The importance of:

Baseline study and ongoing monitoring

‘Coastal narratives – past, present and future’.

September 2022

Integrated Coasts

Coastal narratives

Narrative of the past (baseline study)

Every beach has a story: we collect and analyse data from the past that forms a story as to how a beach was formed and how it has behaved over time.

Narrative of the present (ongoing monitoring)

Monitoring provides a routine update to the story of each beach.

Narrative of the future (projections)

24 NEWS | Sunday, November 7, 2021 advertiser.com.au

Cliffs at risk of collapse

CLARE PEDDIE
CLIMATE AND ENVIRONMENT EDITOR

THE base of the cliffs at Seaford have receded substantially, a study has found, putting them at risk of collapse in decades to come, as well as endangering the road and homes behind them.

Onkaparinga Council commissioned a study by consultant Integrated Coasts on the current and future risks to the district's seafront and to public safety as a result of climate change.

It found the cliff base at Seaford had receded up to 4m from 1979 to 2017, while storms were increasingly causing erosion damage.

A 2016 storm surge was the highest since records began in the 1940s.

"If seas rise as projected, sea flood modelling for 2050 and beyond demonstrates that routine highwater events will have an increasingly significant impact on these cliffs," the council's summary of the study says.

"Combined with larger extreme events, these cliffs are likely to undergo significant and rapid recession, and in some places collapse."

The study also found that towards the end of the century, Port Noarlunga would be awash, with seas overtopping the jetty and promenade and gouging sand from the beach and dunes.

The Onkaparinga River would rise above the levee bank to flood homes.

Integrated Coasts director Mark Western, pictured, said sea levels were already rising and the rate was expected to accelerate after 2050.

"Then beaches and soft sediment cliffs will increasingly undergo recession and place infrastructure at risk," he said.

"In most places, a public road is positioned between the coast and private assets. This means that most risks will initially impact council-owned assets. However, in the longer term, private infrastructure, public safety and the health of our ecosystems could be impacted."

The completed study had been released for public consultation, allowing feedback on how the council should tackle the challenges identified before it prepares a plan to put before elected members.

Onkaparinga Mayor Erin Thompson said fortunately most of the council's 31km coastline was not likely to be vulnerable to flooding.

But she said the council would need to monitor a few areas so risks could be managed effectively.

"Our coastline is generally elevated and therefore most areas won't be vulnerable to seawater flooding, but the study does reveal our main challenge will be responding to erosion issues," she said.

"Getting ahead of the game by taking a planned response to the study will allow us to keep our communities and environment safe and save us and our ratepayers money in the longer term."

She said "protective infrastructure" could be needed to reduce the impact of coastal hazards, while some council assets might have to be relocated progressively inland.

Baseline study

Narrative of the past

What do we mean by baseline?

The Ecology Dictionary provides the most appropriate definition of a baseline:

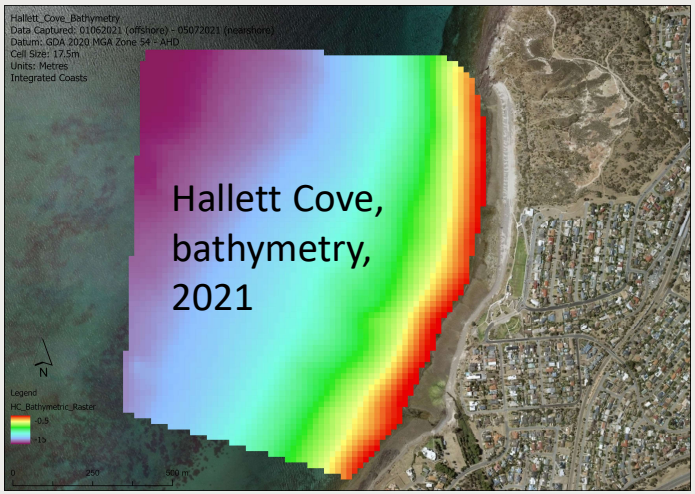
A quantitative level or value from which other data and observations of a comparable nature are referenced…
[and]

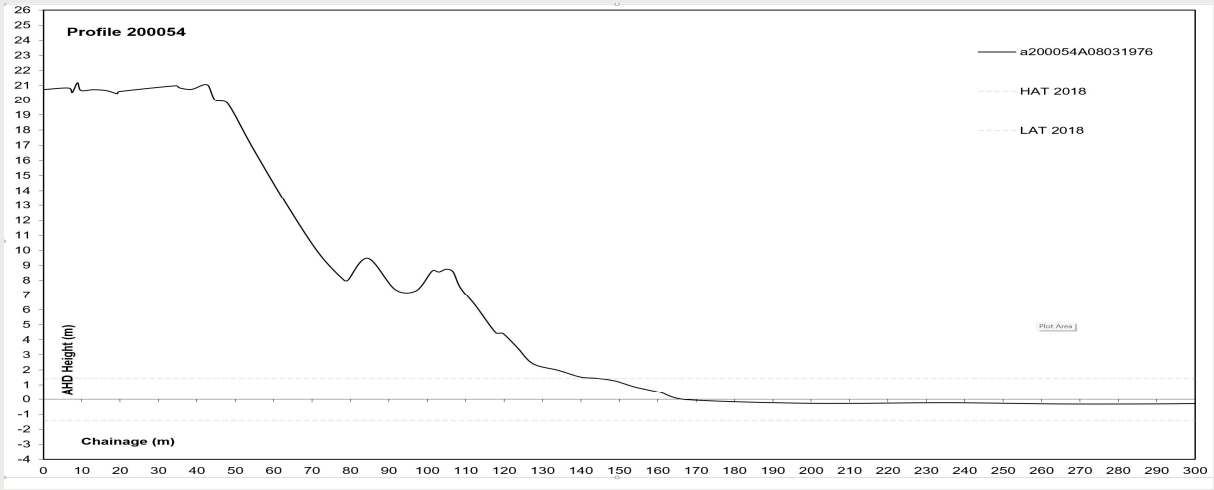
Information accumulated concerning the state of a system, process, or activity.

Baseline study

Version 1 of the definition

A digital model, aerial photograph, coastal profile line establishes a snap shot in time….a ‘baseline from which to compare future changes’.





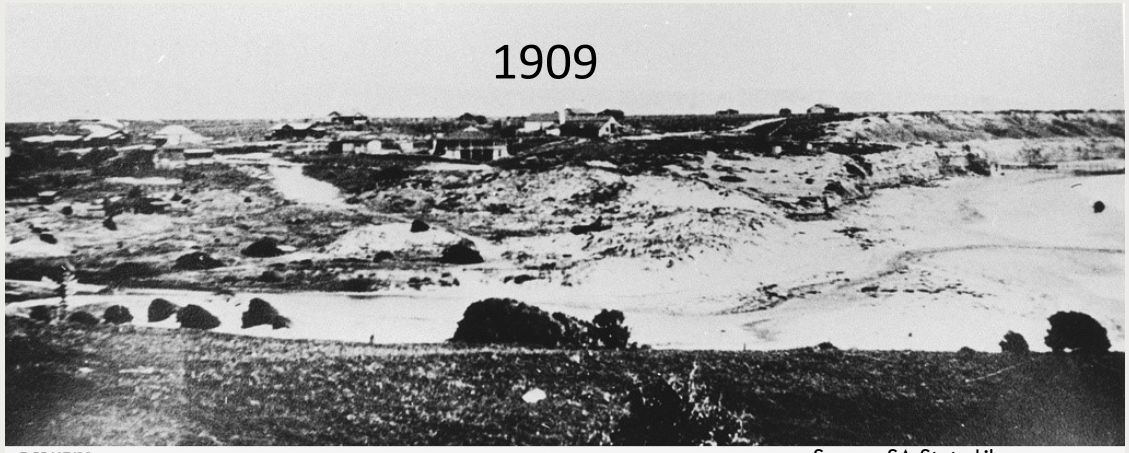
Aldinga Reef, coastal profile line, 1976, CPB

Baseline study

Version 2 of the definition

‘Information accumulated concerning the state of a system, process, or activity’.

