Landscapes of the UK 1

The physical landscapes of the UK have distinctive characteristics.

Term	Definition
weathering	The breakdown of material in situ by physical, chemical and biological processes; if movement is involved this becomes erosion.
Ice Ages	A glacial episode characterised by lower than average global temperatures and during which ice covers most of the Earth's surface.
Holocene	The period of time from 12,000 years ago until today.
igneous	Rocks formed within the interior of the Earth from molten rock.
sedimentary	Rocks formed by layers of sediment, usually at the bottom of the sea.
metamorphic	Rocks that have been changed as a result of heat and pressure being applied to them for long periods of time.
geology	The study of rocks and their formation, structure and composition.

Distribution of areas of upland, lowland and glaciated landscapes

Upland areas are mainly found in the NW; they have colder, wetter weather increasing physical weathering. They were covered by ice during the Ice Ages; ice is very powerful and has eroded the landscape to give dramatic mountain scenery.

Lowland areas are mainly found in central and S England; the rocks are made up of till (material) deposited by the glaciers during the Ice Ages.

Grampian Mountains
- highland area
- Igneous rocks
- Shaped by glaciation (ice) in the past

Snowdonia
- highland area
- Igneous rocks from volcanoes
- Shaped by glaciation (ice) in the past

The Downs and the Weald
- lowland area
- Clays and sands (sedimentary rocks)

Distinctive characteristics of landscapes

Geology	Climate	Human Activity
- The harder the rock, the higher the land – it is eroded less. - Sedimentary rocks like chalk and clay lie under lowland areas. - Rocks are weathered to create soils. - Rocks contain different minerals – this affects the type of vegetation that can grow in the soil. - If the rock is impermeable no water can pass through it so there are many streams and rivers or peat/mires (boggy soil) are formed. - If the rock is permeable there is little surface water.	- Rain, frost and wind all weather rocks. - Highland areas often experience freezing conditions so are shaped by freeze-thaw weathering. - Windy, exposed locations are weathered faster than sheltered locations	- People have cleared land for agriculture. - Flat land has been used for arable (crop) farming. - Grassy areas have been used for dairy farming. - Upland areas have been used for sheep farming. - People have chopped down areas of woodland – we have very little original deciduous woodland left but we have replanted some. - People have planted coniferous (evergreen) forests for timber. - As settlements have grown, land has been reshaped, concreted over, rivers controlled or diverted and roads and railways built.

Landscapes of the UK 2

There are a number of geomorphic processes which create distinctive landscapes.

Term	Definition
geomorphic processes	Processes that result in a change in the shape of the Earth; from 'geo' meaning the earth and 'morph' meaning to change shape.
geodiversity	The natural range of geological, geomorphical, soil and water features that compose and shape the landscape.

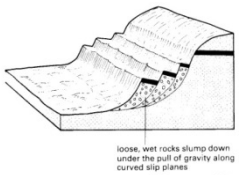
Geomorphic Processes

Weathering – *breakdown of material in situ.*

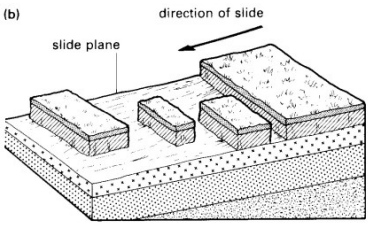
- Mechanical weathering – the physical action of rain, frost and wind that create weaknesses in rocks. Includes freeze-thaw (water in a crack freezes, expands and makes the crack wider) and exfoliation (rocks expand during very hot temperatures and then contract when it cools down making the rock start to peel in layers).
- Chemical weathering – materials react chemically in different ways which weakens them. Includes oxidation (chemicals in the air reacting with the rock).
- Biological weathering – rocks and land can be broken down by plants and animals. Includes rabbits burrowing into river banks.

Mass Movement – *rocks move downhill due to gravity.*

Slumps happen when the rock (clay) is saturated with water and slides downhill.



