

# coasta! Collaboration Cluster



## Coastal adaptation to climate change: a scenario planning tool

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### Introduction

This scenario planning tool is for a hypothetical Australian coastal zone in the Big Bonanza Region. It is designed for use by governments and communities to explore the governance implications of coastal adaptation.

As the tool relates to a hypothetical coast it will be useful for education and communication support in contexts where the local issues are very sensitive and/or no spatially explicit planning or discussions have yet commenced.

The tool consists of

- a video which can be found at <http://vimeo.com/channels/coastaladaptation>
- a map representing Big Bonanza Region
- a scenario that takes place at Big Bonanza Region
- a set of coastal adaption principles designed to guide thinking
- a set of instructions about the deliberation process to be used.

The tool is to be used in a workshop context and is designed to require minimum additional materials: A1 size Post-it notes for the walls and smaller coloured Post-it notes for writing up ideas. Required personnel are a workshop organiser with good working knowledge of coastal adaptation issues, together with an experienced workshop facilitator.

The workshop will take a minimum of 2 hours. Time will be required to read through materials.

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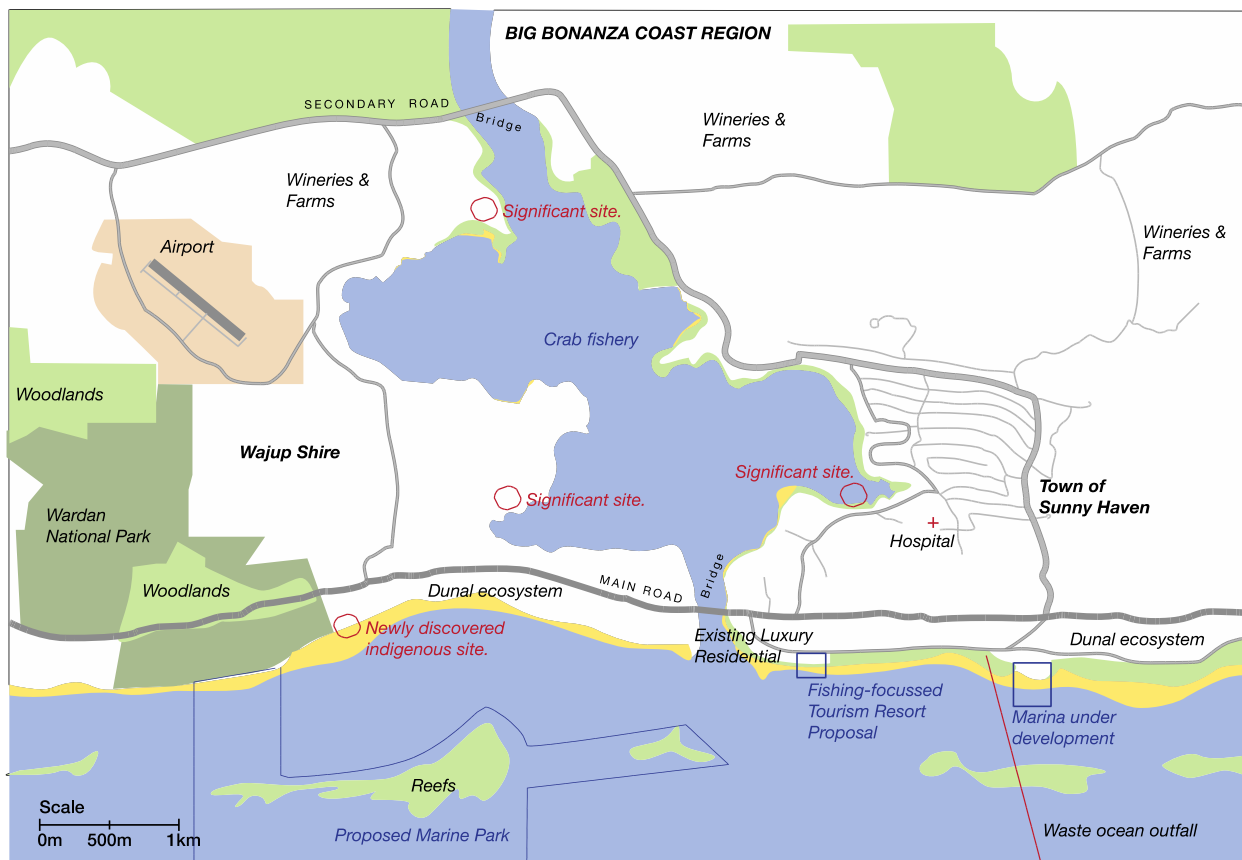
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## Map of Big Bonanza Coast Region



