FACT SHEET 2

Coastal landscape and hazards

A landscape of change

Redland City encompasses over 300 kilometres of coastline and supports a diversity of cultural, social, economic and environmental values. The coastal zone is highly valued by Traditional Owners, local communities and visitors to the area.

One of the more challenging aspects of the coastal landscape is that it experiences constant, and often rapid change. Wind, waves and tides continually work to move sediment and shape the shoreline and adjacent coastal plains.

Drivers of change

Tides: The periodic rise and fall of the daily tide moves sediment both on and offshore and shapes the form of the beach and near-shore environment. The Redlands coastal zone is semi-diurnal, meaning two high tides and two low tides each day. The difference between the lowest and highest tides experienced under normal conditions is called the tidal range. The maximum spring tidal range is around 1.9 m, but extreme weather events can cause considerably higher tides.

Wind and waves: Waves are generated by wind blowing across the water. Wind, combined with the morphology (shape) of the sea floor, drives the size, frequency, duration and energy of waves. Wave energy has the potential to move sediment both offshore, onshore, and along the coastline.

Data on tides, wind, waves and climate patterns are collected by buoys, gauges and weather stations situated along our coastline

Sediment supply: Sediment is delivered to coastlines from catchments, rivers, dunes and offshore environments. When historical sediment supplies reduce or cease, coastlines may be prone to erosion. When sediment supply is abundant, coastlines will tend to build seaward.

People and communities: The number of people living, working and visiting coastal zones is also a key driver of landscape change. The development of urban areas, infrastructure and farmland, can restrict and/or accelerate change.

Weather and climate patterns: Local climatic conditions (e.g. dominant wind patterns) as well as extreme events like cyclones will influence how the coastal landscape develops and changes over time. Extreme weather events can drive major coastline changes in a short period of time. Long-term changes in climate also influence sea level and coastal processes.

In the future, it is expected that the south-east Queensland coastline will experience more intense downpours, sea level rise and more frequent sea level extremes (Figure 1).

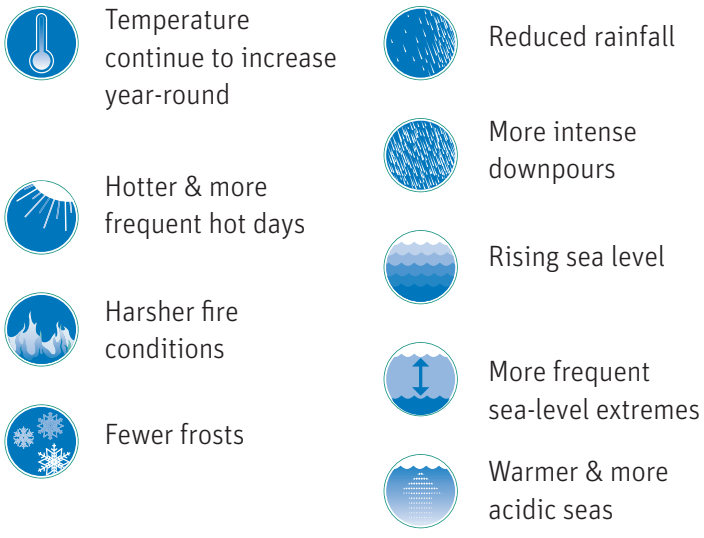


Figure 1. Climate change in the south-east Queensland region. DEHP 2016. https://www.qld.gov.au/_data/assets/pdf_file/0023/67631/seq-climate-change-impact-summary.pdf

What are coastal hazards?

Erosion and inundation are natural processes that shape the coastline. However, they can become hazards when they impact on coastal values and how we use and enjoy the coast.

Coastal hazards include:

- Erosion of beaches and the shoreline
- Short and long-term tidal inundation of low-lying coastal land.

Coastal hazards can have adverse impacts on a range of coastal assets including social, cultural, economic and environmental values. In south-east Queensland, coastal hazard impacts are typically associated with ex-tropical cyclones and East Coast Lows.

Storm tide inundation

Storm tide inundation is the flooding of low-lying coastal land from a locally elevated sea level (the 'storm tide'). The storm tide is a combination of the predicted tide, storm surge, and wave action (Figure 2). Storm surge is driven by the combined influence of low atmospheric pressure and high winds.

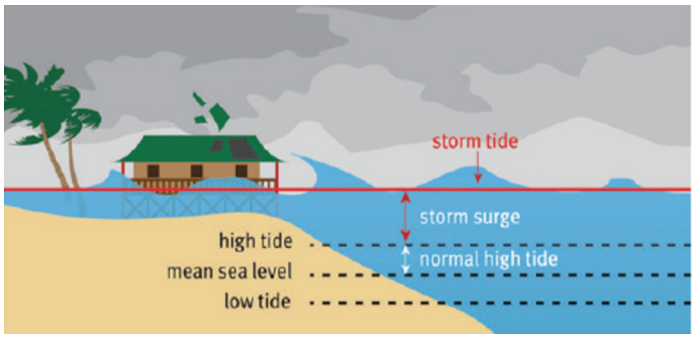


Figure 2. Storm tide inundation

Tidal areas

Tidal areas are periodically inundated by seawater over the regular tidal cycle, including areas impacted by the Highest Astronomical Tide (HAT) or 'king tides'.

Coastal erosion

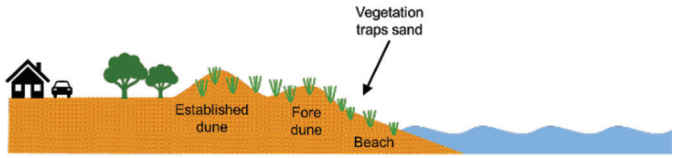
Coastlines naturally erode and accrete over time, driven by variations in sediment supply and climate patterns (Figure 3).

