

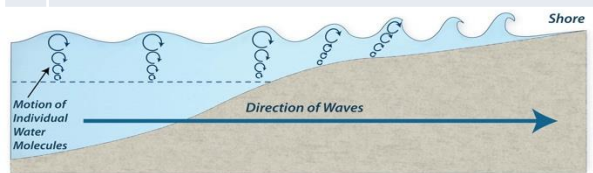
- 1) Swash moves up the beach at the angle of the prevailing wind.
- 2) Backwash moves down the beach at 90° to coastline, due to gravity.
- 3) Zigzag movement (Longshore Drift) transports material along beach.
- 4) Deposition causes beach to extend, until reaching a river estuary.
- 5) Change in prevailing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

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?

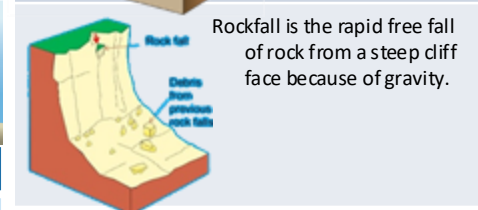
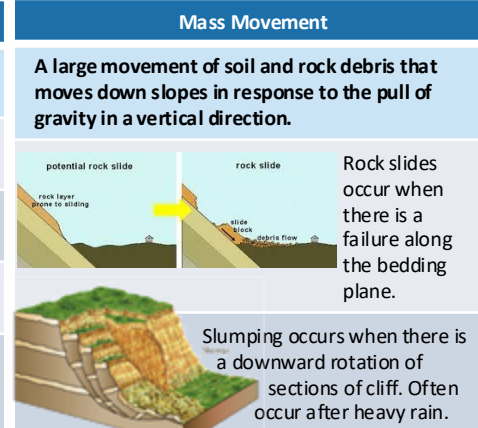
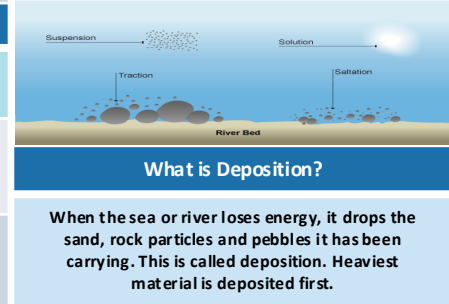
- 1) Waves start out at sea.
- 2) As waves approaches the shore, friction slows the base.
- 3) This causes the orbit to become elliptical.
- 4) Until the top of the wave breaks over.



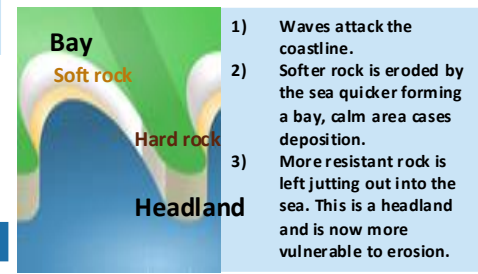
Types of Erosion	
The break down and transport of rocks – smooth, round and sorted.	
Attrition	Rocks that bash together to become smooth/smaller.
Solution	A chemical reaction that dissolves rocks.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart or scraped against the banks and bed of a river.
Hydraulic Action	Water enters cracks in the cliff, or river bank, air compresses, causing the crack to expand.

Types of Weathering	
Weathering is the breakdown of rocks where they are.	
Biological	Breakdown of rock by plants and animals e.g. roots pushing rocks apart.
Mechanical	Breakdown of rock without changing its chemical composition e.g. freeze thaw

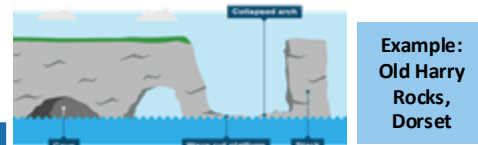
Types of Transportation	
A natural process by which eroded material is carried/transported.	
Solution	Minerals dissolve in water and are carried along.
Suspension	Sediment is carried along in the flow of the water.
Saltation	Pebbles that bounce along the sea/river bed.
Traction	Boulders that roll along a river/sea bed by the force of the flowing water.



Formation of Bays and Headlands



Formation of Coastal Stack

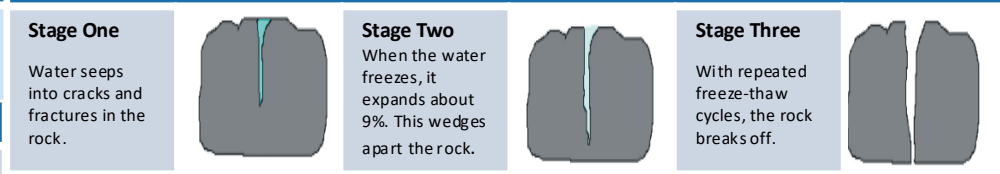


- 1) Hydraulic action widens cracks in the cliff face over time.
- 2) Abrasion forms a wave cut notch between high tide and low tide.
- 3) Further abrasion widens the wave cut notch to form a cave.
- 4) Caves from both sides of the headland break through to form an arch.
- 5) Weather above/erosion below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