1909



B 55417/26

Source: SA State Library

2020

Source: M. Western

The state of this system – stable

Baseline study

Version 2 of the definition

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The state of this system – stable

Baseline study

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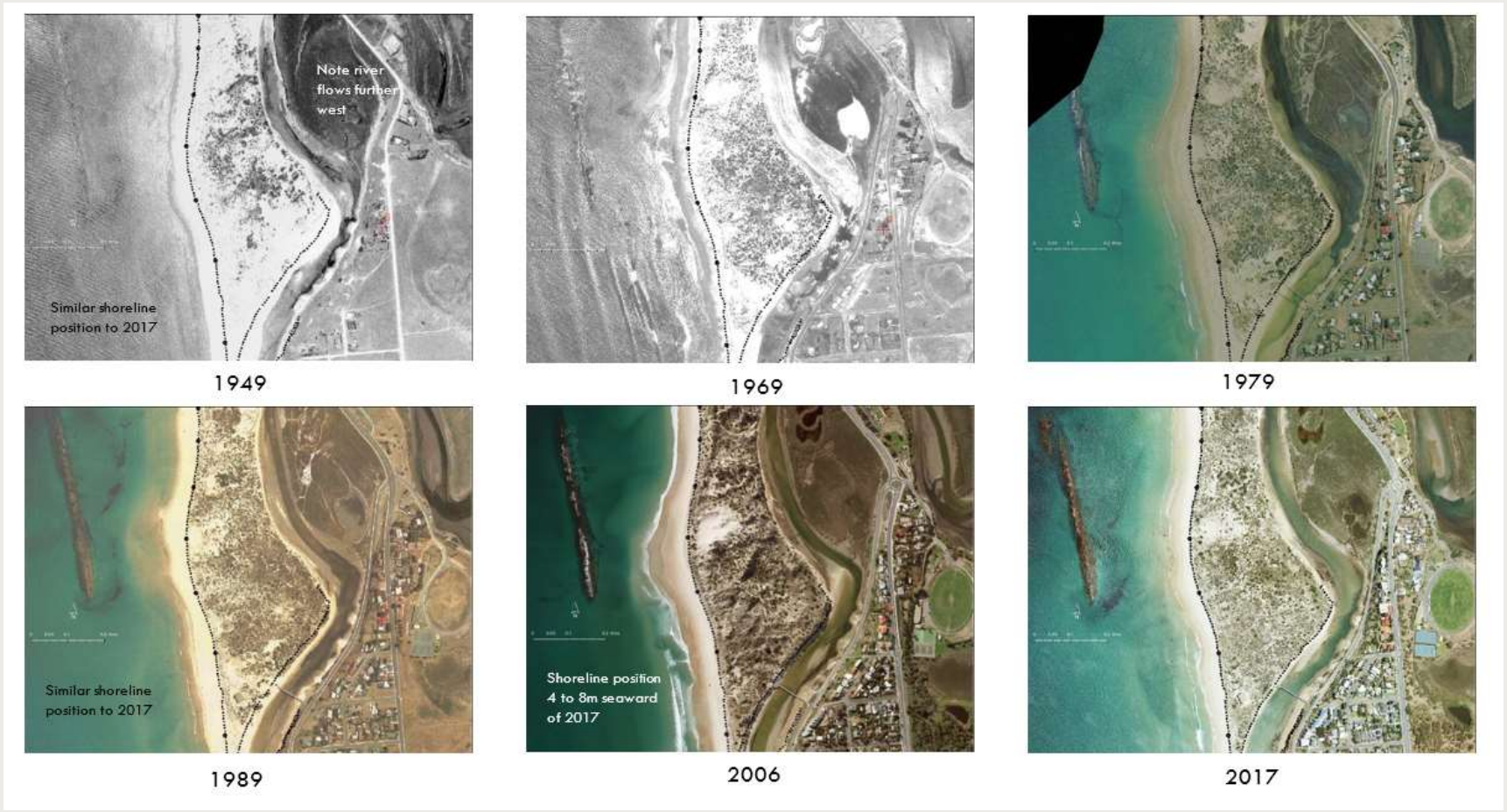
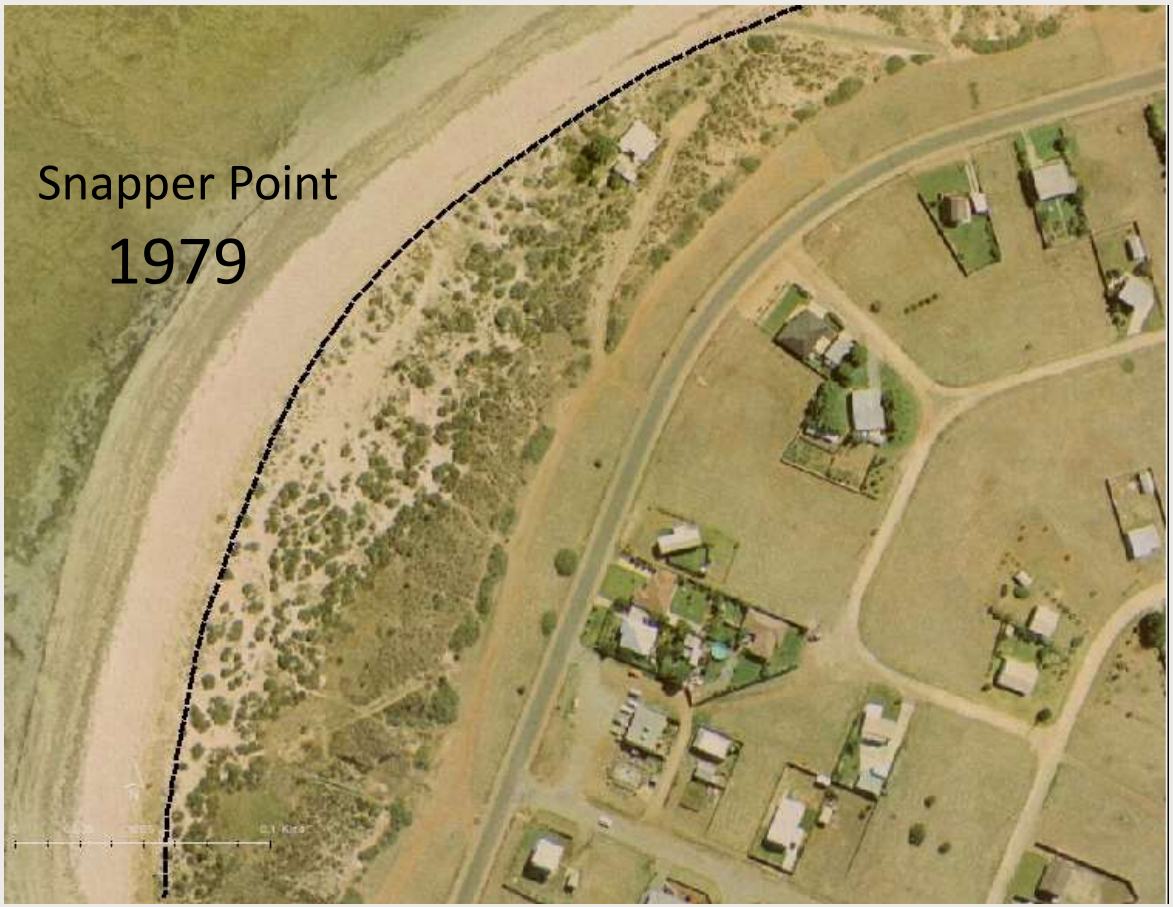


