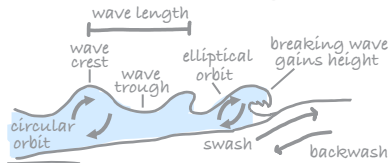


UK Coastal Landscapes

1. Waves

waves Ripples in the sea caused by the transfer of energy from the wind blowing over the surface of the sea.



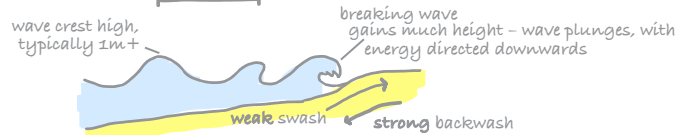
Wave size depends on:

- fetch
- wind speed
- wind duration

fetch The distance of open water the wind blows over.

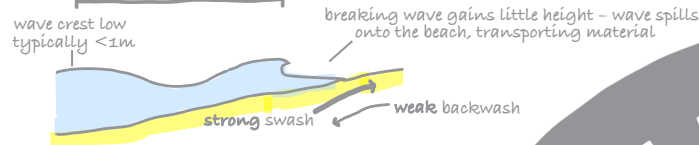
destructive waves High, steep waves; weak swash, strong backwash; erode the coast (remove beach material).

Short wave length - high frequency 10-14 per minute



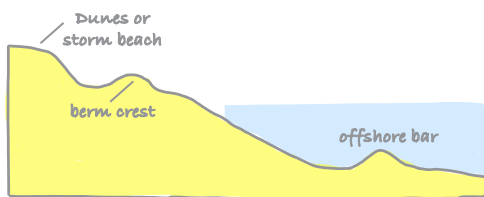
constructive waves Low, long waves; strong swash, weak backwash; deposit material (build beaches).

Long wave length - low frequency 8-10 per minute



5. Depositional Landforms

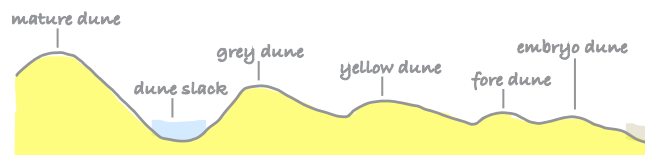
Beaches: Formed by constructive waves depositing sand/shingle between high and low tide marks.



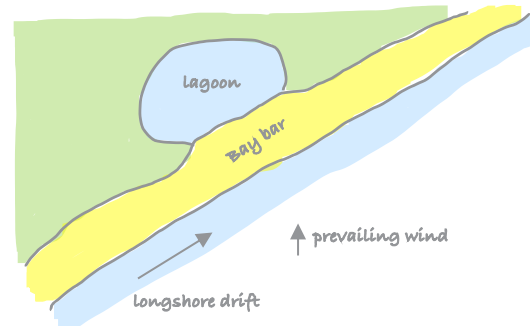
Spits: Longshore drift extends beach material out into the sea, often curving if wind/wave direction changes.



Sand Dunes: Sand is blown inland and trapped by obstacles; vegetation (e.g. marram grass) stabilises dunes.



Bars: A spit grows across a bay, sealing off water behind it to form a lagoon.



2. Processes

Weathering The process of breaking up or dissolving rocks in situ.

Mechanical:

- Freeze-thaw weathering (water expands on freezing in cracks).
- Salt weathering (salt crystals grow, widening cracks).

Chemical:

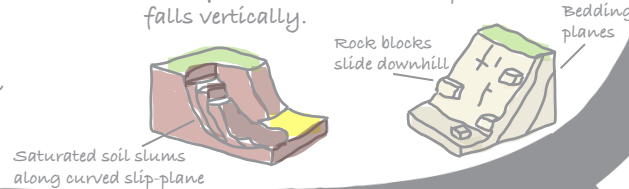
- Carbonation (weak acids in rainwater dissolve limestone/chalk).

Mass movement Definition

Sliding: Material shifts in a straight line.

Slumping: Material rotates along a concave slip plane.

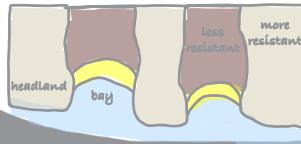
Rock falls: Material breaks up and falls vertically.



4. Landforms of erosion

Headlands and bays

Found on discordant coastlines where softer rock erodes to form bays, leaving harder rock as headlands.



Wave-cut platforms

Waves undercut a cliff (wave-cut notch) by abrasion and hydraulic action; cliff collapses and retreats, leaving a rocky platform.



Erosion of a headland

Weaknesses in headlands erode (hydraulic action & abrasion) to form caves. Cave erodes through to form an arch. Arch collapses, leaving a stack, which can further erode into a stump.



2. Processes

Erosion Wearing away of land by the sea.

Abrasion: transported sediment wears away the base of a cliff or wave-cut platform.

Attrition: rocks and pebbles collide, becoming smaller and rounder.

Hydraulic action (power): Force of waves compressing air in cracks, causing rock to break.

Solution: Certain rock minerals dissolve in seawater.

Transportation The process by which the sea carries its load.

Traction: large boulders rolled along the riverbed.

Saltation: smaller pebbles "bounced" along.

Suspension: fine sediment carried in the water column.

Solution: dissolved materials carried invisibly in water.

Longshore drift: waves approach the shore at an angle (swash), then retreat perpendicular to the shoreline (backwash), transporting sediment along the coast.

Deposition The process by which the sea drops its load.

Occurs when waves lose energy (constructive waves, sheltered areas, shallow water).

Leads to accumulation of sediment, forming depositional landforms (e.g., beaches, spits).

