

DUNE SCAPE

What is a sand dune and how are they made?

Sand dunes are amazing coastal formations, created when the sea brings sand (made from crushed shells and rocks) into shore, and the wind blows this sand up to make a sand dune. This is a long process, and it can take thousands of years for a sand dune to form!

A mixture of natural and human activities also means sand dunes change shape and size every day, as more sand is deposited or eroded.

The following activities will help you explore how dunes are created and the impact of different natural and human impacts.

What you will need:

Activities 1 & 2

- Square or rectangular plastic tub or tray
- Dry sand (e.g. from a sandpit, hardware, or gardening store).
Please do not take sand from the beach as this is not allowed as it is part of the habitat
- Hair dryer
- Small bucket or container with water

Extra resources for activities 3 & 4

- 10 x Plant cuttings approximately 10cm long
- 10 x Plant cuttings approximately 5cm long
- Grass cuttings-handful
- Soil or dirt from the garden
- Lego-type blocks and people
- Seashells or counter/bottle caps to represent shells



Activity 1: Windblown sand dunes

1. Place and spread sand evenly in tub.
2. Use the hairdryer to blow sand from front side of the tub to the back.
This demonstrates how the southerly wind in Victoria moves sand from the beach to form a dune behind the beach.
3. Blow the sand back to show how the northerly wind can push it back down onto the beach.

What does your dune look like? Draw a diagram or add a photo below.

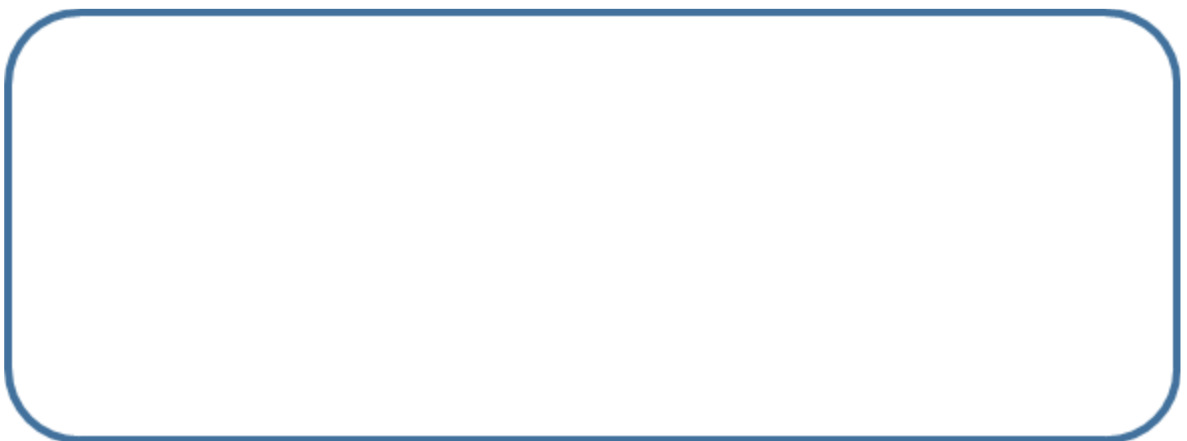


❖ **Dune scape fact:** *Dunes formed by sand movement only are fairly smooth.*

Activity 2: Water washed sand dunes

1. Create a sand dune shape with the sand in the tub.
2. Using the bucket with water, splash the dune from one side.
3. Splash it again. What happens to the sand and water?

What does your dune look like? Draw a diagram or add a photo below.



Dune scape facts:

- ❖ *The water splashing from one side is like the sea waves crashing on the sand dune: this causes erosion (sand breaking down and falling away from dune).*
- ❖ *During winter, sea storms bring larger waves and cause more erosion on our beach and sand dunes. The wind naturally blows the sand back.*
- ❖ *Climate change is causing more large storms and more erosion on our dunes.*

