



# Wetlands and resilience to natural hazards

## Introduction

Many people in Australia, particularly those living in low-lying coastal regions, are at risk from significant flooding caused by storms, cyclones, storm surges and tsunamis. Under projected climate change scenarios, extreme climatic events, including floods, droughts and storms, are expected to increase in frequency and intensity. Natural infrastructure, including wetlands, can help provide communities with resilience to these natural hazards.

## How do wetlands provide resilience to natural hazards?

Well-managed ecosystems can reduce the impact of many natural hazards, such as flooding, landslides and storm surges. The extent to which an ecosystem can buffer against extreme events depends on the ecosystem's health and the intensity of the event. According to the World Bank (2004), investments in preventative measures, including in maintaining healthy ecosystems, are seven times more effective than the costs incurred by disasters.

While the most extreme events will overwhelm any mitigation approach (whether structural or natural), using natural assets can provide benefits in reducing the severity of the impact of extreme weather events, while structural approaches offer little benefit once breached.

Wetlands can provide resilience to the following natural hazards:

- floods—wetlands on the floodplains along waterways can mitigate the impacts of floods by absorbing excess water and retaining it or returning it to the water table. When a river is cut off from its floodplain and associated wetlands, floodwaters are forced to flow in the main channel, and can create deep and high velocity flows downstream.
- drought—healthy and well-functioning ecosystems can provide a degree of protection from extreme weather events. Wetlands can store water which provides a buffer against droughts.
- fire—wetlands can act as a natural barrier to the spread of fires, regulating the frequency and magnitude of fire events.
- storms—coastal saltmarshes and mangroves act as a frontline defence against incoming storms. They help minimise the impact of storms by slowing the speed and reducing the height and force of waves, by slowing winds and by stabilising soil and sediments. Coral reefs also provide coasts with storm protection, by absorbing wave energy, reducing wave heights and reducing erosion.
- landslides and erosion—maintaining and restoring catchment, riparian and in-stream vegetation can stabilise soil, reduce runoff during storms and slow flood waters, reducing the risk of erosion to catchments and streambanks. Floodplains provide natural flood storage, spreading the flood flow and reducing impacts on downstream areas.

## What can we do?

Healthy and well-managed wetlands can help reduce the exposure of people and their productive assets to hazards. To take advantage of this natural infrastructure we can:

- recognise the natural movements of waterways across floodplains and natural changes in shorelines, and retain undeveloped areas which allow this to happen
- consider the use of natural infrastructure to act as buffers to absorb the energy of floods, wind, storm, rather than, or along with, engineering solutions. Maintaining and restoring coastal wetlands can also offer additional benefits for biodiversity, tourism, recreation and fishing, as well as for carbon capture and storage
- manage and restore wetlands as part of contingency planning to reduce the impacts of natural phenomena such as floods
- integrate ecosystem management, in particular relating to wetland and water management, into national disaster risk reduction and climate change adaptation strategies
- incorporate disaster risk reduction measures in wetland and natural resource management plans and other policies, action plans and programs
- avoid, as far as possible, activities in and adjacent to wetlands, such as in-filling, reclamation and infrastructure development which might reduce the role that the wetlands play in mitigating the impact of disasters
- build the resilience of wetland areas by establishing reserves, removing weeds and pests, maintaining water flows and revegetating degraded areas
- carry out long-term research on wetlands and disaster risk management in the face of climate change.



Photo: Wildfire © Kerry Trapnell and the Department of the Environment and Energy

## Further information

- Ramsar Convention Resolution—Wetlands and Disaster Risk Reduction  
[www.ramsar.org/document/resolution-xii13-wetlands-and-disaster-risk-reduction](http://www.ramsar.org/document/resolution-xii13-wetlands-and-disaster-risk-reduction)
- National Climate Resilience and Adaptation Strategy  
[www.environment.gov.au/climate-change/adaptation/publications/national-climate-resilience-and-adaptation-strategy](http://www.environment.gov.au/climate-change/adaptation/publications/national-climate-resilience-and-adaptation-strategy)
- Fact Sheet—Mangroves and saltmarshes  
[www.environment.gov.au/water/wetlands/publications/factsheet-wetlands-mangroves-saltmarsh](http://www.environment.gov.au/water/wetlands/publications/factsheet-wetlands-mangroves-saltmarsh)
- Programs—National Landcare Programme, Green Army  
[www.environment.gov.au/about-us/grants-funding](http://www.environment.gov.au/about-us/grants-funding)

Recent floods and storms in Australia have caused significant losses, including damage of up to \$1 billion due to storms which flooded the Hunter valley in April 2015, \$206 million losses due to Sydney's Kurnell tornado in December 2015 and losses of \$56 million for floods across Queensland, NSW, Victoria and Tasmania in June 2016.

More than \$226 billion (in 2008 dollars) in commercial, industrial, road and rail, and residential assets are potentially exposed to flooding and erosion hazards at a sea level rise of 1.1 metres (a high end scenario for 2100).

Mangroves protect the coast by absorbing the energy of storm-driven waves and wind. The only two yachts undamaged by Cyclone Tracy in Darwin in 1974 were sheltered in a mangrove creek. In 2006, mangroves protected vessels and the coastline during Cyclone Larry in far north Queensland. The damage bill would have been much higher if it wasn't for the existence of intact mangrove forests.

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