Beaches:

- Depositional **landform**
- Extends from the highest **high tide** to the lowest **low tide**.
- Very important temporary **store** in coastal system.
- **Accretion**: sediment returning to the visible portion of a beach
- Beach **accretion** will take place during a prolonged period of **constructive** waves, driven by storms 100's of miles away.
- **Destructive** waves, resulting in localised storms may **excavate** (dig/remove) the beach removing a lot of **sediment** and could expose **wave-cut** platforms.

Chesil Beach, Dorset UK
High energy, shingle coastline

Brighton Beach, Sussex UK
Pebble beach

Swash-aligned Beaches:

- Form in low energy environments e.g. bays
- Waves arrive parallel to the shore
- Could be sand or shingle depending on nature of sediment and power of waves
- High energy waves **transport** sand but **deposit** coarser shingle
- Low energy waves **deposit** sand or mud.

Drift-aligned Beaches:

- Form when waves approach the coast at an angle.
- Longshore drift moves sediment along the beach, often forming a spit which is a sediment store or sink.
- Sediment may be graded on the drift-aligned beach. Finer shingle particles are carried further by longshore drift and become increasingly rounded as they move.

Beaches are described as **swash-aligned** or **drift-aligned** which relates to their orientation relative to the prevailing wind and wave direction.

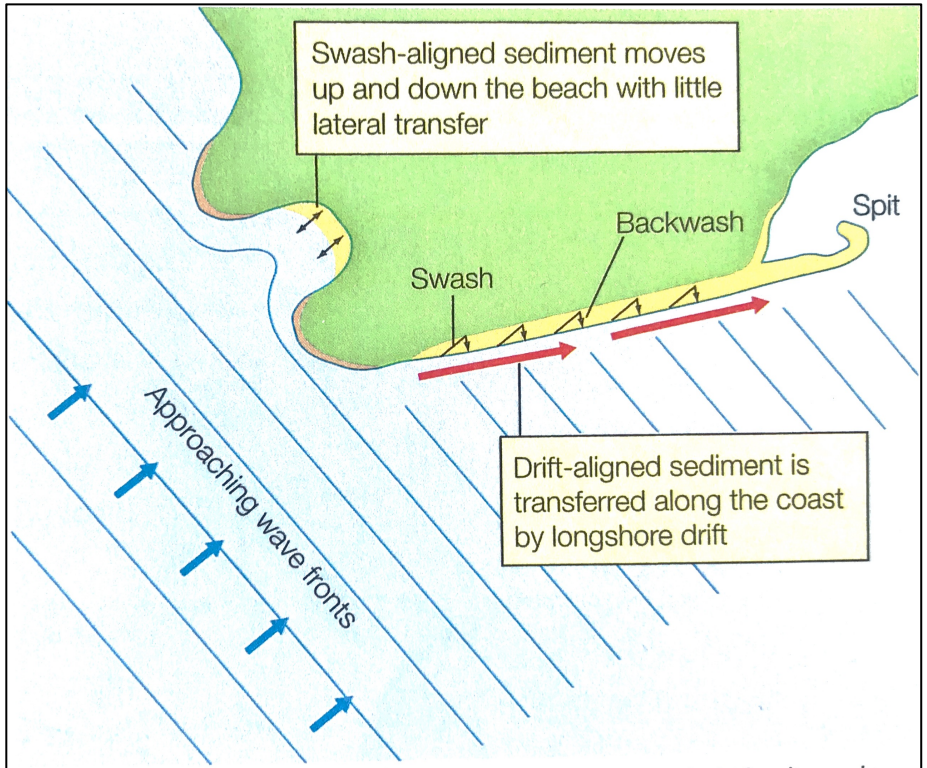
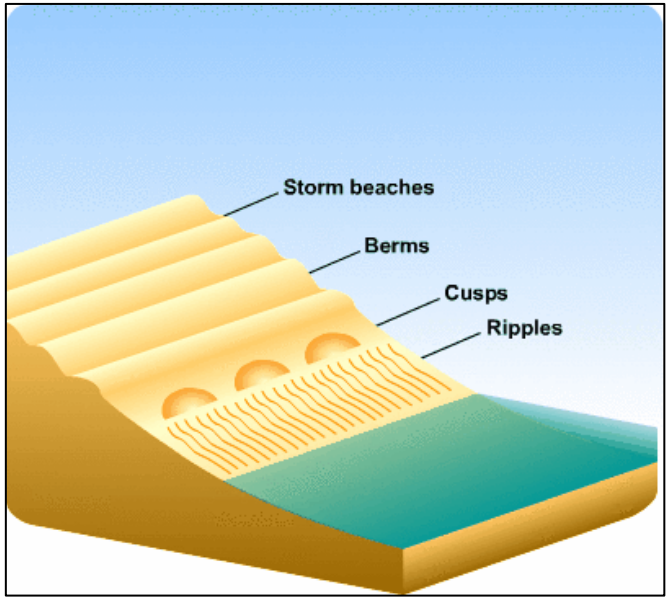


