# Picturing Landforms – 5: Mass Movement B
## Visualise and draw landforms from a verbal description

This activity is the second on the theme of mass movement. Many of the features are similar, so the activity may be used as revision. A practising engineering geologist has enhanced some of the descriptions, providing a more detailed analysis than in Mass Movement
Encourage pupils to look carefully at landforms and to describe them verbally so that another person can visualise them from the description.

Seat pupils in pairs, with each person holding half of the photograph cards showing landforms, printed and cut up from those shown below. The photographs are all taken in the British Isles. Pupils should NOT show each other what cards they have in their hands.

Pupil A then examines one photograph and describes it as fully as possible to Pupil B, who listens carefully and then tries to draw it. Pupil B must listen in silence and not ask any questions. Pupil B then takes a turn with another card, with Pupil A doing the drawing, also in silence. Pupils should then compare their hand-drawn efforts with the photographs.

This first round should be tried without any guidance. Then give each participant the Prompt Card, to encourage them to be more specific in further descriptions, and ask them to work through the remaining photographs, comparing their drawings with the photographs after each round. Some landforms may be repeated on different photographs, and some photographs may show more than one landform.
Note that in this activity, all the photographs show features which originated through processes of mass movement (or mass wasting). This is where weathered rock and soil move downslope under gravity. In contrast to transportation in water, wind or ice, material is moved *en masse* under its own weight. Water, air or ice may well be mixed in with the rock debris but not in sufficient quantity to be regarded as the main means of transportation.

(If drawing the landscape from a partner's verbal description proves too difficult, the speaker could help by drawing a simple cross-section of the feature which is being described. Both pupils could then draw a "field sketch" from the same photo before reverting to the game).

When all have finished, give out the descriptive cards and ask pupils to match the descriptions to the photographs which they have been using.

Aa

Bb

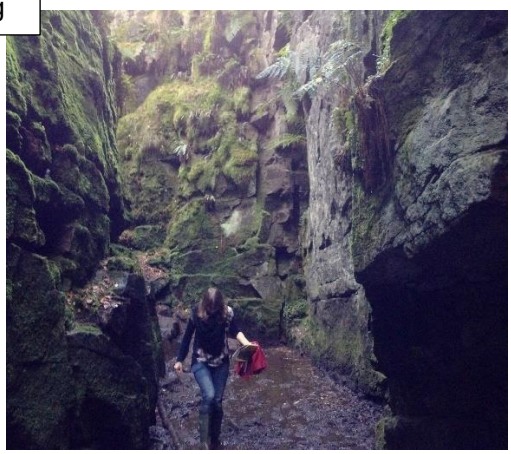
Cc

Dd

Ee

Ff

Gg



Hh

Ii

Jj

Kk

Ll

**Prompt Card**

*Use this card as a check list to aid your verbal description of your photograph to your partner.*
*Is the photo showing:*

- *an upland area, a lowland area or a coastal area?*
- *any evidence of the structure of the rocks – folding, faulting, joints, igneous features?*
- *any evidence of the strength of the rocks?*
- *any evidence of what processes might have moved rocks from their original positions?*

*Can you draw a simple cross section of the photo to help your partner to visualise the scene?*

