2. Geology of the Dandenong Ranges

Aim

This activity introduces students to the geology and landforms of Dandenong Ranges National Park.

Materials

- Resource sheet 2a Geology of the Dandenong Ranges.
- Resource sheet 2b Topography of the Dandenong Ranges.

Extension

- Contour map of Dandenong Ranges and surrounds.

Activities

1. Read the Resource sheet to find out about the formation of the Dandenong Ranges and its geology and topography.

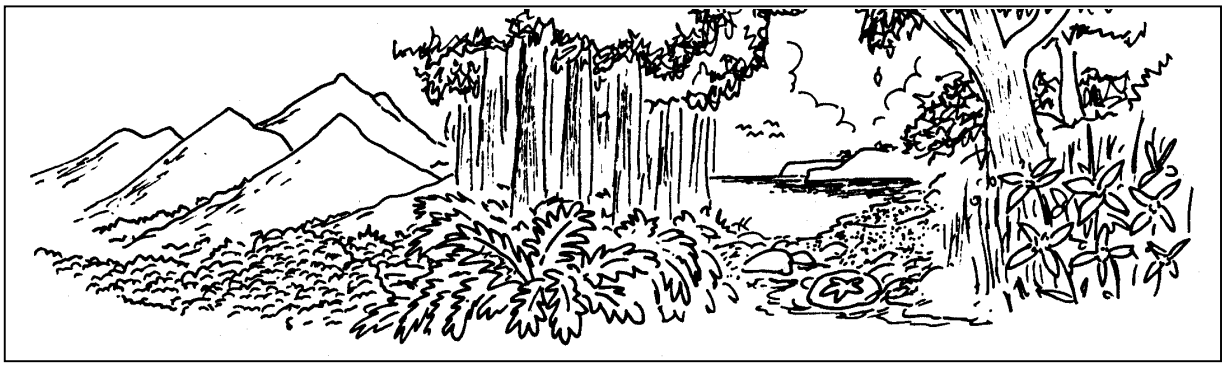
2. Imagine/draw what the area looked like 300 million years ago. Describe what was happening at that time. Explain what influence that period had on the area and the way it looks today.

3. Create an illustrated timeline to show the development of the ranges. Label your timeline with the key times (e.g. 300 million years ago).

4. Create diagrams to represent the key topographical features of the Dandenong Ranges.

Extension

Use a contour map to identify and locate key topographical features referred to in Resource sheet 2b.



2a. Geology of the Dandenong Ranges

The Dandenong Ranges represent the remains of an ancient volcano that existed more than 300 million years ago. Weathering and streams have eroded the old volcano to such an extent that it is largely unrecognisable today. The whole block is separate from other mountain ranges and it is of an earlier volcanic derivation than the vast majority of other volcanic areas in Victoria.

The Dandenong Ranges is a result of volcanic events that produced a complex igneous rock system of Upper Devonian age. This occurred in two stages. The first stage involved numerous volcanic lava flows while the second was a series of cauldron collapses resulting in distinct intrusions.

About **350 million years ago** the formation of the Dandenong Ranges began with a general weakening of the earth's crust.

Some **300 million years ago** near the township of Olinda a large volcano welled up through the earth's crust, creating four distinct lava flows over a period of time.

The first flow of lava spread as far north as Coldstream, and is known as the Coldstream Toscanite. The township of Lilydale is built on the edge of this series of lava flows. The second series of lava flows are known as the Mt Evelyn Rhyodacite. These flows did not go as far north as the earlier flows, but spread to the south past Ferntree Gully.

The Kalorama Rhyodacite is the result of the third series of flows that, with the effect of previous flows, formed a platform that extended over the whole of the volcanic cauldron. The earth's crust above the cauldron gradually melted and became weak and thin. The final flows consisted of ejections of volcanic ash along with thick lava and this is what is now known as the Ferny Creek Rhyodacite.

The lava cauldron was in the shape of a triangle; its western edge ran south-west to Ferntree Gully and was bounded by the Selby fault in the south which stretches from Ferntree Gully to Emerald. Its eastern section was bounded by the fracture known as the Evelyn fault. The cauldron was surrounded by walls of extremely hard sedimentary rocks. After the final series of eruptions had emptied the cauldron of gases and lava the platform created from earlier flows was too weak to support the weight, this caused it to fracture along the Evelyn and Selby faults and also across the middle. The subsequent subsidence of the layers of lava plugged the cauldron.

The eruption took place quite near the earth's surface so the molten rock cooled comparatively quickly to form the fine grained calcite rock rather than coarser grained granite which requires slower cooling.

The bedrock of the Dandenong Ranges is an igneous rock which poured out of the Earth's crust as a lava flow more than **200 million years ago**. It is thought that this lava erupted through fissures in the surface of the earth, rather than through a central vent. There are five recognizable lava types in this Dandenong Ranges Series, consisting of three calcite and two toscanite flows.

2b. Topography of the Dandenong Ranges

Today, the Dandenong Ranges provide a dramatically contrasting backdrop to the gently undulating and relatively featureless topography of the eastern suburbs of Melbourne. The ranges are considered to be of national scenic value.

The topography of the Dandenong Ranges as seen today is the result of sculpture by wind and water which, because of the hardness of the volcanic rocks, has left them standing out in relief.

The ranges are a dissected plateau of acid volcanics. They reach 487 metres at One Tree Hill and 622 metres at Mt Dandenong. They rise abruptly from the surrounding plains running from Mt Evelyn in the north to Upper Ferntree Gully in the south.

Surrounding the main ridges are the foothills ranging from 106 to 183 metres. The foothills are more dominant in the north and south and are not well defined in the west where the main range rises so abruptly from the plains.

The ranges exist along a north-south fault axis with a pronounced broad ridge of lower altitude on an east-west axis. This axis extends from Belgrave to Gembrook.

The western escarpment of the Dandenong Ranges, which includes the steeper sections of the Doongalla unit and the north portion of the western face, was identified as a significant geomorphological feature by the Upper Yarra Valley and Dandenong Ranges Authority in 1983.