Figure 3 *The formation of swash-aligned and drift-aligned beaches*



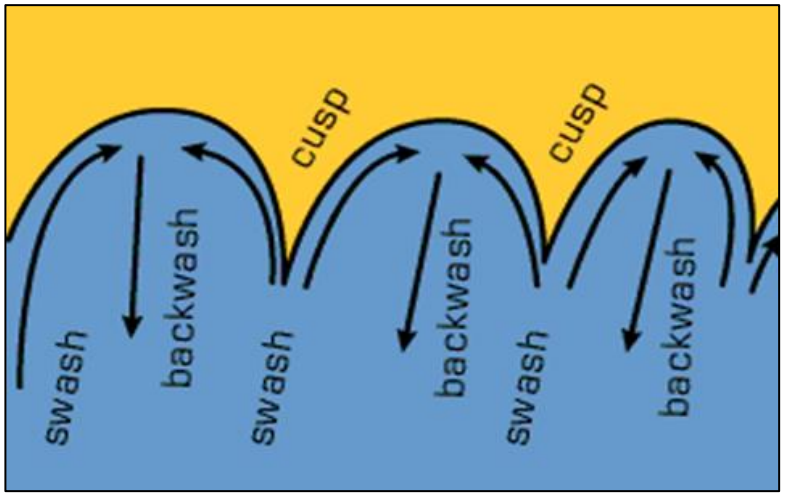
Above = sandy berm

Brighton Beach UK, (above centre, and right) has a lot of Berms. What happened in this picture?

Beach forms:

- Beaches are part of a bigger **deposition** area extending offshore.
- Characteristics of beaches are: **berms, cusps, runnels.**
- Berms are **ridges** that develop on the beach parallel to the water, showing the average high tide mark, resulting from deposition.
- Berms represent different **tidal** levels.
- **Storm berms** show the **highest point** on a beach.
- Berms are made from **sand** or **pebbles**.

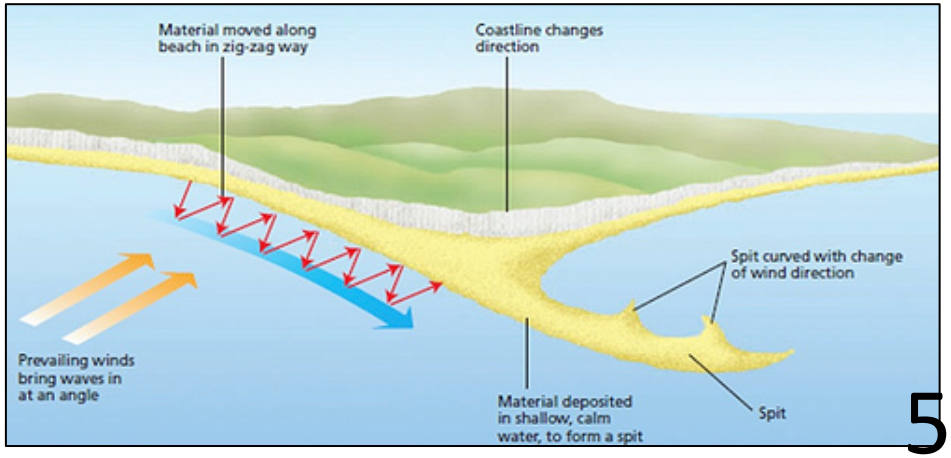
Cusps = semi-circular depressions formed by a collection of waves reaching the same point. The sides channel the incoming **swash** and produces a **stronger backwash** which drags material down the beach from the centre of the **cusp**.



Runnels (ripples) = the spreading out of **waves energy** across a wide area of beach creating **ridges** and intervening **depressions**. They are common on **shallow**, **sandy** beaches.

Spits:

- Long **narrow** feature
- Made of sand or shingle
- Extends from land into the sea, or part way across an **estuary**.
- Form on drift-aligned beaches
- Formed by **longshore drift** continuing when the coastline changes direction e.g. because of a river estuary. **Sediment** builds up across the estuary mouth and a spit will form. The flow of the river will stop the spit from extending across the entire mouth.
- A **recurved tip** is when the end of the spit curves around because wave refraction caries material round into the more sheltered water behind the spit.

