CLIMATE COUNCIL

RISING SEAS, RISING BILLS:

How sea level rise will cost every Australian

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The Climate Council acknowledges the Traditional Owners of the lands on which we live, meet and work. We wish to pay our respects to Elders, past and present, and recognise the continuous connection of Aboriginal and Torres Strait Islander peoples to land, sea and sky. We acknowledge the ongoing leadership of First Nations people here and worldwide in protecting Country, and securing a safe and liveable climate for us all.

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Cover image: Huge wave breaks on to a quayside with a spectator taking cover from the spray.

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Contents

Key findings

1 Sea level rise will conservatively cost Australia $855 billion this century, and become a constant drag on our economy.

- Our analysis finds total economic losses from coastal flooding will reach $855.1 billion this century made up of $274.3 billion in property losses and $580.7 billion in land use damages.
- The losses would be a sustained annual economic drag large enough to potentially cost Australian jobs and push down household incomes.
- Climate pollution from burning coal, oil and gas is overheating our planet and causing ice sheets to melt, and oceans to warm and expand. Sea levels have already risen, with scientists confident at least a further 14 cm rise is locked in by 2050.
- This analysis is based on a conservative scenario where countries implement existing policies to cut climate pollution. Actual sea level rise could be far higher, especially if climate pollution isn't cut deeply enough and glaciers and ice sheets collapse faster than expected.

2 More than 267,000 coastal properties and two million hectares of land in Australia will be damaged by flooding this century as sea levels rise.

- Floods that were considered severe will become a regular consequence of ordinary tides, with every 10 cm of sea level rise tripling the frequency of so-called 'once-in-a-century' flood events. In Sydney, for example, minor coastal flooding that now occurs for just over a week each year will become a daily occurrence by 2100 under a high-polluting scenario.
- Queensland has the greatest number of homes at risk (93,157 properties) followed by New South Wales (71,210) and Western Australia (51,366).
- Queensland's Gold Coast alone faces $84.4 billion in projected economic losses — the single most exposed urban area in Australia.
- Land facing damages spans residential and commercial properties, nature reserves, industrial and agricultural areas and critical infrastructure. Of the 619,713 hectares of farming land that's damaged, the highest losses are concentrated in Western Australia, the Northern Territory and Queensland.

3 Sea level rise will hit every state and the Northern Territory hard, and when it does property owners will largely bear costs on their own.

- Western Australia faces the largest total losses at $230.5 billion. However, no state escapes: with $214.5 billion in losses in Queensland, $167.1 billion in Victoria, $150.7 billion in NSW, $49.2 billion in South Australia, $35.2 billion in the NT and $7.9 billion in Tasmania.
- In New South Wales, communities in Northern NSW and Central Coast face higher property losses than in Greater Sydney – with 71,210 properties at risk across the state; the second highest nationally.
- In Victoria, losses are heavily concentrated in low-lying areas of Melbourne around Port Phillip Bay and the Yarra River.
- Most private insurers don't cover 'actions of the sea' — meaning when coastal flooding strikes, property owners will largely bear the costs alone.

4 The climate damages bill is already hitting Australian coastal communities hard. Governments can act to avoid some higher costs, and stop polluters from making things worse.

› Coastal communities are already dealing with disappearing beaches, homes falling into the sea and a damages bill that's becoming unmanageable. In NSW's Central Coast a proposed seawall to protect 40 houses remains unbuilt because of a dispute over who should pay the $40 million cost.

› Governments can avoid some costs by stopping development in at-risk areas, and managing retreat in the most vulnerable places. However, with significant sea-level rise already locked in, someone must pay for further damages with the Insurance Council of Australia estimating at least $30 billion is needed in large scale coastal protection and adaptation projects, over the next 50 years alone.

› Right now, it's everyday Australians who are wearing these costs. Australia's 537 local councils have voted unanimously that coal, oil and gas corporations – whose pollution worsens sea level rise – should help foot the bill.

› Regardless of who pays, responding to rising seas while continuing to pollute is like bailing water without patching the leak.

› Immediate opportunities for Australia to cut climate pollution further and faster are:

1 Ending coal and gas expansion;

2 Closing loopholes in our national industrial law, which are being exploited by coal and gas corporations.

3 Redirect billions in tax breaks for mining corporations through the Fuel Tax Credit Scheme, which could be reinvested in better preparing communities.

Introduction

Australia is a coastal nation, with approximately half its population living within seven kilometres of the coast. Major cities including Brisbane, Melbourne, Sydney and Perth are all coastal. The continent has one of the longest coastlines in the world, spanning around 36,000 kilometres (excluding offshore islands) and more than 10,600 beaches (Geoscience Australia 2014). Our beaches are central to the Australian lifestyle, popular spots for relaxation, recreation, social gatherings and improving our physical and mental health. However, our proximity to the coast, and its vast expanse, also make us highly vulnerable to sea level rise.

Sea level rise will cost every Australian, not just those who live on the coast.

As climate change worsens, extreme sea level events that are rare today will become much more frequent. Already, we are witnessing the erosion of our beaches, permanent inundation in low-lying areas, and coastal flooding events becoming more frequent and intense.

The consequences of sea level rise, and coastal flooding will be significant – for our societies, culture and economy. Already, it is damaging people's homes, our coastal infrastructure and precious ecosystems. We are poorly prepared for what's already here, and few people are aware of what's at stake, what can be done about it or how to avoid even worse impacts into the future.

This report draws on new research from the University of Melbourne, recently published in the *Nature* journal *Scientific Reports*, to quantify the potential economic losses from sea level rise in Australia (Kompas et al. 2026). This is the first detailed national study of the projected costs of major coastal flooding from sea level rise and storm surges in all of Australia, building on a detailed study conducted for Victoria in 2022 (Kompas et al. 2022).

It is based on mapping the extent of coastal flooding by 2100, taking into account both sea level rise and storm surges (see Appendix for methodology). It projects that the potential economic losses for Australia from sea level rise will be enormous – enough to result in cumulative present value damages of $855.1 billion by 2100 – made up of $274.3 billion from property damage and $580.7 billion from land use losses.[1, 2] This is equivalent to one-third of Australia's current total economic output for a year.

These losses will be felt by every Australian, and every state and territory; not just by those living on the coast. The damages from sea level rise and storm surges will be enough to potentially lower the nation's GDP, on average, each year, by 1.05-1.39% (Kompas et al. 2026). Two consecutive quarters of negative growth is considered a recession, with flow-on impacts for Australians including increased job losses, lower household incomes, shrinking investments and more difficulties borrowing money.

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1 Discounting future damages to their present value effectively reduces the dollar value, which makes the damages appear lower (than if future damages were not discounted). On average, this translates to around $11.6 billion in economic losses per year between now and 2100. If future damages are not discounted, losses on average per year, for every year to 2100, are $41.8 billion.

2 Figures are rounded and may not sum exactly.

These losses should be treated as minimal damages. The figures are based on an "intermediate" climate pollution scenario (called RCP 4.5), where global emissions peak by around 2040 (14 years from present) and decline steeply thereafter. This would lead to global average heating of between 2.1–3.5°C (with a best estimate of 2.7°C), compared to pre-industrial times.

The United Nations projects that we are tracking towards 2.8°C global average rise if all countries continue with current policies to reduce climate pollution and do not strengthen their ambition (UNEP 2025).

Australia's first National Climate Risk Assessment makes the risks clear. Climate pollution from the burning of coal, oil and gas is already harming Australians, and pushing up costs (ACS 2025a). Damages from climate-fuelled disasters have increased, and recovery costs are often footed by the public (ICA 2025). Insurance premiums keep rising, and so does the cost of food (TAI 2025). Extreme weather events such as droughts, fire, floods and heatwaves – made worse by climate pollution – can significantly reduce crop yields and farm productivity, resulting in reduced supply and increased food prices. Every sector of the Australian economy will be impacted, and no one will be immune from climate change impacts over the remainder of the century. Sea level rise, and the damage it will do to all Australians and our wider economy, will add to the climate costs already being borne by Australians.

Image 1: Cyclone Alfred wreaks havoc on Byron Bay beaches.

1.

Homes and communities at risk

Image 2: Big waves breaking at Wollongong harbor breakwall and lighthouse.

How is sea level rise exacerbating coastal flooding?

CLIMATE POLLUTION IS ACCELERATING SEA LEVEL RISE

Climate change, driven by burning fossil fuels such as coal, oil and gas, has already over heated the atmosphere by 1.34-1.41°C since pre-industrial times (WMO 2026). Around 91% of the excess heat caused by the burning of coal, oil and gas has been absorbed by the global ocean, mixing down into deep waters. This has caused the ocean to warm and expand, melted ice-sheets and glaciers and raised the global average sea level by at least 22 cm over the past century (CSIRO 2024). Consistent and continuous global satellite records show sea level rise has been accelerating over the past 30 years. Recent measurements show a rise of around 3.5 cm per decade (CSIRO 2026a).

Sea level rise is not uniform, with significant regional variations. Sea level changes can be much larger or smaller than the globally averaged value, due to variations in salinity, ocean circulation, temperature and influences from ice sheet loss in polar regions (ACS 2026). Around most of Australia, the rate of sea level rise is close to the global average (around 3.5 cm per decade). However, in some areas – such as the north and southeast of Australia – the rate of sea level rise is occurring significantly faster (CSIRO 2026b).

WHAT SEA LEVEL RISE IS EXPECTED INTO THE FUTURE?

The relationship between the rise of global average temperature and sea level rise is direct and cumulative. However, while global average temperature determines the rate of sea level rise, the two do not move in lockstep. The ocean-ice system has massive inertia, so even if all climate pollution ceased today and atmospheric temperatures were stabilised, sea levels would keep rising for centuries because ice sheets and ocean depths take a longer time to respond and change.

Because of this inertia, the amount of sea level rise we can expect by 2050 is already locked in. Australia can expect at least 14 cm of sea level rise by 2050 relative to the 'present day' (2011-2030), because of the climate pollution that has already been released and the overheating that has already occurred (ACS 2026).

If global heating reaches 2°C by 2090, this would correspond to at least 32 cm of sea level rise on average around Australia compared to the present day (with some locations being higher than this and some lower). If global heating reaches 3°C by 2090, this would roughly correspond to at least 54 cm of sea level rise, on average, compared to the present (2011-2030) (ACS 2026). These numbers do not account for the possibility of accelerated ice sheet instability. If warming causes ice sheets to slide into the ocean faster than existing projections assume, then sea level rise of up to 2 metres by 2100 is possible (Fox-Kemper et al. 2021).

While measuring rises in terms of centimetres may appear modest compared to daily tidal fluctuations of several metres, sea level rise is a permanent and irreversible shift in the baseline water level. This has an enormous effect on the frequency and severity of coastal flooding events and the corresponding extent of coastal erosion and land loss.

Sea level rise will continue to occur for centuries beyond 2100, because of the inertia of the ocean-ice system. How high they rise depends on the global warming level that is reached. Sustained temperatures of 2°C represent a 'tipping point' for sea level rise in the long term; triggering the near-complete loss of the Greenland and West Antarctic ice sheets. If this occurs then sea levels will rise by several metres over the next millennia (Fox-Kemper et al. 2021).

Sea level rise is already damaging coastal towns, and worse is on the way.

WHAT EMISSIONS SCENARIO WAS USED IN THIS REPORT?

The future climate scenario used in this report (called RCP4.5) sees climate pollution peak around 2040 and decline steeply thereafter, leading to around 2.7°C of average global warming above the pre-industrial era by 2100 (IPCC 2021). This is currently the trajectory we are on if countries do not significantly ramp up action to cut climate pollution. The United Nations projects that if all countries around the world continue with current policies to cut climate pollution, we will be exposed to 2.8°C average global warming by 2100 (UNEP 2025). This falls well short of the Paris Agreement's primary goal to collectively keep global warming well below 2°C and as close to 1.5°C as possible.

The 'moderate' emissions scenario corresponds to a global mean sea level rise of 56 cm (range: 44-76 cm) by 2100 (relative to 1995-2014) (Fox-Kemper 2021). Around the Australian coastline, average sea level rise is projected to be similar to the global average (approximately 55 cm relative to 1995-2014) by 2100 (McInnes and Zhang 2024). However, the average disguises regional variations. This analysis does not draw on average sea level rise projections, but instead relies on localised projections for sea level rise and storm surges at 239 hotspot locations around Australia's coast (drawn from Kirezci et al. 2020).[3]

3 The global and Australia-wide average sea levels in this report are based on the SSP2-4.5 scenario from IPCC AR6, whilst the sea level rise estimates for the 239 hotspots used the older RCP4.5 (from IPCC AR5), via Kirezci et al. (2020) — chosen for its fine spatial resolution across Australian coastal hotspots, which current AR6-based alternatives do not yet match. While the two scenarios represent the same level of radiative forcing by 2100, the sea level rise projections in AR6 are somewhat higher (reflecting updated ice-sheet science and a later baseline period); as such, the hotspot-based results presented in this report should be treated as a conservative estimate of exposure.

SEA LEVEL RISE PUTS OUR COASTAL COMMUNITIES AT RISK

There are three main impact pathways of sea level rise: permanent inundation, increased frequency and extent of coastal flooding, and erosion and loss of land.

Permanent inundation

Some low-lying coastal areas, islands and wetlands, will be permanently inundated by sea level rise, meaning that they will be regularly or perpetually submerged by the daily tidal cycle, or remain below the high tide line. If land is inundated on a regular basis, saltwater intrusion can result in the permanent transformation of ecosystems, such as freshwater wetlands, salt marshes and mangrove flats. It can also lead to loss of habitability of some regions, such as low-lying islands. Regular inundation leads to groundwater contamination, and hence wells and groundwater sources for drinking water and irrigation becoming useless. This permanent change to groundwater may force migration off islands long before the land is permanently inundated.

More frequent coastal flooding

Coastal flooding occurs when the water level exceeds local flood thresholds (e.g., for minor coastal flooding, major coastal flooding and record coastal flooding). The highest water levels tend to occur when high (or King) tides coincide with storm surges caused by intense, temporary weather events such as tropical cyclones or East Coast Lows. A storm surge is an abnormal rise in the sea level due to powerful winds pushing water onshore. A storm surge which coincides with a high tide is called a 'storm tide'.

Coastal flooding is increasing in response to sea level rise. A small vertical increase in the base sea level allows storm surges and waves to reach much further inland, exponentially increasing the frequency and severity of coastal flooding. Minor coastal flooding already frequently occurs in coastal towns around Australia, in response to sea level rise. Further sea level rise will exponentially increase the frequency and intensity of coastal flooding.

For instance, in Sydney, Australia, the frequency of minor coastal flooding has increased from only 1.6 days on average per year in 1914 to more than a week (7.8 days) per year in the present day. Projections indicate that minor coastal flooding events will occur weekly by 2050, and daily by 2100 under a high climate pollution scenario (Hague et al. 2020). Floods that were historically considered severe, occurring due to a combination of storm surges and high tides, will become a predictable consequence of astronomical tides alone (Hague et al. 2020).

A common rule of thumb is that every 10 cm of sea level rise can triple the frequency of once-in-a-century flood events (Hunter 2012; UNSW 2021). But flooding changes do vary by location. The greatest increases in flood events are projected for southern Queensland and New South Wales. New South Wales is also projected to experience the largest increase in overall flood days.

Image 3: Accelerated collapse of glaciers and ice sheets could push sea level rise as high as 2 m by 2100.

The amount by which coastal flooding increases for a given amount of sea level rise is called the amplification factor. Figure 1 shows the amplification factor for extreme sea level events caused by storm tides for different locations around Australia, and for different increments of sea level rise: 14 cm (the amount already locked in due to past emissions), 32 cm (approximate mean SLR at 2090, assuming +2.0°C global warming is reached in 2090), 54 cm (approximate mean SLR at 2090 assuming +3.0°C global warming is reached in 2090).

