





Coastal landscapes

WHAT FACTORS AFFECT COASTAL EROSION?

Types of wave Destructive waves have a strong backwash to erode beaches. Constructive waves have a weak backwash so can not erode the beach as easily.	Geology Types of rock. Hard rocks (like granite), erode at a much slower rate than soft rock (like sandstone)
Seasonality This relates to the different seasons in the year (summer, spring, autumn and winter). In the winter months more storms bring bigger waves and freeze thaw weathering occurs.	Fetch The UK has a prevailing wind that comes from the south west, across the Atlantic Ocean. This has a large fetch, which is the distance over which the wind blows over open water. (big fetch = big waves)

THE EFFECTS OF COASTAL RECESSION

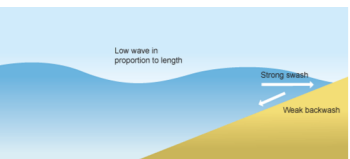
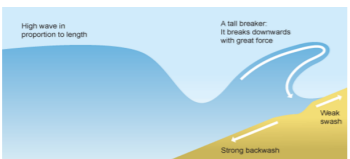
Background information:
The village of Happisburgh is located in North Norfolk. It is one of the fastest eroding coastlines in the UK.

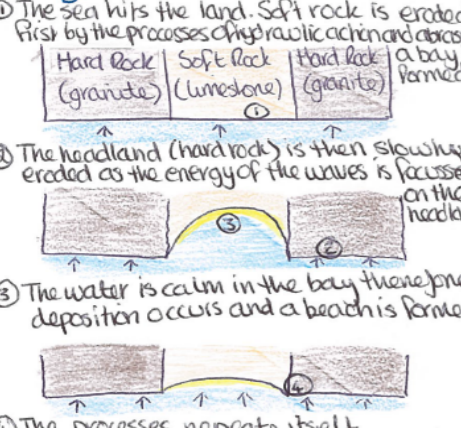
Effects on people
Since 1995 approximately 25 houses have collapsed into the sea.
House prices have dropped from £80,000 to £1.
Beach road has been partially destroyed, making transport in the area difficult.
There is a grade II listed lighthouse at Happisburgh which is close to being washed into the sea.

Effects on the environment
Land is lost at a rate of about 5 metres per year.
The sand dunes (at Sea Palling) are being eroded away - destroying natural habitats.

THERE ARE TWO TYPES OF WAVE:

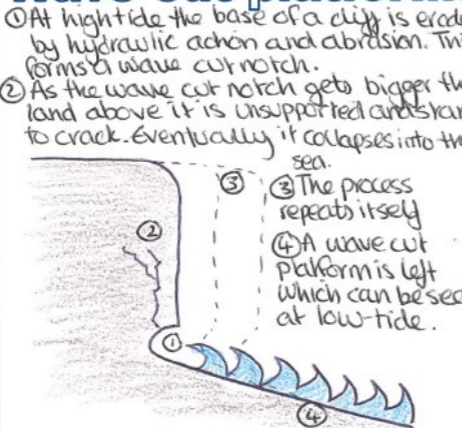
Constructive  Strong swash, weak backwash Deposition occurs Calm conditions, light winds Long in relation to height Gentle waves (6 to 9 per minute)	Destructive  Strong backwash, weak swash Storm conditions, high winds Erosion rates are high High in proportion to length Frequent waves (11 to 15 per minute)
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BAYS AND HEADLANDS



1 The sea hits the land. Soft rock is eroded first by the processes of hydraulic action and abrasion. A bay is formed.
2 The headland (hard rock) is then slowly eroded as the energy of the waves is focussed on the headland.
3 The water is calm in the bay therefore deposition occurs and a beach is formed.
4 The process repeats itself.


