Topic 3
Distinctive Landscapes

What is a landscape?

A landscape has visible features that make up the surface of the land. Landscapes can be broken down into four 'elements'.

Landscape Elements

Physical	Biological
• Mountains • Coastlines • Rivers	• Vegetation • Habitats • Wildlife
Human	**Variable**
• Buildings • Infrastructure • Structures	• Weather • Smells • Sounds/Sights

Relief of the UK

Relief of the UK can be divided into uplands and lowlands. Each have their own characteristics.

Key

Lowlands

Uplands

Areas +600m: Peaks and ridges cold, misty and snow common. i.e. Scotland

Areas - 200m: Flat or rolling hills. Warmer weather. i.e. Fens

Erosion

The break down and transport of rocks – smooth, round and sorted.

Attrition	Rocks that bash together to become smooth/smaller.
Solution	A chemical reaction that dissolved rocks.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart.
Hydraulic Action	Water enters cracks in the cliff, air compresses, causing the crack to expand.

Transportation

A natural process by which eroded material is carried/transported.

Solution	Minerals dissolve in water and are carried along.
Suspension	Sediment is carried along in the flow of the water.
Saltation	Pebbles that bounce along the sea/river bed.
Traction	Boulders that roll along a river/sea bed by the force of the flowing water.

Glaciation in the UK

Over many thousands of years, glaciation has made an impression on the UK's landscape. Today, much of upland Britain is covered in u-shaped valleys and eroded steep mountain peaks.

During the ice age

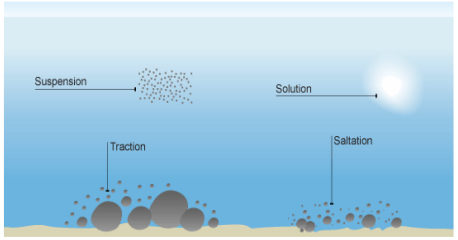
Ice covered areas eroded and weathered landscapes to create dramatic mountain scenery.

After the ice age

Deep valleys and deposition of sediment revealed

Human activity on Landscape

Farming has changed the vegetation which grows there.	Much of the rural landscape has been replaced by urban sprawls.	Infrastructure such as roads and pylons cover most of the UK.
Over thousands of years, much of the UK's woodlands have gone.	Increasing population of the UK means more houses are needed.	UK's marshes and moorlands are heavily managed by people.



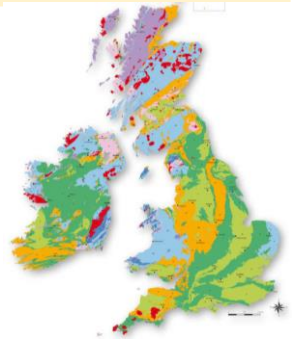
Geology of the UK

The UK is made from a variation of different rock types. The varied resistance of these rocks influences the landscape above.

Igneous Rock
Volcanic/molten rock brought up to the Earth's surface and cooled into solid rock.

Sedimentary Rock
Made from broken fragments of rock worn down by weathering on Earth's surface.

Metamorphic Rock
Rock that is folded and distorted by heat and pressure.



Climate and Weather in the UK

The variations of climate and weather means there are different influences on the UK's landscape.

Climate

The rainfall map of the UK shows variations in average rain.

- **Less** precipitation occurs in low land areas. East England
- **Most** precipitation occurs in upland areas. Scotland.

These differences mean…
Uplands experience more weathering, erosion and mass movement.

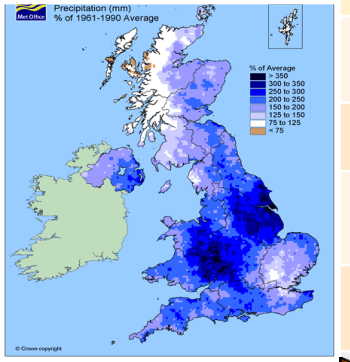
Weathering

Mechanical
Caused by the physical action of rain, frost and wind.

Chemical
Action of chemicals within rain dissolving the rock.

Biological
Rocks that have been broken down by living organisms.

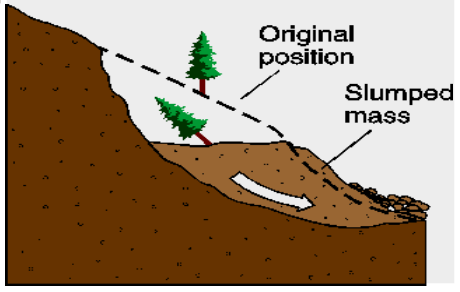
Average rainfall in the UK



Mass Movement

A large movement of soil and rock debris that moves down slopes in response to the pull of gravity in a vertical direction.