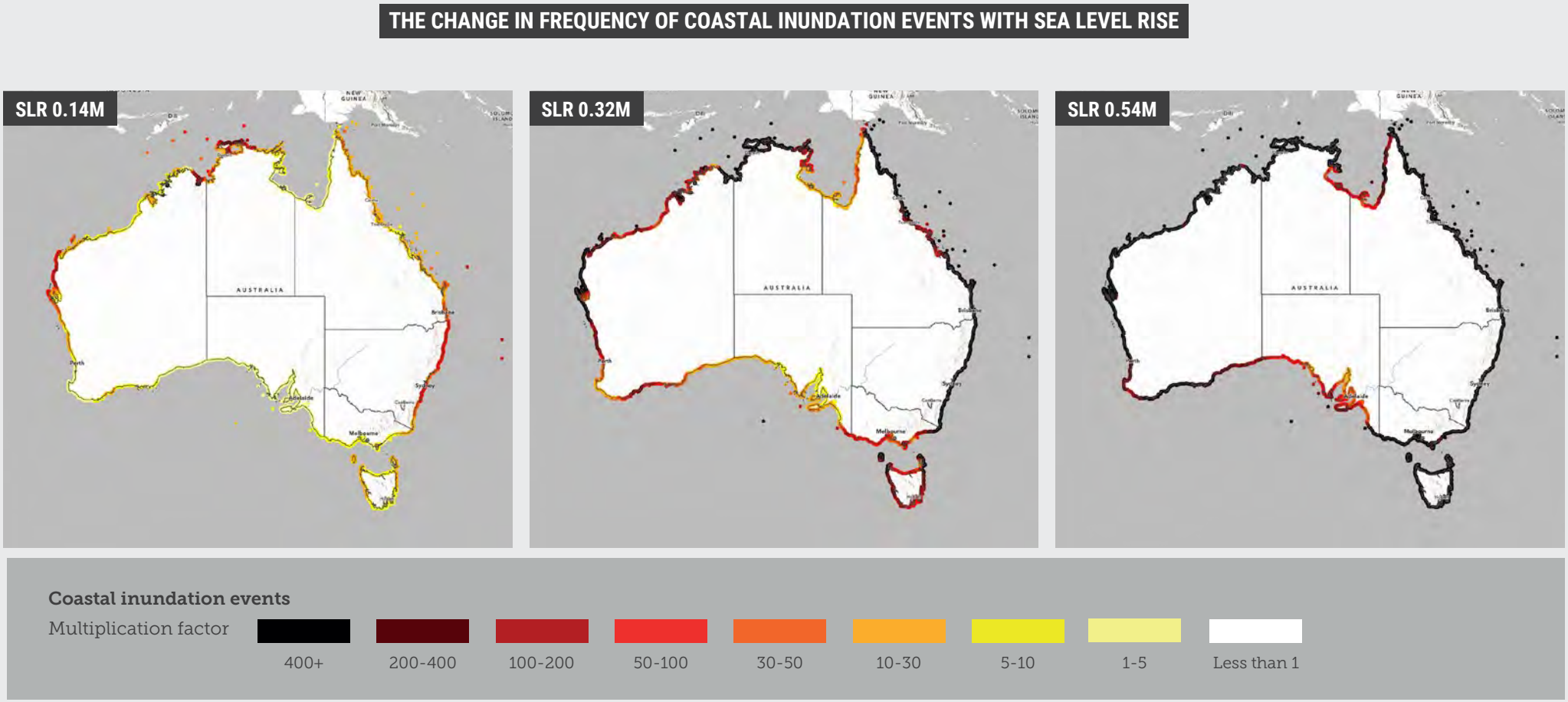


Figure 1: The frequency of coastal flooding will become hundreds of times more likely along much of the Australian coastline as sea level rises (ACS 2026).

Erosion and loss of land

Erosion and loss of land occurs as a result of waves, tides and currents – accelerated by storms, sea level rise and human activity. As a rule of thumb, each centimetre rise in sea level results in around one metre potential horizontal loss of sandy shorelines, on average. This is known as the Bruun rule. In reality, the amount of sand loss depends on multiple factors including the slope of the beach and other local factors. Very steep beaches can lose less than this, while flatter areas can be more dramatically eroded. Erosion occurs as a consequence of storm surges and storm tides, which allow high-energy waves to reach further inland (Coast Adapt 2017).

Taken together, these processes threaten coastal infrastructure, property, and ecosystems, leading to loss of land and habitat and damage to infrastructure including homes, roads, and utilities.

The next section of the report provides an overview of the number of properties, and the amount of land and types of land uses, that are exposed to damages from major coastal flooding with sea level rise.

Image 4: An intense storm lashing the NSW coast caused significant erosion on Sydney's Northern Beaches in June 2016.

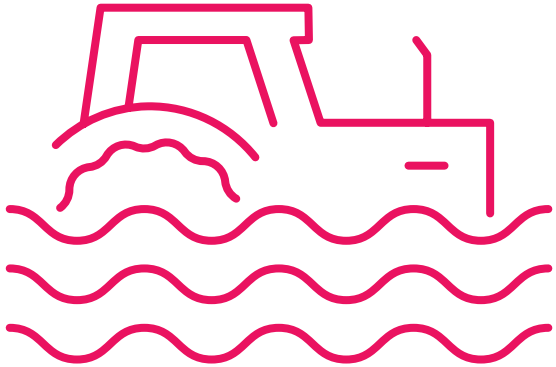
2.

What assets are exposed to coastal flooding?

Image 5: A kid is sitting in front of his flooded house after Category 4 Cyclone Narelle - Exmouth, Western Australia, March 27, 2026.

Sea level rise with storm surges will expose a wide array of coastal assets and lands to increased coastal flooding. If climate pollution follows an intermediate path (RCP4.5 scenario) between the current day and 2100, major coastal flooding would cause a total loss of more than 267,000 properties and two million hectares of land by 2100.

Australian farms, parks, homes and infrastructure — and two million hectares of land will face flooding this century due to sea level rise.



THIS LAND IS MADE UP OF THE FOLLOWING KEY USES:

FARMING

Around 619,713 ha that's farmland, with Western Australia, the Northern Territory and Queensland the most affected. Within Western Australia, the most affected areas are Pilbara North and the Kimberley. Within the Northern Territory, it's the southeast and southwest, while in Queensland, it's the Southern Gulf.

RESERVES

Around 517,696 ha that's classed as 'reserves'. This is managed land including grazing properties, native forests, softwood plantations, and areas managed for conservation. Western Australia and Queensland are the most affected in this category.

RECREATIONAL

Around 379,484 ha that's parks or recreational areas (including nature parks, urban and regional parks, sports grounds, camping and caravan parks), with Queensland the most affected.

TRADITIONAL INDIGENOUS USES

Around 190,164 ha that's traditional indigenous uses (including protection of sacred sites, and land that is traditionally managed through cultural fire burning), all of which is located in the Northern Territory.

RESIDENTIAL

Around 59,221 ha that's residential land, with Victoria, New South Wales and Queensland being the most affected states.

INFRASTRUCTURE

Around 23,021 ha that's land hosting critical infrastructure, such as roads, rail, energy, water supply and sewage. Most of this land is in Victoria and New South Wales.

THIS LAND IS MADE UP OF THE FOLLOWING KEY USES (CONTINUED):

SOCIAL

Around 17,491 ha that's research facilities, and federal defence facilities (classed as 'social'), with the Northern Territory and Western Australia most affected.

COMMERCIAL

Around 12,170 ha that's commercial land (such as retail, offices and business precincts), with New South Wales, Western Australia and South Australia the most affected.

INDUSTRIAL

Around 9,309 ha that's industrial land (such as manufacturing, factories, and processing facilities), with South Australia and Queensland the most affected.

QUARRIES

Around 4,500 ha that's quarries, with Victoria the most affected.

OTHER AREAS

Around 168,122 ha that's classed under 'other areas' (including areas classified as 'landscape', 'land in transition' and 'no clearly defined use').

Although land uses such as residential, commercial and industrial make up a relatively small area of the two million hectares of land exposed to major coastal flooding, they make a disproportionate contribution to the overall economic losses — outlined by regions within states and territories in the following section — because of the higher value of these lands and the properties and assets located on them.

3.

How much will sea level rise cost Australia?

Image 6: Damaged beachfront homes at Collaroy on the northern beaches of Sydney, June 2016.

Sea level rise and storm surge will cost Australia $855.1 billion in present value terms by 2100 – made up of $274.3 billion in property losses and $580.7 billion in land use damages. This is equivalent to one third of Australia's current total economic output (or Gross Domestic Product) for a year.

These costs will be felt across all states and territories and, therefore, by all Australians. Western Australia faces the largest total economic losses by 2100, followed by Queensland, Victoria, New South Wales, South Australia, Northern Territory and Tasmania. Queensland has the greatest number of properties at risk, followed by New South Wales, Western Australia, South Australia, Victoria and Tasmania. Western Australia and Queensland also face the largest land damage losses, followed by the Northern Territory, Victoria, New South Wales, South Australia and Tasmania.

$855 billion is the conservative price tag of rising seas, with the bill paid by every Australian.

Rising seas, rising costs in Western Australia

AT A GLANCE

Total cumulative losses:
$230.5 billion by 2100

Average annual cost:
$3.1 billion

Properties at risk:
51,366

Land affected:
541,464 ha

State fact:
Western Australia has the longest stretch of coastline of all the states and territories with 12,895 km of mainland coastline, and 20,788 km including islands. It also has the largest area of affected land.

Rising seas and storm surge are projected to cost Western Australia at least $230.5 billion by 2100. Economic losses are dominated by damage to land use, and farming is the single largest land-use category affected (203,117 ha, 34.6% of the state's total), ahead of reserves (174,790 ha, 29.8%). The Kimberley region is one of the most impacted regions, due to its combination of extensive intertidal mudflats, macrotidal ranges up to 11 metres and storm surges from cyclones. In this region sea level rise will cause significant coastal flooding and long-term coastal changes. Economic losses are also high in the Middle West and in Greater Perth.

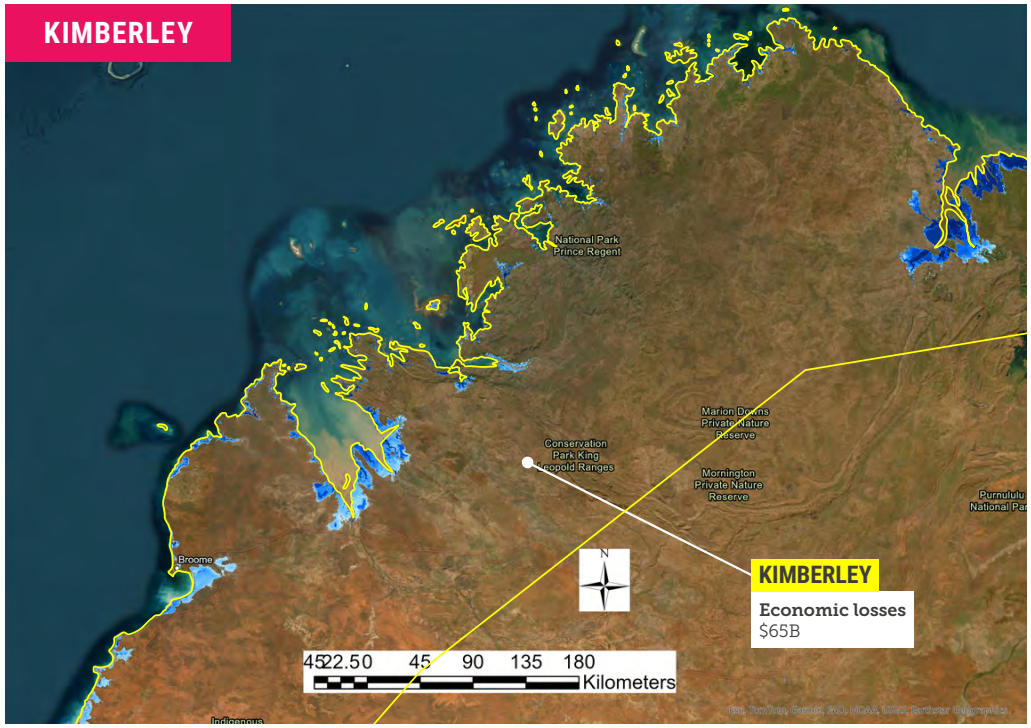
CASE STUDY: SEABIRD, WESTERN AUSTRALIA

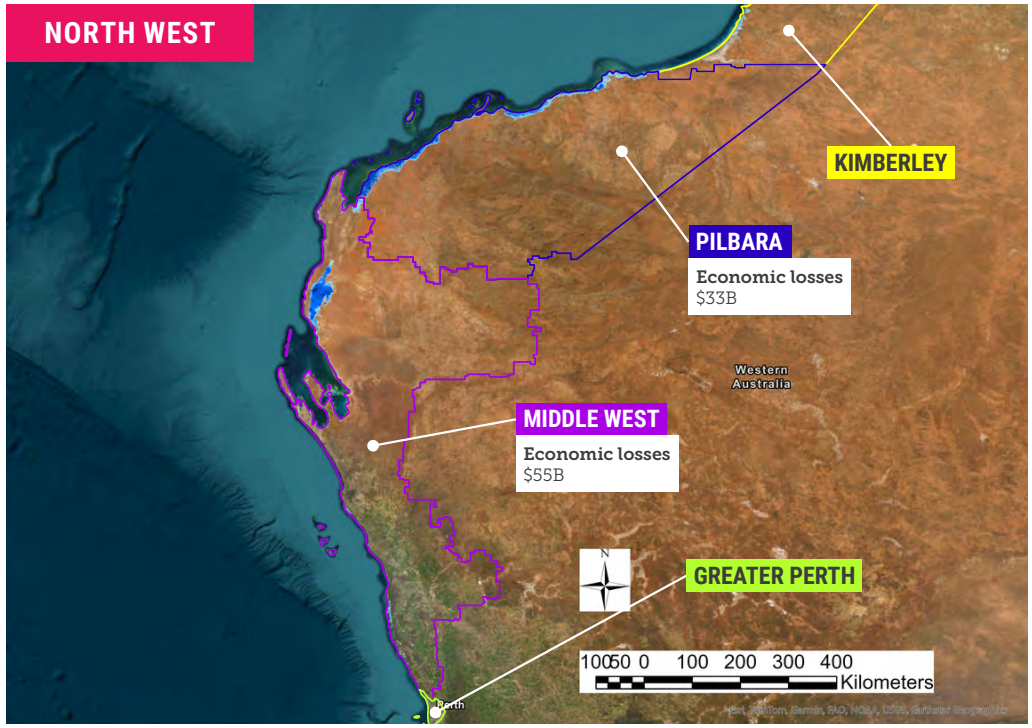
As Australia's most coastal exposed state – Western Australia is home to many towns and suburbs where erosion is threatening beaches, homes and businesses.

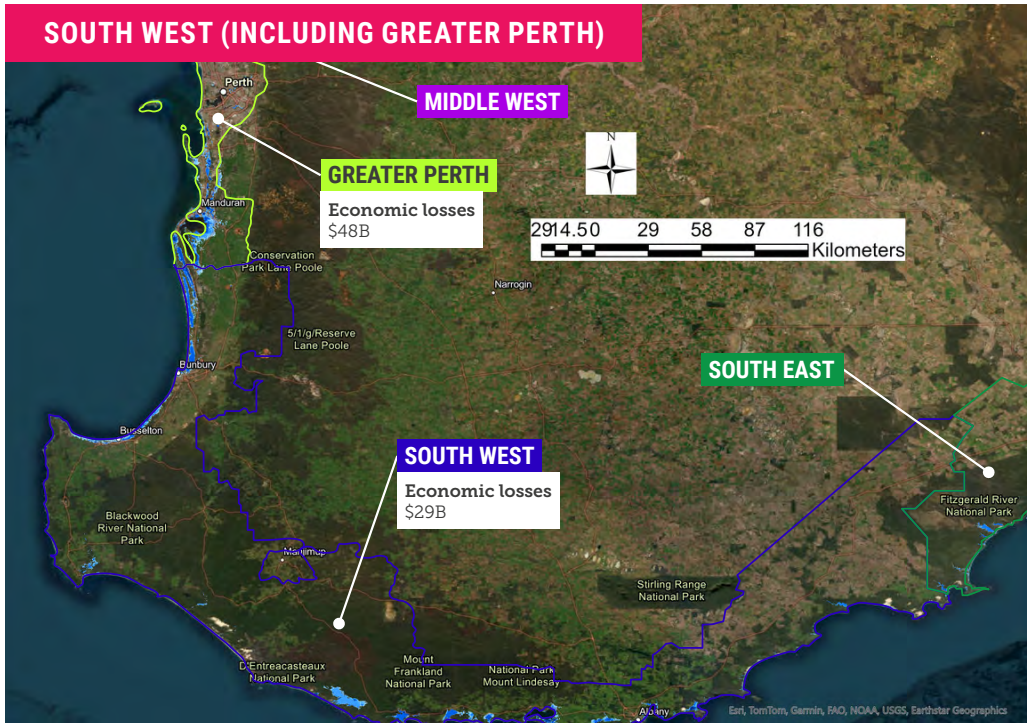
Coastal towns in the Shire of Gingin, north of Perth are facing severe and costly impacts from rising sea levels, storm surges and resulting erosion. In 2016 severe coastal erosion claimed a road and encroached on 15 beachfront homes in the town of Seabird. The homes were left on the edge of a sandy cliff, with some losing road access altogether (ABC 2019). With $2 million in support from the state government the Shire built a seawall to protect properties. However this will require significant funding to maintain and only has a 20 year lifespan – far from a long term solution (ABC 2019).

