

Figure 1 The load in a river changes along its course

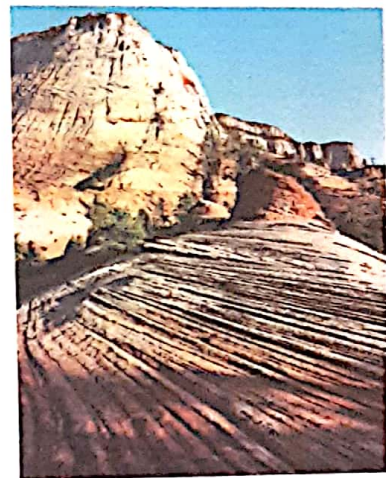
Keyword

sediment: material, from fine mud to large rocks, that has been deposited by the agents of erosion



Basalt rocks and cylinders

Source: Jeffrey Liao/Shutterstock



Eroded sandstone in Zion National Park, Utah

Source: Kavram/Bigstock



Debris flow fan at the mouth of a valley that was deposited by the 1982 Lawn Lake flood.

Source: Gallo Images/ Getty Images Dr. Marli Miller

Unit 2 Erosion and deposition

The difference between weathering, erosion and deposition

- Weathering is the breaking down of rock into small particles by physical, chemical and biological processes. These small particles can then be eroded by rivers, moving ice, the wind and wave action.
- Erosion involves the removal of weathered material by the action of rivers, waves, wind and moving ice. These are called agents of erosion.
- Deposition is the laying down of solid material in the form of sediment, such as mud and sand on a river bed or on the sea floor. Deposition is carried out by the agents of erosion and follows the erosion of the land and the movement of the resulting material.

Rivers – features of erosion and deposition along a river course

Energy is the ability to do work. The amount of energy a river has determines whether it can erode its valley and transport the sediment or drop the material as deposition. Energy is used to overcome friction, to transport sediment and erode.

Features alongside a river course

Deep, narrow, V-shaped valley with interlocking spurs

In the upper course near the source, the river uses its energy to erode down vertically, which deepens the valley. A V-shaped valley therefore gets formed as soil and rocks are eroded by the fast-running water (see illustration below). The river can now bend around obstacles of hard rock jutting out from alternate sides of the valley. These are called interlocking spurs (see Figure 3.5).

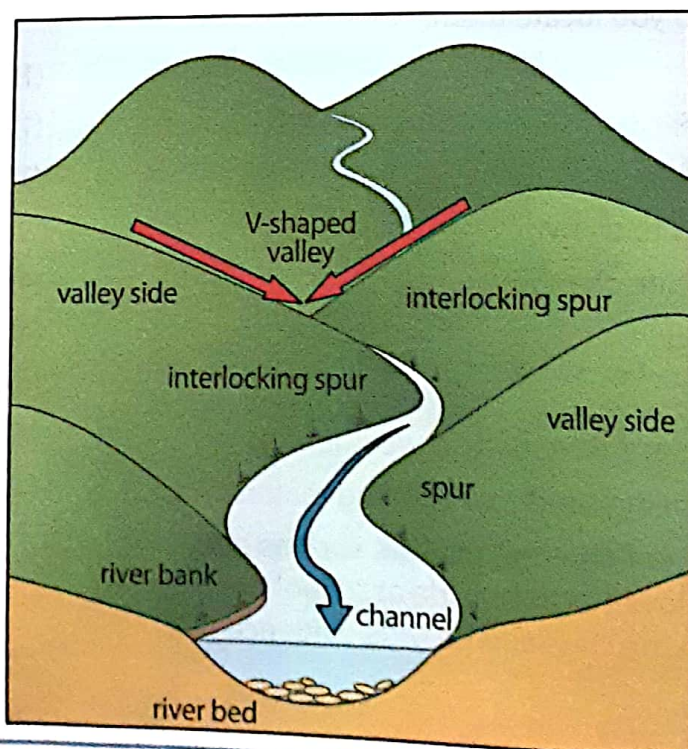


Figure 3.5: A V-shaped valley with interlocking spurs

Activity 3.2 Erosion, weathering and deposition

10 minutes

1. Describe the differences between weathering, erosion and deposition. (6)
2. Draw a diagram to show a V-shaped valley and interlocking spurs. (4)

[10]

Waterfalls and rapids

When a layer of hard rock lies across a river's course, the softer rocks downstream are eroded away quicker than the hard rock. This causes waterfalls or rapids to develop.