CLIFFS AND WAVE CUT PLATFORMS



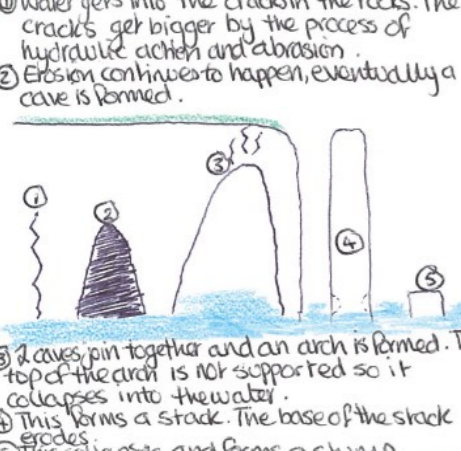
1 At high tide the base of a cliff is eroded by hydraulic action and abrasion. This forms a wave cut notch.
2 As the wave cut notch gets bigger the land above it is unsupported and starts to crack. Eventually it collapses into the sea.
3 The process repeats itself.
4 A wave cut platform is left which can be seen at low tide.

BEACHES

- A beach is an area of land between the high tide and low tide levels on the coast.
- It is made up of sand, pebbles, mud and silt.
- A beach is created by constructive waves depositing material and usually has a natural defence.

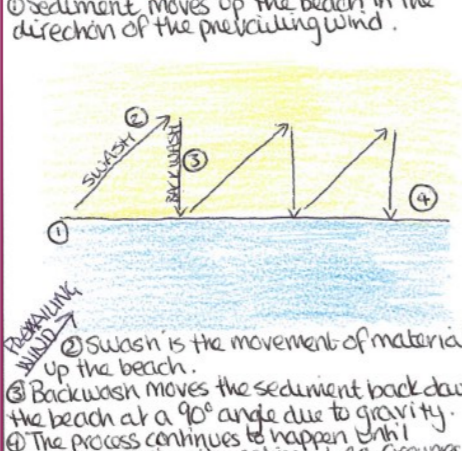


CAVE, ARCH, STACK, STUMP



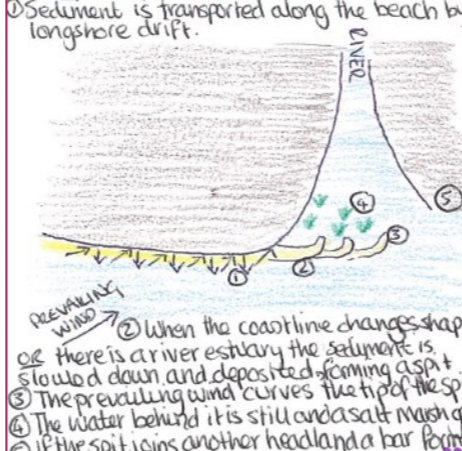
1 Water gets into the cracks in the rocks. The cracks get bigger by the process of hydraulic action and abrasion.
2 Erosion continues to happen, eventually a cave is formed.
3 Caves join together and an arch is formed. The top of the arch is not supported so it collapses into the water.
4 This forms a stack. The base of the stack erodes.
5 This collapses and forms a stump.

LONGSHORE DRIFT



1 Sediment moves up the beach in the direction of the prevailing wind.
2 Swash is the movement of material up the beach.
3 Backwash moves the sediment back down the beach at a 90° angle due to gravity.
4 The process continues to happen until something stops the sediment e.g. groynes.

SPITS AND BARS



1 Sediment is transported along the beach by longshore drift.
2 When the coastline changes shape or there is a river estuary the sediment is slowed down and deposited forming a spit.
3 The prevailing wind curves the tip of the spit.
4 The water behind it is still and a salt marsh grows.
5 If the spit joins another headland a bar forms.

