Topic 2 Geomorphology

Unit 1 Topography associated with horizontally layered rocks

1 What are horizontally layered rocks?

Rocks can be in horizontal layers, inclined layers, or massive. Topography associated with horizontally layered rocks develops where layers of the rock are flat-lying.

1.1 How do horizontally layered landscapes develop?

The landscapes that develop are hilly landscapes, basaltic plateaus, canyon landscapes, and Karoo landscapes.

1.1.1 Hilly landscapes

Hilly landscapes are influenced by the climate of the region and the resistance of the rock. In hot and humid regions the slopes are gentle and rounded. High rainfall results in mass wasting and sheet erosion, while higher temperatures encourage chemical weathering.

1.1.2 Basaltic plateaus

Basaltic plateaus are also called lava plateaus. They are built up over millions of years by lava pouring out of long narrow cracks in the ground. The lava floods the landscape building up to form deposits hundreds to thousands of metres thick. The Drakensberg is the remnants of a basaltic plateau, and a popular tourist and holiday destination in South Africa.

1.1.3 Canyon landscapes

Canyon landscapes develop where horizontal layers erode at different rates. At first the land is level, but running water soon finds weak places in the hard surface layer. The rivers erode vertically into the land and form deep valleys. The valleys have stepped sides. The resistant rock forms steep cliffs and the less resistant rock forms the more gentle slopes.

Uses of canyons:

- Canyons sometimes are dammed to make very deep dams, often used for hydro-electric power.
- The surrounding plateau itself may be too dry to be of agricultural value.
- Impressive scenery makes canyons good tourist attractions.

1.1.4 Karoo landscapes

- Karoo landscapes develop from canyon landscapes.
- Large areas are covered with horizontal layers.
- The plateau is protected by a resistant hard rock such as dolerite.
- Rivers erode vertically, forming canyons.

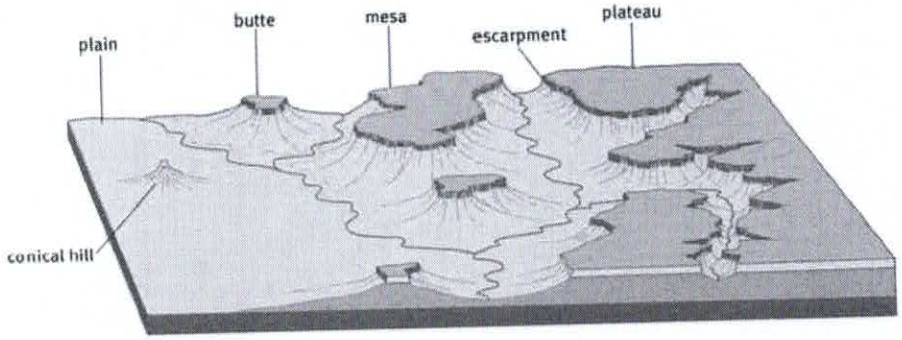

FIGURE 46 Features of a Karoo landscape

2 What is scarp retreat?

- The valleys widen by means of scarp retreat or back wasting.
- Scarp retreat is caused by lateral erosion, mass movement and weathering.
- It takes place over millions of years and reduces the original plateau to mesas, buttes and conical hills.

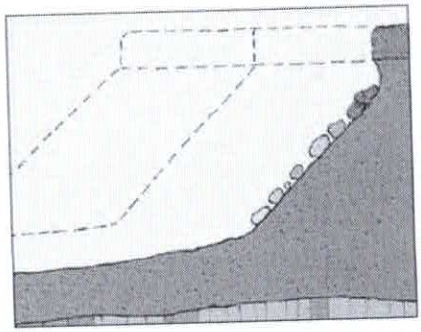

FIGURE 47 The development of a mesa by scarp retreat or back wasting

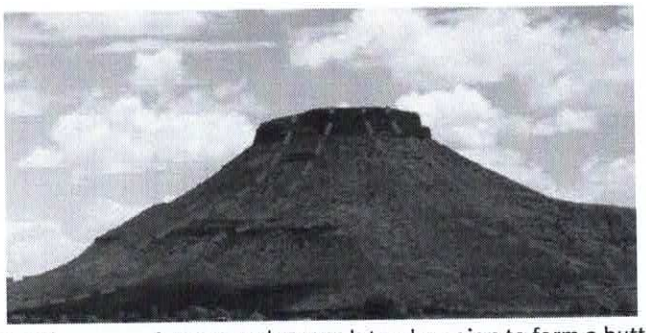

FIGURE 48 A mesa undergoes lateral erosion to form a butte. When the resistant cap rock erodes, what is left is a conical hill.

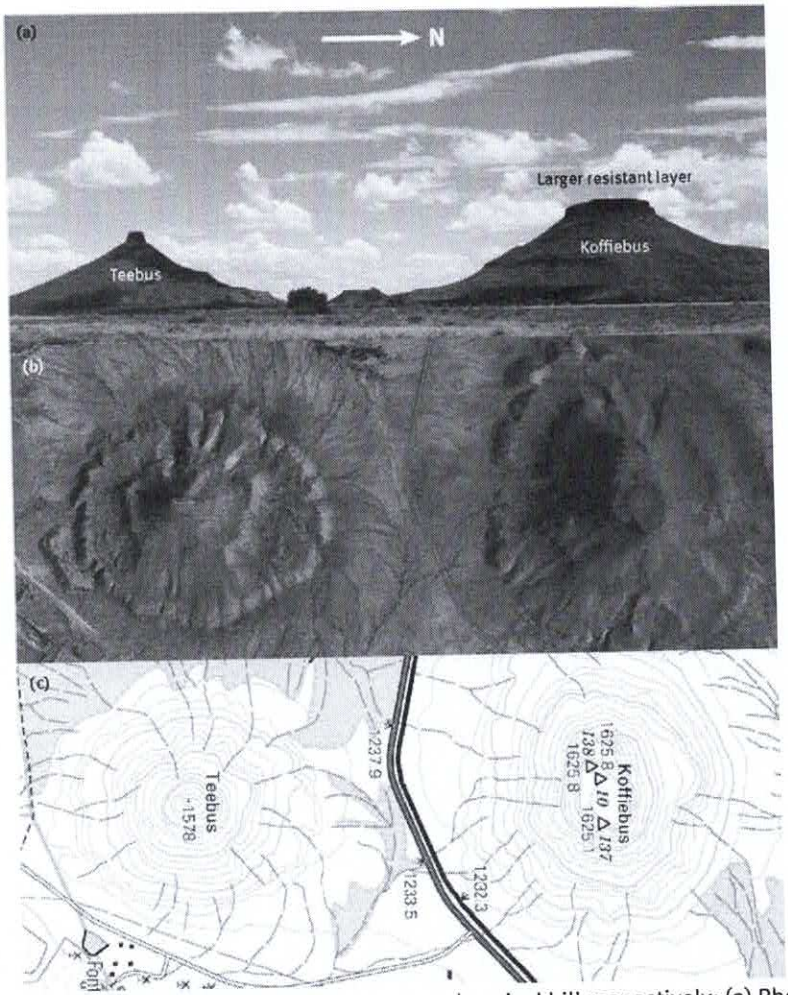

FIGURE 49 Teebus and Koffiebus are a mesa and conical hill respectively: (a) Photograph; (b) Google Earth vertical photograph; (c) Topographic map

The Karoo landscape is arid and the landforms are of no particular significance to humans. A lack of rainfall, steep slopes and extremely shallow topsoil are not suitable for growing crops but the Karoo is a successful sheep farming area.