

# Coasts



Coastline in Pembrokeshire, Wales

A coast is found where the land meets the sea. Coasts undergo change due to **coastal processes** and (as with rivers) there are three main processes at work:

- **erosion**
- **transportation**, and
- **deposition**

Each of these processes involves the power of the sea and the effect of waves that are carried to shore. However, other factors also change and shape our coasts:

## Factors which change and shape our coasts



### Human Activity and Land Use:

The way in which humans manage and use coastal areas helps shape the coast. Some areas of coast are valued more than others. This will influence the way coasts are used and managed.



### Weather and Climate:

The weather and climate of coastal areas can contribute to the processes of erosion and weathering.



### Geology:

The geology and rock types found in coastal areas influence how coastal processes work i.e. hard rock resists erosion.

# Waves

The **power** of waves is one of the most significant forces of coastal change. Waves are created by wind blowing over the surface of the sea. As the wind blows over the surface of the sea, friction is created - producing a **swell** in the water. The energy of the wind causes water particles to rotate inside the swell. This moves the wave forward.

The size and energy of a wave is influenced by:

- The length of time that the wind has been blowing
- The strength of the wind
- How far the wave has travelled (called the **fetch**)



Waves: Powerful destructive waves are associated with erosion (left) and constructive waves are calmer and involved with transport and deposition

Waves can be destructive or constructive.

## 1. Destructive waves:

- operate in storm conditions
- are created from big, strong waves when the wind is strong and has been blowing for a long time
- occur when wave energy is high and the wave has travelled for a long time
- tend to remove material from the coast and associated with **erosion**
- backwash is stronger than the swash.

## 2. Constructive waves:

- operate in calm weather
- are less powerful waves
- break on the shore and tend to deposit material, building up beaches
- are responsible for transporting material .
- swash is stronger than the backwash.

When a wave breaks, water is washed up the beach: this is called the **swash**. Then the water runs back down the beach: this is called the **backwash**. With a constructive wave, the swash is stronger than the backwash. With a destructive wave, the backwash is stronger than the swash.

## Erosion

The sea changes and shapes the coastal landscape. Erosion is the wearing away and breaking up of rock and beach material found along the coast. **Destructive waves** will erode the coastline in the following four ways.

- The constant force of waves crashing on the shore damages it. This is called **hydraulic action**.
- Waves bring with them bits of rock and sand. These help to grind down cliffs. This is called **abrasion**.
- Waves cause rocks and pebbles on the shore to smash into each other and break down. This is called **attrition**.
- Acids contained in sea water will slowly dissolve certain types of rock. This is called corrosion or **solution**.

Hydraulic action, abrasion, attrition and solution are demonstrated in the diagram below.

## Transportation and deposition

Waves tend to approach the coast at an angle; this is because of the direction of the prevailing wind. This causes the waves to break on the beach at an angle. The swash of the waves carries material up the beach at an angle. The backwash then flows back to the sea in a straight line. This movement of material is called **transportation**.

On many coasts the combined effect of continually repeating swash and backwash is to transport material sideways along the coast. This movement of material along coasts is called **longshore drift**. The animation shows how it works.

### Deposition

When the sea loses energy, it drops its load of sand, rock particles and pebbles, that it has been carrying. This is called **deposition**. Deposition happens when the swash is stronger than the backwash.

#### Deposition is likely to occur when:

- Waves enter an area of shallow water
- Waves enter a sheltered area
- There is little wind