## Coastal adaptation principles

### Introduction

Climate change will lead to sea level rise, increased frequency of storm surges and in some places to catchment flooding will lead to coastal inundation and erosion, and to retreat of the shoreline. Impacts will include:

- Loss of houses
- Loss of coastal ecosystems
- Loss of beaches, beach quality and amenity sport and recreation
- Loss of infrastructure and economic value.

### Adaptation principles

Coastal adaptation is a process of deliberate change in response to these impacts. The goal of coastal adaptation is to make changes that will promote sustainability. Below are some emerging principles for coastal adaptation that will guide good practice.

#### Listen to Indigenous stories

Some coastal Indigenous peoples have cultural stories about the last ice age when they lived on coastal plains that are now sea beds, and how the sea levels rose at the end of the ice age to drown those coastal plains and change the shape of the coastline dramatically. So our current society is not the first to have experienced the need for coastal adaptation. It is important to record and learn from the experiences of first peoples and how they achieved sustainability in the face of a changing coastal climate.

#### Consider the four aspects of coastal sustainability and adaptation

Coastal sustainability is about finding positive interactions among economic, ecological, social and cultural aspects of our coastal lives. We have to consider climate impacts on all of these aspects, and develop adaptation goals that account for all of these aspects.

- a. The cultural aspect relates to how we make and share meaning. It may include: heritage and Indigenous sites, art galleries, music clubs, parks, bushland, cafes and football ovals.

- b. The social aspect relates to how we organise ourselves to provide for our needs. It may include: hospitals, libraries, schools, parks, the police station, and cafes.
- c. The economic aspect relates to how we generate livelihoods and the resources required to meet our needs and wants. It may include: water, energy and waste disposal infrastructure, ports, airports, tourist sites, shops, mines, farms and factories.
- d. The ecological aspect relates to the natural world. It may include: beaches, sea, estuaries, bushland, and processes such as water and nutrient cycles.

#### *Engage inclusively to enhance learning, literacy and capacity*

Coastal adaptation is likely to affect whole communities, and the costs of adaptation may affect whole states and countries. The complexity of climate change means we have to learn and adapt continuously using the best information available at the time. A 'trialogue' or structured conversation among society, government and science will help enable learning and literacy for coastal adaptation. Knowledge comes not only from scientists but from government and society as well. Learning will build coastal adaptation literacy and community capacity, and this will enable deeper, fairer, and more constructive conversations around difficult decisions. Many engagement methods and tools are available to help with the learning journey, such as: participatory modeling, visualisations, participatory mapping, community cultural development and management strategy evaluation.

#### *Work with front-runners*

We are starting to see the results of some projects around sustainability and coastal adaptation. These include:

- Coastal vulnerability assessments
- Local adaptation pathways projects funded by the Federal government; for examples, see <http://www.climatechange.gov.au/government/initiatives/lapp.aspx>
- Coastal adaptation decision pathways projects funded by the Federal government; for example, see <http://www.climatechange.gov.au/government/initiatives/coastal-adaptation-decision-pathways.aspx>

Both the successes and challenges shown in these early projects provide useful input into the plans and policies of other communities.

#### *Develop partnerships at the scale of 'coastal compartments'*

Partnerships have become a useful means of sharing information and resources for coastal adaptation. The appropriate scale for a coastal adaptation partnership is likely to be a regional coastal compartment, that is, a natural landform such as a large embayment. Governments working at the scale of a coastal compartment will likely share similar issues.

#### *Think long-term about strategy and resilience*

Climate change operates over a much longer scale than political cycles, and the sea will continue to rise for several millennia beyond 2100. It is likely that in the future we will be dealing with coastal adaptation in a world that is different politically, economically and socially. A long-term strategic adaptation plan is needed that anticipates a dynamic and retreating shoreline, but allows for flexibility and adaptation in governance and management. A buffer or transition zone should be established that identifies the most exposed areas of the coast. The plan should include building resilience into systems so that they can remain sustainable and return to a healthy state even after a trauma such as a major cyclone or flood. Resilience includes psychological, empowerment, institutional, ecosystem and infrastructure considerations. The plan should incorporate the coastal adaptation ladder as set out below.

