Wave

Most deepwater waves approach our coastline from the South-East. As these waves move into shallower water their final direction of approach to the coast is altered. Within the surf-zone, waves are the major mechanism for sand movement. The rates of erosion, transport and deposition, depend on wave energy, wave angle, and rips.
Tides
The tides are caused by the gravitational effect of the moon, and to a lesser extent, the sun and other planets on the oceans. Along the NSW coast, tides are semi-diurnal, i.e. two high tides and two low tides per day. Tidal ranges vary significantly throughout each lunar month and from month to month. Very high and very low tides occur at any time. The long periods of calm between major storms can give a false sense of security. Under calm conditions the sand may shift just a millimetre or so however during an extreme storm event beaches can change rapidly as sand is moved distances offshore.

Elevated water levels
Storms develop with low atmospheric pressure, strong onshore winds and large waves. These factors lead to the development of elevated water levels which allow larger waves to break closer to the beach and cause greater damage to the coast.

Currents
There are four main types of currents. Ocean currents are driven by global scale interactions between the atmosphere and the sea. i.e East Australia Current (EAC) which consists of a series of warm water eddies that originate in the Coral Sea and slowly move southward. Shelf currents are a complex mix of the EAC, the counter currents associated with its eddies, internal waves, coastal trapped waves, tides and local wind induced currents. Nearshore currents help to move sand in the nearshore zone, they also transport water shoreward as waves break and help to rebuild beaches after storm erosion. Nearshore rip currents help water pushed onshore escape seawards and if enlarged by storms can transport large volumes of sand offshore.

Waterborne sediment transport
Sediment is transported onshore, offshore and alongshore through the action of waves and currents. The beach undergoes a series of erosion and accretion cycles of short-term (weeks) medium-term (years) and long-term (decades) with vast quantities of seabed sediment mobilised under wave action.

Coastal Management

Vegetation is the key factor in controlling wind borne sand movement. Dune stability is important as dunes provide a reservoir of sand during erosive periods. Dune vegetation is very vulnerable to damage from human and natural causes. The understanding of coastal dune vegetation, including plant species and their distribution is critical to the effective management of dunes and their role in coastal processes and coastline hazard management.

Rainfall and runoff
Severe storms are often accompanied by extended periods of heavy rainfall which can have significant effects on coastal processes. These can include creek and stormwater outlets eroding the beach, rising groundwater levels which can exacerbate erosion of dunes and increased inundation of low lying areas.

Coastal entrances
Coastal entrances affect the currents and amenity of our beaches. Entrances are influenced by tides, waves, currents, sediment movement and floods. These interactions and the ever changing nature of these factors can cause entrances to migrate along the coastline, to close up and to re-open.
How do coastal processes interact?

The interactions between processes are complex. For instance, coastal water levels are influenced by storms (storm surge), rainfall (flood levels in estuaries), the gravitational effects of the planets and moon (tides), climate change and waves (wave setup). In addition to this, wave behaviour is impacted by storms, currents, water levels, offshore sediment movement and potentially coastal protection works.

Figure: Elevated water levels during a storm

Find out more about Bega Valley Shire Council’s coastal zone management from our website www.begavalley.nsw.gov.au

This factsheet was adapted with thanks from Gosford City Council. Bega Valley Shire acknowledges the assistance of Tim McDonald, Gosford City Council in the development of this factsheet.