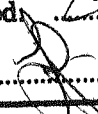


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*South Australian Government Submission
to the Inquiry into Climate Change and
Environmental Impacts on Coastal
Communities*

20 May 2008



**Government
of South Australia**

1. Details of the inquiry

The Minister for the Environment, Heritage and the Arts, the Hon Peter Garrett MP, and the Minister for Climate Change and Water, Senator the Hon Penny Wong, asked the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts to conduct an inquiry into climate change and environmental impacts on Australian coastal communities. The Terms of Reference provide for the Committee to inquire into climate change and environmental pressures experienced by Australian coastal areas, particularly in the context of coastal population growth.

The Terms of Reference are:

- existing policies and programs related to coastal zone management, taking in the catchment-coast-ocean continuum;
- the environmental impacts of coastal population growth and mechanisms to promote sustainable use of coastal resources;
- the impact of climate change on coastal areas and strategies to deal with climate change adaptation, particularly in response to projected sea level rise;
- mechanisms to promote sustainable coastal communities; and,
- governance and institutional arrangements for the coastal zone.

The issues potentially cross a number of areas, including: climate change, water and environmental protection, infrastructure and planning; tourism and regional development; local government; Indigenous affairs; and, agriculture and fisheries.

2. Introduction

The South Australian Government recognises the serious threat that climate change poses to South Australia, Australia and the world and is committed to engaging with the all levels of government on climate change policy. The South Australia Government has a long-standing commitment to tackling climate change – through both mitigation and adaptation – as an essential part of its environmental sustainability agenda, documented in *South Australia's Strategic Plan* and *Tackling Climate Change: South Australia's Greenhouse Strategy*. Central to its efforts is the *Climate Change and Greenhouse Emissions Reduction Act*, introduced in July 2007.

Around 80% of Australia's population lives within 50km of the coast, concentrated in towns and cities. In South Australia, the proportion is around 85%. In addition to accommodating the bulk of the country's human population, coastal areas support other important activities and natural features, such as: infrastructure, agriculture, fisheries, tourism, other recreation, wetlands and estuaries, mangroves and other coastal vegetation, coral reefs, heritage areas and threatened species or habitats.

The likely impacts of climate change will increase the challenge of sustainable management of the coastal zone. Current coastal development patterns may be increasing coastal vulnerability to climate change. There is potential for considerable damage to low lying coastal settlements and infrastructure, affecting large and growing populations, tourism and capital investments, as well as sensitive ecosystems, such as mangroves, saltmarshes and sand dunes, from sea level rise, flooding, rising groundwater with increased salinity and erosion.

It is paramount that the risks for coastal areas associated with climate change impacts are managed appropriately, through:

- avoiding and spreading risk;
- providing effective structural and technological solutions;
- applying best practice regulatory measures and institutional frameworks; and,
- investing in research and education to improve understanding.

3. Impacts of climate change on coastal areas

The following table contains a brief list of likely climate change impacts associated with coastal areas.

Sea level rise (IPCC: 0.18 - 0.59m by 2100, with a possible additional contribution from ice sheets of 10-20cm, and further ice sheet contributions might substantially increase the upper limit)	Increased coastal erosion Increased inundation of coastal wetlands and lowlands Increased risk of flooding and storm damage Increased salinity of surface and ground waters Rising groundwater levels with the potential to threaten development The retreat of saltmarsh and mangroves with sea level rise and their loss when retreat is not possible Increased risk of damage to coastal housing and infrastructure
Increased temperature (IPCC: 1.4 - 5.8°C by 2100)	Species migration Increased algal blooms Coral bleaching
Decreased average rainfall (but higher rain intensity)	Changes to runoff, flooding and erosion Increased salinity of ground waters Changes to water quality and nutrients
Increased storm intensity (including stronger winds)	Increased waves and storm surges and associated flooding Increased risk of damage to coastal housing and infrastructure

4. Environmental impacts of coastal population growth

Population growth impacts on the environment in numerous ways, including: the clearing of vegetation, which often results in erosion, salinity and a loss of biodiversity in terms of flora and a loss of habitat for fauna; and, various types of pollution, such as emissions to land, water and air (including greenhouse gas emissions).

In addition, there are a number of sensitive coastal features that are particularly vulnerable to the impacts of population growth and human developments generally, including saltmarshes, sand dunes and cliffs.

