making space for sand

The story of coastal sand dunes

Lesson 1



Department for Environment Food & Rural Affairs
Environment Agency
Flood and Coastal Resilience Innovation Programme
Part of the Resilience Innovation Fund
CORNWALL COUNCIL
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geography southwest
SOUTH WEST COASTAL MONITORING

What is a sand dune?

This is a photo of sand dunes at Gwithian Towans, near Camborne in Cornwall.



- What are **the main features** of the sand dunes?
- What **would it be like** to be there?
- Do you know **the name of the long grass** commonly found on sand dunes?

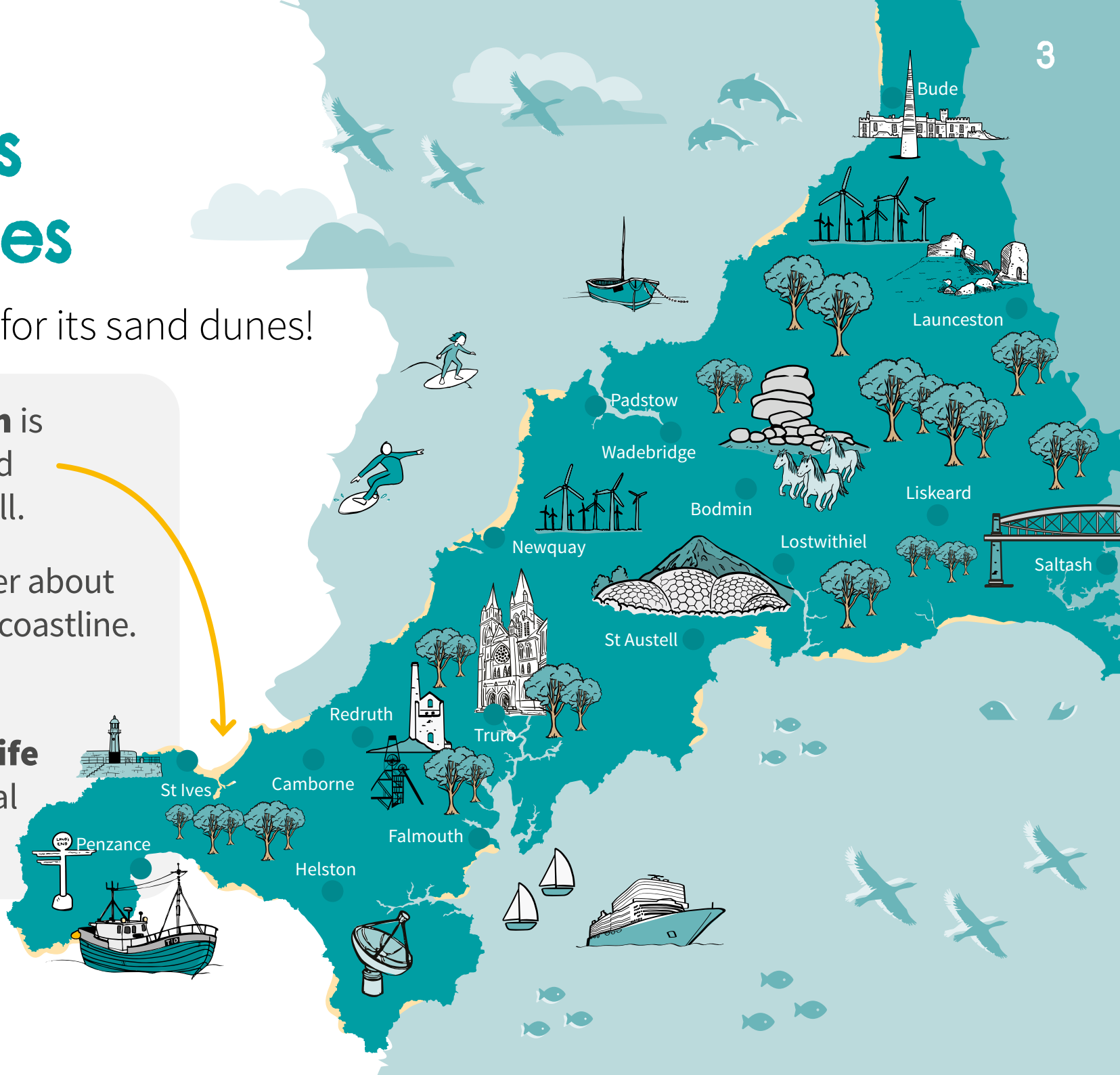
Cornwall's sand dunes

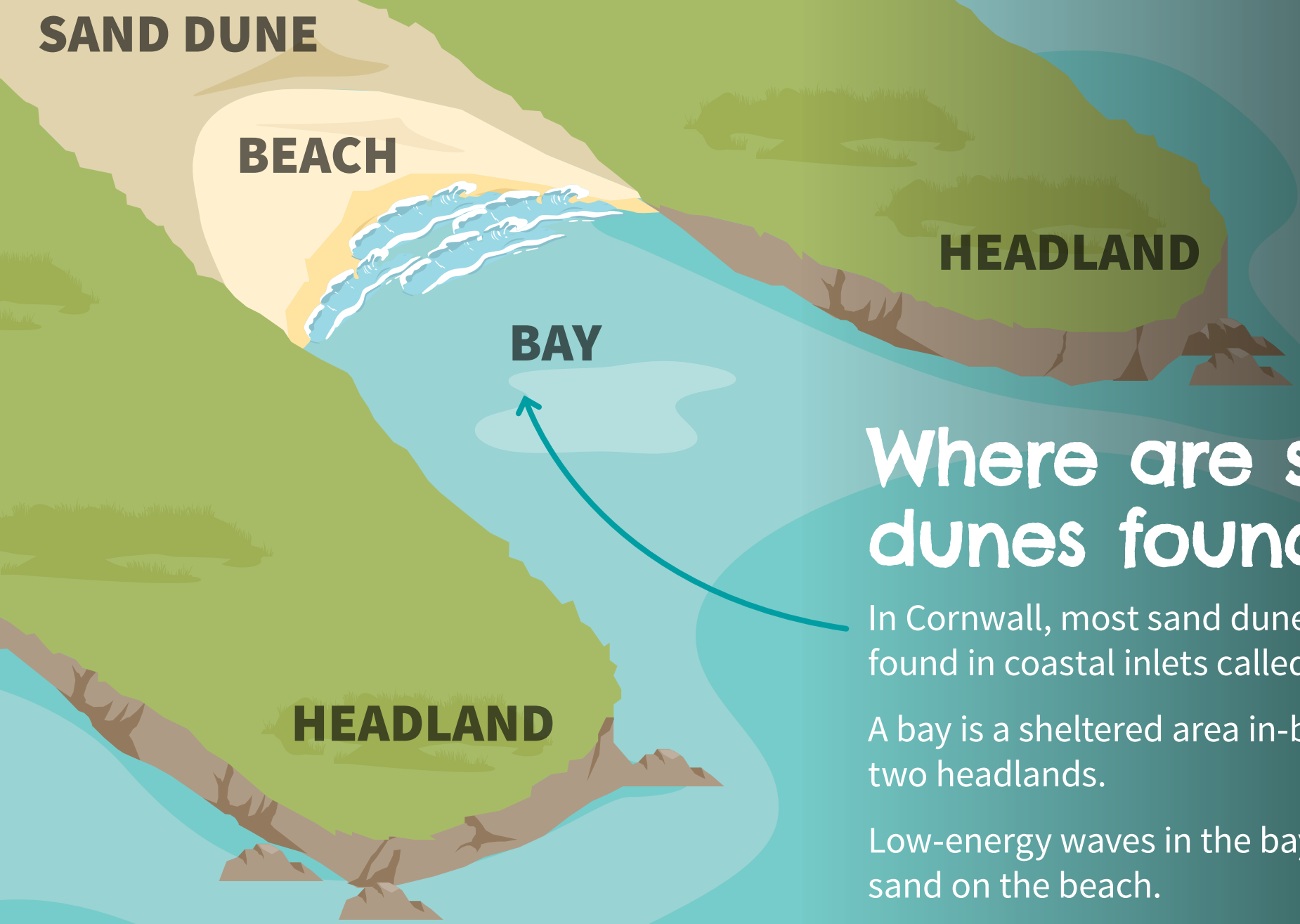
Cornwall is famous for its sand dunes!

