

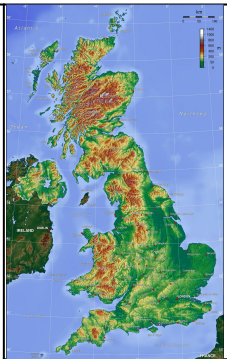
1) Physical Geography of the UK

British Isles: England, Wales, Scotland, Ireland and Northern Ireland.

United Kingdom: England, Wales, Scotland and Northern Ireland.

Great Britain: England, Wales and Scotland.

- Main upland areas- north and west of the country
- Lowland areas- to the south and east.
- Most cities are in lowland areas and on the UK's main rivers- London, Southampton and Portsmouth.
- Two main processes involved in the creation of upland and lowland areas- glaciation and rivers.
- Glaciation carved upland areas (Lake District) and rivers eroded the lowland areas.



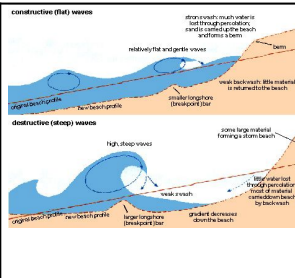
2) Formation and different types of waves

Waves are formed when the energy in the wind is transferred into the water by the force of friction.

When the waves approach the shore, water particles move in a circular motion and as the bottom of the wave touches the seabed, it slows down! This causes the top of the wave to topple over and 'break' onto the beach. As the waves break on the shore it brings material up the beach. This is known as the **swash**. The waves then move down due to gravity. These waves are known as the **backwash** which take material away from the beach.

The size of wave is determined by the strength of the wind, the duration of the wind and the distance the wind blows over (fetch).

- **Constructive** waves are low with long wavelengths. The swash is stronger than the backwash. They build beaches
- **Destructive** waves are higher with shorter wavelengths. The backwash is stronger than the swash eroding the coast.



3) Coastal Erosion

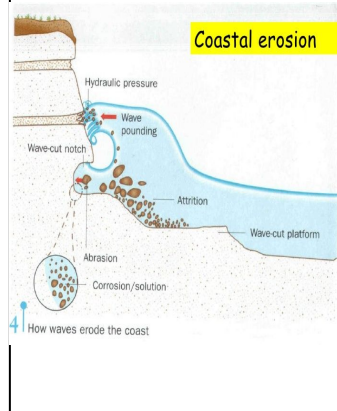
Erosion is the removal of material and sculpting of landforms

Hydraulic action - this is the sheer power of the waves as they smash against the cliff. Air becomes trapped in the cracks in the rock and causes the rock to break apart.

Abrasion - this is when pebbles grind along a rock platform, much like sandpaper. Over time the rock becomes smooth.

Attrition - this is when rocks that the sea is carrying knock against each other. They break apart to become smaller and more rounded.

Solution - this is when sea water dissolves certain types of rocks. In the UK, chalk and limestone cliffs are prone to this type of erosion.



4) Geology and Mass Movement

The shape of the coast is determined by **geology**. Hard rocks (chalk, granite) erode slowly. Clay and sandstone are softer and erode faster

Hard rocks will form headlands and erode slowly.

Soft rocks will form bays and erode quickly

Mass movement is the movement of material downslope under the influence of gravity. It is the falling, sliding or flowing of rock, sediment or soil most often along a slip plane (line of weakness). Different types of mass movement can include rockfall, landslides and rotational slumping.

Rockfall	Landslide	Slumping
Individual fragments of rock fall off cliff usually due to freeze thaw	Rocks fall in a linear fashion along fault lines	Occurs on a curved surface lubricated by water


Physical Geography of the UK - Coasts

Paper 1



5) Weathering

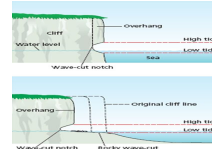
Weathering is the decomposition or disintegration of rock in its original place (erosion involves moving rock)

Chemical	Mechanical
<ul style="list-style-type: none"> • Carbonation. Carbon dioxide dissolved in rainwater forms a weak acid. Reacts with limestone and chalk to form a solution • Hydrolysis – acidic rainwater reacts with minerals in granite • Oxidation – oxygen in rain reacts with iron 	<ul style="list-style-type: none"> • Freeze thaw.  • Salt weathering – salt in sea water expands to form cracks.

6) Landforms of erosion

A wave-cut platform is formed when the following occurs:

- 1) The sea attacks the base of the cliff between the high and low water mark.
- 2) A **wave-cut notch** is formed by erosional processes such as abrasion and hydraulic action - this is a dent in the cliff usually at the level of high tide
- 3) As the notch increases in size, the cliff becomes unstable and collapses, leading to the retreat of the cliff face.
- 4) The backwash carries away the eroded material, leaving a wave-cut platform.
- 5) The process repeats. The cliff continues to retreat.



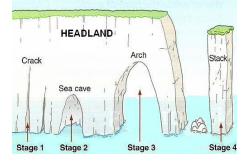
1) Cracks are widened in the headland through the erosional processes of hydraulic action and abrasion.

2) As the waves continue to grind away at the crack, it begins to open to form a cave.