- Saltmarshes provide key habitat for many marine and terrestrial organisms, including roosting sites for migratory wading birds, feeding and refuge areas for fish, and contain rare and endangered species of high conservation values. Tidal saltmarshes are an essential buffer between seaward mangroves and terrestrial ecosystems, regulating salinity and water velocity, and decreasing the suspended sediment load entering the marine environment. Saltmarshes are highly productive and provide the base for food chains vital to fish nursery areas, including those for commercial and recreational species such as King George whiting, blue crabs, western king prawns, garfish, yellowfin whiting, WA salmon, tommy ruff, yelloweye mullet, mulloway, flathead and flounder.

- Sand dunes provide habitat for numerous, often specially adapted, plants and animals and are of scenic and recreational value. Above tide areas of beaches and dunes are important roosting and nesting areas for birds. Many of the plant communities are slow growing sand binders, which protect the dunes from wind and water erosion.

In South Australia, saltmarshes and sand dunes have been lost to agricultural, urban and industrial developments. In the Adelaide metropolitan and northern beaches area, about 80% of the original saltmarshes have been lost to reclamation for industrial development. Saltmarshes are particularly vulnerable to sea level rise if barriers such as levee banks or roads prevent retreat. Urban development on what were previously sand dunes has resulted in the disturbance and loss of coastal vegetation and habitat for some bird species. Associated sand drift has the potential to smother arable land, development and infrastructure. Many birds also build nests on rock stacks and inaccessible cliffs, which are often safe from human disturbance. However, some long used nesting sites have been abandoned due to human disturbance, such as in the Innes National Park on Yorke Peninsula. Residential and other development on cliff tops also tends to disturb both vegetation and wildlife.

5. Governance and institutional arrangements

The two major pieces of legislation related to coastal management and development in South Australia are the *Coast Protection Act 1972* and the *Development Act 1993*.

The Coast Protection Board (CPB) was formed in 1972 under the auspices of the *Coast Protection Act 1972* and continues to be a primary authority on managing coast protection issues and providing advice on coastal development in South Australia. The CPB is subject to the control and direction of the Minister for Environment and Conservation and is under the administration of the Department for Environment and Heritage (DEH). The CPB has a wide representation, with members from: the DEH; the Department of Transport, Energy and Infrastructure; the South Australian Tourism Commission; Local Government; environmental societies and academia.

The functions of the CPB (as stated in the Act) are:

- to protect the coast from erosion, damage, deterioration, pollution and misuse;
- to restore any part of the coast that has been subjected to erosion, damage, deterioration, pollution or misuse;
- to develop any part of the coast for aesthetic improvement or for the purpose of rendering that part of the coast more appropriate for its use and enjoyment;
- to manage, maintain and, where appropriate, develop and improve coast facilities that are vested in, or under the care, control and management of, the Board;
- to report to the Minister upon any matters that the Minister may refer to the Board for advice;
- to undertake, commission or contribute to research into matters relating to the protection, restoration or development of the coast; and,
- to perform such other functions assigned to the Board by or under this or any other Act.

The *Development Act 1993* guides all development through Development Plans. Coastal developments are addressed in the three tiers of the South Australian planning system: the *Planning Strategy for South Australia*, Development Plans and the development assessment process. The *Planning Strategy for South Australia* provides guidance on the formulation and review of Development Plans, which in turn are used to assess development applications.

The planning system provides a sound structure for dealing with coastal development. The operation of that system is subject to continuous improvement and current areas to which effort is being directed are:

- Providing more specific locational guidance in the *Planning Strategy for South Australia* as to where development should occur on the coast.
- Ensuring that Development Plans applying to coastal areas are continually improved through:
 - Investigations for Development Plan Amendments for coastal areas that adequately investigate sensitive coastal features and coastal hazards; and,
 - Placing sensitive coastal features in coastal zones with appropriate provisions.
- Improving the development assessment process by extending the powers of direction of the Coast Protection Board in relation to coastal hazards.

Importantly, there is a provision for listing inappropriate developments as 'non-complying', which provides greater assurance that such development does not occur. The *Development Act 1993* requires that any approval of non-complying development needs the concurrence of at least one other planning authority.

Strategy 1.1 of the *Living Coast Strategy for South Australia 2004* calls for the development and implementation of new coast and marine legislation. Consistent with this, the South Australian Government has recently supported, in principle, a recommendation of the South Australian Parliament's Environment, Resources and Development Committee's Inquiry into Coastal Development, that the Government ensure that a suitably powered State authority whose primary focus is the coast is retained in any review of the *Coast Protection Act 1972*.