**Descriptions of the photographs**

| | |
|---|---|
| **1. Mudflow:** The solid geology here consists of shales and siltstones. Rain water has weakened the adhesion between the particles, and the high ratio of water to clays has caused it to flow *en masse*, probably quite quickly. In this example, the surface of the mudflow is crevassed by many cracks. Mudflows can be hazardous to cross without the feet becoming bogged down. | **7. Hill creep:** The bedrock dips steeply to the right, but near the top of the quarry, weathering has broken up the layers and gradual down-slope creep has caused the strata to dip to the left. This means that measurements of the dip of the beds at the ground surface would not provide accurate data about the structure of the underlying bedrock. |
| **2. T*erracettes:*** These are commonly known as "sheep tracks", but the miniature terraces are produced by gradual down-hill movement of weathered rock and soil. They are most common in areas of thin soils on steeply sloping ground. The surface vegetation binds the surface layer which is stretched at the back and builds up into a ridge to form each terrace. In areas of thick soils it is more likely that the soil will move as a slab down-slope. | **8. Valley bulging:** These mudrocks were laid down horizontally and compressed beneath hundreds of metres of other sediments. As the valley became deepened by erosion, these overlying rocks were removed, but the weight of the remaining rocks of the hills on each side caused the rocks of the valley floor to be forced upwards into folds. Thus the folds are not the result of tectonic processes, but are due to the removal of overburden in the valley and stress caused by gravity. |
| **3. Block slide:** The sedimentary strata here clearly dip towards the left. One block has become detached and has slid bodily along a bedding plane towards the sea. Blocks can become detached from the rock mass along widely spaced sub-vertical joints. Such potential block failure occurs where strata dip into a slope, be that a natural cliff or excavation such as a road or railway cutting. | **9. Rockfall:** The pile of white Chalk in the middle ground has simply fallen from the cliff behind, probably aided by marine erosion of the red Chalk at the base of the cliff. The chalk contains frequent bedding surfaces and joints so it easily breaks up into blocks of varying size as it falls. Such rock falls are common on the coast where marine erosion removes debris from previous rock falls and undercuts the cliff. Also weathering may have weakened the rock mass and resulted in the instability. Such failures occur rapidly, and often without warning, so one must always take care not to walk or sit too close to the base of steep cliffs. |
| **4. Hill creep:** When this drystone wall was built, maybe 200 years ago, it would probably have run across the uniform slope of the meadow. Over time, the soil and the weathered surface layer of the underlying rock has slowly moved downhill, building up behind the wall and gradually pushing part of it over. | **10. Block slide:** The gully here is not an erosional feature but was formed when a huge block of rock on the right slid bodily away from the rest of the strata, which remained in situ. Usually sliding occurs on a weak surface like bedding. It is a common feature in sub-horizontally bedded sedimentary sequences at the edges of valleys, where the weight of the strata forming the valley side causes cambering of the valley edge. The formation of the gully can only be deduced from a more general view of the area and not from this photo alone. |

| | |
|---|---|
| **5. Translational slide:** The soil or weathered bedrock has moved as a slab on a planar surface parallel to the ground surface. Usually movement occurs on a weak surface such as bedding in sedimentary rocks or a surface developed due to the down-slope movement of a surface layer that occurred under seasonal freezing and thawing and high rain-fall conditions at the end of glaciation. It appears that the lower edge of the unstable ground (the toe) has overridden the ground in front of it. | **11. Landslide:** A translational slide where the "tower" on the left has slid bodily away from the main outcrop on an underlying weak surface. The upper parts of the face are mainly made of sandstones, but lower down shales, on which sliding would have occurred, predominate. Water percolating into the shales from the overlying more permeable sandstone layers would weaken them and raise the pore water pressures in the rocks, which would aid failure. Later, the shape of the block and of the cliffs to the right have been modified by rock falls. Weathering of the sandstone has resulted in joint and bedding-bounded rock blocks of various sizes that have accumulated as scree at the bases of the rock faces. |
| **6. Landslide:** The upper part of the cliff failed along a curved surface within the sandy clay glacial till. This resulted in the destruction of a hotel built on flat ground above the cliff slope, in 1993. The slide probably occurred due to the ground becoming saturated by rain following a dry period. The initial failure near the cliff edge left a steep back-scarp which then itself became unstable. The movement progressed inland over a period of hours and three former lawn areas can now be seen between the hotel and the cliff edge in the area of failed ground. There is a steep back-scarp at the top of the main slide and another minor one has formed in the ground underlying the building, causing it serious damage. As there was a promenade at the base of the cliff there would not have been erosion of the "toe" of the landslide**.** The failed material at the toe of the slide has formed an earth flow that has buried the promenade. The valley to the right of the hotel was probably formed by a similar landslide event. | **12. Landslide:** The cliff, formed in weak sand or sandstone, has failed along a steeply dipping surface to form a steep back scarp a few metres high. The former ground level can be seen by the vegetation on top of the unstable ground. Movement of the failed ground will probably continue for some time as material is gradually eroded from the cliff by wind and rain. Movement was probably originally helped by the marine erosion of the softer clays at the base of the cliff. |

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## The back up

**Title:** Picturing Landforms – 5: Mass Movement B

**Subtitle:** Visualise and draw landforms from a verbal description

**Topic:** Enhancing pupils' skills of description and interpretation using photographs of landforms

**Age range of pupils:** 16 years upwards

**Time needed to complete activity**: About 30 minutes, depending on depth of discussion

**Pupil learning outcomes:** Pupils can:

- examine photographs of landforms carefully and describe them intelligibly;
- listen carefully to a verbal description and interpret it in a drawing;
- enhance their observational skills as a prelude to field work.

**Context:** This could form a useful revision activity, once pupils have studied landforms. *Answers to the matching exercise are:*

Aa3, Bb4, Cc12, Dd1, Ee9, Ff6, Gg10, Hh8, Ii2, Jj5, Kk11, Ll7.

