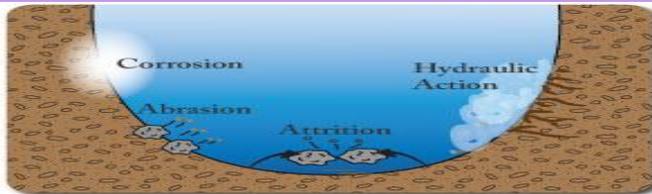


Definitions

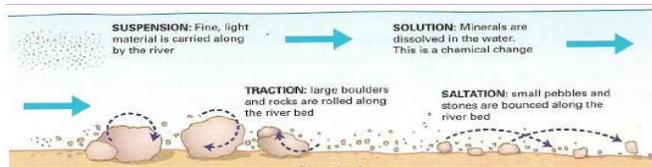
- Erosion-** The wearing away of rocks and other deposits on the earth's surface by the action / movement of water, ice, wind, etc.
- Transportation-** the movement of material from one place to another-material can be moved in different ways depending on its weight/size.
- Deposition-** when material is dropped because there is no longer enough energy to transport it.
- Weathering-** Any of the chemical or mechanical processes by which rocks exposed to the weather undergo changes in character and break down. **Rocks on the earth's surface are broken down in their place of origin – i.e. In situ.**

Erosion

- Hydraulic action-** The explosion of compressed air trapped in cracks of the cliffs by the waves.
- Attrition-** When the waves cause rocks and pebbles to bump into each other and break into smaller pieces.
- Abrasion-** When large waves hurl beach material against the cliff.
- Solution/corrosion-** When salts and other acids in sea water dissolve the rocks of the cliff.

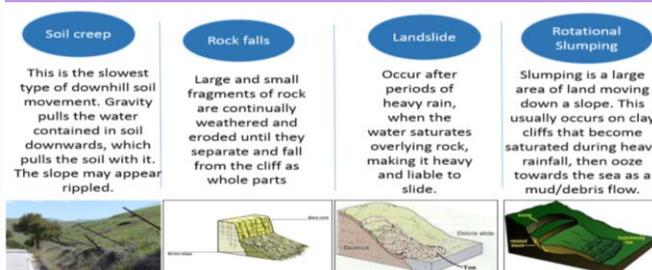


Transportation



What is mass movement?

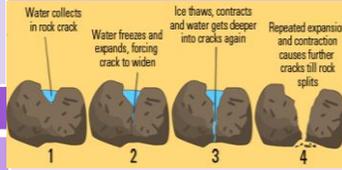
Mass movement is the movement of weathered surface material caused by gravity. Landslides and rock falls are examples of very sudden movements of this type.



Weathering

There are 3 types of weathering;

1. Physical / Mechanical: Disintegration of rock without a chemical change e.g. freeze-thaw-sometimes called frost shattering. Another type is exfoliation- which involves changes in temperature.



2. Chemical: The decomposition of the rocks is caused by a chemical reaction within the rock e.g. acidic rainwater / alkaline seawater and limestone.



3. Biological: Living things such as burrowing animals e.g. badgers and foxes can burrow into banks of soil causing them to collapse. Plant roots weather rocks and weakening their structures by searching for water and nutrients that have often collected in cracks in the rocks.

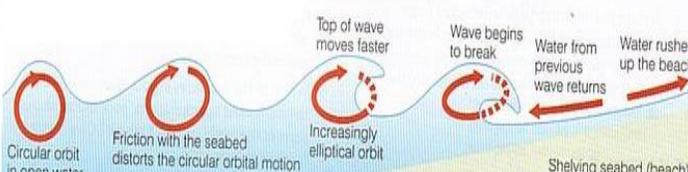


How are waves formed?

- Waves form when the wind blows over the sea. Friction with the surface of the water causes small ripples in the water, which develop in to waves.
- The energy of the wind causes the water particles to rotate as it passes over it, this causes the wave to move forward.
- The distance the wind blows across the water is called the fetch. The longer the fetch, the more powerful the wave.
- Waves can also be formed when earthquakes and volcanic eruptions shake the seabed. These waves are known as tsunami waves.