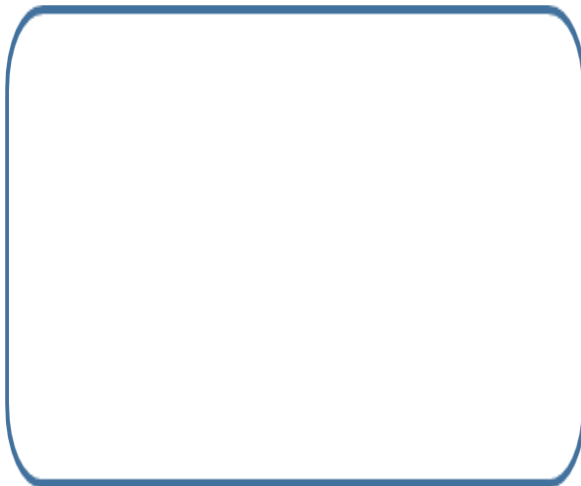
Activity 3: Plants and sand dunes

Plants are not only an important part of the habitat for animals on the sand dunes, but important for holding the dune together, and preventing erosion. Often their roots spread right down many meters deep under the dune.

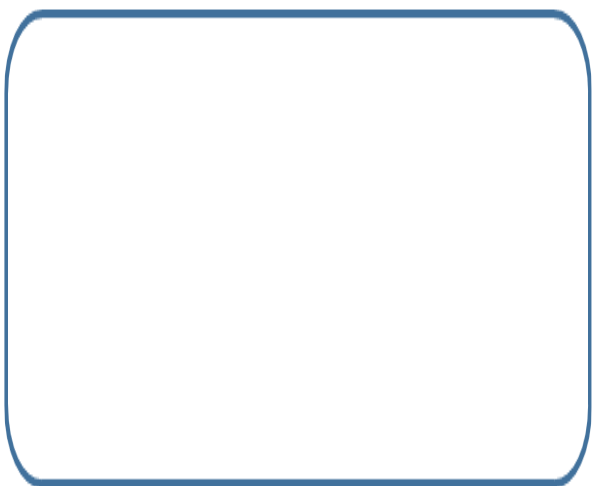
For this activity you'll make your own sand dune habitat and see how plants can help sand dunes survive natural impacts such as heavy rain and high tides.

1. Create a sand dune shape with the sand in the tub again.
2. Decorate the sand dune by sprinkling grass on the front of the dune near the pretend beach (but not on the beach as grass can't grow on the beach due to saltwater and waves).
3. Behind the grass add a line of 5cm tall plant cuttings on the dune, like bushes.
4. Behind the 'bushes' add a line of 10cm plant cuttings at the back of the dune, like trees. You have created your own sand dune habitat!
5. Draw a diagram or add a photo below in "Dune Before storm" box.

Dune Before Storm



Dune After Storm



Now it's time to see what happens when there's a storm surge! *Looking at how sea changes the dune so storm surge or high tides better

1. Using the bucket with water, splash your dune from one side.
2. Splash it again. What happens to the sand and water and plants?
3. Draw a diagram or add a photo above in "Dune After Storm" box.

Questions:

- ❖ Compare your dune with that in Activity 2: Which dune survived better and why?
- ❖ What animals might live naturally in a sand dune on the Surf Coast?
- ❖ What plants might naturally grow on the dunes on the Surf Coast?
- ❖ Why do plants grow at different heights at the front middle and back of dunes?
- ❖ How do you think climate change might affect habitats in the dunes?

Use the Online Resources on page 6 to help you find the answers.