The state of this system – stable

Baseline study

Understanding the state of the system …

1. Identifies when the coastline is moving outside of its normal parameters.



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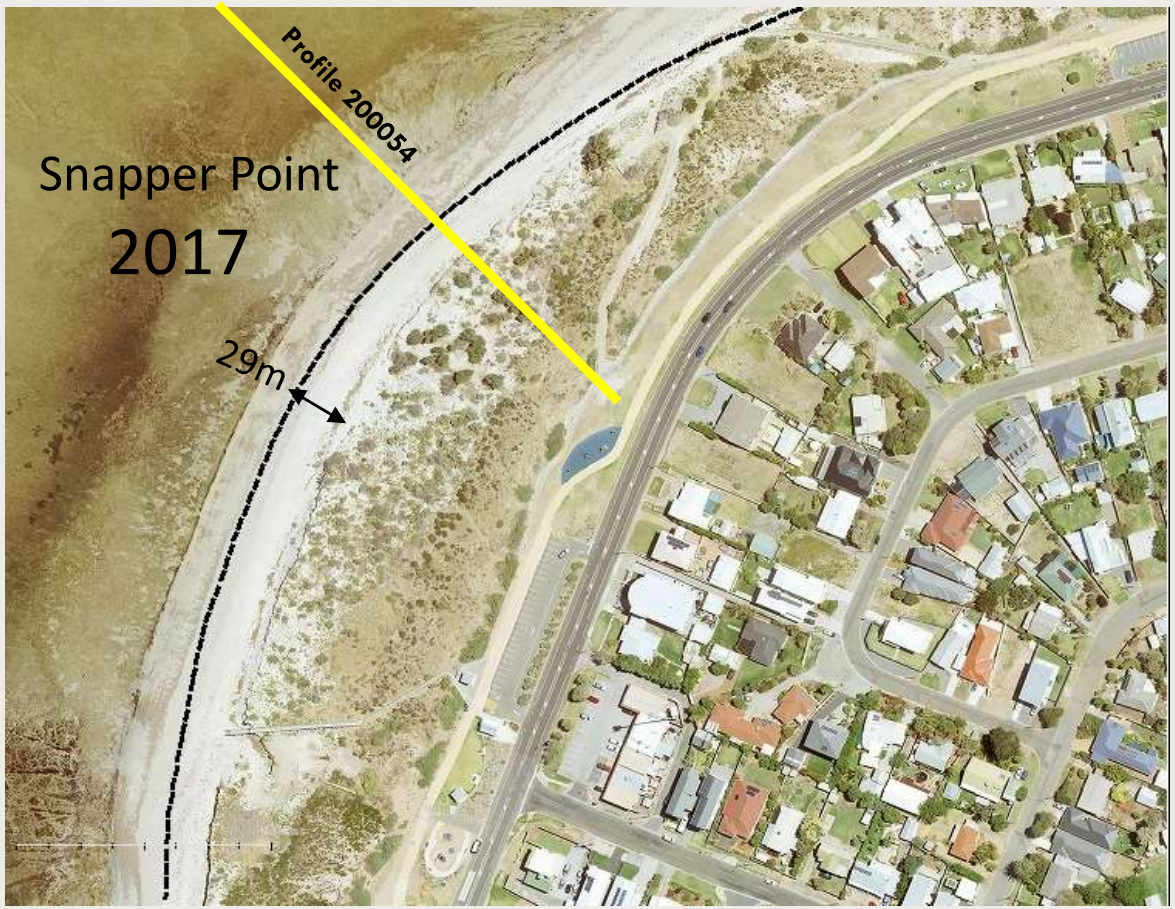

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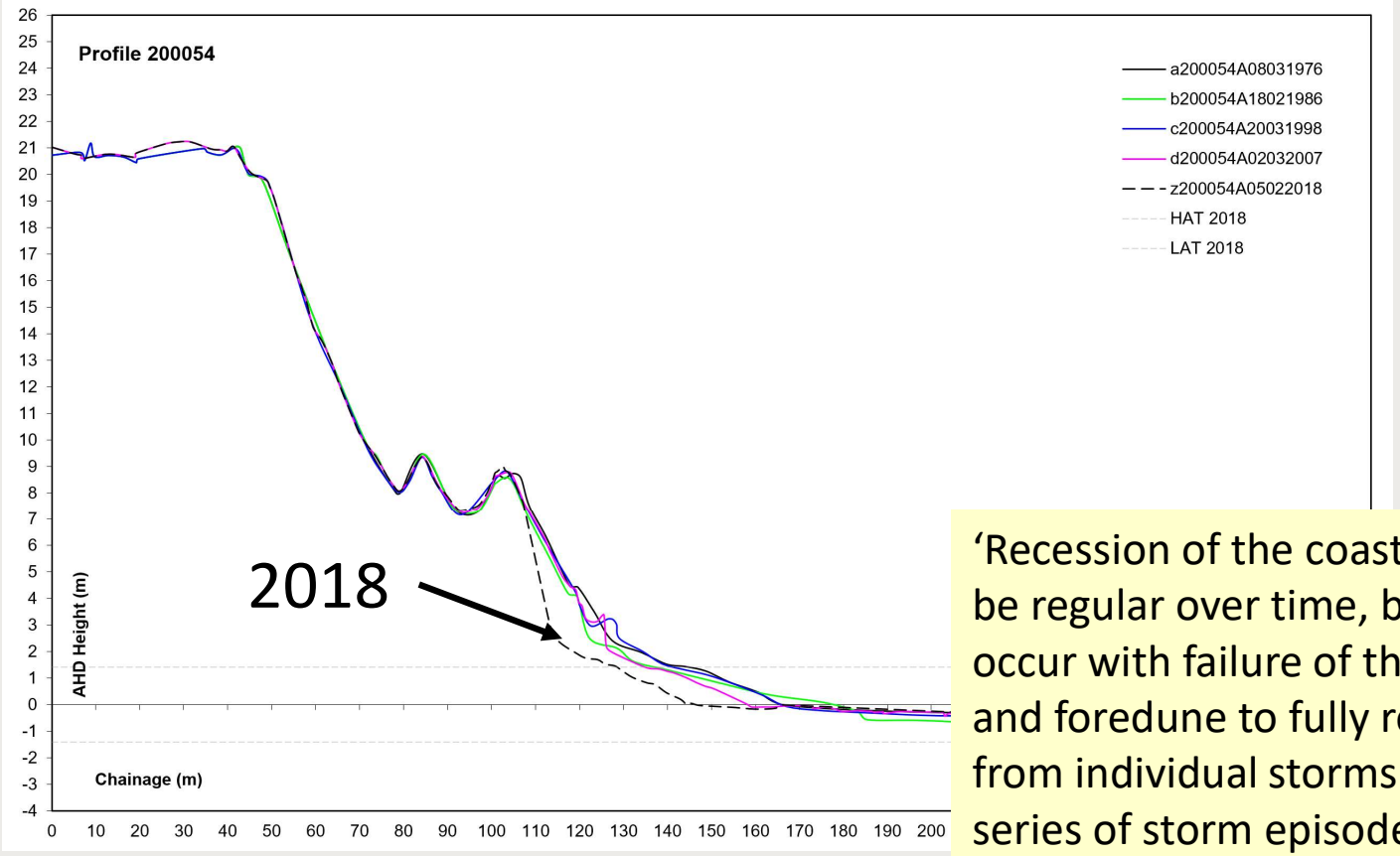

'Recession of the coast will not be regular over time, but will occur with failure of the beach and foredune to fully recover from individual storms or a series of storm episodes'.
Brian Caton, 2007

Understanding the state of the system …

1. Identifies when the coastline is moving outside of its normal parameters.
2. Provides the appropriate basis for decision making.

Recent erosion left the beach access way stranded on the beach,
Kent Reserve, Victor Harbor, 2021.

Understanding the state of the system …

2. Provides the appropriate basis for decision making.

Kent Reserve, Victor Harbor

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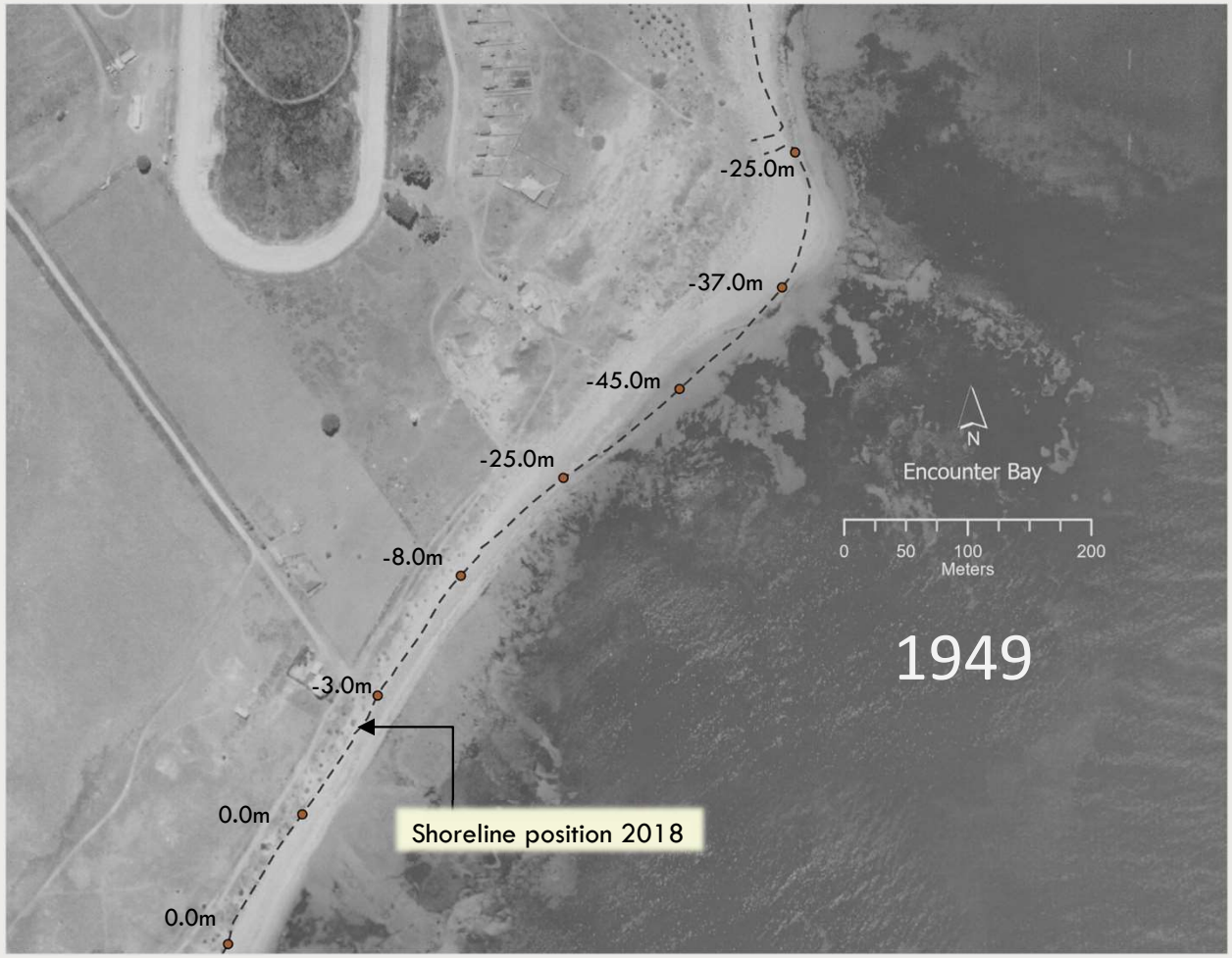