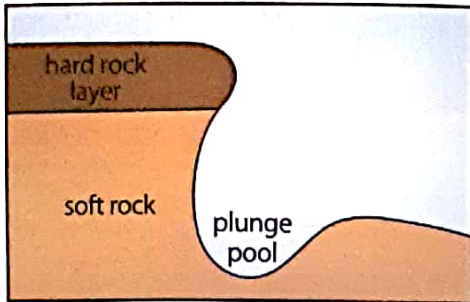


Figure 3.6: How a rock layer forms a waterfall.

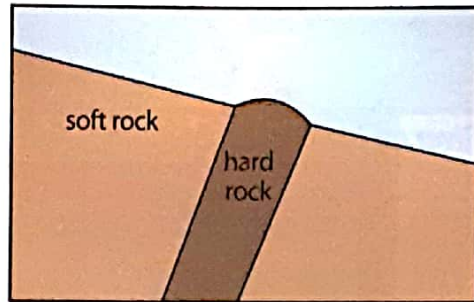


Figure 3.7: How a rock layer forms a rapid.

Meanders and ox-bow lakes

Water flows fastest on the outer bend of a river, where the channel is deeper and there is less friction. This erosion results in the undercutting of the river bank and the formation of a steep-sided river cliff. On the inner bend, water is slow flowing and deposition occurs, resulting in a shallower channel. The bends become bigger as there is more erosion on the outer bank and more deposition on the inner bank.

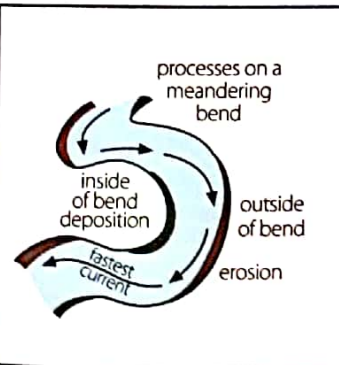


Figure 3.8: The formation of a meander.

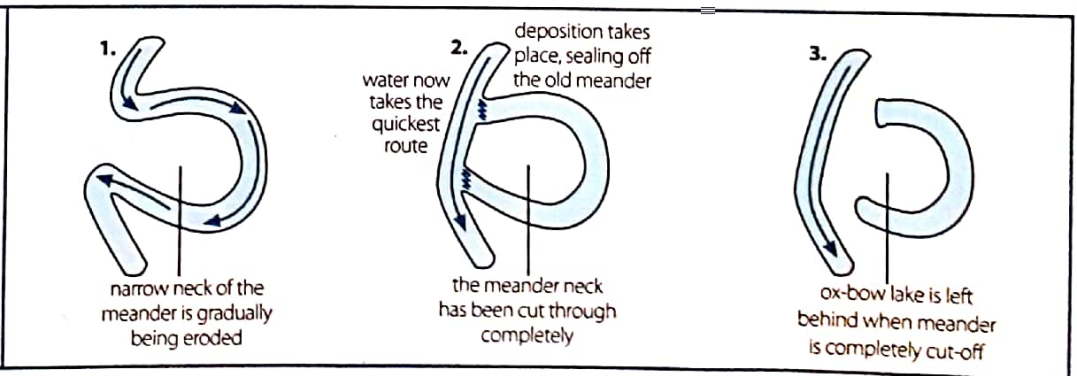


Figure 3.9: The formation of an ox-bow lake.

As the outer banks of a meander continue to be eroded, the neck becomes narrower. Eventually the two outer bends meet and the river cuts through the neck. The water then takes its shortest route rather than flowing around the bend. Deposition gradually seals off the old meander bend, forming a new, straighter river channel. Due to deposition, the old meander bend is left isolated from the main channel as an ox-bow lake.