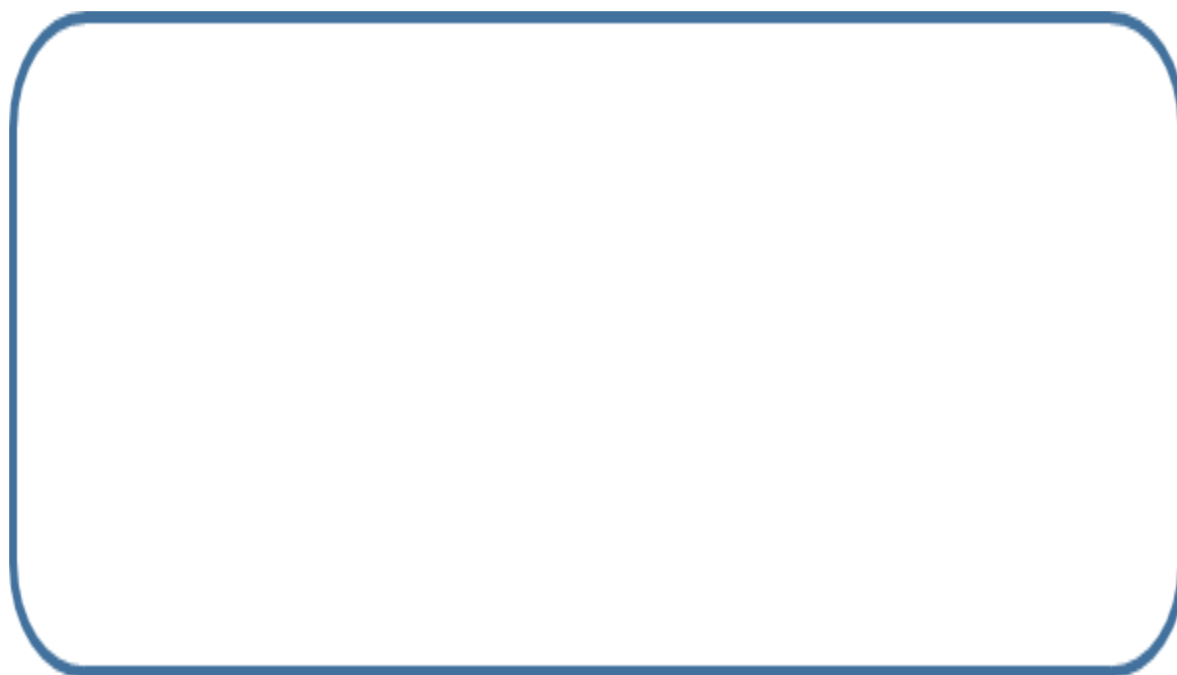
Activity 4: People and sand dunes

Our coast has been a popular place for people to visit and live for a very long time. Our oldest evidence of humans using these areas are the shell middens found within the cliffs and dunes along the Surf Coast. A shell midden is made of layers of empty shells and tells us that these areas were very important resources for the Wadawurrung people who visited these places during different seasons to harvest shellfish. The oldest Wadawurrung shell midden on the Surf Coast is at least 3200 years old!

Unfortunately, today visiting and living on the coast is leaving much bigger impacts on the coast. Have you ever thought about what the landscape looked like before houses were built on the beachfront, or how people accessing the beach might impact the dunes?

This activity will help you explore the human impacts of living and visiting the coast and think about how we can do this in a more environmentally friendly way.

1. Create a sand dune shape with the sand in the tub again.
2. Add your own shell midden layer.
3. Reuse the plants to make your sand dune habitat.
4. Put some Lego houses on the "town side" of your dune.
5. Walk the Lego people down to the beach, and back again a few times.
6. Draw & label a picture or add a photo below of the human impacts on your dunes.



Questions

- ❖ How does people walking and playing in the dunes effect the plants and animals that use this habitat?
- ❖ How are historical shell middens effected by modern human activities?
- ❖ What could we do instead of walking in the dunes?
- ❖ How do you think dogs running in the dunes would affect the animal's habitat?
- ❖ What other human impacts or activities could affect the habitat in the dunes?
- ❖ What could you do to protect the Surf Coast sand dunes?

Online Resources

Dune Habitats and Ecosystems

Dune Ecology: Great Ocean Road Coast Committee

<https://www.gorcc.com.au/education/community-education/dune-ecology/>

Sandy beaches and Dunes: Victorian Fisheries Authority

<https://vfa.vic.gov.au/education/featured/teachers-resource/sandy-beaches-and-dunes>

Coastal dunes fact sheet: GORCC

<https://www.gorcc.com.au/app/uploads/2017/07/GORCC-Fact-Sheet-Coastal-Dunes.pdf>

Sand dunes: Australian National Herbarium

<http://www.anbg.gov.au/photo/vegetation/sand-dunes.html>

Coastal Landscapes: Breamlea Association

[http://breamlea.com.au/main.asp?_ =Coastal%20landscape](http://breamlea.com.au/main.asp?_=Coastal%20landscape)

