

AS Geography 1.3 Coastal Environments *Student Notes*

Landforms of coastal erosion, to include cliffs, wave-cut platforms, headlands, bays, caves arches, stacks and stumps.

You should be able to describe and explain the formation of each landform listed. You must be able to use annotated diagrams and sketches in your descriptions and explanations. You need to know located examples, primarily, but not exclusively, from two contrasting stretches of coastline (North Devon and Dorset Coast)

Cliffs Examples of cliffs have already been looked at in detail.

This diagram is to remind you of some of the complex processes, including weathering, mass movements, wave trimming and sediment removal, that operate on the 80 m cliffs at Warren Bay at Hartland Quay. Notice the strong influence of the geological structures.

How do the cliffs at Hartland quay compare with those of the Dorset coastline?

(Notice that there is evidence in the sketch of erosion, transpotation and deposition.)

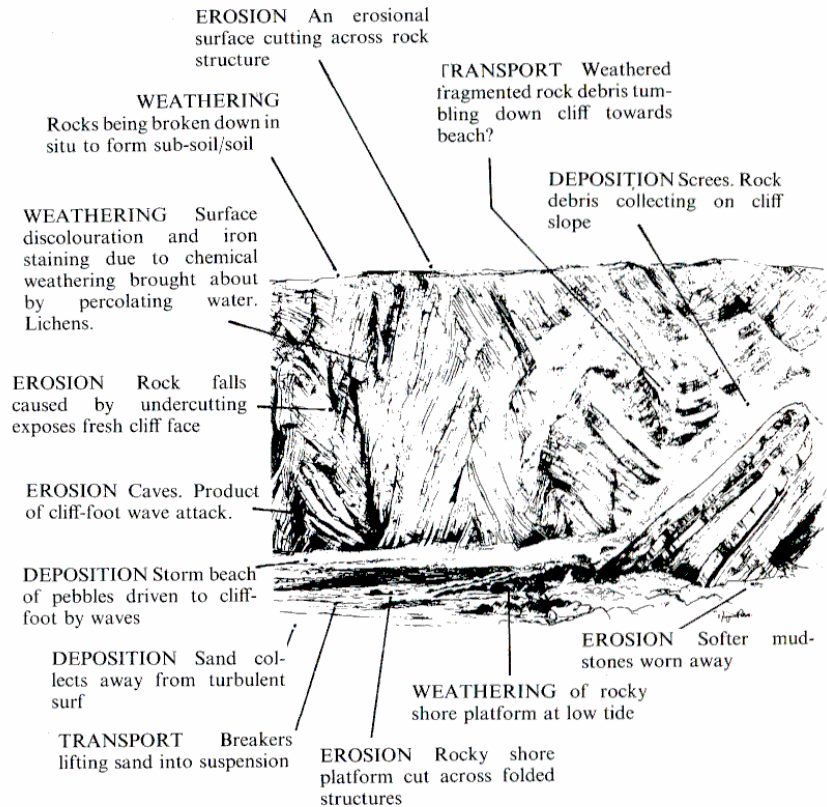
Wave-cut platforms (or shore platforms). Wave cut-platforms and cliffs

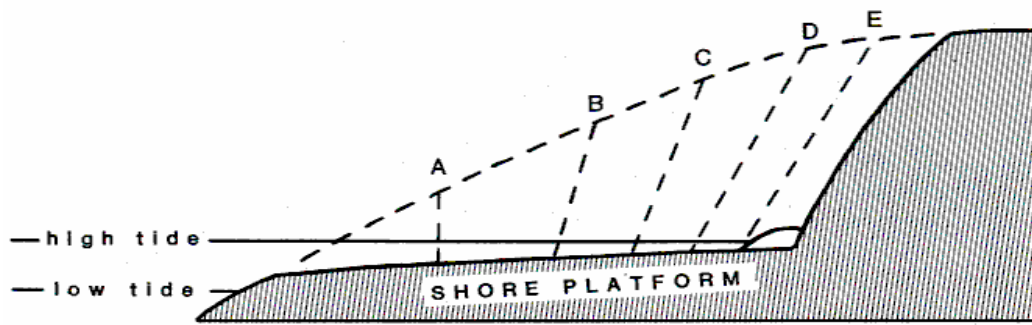
are products of the same group of processes. Marine erosion (abrasion, attrition, hydraulic action and solution) attacks the base of the cliff at high tide. This undermines it and causes the cliff to collapse. As long as the fallen rock is removed by weave action, the process can be repeated many times. Erosion dos not extend down much below the water surface, as this is where the wave energy is concentrated. The retreating cliff reveals a wave-cut platform.

