
Beach, Water and Cliff

Level

7-8

Key question

How do we study a cliff, the nearby beach and the sea.

Key outcome

Describe the structure of a cliff and its associated environment.

Adapted from field sheets provided by Bill MacIntyre, Massey University, NZ, Jan Oliver and Lorna Murray, St. Aidan's School, Brisbane; and Yallingup Coastal Geomorphology and Ecology Fieldwork notes, Geographical Association of WA.

This activity can be combined with a number of other field studies on a beach with a rocky headland.

What you need

Worksheets with the questions, and a pen, in a bucket or container for each group

Clinometer or protractor to measure slope

Object for measuring water speed – apples or pieces of wood are preferred to foam or dye

Watch with second hand or stop watch, measuring tape (10-20 m)

Survey pole in half metres (generally red and white) or broom stick marked off in half metres

What you do

Select a cliffed headland and use a time when the tide is going out.

- (a) Note any likely hazards like the tide coming in, slippery rocks, unstable cliff. Don't enter the water.
- (b) You can work in small groups or pairs, using the equipment and field sheets, working at your own pace through the activities. At the end of the time, groups should collect together and check the results.
- (c) Collect and check in all equipment. Follow up work in the classroom could include writing up the results of the experiments, researching the geological formations of the headland, and using a topographical map to copy selected features which were studied in the field.

Worksheet

The whole environment

- Is it high or low tide?
- What are the weather conditions?
- Wind direction? Wind blowing from to

(to find north, point the twelve on a watch at the sun, & divide the angle between the hour (little) hand and the twelve. This line runs north/south).

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On the beach

- Build a breakwater of stones/wood on edge of water projecting 0.5 m (at least) at right angles to the beach and projecting into the water. Observe what happens to the sand on either side of it.

When you return to your breakwater after an hour, what has happened? How do you account for this?

- Using the tape, measure the distance in m. from high water mark to base of sand dunes, and in m. from low water mark to dunes.
- Measure slope of whole beach using clinometer. Lie on the sand at the water's edge and aim the clinometer at the top of the beach (usually sand dune). Get someone to read the degrees and record If the beach has a number of benches or levels, you will need to do a reading of each level. Record each level.
- Do the activity 'What is Sand?' (separate unit).

The water

Along the edge of the water, measure out 10 m and mark it with poles or people at each end. One person at the end of the length holds a stop watch or watch. Throw an apple or piece of wood out into the waves (to measure the inshore drift) and as it hits the water, start timing. When it passes the distance, stop recording. How long did the item take to move the 10 m?

The timing should be repeated three times to get an average, but this means recovering the item. Only enter the water if it is safe to do so. It may be possible to measure the longshore drift by throwing the item well out (beyond breakers). Record the times and average them to get the flow per minute. Recover the item (it may wash up on shore; do not enter the water without adult supervision).

Extension

Do the "Wave Observations" activity.

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On the cliff

- Draw an aerial sketch of the beach/cliff area showing headlands, fetch, wave refraction (bending), longshore drift (often visible as a current), beach drift (local movement), rips, sand bars, dunes etc.
- Measure the slope of the cliff from beach or base of cliff to the top. Record angle of slope Is this constant all the way.
- Estimate the height of the cliff using measuring poles m.
- Make some observations: Are there any rock falls. Have these the same angle as the cliff. Does erosion occur along joint lines on rocks.
- Sketch some weathering patterns on the rocks (e.g. potholes, odd whirls).
- Record your observations:
 - what are the main rock types
 - any sign of salt collecting on rocks
 - do waves cover platform at high tide
 - why is there no beach at the headland base
 - are there signs that the cliff is receding
 - what vegetation is growing on the cliff
 - at its base.

Extensions

Carry out the 'Rock Platform', 'Boulder Investigations', or 'Thinking about the Beach and the Future' activities (separate units).

References

Geography and Science text books on coastal features and landforms.