Gwithian Towan is one of many sand dunes in Cornwall.

Sand dunes cover about 2% of Cornwall's coastline.

They are **special places for wildlife** and act as natural sea defences.





Where are sand dunes found?

In Cornwall, most sand dunes are found in coastal inlets called bays.

A bay is a sheltered area in-between two headlands.

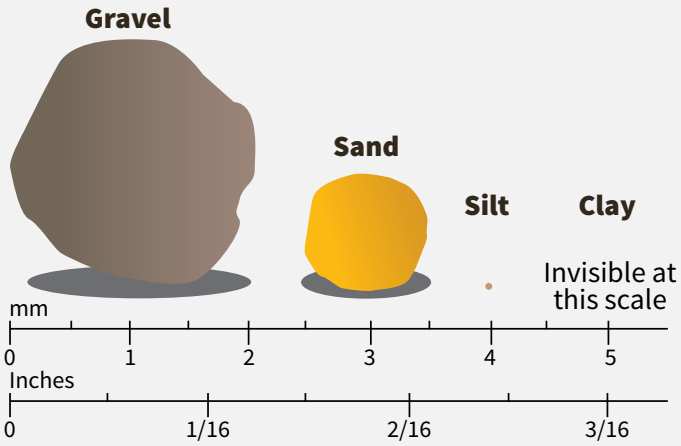
Low-energy waves in the bay deposit sand on the beach.

When sand dries out, wind blows it inland to form sand dunes. This process is known as ‘aeolian transport’.

What is sand and where does it come from?

Sand dunes are made of sand!

- Sand is a size of particle, smaller than gravel but larger than silt and clay.
- Sand can come from sea shells, river sediment and crumbling cliffs.





How do sand dunes form?

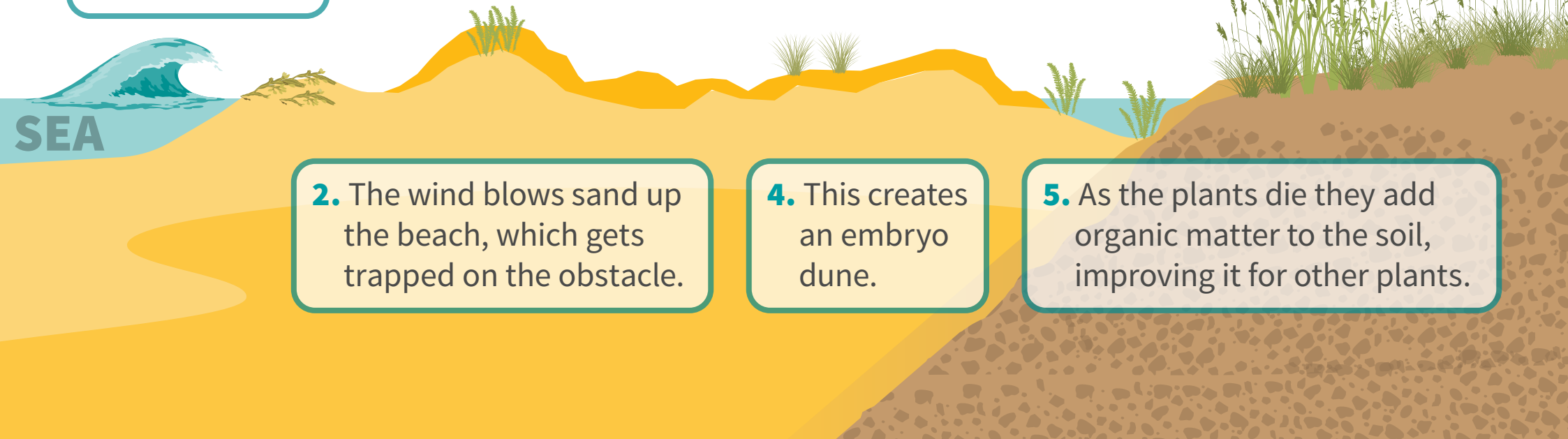
Conditions need to be just right for sand dunes to form:

- Large supply of sand deposited on the beach, with some obstacles (driftwood, seaweed) to trap sand.
- Large, gently sloping shore allowing sand to dry out.
- Onshore winds to blow sand above the level of the tides.

