

# COASTAL PROCESSES

## INFORMATION SHEET

Coastlines are natural systems and are therefore affected by both natural and human-caused factors. These factors can change how the coast looks and functions, including altering landforms, the width of beaches, and the position of the coastline.

As a result, our beaches are constantly changing and these changes sometimes damage properties or infrastructure on or close to beaches and dunes.

### **EROSION AND ACCRETION**

Sandy beaches go through cycles of erosion (loss of sand and sediment from beaches and dunes) and accretion (sand and sediment returning to beaches and dunes). Short-term erosion is a normal coastal process and can be the result of extreme weather events like storms and cyclones. During events like these, waves erode sand from beaches and take it seaward.

After a storm event, normal wave activity will transport sand back onshore and restore the dunes over

time. Well-developed, vegetated dune systems help in the process of accretion as vegetation helps to store and build up sand as it returns to the shore. Compared to erosion, accretion can be a slow process and it may take several years for dunes to be restored to pre-storm conditions.

Long-term erosion is an ongoing process and often occurs when the amount of sand being transported onto the beach is reduced. When a dune is eroded through a storm event, if too much sand is lost seaward and not enough sand returned through normal processes, the beach will not be restored and the coastline will retreat landward. When this happens, property and infrastructure can be damaged.

### **WAVES AND TIDES**

The movement of water has a significant impact on the coast and both waves and tides influence the appearance and function of coastal systems. The size and impact of waves is influenced by:

- Length of fetch (distance of open water over which wind blows);
- Wind duration and direction;
- Wind speed or energy; and
- Depth of water.

Tides are influenced by the effects of gravity, and the Livingstone Shire Coast experiences semi-diurnal tides (two high and two low tides per day). Spring tides are higher tides and occur every fourteen days. Neap tides, or smaller tides, occur for the other days of the month. The highest summer tide and highest winter tide are called king tides.

Waves and tides can have a dramatic effect on the coast, particularly in open-coast areas (areas not protected by reefs, islands, or other land masses). Tides and waves contribute to normal/short-term erosion, however when combined with cyclone or storm activity they can have more significant and long-lasting impacts.

### **CYCLONES, LOWS, AND LONG-TERM WEATHER PATTERNS**

Waves, tide activity, and erosion are all heavily influenced by extreme weather and weather patterns, including:

- Tropical cyclones and East Coast Lows, which can cause serious damage to the coast through intense wind, heavy rainfall, and



changes to ocean activity (such as storm surge and extreme tides);

- Trade winds, which are associated with high-pressure systems and have a strong influence on the whole Queensland coast; and
- Other longer-term weather cycles including El Nino events (during which tropical cyclones are less likely to form) and La Nina events (when cyclones are more likely to form).

Cyclones and lows (storms) are common in Queensland and often impact the Livingstone Shire coast. Some can also travel inland and leave a trail of destruction. These events often result in serious damage to the coast including

serious erosion and damage to vegetation. Healthy coastal systems will usually regenerate and recover over time through accretion and vegetation growth. However, where coastal systems have been affected by other disruptions (such as urban expansion), or where infrastructure is placed in erosion prone areas, the impacts of cyclones and storms can be detrimental.

The frequency and severity of storms and cyclones is predicted to increase in the future as a result of warming oceans, because cyclones and low pressure systems form over warm oceans.

### **HUMAN-CAUSED CHANGES AND HAZARDS**

Waves, tides, storms, cyclones and long-term weather patterns are natural occurrences which do not intrinsically pose serious, long-term threats to the coast: natural and pristine coastal systems have mechanisms inbuilt to recover from these hazards over time.

There are a range of human-caused issues, however, which mean these natural hazards can pose serious threats to life, property, and the environment. These issues include:

### **Population growth, urban expansion, and development**

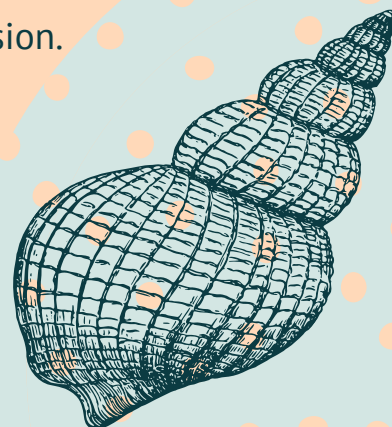
Coastal communities have rapidly expanded, and continue to grow. Coastal risks become dangerous to people, property, and the natural environment where expansion and development occurs in high-risk areas, which includes much of the coast of Livingstone Shire. Homes, businesses, infrastructure (like roads, parks, and playgrounds) and important ecosystems (including dunes, mangroves, and marshes) are all vulnerable to future threats along the coast. We all need to work together to protect the natural and built assets in Livingstone Shire.

### **Removal of dune vegetation**

Coastal vegetation supports dune systems and assists in the accretion process by storing sand and allowing dunes to build up again after erosion. The loss of this vegetation (through clearing/removal, fire, grazing, damage through vehicles, and foot traffic) can result in significant dune erosion.

### **Climate change**

Climate change is currently predicted to



cause a sea level rise of between 0.26 and 0.79 metres by 2100, as well as a 20% increase in rainfall associated with cyclones. Cyclones are also expected to become more intense, and changes in the localised frequency of cyclones are also predicted. These impacts will result in an increased rate of erosion, with limited opportunities for accretion following these events. Tidal inundation is expected to become more frequent (and to reach further inland). Ultimately, a changing climate will result in a more hazardous coastal zone.



### **MORE INFORMATION**

Council has information on our coast, catchments, and the wider environment (including what you can do to limit your impact) available online at

<https://www.livingstone.qld.gov.au/living-here/my-environment>.

You can also contact Council directly for more information:

**Email:** [NRM@livingstone.qld.gov.au](mailto:NRM@livingstone.qld.gov.au)

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