

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

Types of Erosion

| The break down and transport of rocks – smooth, round and sorted. | |
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| Attrition | Rocks that bash together to become smooth/smaller. |
| Solution | A chemical reaction that dissolves 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. |

Types of Transportation

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

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.

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| 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. |

Formation of Coastal Spits - Deposition

Example: Spurn Head, Holderness Coast.

Material moved along beach in zig-zag way. Coastline changes direction. Spit curved with change of wind direction. Material deposited in shallow, calm water, to form a spit. Prevailing winds bring waves in at an angle. Spit.

Types of Weathering

Weathering is the breakdown of rocks where they are.

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| Carbonation | Breakdown of rock by changing its chemical composition. |
| Mechanical | Breakdown of rock without changing its chemical composition. |

What is Deposition?

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



- 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.

Unit 1c Physical Landscapes in the UK

AQA

Formation of Bays and Headlands

Bay Soft rock. **Headland** Hard rock.

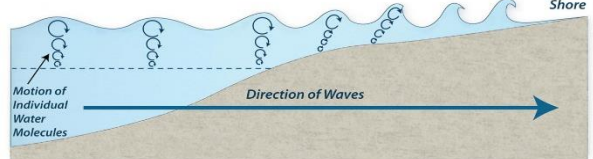
- 1) Waves attack the coastline.
- 2) Softer rock is eroded by the sea quicker forming a bay, calm area cases deposition.
- 3) More resistant rock is left jutting out into the sea. This is a headland and is now more vulnerable to erosion.

How do waves form?

Waves are created by wind blowing over the surface of the sea. As the wind blows over the sea, friction is created - producing a swell in the water.

Why do waves break?

- 1) Waves start out at sea.
- 2) As waves approaches the shore, friction slows the base.
- 3) This causes the orbit to become elliptical.
- 4) Until the top of the wave breaks over.



Mechanical Weathering Example: Freeze-thaw weathering

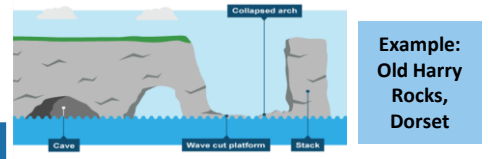
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| Stage One | Water seeps into cracks and fractures in the rock. | | Stage Two | When the water freezes, it expands about 9%. This wedges apart the rock. | | Stage Three | With repeated freeze-thaw cycles, the rock breaks off. | |
|------------------|--|--|------------------|--|--|--------------------|--|--|

Size of waves

Types of Waves

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| Constructive Waves | Destructive Waves |
| This wave has a swash that is stronger than the backwash. This therefore builds up the coast. | This wave has a backwash that is stronger than the swash. This therefore erodes the coast. |
| | |

Formation of Coastal Stack



Example: Old Harry Rocks, Dorset

- 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 form 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. | <ul style="list-style-type: none"> ✓ 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. | <ul style="list-style-type: none"> ✓ 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. | <ul style="list-style-type: none"> ✓ Cheap ✓ Local material can be used to look less strange. ✗ Will need replacing. |

Soft Engineering Defences

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| Beach Nourishment | Beaches built up with sand, so waves have to travel further before eroding cliffs. | <ul style="list-style-type: none"> ✓ Cheap ✓ Beach for tourists. ✗ Storms = need replacing. ✗ Offshore dredging damages seabed. |
| Managed Retreat | Low value areas of the coast are left to flood & erode. | <ul style="list-style-type: none"> ✓ Reduce flood risk ✓ Creates wildlife habitats. ✗ Compensation for land. |

Case Study: Lyme Regis Coastal Management

Location and Background
 A small coastal town on the south coast of England. Part of a World Heritage Site known as the Jurassic Coast. The town is a popular tourist destination but is built on unstable cliffs. Many properties have been destroyed or damaged and sea walls have been breached.

Geomorphic Processes

- The coastline is eroding more rapidly than any in Europe.
- Powerful waves from the south west have caused considerable erosion of the foreshore.
- The area is subject to large landslips



Management
 The Lyme Regis Environmental Improvement Scheme was set in the early 1990's. It's aim was to provide long-term coastal protection and reduce the threat of landslips.

- Phase 1 – new sea wall and promenade constructed. Large nails use to stabilise the rock cliffs, improving drainage.
- Phase 2 – Extensive improvements made to the sea front costing £22 million. Construction of new sea walls and promenades. Creation of a wide sand and shingle beach. Extension of the rock armour.
- Phase 3 – Not completed.
- Phase 4 – Constructed a new sea wall to the east. Extensive nailing, piling and drainage to protect 480 homes.