The waver-cut platform at Well Beach and Warren Bay at Hartland Quay are about 300m across. Sea levels reached their current levels about 6000 years ago so the rate of cliff retreat averages about 5cm a year. On the coat at Westward Ho! It is no more than 4cm a year.

In reality, the surface of the platform will not be flat. Erosion of its surface is differential so in North Devon the platforms are deeply ribbed by the differential erosion between the sandstone and shales. Where faults cross the platforms, wide gullies have been eroded up to a metre deep.

Cliff forming processes at Warren Bay at Hartland Quay

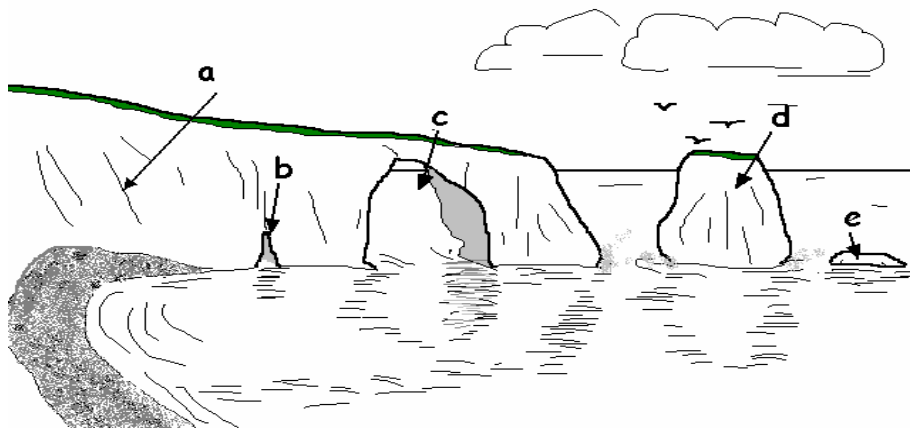




In the softer rocks of the Dorset coast, wave cut platforms are not as well developed, except in Kimmeridge Bay where extensive platforms of fossiliferous shales are exposed at low tide.

Headlands and Bays. The discordant and concordant coasts of Dorset best exemplify the formation of headlands and bays. In North Devon, large bays, such as Bideford Bay result from variations in the balance between the multiple strata of Carboniferous shale and sandstone. Where there is more sandstone than shale (Crackington Formation), headlands form. Where there is more shale (Bude Formation), bays form. Small bays, such as Warren Bay and Well Bay, form where the geological folds, created in the Varsican orogeny, are closer together and are more susceptible to wave attack.

Caves, Arches, Stacks and Stumps.



Stages in coastal Development

- a) geological weakness (e.g. fault).
- b) formation of sea cave by marine erosion.
- c) enlargement of cave to form arch.
- d) collapse of arch to form stack.
- e) removal of stack to create a stump.

There are many geologically controlled caves in Warren Bay at Hartland Quay. There are also stacks such as Bear Rock and Life Rock and stumps are revealed at low tide. The banding of shale and sandstone does not favour the development of arches although Tunnel Slab is effectively a small arch.

On the Dorset Coast, there are sea caves in Stair Hole and at the base of the Foreland at Studland where Old Harry Rocks have formed. The best know example of an arch is Durdle Door, although there are small examples in Old Harry. Old Harry is a good example of a stack and Man o' War rocks are excellent examples of stacks and stumps. *Make sure you know where these examples are located. Draw your own annotate sketch map.*