Kent Reserve, Victor Harbor

Understanding the state of the system …

2. Provides the appropriate basis for decision making.

Kent Reserve, Victor Harbor

Understanding the state of the system …

2. Provides the appropriate basis for decision making.

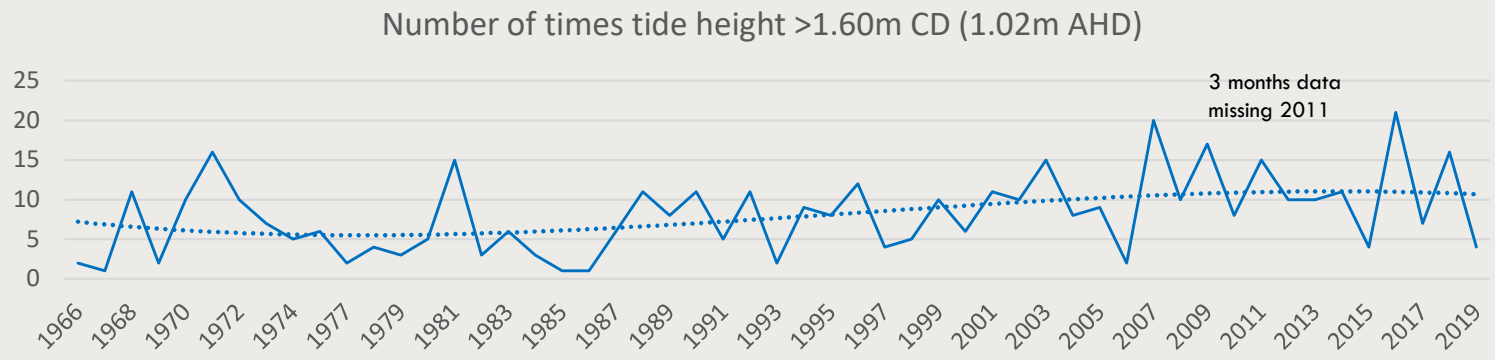
General theory was lack of sand supply from the west:

- Sand sausage (2004)
- 9 groynes (2009)
- Beach nourishment 2500m3 (2009)
- Block protection (2015)

Esplanade Beach, Victor Harbor

Understanding the state of the system …

2. Provides the appropriate basis for decision making.



Correlation with tidal data

Between 2007 and 2011 tides were over 1.60m CD:

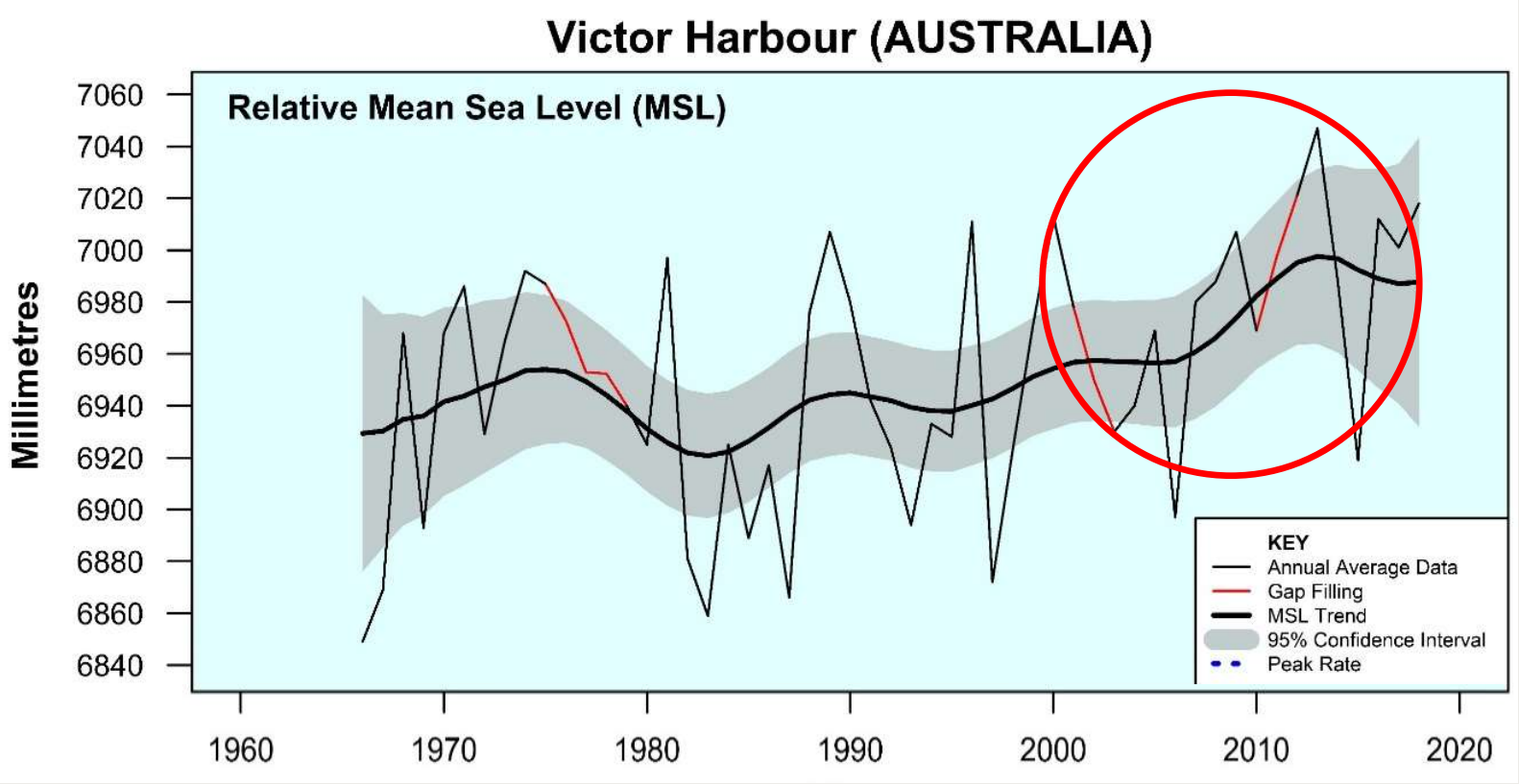
- 2007 – 20 times.
- 2009 – 17 times.
- 2011 – 15 times.

The likely cause of erosion was increased storminess in this time period.

Esplanade Beach, Victor Harbor

Understanding the state of the system …

2. Provides the appropriate basis for decision making.



Dr. Phil Watson, (2020) Researcher, long term tide gauges and satellite record.