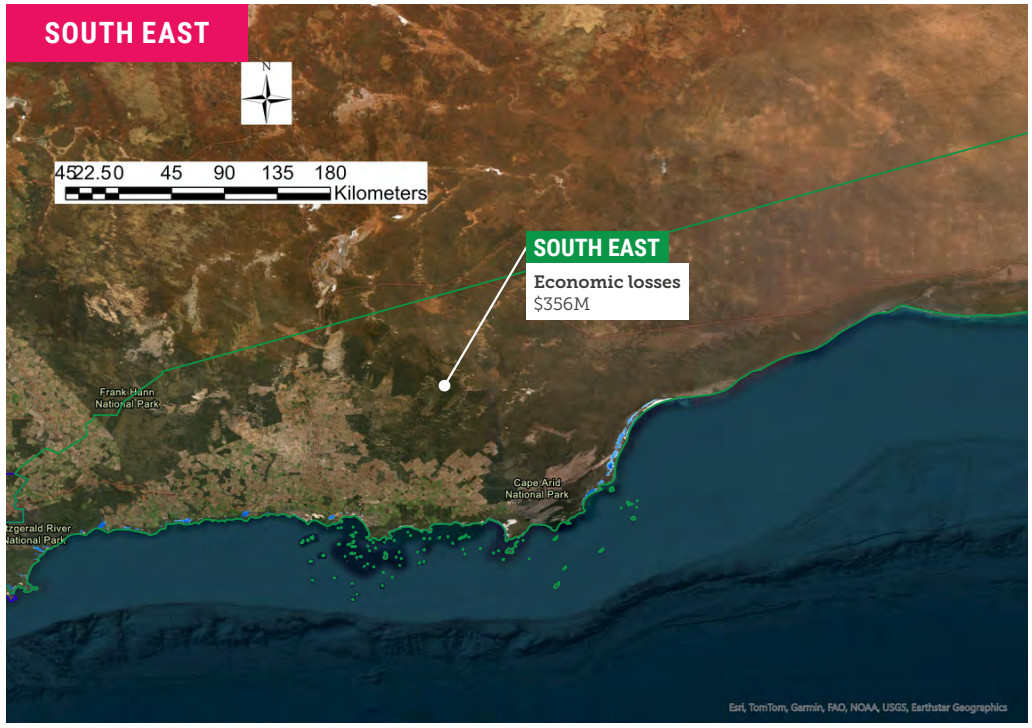
Further, with only 5,000 ratepayers and 13 coastal communities, the Shire is facing a severe finance crunch where it cannot possibly fund the remediation works required to protect community facilities and homes from the encroaching sea (ABC 2019).

Image 7: This seawall of nearly 600 metres is currently protecting 15 homes and a public reserve from coastal flooding in Seabird, WA. However, with only a 20 year lifespan, this is far from a permanent solution to sea level rise for this community.









Maps adapted from Kompas et al. (2026).

Location	Land and assets at risk		Economic losses ($Mill)	Example hotspots
	Properties	Land (ha)		
Kimberley	204	291,089	$65,408	Parts of Broome, Derby-West Kimberley and Roebuck Bay
Middle West	2,683	84,982	$55,034	Parts of Carnarvon, Exmouth, Geraldton and Gingin-Dandaragan (e.g. Lancelin and Seabird)
Greater Perth	33,208	11,804	$47,612	Parts of Mandurah, Dawesville-Bouvard, Falcon-Wannanup, Port Kennedy, Rockingham Lakes, Fremantle and East Fremantle
Pilbara	755	164,853	$33,120	Parts of Port Hedland, Ashburton (WA) and Karratha
South West	14,090	33,549	$28,937	Parts of Bunbury and Busselton
South East	426	610	$356	Parts of Esperance and Esperance surrounds
TOTAL	**51,366**	**586,887**	**$230,467**	
Average/year	**694**	**7,931**	**$3,114**	

Source: Kompas et al. (2026).

Rising seas, rising costs in Queensland

AT A GLANCE

Total cumulative losses:
$214.5 billion by 2100

Average annual cost:
$2.9 billion

Properties at risk:
93,157 properties

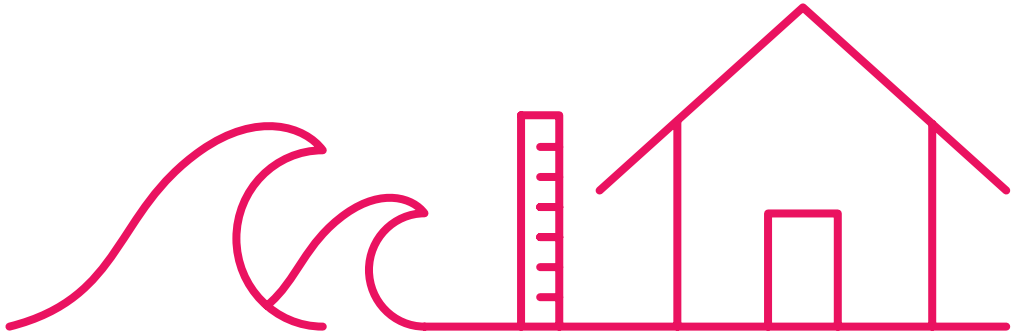
Land affected:
541,464 ha

State fact:
Queensland has the highest number of properties at risk (93,157 properties).

Rising seas and storm surge are projected to cost Queensland at least $214.5 billion by 2100. Across the entire state, damages are split almost evenly between land use ($114 billion) and property ($101 billion), but this varies enormously region to region.

Parks and outdoor recreational areas make up the single largest share of affected land (219,574 ha, 41% of the state's affected land), followed by reserves (173,415 ha, 32%) and farming (115,789 ha, 21%). However, economic damages are concentrated in urban areas. The Gold Coast zone alone accounts for more than a third of Queensland's total economic losses ($84 billion), driven overwhelmingly by high-value, high-density coastal and canal developments.

In contrast, remote northern zones such as the Southern Gulf and Cape York register very large areas of damaged land but comparatively modest dollar losses, reflecting far lower land values. Brisbane and the 'Rest of South East' zone also incur significant losses, reflecting Queensland's concentration of population and infrastructure in the South East corner.



CASE STUDY: GOLD COAST, QUEENSLAND

When Tropical Cyclone Alfred made landfall in March 2025, storm surges and wind-driven waves amplified by climate pollution-driven sea level rise battered around 500 kilometres of Southeast Queensland and Northern NSW coastline.

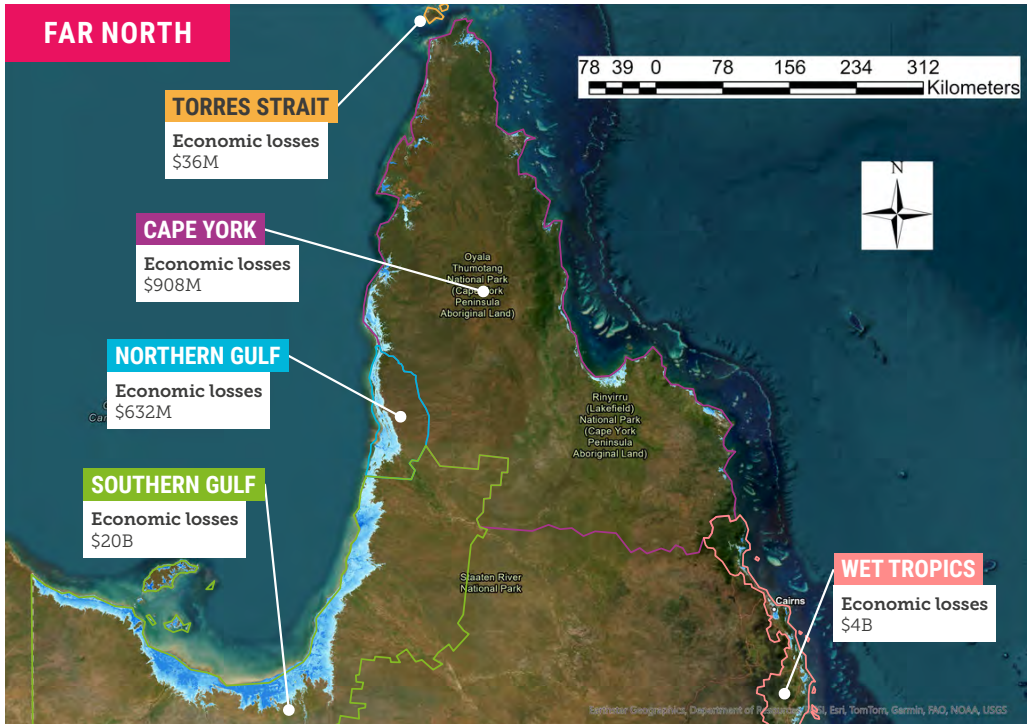
A 12.3 metre wave off Main Beach was the highest recorded on the Gold Coast in 38 years of measurements (ABC 2025a). The relentless force of the waves gouged millions of cubic metres of sand, leaving escarpments up to six metres high in dunes along iconic Surfers Paradise (ABC 2025b).

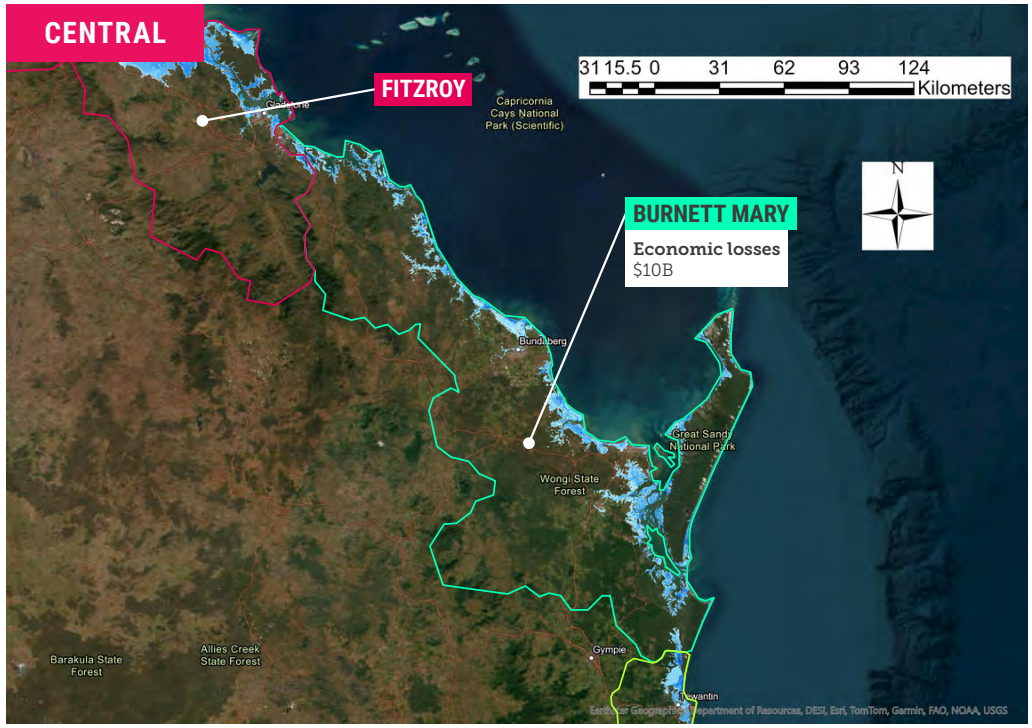
Beach erosion upended several major events, with the Pacific Airshow cancelled after it was expected to attract 270,000 spectators over three days, and other music and sporting events relocated. To replenish the beaches, the City of Gold Coast spent $35 million and deployed a barge to dredge sand from the ocean floor and pump it back to shore to speed up the process and reduce loss of income from tourism (ABC 2025c; ABC 2025d).

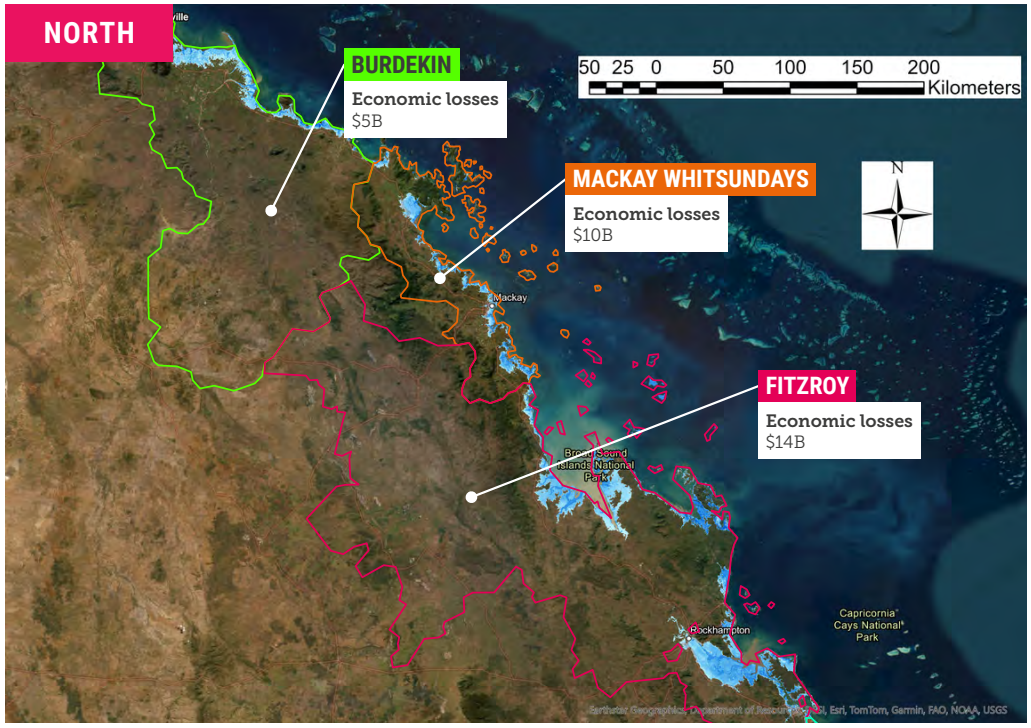
In a funding partnership program announced in February, 2026 the Queensland and Federal Governments committed to spend $57 million to help eight different coastal communities in the state recover from the erosion caused by the cyclone (Queensland Government 2026). It is clear such interventions will need to be repeated as climate pollution drives more intense storms and higher seas.

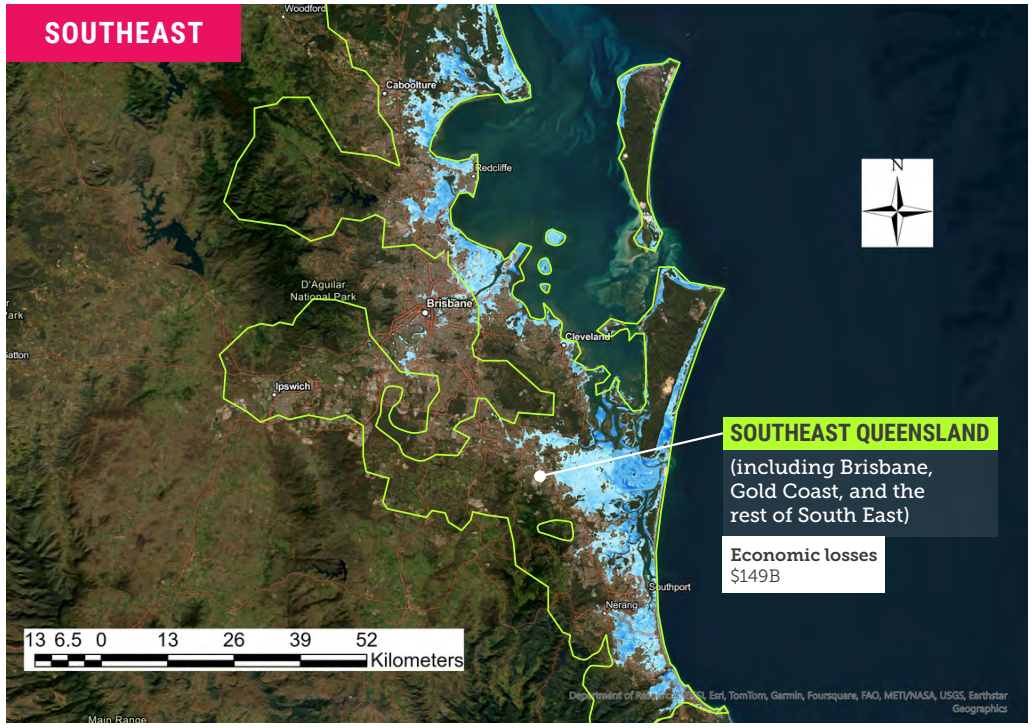
Coastal planning expert Mark Ellis said the Gold Coast *"remains trapped in a cycle of repair"* with an underlying failure to address the permanent, long-term shift in coastal risk and flooding (Gold Coast Bulletin 2026).

Image 8: Tropical Cyclone Alfred left beaches on the Gold Coast heavily eroded in March 2025.









Maps adapted from Kompas et al. (2026).

Location	Land and assets at risk		Economic losses ($Mill)	Example hotspots
	Properties	Land (ha)		
Gold Coast	32,490	6,985	$84,399	Parts of Jacobs Well, Paradise Point, Runaway Bay, Biggera Waters, Mermaid Beach and Palm Beach
Brisbane	12,392	5,419	$35,025	Parts of Nudgee Beach, Brighton, Sandgate - Shorncliffe, and the Southern Moreton Bay Islands
Rest of South East	22,875	10,192	$29,777	Parts of Bribie Island, Beachmere, Mooloolaba and Noosa Heads
Southern Gulf	409	314,401	$20,447	Parts of Carpentaria
Mackay Whitsundays	7,564	18,412	$10,367	Parts of Mackay (East, South, North and West) and Andergrove
Burnett Mary	7,450	28,100	$10,250	Parts of Bargara - Burnett Heads, Bundaberg East, Maryborough, Booral - River Heads, Pialba - Eli Waters
Fitzroy	2,937	56,474	$13,690	Parts of Emu Park, Yepoon, Callemondah, Gladstone Central
Burdekin	3,888	24,576	$5,402	Parts of Townsville (e.g. Belgian Gardens - Pallarenda, South Townsville - Railway Estate, Oonoonba, and low-lying parts of Townsville City - North Ward)
Wet Tropics	3,047	16,167	$3,561	Parts of Machans Beach-Yorkeys Knob, Manunda, Westcourt-Bungalow, Port Douglas, Innisfail, Ingham and Yarrabah
Cape York	53	33,819	$908	Parts of Aurukun, Weipa, Mapoon
Northern Gulf	8	26,333	$632	Parts of Kowanyama and Pormpuraaw
Torres Strait	43	585	$36	Boigu, Saibai, Masig, Poruma and Warraber
TOTAL	**93,157**	**541,464**	**$214,494**	
Average/year	**1,259**	**7,317**	**$2,899**	

Source: Kompas et al. (2026).