Coastal erosion occurs when winds, waves and coastal currents shift sediment away from the shoreline. This can be a short-term shift, or a long-term erosion trend.

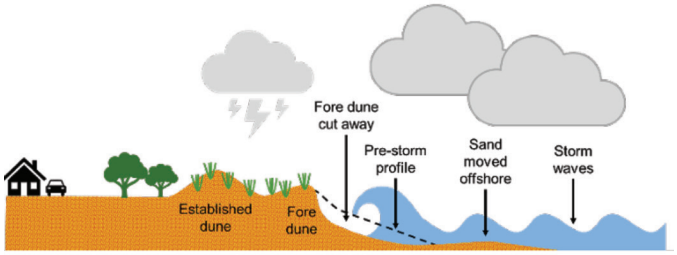
When a beach is stable, all of the sand moved offshore during a storm eventually moves back onto the beach (over timeframes of months to years). In this case the beach erosion (storm bite) is only temporary.

In other cases, due to changing sediment supply or climate conditions, the beach may not have sufficient capacity to rebuild between storm events. In the absence of intervention, long-term erosion (termed recession) may continue.

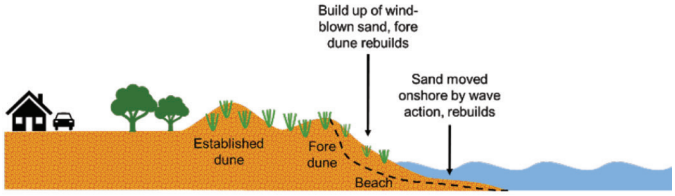
Both short-term and long-term erosion processes may impact on coastal assets, depending on how close to the fore dune assets are located.



Normal beach shape, calm conditions

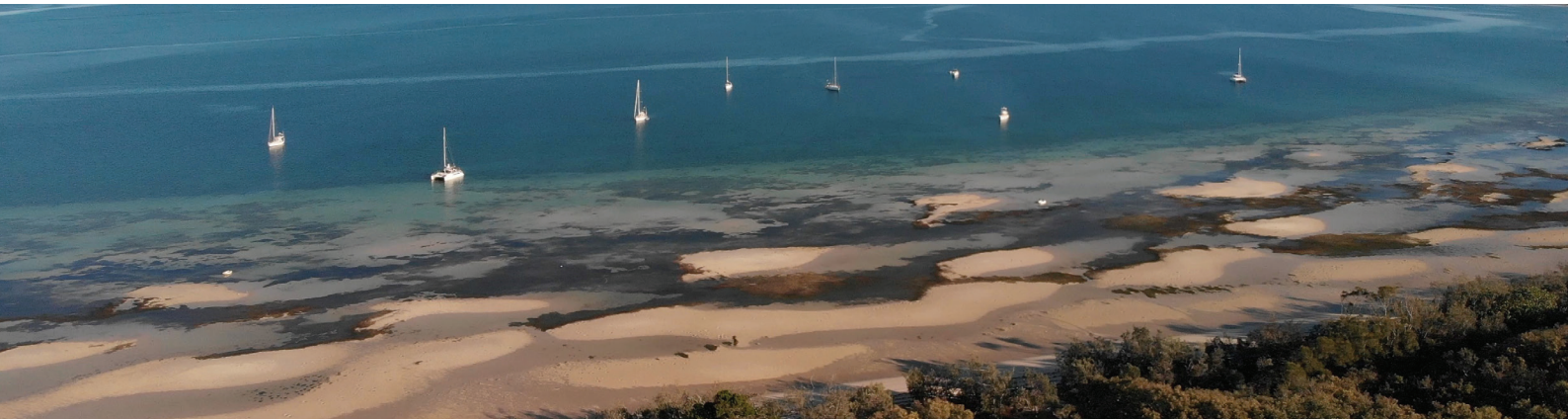


Beach erosion during storm



Beach and dune repair after storm

Figure 3. Coastal erosion and rebuilding





Future impacts

Projected sea level rise and an increase in storm intensity for the Queensland coastline is anticipated to increase the extent and impact of coastal hazards, including (after DEPH 2013[1]):

Storm tide inundation:

- Sea level rise will increase the apparent severity and frequency of storm tide inundation and will cause inundation to occur further inland
- Increased storm intensity will add to the magnitude of storm tide events and the extent of inundation
- A potential increase in seawall overtopping may increase nuisance flooding, public safety hazards, and damage to infrastructure behind the wall.

Tidal inundation:

- Areas inundated by king tides will occur more often
- Area, depth, and frequency of tidal inundation is expected to increase for low-lying areas
- Some areas of low-lying land may be permanently inundated.

Coastal erosion:

- Increased water levels will accelerate coastal erosion
- Sediment transport patterns may be altered by shifts in wave direction, triggering changes to the form and location of shorelines
- Increased storm activity will escalate the severity of coastal erosion events.

Planning to adapt

Adverse impacts of coastal hazards can be minimised through strategic planning and adaptation actions.

This involves:

- Understanding the physical processes
- Assessing the likely extent of storm tide inundation, tidal areas and erosion, now and in the future, and assets that may be impacted
- Assessing the consequence of impacts for communities and assets
- Considering the range of planning and adaption options and developing an adaptation strategy.

Redland City Council is actively planning to avoid or mitigate the impact of coastal hazards, both now and into the future. This work includes locality specific initiatives in shoreline erosion management, as well as the City-wide development of a Coastal Hazard Adaptation Strategy (CHAS). The Strategy provides a proactive plan for Redland City Council communities to adapt to change.

More information

QCoast2100: **www.qcoast2100.com.au/**

[1] **Source:** Coastal Hazard Technical Guideline (DEHP 2013)

your say coastal hazard adaptation strategy

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