We need to understand the state of all the systems

Understanding the state of the system …

1. Identifies when the coastline is moving outside of its normal parameters.

2. Provides the appropriate basis for decision making.

3. Provides a context to understand the role of human intervention.

Understanding the state of the system …

Provides a context to understand the role of human intervention

Charles Reade, South Australia's first government Town Planner, laid out the design, proposing 'construction of a sea wall 3 to 4 feet high above the existing high-water mark' which was needed to **'redress the recurrent problem of high tides and strong winds which affected the suitability of the foreshore as a public recreation space and damaged the newly planted gardens'.**

'Legacy issues' – past human intervention that is causing ongoing coastal problems and irrespective of any rise in sea level.

Understanding the state of the system …

Provides a context to understand the role of human intervention

'Legacy issues' – past human intervention that is causing ongoing coastal problems and irrespective of any rise in sea level.

Understanding the state of the system …

Provides a context to understand the role of human intervention (apart from any sea level rise issues).

‘Legacy issues’ – past human intervention that is causing ongoing coastal problems and irrespective of any rise in sea level.

Understanding the state of the system …

1. Identifies when the coastline is moving outside of its normal parameters.

2. Provides the appropriate basis for decision making.

3. Provides a context to understand the role of human intervention.

4. Enables us to apply future projections in a more fine-grained manner.

Understanding the state of the system …

Enables future projections to be applied in a more fine-grained and accurate way.

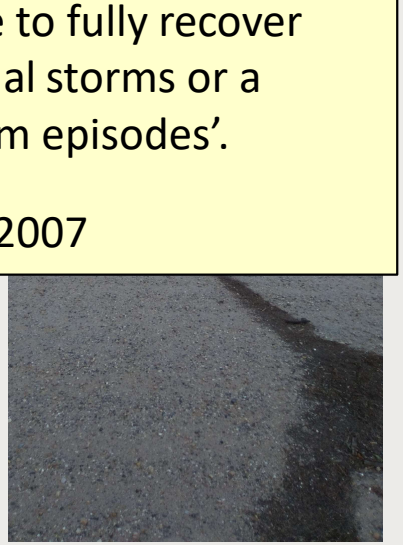
Storm studies

9 May 2016 (14 locations around Gulf St Vincent)
Monitored storm for A)
Onkaparinga coastline
Marion coastline (mor

'Recession of the coast will not be regular over time, but will occur with failure of the beach and foredune to fully recover from individual storms or a series of storm episodes'.

Brian Caton, 2007

Port Noarlunga



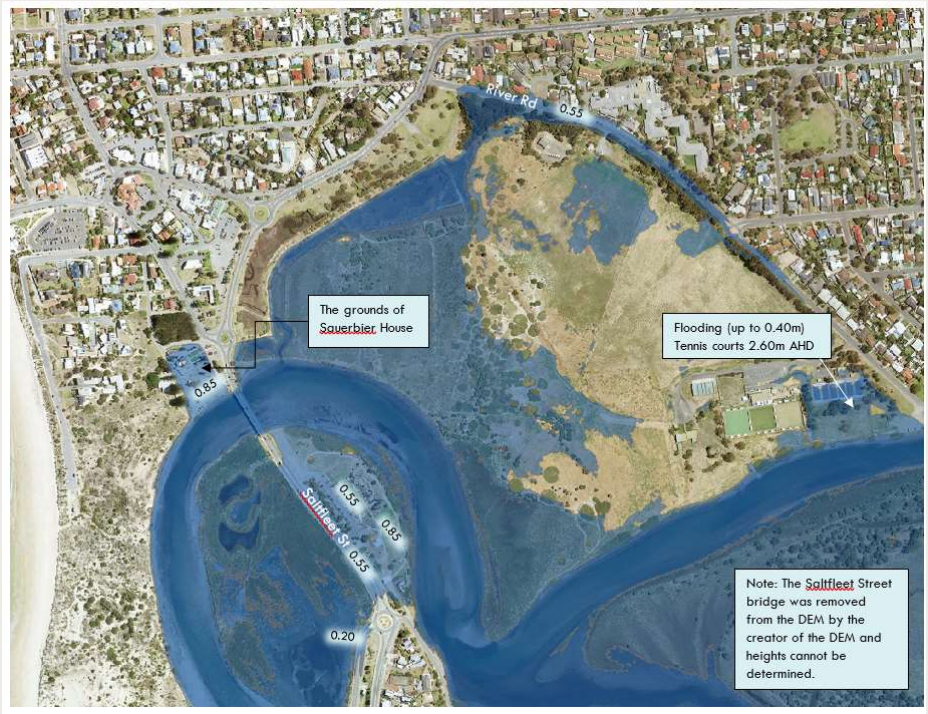
Survey

Digital model

Understanding the state of the system …

Enables future projections to be applied in a more fine-grained and accurate way.

Storm studies

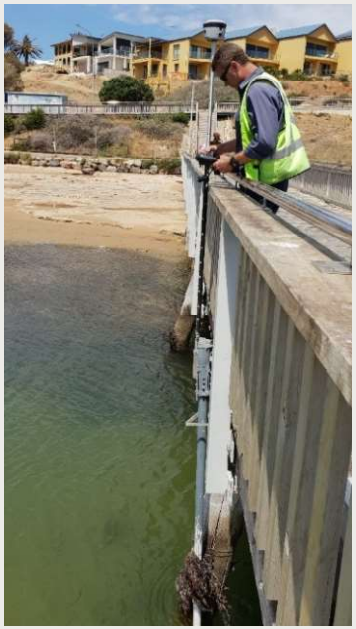


For example, if seas rise as projected then the levee at Port Noarlunga will provide protection until circa 2070.

Understanding the state of the system …

Enables future projections to be applied in a more fine-grained and accurate way.

Tidal studies (routine tides)



Tide gauge in Onkaparinga estuary
(5 years life span)

Installed temporary tide gauges at Maslin and Sellicks Beaches

Understanding the state of the system …

Enables projections to be applied in a more fine-grained and accurate way.

Tidal studies (findings)

Port Noarlunga is 0.19cm lower than Outer Harbor

Tidal regime from O'Sullivan to Sellicks suitably similar for modelling without adjustment.

The cost of doing these projects is often high and not regarded as essential.

There is a very large difference to saying 'we think' to 'we know' when it comes to dealing with governments and the community.

Understanding the state of the system …

Enables projections to be applied in a more fine-grained and accurate way.

24 NEWS | Sunday, November 7, 2021 advertiser.com.au

Cliffs at risk of collapse

CLARE PEDDIE
CLIMATE AND

It found the cliff base pact on these cliffs," the council's summary of the study says. Mark Western, pictured, said sea levels were already rising The completed study had been released for public con- areas won't be vulnerable to seawater flooding, but the

We can act decisively and confidently because we have the data.

Understanding the state of the system …

Provides the basis to advocate to governments and the community for necessary changes.

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We can act decisively and confidently because we have the data.

Ongoing monitoring

Narrative of the present

Understanding the ‘state of the system’ in the present….

