

# 8.02: Coasts



## Geology

### Wave features

1	<b>swash</b>	(n) the movement of a wave up the beach. The direction is dependent upon the wind direction.
2	<b>backwash</b>	(n) the movement of water down a beach. This is caused by gravity and happens at 90 degrees to the shore.
3	<b>constructive wave</b>	(n) waves that have a strong swash and a weak backwash. Deposition is the dominant process.
4	<b>destructive wave</b>	(n) waves that have a weak swash and a strong backwash. Erosion is the dominant process.
5	<b>fetch</b>	(n) the distance a wave has travelled
6	<b>prevailing wind</b>	(n) the direction that the wind usually comes from in a particular area over a long period of time

### Weathering and erosion

1	<b>hydraulic action</b>	(n) the erosion caused by the force of the water hitting the rocks, which traps and compresses air in the cracks and causes the cracks to weaken and break
2	<b>abrasion</b>	(n) the erosion caused when rocks and sediment carried by waves (or a river) are thrown against a cliff or riverbank
3	<b>attrition</b>	(n) the erosion caused when rocks and sediment carried by waves (or a river) hit each other and cause each other to break into smaller pieces
4	<b>weathering</b>	(n) the slow breakdown of rocks while they are in place

1	<b>geology</b>	(n) the scientific study of the Earth, including its structure, materials (such as rocks and minerals) and the processes that act upon it
2	<b>igneous rock</b>	(n) rocks formed from the cooling and crystallisation of molten rock. Examples include basalt and granite.
3	<b>metamorphic rock</b>	(n) rocks formed when very high temperature and pressure cause existing rocks to change. Examples include slate and marble.
4	<b>sedimentary rock</b>	(n) rocks formed when sediments of rock are transported, deposited, compacted and cemented together in layers. Examples include chalk, clay and limestone.

## Coastal processes

1	<b>transportation</b>	(n) the movement of sediment
2	<b>deposition</b>	(n) when waves drop the sediment they are transporting, either due to a loss of energy or change in the direction of the coastline
3	<b>longshore drift</b>	(n) the process by which sediment (such as sand and pebbles) is transported along a coastline by the action of waves. It creates beaches.

## Headlands and bays

1	<b>resistant</b>	(aj) does not easily erode or wear away
2	<b>headland</b>	(n) a piece of land that sticks out into the sea and is usually made of hard, resistant rock
3	<b>bay</b>	(n) a curved or indented area of the coastline where the land curves inward

Alternating hard and soft rock → destructive waves → hydraulic action → soft rock less resistant → erodes quickly → hard rock more resistant → erodes slowly → soft rock retreats → bay forms → hard rock remains → headland forms

## Caves, arches, stacks and stumps

1	<b>cave</b>	(n) a hollow or opening in a cliff face, usually at the base, formed when waves erode a weakness in the rock, such as a fault or crack
2	<b>arch</b>	(n) a natural bridge of rock with an opening underneath, formed when a cave is eroded all the way through a headland.
3	<b>stack</b>	(n) a tall, isolated pillar of rock that is left standing in the sea after the roof of an arch collapses
4	<b>stump</b>	(n) the remains of a collapsed stack, which has been eroded by waves down to a small, flat rock just above or below sea level

Weakness or crack in headland → destructive waves → hydraulic action and abrasion → cave formed → headland erodes through → arch formed → unsupported roof collapses → vertical stack left → stack collapses leaving a stump



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## Beaches and longshore drift

1	<b>sand</b>	(n) loose material made up of fine rock particles, usually smaller than 2 mm in diameter
2	<b>shingle</b>	(n) loose, rounded pebbles and small stones found on beaches, usually between 2 mm and 200 mm in size
3	<b>sediment</b>	(n) solid material that is moved and deposited in a new location
4	<b>beach</b>	(n) a landform made of loose material, such as sand, pebbles or shingle, that lies along the edge of a sea, ocean or lake
5	<b>longshore drift</b>	(n) the process by which sediment (such as sand and pebbles) is transported along a coastline by the action of waves. It creates beaches.

Direction of prevailing wind at an angle → swash happens at an angle → transports material up the beach → backwash takes material down the beach at 90 degrees → due to the force of gravity → process repeats → sediment moves across the beach → zigzag pattern

## Coastal management

1	<b>soft engineering</b>	(n) adaptations to work with nature <b>beach nourishment</b> – Sand and shingle from elsewhere are added to the beach. <b>managed retreat</b> - Engineers do nothing, people are moved and the coast is left to erode and flood naturally.
2	<b>hard engineering</b>	(n) human-made structures that help to deal with coastal erosion <b>seawalls</b> – concrete walls that reflect the waves' energy back out to sea <b>groynes</b> – wooden posts that trap sediment and interrupt longshore drift

## Other threats to the coast

1	<b>plastic pollution</b>	(n) when plastic waste ends up in the environment, especially in the sea
2	<b>sewage pollution</b>	(n) when untreated or poorly treated wastewater (including human waste) is released into rivers or the sea
3	<b>oil spill</b>	(n) when oil accidentally leaks into the sea, usually from a ship or drilling platform
4	<b>sea level rise</b>	(n) the increase in the average level of the world's oceans
5	<b>sustainability</b>	(n) meeting the needs of the present without compromising the ability of future generations to meet their own needs

## Coastal erosion case study: Happisburgh, Norfolk coast

**Background:** Norfolk coast in between Cromer and Sea Palling.  
A small village with a population of approx. 1400 people.

**Vulnerability:** soft boulder clay, long fetch, longshore drift, limited sea defences

Impacts		Management strategies
homes destroyed or had to be knocked down	roads lost to the sea	1950s: groynes and revetments
car parks relocated	homes valued at £1 on Beach road	
farmland lost: 1 field per year	businesses lost, e.g. caravan parks	
		2000s: rock armour
		2007 onwards: managed retreat