1. Obstacles such as driftwood get dropped on the beach.

3. Colonising pioneer plants like marram grass grow on the the dune and stablise it with their roots and trap more sand.





2. The wind blows sand up the beach, which gets trapped on the obstacle.

4. This creates an embryo dune.

5. As the plants die they add organic matter to the soil, improving it for other plants.

The story so far...

- What are **the obstacles** on this beach?
- How will they **encourage new sand dunes** to form?
- What is **the name of the grass** on the sand dune?
- How does **the grass encourage the development** of sand dunes?



Sand dunes for plants: sea rocket

Plants living on sand dunes are well adapted to the dry and salty conditions and the strong winds.

Sea rocket has the following adaptations:

Low growing habit to withstand strong, drying winds.



Succulent (fleshy) leaves to store water.



A long ‘tap root’ to provide stability against the wind and to seek water deep below the surface.

Sand dunes for animals: adders

Sand dunes are unique environments, home to butterflies, bees, snakes, rabbits and lizards.

Adders are well adapted to living on sand dunes:





They can bury themselves in sand to escape heat and ambush prey.

‘Sidewinding’ enables them to move freely across sand dunes.

Sand dunes for animals: rabbits

Rabbits are well adapted to living on sand dunes:

They can dig burrows in the soft, sandy soil.

They can graze the vegetation.



Rabbits can benefit sand dunes:

- grazing keeps plant growth low, which benefits native plants.
- burrowing promotes the movement of sand through the dune system.

Sand dunes for people

Sand dunes and beaches are extremely popular with people.

Sunbathing and sandy beach activities

Dog walking

Walking and nature watching (e.g. birds and wild flowers)

Adventurous activities, such as biking and dune-surfing



Sand dunes for coastal defence

Sand dunes are important natural barriers,
protecting the land behind them from flooding and erosion.

Sand dunes:

Provide shelter from coastal flooding and strong winds.





Absorb energy from waves.

Store and feed beaches with sand, reducing wave energy.



Sand dunes under threat



- People trample sand dunes, damaging fragile vegetation and disturbing wildlife.
- Litter looks unsightly, smothers plants and can harm wildlife if eaten. Fires can be caused by barbecues.
- Sea level rise is threatening to erode and overtop sand dunes. This can reduce the effectiveness of dunes in coastal defence.
- Invasive plant species, (e.g. Japanese rose), are out-competing native plants.
- Some introduced plants spread in dunes and cause damage to the quality of the environment.







Sand dune developments

Cornwall's sand dunes have been under threat from development.

Sand dunes are ideal locations for campsites and holiday parks, which can impact wildlife and cause erosion.

At Gwithian Towans, sand was quarried to extract tin and for the construction industry (see Lesson 3 for more detail).

Golf courses have been developed on sand dunes, affecting plants and wildlife.



Managing sand dunes

Sand dunes are managed to prevent them being damaged and to conserve wildlife.

- Marram grass is planted to stabilise dunes and encourage them to become fixed.
- Selective grazing, by sheep and cattle, control invasive plants and support pioneer plants.
- Notches – V-shaped gaps in mobile dunes – allow sand to be blown inland to restore areas where sand is missing.





making space for sand

‘Making Space for Sand’ is a project that aims to build resilience for coastal communities from storms, flooding and erosion. This has involved:

- Collecting data on how sand moves on beaches and along the coast.
- Assessing the health of coastal dunes and identifying rare and endangered plant species.
- Working with coastal communities, to help them to adapt and become more resilient to predicted future changes to the coastline.

