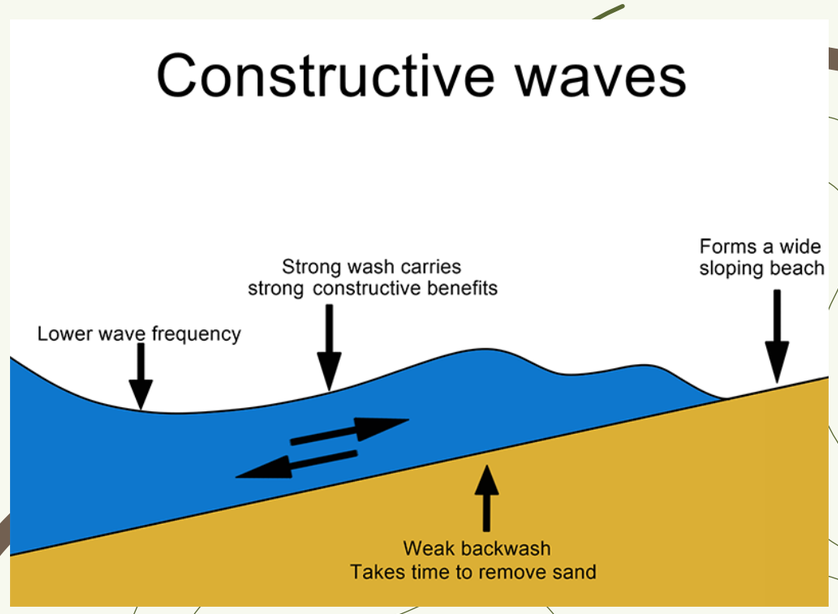
The formation of waves

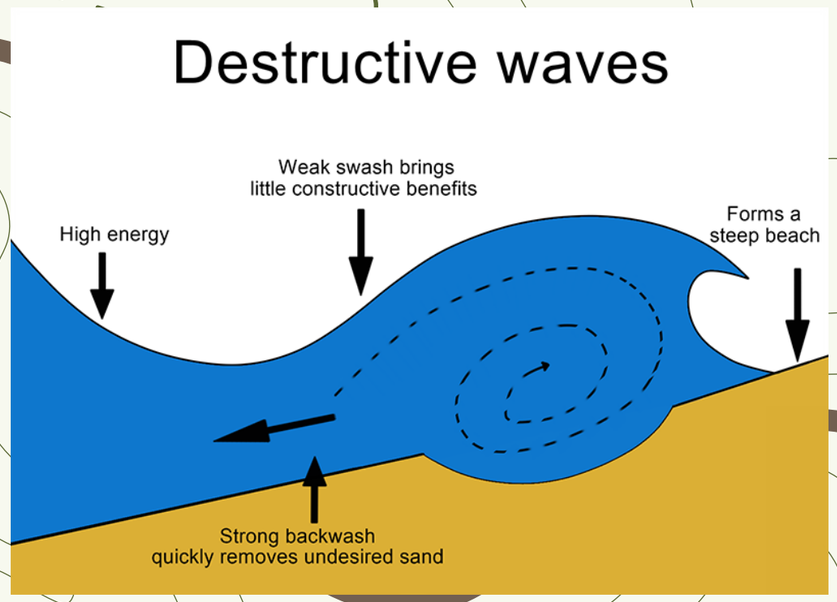
Sea waves are formed by the wind blowing across the surface of the ocean. As wind energy is transferred to the water, it creates ripples that grow into waves. The size and strength of waves depend on wind speed, duration, and the fetch – the distance over open water which the wind blows.

The characteristics of constructive and destructive waves

Destructive waves are powerful waves that erode coastlines. They are typically high and steep, with a strong backwash that pulls materials away from the shore. These waves are often associated with stormy weather and have a short wavelength, meaning they break frequently. Their strong backwash is more dominant than their swash, leading to the erosion of beaches and cliffs.

Constructive waves, on the other hand, are gentle, low-energy waves that help build up coastlines. They have a long wavelength and a low height, with a swash that is stronger than their backwash. This allows them to deposit materials like sand and pebbles onto the shore, contributing to the formation of beaches. Constructive waves are typically associated with calm weather and occur less frequently than destructive waves.





The role of fetch in influencing wave characteristics

The size of waves is directly influenced by the fetch, with greater fetch typically producing stronger waves.

A longer fetch allows waves to gain more energy, resulting in larger and more powerful waves.

Shorter fetch limits the distance over which wind can transfer energy to the water, leading to smaller waves.

There is a positive relationship between fetch distance and wave energy.

How seasonal changes in wave energy leads to differing beach profiles

In summer, beaches typically have a gentle profile with wide, sandy shores. This is because constructive waves dominate during the summer months, depositing sand and sediment that build up the beach. These waves have a strong swash and a weak backwash, which allows sediment to accumulate and creates a smooth, gently sloping beach profile.

In winter, however, the beach profile changes dramatically. Destructive waves, which are more common during the winter, have a strong backwash that erodes sand and sediment away from the shore. This results in a steeper, narrower beach profile with exposed pebbles and rocks. The beach appears more rugged as the sand is carried offshore.