**Following up the activity:**

- Ensure that pupils use the same careful description and interpretation approach to geology in the field.
- Ask pupils to study the photograph below and to describe the evidence for mass movement as fully as they can. *(See Photo notes*)

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Mam Tor, Peak District, Derbyshire *(Photo: © Bill Bevans www.billbevanphotography.co.uk)*

**Underlying principles:**

- This strategy provides training in careful observation and interpretation of all relevant features.
- Being obliged to give a verbal description encourages careful observation, to ensure that clues are not missed.

**Thinking skill development:**

Verbal dexterity and metacognition are encouraged by the need to give intelligible verbal descriptions and to interpret from them**.** Applying the activity to the field situation is a bridging activity.

**Resource list:**

- Card sets of Photographs, Prompt Cards and Description Cards, cut out from those shown above.

**Useful links:**

See the table below for other Earthlearningidea activities in the "Picturing" series. Also:
https://www.earthlearningidea.com/PDF/409_Coastal_erosion.pdf
https://www.earthlearningidea.com/PDF/406_Net_zero_Landslide_danger.pdf
https://www.earthlearningidea.com/PDF/Landslide_through_window.pdf
https://www.bgs.ac.uk/geology-projects/landslides/national-landslide-database/

**Source:** Written by Peter Kennett of the Earthlearningidea Team. Thanks to Dr. John Cripps for technical advice.

**Photos:**

**Aa,** Mainland, Orkney Islands, Scotland. 5822016 © Anne Burgess. www.geograph.org.uk licensed for reuse under this Creative Commons Licence
**Ee.** Hunstanton, Norfolk. © Hazel Clark
**Ff.** Holbeck Hall Hotel, Scarborough, North Yorkshire. © BGS P707131
**Gg.** "Lud's Church", Dane Valley, Cheshire. 4549199 © Robin Stott. www.geograph.org.uk licensed for reuse under this Creative Commons Licence
**Hh.**, near Ashhopton, Derbyshire. © BGS P006233
**Ii.** Kingston near Lewes, Sussex. 1822067 © Robin Webster. www.geograph.org.uk licensed for reuse under this Creative Commons Licence
**Kk.** Alport Castles, Peak District, Derbyshire. © J. Cripps
**L.** Moel Hafod Owen, Snowdonia, Wales. © BGS P008236

**All other photos**. © P. Kennett
**Bb**. Abney, Peak District, Derbyshire.
**Cc**. Barton cliffs, Hampshire
**Dd**. Speeton, North Yorkshire
**Jj**. Boulby, North Yorkshire

**Notes on Mam Tor photo, mostly from Dr John Cripps**

Major rotational slide. Failure has occurred in shales beneath the sandstones and shales forming the steep backscarp, on a curved surface such that the strata in the slumped material are back tilted. The light brown area in the ground beyond the fields is an earth flow which consists of degraded rock and soil formed from the leading edge of the slumped material. This material is moving over the valley floor, actively burying it. The feature at the top of the hillside to the right of the main scarp is a rampart that forms part of an Iron Age hillfort. This has been undercut at the backscarp and may pre-date the original instability. Research has shown that the weathering of pyrite in the shales is a major factor in their breakdown and susceptibility to failure.

**Picturing……**

Earthlearningidea has compiled a series of activities involving examination of photographs of geological interest and their careful verbal description to others. This table will be updated as fresh activities are added. All titles begin with: “Picturing……”

| Title | Sub-title |
|---|---|
| Puzzle structures | Visualise and draw sedimentary structures from a verbal description |
| Trace fossils and other strange shapes | Visualise and draw trace fossils and sedimentary structures from a verbal description |
| Igneous rocks – 1 | Visualise and draw igneous rocks from a verbal description |
| Igneous rocks – 2 | Visualise and draw igneous rocks from a verbal description |
| Metamorphic rocks | Visualise and draw metamorphic rocks from a verbal description |
| Tectonic structures – 1 faulting | Visualise and draw fault structures from a verbal description |
| Tectonic structures – 2 folding | Visualise and draw fold structures from a verbal description |
| Minerals -1 | Visualise and draw minerals from a verbal description |
| Minerals -2 | Visualise and draw minerals from a verbal description |
| Fossils -1 | Visualise and draw fossils from a verbal description |
| Fossils -2 | Visualise and draw fossils from a verbal description |
| Landforms 1 | Visualise and draw landforms from a verbal description |
| Landforms 2 | Visualise and draw landforms from a verbal description |
| Landforms 3 | Visualise and draw landforms from a verbal description |
| Landforms 4A | Visualise and draw landforms from a verbal description |
| Landforms 5B | Visualise and draw landforms from a verbal description |