Rising seas, rising costs in Victoria

AT A GLANCE

Total cumulative losses:
$167 billion by 2100

Average annual cost:
$2.3 billion per year

Properties at risk:
17,364 properties

Land affected:
185,775 ha

State fact:
Victoria is the only state where property damages ($85.6 billion) exceed land use damages ($81.5 billion). Despite being the smallest mainland state, it has the largest area of affected residential land of all the states and territories (27,138.8 hectares).

Rising seas and storm surge are projected to cost Victoria at least $167 billion by 2100. Unlike every other state, Victoria's economic losses are dominated by property rather than land. This reflects the state's concentration of valuable coastal real estate around Port Phillip Bay.

In terms of land use area, reserves make up the single largest share of affected land (102,117 hectares, or 55% of all Victoria's affected land), followed by farming (19.1%) and residential land (14.6%). In dollar terms, the East Melbourne zone is responsible for $68.7 billion of the state's total, by far the largest of any zone in Victoria, driven by $56.6 billion in property losses. West Melbourne and Melbourne also incur significant losses.

CASE STUDY: INVERLOCH, VICTORIA

The tourist town of Inverloch on Victoria's Bass Coast has lost more than 70 metres of foreshore — around 10 metres per year — since 2012, with the worst losses following storm events and high tides (ABC 2026a).

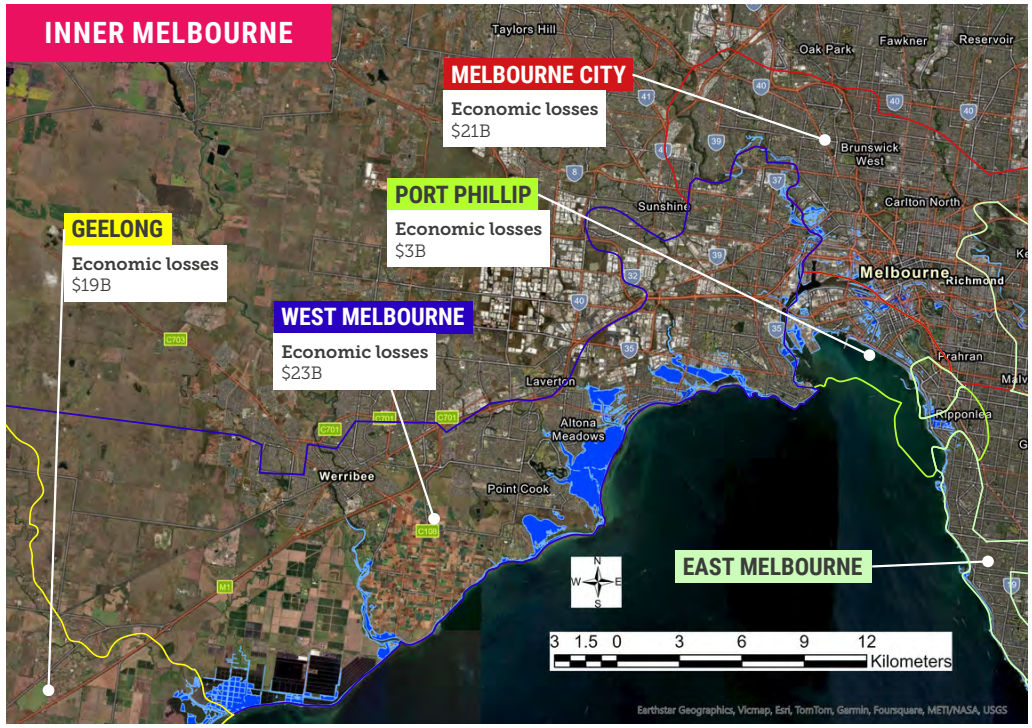
A surf lifesaving club built in 2010 now relies on sandbags to hold back the tide, while measures including wet sand walls and sand dredged from a nearby inlet have provided only temporary relief.

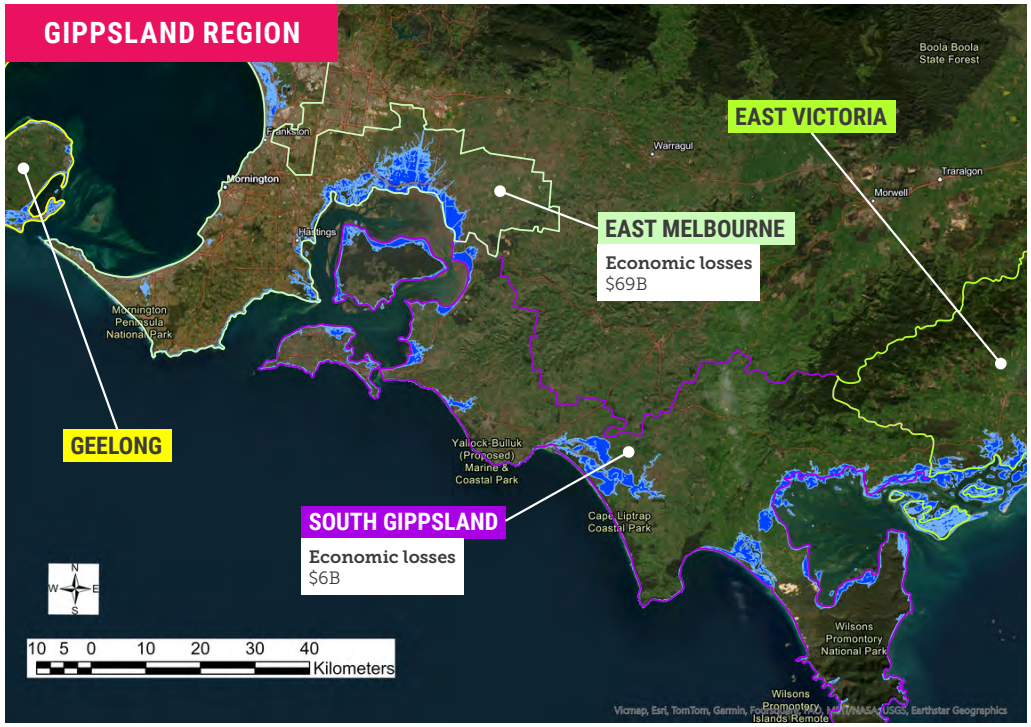
Nearby Silverleaves on Phillip Island has seen its western shoreline recede by 77 metres.

State and federal governments have committed $9 million to protect coastal towns across the Bass Coast, but the local council wants big polluters to start paying for the damage. The Bass Coast Shire will ask the Federal Government for a levy on fossil fuel corporations to be imposed, with any funds raised used to help communities recover from climate-driven damage.

"These aren't hypothetical matters for us in Bass Coast. It's either we pay for it and our ratepayers pay for the damage or the fossil fuel polluters do," Bass Coast Shire Councillor Morgan said (ABC 2026a).

Image 9: This surf lifesaving club in Inverloch in Victoria's south-east is under threat from coastal erosion.





Maps adapted from Kompas et al. (2026).

Location	Land and assets at risk		Economic losses ($Mill)	Example hotspots
	Properties	Land (ha)		
East Melbourne	1,042	22,558	$68,667	Parts of Koo Wee Rup, Braeside, Chelsea Heights and Carrum-Patterson Lakes
West Melbourne	310	22,951	$23,184	Parts of Williamstown, Newport, Footscray, Seddon - Kingsville, West Footscray - Tottenham, & Maribyrnong, Werribee South & Point Cook
Melbourne City	1,299	1,276.70	$20,550	Parts of Docklands, Flemington Racecourse, Kensington Banks, Melbourne, Southbank
Geelong	3,879	15,703.	$19,451	Parts of Point Lonsdale - Queenscliff, Ocean Grove – Barwon Heads, Clifton Springs / Portarlington and Lorne - Anglesea
East Victoria	6,729	63,324	$18,272	Parts of Lakes Entrance and Paynesville
West Victoria	1,610	20,077	$8,470	Parts of Glenelg, Warrnambool - South, Moyne East and West
South Gippsland	2,227	39,527	$5,542	Parts of French Island and Phillip Island, parts of the Bass Coast (including Inverloch)
Port Phillip	268	358	$2,978	Parts of Albert Park, Elwood, Port Melbourne, Port Melbourne Industrial, South Melbourne
TOTAL	**17,364**	**185,776**	**$167,115**	
Average/year	**235**	**2,511**	**$2,258**	

Source: Kompas et al. (2026).

Rising seas, rising costs in New South Wales

AT A GLANCE

Total cumulative losses:
$150.7 billion by 2100

Average annual cost:
$2 billion per year

Properties at risk:
71,210 properties

Land affected:
167,723 ha

State fact:
New South Wales has the highest population of any state or territory (8.4 million) concentrated along a relatively short mainland coastline of 2,007 km, giving it the highest ratio of coastal population to coastline length of any state or territory. It also has the second highest number of properties at risk (71,210), and the largest area of commercial land at risk (6,885 ha).

Rising seas and storm surge are projected to cost New South Wales at least $150.7 billion by 2100, with economic losses from land ($113.2 billion) far outweighing economic losses from property ($37.5 billion). Farming land makes up the single largest share of NSW's affected land (68,794 ha, 41%), followed by reserves (42,738 ha, 26%) and parks (25,676 ha, 15%).

However, it is the state's commercial land exposure that stands out nationally: NSW holds more than half of Australia's total at-risk commercial land, concentrated in the North Coast zone.

Somewhat counter-intuitively, it is not Greater Sydney that dominates the state's dollar losses but rather the Northern NSW zone (including Byron Bay), which accounts for $55.2 billion in losses — more than double Greater Sydney's $20.1 billion in losses. This reflects the large areas of low-lying, flood-prone land along the northern coast. The Central Coast (including Newcastle) also incurs substantial losses at $33.2 billion.

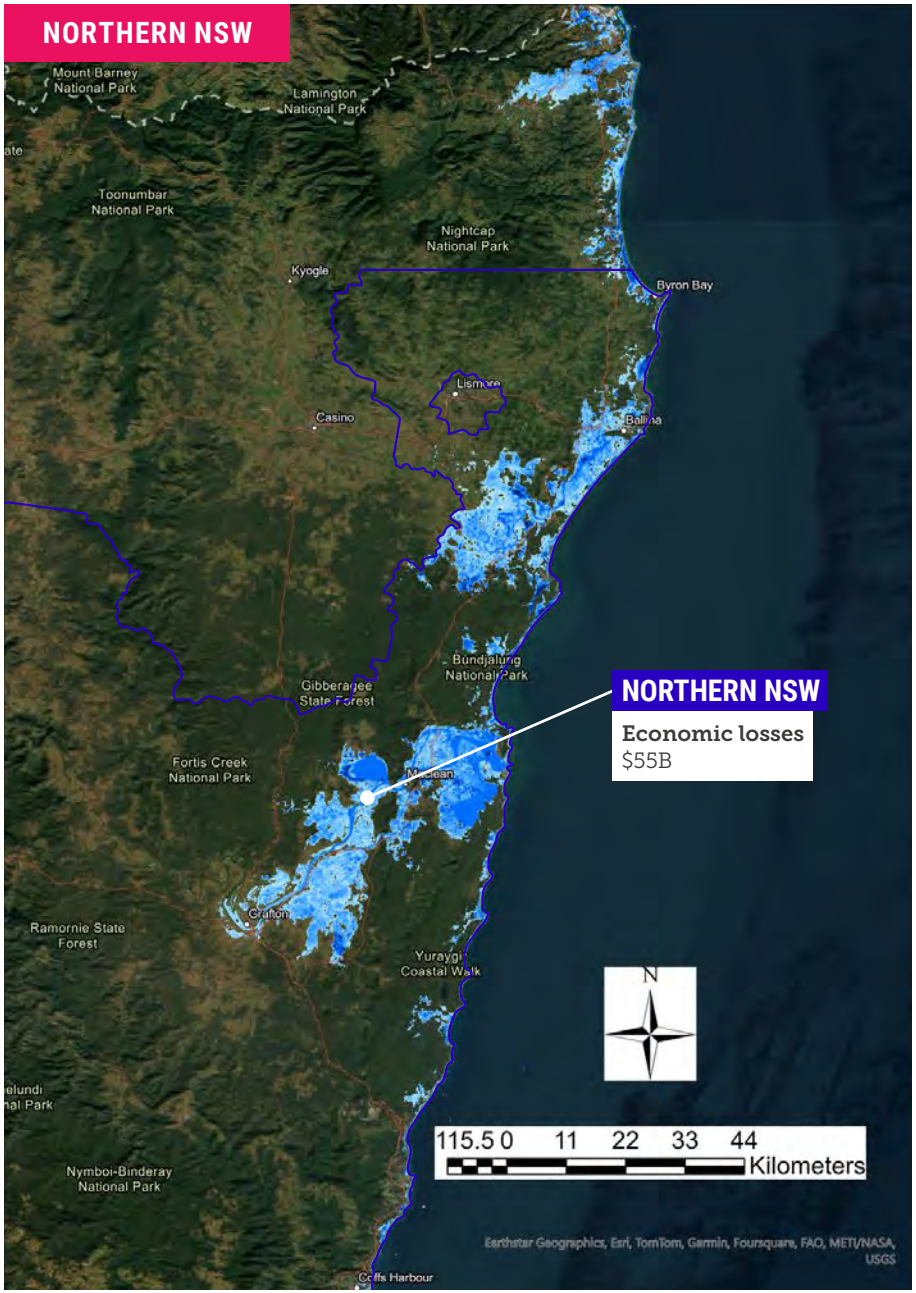
CASE STUDY: SYDNEY'S NORTHERN BEACHES, NSW

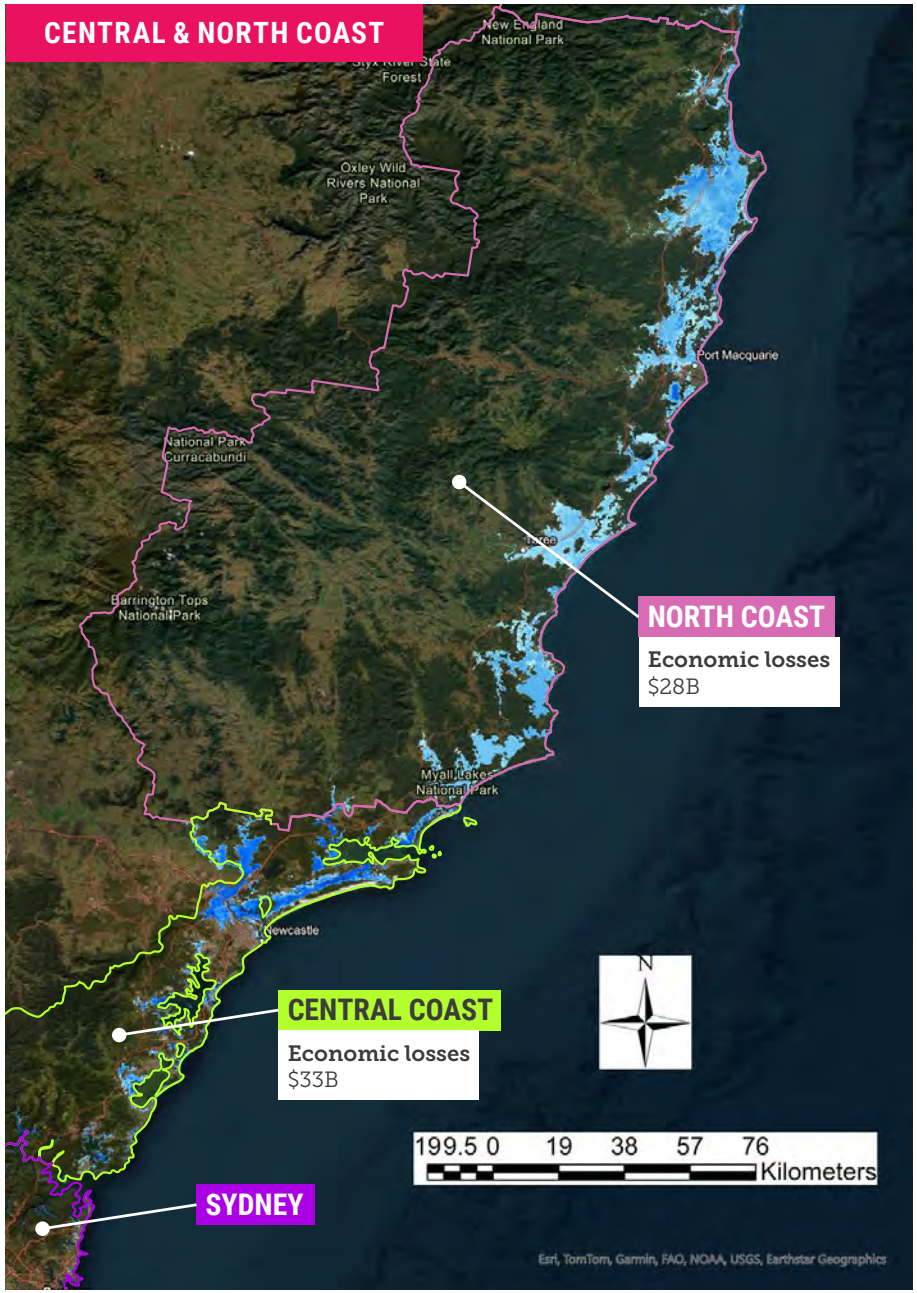
In June 2016 a "super storm" and king tides impacted Collaroy Beach in Sydney's north, where hundreds of metres of beach suddenly disappeared along with people's backyards, a swimming pool and sunroom. Volunteers from all of Sydney turned up to try to save properties with a temporary retaining wall using 10,000 sandbags (ABC 2016).