COASTAL DEFENCES

There are TWO types of coastal defence:

	Hard engineering	Soft engineering
Advantage	Very effective at stopping erosion Effective for many years Absorbs or reflects wave power	Less expensive than hard engineering methods Looks natural Little impact on the environment
Disadvantage	Expensive to build Unattractive and causes visual pollution May affect the natural environment	Short term option Often requires maintenance (long-term costly)

Types of hard and soft engineering

- Sea wall—Hard engineering**
This is a large wall built at the bottom of cliffs (sometimes curved) to absorb or reflect the waves energy.
- Rip-rap—Hard engineering**
Large rocks placed in front of the cliff to absorb wave energy.
- Groynes—Hard engineering**
Wooden walls stretching out to sea to prevent longshore drift, so the beach stays. (the beach is a natural defence)
- Beach replenishment—Soft engineering**
The placing of sand and pebbles onto the beach (the beach is a natural defence)
- Managed retreat—soft engineering**
Land with no value is left to erode with no intervention
- Cliff regrading—Soft engineering**
Wooden walls stretching out to sea to prevent longshore drift, so the beach stays. (the beach is a natural defence)

HUMAN AND PHYSICAL AFFECTS ON THE LANDSCAPE

- Example: Isle of Purbeck
- Geology (physical)**
The coastline is discordant with varying rock types. This leads to the creation of headlands (Ballard Point) and bays (Swanage Bay)
 - Erosion and weathering (physical)**
Coastal erosion and weathering along the headlands (e.g. Ballard Point) has led to the creation of caves, arches, stacks and stumps
 - Landslips (physical)**
The coastline south of Ballard Point has frequent landslips causing coastal recession.
 - Tourism (human)**
The coastline around Studland Bay is owned and protected by the National Trust. As it is a tourist hotspot, the National Trust limit the number of people who can come onto the beach, so they do not litter the area or cause human erosion.
 - Coastal defences (human)**
Coastal defences have been built at Swanage Bay. 18 groynes have created larger beaches
 - Agriculture (human)**
As farmland areas have been created, natural habitats have been taken over and deforestation of areas has taken place. Also old wetlands (marshland) are drained of water so that they can be used for farming
 - Urbanisation and industry (human)**
As urban areas have been built, natural habitats have been built upon and deforestation of areas has taken place. Also old wetlands (marshland) are drained of water so that they can be built on.

THE ENVIRONMENT AGENCY

The Environment Agency also plays an important role in managing coastlines across the UK to reduce flooding. They have the following roles/responsibilities:

- Monitor sea levels across the UK
- Provide assistance to areas experiencing floods (e.g. giving sandbags)
- Provide flood warning to advise people when a flood is likely



FLOOD ALERT
FLOODING IS POSSIBLE. BE PREPARED.

Flood Alert - indicates that flooding is possible and that people should make simple preparations (e.g. check that domestic flood gates/boards are ready to be put in place, move small valuable items upstairs, check travel plans) and remain vigilant.



FLOOD WARNING
FLOODING IS EXPECTED. IMMEDIATE ACTION REQUIRED.

Flood Warning - indicates that flooding of homes is expected and people should take specific actions (e.g. move/raise belongings, put in place flood boards, move to places of safety).



SEVERE FLOOD WARNING
SEVERE FLOODING. DANGER TO LIFE.

Severe Flood Warning - to be used in extreme circumstances to tell people that flooding will/is posing a significant risk to life or significant disruption to communities which could also cause risk to life.

KEY PROCESSES

- Erosion** - The wearing away of rocks by the waves.
- Hydraulic action** - The force of water against the coast, wearing it away
- Corrosion** - The chemicals in the sea water slowly dissolve rocks on the coast
- Attrition** - Material carried by the waves bump into each other and are broken down into smaller particles.
- Abrasion** - Waves throw particles (rocks/sand) against the cliff rock, wearing it away
- Deposition** - This is the laying down or **dropping** of material that had been carried in the water. This can create a beach.
- Sliding** - This is similar to the slumping, however the land moves down a flat slope, not in a rotational way.
- Slumping** - When the ground becomes saturated (wet), and falls down a slope in a rapid movement. This occurs with a rotational (curved) movement
- Solution** - minerals are **dissolved** into the water and transported
- Suspension** - small particles are carried **within** the water
- Solution** - minerals are **dissolved** into the water and transported