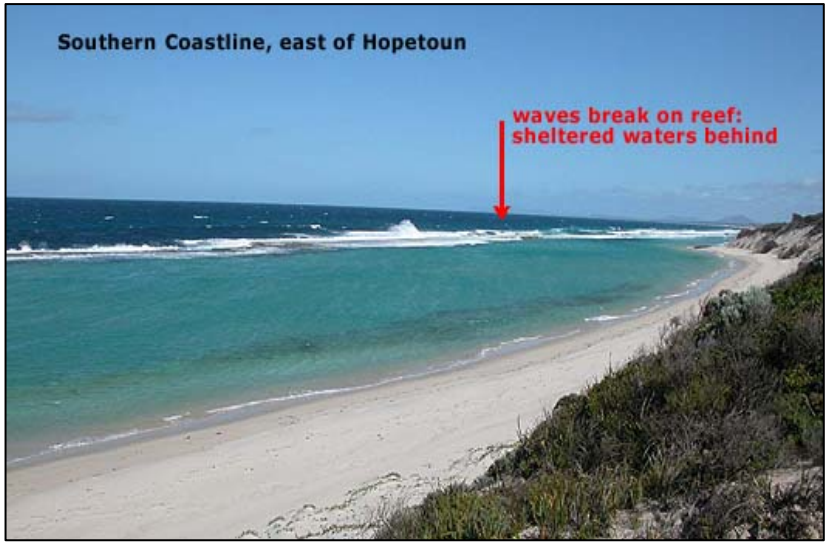


Tombolo:

- Is a **beach** or **ridge** of **sand** and **shingle** that has been formed between a small **island** and the **mainland**.
- **Deposition** occurs where waves lose energy and the tombolo begins to build up.
- Tombolo's may be covered at **high tide**. E.g. st Ninian's in the Shetland Islands

Offshore bars:

- Also known as **sandbars**
- **Submerged** or **partly exposed** ridges of sand or coarse sediment
- Created by waves **offshore** from the coast.
- Destructive waves erode sand from the beach with their strong **backwash** and **deposit** it offshore
- Offshore bars act as both **sediment sinks** and potentially sediment **input stores**.
- They can absorb **wave energy** thereby reducing the impacts of waves on the coastline.

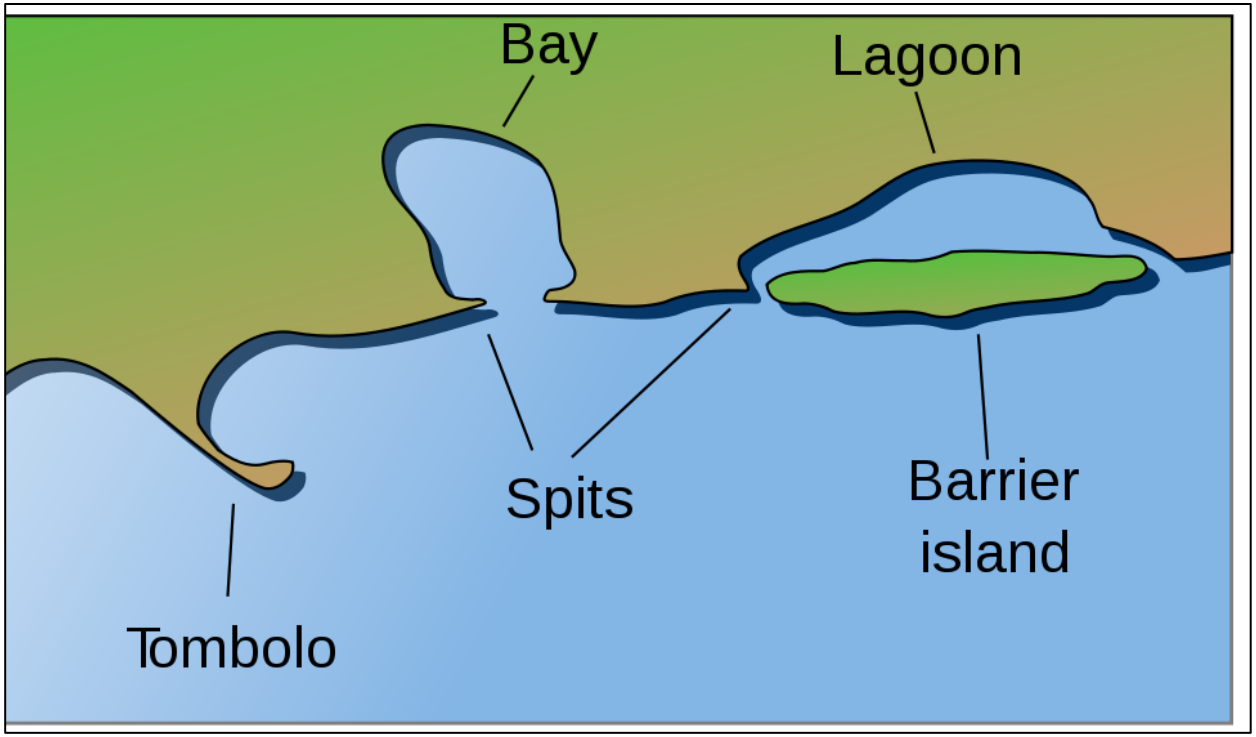


Barrier Beaches:

- Also called bar/barrier bar.
- Where a beach or spit extends across a bay to join two **headlands.**
- E.g. Start Bay Devon, which is 9km long and is formed from rounded shingle deposits (mostly of flint and quartz gravel)
- Can trap water behind and create a lagoon such as Slapton Ley.
- Barrier beaches and bars on the south coast of England are believed to have been deposited following rising sea levels after the last glacial period. Sediment deposited by meltwater in what is now the English Channel was bulldozed onshore to form the present-day barrier beach or bar.
- Later longshore drift has added more material and reworked the sediment.
- This is a good illustration of energy flows and it also demonstrates the importance of time in the formation of present-day landforms.
- We cannot always assume that landforms are the result solely of processes operating at the present time.

Barrier Islands:

- Where a beach becomes separated from the mainland it is referred to as a barrier island.
- Barrier islands vary in scale and form.
- They are usually sand or shingle features
- Common in areas with low tidal ranges and where the offshore coastline is gently sloping.
- Large-scale barrier islands can be found along the coast of the Netherlands, and in North America along the South Texas coast.



Sand dunes:

- Sandy beaches may be backed by sand dunes. E.g. Studland in Dorset.
- Sand has been blown off the beach by an onshore wind.
- An offshore sand bar is an ideal source of sand for a sand dune.
- Prerequisites for sand dunes to form:
  - ❑ Large quantities of available sand, washed onshore by constructive waves.
  - ❑ Large tidal range creating large exposure of sand that can dry out at low tide
  - ❑ Dominant onshore winds that will blow dried sand to the back of the beach
- Dunes develop where sand is initially trapped by debris towards the back of the beach.
- Vegetation helps to stabilise the sand and gradually dunes develop.

Bolonia, Andalucia, South Spain

Sand dune vegetation succession:

- The first colonising species are called **pioneer species**
- **Pioneer species** have **adaptations** to help them survive the hostile conditions.
- **Sea rocket** and **couch grass** are plants which are able to **cope** with very **dry**, **salty** and **exposed** conditions.
- **Embryo** dunes are the first dunes to develop
- **Fore dunes** are once the sand dune becomes bigger, and is yellow in colour but over time darken to grey due to decaying plans adding humus. **Marram grass** is found in this zone and is **adapted** with **long tap roots** to seek water. The roots help bind the sand and add stability to the dune.
- **Depressions** between **dunes** can develop into **dune slacks** where there is more **damp** conditions because the water table is close to it or at the surface.
- The final community will be adjusted to the climatic conditions of the area and is known as the climatic climax community.

Estuarine mudflats:

- ✧ River estuaries are important sediment stores (sinks) where huge quantities of river sediment is deposited in water close to the edges of the river away from the faster tidal currents that scour the channels.
- ✧ Rising tides create a buffer to the river flow, slowing velocity and leading to considerable deposition.
- ✧ Most of the sediment that accumulates here is mud, due to the low velocities, and over time, expansive mudflats can form that then develop into saltmarshes.

Saltmarshes:

- Saltmarshes are areas of flat, silty sediments that accumulate around estuaries or lagoons.
- They develop in three types of environment:
  - Sheltered areas where deposition occurs (e.g. lee of a spit)
  - Where salt and freshwater meet (e.g. estuaries)
  - Where there are no strong tides or currents to prevent sediment deposition and accumulation.
- They are covered at high tide and common around the British coast.

Saltmarsh vegetation succession:

- They develop over time with vegetation succession.
- To start mud is deposited close to the high tide line dropping out of the water by a process known as flocculation. Flocculation is when tiny particles of clay/mud stick together to eventually have the combined mass to sink to the seabed.
- Eelgrass and cordgrass start to colonise the transition zone between high tide and low tide. These plants can tolerate inundation by saltwater and they also help trap in the mud deposits.
- Once the mud level rises above the high tide mark a lower saltmarsh develops a wider range of plants that no longer need to be well adapted to salty conditions.
- Soil conditions improve and vegetation succession continues to form a meadow.
- Eventually shrubs and trees will colonise the area as the succession reaches its climatic climax.