Other legislation that informs and influences coastal development include:

- *Crown Lands Act 1929*;
- *National Parks and Wildlife Act 1972*;
- *Historic Shipwrecks Act 1981*;
- *Wilderness Protection Act 1992*;
- *Heritage Places Act 1993*;
- *Adelaide Dolphin Sanctuary Act 2005*; and,
- *Marine Parks Act 2007*.

6. Existing coastal policies and programs

There are a number of strategy and policy documents that are relevant to South Australia's coastal management and the impact of climate change. These include:

- South Australia's Strategic Plan (2007)
- Planning Strategy for South Australia
- Living Coast Strategy for South Australia (2004)
- Adelaide's Living Beaches: A Strategy for 2005-2025
- State Natural Resources Management Plan (2006)
- Tackling Climate Change: South Australia's Greenhouse Strategy 2007-2020 (2007)
- Coast Protection Board Policy Document (2002)
- South Australian Tourism Plan 2003-08
- No Species Loss – A Nature Conservation Strategy for South Australia 2007-2017
- NatureLinks: Implementing the WildCountry philosophy in South Australia
- National Cooperative Approach to Integrated Coastal Zone Management – Framework and Implementation Plan (2006)

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- The South Australian Parliament's Environment, Resources and Development Committee's Inquiry into Coastal Development, 2007.

A key program area for the DEH is 'Coast and Marine Conservation', which incorporates the following actions:

- The provision of input to coastal development strategy and systems;
- The provision of input to updates of Development Plans;
- The provision of responses to development proposals;
- Implementation of *Adelaide's Living Beaches: A Strategy for 2005-2025*;
- Release of Marine Environmental Capability Guidelines; and
- Delivery of Marine Parks in South Australian waters.

The *Living Coast Strategy for South Australia 2004* contains six major objectives:

- To provide a legislative and policy framework for ecologically sustainable development and use of our coastal, estuarine and marine environments;
- To conserve and safeguard the natural and cultural heritage of our coastal, estuarine and marine environments;
- To control pollution of our coastal, estuarine and marine environments;
- To protect our coastal, estuarine and marine environmental assets;
- To improve our understanding of our coastal, estuarine and marine environments; and
- To develop and maintain partnerships between State and Local Governments, community and industry.

In 1994, the Planning Minister authorised the *Regional Coastal Areas Policies Amendment*, which added provisions to Development Plans across the State that were consistent with the policies of the CPB, in particular the *Policy on Coast Protection and New Coastal Development, 1991*. Those provisions included: matters of environmental protection; the preservation of scenic heritage and other values; maintenance of public access; and, hazard risk minimisation. The hazard risk minimisation provisions included a consideration of sea level rise induced by climate change. In addition, the CPB has convened a Sea Level Rise Advisory Committee to conduct a review of the sea level rise policy to commence in July 2008. This will take into account the latest IPCC projections of sea level rise in its November 2007 report, including assessing implications of the IPCC's statement that "the upper values [of the sea level rise projections contained in their 2007 report] are not to be considered upper bounds for sea level rise".

The Coast Protection Board (CPB) has a range of policies designed to address a number of key areas including:

- development;
- coastal hazards (including a consideration of climate change-induced sea level rise) – such as flooding, erosion and acid sulfate soils;
- protection works;
- conservation of coast and marine habitats including coastal wetlands, rivers and estuaries;
- heritage and landscape; and,
- access to the coast.

However, the CPB has limited powers and the South Australian Parliament's Environment, Resources and Development Committee's Inquiry into Coastal Development noted that around 20% of the CPB's advice was not followed by planning authorities. Coastal hazards are a particular concern in this regard.

The Committee made four recommendations regarding climate change and coastal management:

- That the Government explicitly considers climate change and sea level rise in all aspects of planning, development and assessment;
- That the Government ensures that development planning and the protection of existing development is underpinned by an investigatory phase involving detailed mapping of land, beach and near shore levels as a necessary initial step in identifying risk areas, taking into consideration projections of sea level rise;
- That the Minister for Planning ensures that Development Plans are amended to incorporate updated IPCC projections of sea level rise as they are provided; and,
- That the Minister for Planning amends Development Plans to allow for the sea level rise induced erosion of beaches and retreat of mangroves and saltmarshes.

