GCSE Case Study Student Worksheet

Coastal landforms of erosion and deposition: Trevose Head, Cornwall

Where is Trevose Head?

1. Using the maps below, describe the location of Trevose Head.



Trevose Head is located on the north coast of Cornwall between Newquay and Padstow (Wadebridge)

Landforms of erosion and deposition

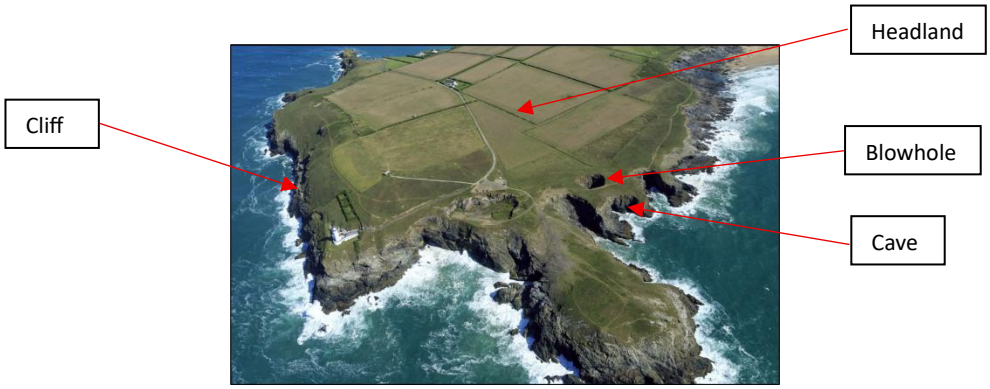
2. Using located arrows, label the coastal landforms of erosion and deposition at Trevose Head.
   Student activity (see PowerPoint for examples)



Landforms of coastal erosion

The aerial photo below shows Trevose Head.

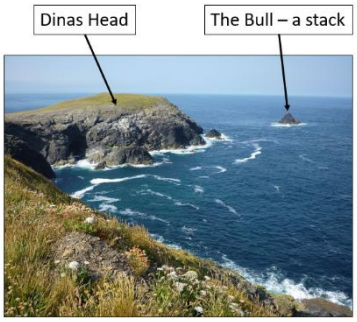
3. Use arrows to locate labels on the photo identifying landforms of coastal erosion, such as headland, cliffs, caves and blowhole.



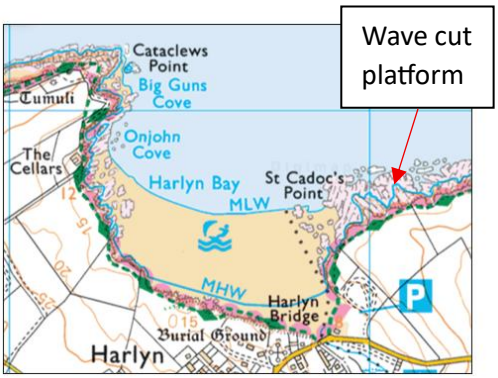
4. Explain how geology is affecting the coastal landforms at Trevose Head. The rocks forming the headland are hard and resistant sedimentary and igneous rocks, which withstand erosion and form landforms such as cliffs and stacks. Weaknesses in the rocks, such as faults, have been exploited to form caves.
5. The photo below shows Dinas Head, at the southern end of Trevose Head. The Bull is an example of a stack. Using a series of labelled diagrams, describe the likely formation of The Bull.

The Bull was once connected to the headland (Dinas Head). Erosion by the sea exploited weaknesses in the headland (such as faults) to create caves. Over time, erosion enlarged caves on opposite sides of the headland, eventually braking through to form an arch. Following further erosion and weathering, the roof of the arch collapsed to leave an isolated stack.

Student diagrams



6. Harlyn Bay is located on the northern side of Trevose Head. The map below is an enlarged 1:25,000 OS map extract of Harlyn Bay.





(a) In what direction is the photo looking? N
(b) Identify the name of the headland at X. Cataclews Point
(c) The photo was taken at low tide. True or false? True
(d) Using arrows, label a wave cut platform on the map **AND** on the photo.
(e) Explain why wave cut platforms have formed at the headlands.

Over time, marine erosion causes a cliff to retreat inland through undercutting and collapse. This leaves behind a rocky platform - the wave cut platform - that is abraded (smoothed) by the sea.

Constructive and destructive waves

It is possible to identify two types of wave:

- Constructive waves are generated by storms far out to sea. They are usually well spaced apart (long wavelength) enabling them to surge onshore uninhibited by the backwash of the previous wave. This results in extensive deposition. Constructive waves are typically associated with gentle beach profiles and sandy beaches.

- Destructive waves are generated by local storms. The waves are higher and have shorter wavelengths, often more chaotic as they approach the shore. Much of the wave energy is expended when the waves crash down onto the beach and the powerful backwash results in erosion of beach sediment. Destructive waves are usually associated with steeper beach profiles and coarser sediment (shingle).

7. Look at the photo below. What is the evidence that these are constructive waves?

The waves are quite low and are relatively far apart (long wavelength). They surge a long way up the beach (swash) without being interrupted by the backwash of the previous wave. The beach is gently sloping and sandy, typically associated with constructive waves.



Landforms of coastal deposition

There are many examples of beaches and sand dunes along the Cornish coast.