Sliding happens when a section of land falls down a slope and dislodges other material on its way.



Erosion: the wearing away and removal of materials by a moving force.

Attrition: Where pebbles hit each other or landforms, making rocks break and get smaller and rounder.

Abrasion/Corrasion: When sediment is thrown against a surface by water and rubs the material to smooth the land.

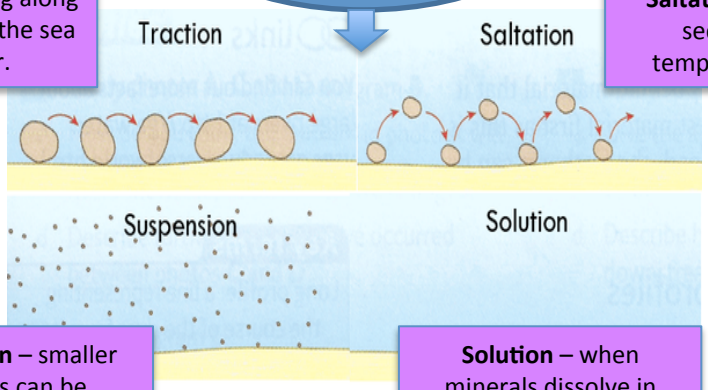
Corrosion/ solution: Where rocks are dissolved in water.

Hydraulic action: Where water forces its way into cracks, which creates weaknesses in rocks, splitting them apart.

Transportation: the movement of material along the coast by waves or along a river bed by the river.

Traction – the movement of larger sediment rolling along the bottom of the sea or a river.

Saltation – small pieces of sediment picked up temporarily in the water.



Suspension – smaller particles can be suspended in water.

Solution – when minerals dissolve in water *(is invisible)*.

Deposition: the laying down of materials that have been transported (due to loss of energy).

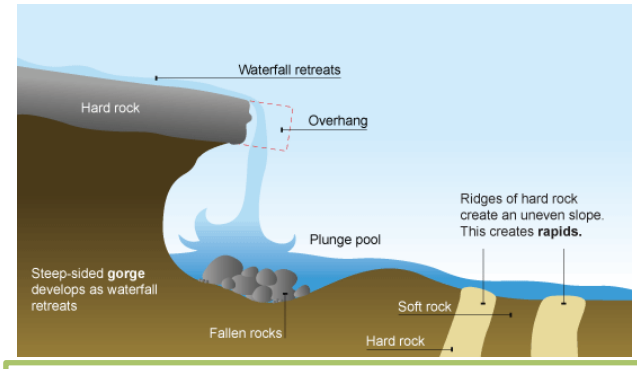
Landscapes of the UK 3

Rivers create a range of landforms which change with distance from their source within a river basin.

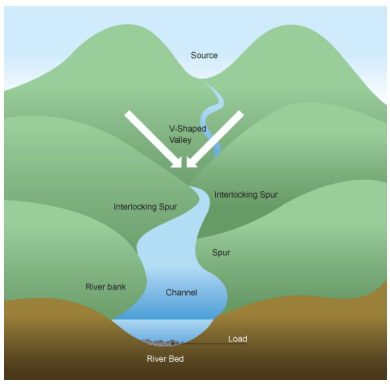
Term	Definition
vertical erosion	Erosion downwards; this deepens the river valley and channel to create v-shaped valleys. It is dominant in the upper course of a river.
lateral erosion	Erosion sideways; this widens the river valley and channel as the river meanders (bends). If is dominant in the middle and lower course of a river.
cross profile	Shows you what the cross-section of the river channel looks like; it should be narrow and shallow at the source and very wide and deep by the time the river reaches the sea/lake.
long profile	Shows you how the gradient (steepness) changes along a river; it should be steep at the source and become almost flat by the time the river reaches the sea/lake.