This prompted a debate on who should pay to protect the waterfront properties, with a seven-metre high, 1.3km long sea wall being built to help mitigate storm and tidal damage to 49 homes, 11 public land areas, a surf lifesaving club and a car park. Residents covered 80% of the cost, with 10 households contributing $300,000, and the state and local governments splitting the remainder (Guardian Australia 2021).

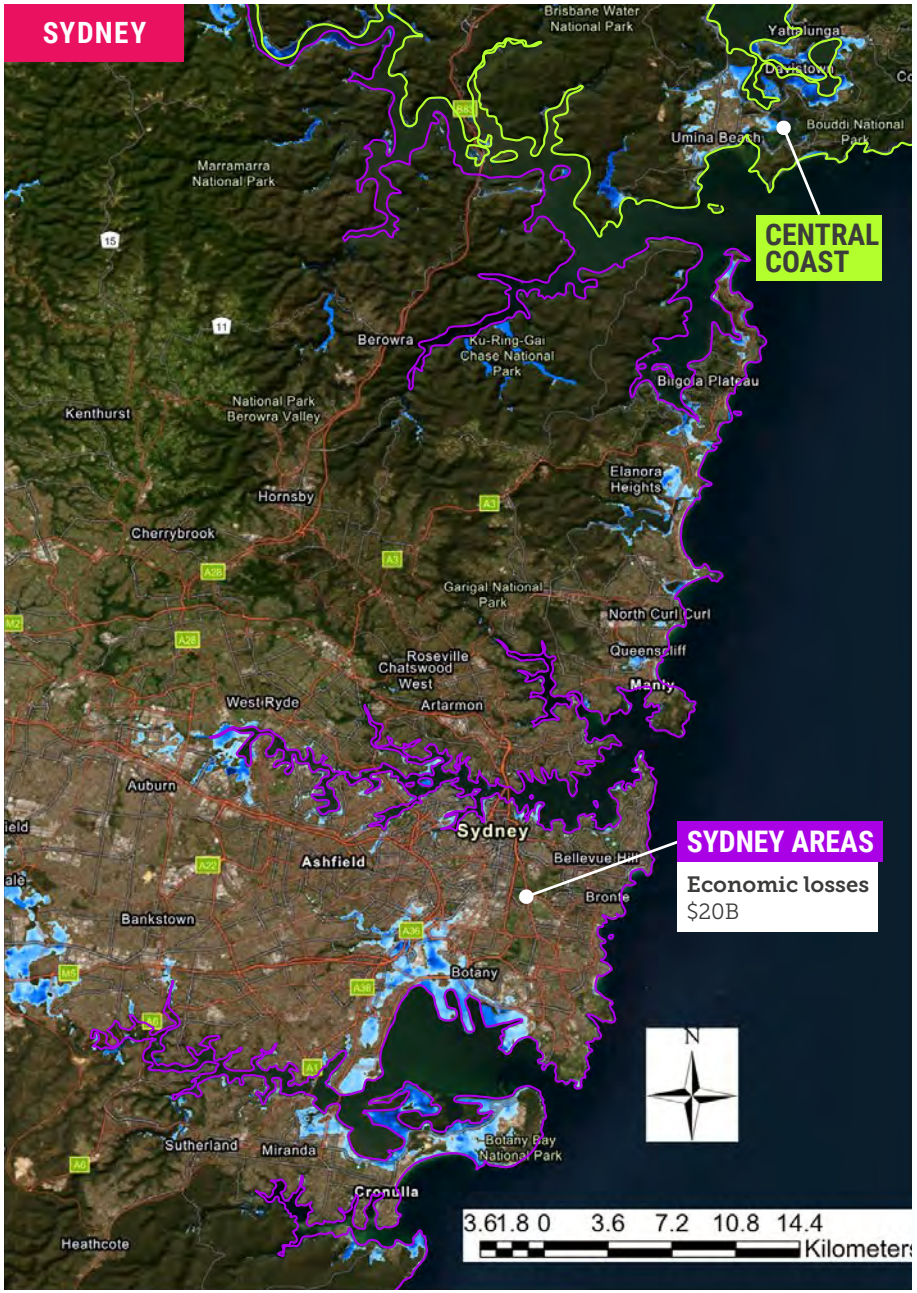
Issues remain with large swells and high tides in 2022, driven by ex-Tropical Cyclone Seth, hitting the Collaroy sea wall, washing sand away and causing further erosion (SMH 2022). While sea walls may provide some immediate protection to certain properties or infrastructure from incoming tides, they ultimately shift that risk and impact to neighbouring, unprotected coastal areas.

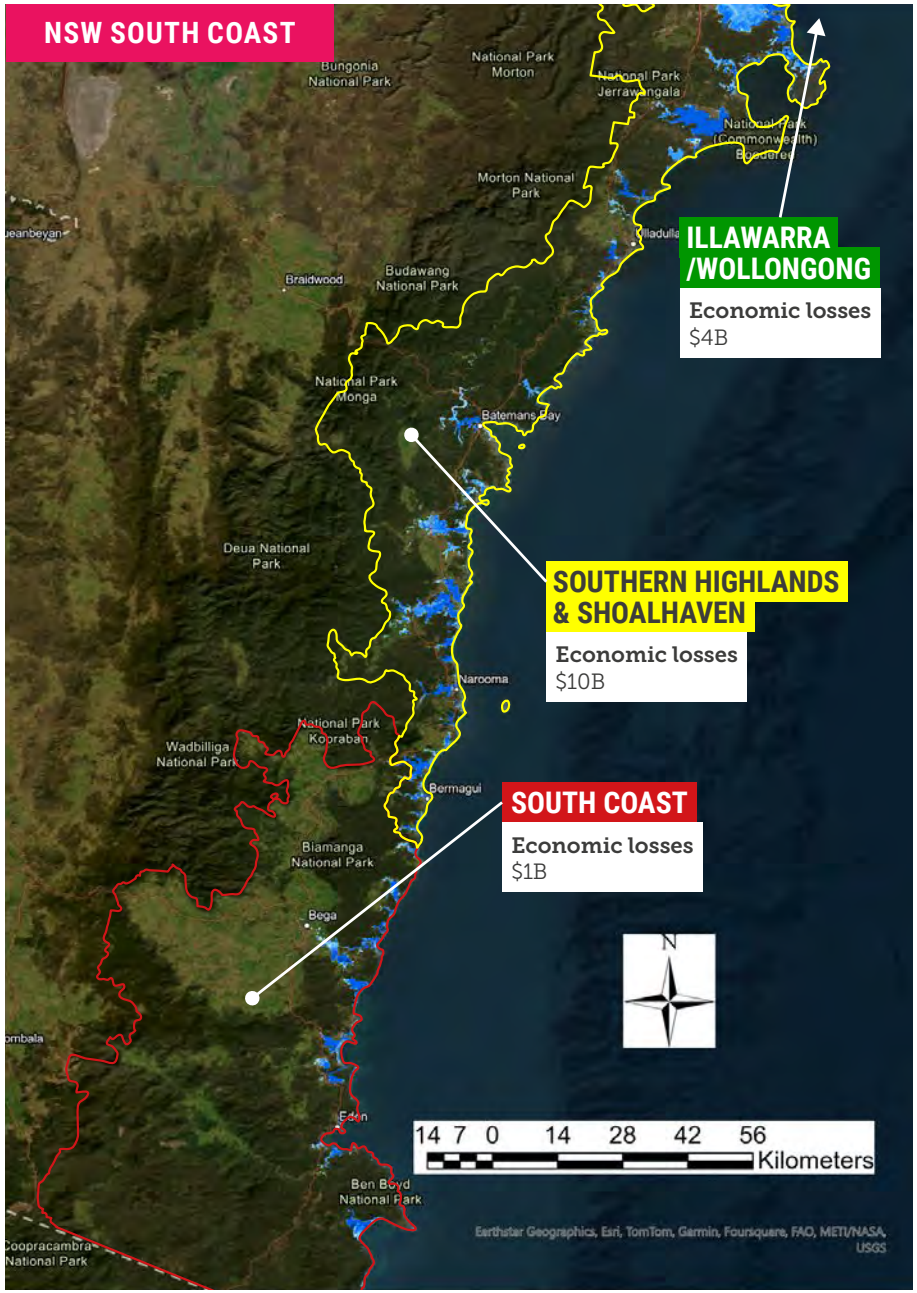
"It's all our beaches, it's all our sand, it's all our neighbours, so it's all our friends," one volunteer said (Guardian Australia 2021).





Maps adapted from Kompas et al. (2026).





Maps adapted from Kompas et al. (2026).

Location	Land and assets at risk		Economic losses ($Mill)	Example hotspots
	Properties	Land (ha)		
Northern NSW	17,995	60,024	$55,244	Parts of Maclean - Yamba - Iluka and Ballina / Evans Head, Byron Bay (Belongil Spit), Brunswick Heads, Kingscliff / Tweed Heads and Sawtell
Central Coast (including Newcastle)	17,984	17,501	$33,183	Parts of Wamberal - Forresters Beach, Umina - Booker Bay - Patonga, Woy Woy - Blackwall, Saratoga - Davistown, The Entrance, Toukley - Norah Head, Tea Gardens - Hawks Nest, Stockton, Carrington, Wickham and Kooragang
North-Coast	10,553	68,120	$27,555	Parts of Forster-Tuncurry, Kempsey, Port Macquarie, Old Bar, Manning Point and Red Head
Greater Sydney	17,631	2,963	$20,053	Parts of Port Botany – Sydney Airport / Mascot, Botany Bay southern foreshore (Sans Souci – Ramsgate / Brighton-le-Sands – Kyeemagh), Wolli Creek, Bondi – Tamarama – Bronte, Manly – Fairlight and Freshwater-Brookvale.
Southern Highlands/ Shoalhaven	3,915	12,349	$9,761	Culburra Beach, Sussex Inlet - Berrara
Illawarra/ Wollongong	2,685	3,144	$3,704	Windang - Primbee & Berkeley - Lake Heights - Cringila, Port Kembla - Warrawong & Port Kembla Industrial, Warilla Shellharbour - Oak Flats
South Coast	448	3,623	$1,241	Parts of Batemans Bay, Batemans Bay - South, Moruya - Tuross Head
TOTAL	**71,210**	**167,723**	**$150,741**	
Average/year	**962**	**2,267**	**$2,037**	

Source: Kompas et al. (2026).

Rising seas, rising costs in South Australia

AT A GLANCE

Total cumulative losses:
$49.2 billion by 2100

Annual cost:
$665 million

Properties at risk:
31,791 properties

Land affected:
64,760 ha

State fact:
South Australia has the largest area of industrial land at risk of all the states and territories (3,107 ha).

Rising seas and storm surge are projected to cost South Australia at least $49.2 billion by 2100. Land-use damages ($34.8 billion) exceed property damages ($14.4 billion). The North Central zone — including Adelaide's metropolitan coast — accounts for $23.5 billion of the state's total losses, more than any other zone by a wide margin. The South East zone (Limestone Coast) is the next most affected, at $15.6 billion in losses driven mainly by extensive low-lying land rather than property value.

CASE STUDY: ROBE, SOUTH AUSTRALIA

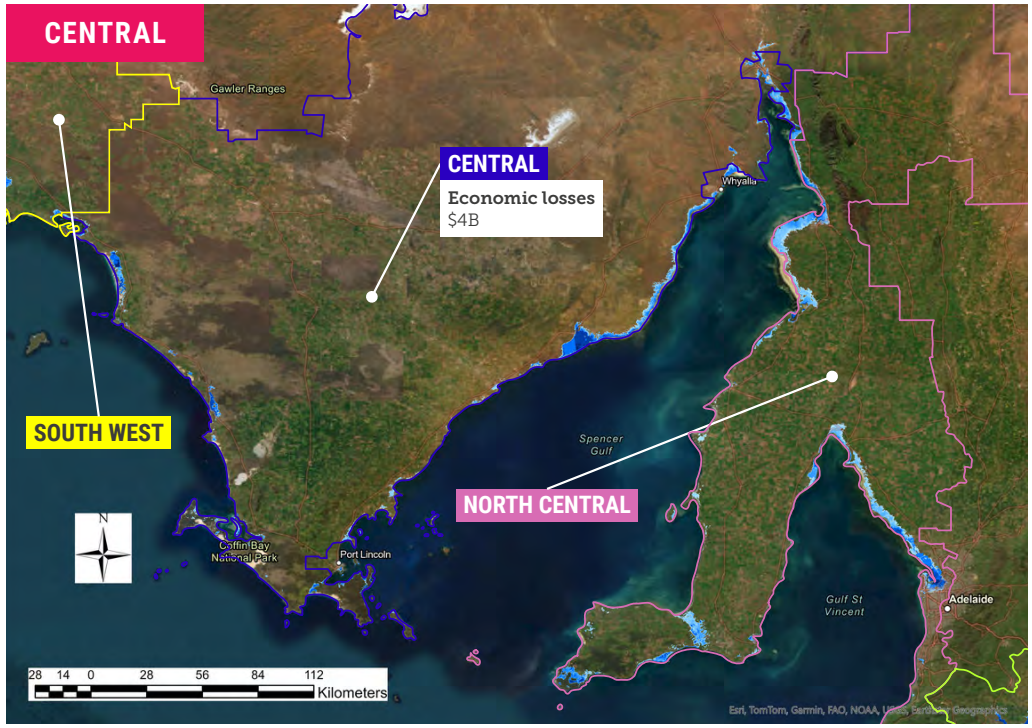
Residents of Robe, a holiday town on South Australia's Limestone Coast, are living the reality of climate-driven coastal erosion. Successive storms in May, June and July in 2025 brought high tides, wind gusts, heavy rainfall and storm surge that destroyed three historic jetties, carved away Robe's coastline and inundated properties with seawater. King tides and strong winds later pushed waves over sand dunes and washed away sections of the esplanade road (ABC 2025e; ABC 2025f).

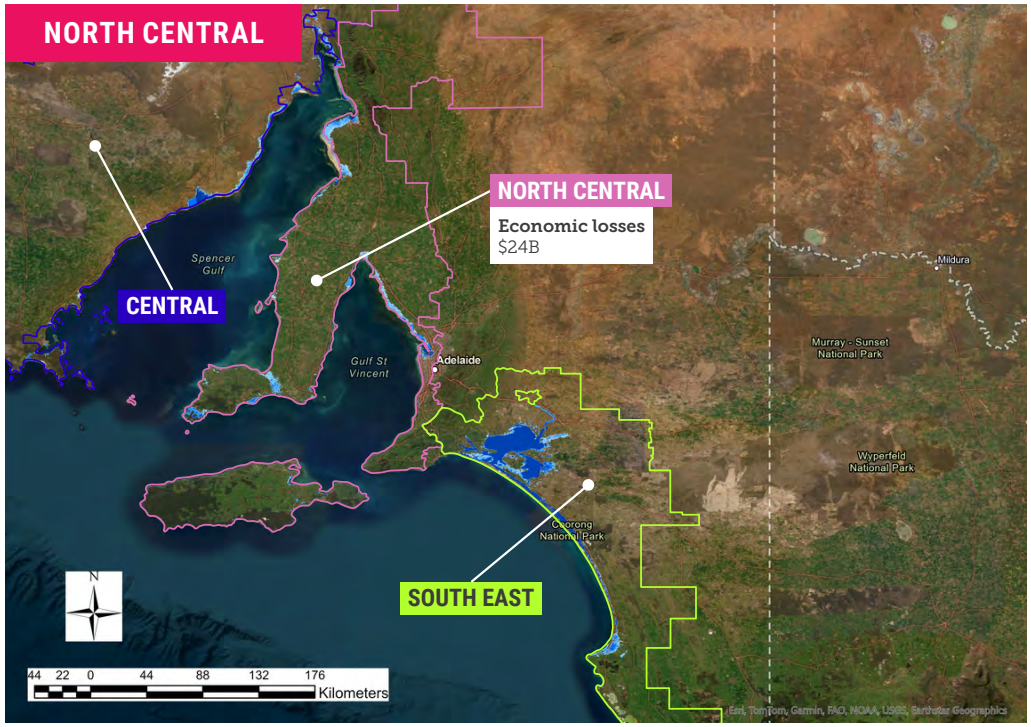
The scale of destruction was staggering: with erosion levels that the local council had not expected to see until 2050 under its own planning reached in 2025 (ABC 2026b).