Water Cycle Key Terms

| | |
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| Precipitation | Moisture falling from clouds as rain, snow or hail. |
| Interception | Vegetation prevent water reaching the ground. |
| Surface Runoff | Water flowing over surface of the land into rivers |
| Infiltration | Water absorbed into the soil from the ground. |
| Transpiration | Water lost through leaves of plants. |

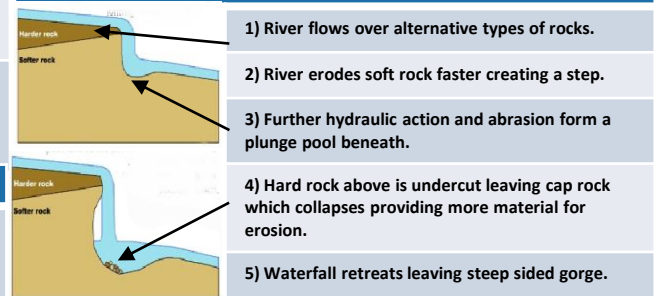
Physical and Human Causes of Flooding.

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| Physical: Prolong & heavy rainfall Long periods of rain causes soil to become saturated leading runoff. | Physical: Geology Impermeable rocks causes surface runoff to increase river discharge. |
| Physical: Relief Steep-sided valleys channels water to flow quickly into rivers causing greater discharge. | Human: Land Use Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff. |

Upper Course of a River

Near the source, the river 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.

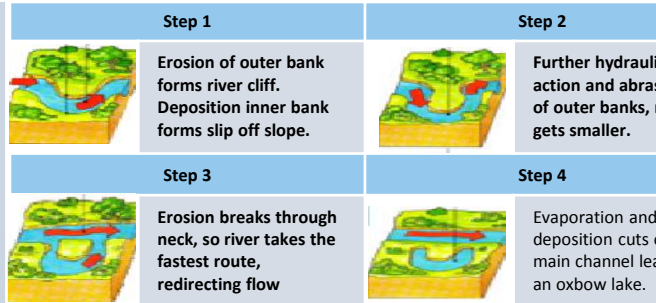
Formation of a Waterfall



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



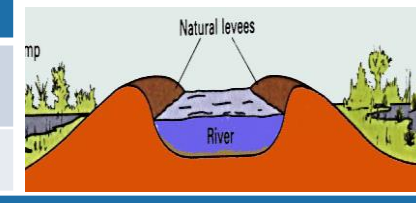
Lower Course of a River

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.

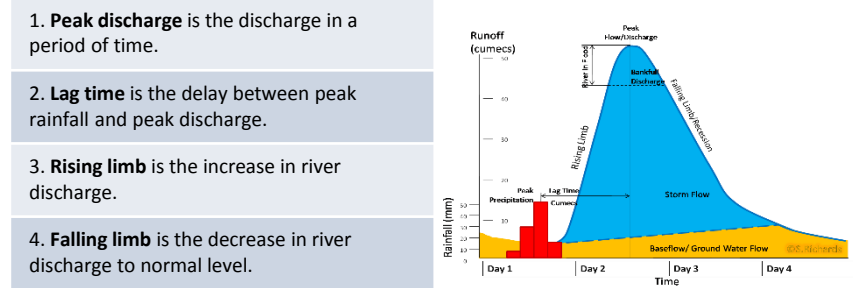


River Management Schemes

| Soft Engineering | Hard Engineering |
|---|--|
| <p>Afforestation – plant trees to soak up rainwater, reduces flood risk.</p> <p>Demountable Flood Barriers put in place when warning raised.</p> <p>Managed Flooding – naturally let areas flood, protect settlements.</p> | <p>Straightening Channel – increases velocity to remove flood water.</p> <p>Artificial Levees – heightens river so flood water is contained.</p> <p>Deepening or widening river to increase capacity for a flood.</p> |

Hydrographs and River Discharge

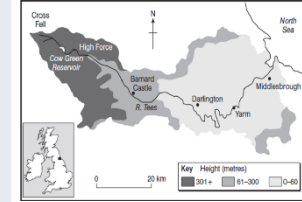
River discharge is the volume of water that flows in a river. Hydrographs who discharge at a certain point in a river changes over time in relation to rainfall



Case Study: The River Tees

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

Geomorphic Processes
Upper – Features include V-Shaped valley, rapids and waterfalls. Highforce 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

- Towns such as Yarm and Middlesbrough are economically and socially important due to houses and jobs that are located there.
- Dams and reservoirs in the upper course, controls river's flow during high & low rainfall.
- Better flood warning systems, more flood zoning and river dredging reduces flooding.