

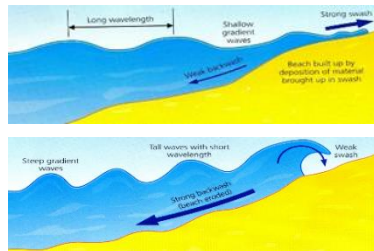
Year 8: Coasts

Waves

Formation - 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.

Size - Determined by the fetch which is how far the wave has travelled, the strength of the wind and how long the wind has been blowing for.

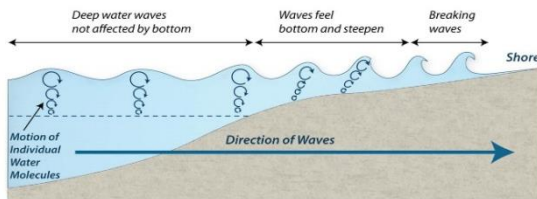
Constructive wave - This wave has a swash that is stronger than the backwash. This therefore builds up the coast.



Destructive wave - This wave has a backwash that is stronger than the swash. This therefore erodes the coast.

Why do waves break?

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



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

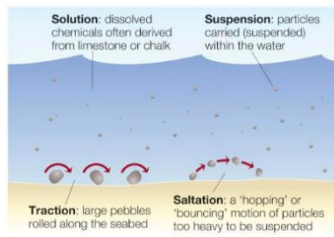
Erosion - The break down and transport of rocks - smooth, round and sorted.

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.

Hydraulic Power - Water enters cracks in the cliff, air compresses, causing the crack to expand.



Weathering

Weathering is the breakdown of rocks where they are.

Carbonation - Breakdown of rock by changing its chemical composition.

Mechanical - Breakdown of rock without changing its chemical composition.

Mechanical Weathering Example: 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.



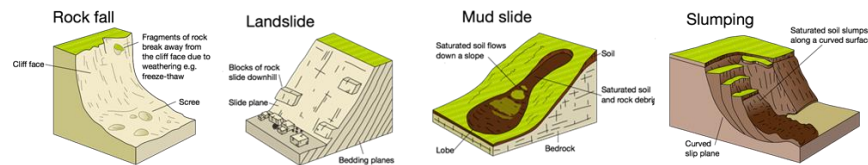
Stage Three
With repeated freeze-thaw cycles, the rock breaks off.



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.



Transportation

Solution - Minerals dissolve in water and are carried along.

Suspension - Sediment is carried along in the flow of the water.

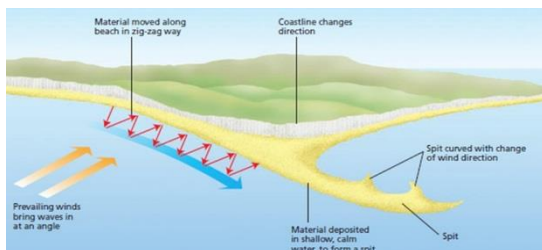
Saltation - Pebbles that bounce along the sea bed.

Traction - Boulders that roll along a river/sea bed by the force of the flowing water.

Formation of Coastal Spits

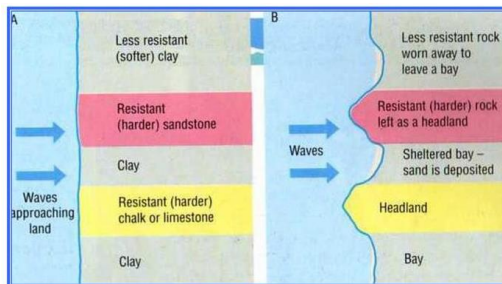
A spit is a long, narrow finger of sand or shingle jutting out into the sea from the land.

- 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.



Bays and Headlands

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



Coastal Defences

Hard Engineering Defences

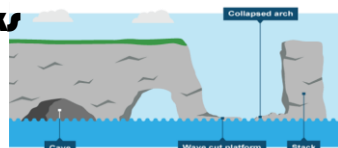
Groynes	Wood barriers prevent longshore drift, so the beach can build up.	<ul style="list-style-type: none"> ✓ Beach still accessible. ✗ No deposition further down coast = erodes faster.
Sea Walls	Concrete walls break up the energy of the wave. Has a lip to stop waves going over.	<ul style="list-style-type: 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

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.



Caves, arches and stacks



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.