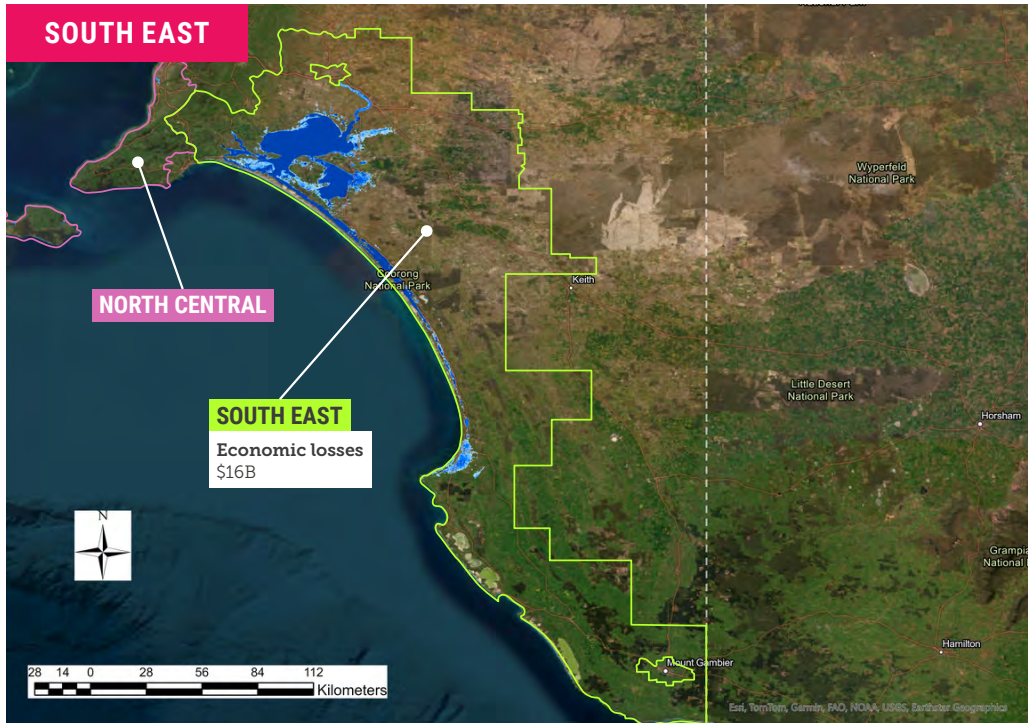
The council is now exploring all options including artificial reefs, dune planting or even a managed retreat (where people, buildings and other infrastructure are permanently moved away). In the meantime, it is using $205,000 in state funding to install "geo-textile" sandbags at Fox Beach, and $30,000 to replace lost sand (ABC 2026b; ABC 2026c).

"Whatever we do in any particular location will have much wider implications," University of Melbourne research fellow in coastal processes Andrew Pomeroy said. *"We don't want to just install a reef at the expense of supplying sand or moving sand movements around. We need to make sure it works in its actual environment"* (ABC 2026c).

Image 10: Storms in 2025 resulted in significant erosion on beaches along the Limestone Coast, including in Robe. Pictured is a road behind Fox Beach in Robe, which was damaged by flooding and erosion.







Maps adapted from Kompas et al. (2026).

Location	Land and assets at risk		Economic losses ($Mill)	Example hotspots
	Properties	Land (ha)		
North Central	18,454	12,459	$23,505	Parts of Port Adelaide, West Lakes and Port Pirie
South East	8,103	25,721	$15,608	Parts of Kingston- Robe, Victor Harbor and Port Eliot
South West	309	15,941	$6,038	Parts of Port Lincoln, West Coast (SA) and Ceduna
Central	4,926	10,639	$4,055	Eyre Peninsula, Kimba - Cleve - Franklin Harbour, Le Hunte - Elliston, Port Lincoln, Quorn - Lake Gilles, Port Augusta, Quorn - Lake Gilles, Whyalla
TOTAL	**31,791**	**64,760**	**$49,205**	
Average/year	**430**	**875**	**$665**	

Source: Kompas et al. (2026).

Rising seas, rising costs in Northern Territory

AT A GLANCE

Total cumulative losses:
$35.2 billion by 2100

Average annual cost:
$476 million

Properties at risk:
No data available

Land affected:
414,807 ha

State fact:
The Northern Territory is projected to be the most vulnerable relative to the size of its economy, with average annual damages from sea level rise and storm surges equivalent to 3.7% of Gross State Product — the highest share in the country.

Rising seas and storm surge are projected to cost the Northern Territory at least $35.2 billion by 2100. Because comprehensive property data is not available for the Territory, these losses are driven entirely by land-use damages.

Traditional Indigenous land is the single largest category of affected land (190,164 ha, 45.8% of the Territory's total), narrowly ahead of farming land (156,307 ha, 37.7%). Together these two categories make up more than 80% of the affected land area in the Northern Territory.

The Southwest zone (Daly, Thamarrurr) records the largest losses at $14.1 billion, ahead of the Northwest zone around Darwin ($10.2 billion) despite Darwin's higher population and concentration of infrastructure. This reflects both the sheer scale of low-lying land exposed to inundation across the Territory's southwest, and the absence of property data meaning Darwin's losses are likely to be understated.

CASE STUDY: SALTWATER INTRUSION IN KAKADU NATIONAL PARK, NORTHERN TERRITORY

In the Northern Territory, even small increments of sea level rise are magnified by two compounding factors: sea levels are rising at roughly twice the global average, and the region already has some of the largest tidal ranges in the country (NESP ESCCH 2020).

The low-lying coastal floodplains of the World Heritage-listed Kakadu National Park are among the most vulnerable ecosystems in Australia to sea level rise. Saltwater intrusion – exacerbated by sea level rise – has affected the floodplains of many rivers including the Mary, East Alligator, South Alligator, West Alligator and Wildman Rivers. As these river systems sit on a flat coastal plain, small increases in sea level have resulted in catastrophic ecological changes.

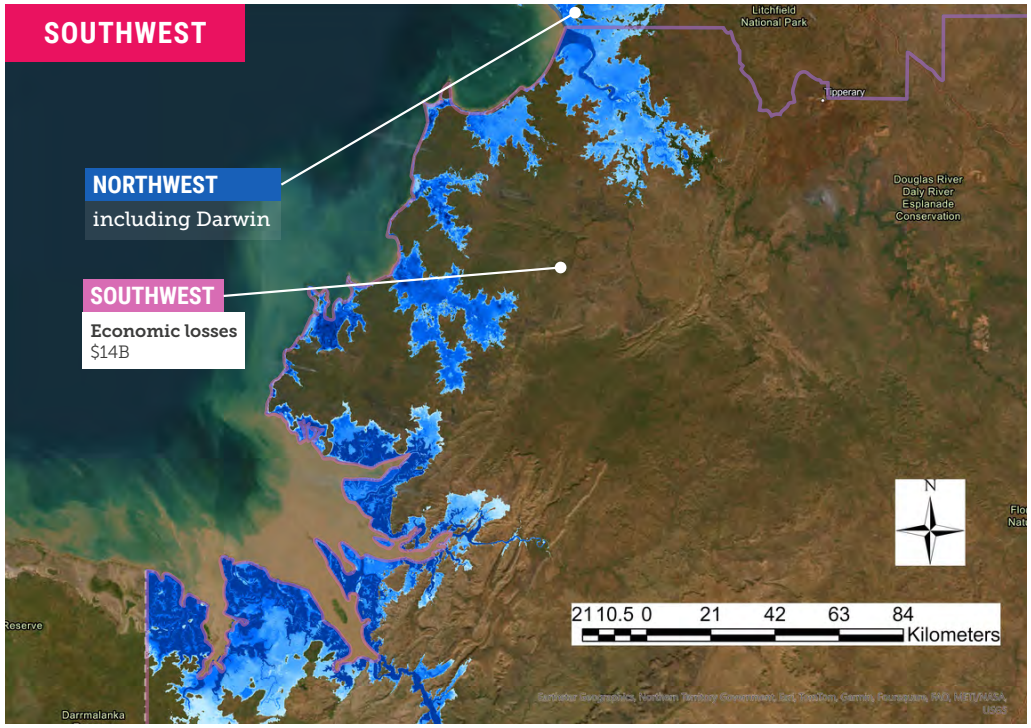
The Mary River is a clear example. Historically, the Mary River was naturally separated from saltwater tidal creeks by low sandy ridges. This separation was breached in the late 1930s and early 1940s – primarily due to the environmental impact of water buffalo – and tidal creeks underwent rapid expansion over the following decades causing significant saltwater intrusion into the lower Mary River floodplains (Williams 1996; Mollick et al. 2026).

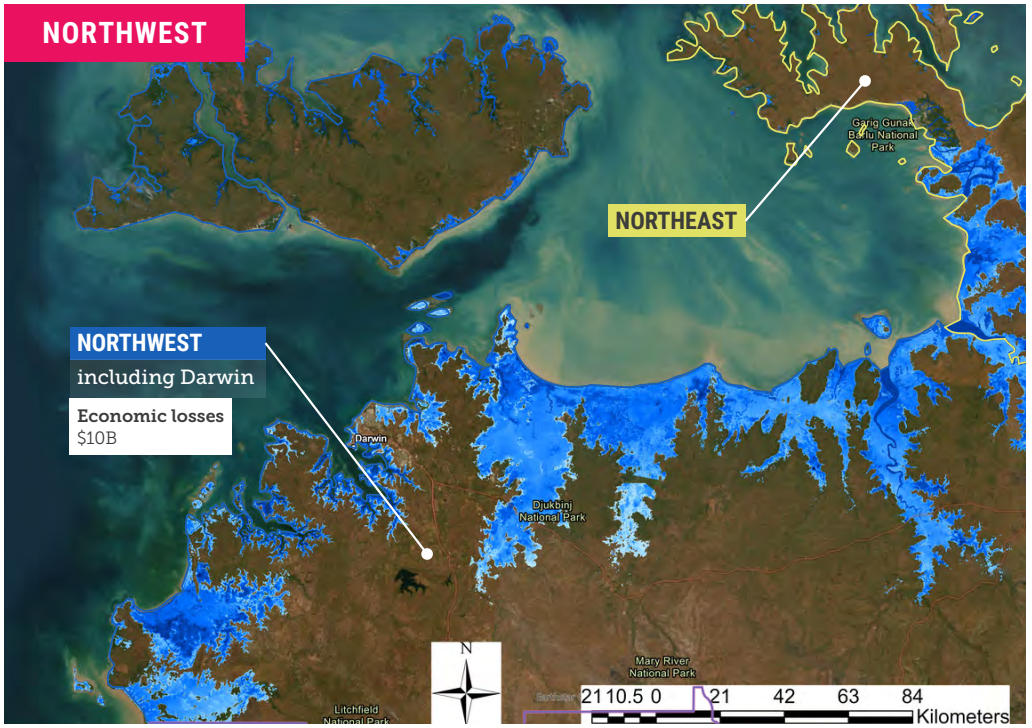
Sea level rise is pushing saltwater past its historical boundaries, destroying tens of thousands of hectares of freshwater wetlands and paperbark forests. As the freshwater species have died, salt-tolerant mangroves have migrated further upstream, replacing the freshwater floodplains with saltwater habitat (Mollick et al. 2026).

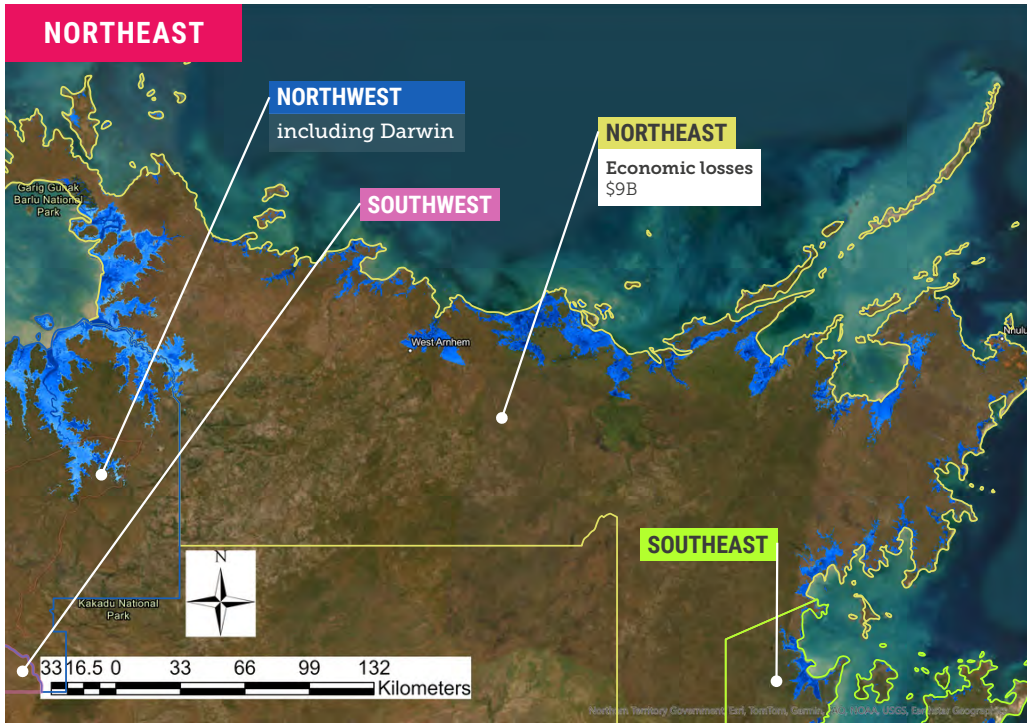
While sea level rise didn't cause the initial breakdown of those protective sandy ridges, it has capitalised on this structural breakdown, and driven saltwater deep into previously unthreatened freshwater environments.

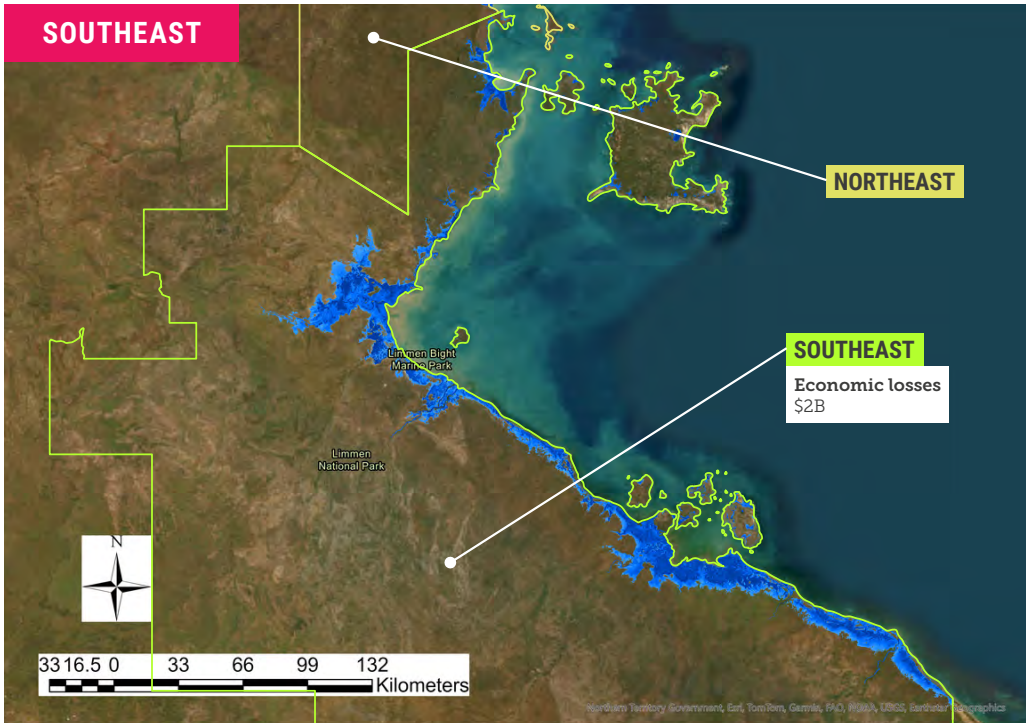
According to CSIRO, sea level rise of around 70 cm would inundate around 45% of Kakadu, and sea level rise of 1.1 m would inundate around 65% of this UNESCO World Heritage-listed national park in Australia's Northern Territory (CSIRO 2018).

Image 11: Kakadu's freshwater wetlands are under significant threat from sea level rise, which is pushing saltwater further up tidal creeks and rivers and transforming freshwater habitats into saltwater ones. Pictured is Traditional Owner Jonathon Nadji, who is also on the Kakadu Board of Management, and his wife Dionne.









Maps adapted from Kompas et al. (2026).

Location	Land and assets at risk		Economic losses ($Mill)	Example hotspots
	Properties	Land (ha)		
South West	-	104,088	$14,127	Parts of Daly and Thamarrurr
Northwest	-	91,276	$10,248	Parts of Rapid Creek, Coconut Grove, Ludmilla, and Fannie Bay, Nightcliff, Stuart Park, and Woolner - Bayview – Winnellie, Tiwi Islands
Northeast	-	148,503	$9,031	Parts of Anindilyakwa and the Gulf region
Southeast	-	70,939	$1,801	Parts of West Arnhem, East Arnhem and Nhulunbuy
TOTAL	**-**	**414,807**	**$35,207**	
Average/year	**-**	**5,606**	**$476**	

Note: This only includes land damages, as property data was unavailable for the Northern Territory. **Source:** Kompas et al. (2026).

Rising seas, rising costs in Tasmania

AT A GLANCE

Total cumulative losses:
$7.9 billion by 2100

Average annual cost:
$106 million per year

Properties at risk:
2,698 properties

Land affected:
39,476 ha

State fact:
In Tasmania, most losses occur along the state's northern and eastern coastlines.

