

## CORE KNOWLEDGE FROM LOCKDOWN LEARNING

- How the sea **erodes** the land
- How beach materials is **transported**
- How erosion processes create distinct **landforms**
- How the coastline is **managed** to reduce erosion
- CASE STUDY: Holderness coast, NE England

## Processes of erosion

**Erosion** The process by which the coastline gets worn away and moved elsewhere.

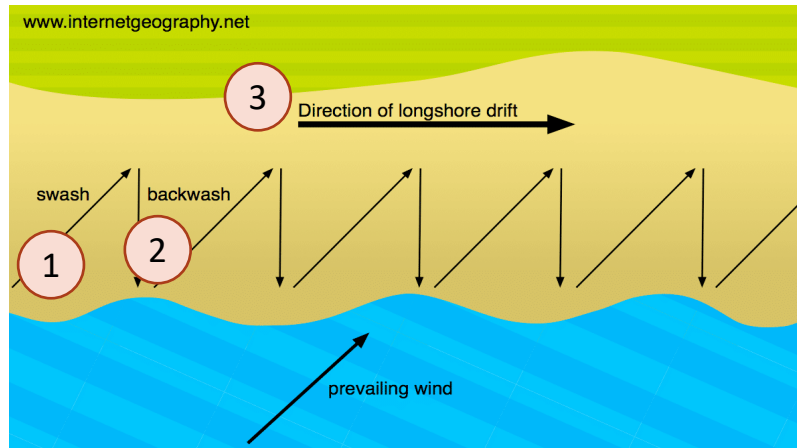
**Hydraulic action** The power of the wave forces water and air into cracks in the rock. This pressure forces fractures in rock to split apart. Over time, this creates faults and notches which get bigger.

**Abrasion (corrasion)** The waves pick up rocks from the sea and throw them against the cliffs. Over time, this rubs and smooths the rock, like using sandpaper.

**Attrition** The sea picks up angular rocks and knocks them into each other. This chips away the corners to make them rounder.

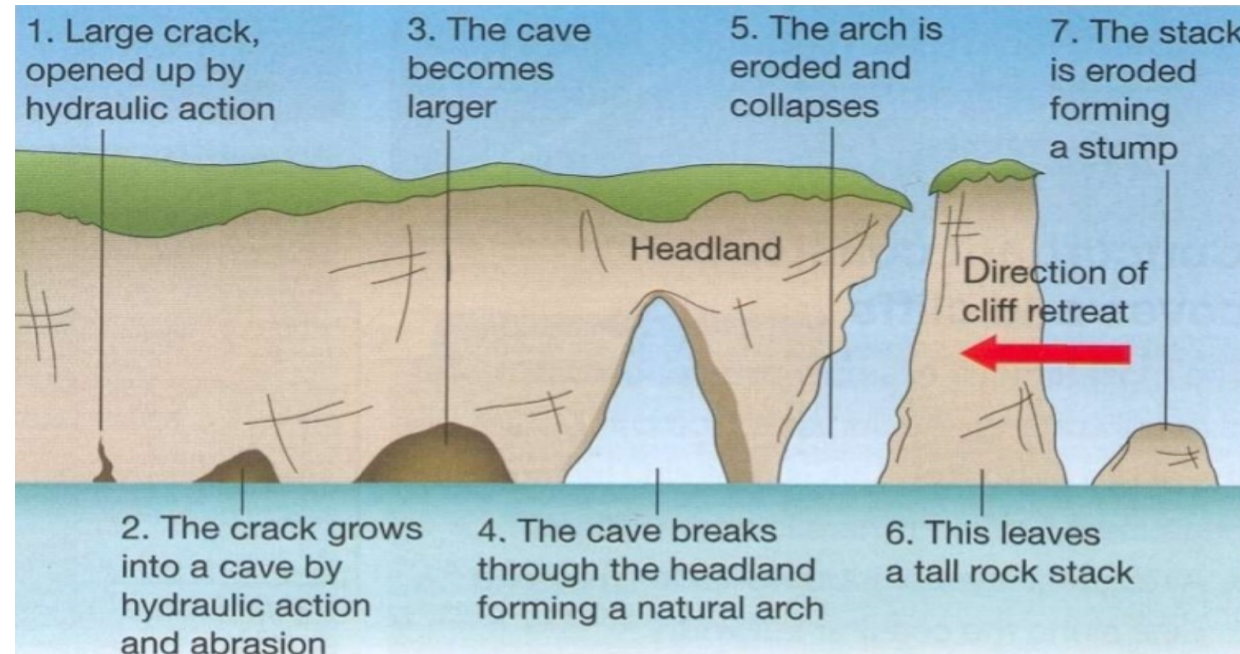
**Solution (corrosion)** Salts or chemicals in the water act to dissolve the rocks they touch, for example limestone is dissolved by sea salt.

## Transportation - Longshore Drift



- 1 The prevailing wind (most common wind direction) pushes the wave up the beach from an angle, picking up beach material in the swash.
- 2 The backwash drags the material back down the beach with gravity.
- 3 The process continues to move sediment along the beach.

## Landforms created by erosion



## Coastal management

### Hard engineering

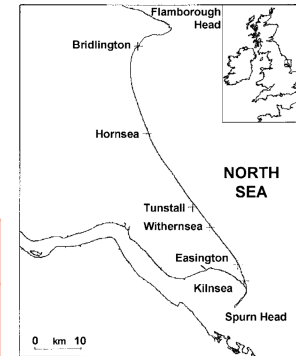
This involves building structures to protect the coast; they tend to be expensive.

### Soft engineering

This involves working with nature by using natural materials or allowing nature to take back areas

Defence	Advantages	Disadvantages
Sea wall	Straight and curved concrete walls built to reflect wave energy and protect land behind it.	Can be considered unattractive. Expensive – usually £5000-10000 per metre and need constant maintenance.
Rock armour/ rip rap	Often considered natural looking. These break up wave power and trap sediment to keep beaches and cliffs intact. Cost £1000-£3000 per metre.	Can be expensive if large scale. Rocks have to be transported long distances.
Gabions	Small rocks are encased in wire cages and absorb wave energy. Cost about £1000 per metre.	Considered unattractive. Wire mesh can be dangerous as it breaks easily and rusts so risk of injury.
Groynes	Helps reduce longshore drift by trapping material. Wood groynes cost £100,000 each.	Wood groynes have a short lifespan and need replacing every 10-15 years.
Beach recharge	Maintains the size of the beach, absorbs wave energy. More attractive and natural. £2000 per metre.	Needs to be frequently replaced as it is easily washed away. Materials has to be dredged from elsewhere.
Managed retreat	Nature takes its course, less valuable land allowed to flood. Creates new habitats.	Often loses farmland, and requires compensation to be paid to the land owner.

## CASE STUDY: Holderness Coast



The Holderness coast stretches from Flamborough Head to Spurn Point in NE England.

Much of Holderness consists of soft materials: clay with a mixture of boulders known as glacial till.

Longshore drift transports beach material southwards, causing the beach to be smaller in some places.

Fastest eroding coastline in Europe due to rock type, prevailing wind direction and storms.

Area is mostly rural with a population of 312,000. There is rich fertile agricultural land.

At Mablethorpe, an average of two metres of land is lost each year. There are 50 properties and approximately 360 people.

In 1991, hard and soft engineering solutions were introduced costing £2 million with rock groynes, granite rock armour for the cliff base and stabilisation of the cliffs.

The groyne traps sand causing erosion further along the coast.