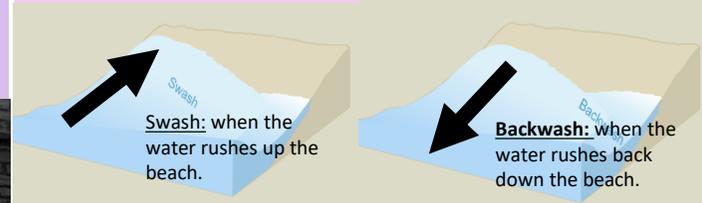
The size and strength of a wave depend on three factors:

- 1) The speed of the wind
- 2) Length of time the wind blows
- 3) The distance the wave has travelled: (Fetch)



Swash and backwash

- When a wave reaches shallow water near the coastline, it breaks.
- This is because the base (bottom) of the wave is slowed down by the friction or drag of the sea bed.

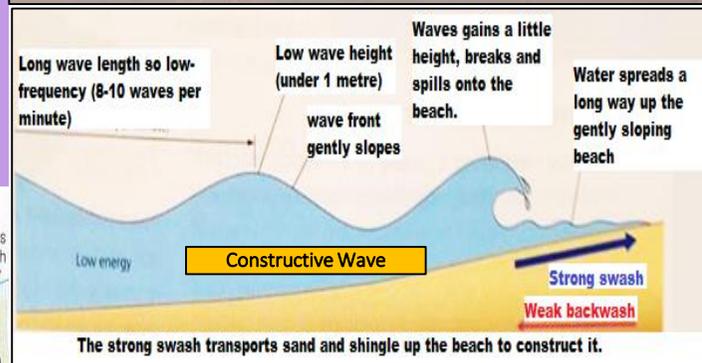
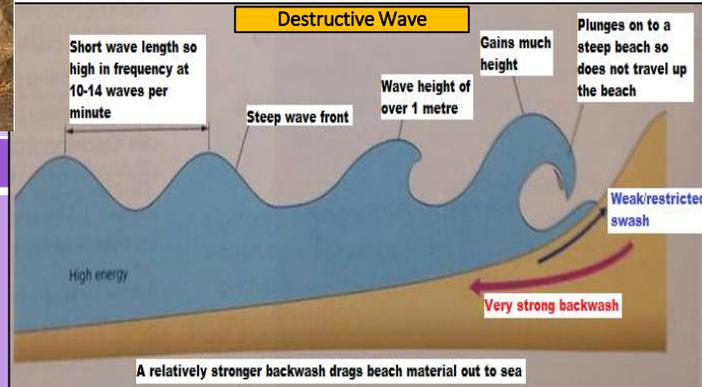


What happens when the waves reach the coast?

- As the water gets shallower, the seabed interrupts the circular motion of the water making the waves more elliptical.
- This causes the crest of the wave to rise up and eventually collapse onto the beach.

Constructive & destructive waves?

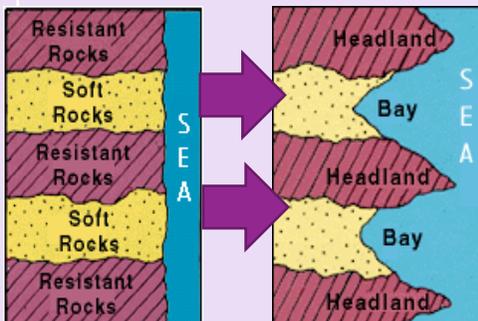
- The way in which the wave breaks determines whether it is constructive (to build) on the coastline or a Destructive (destroy) effect which causes erosion of the coastline. Destructive waves are often associated with storms.



Landforms of erosion

Headlands and bays

Originally the coastline consisted of parallel bands of hard and soft rock which were perpendicular to the sea. As a result of erosion, the bands of soft rock were eroded much more quickly than the bands of hard rock to form bays and headlands.