Rising seas and storm surge are projected to cost Tasmania at least $7.9 billion by 2100. Whilst this is the lowest of any state or territory, it is a considerable amount given Tasmania's smaller population and economy (the Tasmanian government's total general government sector revenue is forecast at $10.19 billion for the 2026-27 financial year) (Pulse Tasmania 2026). Land-use damages ($6.8 billion) dominate losses over property damages ($1.1 billion). Parks and outdoor recreation alone account for over half of the state's affected land area, ahead of farming (18.4%) and reserves (16%).

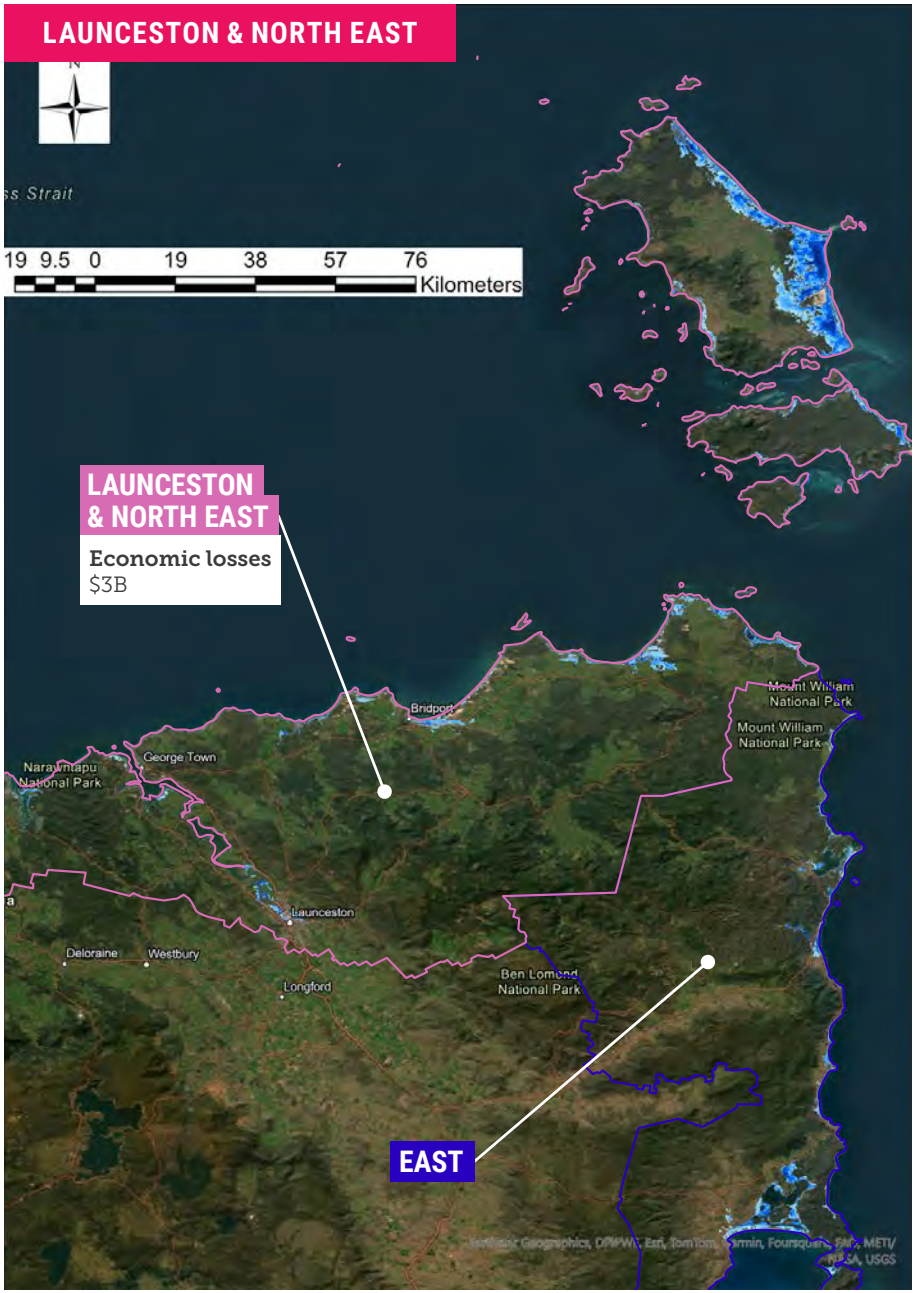
In dollar terms, the Launceston and North East zone is the most affected, at $3.3 billion of losses, followed by the East zone at $2.5 billion. Hobart – despite being the capital of the state – records comparatively minor losses due to its terrain being relatively steep and rocky, but surrounding coastal communities are vulnerable to rising seas and storm surges.

CASE STUDY: HOBART, TASMANIA

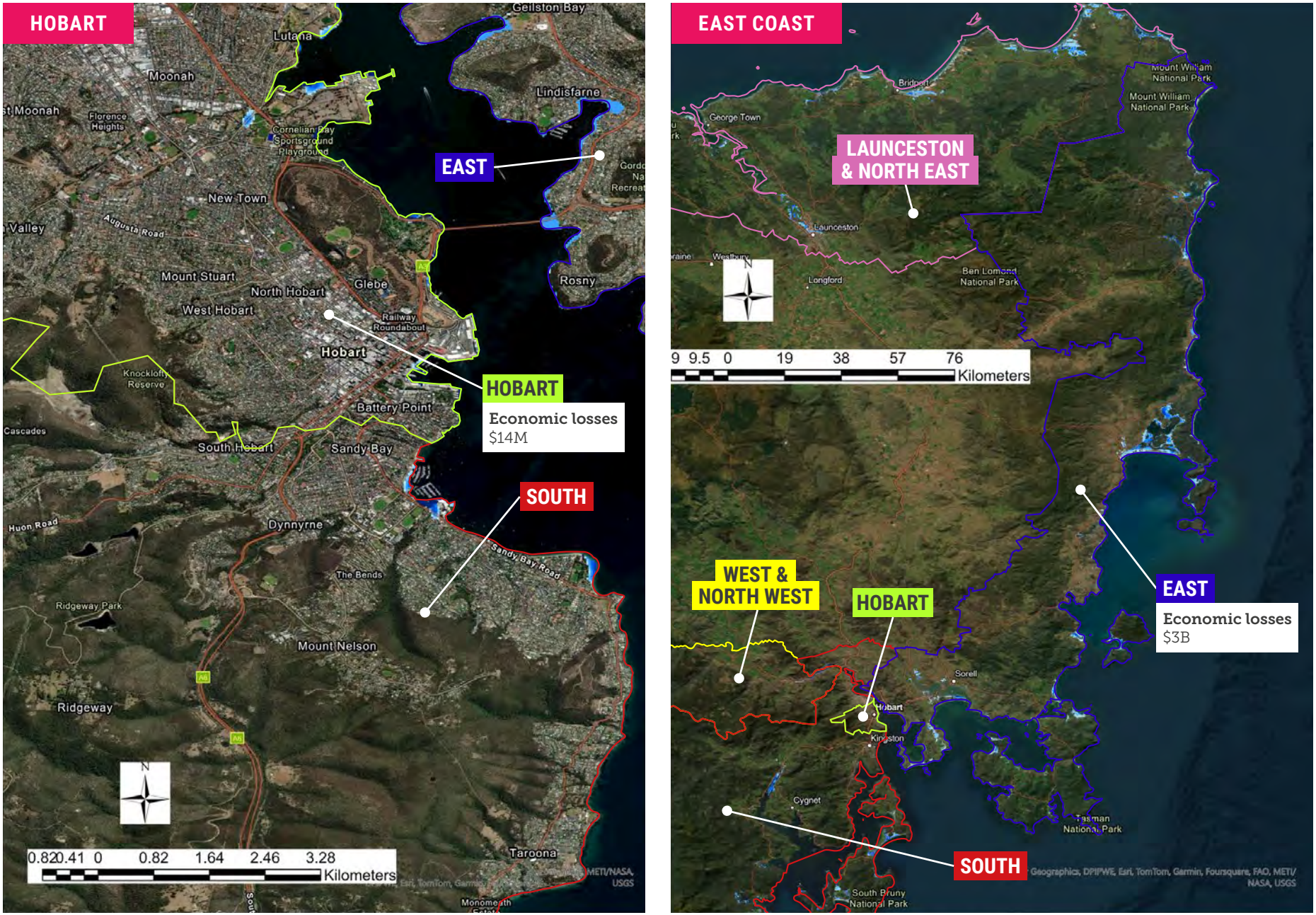
Many of Hobart's coastal communities are grappling with the compounding effects of sea level rise, high tides, storm surge and erosion. In Lewisham, 40 minutes north-east of the city, shoreline loss has damaged infrastructure, exposed pollutants and threatened properties in recent years (The Mercury 2017).

At Lauderdale's Roches Beach, decades of erosion driven by sea level rise and ocean swells culminated in a major event in July 2011, when dunes receded by more than five metres and came close to destroying several homes. ABC reported that the Clarence City Council had allocated $1 million to try to climate-proof the Lauderdale foreshore (ABC 2011).

Ongoing sand replenishment works by the local council have slowed but not stopped the erosion (Sharples and Watson 2025).



Maps adapted from Kompas et al. (2026).



Maps adapted from Kompas et al. (2026).

Location	Land and assets at risk		Economic losses ($Mill)	Example hotspots
	Properties	Land (ha)		
Launceston and North East	1,224	21,321	$3,259	Parts of Launceston (e.g. Invermay, Mowbray), West Tamar (e.g. Riverside, Trevallyn), Devonport, La Trove and Port Sorell
East	781	6,886	$2,522	Parts of Dodges Ferry - Lewisham, South Arm, Howrah - Tranmere and St Helens - Scamander
South	511	3,874	$1,115	Parts of Kingston Beach - Blackmans Bay, Huonville - Franklin, Claremont and Austins Ferry - Granton
West and North West	161	7,387	$966	Parts of Wynyard, Somerset, Cooee and King Island
Hobart	21	8	$14	Parts of Derwent Park, Moonah and Hobart (CBD)
TOTAL	**2,698**	**39,476**	**$7,875**	
Average/year	**36**	**534**	**$106**	

Source: Kompas et al. (2026).

What can we do?

PREPARING AND ADAPTING

Sea level has already risen, and coastal communities are already feeling the impacts with more frequent coastal and estuarine flooding, coastal erosion and shoreline change. Because ice sheets and the deep ocean take a long time to respond to warming, sea levels will continue to rise by a minimum of 14 cm by 2050 regardless of how quickly we can cut climate pollution (ACS 2026). What happens beyond 2050 depends on how dramatically Australia – alongside other countries – cuts climate pollution from burning oil, coal and gas.

Adapting to coastal changes already locked in will be a necessity. The Coastal Hazard Risk Management Framework (CHRMAP) identifies four main ways of managing the impacts of sea level rise including a hierarchy of most preferable to least, as seen in Figure 2 (West Australian Government 2019).

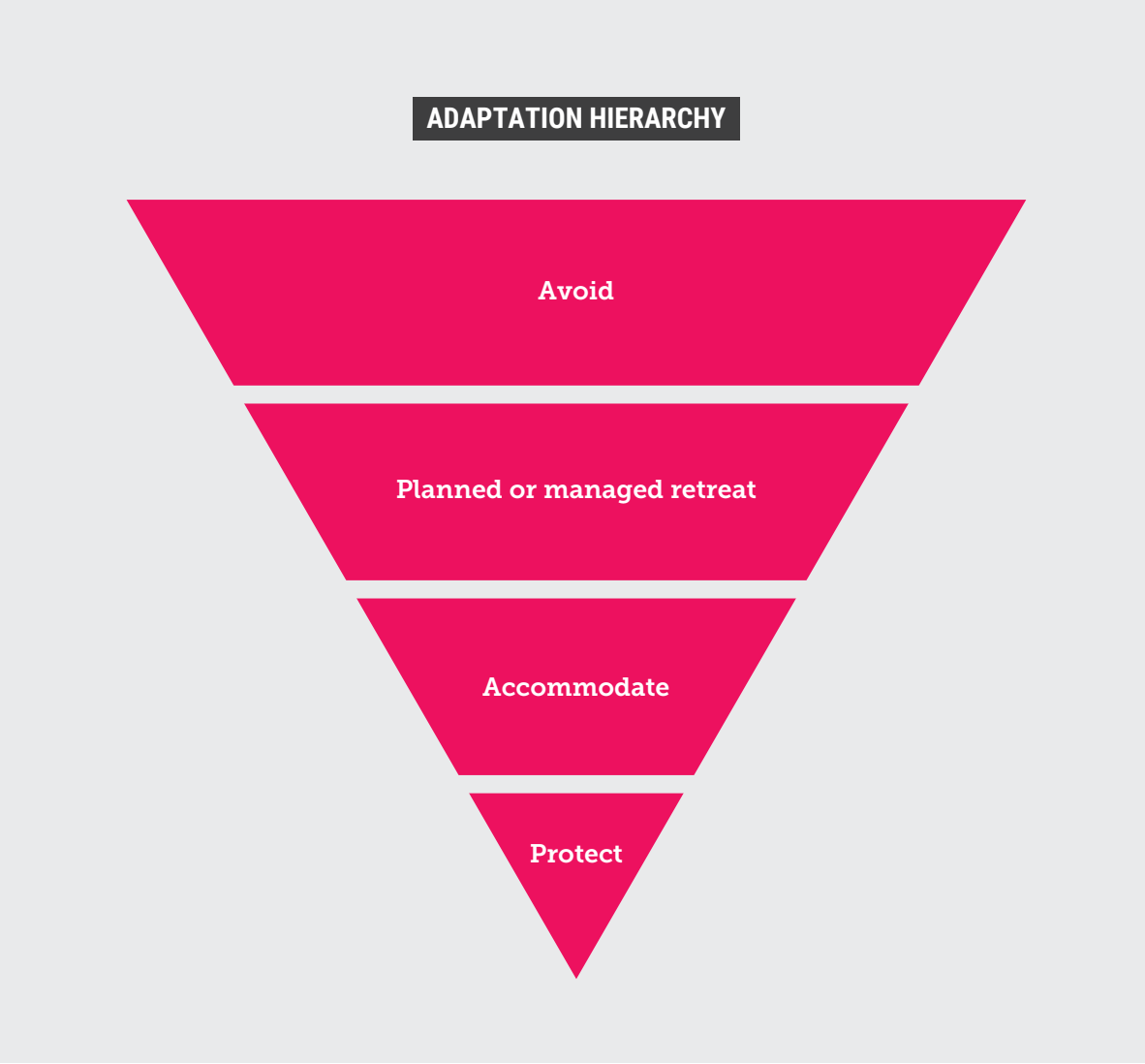


Figure 2: Choosing how to respond. Adapted from West Australian Government (2019).

Avoiding coastal hazards in the first place is the single most effective and cost-efficient option. 'Avoiding' involves identifying future 'no build' areas, and using planning laws to prevent new developments from occurring in areas that are at risk now, or will be in the future.

Planned or managed retreat aims to preserve beach and coastal foreshore assets, and allow coastal processes to occur with as little interference from developments as possible – allowing the shoreline to migrate landwards as the sea level rises. Beaches and dunes are the natural interface between the land and the sea, absorbing the energy of waves and continuously shifting sand to create a protective, dynamic buffer that naturally recovers over time.

Retreat involves withdrawing, relocating or abandoning assets that are at risk, both public and private, either when an asset reaches the end of its functional life, is damaged by a coastal flooding event or storm, or when erosion reaches a predetermined distance from the asset.

Accommodation means living with coastal hazards, rather than blocking or retreating from them – combining building modifications (such as raising the floor height of buildings) with planning tools like hazard mapping, contingency planning or insurance (where available) to reduce the damage that these hazards cause, or the time needed to recover. Accommodation is generally considered a transitional, short-term strategy, until the risks become intolerable.

Protection should be a last resort.

Soft coastal protection measures are nature-based solutions that aim to mimic ecosystems and natural processes, such as artificial reefs, sand nourishment, stabilising dunes with vegetation, and restoring mangroves. Such measures can help to delay shoreline recession in the medium term. However, some of these measures are themselves vulnerable to the impacts of worsening climate change – e.g., mangroves and seagrass meadows are vulnerable to both marine heatwaves and sea level variability (West Australian Government 2019).

Hard coastal protection options include the construction of groynes, seawalls, offshore breakwaters and artificial headlands. Construction and maintenance can be very expensive, and they can also accelerate erosion elsewhere, such as adjacent beaches. Sea walls are also not a permanent solution in a world where sea levels will only keep rising. Due to these drawbacks, they should only be considered when there is no other option, and where they can deliver broader public benefits such as enhancing foreshore amenity.

In practice, trying to adapt to rising seas and coastal impacts is complex, costly and often slow. Financing models, tensions between public and private interests, and cultural and social considerations often result in tradeoffs and negotiations needing to occur. Resolving these issues can cause significant delay. The following case study illustrates how these tensions can play out on the ground.

Image 12: Nature's seawall: Mangroves buffer coasts against rising sea levels.

COSTLY AND COMPLEX: FIXING EROSION AT WAMBERAL BEACH, CENTRAL COAST

Wamberal Beach on the NSW central coast is an erosion hotspot, with major storms repeatedly eating away at the sand dunes since the 1970s. Major erosion events have occurred in 1974, 1978, 1995, 2007, 2016 and 2020. The first houses were lost during the 1978 event. In 2020, severe storms caused coastal erosion that threatened to destroy around 40 homes, triggering mandatory evacuations.