Keywords

waterfall: a vertical stream of water where a river falls over the edge of a steep place

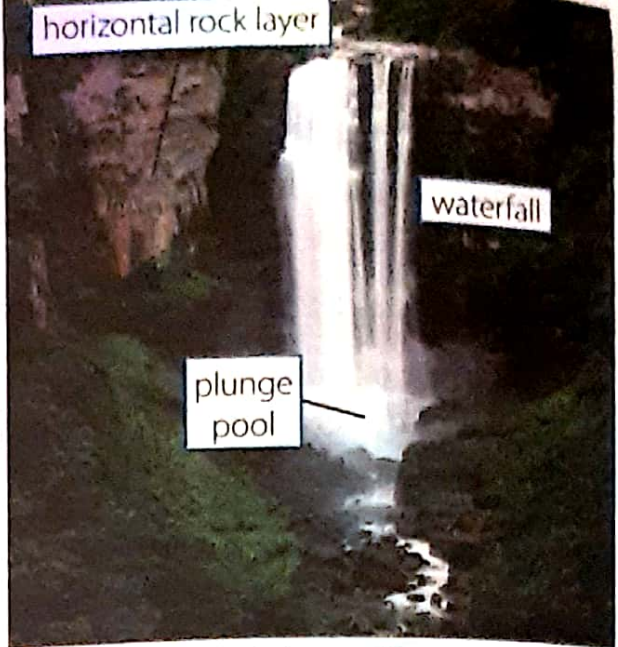
rapid: an area where a river becomes shallower and has some rocks exposed above the flow surface

meander: sharp bend in a river



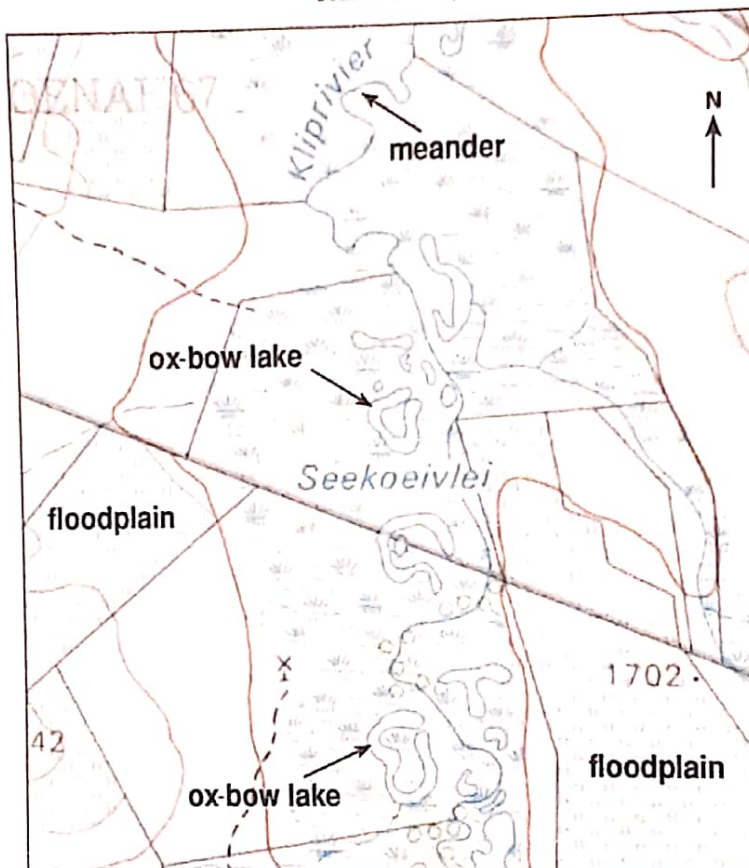
River rapids, Drakensberg

Source: Anthony Hambly



Karkloof Waterfall near Pietermaritzburg

Source: Leksele/Shutterstock



Source: The Chief Directorate: National Geo-spatial Information (NGI)

Figure 3.10: 1:50 000 topographic map showing meanders, ox-bow lakes and the floodplain of the Klip River in the Free State.

Activity 3.3 Waterfalls, rapids, meanders and ox-bow lakes

10 minutes

1. What is the difference between a waterfall and a rapid?
Draw a labelled diagram to show how each is formed. (8)
2. In Figure 3.10 a meander in the Klip river is indicated in the north of the mapped area. Explain briefly how this meander will develop into an ox-bow lake. (8)

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