

Questions for any rock face 2: erosion

What questions about erosion might be asked at any rock exposure?

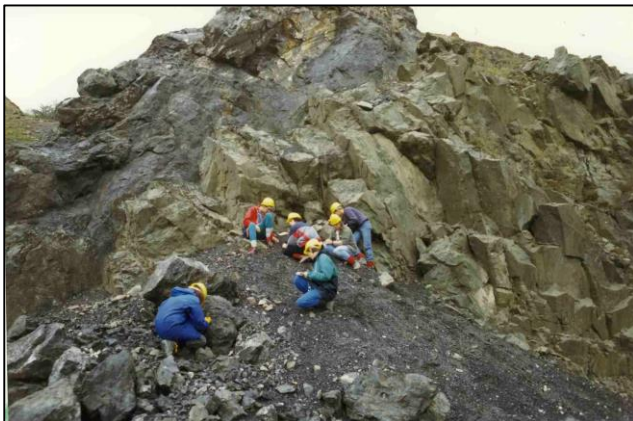
The ELI* series of ‘Questions for any rock face’ helps teachers to plan investigative fieldwork at any rock exposure**. In each case some possible questions are given, with some likely answers, to help you to decide whether the questions might work well at your site, or whether they would be asked better elsewhere. Answering the questions will provide basic understanding of the evidence preserved in rocks of the processes that formed them.

Erosion

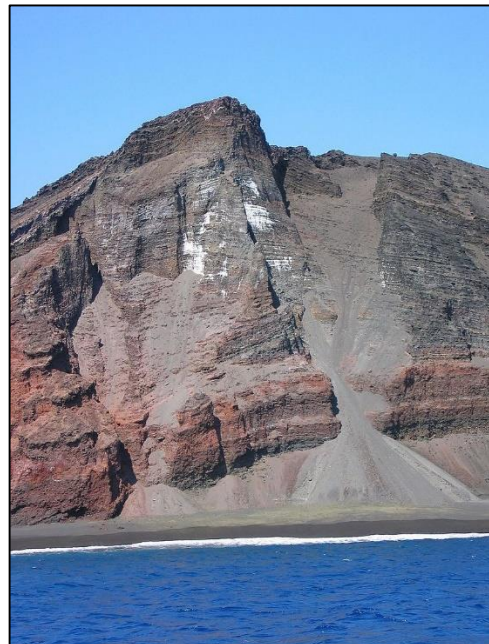
Erosion is ‘The removal of solid material, by gravity, water, wind or ice’ and so is the beginning of transportation.

Take your pupils to an area of loose rock beneath a rock face, preferably with water-formed gullies leading away – and ask these questions:

Possible questions	Possible answers
How did the pile of rock fragments build up at the bottom of the rock face?	Broke off and fell – caused by gravity (or gravitational pull on the mass of the loosened rock fragment) – the rock fragments were probably weakened by weathering beforehand
How else are fragments being carried away from the rock face? How can you tell?	Water carries fragments down gullies. You may see water-worn gullies and small fans of sandy/muddy sediment (‘Pupil power’ may be causing erosion too)
What is the name of the process that removes fragments from rock faces?	Erosion
Are the erosive processes here acting slowly, at moderate rates or quickly?	This question encourages pupils to think about rates and timescales



Fan of eroded material, Builth, Wales, UK. (Peter Kennett).



A volcanic cone with a fan of eroded material where it meets the sea. Hawaii, USA.

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* ELI = Earthlearningidea

** An exposure is where rocks can be seen at the Earth’s surface, exposed by natural or artificial means; anywhere where a rock reaches the surface, even if it is covered by soil, etc. is an outcrop, so an exposure is also part of an outcrop.

The back up

Title: Questions for any rock face 2: erosion

Subtitle: What questions about erosion might be asked at any rock exposure?

Topic: Helping teachers to ask suitable investigative questions about erosion at rock exposures.