The NSW Government appointed a Local Emergency Operations Controller, who oversaw an emergency response involving the placement of 4,400 tonnes of rock. This was designed to halt further damage during the event, but was not intended as a permanent solution to the erosion issue. The proposed long-term solution involves the construction of a 1,400-metre sea wall, coupled with regular beach nourishment, as a solution to both protect properties and the beach.

The draft engineering design requirements, released by council, specify that property owners must pay for any works designed to protect their private property. The proposed funding model is that property owners pay 80%, council pays 10% and the state government pays 10%. The Central Coast's share of the cost is primarily intended to fund elements that relate to protecting public land, beach access ways and infrastructure.

The council-commissioned concept design estimated that the seawall would cost between $25-$40 million, with annual maintenance costs between $34,000-$265,000. Whilst some landowners expressed willingness to pay, others said they cannot afford to.

To date, the seawall remains heavily debated, with issues related to land access, environmental impacts and financing remaining significant hurdles. The Wamberal Protection Association (WPA) submitted development applications for the continuous seawall, but the Hunter Regional Planning Panel has repeatedly requested clarification on the financing and legal mechanisms for the project. Because the seawall spans a mix of public and private property, securing consensus on a coordinated delivery and financing model remains a key obstacle to finalizing the project (Central Coast Council 2026).

Coastal adaptation comes at a significant cost. But who should pay is not always clear.

Between a rock and a storm surge: Challenges for coastal adaptation in Australia

Adapting to coastal erosion and sea level rise in Australia has been incremental and piecemeal. Major barriers include tensions between public and private interests, underfunded councils and a fear of legal liability. The problem of fragmented governance arrangements underpins many of the problems facing coastal adaptation (ACS 2025b).

The first challenge is funding gaps and cost-shifting. Whilst the federal government collects the majority of tax revenue, it is local councils that are mostly expected to pay for the maintenance/building of expensive coastal infrastructure like seawalls and sand nourishment, or at least facilitate such. Small regional councils with long coastlines and low populations often lack the tax base to fund such expensive fixes.

The second is legal liability and risk aversion. Although state planning legislation gives councils the power to approve or reject coastal developments, this creates a legal double-bind: reject a development on the basis of projected climate risk, and the developer may challenge or appeal that decision; approve it, and the council can face challenges – either from third parties arguing the approval didn't adequately account for climate risk – or negligence claims from property owners if the site is later damaged by risks the council knew about. This double-bind is a recognised structural problem in Australian coastal planning law, though the extent of council liability varies by state, and some jurisdictions provide good-faith exemptions for decisions made on the basis of known hazard information.

The third challenge is lack of consistency in data collection, delivery and application. For example, there are no uniform national sea level rise benchmarks used in planning across jurisdictions. Instead, states use varying baselines and timelines for sea-level rise projections, derived from varying sources and scenarios. This has created confusion for insurers, banks, developers, and everyday homebuyers trying to evaluate risk. Notably, New South Wales operates under a devolved model whereby individual councils must choose and defend their own sea-level rise projections, exposing them to litigation risk and political pressure from coastal property developers (though a common technical dataset has recently been created for NSW, available through AdaptNSW).

To overcome some of these challenges, several states have established regional partnerships between councils to help tackle the complex challenge of responding to climate change. These partnerships help councils to develop shared risk assessments, pool critical resources and expertise, align localised efforts with state and federal policies and create a unified voice advocating for state and federal government funding (such as Victoria's Greenhouse Alliances and South Australia's Regional Climate Partnerships).

As of 2025–2026, some federal-level scaffolding has emerged — a national risk assessment, an adaptation plan, and a coastal-hazards framework aimed at coordinating sea level rise benchmarks and policy across jurisdictions. However, the National Adaptation Plan lacks legislated timelines, funding commitments, or flagship actions, while the National Climate Risk Assessment has no guarantee of being repeated on a regular basis, unlike comparable international frameworks. The Climate Projections Roadmap, similarly, describes itself as a voluntary coordination mechanism aimed at delivering more consistent climate projections across agencies — rather than a binding standard with enforcement mechanisms attached. As part of the Coastal Hazards Framework, both *Climate Change Risks to Australia's Coasts: A First Pass National Assessment* (2009/2011) and the underlying national coastal geomorphology mapping and classification (2009–2010) should be prioritised for update — this data remains the foundation for understanding landform vulnerability along Australia's coastline, yet is now over 15 years old. This is a significant gap, as landform type determines how a coastline will respond to sea level rise.

In an effort to address the funding challenge, Australia's 537 local councils – represented by the Australian Local Government Association (ALGA) – passed an unopposed motion (in June 2026) calling for a national levy on major coal, oil, and gas companies to help councils pay for the costs of adaptation to climate change hazards including sea level rise. The motion also called on the Federal Government to establish a Parliamentary Inquiry into the adequacy of the 2025 National Adaptation Plan (Renew Economy 2026).

CUTTING CLIMATE POLLUTION TO REDUCE RISK

Adapting to rising sea levels while continuing to pollute is a little like bailing water out of a sinking boat without bothering to patch the leak.

For the next few decades, the rate of sea level rise will be determined mostly by climate pollution that has already been released. However, as the years progress, the amount of sea level rise we experience will directly depend on the decisions we make today and in the coming years. By cutting climate pollution much further and faster, we can reduce the amount of sea level rise we experience into the future – and therefore, how difficult it becomes to cope with what unfolds.

The climate pollution scenario used in this report is associated with around 2.7°C warming by 2100, which is broadly aligned with where the world is heading based on the current policies of countries to reduce climate pollution (UNEP 2025). The amount of mean sea level rise around Australia associated with this scenario is around 55 cm by 2100 (relative to 1995-2014), which, combined with storm surges, leads to the significant potential economic losses outlined in this report.

To reduce the impacts and economic losses outlined in this report, Australia – alongside other countries – must substantially slash climate pollution.

Coastal communities in Australia, the Pacific, and around the world are already experiencing the impacts of sea level rise at current levels of warming, and every fraction of a degree of further warming substantially increases the danger. Already at current levels of warming, ice sheets in Greenland and West Antarctica may be approaching a critical threshold, beyond which ice loss becomes self-sustaining and irreversible, continuing for centuries even if global temperatures are stabilised or reduced (Armstrong McKay et al. 2022). This differs from the gradual, ongoing melting already occurring at current temperatures, where a tipping point instead involves self-reinforcing feedbacks — such as ice loss further destabilising an ice sheet — that drive collapse forward independent of future warming. Whilst this tipping point could trigger under current levels of warming, it is more likely to occur beyond 1.5°C warming above pre-industrial levels. If triggered, this would commit the planet to multiple additional metres of sea level rise over centuries to millennia — compounding the sea level rise that is already locked in even under the most optimistic warming scenarios (Oppenheimer et al. 2019; IPCC 2023).

To slash climate pollution and reduce risks, Australia needs to continue building out renewable energy and storage, and keep electrifying our homes, transport and industry. Australian households and small businesses are already playing their part, with widespread adoption of solar on rooftops, batteries and electric vehicles. Australia's largest industrial polluters need to play their part too.

The Australian Government must also treat the climate targets that have been set for 2030, 2035 and 2050 as a floor and not a ceiling, going further and faster to cut our climate pollution across all sectors – with the aim of reaching net zero as soon as possible. Every fraction of a degree of avoided warming matters, and will be measured in lives and livelihoods saved, fewer families forced from their homes, and a safer future for our children (Climate Council 2025).

The Australian Government has three key opportunities to drive down industrial pollution in this Parliamentary term and secure a safer future for every Australian:

1. **Stop approving new or expanded coal, oil and gas projects** that add to the climate pollution fuelling worsening climate disasters and harming our communities and economy;
2. **Strengthen our industrial pollution standards** by closing loopholes in the Safeguard Mechanism that allow big industry to keep polluting (see Climate Council 2026a); and
3. **End the billions in tax breaks going to big miners each year** to pollute (via the diesel tax rebate), which actively undermines our energy security and shift to clean energy. Introducing a $50 million cap on the scheme would free up $2.5 billion a year that could be invested in clean energy and electrification, or coastal adaptation to help protect communities (see Climate Council 2026b).

Conclusion

Australia is a coastal nation facing an enormous and rapidly growing economic threat. The present-value $855 billion price tag laid out in this report is not a distant or hypothetical risk — it is the conservative cost of a future that is already being locked in along our coastline, driven by decades of burning coal, oil and gas. Every Australian will pay this bill, whether they live on the beach or not, either through lower economic growth, damaged infrastructure bills or the slow erosion of the coastal communities that define our national identity.

This report provides a snapshot of what sea level rise will cost but it has not explored the complex question of who should pay, who is likely to pay, and how those costs will be shared. The damages bill of sea level rise is unlikely to be shared equitably.

Homeowners and individuals, insurers and taxpayers across all levels of government will bear the majority of costs. Homeowners and individuals will face devastating direct impacts, including loss of property value, costs of repair and ongoing protection (e.g. sea walls that protect private property). The costs of total abandonment via managed retreat – where that becomes necessary – are also likely to be borne by homeowners.

State and federal governments are responsible for protecting, or rebuilding, government infrastructure such as roads, ports and essential utilities. Local governments are at the 'coal face' and are burdened with the legal and financial responsibility of managing coastal hazards, maintaining seawalls (that protect local public infrastructure) and denying or approving building permits. They are therefore critically important in ensuring that coastal hazards are avoided where possible, by not approving structures in areas that will be at risk over the coming decades.

These activities – e.g. improved coordination in data collection and investments in coastal protection infrastructure where it is shown to be economically and environmentally feasible – are broadly aligned with what the Insurance Council of Australia is also recommending (see ICA 2021).

The Insurance Council of Australia estimates that – at a minimum – $30 billion is needed to be spent over the next 50 years on large scale coastal protection and adaptation projects (ICA 2021).

Standard insurance policies have long-excluded 'Actions of the Sea' (e.g. tidal inundation, coastal erosion and shoreline movement), treating them as too inevitable and ongoing to be insurable. As climate change increases the frequency and severity of these hazards and expands the number of properties exposed to them, this longstanding exclusion is driving a widening protection gap for coastal communities.

With insurance largely unavailable, more attention needs to be given to reducing the risks that coastal communities face, through slashing climate pollution to reduce future sea level rise, and through the actions outlined in the adaptation hierarchy (see p. 48): avoiding coastal hazards in the first place by preventing developments in areas that are, or will be, at risk; planning and managing retreat for properties in highly exposed locations; accommodation; and, investments in coastal protection measures, where these are shown to be economically and environmentally feasible. Improved coordination in data collection and delivery is also an important area of activity for reducing the risks that communities face.

One thing is certain. Adapting to sea level rise will be costly, challenging and complex. Cutting climate pollution more swiftly and deeply will help to avoid some of the worst impacts, costs and complexities associated with adaptation. The decisions made by governments and industry over coming years will determine how much worse things get. This Parliamentary term key opportunities include closing loopholes in the Safeguard Mechanism and ending billions of dollars in tax breaks for polluting diesel being handed to profitable mining corporations are practical steps that can be taken to help avoid a far more costly, dangerous and irreversible future.

The science is clear, the economics are stark, and the solutions are within reach. What's needed now is the political will to act.

Appendix

HOW ARE ECONOMIC LOSSES CALCULATED IN THIS REPORT?

The overall economic losses depend on the amount of land and number of assets exposed to coastal flooding, the extent of damages, and the price or value of the assets and/or land.

The modelling is based on major coastal flooding events, including the contribution of storm surges. Estimates of the contribution of storm surges to coastal flooding were derived from Kirezci et al. (2020) by fitting a probability distribution to historical storm-tide records at 239 locations around Australia and extrapolating to the water level with a 1% annual exceedance probability — the elevation with a 1-in-100 chance of being reached or exceeded in any given year, based on the conditions observed over the historical record (in this paper, 1979–2014).

Whilst, the 1-in-100 flood level was used to derive a historical baseline for storm surges, it is not used to determine the probability of an event occurring in the future under higher sea levels. The likelihood of an inundation and storm surge event occurring in the future is much higher. Kirezci et al. (2020) suggest that the average likelihood of such an event is closer to 1-in-10 in 2100, globally, and substantially higher in some locations. At the same time, sea level rise will result in flooding events of a larger magnitude than in the past. This analysis is based on that larger magnitude flood level.

To obtain future projections, the storm surge estimates were combined with the projected relative sea level rise at 239 hotspot locations around Australia (taken from Kirezci et al. 2020). The scenario used for the amount of future sea level rise in this report is an 'intermediate' climate pollution reduction scenario (RCP4.5), which assumes that climate pollution peaks around 2040 and declines thereafter, resulting in a best estimate of 2.7°C heating by 2100 compared to pre-industrial times (IPCC 2021, Figure SPM.4b).

The projected flooded areas were mapped using Australia's Digital Elevation Model.

Then, the value of assets and vacant, residential and farm land in the flooded areas was found by collecting publicly available information from a variety of sources (such as real estate websites). In cases where there were no land value estimates available, a percentage proxy from nearby land values was used.

Next, the physical damages to those assets from sea level rise (and storm surges) was calculated, using obtained data and a statistical model to calculate the distribution of damages within regions and between properties (called a log normal distribution). This model reflects the reality that in some cases, flooding from sea level rise and storm surges will result in the complete loss of the value of a land parcel or property. In most other cases, damages are far less extensive but accrue over time.

Finally, the total economic losses were found by multiplying the physical damages to assets and land with the value of the asset/land use. Value losses are generally much more significant than physical damages only. For example, the physical damages of flooding to a parking garage in a building detracts from the economic value of the entire building, not just the garage.

In calculating the losses associated with this flooding, the value of assets and land is assumed to grow in line with economic growth of 2% per year, and the overall damages are discounted (by 5%) per year as is common practice in public policy economics. The losses in each year up until 2100 are aggregated (or added up), and then averaged (across all years).

There are several limitations to this study.

First, the value of ecosystems, such as wetlands, is underestimated, as these ecosystems are generally treated in the valuation as either dry land or were ignored due to lack of data. Properly valuing ecosystem services is methodologically complex and was beyond the scope of this work.

Second, the flood modelling uses a "bathtub approach," which overlays the projected water level — including sea level rise, storm surges and wave setup — onto the Digital Elevation Model, with any land below that level designated as flooded. This approach does not account for the dynamic movement of water over land, nor for shoreline erosion and recession.

Third, while projected coastal flooding includes sea level rise and storm surges, it does not account for the potential increase in storm intensity due to climate change.

Together, these factors mean the estimated economic losses are conservative. The use of discounting for future damages (by 5% per year), along with the sea level rise scenario adopted, further reinforce this conservatism.

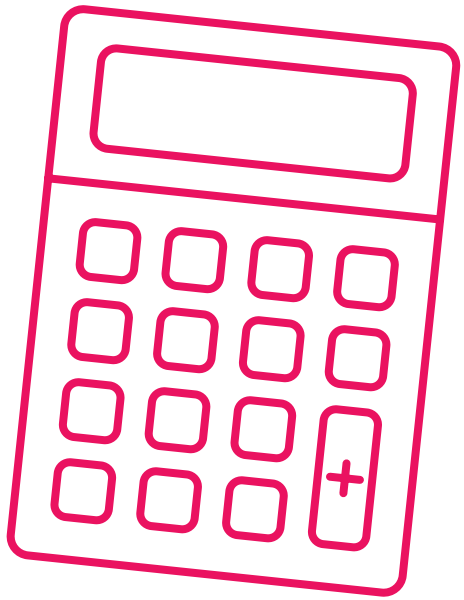
Figures throughout this report are rounded for readability. As a result, some totals (e.g. state and category breakdowns) may not sum precisely to the headline national figures.

WHAT DOES DISCOUNTING MEAN?

When considering costs (and economic benefits) over time it is common to use a "discount rate" that converts future dollar amounts into present value. This means it is easier to compare apples with apples.

The rationale offered by economists for discounting can be put in these terms: "Would you prefer $100 today or 10 years from now?" The natural response is $100 today, since with that money one could invest the money, earn a return, compound those returns over time and thus enjoy a much larger amount of money 10 years later. At a 10% interest rate, for example, $100 today would be worth $110 a year from now and (with compound interest), $121 in year 2, $133 in year 3 and so on, up to $259 in year 10. In that sense, 10 years from now $259 would actually be worth only $100 today in 'present value' terms. Discounting can thus translate future value into present value.

The challenge comes with choosing the discount rate to apply since higher rates greatly discount future damages. For example, $100 in damages 80 years from now is worth $12.22 in present value at a 3% discount rate, $2.62 at 5% and only six cents at a 10% discount rate. In other words, discounting over a long period of time at high rates can severely decrease future damage estimates. This is fundamentally why it is suggested to use lower discount rates when considering sea level rise. In this report, 5% is taken as a base discount rate, noting that this greatly underestimates the damage to intergenerational environmental assets.



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The Climate Council acknowledges the Traditional Owners of the lands on which we live, meet and work. We wish to pay our respects to Elders, past and present, and recognise the continuous connection of Aboriginal and Torres Strait Islander peoples to land, sea and sky. We acknowledge the ongoing leadership of First Nations people here and worldwide in protecting Country, and securing a safe and liveable climate for us all.

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