3. Geology & Rock Type

Rock Type (hard vs soft): influences erosion rates (e.g., chalk erodes slowly, boulder clay rapidly).

Concordant & Discordant Coastlines:

- **Concordant:** Rock layers run parallel to the coastline; features like coves may form where a harder outer layer is breached and softer rock behind is eroded (e.g. Lulworth Cove).
- **Discordant:** Rock layers run perpendicular to the coastline, creating alternating bands of hard and soft rock, leading to headlands and bays.

Structure: Arrangement of bedding planes, faults, and joints can create weaknesses (more rapid erosion) or resistance (headlands).



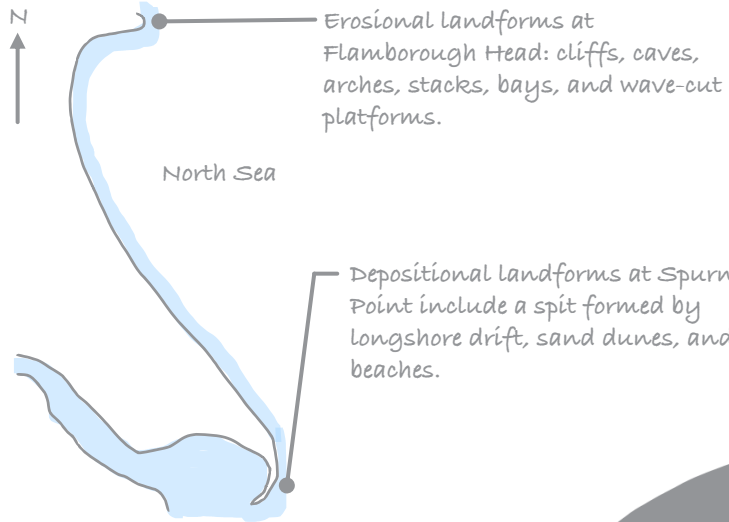
Notes



Quizzes

6. UK Coastline

Holderness East Yorkshire 61 km - Flamborough to Spurn Point
Chalk at Flamborough - boulder clay to the south



10. Coastal Management

Mableton: Holderness Coast; village population 342; 50 properties; B1242 coastal road.

Reasons for Management:

- Rapid cliff erosion (boulder clay) threatened the B1242 coastal road and local properties.
- Mableton is a small village but strategically important due to the road link.

Management strategy:

- Hard engineering: Two rock groynes and rock armour (large granite boulders) along the base of the cliff.
- Soft engineering: cliff reprofiling.
- Cost: Approx. £2 million (installed in the 1990s).

Effects and conflicts:

Positive:

- The groynes have built up the beach at Mableton, protecting the village and road.
- Reduced erosion rates immediately behind the defences.

Negative:

- Down-drift areas (e.g., Cowden Farm) experience higher erosion due to sediment starvation.
- Some landowners south of Mableton argue their land is being lost faster because of the defences.

UK Coastal Landscapes

7. Hard Engineering

Hard engineering refers to the use of large, man-made structures to directly control and defend against coastal erosion and flooding.

Strategies	Advantages	Disadvantages
Sea walls	Effective, long-lasting, reflect wave energy.	Very expensive, can be visually unattractive.
Rock armour	Absorbs wave energy, relatively cheap.	Rocks can shift in storms, unattractive.
Gabions	Cheap, absorb wave energy well.	Shorter lifespan; can become unsightly if damaged.
Groynes	Builds up a wider beach by stopping longshore drift; can boost tourism.	Starves downdrift beaches; can look unnatural.



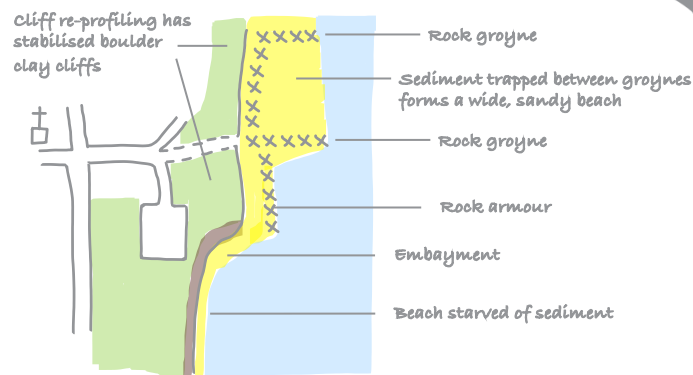
9. Managed Retreat

Process: Letting low-value coastal land flood naturally, forming salt marshes that act as a buffer.

Pros: Creates habitats; more sustainable in the long run.

Cons: Loss of farmland or properties; compensation costs.

Examples: Examples of managed retreat in the UK include Donna Nook on the Lincolnshire Coast, Wallasea Island in the Thames Estuary and the Medmerry flood defence in Sussex.



8. Soft Engineering

Soft engineering A more natural, sustainable approach to coastal management that works with natural processes to reduce erosion and flood risk with minimal environmental impact.

Beach nourishment: Adding sand or shingle (often brought from elsewhere) to widen and build up the existing beach.

✓ Creates wider beaches that dissipate wave energy, can enhance tourism.

✗ Needs frequent maintenance; can be expensive over time.



Beach reprofiling: Reshaping and redistributing sediment on a beach (e.g., bulldozing the upper beach to create a gentler slope).

✓ Helps absorb wave energy, reduces the rate of erosion.

✗ Can be disruptive to beach users; regular upkeep may be required.



Dune regeneration: Replanting and stabilising sand dunes (e.g., using marram grass) to form a natural buffer.

✓ Creates wildlife habitats, more sustainable and visually attractive.

✗ Easily damaged by human activity; not suitable for all coastlines.



Notes



Quizzes