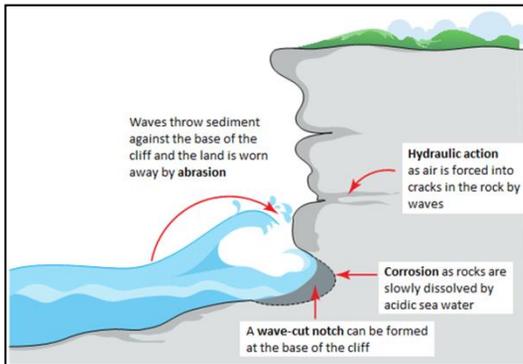


Key words

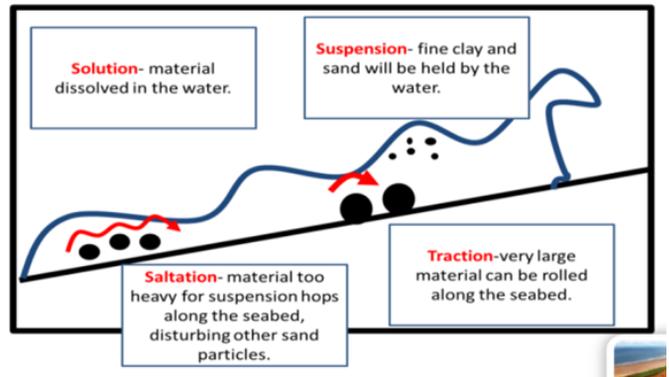
Coasts – processes and landforms

Erosion	Mechanical wearing away of rocks.
Attrition	Rocks smash and rub against each other, becoming smoother and smaller over time.
Abrasion	Rocks being dragged along the river bed and river banks, removing rocks.
Hydraulic Action	Force of the flowing water, removing rocks from the river bank and bed.
Deposition	Dropping of rocks.
Transport	Movement rocks from one place to another.
swash	Waves that move material up the beach
backwash	Waves that move material down the beach

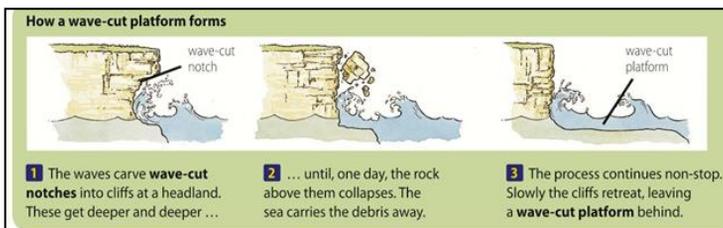
Processes of erosion



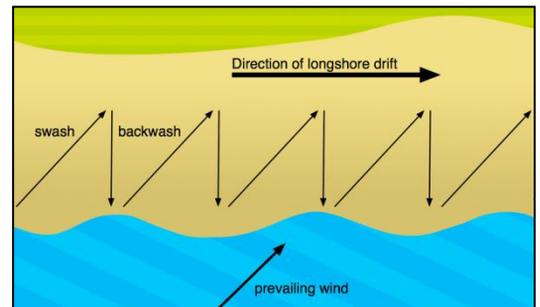
Processes to transport material



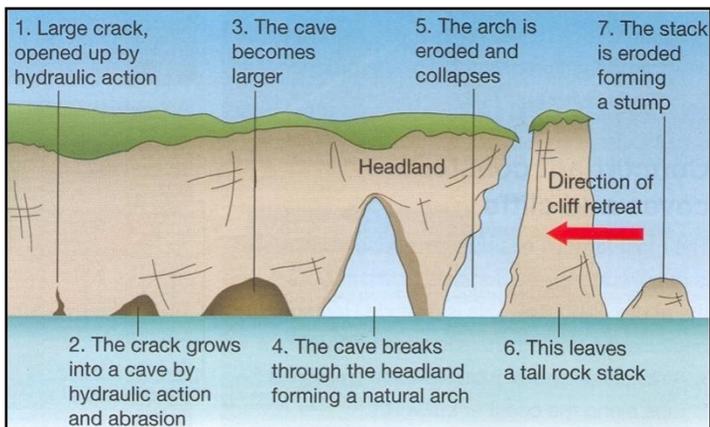
How a wave-cut platform forms



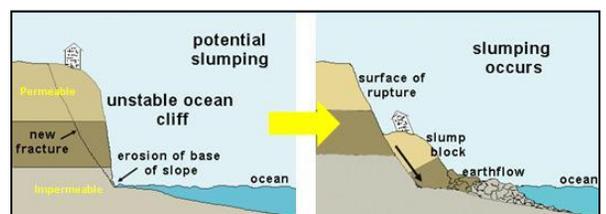
Longshore drift



How caves, arches and stacks are formed



How a cliff slumps by erosion



Key words

Hard engineering	Artificial (man-made) structures such as sea walls or concrete river embankments. Costly but effective.
Soft engineering	Alternative method of reducing floods by planting trees or allowing areas to flood naturally. (using the knowledge of the sea and its processes) Good for the environment.

Why is erosion so severe at Happisburgh ?

The coast at Happisburgh is eroding faster than anywhere else in the UK. Why ?



62

Protecting Against Erosion

Sea defence	Good thing	Bad thing
sea walls 	Sea walls stop the waves reaching the cliff and send back some of the energy of the waves.	Expensive and look ugly
Groynes 	Groynes help keep the sand in place and the sand uses up the wave energy. They help to build up the beach. They are cheap.	Groynes are made from wood. They cost £100,000. They can easily be destroyed.
rock armour 	Rock armour uses up some of the wave energy, so there is less energy to erode the coast.	They cost £2500 per metre. They can easily be moved. They need to be replaced.
Revetments 	Revetments are like fences. They stop the waves reaching the cliff and use up some of the energy of the waves.	Revetments are made from wood. They cost £1500 per metre. They create a strong backwash which erodes under the barrier.
Beach nourishment 	Adds more sand to the beach. This builds up the beach and makes it wider. It protects it from erosion and flooding. It looks natural.	Taking material can kill wildlife. It is very expensive. It has to be repeated. Could affect tourism.

Coasts- Impacts and Management

North Sea Storm Surge 2013

- Depression- low pressure, high rainfall over 19 days
- High wind speeds
- High spring tide
- 2 metre storm surge
- 2 deaths
- 1,400 homes flooded
- 15,000 evacuated
- Cost of damage £100 million
- 40 seal pups washed inland in Norfolk

Reasons for increased coastal flooding

- Rising temperatures, leading to melting of land based ice and thermal expansion
- Warmer seas leading to more intense depressions, resulting in storm surges and heavy rainfall
- Coastlines are densely populated, increasing the risk of flooding

Protecting Against Erosion

Hard Engineering

Rock armour
Groyne
Sea wall

Soft Engineering

Beach nourishment
Managed retreat