3) The cave becomes larger and eventually breaks through the headland to form an arch.

4) The base of the arch continually becomes wider through further erosion, until its roof becomes too heavy and collapses into the sea.

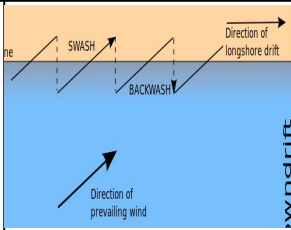
5) This leaves a stack (an isolated column of rock). The stack is undercut at the base until it collapses to form a stump.



7) Transportation of sediment

Longshore drift: Sediment is carried by the waves along the coastline. The movement of the material is known as **longshore drift**. Waves approach the coast at an angle because of the direction of prevailing wind.

The **swash** will carry the material towards the beach at an angle. The **backwash** then flows back to the sea, down the slope of the beach.



The process repeats itself along the coast in the zigzag movement.

Solution – when minerals in rocks like chalk and limestone are dissolved in seawater and then carried in solution. The load is not visible.

Suspension – small particles such as silts and clays are suspended in the flow of the water.

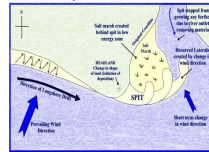
Saltation – where small pieces of shingle or large sand grains are bounced along the sea bed.

Traction – where pebbles and larger material are rolled along the sea bed.

8) Landforms of deposition

Spits




- 1) Sediment is carried by **longshore drift**
- 2) When there is a change in the shape of the coastline, **deposition** occurs. A long thin ridge of material is deposited. This is the spit.
- 3) A hooked end can form if there is a change in wind direction.
- 4) Waves cannot get past a spit, therefore the water behind a spit is very sheltered. **Silts** are deposited here to form salt marshes or mud flats.
- 5) Sometimes a spit can grow across a bay, and joins two headlands together. This landform is known as a **bar**. They can trap shallow lakes behind the bar, these are known as lagoons. Lagoons do not last forever and may be filled up with sediment.



Beaches





- 1) Beaches are made up from eroded material that has been transported from elsewhere and then deposited by the sea.
- 2) For this to occur, waves must have limited energy, so beaches often form in sheltered areas like **bays**. **Constructive waves** build up beaches as they have a strong **swash** and a **weak backwash**.
- 3) Sandy beaches are usually found in bays where the water is shallow and the waves have less energy. Pebble beaches often form where cliffs are being **eroded**, and where there are higher energy waves.
- 4) A cross-profile of a beach is called the beach profile. The beach profile has lots of ridges called **berms**.
- 5) They show the lines of the high tide and the storm tides. A sandy beach typically has a gentle sloping profile, whereas a shingle beach can be much steeper.

11) Dorset Coastline (Case study)

Feature	Picture	Description
Bay		The area around Swanage is made up of bands of hard and soft rock. The soft rock is made of clay and sands, and the hard rock is chalk and limestone. As erosion processes take place, the clay erodes away quicker than the limestone and chalk. This forms headlands and bays , creating Swanage Bay and two headlands - Ballard Point and Durlston Head.
Old Harry Rock		Old Harry Rocks are located on the headland between Swanage and Studland Bay. The headland is made out of chalk, a hard rock. The headland juts out into the sea, so it is more vulnerable to high-energy waves. This caused the formation of Old Harry, a stack. Over time Old Harry will collapse to form a stump.
Chesil Beach		Chesil Beach is an example of a bar. Sediment has been deposited over time to form a spit. The spit has continued to join to the Isle of Portland. Behind the spit there is The Fleet, a lagoon.

10) Coastal Management Strategies

Hard Engineering

Strategy		Benefits	Costs
Sea wall – concrete structure at top of beach acts as a barrier to sea		>V effective >Can develop top for walking, stalls etc	>£5000 – £10000 / metre >V expensive >Ugly
Rock Armour – large boulders at foot of cliff to reduce force of waves		>Relatively effective at reducing force of waves >Relatively cheap	>£2000 000 / 100 metres >Ugly >Can be dangerous to public
Gabions – wire cages filled with rocks. Permeable so improve cliff drainage		>Flexible >Cheaper £50 000 / 100 metres >Quick to construct	>Not attractive >Cages can break >Need replacing every 10 years
Groynes – wooden or stone fences built at right angles to coast to stop longshore drift		>Create wider beaches >Cheap	>Starve beaches further down the coast making them narrower and so more likely to erode >Need some maintenance

Soft Engineering

Beach nourishment / reprofiling. Adding sand to a beach or changing its shape eg high ridges



>Looks natural
>Creates amenity for tourism
>Cheap

>£50 000 / 100 metres but can vary
Needs constant maintenance
>Less effective than hard engineering

Dune Regeneration



>Considered natural
>Creates area for picnics etc
>May increase biodiversity

>£2000 per 100 metres. Time consuming to plant and maintain
>Easily damaged by storms
>Not particularly effective.

Managed Retreat

Doing nothing. Allow sea to move into area	>Long term solution with low maintenance >A natural buffer >New ecosystem created >Biodiversity improves, eg bird watching >More attractive	>Low value land is lost to sea >Local people have to move so need to be compensated > Some ecosystems may be lost
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