

2. The park's geological formation

Aim

Students research the geological formation and main geological features of Port Campbell National Park.

Materials

- Port Campbell National Park location map or road map of western Victoria.
- Port Campbell National Park map.
- Resource sheet: Geological formation of the Port Campbell coastline.

Activities

Refer to the resource sheet to help you answer the following:

1. What is limestone comprised of?
2. Create a diagram to show the location of the coastline of southern Victoria during the Miocene period.
2. Write a paragraph describing the early role of the sea and sea life on the park's geology during the Miocene and Pliocene. Have many millions of years ago was this?
3. What occurred along this coastline during the last 2 million years?
4. Is limestone easy or hard to erode? What forces have eroded it in this part of Victoria? Write a paragraph or create some diagrams to explain how limestone erodes.
5. Create a glossary explaining the following geological terms. Create accompanying diagrams where possible.
 - steep cliff
 - rock stack
 - arch
 - caves
 - gorge
 - inlet
 - headland
 - embayment
 - sandbank
 - limestone
 - joint
 - bryozoan
 - Miocene
 - Pliocene
 - Quaternary



2. Geological formation of the Port Campbell coastline

The steep cliffs, rock stacks, caves, headlands and bays that form the Port Campbell coastline are the result of continuous **marine erosion** on generally flat lying **limestone** rocks formed some twenty million years ago.

The south-western coastline of Victoria was not always land. The layered rocks that can be seen along the coastline were formed in a shallow sea about twenty million years ago (the geological time period known as the Miocene). During the Miocene the coastline of southern Victoria was much further inland from its present position, in fact, it was located along a line that joins Sunbury to Ballarat-Hamilton and to just north of Mt. Gambier.

An abundance of marine algae and animals lived in this ancient shallow sea. Calcium-rich algae and shellfish and bryozoans lived on the sea floor. Bryozoans are similar to corals (like the ones in the Great Barrier Reef) in that they grow in colonies, except that bryozoans tend to live in cooler waters.

The shellfish and bryozoan colonies formed close to the shoreline in this ancient sea and the wave action along the shore broke up the shells and bryozoans into small, sand-sized pieces that were swept short distances and over time built up large sandbanks in the shallow sea.

Around five million years ago (in the Pliocene) this shallow sea became land and the vast sandbanks of broken fragments of marine animals compacted to form rock known as **limestone**.

Throughout the last two million years (in the Quaternary), sea levels rose and fell for short periods of time. As a consequence, during these times the coastline shifted further north and south of the present day position. For most of the

time however the limestone was exposed to the atmosphere and the attack of rainwater and marine erosion.

The flat-layered limestones seen in the present coastline vary in hardness and as a result weather and erode at different rates. More rapid rates of erosion also occur along deep vertical cracks (known as **joints**) that run south-west to north-east throughout the limestones. The location of these joints through the rock has strongly influenced the position of gorges and inlets along the coast.

The coastline is continuously being undermined and eaten away because of the generally rapid erosion of the limestone and the constant action of waves and seaspray on the cliffs. Slabs of cliff occasionally fall into the sea. The sand, gravel and debris that wash into the sea make the waves even more abrasive as they crash against the coastline. This quickens the erosion process.

Ocean currents eventually disperse the sand-sized particles that result from this erosion, and over time the particles settle to form new sandbanks somewhere offshore. These may become part of the land in the future.

The striking geological features of the Twelve Apostles, London Bridge, Loch Ard Gorge, Thunder Cave and many others along the coast of the Port Campbell National Park are the result of the constant attack of the sea on limestone cliffs that are easily weathered and eroded.

This geological process will continue to erode the coast in the Port Campbell region.