1	Rain saturates the permeable rock above the impermeable rock making it heavy.
2	Waves or a river will erode the base of the slope making it unstable.
3	Eventually the weight of the permeable rock above the impermeable rock weakens and collapses.
4	The debris at the base of the cliff is then removed and transported by waves or river.



Freeze-thaw weathering

Stage One
Water seeps into cracks and fractures in the rock.

Stage Two
When the water freezes, it expands about 9%. This wedges apart the rock.

Stage Three
With repeated freeze-thaw cycles, the rock breaks off.

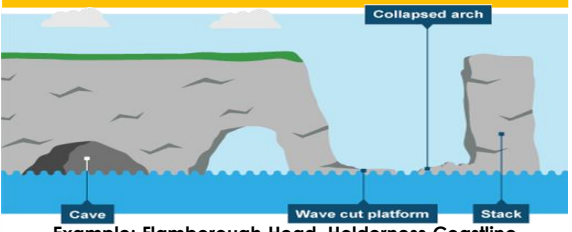
Soil & Landscape

- Soils are created from weathered rocks, organic material and water. Rock types have influence over fertility of soil.
- Low-laying areas such as the Cambridgeshire Fens have deep soil whereas uplands have thin soil.
- Deep soil is more often associated with deciduous woodland rather than coniferous woodlands.

Deposition

When the sea or river loses energy, it drops the sand, rock particles and pebbles it has been carrying. This is called deposition.

Formation of Coastal Stack



Example: Flamborough Head, Holderness Coastline

1) Hydraulic action widens cracks in the cliff face over time.
2) Abrasion forms a wave cut notch between HT and LT.
3) Further abrasion widens the wave cut notch to from a cave.
4) Caves from both sides of the headland break through to form an arch.
5) Weather above/erosion below –arch collapses leaving stack.
6) Further weathering and erosion eaves a stump.

Coastal Defences

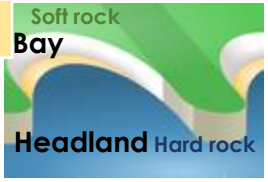
Hard Engineering Defences

Groynes	**Wood barriers prevent longshore drift, so the beach can build up.**	✓ **Beach still accessible.** ✗ **No deposition further down coast = erodes faster.**
Sea Walls	**Concrete walls break up the energy of the wave . Has a lip to stop waves going over.**	✓ **Long life span** ✓ **Protects from flooding** ✗ **Curved shape encourages erosion of beach deposits.**
Gabions or Rip Rap	**Cages of rocks/boulders absorb the waves energy, protecting the cliff behind.**	✓ **Cheap** ✓ **Local material can be used to look less strange.** ✗ **Will need replacing.**

Soft Engineering Defences

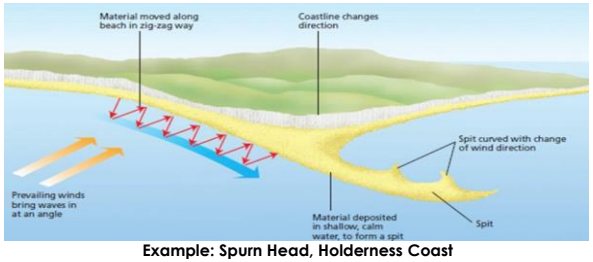
Beach Nourishment	**Beaches built up with sand, so waves have to travel further before eroding cliffs.**	✓ **Cheap** ✓ **Beach for tourists.** ✗ **Storms = need replacing.** ✗ **Offshore dredging damages seabed.**
Managed Retreat	**Low value areas of the coast are left to flood and erode naturally.**	✓ **Reduce flood risk** ✓ **Creates wildlife habitats.** ✗ **Compensation for land.**

Formation of Bays and Headlands



1) Waves attack the coastline.
2) Softer rock is eroded by the sea quicker forming a bay, calm area cases deposition.
3) More resistant rock is left jutting out into the sea. This is a headland and is now more vulnerable to erosion.

