

Volcanoes, Earthquakes, Fold mountains

Mantle

Hot molten rocks

Magma

Continental Drift

Pangea

Earthquakes

plate boundaries

fault lines

focus

epicentre

seismograph

Richter Scale

Tsunamis

Volcanoes

Cone

Vent

Lava

Active

Dormant

Extinct

Pacific Ring of Fire

Volcanoes

Constructive

Fertile soil
New land
Hot springs
Tourist attraction

Destructive

Loss of life
Damage to property
Damages infrastructure
Poisonous gasses

Fold Mountains 01

Plates collide and buckle

Upfolds = ANTICLINES = Mountains

Downfolds = SYNCLINES

Fold Mountains 02

MOUNTAIN BUILDING TIMES

NAME	TIME	EXAMPLE
Caledonian	400 million years ago	Scandinavia Donegal
Armorican	250 million years ago	NW France South Ireland
Alpine	35 million years ago	Alps, Andes, Rockies & Himalayas

Fold Mountains 03

The Effects of Mountains

Barriers between people

An effect on climate

Useful for coniferous forestry

Hydro-electricity

Tourist attraction

ROCKS 01

Igneous - Sedimentary - Metamorphic

WHAT YOU NEED TO KNOW (!)

Formation of rock types...?

Examples of each type...?

Where can these be found...?

What use are these rocks...?

ROCKS 02

IGNEOUS ROCKS

hot magma cooled and became solid

GRANITE

cooled slowly and formed large crystals
grey in colour

Dublin, Wicklow and Mourne mountains
building material and in the construction of
monuments

ROCKS 03

IGNEOUS ROCKS

hot magma cooled and became solid

BASALT

magma cooled quickly on the earth's surface

very dark (often black) in colour

Antrim-Derry plateau

Giants Causeway formed hexagonal columns

building material and for road foundations.

ROCKS 04

SEDIMENTARY ROCKS

sediments (small particles) of other rocks or sediments from plants or marine organisms were crushed together

organic

(the remains of vegetation or marine life)

inorganic

(from broken down particles of other rocks)

Limestone

organic sedimentary rock
seabed where the skeletons and shells of marine
life

Burren in Co. Clare

building industry, in the manufacture of cement
and as a fertiliser by farmers

Sandstone

inorganic sedimentary rock
grains of sand which were unearthed from other
rocks and then deposited elsewhere
compressed and cemented together to form rocks

Galtee Mountains in Munster

Sandstone does not weather into fertile soil
building material and for road surfacing

ROCKS 05

Metamorphic Rocks metamorphosed (changed)

originally either igneous or sedimentary rocks
due to great heat and/or pressure
heat caused by contact with magma
pressure caused during the creation of
fold mountains

Marble

(originally limestone)

Marble is found in Connemara

Quartzite

(originally sandstone)

quartzite at the top of many mountains e.g. the
Sugarloaf in Co. Wicklow.

Weathering

What is Weathering? - Definition:

Weathering involves the breaking down of rocks due to their exposure to the earth's atmosphere

Weathering of rocks means that the rocks are broken down into small fragments which are then capable of being taken away by the agents of erosion

(e.g. moving ice, rivers, the wind, the sea).

There are two basic types of weathering:

Mechanical Weathering

&

Chemical Weathering

Mechanical Weathering

Freeze-thaw Action

(also called frost action)

Onion weathering

(also called exfoliation)

Freeze-thaw Action

occurs in mountain ranges in mid-latitudes

e.g. the slopes of mountains in Ireland

During the day water seeps into cracks in rocks and at night the water freezes. When water freezes it expands by about **9%** of its volume. This constant expansion and contraction makes small fragments of rock break off. These little pieces accumulate at the foot of the mountain and are known as **scree**.

Onion Weathering

occurs in the hot desert regions of the world.

These areas experience a large diurnal temperature range i.e. it can be very hot during the day but quite cold at night.

Rocks **expand** during the heat of the day and **contract** with the coldness of the night. This constant expansion and contraction causes the outer layer of the rock to peel or break away.

Chemical Weathering

Carbonation

occurs in limestone regions.

rain falling through the air takes on carbon dioxide (CO_2). This turns the rainwater into a weak form of carbonic acid. This then turns the calcium carbonate in limestone into calcium bi-carbonate which is soluble

the rainwater dissolves the limestone

Case Study - The Burren 01

formed 300 million years ago under the sea.

Limestone is a sedimentary rock and is laid down in layers with horizontal lines of weakness called bedding planes and vertical ones called joints.

When the Armorican Fold mountains were being formed, this limestone was raised above sea-level.

Any soil that formed on top of it was removed during the last period of glaciation in Ireland.

Case Study - The Burren 02

This left an area of **exposed limestone** which was changed by the chemical weathering process known as carbonation.

Many **unusual features** both above and below ground were formed.

This type of landscape is known as **karst**

Case Study - The Burren 03

Overground features

1. Clints and grikes
(limestone payments)
2. Swallow holes.

Clints

are large blocks of exposed limestone and grikes are deep grooves between the blocks which have been cut by the process of carbonation.

Together these features are called limestone pavement as they look somewhat like paving slabs!

Swallow holes

are large openings in the ground which can "swallow-up" a stream or small river.

This happens when the stream flows off some other type of rock onto the limestone, dissolves some of the limestone and flows down into the hole thus formed.

Case Study - The Burren 04

Underground features

1. Caverns

2. Dripstone features

(stalactites and stalagmites).

