

6. Coastal processes – beaches and dunes

Aim

This activity gives students a brief introduction to the processes involved in beach development. It investigates dunes and the ways they can be affected by human activity.

Materials

- Resource sheet: Beaches and dunes.
- Workbook, drawing pencils and pens.
- Student text book on coastal processes.

Activities

1. Refer to the resource sheet: Beaches and dunes, and a relevant text book on coastal processes to complete the following.
2. Draw a cross section diagram of a beach, labelling the following:
 - Low tide level.
 - High tide level.
 - Foredune.
 - Backdune.
 - Primary dune.
 - Secondary dune.
 - Swale.
3. Describe the steps involved in the development of a sand dune, or create diagrams to show the development over time.
4. Suggest why there has been poor development of beaches along the coastline within Port Campbell National Park. How might the beach at the mouth of the Curdies River be built up?

5. The list below notes human activities that can affect sand dunes and beaches. Discuss these with a workmate. Draw up a table with headings similar to the one shown below. List one activity per row and describe a positive and/or a negative effect that activity could potentially have on a sand dune or beach. One example is completed for you.

Human activities that can affect coastal areas

- Picnicking.
- Building a house.
- Carparks.
- Revegetating.
- Dune buggy riding.
- Constructing an access path to the beach.
- Unrestricted walking by people.
- Wildfire.
- Cattle grazing.
- Parking cars in unauthorised areas.
- Fencing at the back of the beach.
- Advertising boards erected.

Activity or action	Positive effect	Negative effect
<i>e.g. Unrestricted walking by people.</i>		<i>Removes vegetation and causes wind blown erosion.</i>

Link to Section 2

See also Section 2 of this Parks Victoria education resource kit, in particular: Parks and Science

29. Vegetation and its effects on rates of erosion.
30. Soil compaction effects on vegetation.
31. Soil compaction effects on erosion.

6. Beaches and dunes

Sand dunes

Sand dunes are an important coastal feature but they do not occur on all beaches. They need a large supply of sand, long periods of dry weather, and frequent onshore winds to become established.

The sand in these dunes comes from the beach. Onshore winds pick up grains of sand when the beach is dry. The wind blows these to the top of the beach and then drops the particles. This process establishes the front or **foredune**. Salt tolerant plants such as Sea Rocket and Hairy Spinifex start to grow on the newly formed dune and these plants trap more sand and increase the dune's growth.

If a sequence of stormy and calm weather happens over a long time, a series of parallel dunes will be built on a coastline. These back dunes are known as the **primary** and **secondary dune** and are separated by a trough or area of lower land known as a **swale**.

Dunes are not always stable. An area of fresh moving sand slowly spreading over the plants inland from the beach is known as a **blowout**. This occurs when the plants that hold sand together are removed, or if there are stronger winds than normal. Blowouts are difficult to stop once established as the blown sand in turn covers and kills established vegetation.

Beaches and dunes

Beaches are scarce along the Port Campbell limestone coast. There are some in **bays** and **inlets**, and some of the larger bays have wider beaches backed by grassy dunes.

The beach of calcareous sand in Newfield Bay curves out to a sandy cusped spit shaped by the refraction of swell in the lee of Schomberg Reef (named after a ship wrecked here in 1855), a planed-off nearshore **stack**. It is backed by a high grassy foredune that has been cut back by marine erosion to form a steep cliff of crumbling sand.

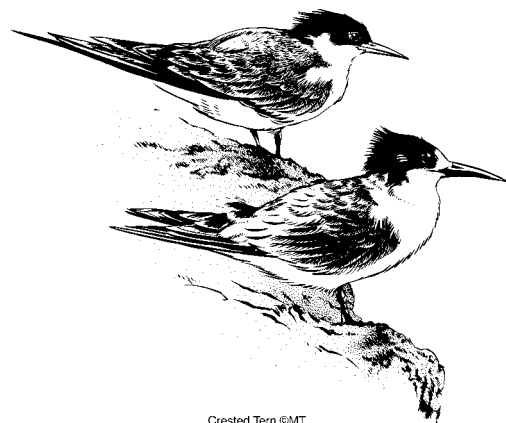
The poor development of beaches is due partly to the small supply of sand and partly to wave refraction from the vertical cliffs, which together prevent the beach from building up. The rivers that drain to this coast carry little sediment into the sea, and the material created by cliff erosion is generally too soft and too fine in texture to remain on beaches exposed to strong wave energy. This silty material is soon dispersed and carried well out to sea. The beach sands are well sorted medium sand, consisting generally of 70 to 80 per cent carbonate while the rest is mainly quartz grains.

The general lack of beaches along the Port Campbell National Park coastline means that storm waves can vigorously and regularly attack the base of the cliffs.

Valley mouth features

At Peterborough the cliffs are interrupted by the mouth of Curdies Inlet, a shallow lagoon bordered seaward by a dune-capped sand barrier behind Newfield Bay. This lagoon formed in the wide valley incised into the Port Campbell limestone plateau by the Curdies River.

The outlet from Curdies Inlet is often sealed off by the build-up of beach sand, but after rainy weather the lagoon level rises and the overflow cuts a new outflow channel. When the outlet is open the lagoon level falls and a sandy threshold is exposed.



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