Formation of Coastal Spits - Deposition



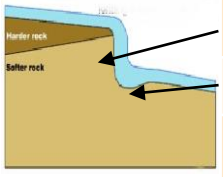
Example: Spurn Head, Holderness Coast

1) Swash moves up the beach at the angle of the prevailing wind.
2) Backwash moves down the beach at 90° to coastline, due to gravity.
3) Zigzag movement (Longshore Drift) transports material along beach.
4) Deposition causes beach to extend, until reaching a river estuary.
5) Change in prevailing wind direction forms a hook.
6) Sheltered area behind spit encourages deposition, salt marsh forms.

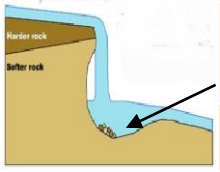
Upper Course of a River

Near the source, the river is flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.

Formation of a Waterfall



1) River flows over alternative types of rocks.
2) River erodes soft rock faster creating a step.
3) Further hydraulic action and abrasion form a plunge pool beneath.

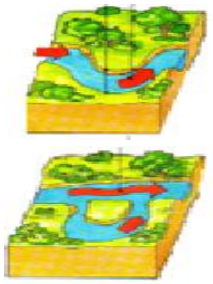


4) Hard rock above is undercut leaving cap rock which collapses providing more material for erosion.
5) Waterfall retreats leaving steep sided gorge.

Middle Course of a River

Here the gradient get gentler, so the water has less energy and moves more slowly. The river will begin to erode laterally making the river wider.

Formation of Ox-bow Lakes



Step 1

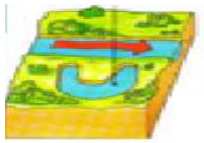
Erosion of outer bank forms river cliff. Deposition inner bank forms slip off slope.

Step 2

Further hydraulic action and abrasion of outer banks, neck gets smaller.

Step 3

Erosion breaks through neck, so river takes the fastest route, redirecting flow



Step 4

Evaporation and deposition cuts off main channel leaving an oxbow lake.

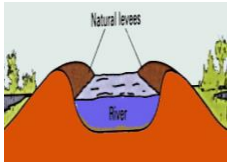
Lower Course of a River

Near the river's mouth, the river widens further and becomes flatter. Material transported is deposited.

Formation of Floodplains and levees

When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river's banks, the heavier materials build up to form natural levees.

✓ Nutrient rich soil makes it ideal for farming.
✓ Flat land for building houses.



River Management Schemes

Soft Engineering

Afforestation – plant trees to soak up rainwater, reduces flood risk.
Demountable Flood Barriers put in place when warning raised.
Managed Flooding – naturally let areas flood, protect settlements.

Hard Engineering

Straightening Channel – increases velocity to remove flood water.
Artificial Levees – heightens river so flood water is contained.
Deepening or widening river to increase capacity for a flood.

Case Study: Holderness Coastline

Location and Background
The Holderness Coastline is located in Yorkshire. Chalk is located to the north above Bridlington and boulder clay is located to the south. This area is Europe's fastest eroding coastline.

Geomorphic Processes
- Flamborough head is a chalk headland with a crack to stump formation.
- A large bay is located at Hornsea created where boulder clay has eroded via processes of hydraulic action and abrasion.
- Waves transport sediment via the processes of longshore drift southwards where its deposited forming a spit, called Spurn Point, located on the Humber Estuary.

Management
- The position of the coastline at Hornsea has been artificially fixed since existing coastal defences were built in 1900. Hard defences are in the form of a concrete seawall and timber groynes as well as continual beach nourishment.
- Groynes have trapped sediment being transported via LSD reducing erosion along the front of the town but increased rates are evident further south where the defences stop. The video below demonstrates this.

Case Study: The River Tees

Location and Background
Located in the North of England flows 137km from the Pennines to the North Sea at Red Car.

Geomorphic Processes
Upper – Features include V-Shaped valley, rapids and waterfalls. High Force waterfall drops 21m and is made from harder Whinstone and softer limestone rocks. Gradually a gorge has been formed.
Middle – Features include meanders and ox-bow lakes. The meander near Yarm encloses the town.
Lower – Greater lateral erosion creates features such as floodplains & levees. Mudflats at the river's estuary.

Management
- Cow Green is a regulating reservoir, storing water in times of plenty and releasing enough for the needs of industry in times of low flow. It can hold back water during times of flood.
- The Tees Barrage forms an artificial barrier between estuary and the upstream catchment. This helps maintain water levels and eliminates tidal effects further upstream reducing flooding.