The Government has assured the Committee that these recommendations have its in-principle support. In addition, the Committee believed “that establishing Development Plan coastal zones over land containing sensitive features throughout South Australia should be a priority, along with regular revisions of the zoning. The advantages of coastal zoning are that development is not placed in areas at risk of coastal hazards, and sensitive coastal features can be protected from the adverse impacts of development.”

Current work on Development Plans is ensuring that the following sensitive coastal features will be included in coastal zones:

- coastal dunes, coastal wetlands, samphire (tidal saltmarsh) and mangrove areas;
- coastal geological features;
- coastal heritage, cultural, scientific, environmental or educational features;
- areas exposed to coastal hazards (such as acid sulfate soils, or seawater flooding or erosion) where there are no provisions to resolve the deficiency (such as a council-managed seawall or levee, or another strategy to protect development);
- coastal protection measures such as erosion buffer areas, seawalls and levee banks; and,
- coastal landscapes with high scenic quality.

In particular, different agencies within the South Australian Government are working together to implement the Better Development Plans (BDP) project. The aim of the BDP project is to provide modules that councils can adopt when making amendments to their Development Plans. There are three proposed coastal zone modules in BDP: Coastal Conservation Zone; Coastal Open Space and Recreation Zone; and, Coastal Settlement Zone. The BDP also contains a listing of the types of development that are considered to be 'non-complying' in coastal zones, which takes into account sensitive coastal features. The inclusion of appropriate BDP policy modules in Development Plans by councils across the coastal areas of the State will create consistent and appropriate policy.

7. Climate change adaptation in coastal areas

According to the Department of Climate Change's *Climate Change Impacts and Risk Management: A Guide for Business and Government*, released in 2006, there are generally six ways to manage the risks of climate change impacts through adaptation:

- Spread risk – through the use of insurance and diversification strategies.
- Structural and technological – to prevent effects through engineering solutions and changed practices.

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- Regulatory and institutional – to prevent or mitigate effects through revised regulations and planning.
- Avoidance – to avoid or exploit changes in risk.
- Research – to improve understanding of the relationship between climate change and risk.
- Education and behavioural – to educate and inform stakeholders about the risks of climate change.

For adapting to climate change impacts in coastal areas, these strategies imply a number of actions including (but not limited to):

- locating new developments away from coastal areas, in accordance with up to date climate change and sea level rise projections. In South Australia, this is under review, so that the latest IPCC projections of sea level rise can be taken into account in Development Plans;
- encouraging the insurance industry to price risk associated with coastal developments in sensitive areas accordingly (this is likely to include higher insurance premiums or no insurance provision);
- strengthening coastal protection measures;
- amending local planning schemes to give greater weight to flood risk;
- limiting the type of developments that can take place along the coast in accordance with up to date climate change and sea level rise projections;
- improving modelling of coastal climate change impacts, such as the risk and likely damage of sea level rise or the impact of extreme events; and,
- increasing public awareness about the potential impacts of climate change on the coast.

Planning for new urban development and infrastructure will also need to incorporate policies to minimise exposure to the impacts of climate change, particularly the impacts associated with sea level rise. This will be especially important for large public infrastructure works that require proximity to the coast, such as power stations and desalination plants. Many major transport corridors skirt coastal areas and upgrades and new routes could be subject to hazards in the future without a detailed assessment of climate change impacts. The location of existing coastal roads, electricity transmission corridors and embankments may in the future limit the retreat of important coastal ecosystems. Coastal habitats that are tide-dependent, such as mangroves and saltmarshes, will need to be able to migrate with sea level rise.

A high resolution digital elevation model (DEM) of the South Australian coast (including near shore bathymetry) would enable broad scale quantitative assessment of the potential impacts of climate change induced sea level rise and identification of appropriate response strategies. This would assist with the recognition of and planning for the need for major capital expenditure on protection for existing settlements. Consideration of policy settings to consider the full range of response measures that might be applied is critical.

A pilot project analysing the impact of sea level rise using DEM and coastal flood maps is being conducted for four towns on the Yorke Peninsula. The pilot project funded through the Natural Disaster Mitigation Program (NDMP). This work is expected to be used to assist in appropriate land use zoning to allow the expansion of coastal townships in a sustainable manner. However, Commonwealth funding to acquire information from a national DEM would be more effective in achieving comprehensive outcomes than piecemeal reliance on NDMP funding, which has an uncertain future (NDMP funding goes to 2008-09).