1. Provides the appropriate basis for decision making.

2. Identifies when the coastline is moving outside of its normal parameters.

3. Enables us to apply future projections in a more fine-grained manner.

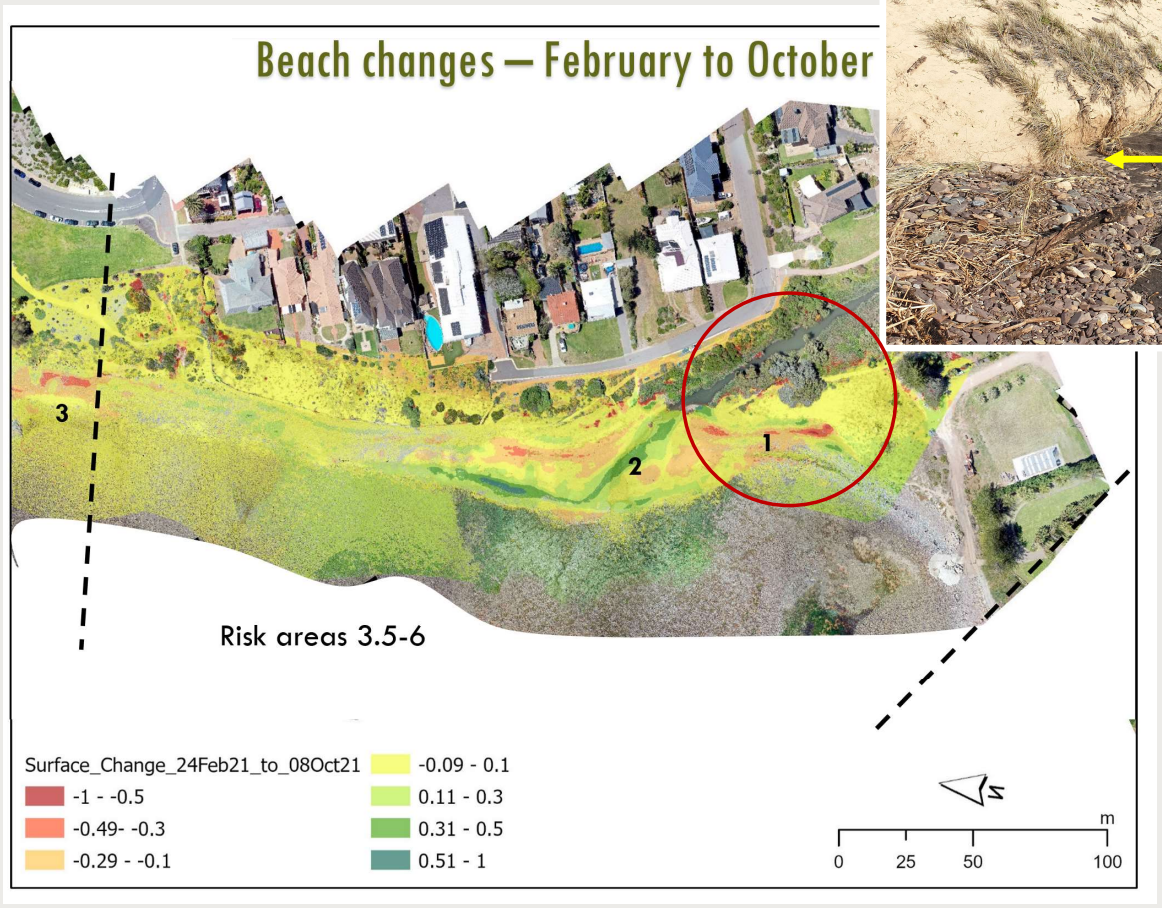
4. Provides the basis to advocate to governments and the community for necessary changes.

Two sides of the same coin

Ongoing monitoring

Narrative of the present

Ongoing monitoring provides early warning of impacts in backshores.



City of Marion – 2 year monitoring program

Baseline study – state of beach systems (Aus)

Findings (National)

Andrew Short, 2022, Australian beach systems: Are they at risk to climate change?

Over the last 30-40 years:

- 78% of beach systems were stable.
- 11% were receding.
- 11% were accreting.
- Coastlines were adapting at the current rate of sea level rise.

Narrabeen (NSW):

- Beach monitoring (fr. 1976).
- Has an accretion/ erosion range of 100m that takes place over decades.
- Sea level rise to date has not triggered shoreline recession.

'Legacy issues'

www.dailymail.co.uk

Baseline study –sea level rise (Aus)

Findings (National)

Watson, P., 2011, Is There Evidence Yet of Acceleration in Mean Sea Level Rise around Mainland Australia?

Watson, P., 2020, Updated mean sea level analysis: Australia

- Took into account vertical land movement (VLM)
- Used four gauges with tide gauge records of +75 years
- Attempting to identify eustatic (global) sea level rise
- Found only weak acceleration in tide gauges (statistically equal to zero).

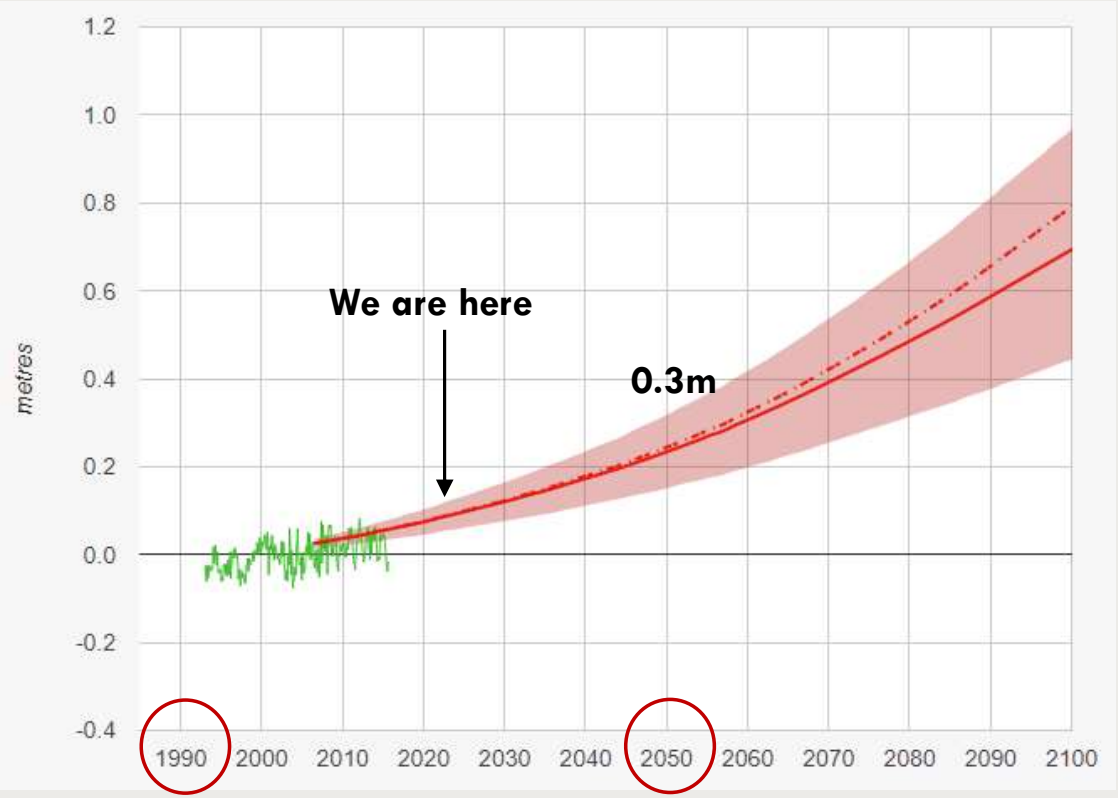
Hague, B., 2022, Australian coastal flooding trends and forcing factors

- Did not into account vertical land movement (VLM)
- Found that seas had risen approximately 105mm since 1966 (1.8mm per year), with increased rate of sea level rise since 1993 (3.7mm per year)
- The purpose was to identify increased tidal flooding (routine flooding) rather than utilsing 1 in 100 ARI.

Projections

Narratives of the future

Cautionary tales about emphasis and messaging.



IPCC AR6 (citing Vousdoukas et al, 2020), Median shoreline change projections under both RCP4.5 and RCP8.5 show that, by mid-century, sandy shorelines will retreat (relative to 2010) by between 50 m and 80 m all around Australiasia (Short p. 2)

Projections

Narratives of the future

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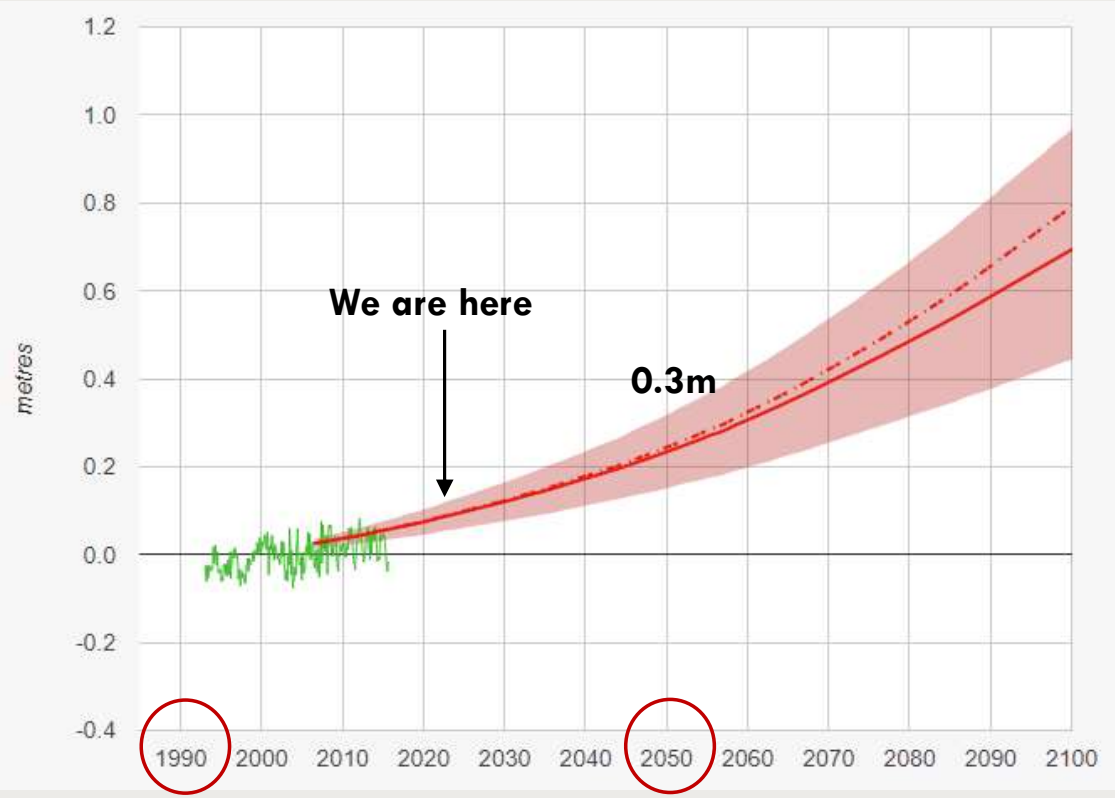