#### *Use the coastal adaptation ladder*

The coastal adaptation ladder is a hierarchy of planning decisions which are not mutually exclusive but can be ordered from highest to lowest priority. They are:

- a. Avoid creating future liability. Direct new development away from the coast. This guideline already exists in some state planning policies, but may be open to interpretation in some contexts. Local governments can embed coastal SPPs in town planning schemes to give an unambiguous message to developers. Allow generous buffers between the sea and buildings in the form of native vegetation and public open space.
- b. Protect and enhance natural buffer systems. Coasts have their own buffer systems such as dunes and wetlands. These can be strengthened through the planting of native vegetation and avoiding their destruction for development purposes. This can slow the erosion of shorelines.
- c. Roll back existing development. Move existing coastal development to safer ground, or plan for its complete removal. This is a strategic planning process that will involve close community and stakeholder engagement. Specific policies, standards and guidelines will need to be developed.
- d. Accommodate floods and sea level rise. Some development can be allowed to remain longer in a transition zone if it is resilient to occasional inundation or flooding. This includes some sports and recreation facilities or parkland. Some development can be

made more resilient to flooding or inundation through building retrofits or design.

- e. Defend highly valuable assets with coastal engineering structures. This option is attractive to many stakeholders but present problems in the form of: conflicts around prioritisation; expense of construction; false perceptions of long term risk reduction; increased future liability for maintenance; transfer of risk along coast; and loss of beach.

#### *Mitigate to adapt*

The fewer greenhouse gases we emit, the less we will have to adapt in the future. Mitigation is still the best form of adaptation.

### Scenario: Rapid Coastal Erosion at the Region of Big Bonanza Coast

The hypothetical region of Big Bonanza Coast has been attracting a range of residents and visitors for many years. In the past 15 years urban development has increased at a rapid rate, making it among the fastest growing regions in Australia.

Big Bonanza Coast features a surf beach with a reef break which is popular with local and interstate surfers. The beach is backed by dunes with an estuary-opening adjacent to the surf beach. On one side of the estuary a woodland featuring a rare and highly localised species of eucalypt occurs behind the primary dunes. This area is part of the Wardan National Park, which protects the dunal ecosystem, eucalypt woodland and also a rare species of wallaby. The sea is famous for its clear turquoise water and abundant fish such as snapper, bream, tailor, drummer and luderick that can be angled from the beach, although these are declining in number. The estuary contains a commercial and recreational crab fishery. A popular safe swimming beach is located close to the town. Around the estuary and on the dunes there is tourism and residential development. An airport and hospital also exist close to the estuary. The main road runs very close to the sea and crosses the estuary at a low bridge. Inland of the estuary there are wineries and farms.

Big Bonanza Coast is thus of interest to sea-changers, retirees, scientists, fishers, surfers, conservationists, holiday-makers, tourist operators, entrepreneurs, developers, creative industry operators, and a range of primary production value-added specialist beverage and gourmet food producers. Indigenous folk have also valued the area for thousands of years for its abundant food sources and excellent campsites. There are several significant men's sites and women's sites on the dunes and around the estuary.

Because of its varied land uses, this location is highly prized and under extreme pressure for development. The region has become divided over land use issues, with diverse interests in the use and protection of the dunes, estuary and seashore. There are also divisions between the older residents who remember fondly the quiet little town they first came to and the newcomers who are part of the development boom.

The area straddles two local government areas that lie on either side of the estuary: Wajup Shire on one side which is largely rural, with wineries and farmland, but with much land under development applications; and the Town of Sunny Haven on the other side where much of the new development has already occurred.

Significant long-term shoreline recession has already been occurring as part of a historical pattern. Erosion of beaches and sand-dunes is now accelerating. What were previously isolated erosion points have now reached a threshold where they have coalesced into a major loss of beachfront along the whole coastline. Each winter, shoreline recession eats further into the dunes where the national park and housing developments are located.