Coastal management: Jacaranda Geography

http://www.jaconline.com.au/essentials/downloads/JEG2_04.pdf

Dune Coastal Animals and Plants

Surf Coast Nature Search

<https://scnaturesearch.com.au/>

Beach Nesting Birds

<https://www.birdlife.org.au/projects/beach-nesting-birds>

Save the Hoodie: GORCC

<https://www.gorcc.com.au/conservation/hooded-plovers/>

Fauna: GORCC

<https://www.gorcc.com.au/conservation/fauna/>

ANGAIR Fact sheets

<https://www.angair.org.au/knowledge-bank/factsheets>

Shell middens

Aboriginal Victoria: Fact sheet – Aboriginal Coastal Shell Middens

<https://www.aboriginalvictoria.vic.gov.au/fact-sheet-aboriginal-coastal-shell-middens>

Torquay museum without walls: Wathaurong and the land

<https://www.torquayhistory.com/our-collections/first-australian/wathaurong-and-land/>


Teachers Notes & Curriculum Links

This resource has been designed to cater for students studying Geography and Outdoor and Environmental Education. It is designed as an introductory resource which can be completed at school or as homework as preparation for a visit to and study of human impacts on a coastal area. We hope your students enjoy and find these activities meaningful, and we would appreciate any photos, details or links to students work to inspire others. These can be sent to our Education team at education@gorcc.com.au.

VICTORIAN CURRICULUM LINKS	
YEARS 7 & 8	
Geography	Elaborations
Identify, analyse and explain interconnections within places and between places and identify and explain changes resulting from these interconnections (VCGGC101)	<ul style="list-style-type: none"> analysing the role of landforms and landscapes in tourism. For example, Uluru in Australia or the Grand Canyon in the USA examining how urbanisation can affect environmental quality and analysing the effects of erosion and sedimentation produced by human activities on landscape quality
Different types of landscapes and their distinctive landform features (VCGGK116)	<ul style="list-style-type: none"> identifying different types of landscapes, such as coastal, riverine, arid, mountain and karst, and describing examples from around the world, including Antarctica identifying some iconic landforms in Australia and the world, and describing what makes them iconic exploring the names, meanings and significance of landform features from an Aboriginal or Torres Strait Islander perspective
Human causes of landscape degradation, the effects on landscape quality and the implications for places (VCGGK119)	<ul style="list-style-type: none"> analysing the effects of erosion and sedimentation produced by human activities on landscape quality, including farming and recreation examining the effects of mining and quarrying, and urban development, on landscape quality and how this affects places describing the effects of river regulation, including dams, locks, channel straightening and drains, on riverine and wetland landscape quality investigating the effects on coastal landscape quality of the built elements of places. For example, urban development, marinas and sea walls investigating the ways introduced plants or animals or activities such as mining affect landscape quality and examining the effects on Aboriginal and Torres Strait Islander communities
Geomorphic processes that produce landforms, including a case study of at least one landform (VCGGK117)	<ul style="list-style-type: none"> describing the influence of folding, faulting or volcanism on a chosen landform contrasting the effects of geomorphic processes that lower the land surface (weathering and erosion) and those that raise the land surface (transportation and deposition)

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 www.gorcc.com.au/education

**ENVIRONMENTAL
EDUCATION**

Caring for the Coast
and Community



YEARS 7 & 8 continued

Geography	Elaborations
Spiritual, cultural and aesthetic value of landscapes and landforms for people, including Aboriginal and Torres Strait Islander peoples, that influence the significance of places, and ways of protecting significant landscapes (VCGGK120)	<ul style="list-style-type: none"> • discussing the significance of landscapes in literature, song/music, film, art and identity • analysing the role of landforms and landscapes in tourism. For example, Uluru in Australia or the Grand Canyon in the USA • exploring the multilayered meanings (material, cultural and spiritual wellbeing) associated with landscapes and landforms by Aboriginal and Torres Strait Islander peoples • identifying different views about the recreational, psychological, aesthetic and spiritual value of particular environments and about the nature and extent of their protection, and discussing how this links to ideas about environmental sustainability • investigating a significant landscape that is threatened by human activities and developing a proposal for the future of the landscape that takes account of the views of the diverse groups, including Traditional Owners, with an interest in its use or protection