Age range of pupils: 9-16 years

Time needed to complete activity: 10 minutes

Pupil learning outcomes: Pupils can:

- describe erosion as the removal of solid material;
- point out local examples of erosion by gravity and flowing water, and possibly, depending on the environment, by wind and ice;
- distinguish erosion (the removal of solid material) from weathering (the weakening of material *in situ*).

Context:

The effects of erosion by gravity are usually clear at any exposure (broken angular fragments or boulders at the base of the rock face) and fans of water-moved material are also common. Eroded fragments can also be found at the bases of most walls too.

Although weathering is distinct from erosion, weathering and erosion usually work together; rocks are weakened by weathering and the weakened material is removed by erosion.

The question asking, ‘Are the erosive processes here acting slowly, at moderate rates or quickly?’ is a difficult question to answer, because it depends upon the timescales being considered; it is asked to encourage pupils to think about relative rates of Earth processes.

Erosive effects that can be seen elsewhere include river valley and coastal erosion, wind erosion (particularly in desert areas) and the results of ice-erosion in regions that are, or once were, glaciated.

Remember to carry out a risk assessment before taking anybody to any rock exposure.

Following up the activity:

Continue with other ‘Questions for any rock face’ Earthlearningideas.

Underlying principles:

- Erosion is the removal of solid material, by gravity, water, wind or ice (as the start of transportation).
- Weathering is the break up and break down (physical break up and chemical breakdown) of rocks at the Earth’s surface without the removal of solid material (although material can be removed in solution).
- Erosion causes fragments to build up at the bottom of rock faces, usually as the result of gravity or water flow.

Thinking skill development:

Pupils have to apply a definition (of erosion) to real world circumstances and so bridge the concept of erosion to their outdoor observations.

Resource list:

- the resources needed for pupil fieldwork listed in the Earthlearningidea, ‘*Planning for fieldwork: preparing your pupils before setting out to “ask questions for any rock face”*’

Useful links:

See: the Earthlearningidea, ‘What’s the difference between weathering and erosion?’ at:

http://www.earthlearningidea.com/PDF/207_Weathering_erosion.pdf

The Field Studies Council provides a useful guide to coastal fieldwork, including weathering, at:

<http://www.geography-fieldwork.org/coast/coastal-processes.aspx>

A teacher guide to weathering and erosion is provided at:

<http://geographyclassroom2014.weebly.com/weathering.html>

Source: Devised by Chris King of the Earthlearningidea Team.

The ‘Questions for any rock face’ series of Earthlearningideas and the sites where they may be applicable

‘Questions for any rock face’ Earthlearningidea	Site
Planning for fieldwork	Preparation in school beforehand
1: weathering	Any exposure (cliff, coastal exposure, quarry, cutting) or weathered constructions (wall, gravestone, monument)
2: erosion	Any exposure and many walls
3: soil	Some exposures have a useful soil profile at the top (but many do not)
4: rock group (igneous or sedimentary)	Any exposure of igneous or sedimentary rock or both; also applicable to sedimentary and igneous building stones, gravestones or monuments
5: sedimentary grains	Any exposure of sedimentary rock and also building stones, gravestones or monuments
6: fossils	Any exposure containing readily found and obvious fossils, including some building stones, gravestones or monuments
7: tilted or folded rocks	Any exposure of clearly tilted or folded rocks
8: faults	An exposure where rocks are clearly faulted, preferably where beds can be matched up on either side of the fault
9: metamorphism	An exposure where metamorphic features are clearly visible and preferably, where there is also evidence of the former rock type
10: sequencing	An exposure where a sequence of geological events can be relatively dated using ‘Stratigraphic Principles’
11. tectonic plates	An exposure of sedimentary rocks containing evidence of deposition in different climates and altitude/depths from today, with further evidence of plate margin processes
12. quarry/ cutting potential	An exposure in any quarry or cutting
13: quarry economics	An abandoned (or working) quarry
14: recording	Any exposure

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