Even though under current conditions there is already very serious erosion on beaches, dune systems and the township, under climate change projections these will be exacerbated by:

- Changing patterns of alongshore and onshore sediment transport
- A significantly accelerated rate of erosion due to sea level rise
- Much more frequent coastal inundation from storm surges
- Increased catchment flooding from heavy rainfalls
- Unpredictable effects on marine ecology and fish stocks produced by changing sea temperatures and currents.

However, because of the intense demand for residential and tourism development, both local governments are under constant pressure to approve requests for development and increase infrastructure provision, but also to protect vulnerable ecosystems, land and properties. This has come to a head with several controversial new developments in place and others being vigorously proposed by real estate and tourist developers.

- A large marina is under construction, including island and canal developments aimed at building 1000 dwellings, hotels, boardwalk retail developments, as well as beaches and seawalls. This would provide employment for 1000 during construction and 500 once in place. The developer has provided scientific evidence that the marina will create minimum additional coastal impacts, but this has been disputed by NGO groups who have commissioned alternative research and accessed CSIRO science to support their position.
- There already exists a luxury residential development on the primary dune system, which would have access to the marina facilities.

- A tourist resort has just opened, aiming to concentrate on recreational fishing, both big game offshore and angling onshore. The owner is asking for support from Council and state government to provide more jetties, fishing amenities, seating and fish cleaning areas.
- The local conservation group backed by several national and international NGOs is calling for the gazettal of waters off Big Bonanza Coast as a marine protected area, as altered current regimes mean that reefs in this area are now a key larval recruitment site for several iconic but threatened marine species as well as the commercial rock lobster. Commercial fishing interests dispute the science of the NGO proposal, claiming the area is not as unique as is suggested.
- While in the past, wastewater was deposited in inter-dunal depressions, all wastewater is now disposed via an ocean outfall. However, changing currents and beach forms mean that sewerage is now washing back towards the beach in some storms.
- An Indigenous burial site in the dunes has recently been exposed in the face of the eroding dune which reveals that Indigenous folk were occupying this site for much longer than previously acknowledged – a significant and surprising find.

Given that coastal erosion is rapidly accelerating and all of these developments are under threat from cascading impacts, how can we collectively manage the future development of this area?

## Deliberation process

The aim of this deliberative process is to share innovative ideas and to build a strategy based on the video, map and scenario provided. You will need to be in small groups and nominate a scribe and facilitator for each group. The process takes a minimum of 2 hours, not including feedback.

### A. Coastal adaptation strategy development (90 minutes)

The Big Bonanza Coast region has become very polarised about its future development. Hence, the Commonwealth, State and local governments concerned have decided to appoint a broad-based Taskforce on coastal adaptation to climate change for the region. You are members of this Taskforce. Your brief is to consider as wide a range of community interests as possible, and to think in the short and long term. You are asked to begin by addressing the following questions:

1. What are key challenges?
2. What is most likely response(s) to these challenges under a business as usual approach?
3. Would this response(s) be adequate? If not, why not?
4. What are some innovative ideas for alternative responses? You should consider:
  - a) How can science and research be best used in decision-making?
  - b) Which actors should play a role in developing a long-term adaptation response?
  - c) What legislation or regulation should be created or eliminated?
  - d) What new processes, institutional arrangements and policies would be necessary?
  - e) What sort of economic, commercial and planning instruments and signals can be deployed?

### B. Affinity diagram

For each of the questions above, write individual ideas on post-it notes as you go and use them to create an Affinity Diagram.<sup>1</sup>

### C. Plenary (30 minutes)

A spokesperson for each affinity diagram reports the findings. All materials are to be written up and sent back to workshop participants.

<sup>1</sup> An Affinity Diagram is a tool for sorting large amounts of data, based on a creative rather than logical process, sorting rather than discussing. It is particularly useful to avoid old ways of thinking or when many ideas are produced and need to be rapidly themed. Ideas are written by the broad participating group onto post-it-notes, one idea per note, and later are placed randomly on butchers' paper. A small team (4-8) sorts the post-its into 5 – 10 groupings, without discussion. The team discusses what the heading statement should be, incorporating both the tone and content of the ideas below. After final modification, this becomes the final Affinity Diagram.