

Coastal Erosion

Our coastline is constantly being shaped and changed. Winds buffet the cliffs, placing pressure on loose rocks and cracks, and the power of the waves constantly wears away at beaches and headlands. Materials are weathered, loosened and moved along in a constant process called coastal erosion. The processes at work can cause huge changes to the shape of our coasts and can put people in danger. The diagram below shows some of these processes at work.

Cliff geology

Cliffs are constantly under attack from the waves and wind. If the rock that forms the cliffs is soft (such as chalk) it may be weathered (worn by long exposure to the atmosphere) and the materials either dissolve into the water or are washed away by the waves. If the rock has fissures in, water can get into the cracks and put pressure on them. This can cause the fissures to widen and become fragments. Gradually, these chunks of the cliff become loose and fall.

Bays

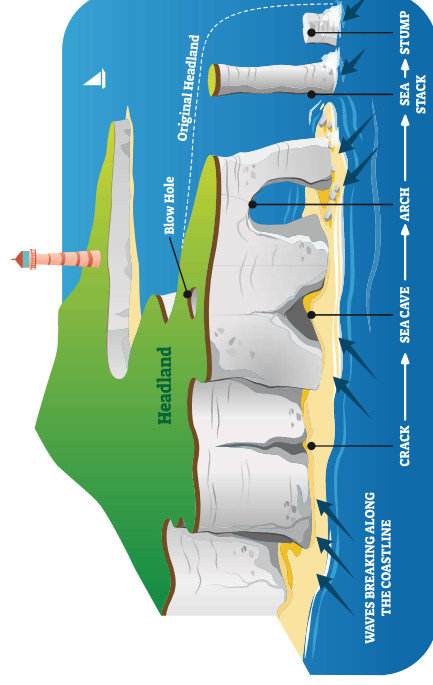
In some areas, these softer rocks are surrounded by bands of harder rock. If the softer rock is worn away, but is banded on either side by harder rock, a bay is slowly eroded, as the softer rock is removed by the sea.

Headland

The sections of harder rock cliff left at the side may form a headland, an outlying area of land that juts out into the sea. As the headland shelters the bay, it consequently takes on more of the force of the waves, which can in turn cause erosion of this area into caves, arches, stacks and stumps.

Caves

Caves are the first features to form. As the waves break along the coastline, they force their way into cracks and fissures in the harder rock. Over a longer period of time, these cracks will widen as the force of the waves grinds away at the rock. Eventually, these may become a cave.



Arch

The waves now work their way into the cave, pummelling the rock with focussed, powerful force and with all the loose materials they contain from eroding the cliffs. If the cave is in a headland, it may eventually break through to form an arch.

Stacks

Arches are now exposed to the power of the weather and as the winds travel through them, they weather and break up loose rock and wear away the exposed curve of the arch. This will grow wider and wider until it can no longer support the bridge at the top and then this will collapse. This leaves headland on one side and a single column of rock, called a stack, on the other.

Stumps

Stacks are weaker structures and are now at the mercy of the sea. Attacked at the base by the erosive power of the waves, eventually this too will collapse. What is left, is a stump – a small rock which will eventually be claimed by the sea.

Human Impact

As a consequence of these processes, Britain's coastline has been changed dramatically over the centuries. Coastal areas have long battled to try to preserve their land and livelihoods adding sea defences to areas under threat.

Sea walls are built to protect the cliffs from heavy waves and offshore sandbanks are dredged and the materials relocated to build up beaches in a bid to prevent or slow attrition rates. Groynes are added to try to retain beaches.

However, climate change has strengthened the erosive power of some weather patterns. Increased rainfall has led to higher levels of water infiltrating the ground and cliffs, subsequently land slumps and cliff falls are now more common. In some areas of Norfolk, the coastline has retreated over 50m in the last hundred years, leaving cliff-top homes balanced precariously on the edge or smashed to pieces on the beaches below. It's clear that our island faces an ongoing battle with the waves in a bid to survive.



RETRIEVAL FOCUS

1. Name a soft rock.
2. How is a bay formed?
3. What have humans done to try and slow coastal erosion?
4. How far has the Norfolk coastline retreated over the last 100 years?
5. What does it mean to be “weathered”?

VIPERS QUESTIONS

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Put these processes in the order they happen:

- A stump forms
- A headland cave erodes through into an arch
- Waves open a crack in the cliff which erodes into a cave
- Soft rock erodes in between hard rock forming a bay
- The arch collapses leaving a stack

E

Explain how a cave is created.

E

Explain how the waves cause erosion.

V

Find another word for erosion.

I

Why might a cliff fall result in a beach being closed .