YEARS 9 & 10

Geography	Elaborations
Identify, analyse and explain significant interconnections within places and between places over time and at different scales, and evaluate the resulting changes and further consequences (VCGGC129)	<ul style="list-style-type: none"> • using the concept of a system to examine the interconnections between biophysical processes and the human actions, and their underlying causes, that generate environmental change, together with the consequences of these changes • identifying the biomes in Australia and overseas that produce some of the foods and plant material people consume and ways that the production of food and fibre has altered some biomes through, for example, vegetation clearance • examining how a person's wellbeing is influenced by where they live, with reference to at least two different scales in a country of the Asia region
Effects of people's travel, recreational, cultural or leisure choices on places, and the implications for the future of these places (VCGGK143)	<ul style="list-style-type: none"> • investigating the global growth of tourism and its likely effects on the future of places • discussing the effects of people's cultural and leisure choices on towns and cities or heritage areas. For example, predicting how changing choices may affect these and other places in the future
Causes and consequences of an environmental change, comparing examples from Australia and at least one other country (VCGGK147)	<ul style="list-style-type: none"> • using the concept of a system to examine the interconnections between biophysical processes and the human actions, and their underlying causes, that generate environmental change, together with the consequences of these changes • evaluating the effects of the environmental change on the sustainability of the environment

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YEARS 9 & 10

Geography	Elaborations
Environmental, economic and technological factors that influence environmental change and human responses to its management (VCGGK145)	<ul style="list-style-type: none"> identifying human-induced environmental changes, such as water and atmospheric pollution, loss of biodiversity, degradation of land, inland and coastal aquatic environments, and evaluating the challenges they pose for the sustainability of environmental functions evaluating the concept of ecosystem services and the importance of these services for sustainability of biodiversity discussing whether environmental change is necessarily a problem that should be managed proposing geographical management strategies for the environmental change being investigated, for example, establishing reserves and corridors to preserve biodiversity (a spatial strategy), ecosystem based management (an environmental strategy), urban planning to reduce energy consumption (a spatial strategy), & addressing the underlying as well as immediate causes of environmental change (holistic thinking)
Land and resource management strategies used by Aboriginal or Torres Strait Islander peoples to achieve food security over time (VCGGK137)	<ul style="list-style-type: none"> investigating the knowledge and practices of Aboriginal and Torres Strait Islander peoples that enabled them to use resources and environments sustainably (such as rotational use and harvesting of resources through planned movement, controlled burning, temporary or permanent prohibitions on hunting animals and harvesting plants, and limitations on harvesting) and how some of this knowledge is currently shared among Aboriginal and Torres Strait Islander peoples and also with non-Aboriginal and Torres Strait Islander peoples investigating the impacts of alterations of biomes on the productivity and availability of staple resources for Aboriginal and Torres Strait Islander peoples, for example, the Murnong (yam daisy) in Victoria

VCE

Outdoor and Environmental Studies	Elaborations
VCE Outdoor and Environmental Studies Unit 2 – Discovering outdoor environments Area of Study 2 (Outcome 2) – Impacts on outdoor environments	<ul style="list-style-type: none"> “...In this area of study students focus on human activities undertaken in outdoor environments and their impacts on those environments. Although environmental impacts include both natural and human induced changes on components of the environment, the focus here is on human impact – both positive and negative...”
VCE Outdoor and Environmental Studies Unit 4 – Sustainable outdoor relationships Area of Study 1 (Outcome 1) – Healthy outdoor environments Area of Study 2 (Outcome 2) – Sustainable outdoor environments	<ul style="list-style-type: none"> “In this unit students explore the sustainable use and management of outdoor environments. They examine the contemporary state of environments in Australia, consider the importance of healthy outdoor environments, and examine the issues in relation to the capacity of outdoor environments to support the future needs of the Australian population...”

VCE

Geography	Elaborations
VCE Geography Unit 2 – Tourism Area of Study 2 (Outcome 2) – Impacts of Tourism	<ul style="list-style-type: none">“...They investigate at least one tourism location, using appropriate fieldwork techniques, and another elsewhere in the world. Students evaluate the effectiveness of measures taken to enhance the positive impacts and/or to minimise the negative impacts at these locations...”
VCE Geography Unit 3 – Changing the land Area of Study 1 (Outcome 1) – Land use change	<ul style="list-style-type: none">“...This unit focuses on two investigations of geographical change: change to land cover and change to land use. Land cover is the natural state of the biophysical environment developed over time as a result of the interconnection between climate, soils, landforms and flora and fauna and, increasingly, interconnections with human activity. Natural land cover has been altered by many processes such as geomorphological events, plant succession and climate change...”