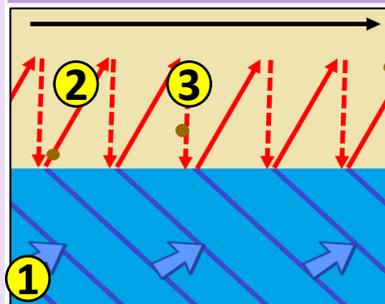


How do hard and soft rocks affect landforms?

Hard rocks such as granite, limestone and chalk are tougher and more resistant to erosion than soft rocks such as clays and sands. The harder rocks form impressive cliffs and headlands that point out to sea, whilst soft rocks form bays or low-lying stretches of the coastline.

Longshore drift

Longshore drift is the process by which the sea moves (transports) material (such as sand or pebbles) along a beach.



- Waves approach the beach at an angle (dependent on wind direction).
- Sediment will be moved along the beach in a zigzag pattern. The swash of the wave carries the sediment along the beach.
- The backwash carries the sediment back down the beach as the wave retreats to the sea.

Landforms of deposition

Coastal deposition

- When the sea loses energy, it drops the material it has been carrying. This is called deposition.
- Deposition happens when the swash is stronger than the backwash and is associated with constructive waves.

What is a beach?

- Beaches are found on coasts between high and low tide level. Beaches are deposits of sand that lies between the high and low tide levels.
- Most beaches are formed of sand and shingle (pebbles) as well as mud and silt.
- They are mainly found in bays because the waves that enter the bay are constructive waves that have a strong swash and build up the beach.

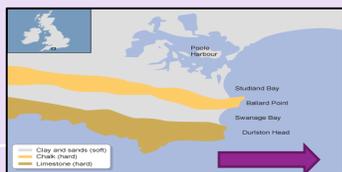
Deposition is likely to occur when:

1. Waves enter an area of shallow water.
2. Waves enter a sheltered area, e.g. a cove or bay.
3. There is little wind.
4. There is a good supply of material.



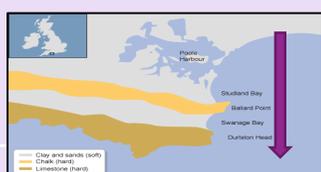
Discordant coastlines

Differential erosion may occur, where bands of hard and soft rock outcrop at right angles to the sea.



Concordant coastlines

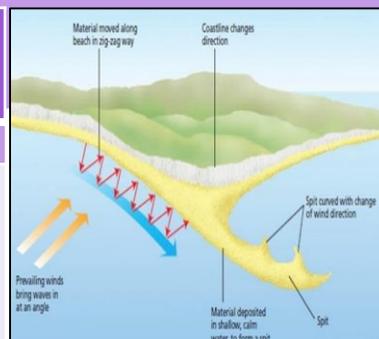
Rocks are parallel to the wave front and therefore rates of erosion are similar along the coastline.



Landform of deposition- formation of a spit

- Longshore drift transports sand along the coast.
- The coastline changes shape and the waves begin to lose energy.
- Deposition starts to build up at the proximal end and the spit grows out into the sea.
- The spit is exposed to changes in wind and wave direction which cause the distal end to hook back towards the land.

Coastal landscapes Year 9 knowledge organiser



What is a bar?

A bar is another depositional landform that can form on the coast. It is linked to longshore drift.

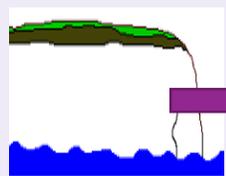
Steps

1. A spit joins together two headlands.
2. A bar cuts off the bay between the headlands from the sea.
3. A lagoon can form behind the bar.