Constantine Bay

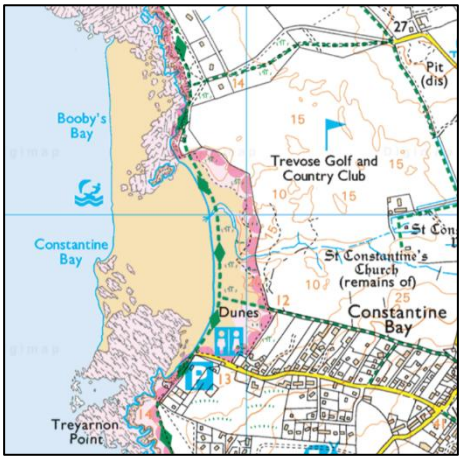
8. Constantine Bay is located just south of Trevose Head. The extensive beach has formed in the calmer, sheltered waters between two headlands. The map alongside is an enlarged 1:25,000 OS map extract.

(a) What is the name of the headland at the southern end of Constantine Bay? Treyarnon Point

(b) Is the beach made of sand or shingle? Sand

(c) Describe the location of the sand dunes.

The sand dunes are located on the upper beach above high tide at the southern end of Constantine Bay



9. The photo below shows the beach at Constantine Bay.



(a) In the photo, are the waves constructive or destructive? Constructive

(b) Explain your answer to Question 9a. Low surging waves, long wavelength, gentle sandy beach

(c) What is the evidence that the tide is retreating? Waves appear to be below the strand line (marked by seaweed) and the damp sand higher up the beach

(d) On the photo, use an arrow to locate and label the sand dunes.

(e) In the box below, draw an annotated diagram to explain the formation of sand dunes.

Student annotated diagram (see PowerPoint)

Treyarnon Bay

Treyarnon Bay is located to the south of Constantine Bay. A small beach has formed at the head of this narrow, sheltered bay.



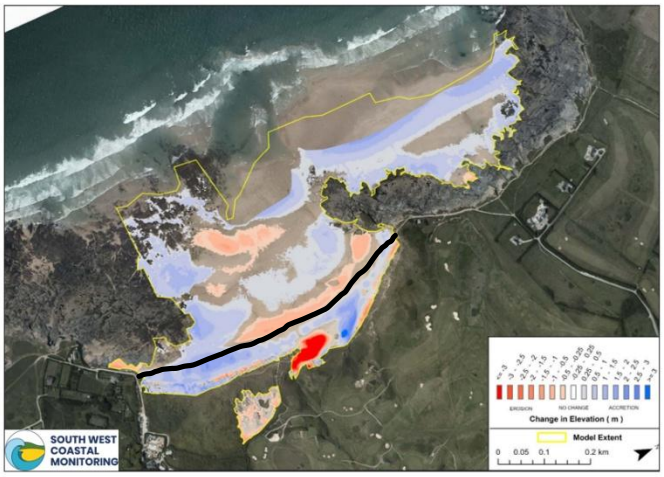
10. The map shows Treyarnon Bay.
    (a) What is the name of the rocky outcrop at the southern end of Treyarnon Bay? Trethias Island
    (b) Compare the beach at high tide with that exposed at low tide. The beach at high tide is much less extensive than the beach exposed at low tide.
    (c) On the map, draw a ring around the sand dunes.
    (d) Explain why the sand dunes have formed inland of the beach. Sand dunes form when dry sand is blown onshore. The sand collects around an obstacle and develops into an embryo dune. Vegetation encourages more sand to collect and so the dunes grow larger.

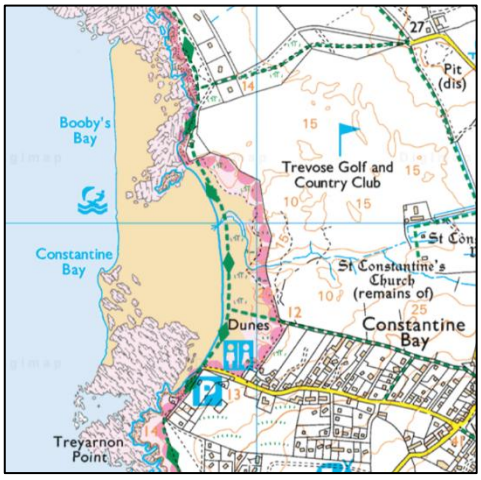
Extension Activity

The aerial photo below shows Constantine Bay. Locate the North arrow and notice that the photo has been slightly rotated. This explains why the orientation of the coast is different from the map alongside.

Detailed beach surveys between 2008 and 2022 have enabled scientists at South West Coastal Monitoring (Plymouth University) to create this image showing deposition/accretion (shown blue) and erosion (shown red) during this period.

Look at the key. Notice that the colours show changes in beach elevation (height). The darker the colour, the greater the change in elevation in the period 2008-2022.





1. What is the evidence that, during the period 2008-2022, the beach at Constantine Bay has generally increased in its elevation? There are more extensive areas shaded blue, indicating a general rise in elevation of the beach.
2. Using the map, attempt to draw the high tide line on the aerial photo. In black
3. What is the evidence that the zone of greatest increase in elevation is the upper beach, above high tide?

The slightly darker blue shading above the high tide line

4. Can you suggest why there is a narrow zone of erosion along the lower edge of the high tide line? This may result from local storms creating destructive waves, which erode the beach at the high tide line.

5. Using the map extract, suggest why there is a small area of dark red indicating erosion about half way across the bay.

This seems to coincide with a small stream reaching the beach and probably causing some very localised erosion.