3. Geology and landforms of the Kinglake National Park

Aim

Students will develop an understanding of the geology and geomorphology of Kinglake National Park. They will become familiar with the park's location, shape, internal and surrounding features.

Materials

- Map of Kinglake National Park in Kinglake National Park Visitor Guide (This Parknote is provided as part of this education resource kit. It is also available from Parks Victoria's website www.parkweb.vic.gov.au

  Click on Publications then Parknotes.)
- Maps of Kinglake and surrounds.
- Contour map showing Kinglake National Park.
- Resource sheet 3: Geology and geomorphology of Kinglake National Park.
- Paper, pens/pencils, highlighter pen, or computer.

Activities

1. Draw and illustrate a timeline of the geology and geomorphology of Kinglake National Park, using the scale of 1 cm = 20 million years for your timeline

2. Using a contour map of Kinglake National Park, locate the areas of the park that are plateau, slopes and gullies.

3. Label, or find and mark in highlighter pen, the following features of your copy of a map of Kinglake National Park:

- Masons Falls.
- Great Dividing Range.
- Kinglake Plateau.
- Kinglake West, Kinglake, and Toolangi townships.
- Goulburn River.
- Yarra River.
- Hume or Plenty Ranges.
- Mt. Disappointment.
- Mt. Slide.
- Sugarloaf peak.
- Kinglake Escarpment.
- Christmas Hills.
- Diamond, Watson and Steel Creeks.
- Mount Beggary.
- Kinglake to St. Andrews Road.

4. Write a fact about each of the features listed in Q.3.

5. Identify whether the following features are on the plateau, slopes and gullies of the park:

- The park's Visitor Centre.
- Masons Falls picnic area.
- Masons Falls.
- Jehosaphat Gully picnic area.
- Island Creek picnic area.
- The Gums camping ground.
- Andrew Hill.
- Frank Thomson Reserve.

3. Geology and geomorphology of Kinglake National Park

Prehistory and landforms:

The basal rocks of the Kinglake area are sedimentary mudstone and sandstone that formed on the bed of an ancient sea. Some **440 million years ago**, the Kinglake area lay under a shallow sea in the "Melbourne trough". At this time the only animal life consisted of marine creatures such as trilobites, echinoderms, sea sponges and graptolites. Primitive land plants had only just evolved.

The very warm, wet climate meant that there was massive erosion of mud and sand from surrounding areas into the Melbourne trough, trapping many of these marine animals which now appear as fossils in the mudstone. This process continued for about 50 million years resulting in a layer of mudstone over 1000 metres thick, 45 metres of which is exposed at Masons Falls.

Until about **340 million years ago**, the Victorian landmass experienced alternating periods of uplifting and subsidence. Towards the end of this period amphibians and insects had evolved and ferns and primitive leafy plants were spreading across the land.

The Mesozoic Era (**200 - 65 Million years ago**) is known as the age of the dinosaurs, while ferns, cycads and gymnosperms were the main types of land plants. Flowering plants were only just beginning to develop. At the end of this era there was a long period of geologic stability resulting in extensive plains represented today by the surface of the Kinglake Plateau.

At the beginning and end of the Tertiary Era (**60 - 6 million years ago**) there was a general uplift of land giving rise to the Great Dividing Range and its deeply dissected valleys.

Landforms

The Kinglake Plateau (Great Dividing Range)

From Kinglake West through Kinglake and on to Toolangi, the road follows the Kinglake Plateau which is part of the Great Dividing Range. North of the Divide, creeks flow into the Goulburn River which flows on to the Murray, while creeks on the south of the Divide flow to the Yarra River. This part of the Great Dividing Range is known as the Hume or Plenty Ranges.

Between Mt. Disappointment (794m) in the west and Mt. Slide in the east is an extensive area which is level or gently undulating. This level area is known as the **Kinglake Plateau**. It has rich deep red soils which support the area's flourishing agriculture. The deep soils indicate that a long period of weathering and soil formation took place before the onset of the present cycle of erosion.

At several points along the Hume Highway between Melbourne and Kilmore the Kinglake Plateau appears to be tilted gently towards the north.

The Escarpment

Roughly, between Coombes Road, Sugarloaf peak and Bald Spur Road (near Frank Thomson Reserve), the land drops away sharply to the south. This steep slope is known as the **Kinglake Escarpment**. It was formed by the continuous action of streams cutting deeply into the old land surface.

The southern slopes of the Plenty Range are much steeper than the northern slopes, resulting in greater erosion in the south. This differing rate of erosion has caused the main ridgeline to move north about 6 kms in the last 30 million years.

The Lower Country

To the south-east of the park the escarpment slopes away more gently from the Kinglake Plateau to the lower undulating hill country and the Yarra River. This lower country to the south includes the Christmas Hills and the basins of Diamond, Watson and Steel Creeks - all tributaries of the Yarra.

Rocks

The rock formations in which the present land surface has been carved are similar to those in the Melbourne-Lilydale area. In the south-eastern part of the park around Mount Beggary the rocks are of Silurian (Melbournian) age. In the cuttings along the road from St. Andrews to Kinglake the beds of sandstone and mudstone can be seen to be steeply inclined, forming a series of folds which tend roughly north and south. It contains rare marine fossils similar to those occurring in the Melbourne area.

Toadstool © MT

Soils

Soils of the plateau are red loams of friable stable structure. These are often deep and well drained with gradational profiles to an average depth of 2 metres. Fertility is only fair and reserves of nutrients poor. In many areas a mosaic of grey-yellow and red soil occurs due to the differential leaching of iron.

In the higher parts of the park, the greater rainfall has lead to more weathering of the rocks and therefore more soil formation particularly of the red, comparatively fertile, soils that have now mostly been cleared for cultivation.

Yellow gradational soils have formed at lower elevations and generally have a more sandy surface which grades with depth to a medium clay. Structure is often poor but permeability and water holding capacity are moderate. They are also acidic with low fertility.

Shallow stony soils occur in erosive situations in the hilly sections, particularly on ridges. They have stony profiles (loamy surfaces with light clay subsoils) and are usually less than 30 cm in depth. They have weak structure, high permeability, very low fertility and a low water holding capacity.

Soil formation is affected by landform and climate. Erosion activity on the ridgelines causes shallow soils. Soil addition (alluvial soils) in the gullies causes deeper soils. Greater rainfall leads to more weathering of rock and therefore more soil formation.