Waterfalls and Gorges

1. Created when the river flows over an area of hard rock followed by soft rock.
2. The soft rock is eroded more quickly creating a step.
3. As the water goes over the step it eroded more and more of the softer rock.
4. A steep drop is created which is called a waterfall.
5. The hard rock is undercut by the erosion and collapses due to gravity.
6. The collapsed rock is swilled around and helps to erode the softer rock in the plunge pool.
7. Overtime more collapses occur and the waterfall retreats creating a gorge.

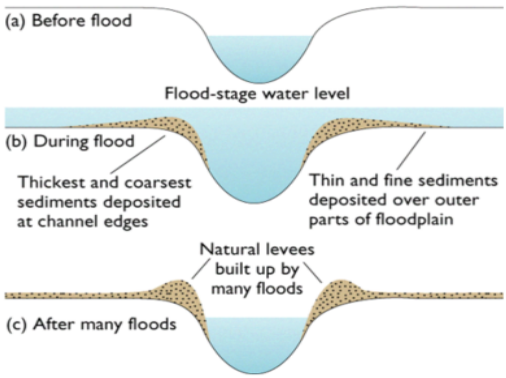


V-shaped Valleys and Interlocking Spurs



The river erodes vertically downwards near its source creating V-shaped valleys. The rivers are not powerful enough to erode laterally as they have to wind around the hillsides creating interlocking spurs.

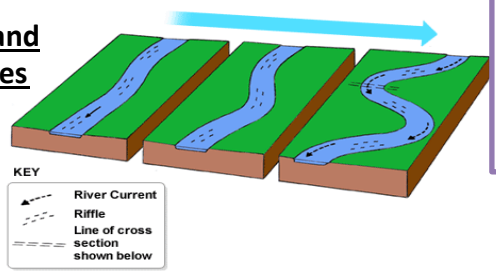
Levees

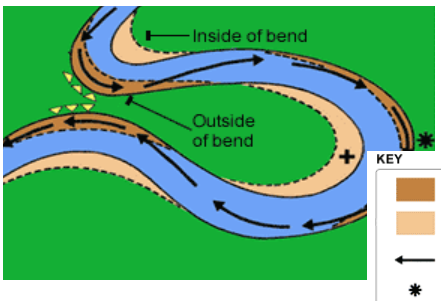


Floodplains

When a river floods onto the flood plain the water slows down and deposits the eroded material. This builds it up.
Meanders migrate across the flood plain making it wider. The deposition that happens on the slip off slopes of meanders also helps to build up the flood plain

Meanders and Ox-bow lakes





1. The current if faster on the outside of the bend because the channel is deeper. Therefore more erosion takes place on the river bend forming a river cliff.
2. The current is slower on the inside of the bend because the channel is shallower. So eroded material is deposited on the inside forming a slip-off slope.
3. Eventually erosion causes the outside bends to become closer and the river breaks through. Deposition cuts off the meander forming an ox-bow lake.

Landscapes of the UK 4

River landscapes are dynamic and differ depending on their geology, climate and human activity.

Key term	Definition
Corrie	An armchair shaped hollow, high on a mountain with steep back and side walls
Glacial trough	A valley shaped by glaciers with steep sides and a flat valley bottom formed by a combination of plucking on the valley sides and abrasion on the valley floor
Riffles	Shallow areas of fast flowing water- good habitats for fish and insects

The Afon Ogwen (River Ogwen) – NW Wales

1. Just a few hundred metres from the source, the Afon Ogwen flows into a corrie tarn called **Ffynnon Loer.**

fig.69 **Ffynnon Loer**

2. Having fallen 450m in just 2km, the river enters **Llyn Ogwen**, a glacial ribbon lake at the end of the Ogwen valley.

fig.70 **Llyn Ogwen**

3. Leaving Llyn Ogwen the river plunges 100m down the **Ogwen Falls**, a series of cascades descending into the **Nant Ffrancon** valley.

fig.71 **Ogwen Falls**

4. Leaving the Nant Ffrancon, the Afon Ogwen flows past the slate wastes of the **Penrhyn Quarry** into the village of **Bethesda.**