Unit 1c

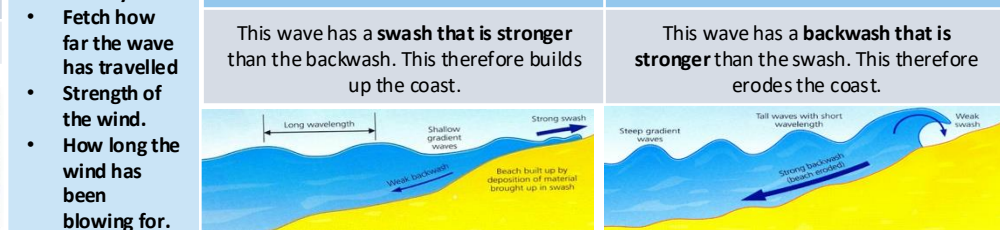
Physical Landscapes in the UK

Mechanical Weathering Example: Freeze-thaw weathering



Size of waves

Types of Waves



Coastal Defences			
Hard Engineering Defences			
Groynes	Wood barriers prevent longshore drift, so the beach can build up.	<div>✓</div> <div>✗</div>	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.	<div>✓</div> <div>✓</div> <div>✗</div>	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.	<div>✓</div> <div>✓</div> <div>✗</div>	Cheap Local material can be used to look less strange. Will need replacing.

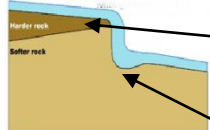
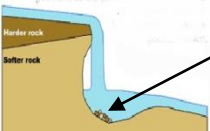
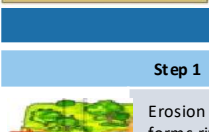

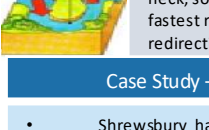
Soft Engineering Defences			
Beach Nourishment	Beaches built up with sand, so waves have to travel further before eroding cliffs.	<div>✓</div> <div>✓</div> <div>✗</div> <div>✗</div>	Cheap Beach for tourists. Storms = need replacing. Offshore dredging damages seabed.
Managed Retreat	Low value areas of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

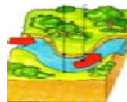


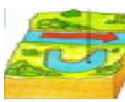
Case Study: Dorset Coast and Lyme Regis	
Location and Background <ul style="list-style-type: none"> Located on the southern coast of Dorset. Lyme Regis is a popular seaside resort. In 2013, the town suffered damage from a storm surge. The Sea Life Centre was flooded and closed for a number of months. A large portion of the town is built on unstable cliffs that are prone to erosion. Several homes have been damaged over the years, despite some coastal defences being built. 	
Processes Erosion at Old Harry Rocks, Durdledoor, Lulworth Cove has created stacks, arches and coves. Deposition at Chesil Beach has led to the formation of a large beach and also a tombolo and lagoon.	
Management -The coastline is protected by new 390m sea wall and cliff stabilisation to protect 480 homes for the next 50 years	

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.

Water Cycle Key Terms	
Precipitation	Moisture falling from clouds as rain, snow or hail.
Interception	Vegetation prevents water reaching the ground.
Surface Runoff	Water flowing over the 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.	
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.

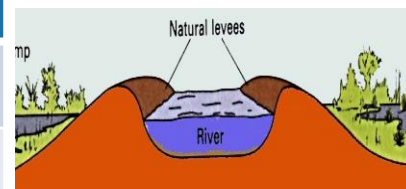
Upper Course of a River
Near the source, the river flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.

Formation of a Waterfall	
	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.

Formation of Ox-bow Lakes			
Step 1		Step 2	
	Erosion of outer bank forms river cliff. Deposition inner bank forms slip off slope.		Further hydraulic action and abrasion of outer banks, neck gets smaller.
Step 3		Step 4	
	Erosion breaks through neck, so river takes the fastest route, redirecting flow		Evaporation and deposition cuts off main channel leaving an oxbow lake.

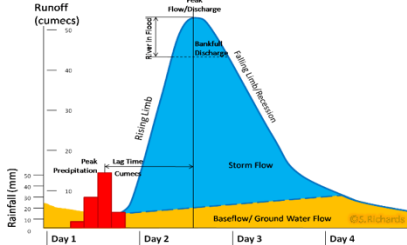
Case Study – Shrewsbury Management
<ul style="list-style-type: none"> Shrewsbury has flooded 1941,1946, 1947, 1960, 1964, 1965, 1968, 1998, 2000, 2004, 2007 Frankwell and Coleham Head Flood Defence Schemes

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.	
<div>✓</div> <div>✓</div>	Nutrient rich soil makes it ideal for farming. Flat land for building houses.



River Management Schemes	
Soft Engineering	Hard 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.	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.

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

1. Peak discharge is the discharge in a period of time.	
2. Lag time is the delay between peak rainfall and peak discharge.	
3. Rising limb is the increase in river discharge.	
4. Falling limb is the decrease in river discharge to normal level.	

Case Study: The River Sever	
Location and Background The UK's longest river - 220 miles long	
Geomorphic Processes Upper – The source of the River Sever is on the slopes of the Plynlimon Hills 610m high. Here we get narrow shallow tributaries, V-shaped valleys, waterfalls and gorges. Middle – Features include meanders and ox-bow lakes. The meander near Shrewsbury encloses the town. Lower – Greater lateral erosion creates features such as floodplains & levees. Mudflats at the river's estuary.	
Causes of flood – Sited on a meander of the River Severn, the longest river in the UK of 220 miles <ul style="list-style-type: none"> numerous tributaries steep-sided mountain valleys high annual rainfall 	Engineering Strategies – Flood embankments Flood warning systems Mobile dams Land management Improving the drainage system Raising of buildings Upstream storage Landscaping