IPCC-AR6 predication that majority of Australia's sandy beaches will be in retreat by mid-century and recede by a median of 100 m by 2100, is refuted (A. Short, p. 8).

It would appear that the tipping point, at which general beach recession will commence around Australia, is still decades away (A. Short, p. 8).

Projections

Narratives of the future

Cautionary tales about emphasis and messaging.

‘Children just aren’t going to know what snow is’, David Viner, Climate Scientist, 2000.

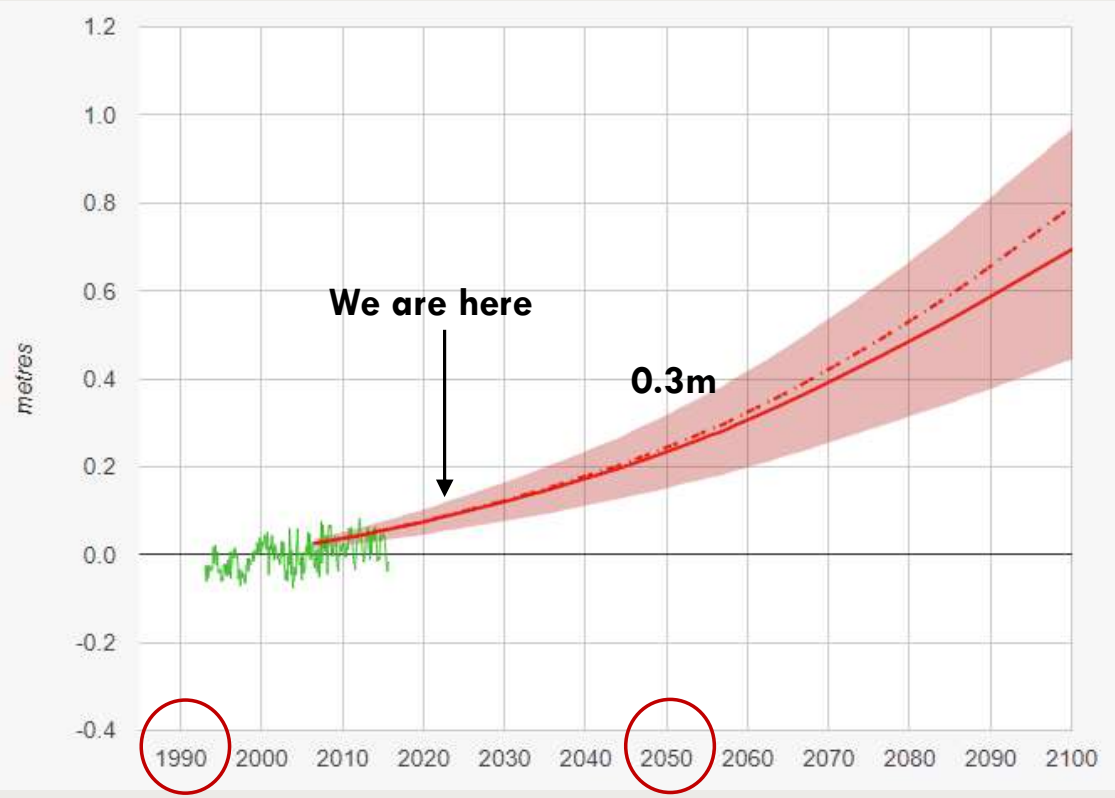
AUSTRALIA RECORDS ITS MOST SNOWFALL EVER OUTSIDE OF AN ALPINE AREA (2020)

RECORD SNOW AT PERISHER (2022)

Projections

Narrative of the future

Cautionary tales about emphasis and messaging.



The emphasis on long range projections and the over-interpretation of current events is creating two responses:

- Unrealistic fear (esp. young)
- Increasing scepticism (older)

The importance of:
Baseline study and ongoing monitoring

1. Identifies when the coastline is moving outside of its normal parameters (this may be decades away).

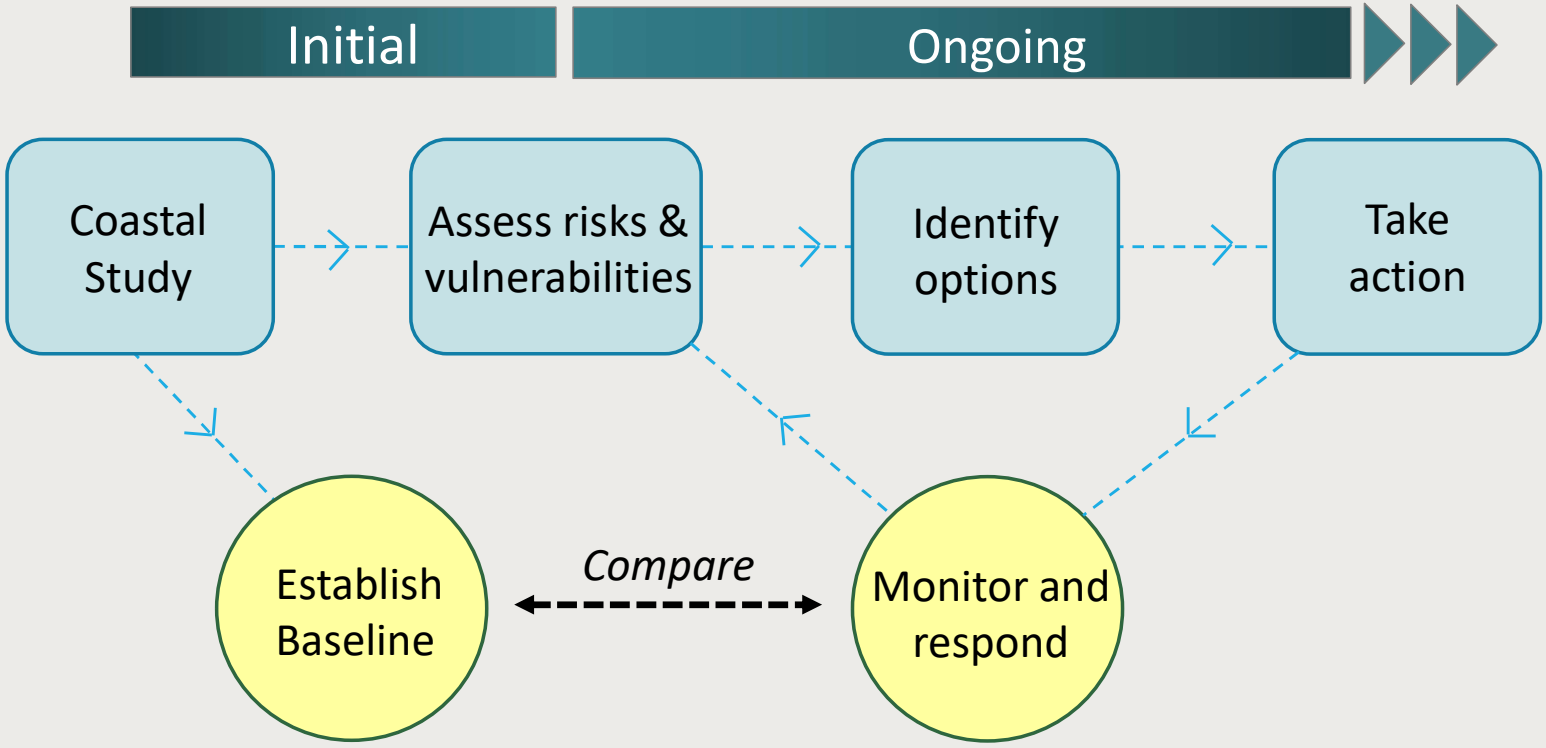
2. Provides the appropriate basis for decision making (the more we know the story of the beach, the better our decisions will be).