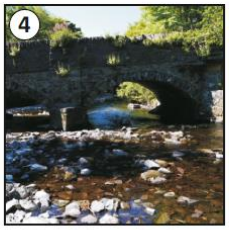


fig.72 **Bridge at Bethesda**

5. On leaving Bethesda, the river flows north, until making a sharp turn west through dense woodland after the **Halfway Bridge.**

fig.73 **Halfway Bridge**

6. Finally, after 20km the river reaches its mouth where, at low tide, it flows out across the **Bangor Flats,** towards the **Irish Sea.**

fig.74 **Bangor Flats**

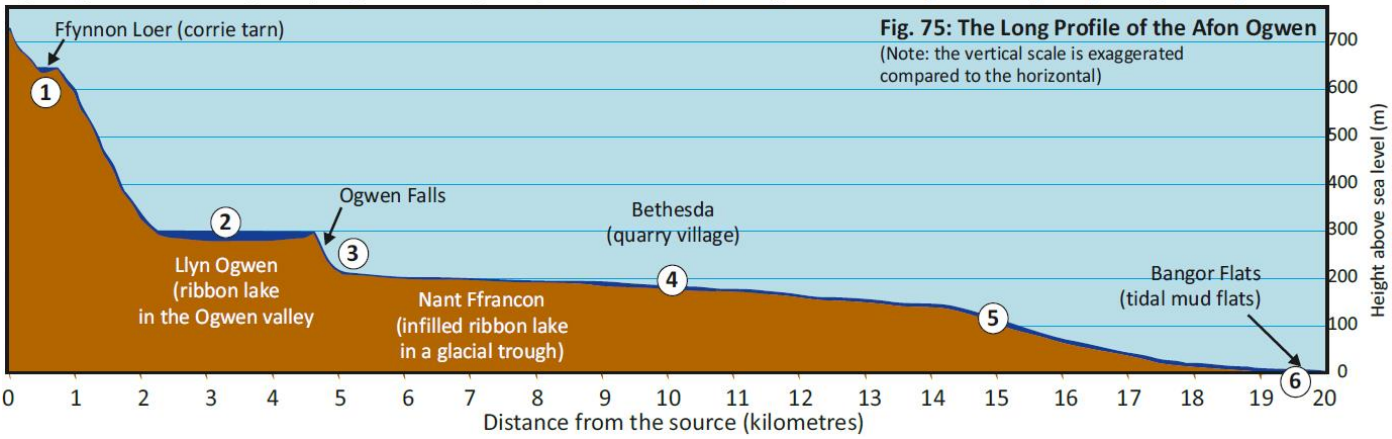


Fig. 75: The Long Profile of the Afon Ogwen
(Note: the vertical scale is exaggerated compared to the horizontal)

Geomorphic Processes: The Afon Ogwen basin has largely been shaped by glacial erosion

Upper course- igneous rock	Middle Course - sedimentary	Lower Course- sedimentary
Igneous rock makes this part of the river basin very resistant to erosion. However, glaciers during the last ice age have carved out corries such as Ffynnon Loer through plucking and abrasion. More recently, a combination of river erosion and mass movement has created v-shaped valleys. Rates of weathering can be high here due to the high rainfall and low temperatures in winter.	Glacial erosion through plucking of the side walls and abrasion of the valley floor has created the Nant Ffrancon which is a glacial trough.	Flooding in the lower course, north of Bethesda, has caused deposition and created floodplains. Deposition has also helped create the Bangor Flats, as the river slows when it meets the sea, it deposits fine alluvium, making it a perfect habitat for birds.

