸ <http://wetlandinfo.derm.qld.gov.au/wetlands/factsfigures/FloraAndFauna/Flora/mangroves.html>

⁹ www.terrain.org.au

¹⁰ Fitzgerald, SK, Stanford, BD, Khan, SJ. (2012). *Op cit*.

negative impacts on the social and economic assets dependent on the health and functioning of these environmental assets.

Natural Ecosystems

Climate change is a major threat to Australia's natural ecosystems, including our biodiversity. The Australian Government has implemented a number of policies and programs that aim to mitigate the risks of climate change impacts and support adaptation nationwide. Through these initiatives, the Australian Government is seeking to improve the health and resilience of our natural ecosystems so they can better withstand the impacts of extreme weather and continue to support our economic and social wellbeing. Examples of these programs include: the Biodiversity Fund; the Regional Natural Resource Management Planning for Climate Change Fund; Caring for our Country; National Wildlife Corridors Plan; and Australia's Native Vegetation Framework.

Water resources

The Australian Government is working to increase the long-term resilience of the Murray-Darling Basin, to enable the rivers, wetlands and floodplains to cope better with future extreme weather events such as drought and to adapt to a changing climate. Commonwealth environmental water holdings are being acquired through investment in irrigation efficiency under the Government's Water for the Future Initiative and through direct market purchases. This water is being managed to protect and restore environmental assets in the Murray-Darling Basin, and to give effect to relevant international agreements including the United Nations Climate Change Convention and the United Nations Convention to Combat Desertification.

The Murray-Darling Basin Plan (Basin Plan) establishes sustainable limits on water extraction, based on the Murray-Darling Basin Authority's (the Authority) assessment of the environmentally sustainable level of take, and allows water to be returned to the environment to restore the system to health. The Basin Plan is designed to manage water across the spectrum of climatic conditions, and prepares for future climatic extremes by establishing an adaptive and integrated management framework. This framework provides for better understanding of future risks, incorporation of new knowledge, ideas and local knowledge of people across the basin and opportunities for innovation.

Water for the Future is the Australian Government's long-term initiative to better balance the water needs of communities, farmers and the environment. It contains a suite of urban and rural policies and programs to help improve resilience in the environment and communities, including significant funding for water purchasing, irrigation modernisation, desalination, recycling and stormwater capture.

Projects conducted under Water for the Future programs benefit the economy by making irrigation more productive, improve the health of our rivers and wetlands by returning water to the environment and support communities to thrive by putting water use on a sustainable footing. The very nature of these outcomes means that with the completion of the projects, the relevant irrigation communities will be more resilient and better prepared for future drought events.

Water trading is a valuable mechanism to manage seasonal variations in water availability. Several studies have shown that water trading has been critical in helping irrigation communities and industries survive the recent drought period.¹¹

A key element of the Council of Australian Governments' (COAG) National Water Initiative is the development of water resource plans which allow for the annual variability of rainfall in allocating water. The Commonwealth, states and territories are taking action to better prepare for the potential impacts of extreme weather events on the water resources sector through improved consideration of extreme events in the development of water plans.

COAG has endorsed the *National Water Initiative Policy Guidelines for Water Planning and Management*, which include principles for dealing with unprecedented events in developing plans. Governments have also agreed to develop a module to the guidelines on taking account of likely climate change within water resource plans; and to biennial reporting on the status of plans which include assessments of planning for climate change and extremes in inflows or recharge.

(h) any related matter.

Wetlands

Wetlands are critical aspects of Australia's landscape in our adaptation to, and mitigation of, climate change. In addition to playing an important role in providing connections for wildlife across the landscape, they are also important for the mitigation of the impacts of extreme weather events through acting as buffers. In particular, wetlands can help mitigate the impacts of extreme weather events by providing:

- Natural hazard reduction – by reducing floodwater impacts (reducing peak levels and velocity), and fire intensity and frequency;
- River/lake bank stabilisation – by retaining soil and preventing erosion and slumps;
- Storm and coastal shoreline protection – by providing physical structures to stabilise the shoreline and providing protection from the impacts of wind and wave action; and
- Hydrological regime maintenance, including groundwater recharge and discharge and providing water supply and storage.

¹¹ National Water Commission. (2010). *The impacts of water trading in the southern Murray-Darling Basin: An economic, social and environmental assessment*. Available at: http://www.nwc.gov.au/__data/assets/pdf_file/0019/10783/681-NWC_ImpactsofTrade_web.pdf.