Development plans will also be updated to:

- Reflect updated projections of sea level rise arising from any changes to Coast Protection Board policy resulting from its current review.
- Allow for the sea level rise induced erosion of beaches and retreat of mangroves and saltmarshes.
- Allow for the increased drift of sand dunes as a result of climate change induced aridification.

With regards to the protection of existing development, investigations as to where and when protection works are required, and the subsequent design, assessment construction and maintenance of those works, has cost implications for present and future landowners, councils and State agencies. The construction of a seawall at St Kilda (north of Adelaide) is expected to cost about \$1 million for about 500 metres of rock wall (or \$2000 a metre). Levee banks are also being constructed at Port Augusta and Port Pirie. These are often less expensive per metre, but such examples illustrate the importance of ensuring that the exposure of new development to climate change impacts and coastal hazards is minimised through the development and assessment system.

It is also important to recognise that significant costs in providing emergency services could eventuate from damage caused by sea level rise and associated storm surges, particularly in areas where adaptation is inadequate or risk accepted and no actions undertaken.

With regards to the costs of adapting to climate change are the issues of funding across the three tiers of Government, where any risks of liability lie if insurance is inadequate or non-existent and who is responsible for the associated compensation claims if significant damage eventuates. This will need to be resolved or made more transparent.

8. Measures to promote sustainable coastal communities

To conclude, the South Australian Government believes that the primary elements required for promoting sustainable coastal communities include:

- Review and, where appropriate, adopt legislation and policies which ensures: development in coastal areas on a sustainable basis; protection for sensitive coastal areas (including flora and fauna); the control and reduction of pollution; and, administrative bodies that are able to deliver policies and programs that achieve those outcomes;
- Collection and delivery of up to date information on climate change (such as projections of sea level rise), to be included in the Planning Strategy, Development Plans, policy reviews and development approval processes;
- The continued review of coastal zones and areas, to ensure sustainable development, the avoidance of coastal hazards, and protection for sensitive coastal areas;
- Analysis of existing coastal communities, to determine which are most at risk from climate change and/or most likely to damage coastal environments and what adaptation actions and mitigation need to be implemented (such as the building of levees, sea walls or the relocation of some development) to make them as sustainable as possible;
- The utilisation of a high resolution digital elevation model (DEM) of the coast (including near shore bathymetry) that would enable broad scale quantitative assessment of the potential impacts of climate change induced sea level rise and identification of appropriate response strategies;
- Communication and ideally cooperation between all levels of Government, the community and industry, including the resolution of responsibility for funding, liability and compensation if significant damage eventuates; and,

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- Educating communities, particularly coastal communities, about the potential impacts of climate change on the coast.

References / Information Resources

Department of Climate Change's *Climate Change Impacts and Risk Management: A Guide for Business and Government*

<http://www.climatechange.gov.au/impacts/publications/pubs/risk-management.pdf>

Coast Protection Board

<http://www.environment.sa.gov.au/coasts/board.html>

Adelaide's Living Beaches Strategy

http://www.environment.sa.gov.au/coasts/adelaides_living_beaches.html

South Australia's Strategic Plan

<http://www.stateplan.sa.gov.au/>

Tackling Climate Change: South Australia's Greenhouse Strategy 2007-2020

<http://www.climatechange.sa.gov.au/>

Planning Strategy for South Australia

<http://www.planning.sa.gov.au/go/strategy/land-use-planning-strategy-for-sa>

Living Coast Strategy for South Australia

http://www.environment.sa.gov.au/coasts/pdfs/living_coast.pdf

State Natural Resources Management Plan

http://www.dwlbc.sa.gov.au/nrm/state_nrm_plan/index.html

National Cooperative Approach to Integrated Coastal Zone Management – Framework and Implementation Plan

<http://www.environment.gov.au/coasts/publications/framework/index.html>

The South Australian Parliament's Environment, Resources and Development Committee's Inquiry into Coastal Development, 2007

<http://www.parliament.sa.gov.au/Committees/Standing/HA/EnvironmentResourcesandDevelopmentCommittee/CompletedInquiries/61ReportCoastalDevelopment/61ReportCoastalDevelopmentInquiry.htm>