3. Provides a context to understand the role of human intervention (apart from any sea level rise issues).

4. Enables us to apply future projections in a more fine-grained manner (including lower or delayed sea level rise).

5. Provides the basis to take Governments and the community along with us (activists or scientists?) (sceptics or supporters?)

Strategy for coastal management: Baseline study and ongoing monitoring



Mark Western (2017)

Projections

Narratives of the future

Cautionary tales about emphasis and messaging.

‘Even the rain that falls isn’t going to fill our dams and river systems’. Professor Tim Flannery, Chief Climate Commissioner, 2007,

NSW DAM LEVELS REACH 100 PERCENT CAPACITY IN MANY REGIONS

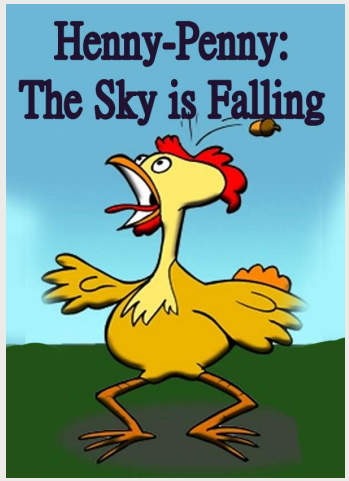
https://www.msn.com/en-au/news/australia/nsw-dam-levels-reach-100-per-cent-capacity-in-many-regions/ar-AA1297dO

SHOULD WE HAVE BUILT MORE DAMS RATHER THAN DESALINATION PLANTS?

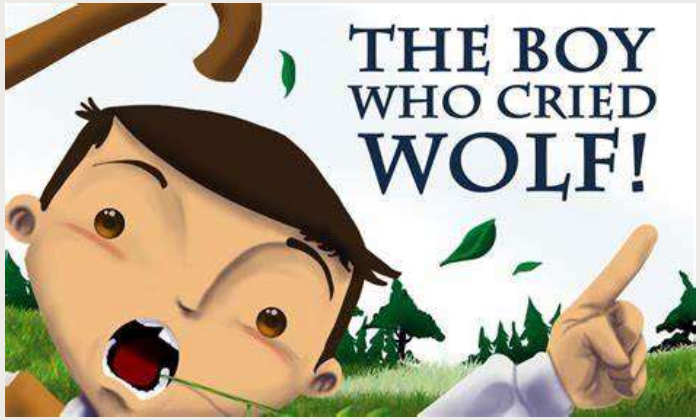
Projections

Narrative of the future

Cautionary tales about messaging.



https://www.abc.net.au/



The emphasis on long range projections and the over interpretation of current events is creating two responses:

- Unrealistic fear (esp. young)
- Increasing scepticism (older)

Conclusions

Funding:

- Obtaining funding for monitoring projects
- Funding cycles

Collecting data:

- In an organised and holistic way
- Accumulating and analysing various data sources
- Should we be tracking vertical movement of tide gauges at Outer Harbor and Victor Harbor (60 years of data)

Making data accessible so that it can be utilised in decision making.

Baseline study

Findings

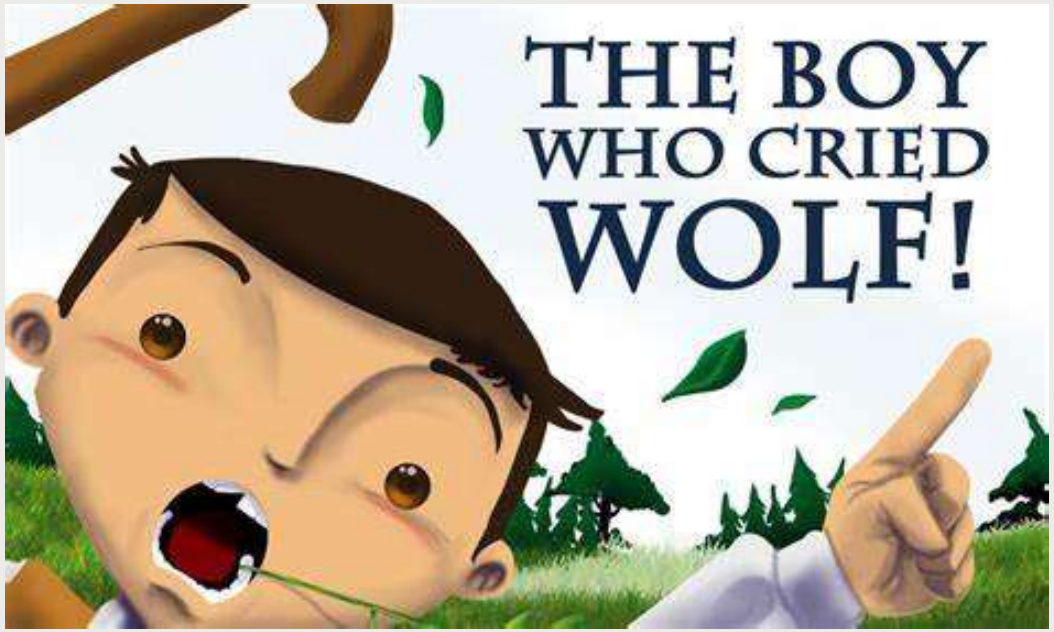
- The coastlines have been largely stable.
- Pockets of erosion and accretion.
- Some locations at risk (Seaford Cliffs, Snapper Point).
- Some problem areas as a result of human intervention in the past (Yilki, Victor Harbor).

Personal Note

These findings NOT what I expected three or four years ago.

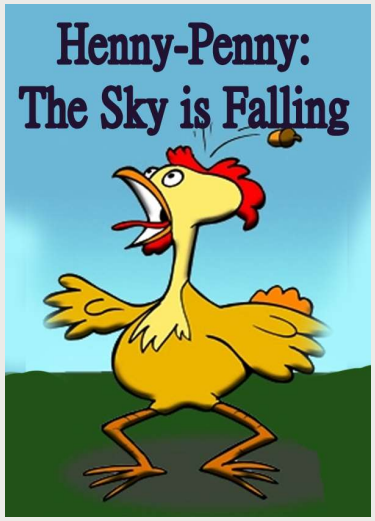
However, when dealing with the moral behaviour of adults, Samuel Croxall asks, referencing political alarmism, "when we are alarmed with imaginary dangers in respect of the public, till the cry grows quite stale and threadbare, how can it be expected we should know when to guard ourselves against real ones?".[11]

The Fables of Aesop, Fable CLV; available on Google Books, p. 263



"A liar will not be believed, even when he speaks the truth."

[“The Boy Who Cried ‘Wolf’” | Aesop's Fables | Aesop | Lit2Go ETC (usf.edu)]



Fear is only a short term motivator.

Some people become numb, some people are highly suspicious.

Understanding the state of the system …

1. Provides the appropriate basis for decision making.

2. Identifies when the coastline is moving outside of its normal parameters .

3. Provides a context to understand the role of human intervention.

4. Enables us to apply future projections in a more fine-grained manner.

5. Provides the basis to take Governments and the community along with us.

School of Geosciences
University of Sydney

Andy Short is a coastal geomorphologist specializing in coastal processes, morphology and evolution. He has degrees from the University of Sydney, University of Hawaii and Louisiana State University and has worked on the coasts of North and South America, including north Alaska and Hawaii, Europe, New Zealand, Korea and the entire Australian coast. He is presently Honorary Professor in the School of Geosciences at the University of Sydney; Honorary Professorial Fellow in the School of Earth and Environmental Sciences at the University of Wollongong; Senior Coastal Scientist (part-time) with CoastalCOMS.com; and board member of National Surfing Reserves (Australia). He also runs his own consultancy called Coastal Studies and served on the NSW Coastal Panel (2011-2019). He has written 11 books, edited 5 and published over 200 scientific publications and reports. His contribution to both coastal science and beach safety was recognized on Australia Day 2010 with an Order of Australia Medal. His latest book (2019) covers the entire Australian coast and it's 354 sediment compartments and is titled "Australian Coastal Systems: beaches, barriers and sediment compartments".