How Human Activity Impacts the Landscape:

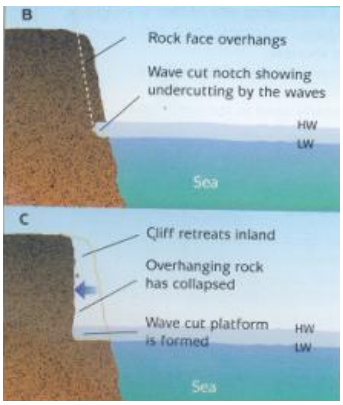
Positives	Negatives
1990s- The Environment Agency helped to **restore the river to recreate the meanders, pools and riffles** to allow the river to re-gain its original form and diversity of wildlife. Salmon numbers have since seen a rise. Snowdonia is a **National Park** – this limits the negative impacts of humans upon the landscape as new buildings and developments are strictly regulated and land use is monitored carefully.	1960s- Part of the river flowing through the Nant Ffrancon was **dredged and straightened** to help drain farmland. However, this increased river velocity and removed the gravel from the river bed, meaning salmon numbers dropped significantly. Footpath erosion- tourists visit to view the beautiful river basin but damage the landscape as a result.

Landscapes of the UK 5

There are a range of landforms within the coastal landscape.

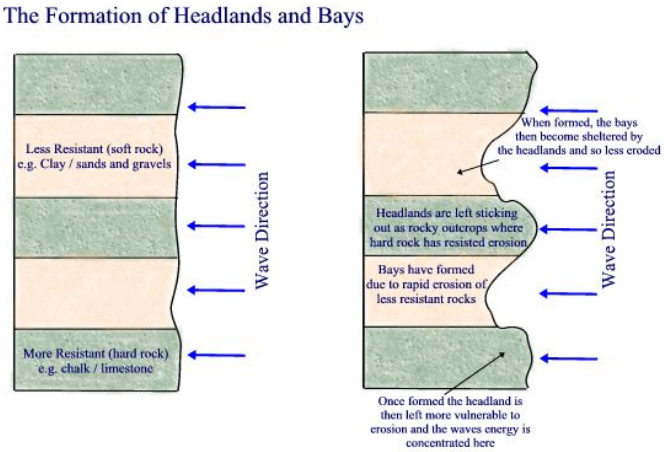
Term	Definition
longshore (littoral) drift	The movement of sediments along a stretch of coastline as a result of wave action.
waves	Elliptical or circular movement of the the sea surface that are translated into a movement of water up the beach as they approach the coastline.

Cliff Retreat and Wave-cut Notches/Platforms



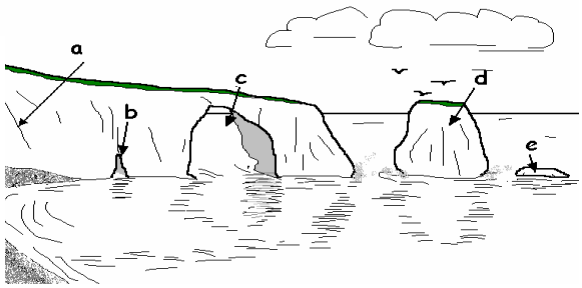
The erosion of cliffs can create wave-cut platforms – areas of flat rock at the base of the cliff.

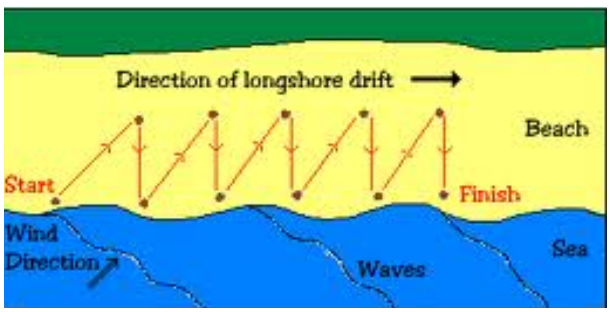
Headlands and Bays



Caves, arches, stacks and stumps

a) Fault in the gradually gets bigger due to weathering.
b) Erosion by waves widens the weakness in the cliff to form a cave.
c) Waves cut through the headland to form an arch.
d) Collapse of arch due to gravity to form a stack.
e) The stack is undercut all the way round as wave cut notches form. It eventually collapses to leave a stump which is covered at high tide.





