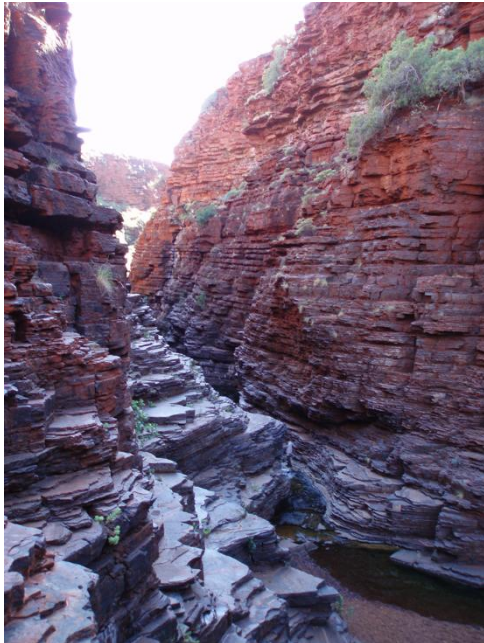


Erosion - Teacher Background

Erosion is the process of removal and transport. During this process clasts may be further broken down into smaller and rounder pieces. The products of weathering are removed by erosion (Latin e=away from, rodos=to gnaw)



The Fortescue River cut this and many other gorges through the Hamersley Ranges after their uplift that started about 160 million years ago.

Moving water carries clasts which abrade the underlying rocks. The country rock consists of lightly metamorphosed ancient Banded Iron Formations (BIF). Hard silica rich red layers (jasper) are inter-bedded with softer ironstone and asbestos. Differential weathering and erosion of these produces the characteristic layered effect seen in this photograph.

Weathering during the last 60 million years has removed silica and asbestos resulting in iron rich zones. The original rock averaged 30% iron ore whereas the weathered material can rise to 60% and more forming the iron ore deposits presently being mined near Newman and Tom Price.

Photograph by Amber Atkins

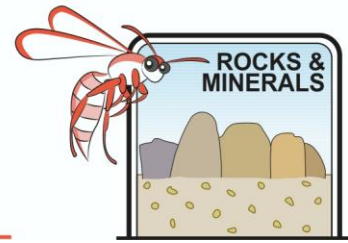
With the exception of glaciers, anything that moves mixtures of materials will sort them by size and by density. This can be demonstrated by “yandying” a mixture of materials in a shallow dish such as a laboratory tray, meat tray or yandy as seen below. Dried materials separate fairly quickly.

ASIDE: The old university story of professors grading student theses by grabbing a pile and throwing them across the lecture theatre is based on this process. The heaviest would land near the professor’s feet and be given a “first” whilst those that hit the far wall were given a “third”.

The major forces for erosion are gravity, wind and water. Biological agents play a minor role.

1. Wind

Wind is produced by the Sun heating the atmosphere and the ground. Close to the surface of the Earth it blows strongly but its strength and its carrying power decreases with height. Walking along the beach or out on a sand flat sand carried by the wind stings your ankles but rarely has little effect at head height. Dunes along our coast and at the side of inland salt lakes are formed by wind power. At Cervantes near the Pinnacles, roads have to be kept clear of wind blown sand. Dunes can move a hundred metres in one year.



Erosion - Teacher Background

2. Water

Running fresh water moves downhill. The clast size it can carry depends on the force of the flow. Clast shape is also affected by collisions within the flow. In mountainous regions where the grade of the riverbed is high a mixture of clast sizes will be carried. When rivers enter the sea their flow is rapidly slowed and large amounts of medium grained sediments will be deposited in alluvial fans such as those at the mouth of the Swan and Gascoyne rivers. Only fine silts and muds will be carried far out to sea.

Seawater has maximum erosive power at wave level. This erosive force cuts platforms on reefs and rocks and wave cut notches at the base of cliff. They can be used to indicate historic sea levels.

This small cliff near Rockingham has notches cut at present day sea level and at much higher sea level during the Ice Age.

Ice Age notch →

Present day notch →



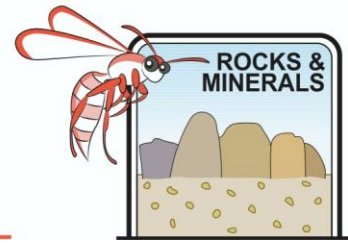
3. ICE

Glaciers cover 10% of our planet. Although we do not have glaciers scouring the surface of mainland Australia at present, during the great Permian Ice Age approximately 300 million years ago it was covered by ice to a depth of 5km.

Ice freezes around weathered fragments and plucks rock from the sides of the valleys it passes down. Clasts are unsorted unless reworked by glacial rivers. Glaciation leaves classic U-shaped valleys.

Boulders dropped from Permian glaciers can be found near Mingenew in the Central Midlands of WA.

Erosion - Teacher Background



4. GRAVITY (Soil Creep and landslides) movement due to gravity

Weathered material on slopes slowly moves downhill due to gravity. The rate of movement depends on the size of the clasts, presence or absence of water and the angle of slope. Weathered material from Wiluna is moving very slowly down towards the Eucla Basin and will eventually end up in the Great Australian Bight. This process may take millions of years. Landslides that occur when water moves unstable soil slopes, can take only minutes.