Caverns

are large underground passages or chambers in a limestone region.

They are formed when the soft limestone is dissolved by the action of water that has seeped in from above.

The Burren has a large range of caves and caverns beneath its surface.

Dripstone features

are formed when water containing dissolved calcium carbonate (calcite) hang from the roof of a cave or drops onto the floor.

As the water evaporates, the icicle-like features of calcite are left behind.

Those hanging from the ceiling = stalactites
Forming on the ground = stalagmites.

[LIMESTONE CURTAINS & LIMESTONE PILLARS]

Agents of Erosion

Erosion

involves the removal of material which has often already been weathered.

The key agents of erosion are:

rivers, moving ice and the sea.

Rivers

(Fluvial Processes)

Three stages of a rivers course

1. Upper Course (stage of Youth)
2. Middle Course (stage of Maturity)
3. Lower Course (stage of Old-Age)

The Upper Course of a River

the river is mainly concerned with erosion.

The river valley has a V-shape.

Key features:

interlocking spurs, waterfalls and rapids.

The Middle Course of a River

**the river is concerned with both
erosion and deposition**

**It is eroding its sides and now the valley has a
broader flatter profile.**

**The river twists and turns (meanders) with its
broader valley.**

Key features:

meanders and flood plains

The Lower Course of a River

the river is flowing on a very gentle slope,
it is flowing more slowly.

This lack of speed means the river is unable to
carry all its load.

Deposition now occurs

Key features: [depositional ones]

deltas and ox-bow lakes

How does a River Erode?

The speed of the river

(increases with steepness of slope)

The volume of water in the river

**(increased water means increased ability to
carry material)**

How does a River Transport its load?

Suspension

(carried in the water)

Solution

(dissolved in the water)

As bedload

(rolled along the bed of the river)

When does a River Deposit its load?

When it slows down

(usually when it comes to flatter land)

When its volume decreases

(e.g. in times of drought)

When it reaches the sea

Rivers and Mankind

Advantages of rivers include:

H.E.P. (hydro-electric power)

transport

recreational purposes

irrigation purposes.

Rivers and Mankind

Disadvantages include:

Flooding

loss of life

damage to crops

damage to property.

The Sea

(Coastal Landforms)

Sea Erosion is caused by waves

The strength of the waves depends on the strength of the wind and the fetch

(the distance the wave travels)

Waves reaching the West of Ireland will have a greater fetch than those on the east coast

Waves erode mainly by:

Hydraulic action

Abrasion

Solution

Key features of erosion would include:

bays, cliffs and caves

Types of Waves

Destructive waves is the term used for waves which erode the coastline.

Constructive waves are those which lead to the formation of new features along the coast.

This usually happens when the coastline is shallow.
[Where waves are forced to slow down and they then deposit material which may have been removed elsewhere]

Sea Deposition

A beach is formed when constructive waves deposit material along the shore.

This is most likely to happen in a bay
Most other features of deposition are associated with longshore drift. This is where material (sand etc.) is carried along the shore by currents

When this material meets an obstruction such as a headland, it gets deposited

Features of Longshore Drift:

spit

(a ridge of sand projecting out from the shore)

tombolo

(where a spit links an island to the mainland)

lagoon

(a lake formed when a spit closes off a bay)

Coasts and Mankind

The sea is of huge benefit to man for food, transport etc.

Many cities are situated on the coast and mankind has often tried to control how the sea shapes the coastline.

Mankind tries to control coasts in order to prevent flooding ; reclaim land from the sea; stop the erosion of amenities such as beaches.

Soil

Soil Formation

Soil is the top layer of the earth and is formed by the interaction of a number of different elements as outlined below.

Parent material:

this is broken down by weathering and provides the main material for the soil.

Climate:

this will play a strong role in the type of soil finally produced. Climate decides how much rain, sun etc. the parent material will receive. It also plays a key role in the type of weathering that will take place.

Humus:

this is decayed vegetative matter and the remains of animals etc that provides the nutrients for the soil.

Micro-organisms:

earthworms, slugs etc eat the decaying vegetative matter and help to break it down. They also allow oxygen to pass through the soil by creating holes as they move through it.

Moisture:

water passing through the soil plays an important part in the downward movement of minerals in the soil. This process is called leaching.

Time:

the formation of soil is a slow process. The type of soil is often decided by how long each of the above has acted on the parent material.

Soil Types

Typical Irish soils include the following:

1. **Podzols:** grey in colour, low in humus (not fertile). Found in west Cork and west Wexford.
2. **Brown soils:** brown in colour, high in humus content (fertile).
Found in the South East and the Midlands.

Soil Types

- 3. Peat soils:** black in colour, very acidic and therefore not very fertile, but suitable for coniferous trees.
- 4. Grey soils:** grey/blue in colour, often badly drained, and usually not fertile. Found in Ulster.

An Example of a World Soil Type

Tropical Red Soil

the high temperatures and heavy rains produce a soil rich in humus but heavily leached. These soils produce tropical rainforests (very valuable timber) but can be easily washed away when the trees are removed. Leaching of all minerals except iron causes the red colour. The iron then produces the red colour due to oxidation

Soil erosion

Soil Erosion

caused by **deforestation**

(the removal of forests) and

by poor farming practices **overgrazing** by animals,

and **ploughing up and down** hillsides thus
allowing rain to wash away the soil.

Proper soil management can help