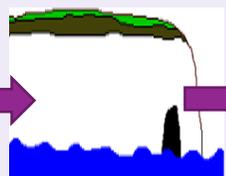
The formation of Caves, arches, stacks and stumps



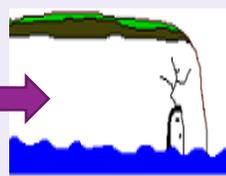
The process starts where there is an area of weakness or a crack in the rock.



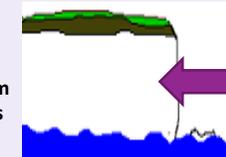
Waves use this area of weakness to erode the rock by the erosional processes of hydraulic action and abrasion.



Waves continue to attack the area of weakness and eventually a cave will form. Caves normally form in areas of resistant rock.

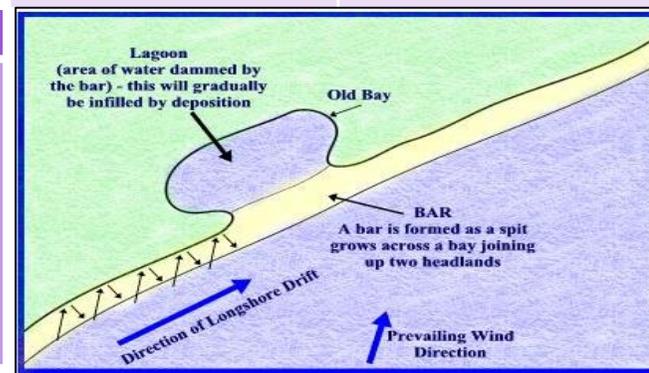
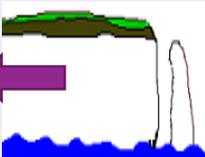


If a cave forms in a headland it may continue to be widened and deepened by processes of abrasion and hydraulic action, until the sea cuts through to form an arch.



The stack eventually collapses through continual attacks from the waves, this leaves a feature known as a stump.

Further erosion at the foot of the arch occurs until the roof is too heavy to be supported. This causes the arch to collapse leaving a pillar of rock standing in the sea. This feature is known as a stack.



Coastal management techniques

Hard engineering

This involves building artificial defences, usually out of concrete, to interrupt natural processes or to dissipate the energy of the waves to lower their impact on the coastline.



Groynes

These are wooden or stone barriers, they act by preventing or halting the action of longshore drift. This acts to build up deeper and wider beaches which tourists like.

Groynes are cheaper than some methods, but several are needed on a beach. Some people think they fit in well with the look of the beach.

Other people think they spoil the beach. Wooden groynes can rot over time and will need replacing.



Offshore breakwater

These are large obstructions to waves that are constructed out at sea. Their job is to calm the waves, they are an extremely expensive option and are used infrequently.



Gabions

Act by providing a cheap solution to wave erosion. The simple rock filled cages absorb the energy of the waves and the gabions can be placed in front of areas at risk. Can go rusty and be a risk to children climbing on them.



Sea Walls

These can be very expensive to put in place and act to prevent wave energy penetrating the vulnerable pieces of land. Often due to their price, these are only used to protect populated areas. Last approx. 10 years.



Rip-rap

This is where large boulders are placed in front of the vulnerable area to absorb wave energy. They are a fairly cheap method of coastal protection and fit in well with the landscape. Some people think they look ugly and don't fit in though.

Revetments

Soft engineering

Takes a more natural approach, allowing the processes to work and the land to change in a more environmentally sustainable way.



Beach Nourishment

This replaces beach material that has been removed by erosion or longshore drift. Sand is either brought in from elsewhere, or transported back along a beach, usually once a year. In tourist areas this is often done during the spring after the winter storms and before the tourists arrive to enjoy the beach.



Do nothing

This is where we just let the sea do what it wants- to allow it to erode the coasts. We relocate people to other areas and choose not to build new houses in these areas.

This means we don't have to spend millions of pounds on defences, but it may be costly and upsetting to relocate people. It also means a lot of land near the coast are left unused, but in the long run we may save money.

Managed retreat

Sand dune regeneration

Case study