Beaches

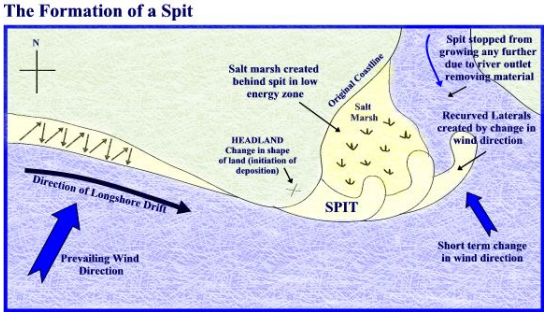
Beaches are areas of land that lie between the storm-tide level and the low-tide level. They can be made up of sand, pebbles or a mixture of both.

Longshore drift carries material along the coast/beach:

1) Waves approach the coast at the angle of the prevailing (most common) wind direction.
2) **Swash** pushes sand and gravel up the beach at the same angle.
3) **Backwash** carries sand and gravel back down the beach at 90° under the force of gravity.
4) Sand and gravel move along the beach in a zigzag fashion.

Spits

Spits care creates when the coastline ends but the process of longshore drift continues. If the conditions are right the sediment is deposited and is built up to create new land.



If longshore drift continues along the spit, it may join up with the coastline on the other side to form a **bar** if there is no river to keep washing away the sediment.

Landscapes of the UK 6

Coastal landscapes are dynamic and differ depending on their geology, climate and human activity.

Key term	Definition
Sea walls	Walls made of concrete to reflect wave energy and prevent erosion.
Groynes	Wooden fences at right angles to the coast which traps material carried by LSD. This builds a beach to absorb wave energy. (Some can be made from rock armour).
Rock armour	Large boulders placed in front of cliffs to dissipate wave energy and protect the cliffs from erosion.

North Wales Coast

Geomorphic Processes: The North Wales coast has been shaped by erosion, longshore drift and deposition

Landform	Location and geology	Geomorphic processes and influence of climate
Headland and bay	**Great Orme**- headland made out of hard limestone which is resistant to erosion **Colwyn Bay**- bay made out of soft sandstone and siltstone	Waves erode the coastline via processes such as hydraulic action and abrasion. The area of Great Orme has taken longer to erode due to the rock type and so it is left jutting out into the Irish sea. In contrast Colwyn bay has been formed as the sandstone is less resistant to erosion and therefore the land has eroded at a faster rate creating the bay. In the future Great Orme may erode further resulting in the formation of stacks.
Spit and sand dunes	**Talacre**- made up of sands which have been deposited, making it vulnerable to erosion.	Prevailing winds along the coast from Prestatyn to Talacre cause waves to hit the beach at an angle. This means sediment is transported eastwards along the coast via longshore drift. When this reaches the Dee Estuary the sediment is deposited as the waves lose energy; this has built up over time to form the spit and sand dunes at Talacre.
Beach	**Colwyn Bay**	This area is sheltered by Little Orme to the north west, meaning waves have less energy. Constructive waves have a stronger swash and a weak backwash, therefore sand is deposited building a beach up over time.

How Human Activity Impacts the Landscape:

Positive	Negative
Coastal Management- Sea wall, groynes and beach nourishment in place at **Colwyn Bay** mean that coastal properties and businesses are protected. **Talacre** has been protected through the use of beach nourishment to provide more sediment for the spit. People have also been encouraged to donate their old Christmas trees to help sediment deposition on the dunes. **SSSI- site of special scientific interest** at **Talacre**. This helps to protect rare species such as the natterjack toads, sea holly and miner bees. It also ensures that there is no new developments which will destroy the landscape.	**Coastal Management-** groynes used in towns such as **Prestatyn** stop longshore drift and can starve depositional features further down shore. This has meant that the spit at **Talacre** is being eroded and sediment is not being replaced. This can then put the habitats of key species such as the natterjack toad at risk. Management strategies such as sea walls can degrade over time and have a negative impact on environmental quality. E.g. sea walls in places are over 100 years old.