

## Landslide through the window - what would you see, what would you feel? Asking pupils to picture for themselves what a landslide through the window might look like

What would the view through the window look like if a sudden landslide were to strike? The answer depends on whether the view, and your building, is hit by a landslide or if it is being carried along on a landslide. Try both of these scenarios with your pupils by asking these questions.

### Being hit by a landslide



An earthquake-triggered landslide, Loma Prieta, California, Earthquake, October 17, 1989. San Francisco and San Mateo County Coast. The slide mass is approximately 2,830 cubic metres of material and 30 metres high.

United States Geological Survey photo archive at: <http://libraryphoto.cr.usgs.gov/> Slide IV - U.S. Geological Survey Open-File Report 90-547.

- If a sudden big landslide were to come from the left out of the window – what would it look like?
- How fast would it be moving?
- Would it be carrying anything?
- What impact would it have on the buildings or trees you can see?
- If you had been in its path, could you have got out of the way?
- What would you feel as the landslide struck?
- How would you feel?
- What would you do? What would you tell your friends to do?
- What might have caused the landslide?
- Can we tell when landslides like these are coming?

### Being carried by a landslide



Buildings carried by a landslide - the Turnagain Heights landslide in Anchorage. 75 homes slumped, twisted, or collapsed when liquefaction of subsoils caused parts of the suburban area to move up to 700 metres during the 1964 earthquake (9.2 magnitude).

American Geological Institute, Earth science World Image Bank (<http://www.earthscienceworld.org/images/index.html>). Photo ID: hfyyxn. National Geophysical Data Center, courtesy NGDC.

- If the land, including your building, were suddenly to start sliding, from the left to the right out of your window – what would it look like?
- How fast would it be moving?
- What impact would it have on the buildings or trees you can see?
- What would you feel as the landslide struck?
- How would you feel?
- What would you do? What would you tell your friends to do?
- What might have caused the landslide?
- Can we tell when landslides like these are coming?

Finally, reassure your pupils that landslides like these generally occur only in earthquake-prone areas where slopes are steep. If they live in a lowland area or a place where earthquakes are uncommon – they are unlikely to see and feel sights like these! Even in earthquake-prone areas with steep slopes, catastrophic landslides are uncommon. However, unwise location of waste dumps may trigger landslides, as at Aberfan, Wales in 1966. 112 children and some of their teachers were killed when a landslide of coal mine waste engulfed their school.

### The back up

**Title:** Landslide through the window - what would you see, what would you feel?

**Subtitle:** Asking pupils to picture for themselves what a landslide through the window might look like

**Topic:** A 'thought experiment' imagining how different landslides might affect the view through the window.

**Age range of pupils:** 8 – 18 years

**Time needed to complete activity:** 15 – 30 mins

**Pupil learning outcomes:** Pupils can:

- describe what it would look and feel like if a landslide hit or 'carried' the view outside;
- describe the best things to do in circumstances like these;
- explain some of the causes of landslides;
- discuss the possibility of landslide prediction.

**Context:** If a landslide were to hit the area, possible answers to the questions might be as follows.

- If a sudden big landslide were come from the left out of your window – what would it look like? - *like a wave of material suddenly appearing.*
- How fast would it be moving? - *the speed could be more than  $40 \text{ msec}^{-1}$  ( $150 \text{ kmh}^{-1}$  or  $90 \text{ mlh}^{-1}$ ).*
- Would it be carrying anything? – *anything in its path - houses, cars, trees, etc.*
- What impact would it have on the buildings or trees you can see? – *it would sweep them away towards the right.*
- If you had been in its path, could you have got out of the way? – *unfortunately not – it would be too fast.*
- What would you feel as the landslide struck? - *the land would vibrate from the movement; if the landslide was caused by an earthquake, it might still be moving from that.*
- How would you feel? – *you would never have experienced anything like this before – and would probably be very scared!*
- What would you do? What would you tell your friends to do? – *there would be little time to do anything – apart from maybe diving under a desk or table.*
- What might have caused the landslide? *Most large landslides are triggered by earthquakes, but smaller landslides can be triggered by storms, when the ground gets waterlogged by heavy rain; some landslides are triggered by volcanic eruptions.*
- Can we tell when landslides like these are coming? *Major earthquakes and landslides are very difficult or impossible to predict at the moment. However, we can map out areas that might be prone to landslide risks – and try to stop people living there.*

**If a landslide were to carry the area** – answers might be:

- If the land were suddenly to start sliding, from the left to the right out of your window – what would it look like? – *a chaotic mass of sliding land, buildings and trees*
- How fast would it be moving? – *a landslide like this might be moving several metres per second/ km per hour/ miles per hour.*
- What impact would it have on the buildings or trees you can see? - *it would carry them away in a jumbled mass.*

- What would you feel as the landslide struck? -, *the whole building would be sliding down – and would probably be breaking apart around you.*
- How would you feel? – *very scared*
- What would you do? What would you tell your friends to do? • What might have caused the landslide? • Can we tell when landslides like these are coming? - *similar answers to those above.*

#### Following up the activity:

- Try the Earthlearningidea 'Earthquake through the window' activity.
- Discuss contingency plans for dealing with a landslide.
- Consider how landslide hazard mapping might best be carried out.

#### Underlying principles:

- A landslide is triggered when the gravitational pull on the mass of material is greater than the frictional resistance to movement.
- Frictional resistance is reduced by shaking during earthquakes and by changes in the pore water pressure (from the water between the grains) caused by earthquake shaking or by extra water from storms.
- Landslide conditions are affected by: slope steepness; competence of the material (how well it is stuck together); planes of weakness (eg. bedding, faults, fractures); and the prevalence of earthquakes/storms/eruptions.

#### Thinking skill development:

Pupils are asked to translate their understanding from different situations and trigger photographs into the 'through the window' situation (bridging).

#### Resource list:

- a window - and imagination

**Useful links:** See the 'Landslide Hazard Manual trainers handbook' at: <http://www.engineering4theworld.org/Documents/LAP/Landslide%20Awareness%20TrainerManualES01-15.pdf> and details of the Aberfan disaster at: <http://www.nuffield.ox.ac.uk/politics/aberfan/home.htm>

**Source:** Devised by Chris King of the Earthlearningidea team. Many thanks to Dave Rothery of the Open University for his helpful comments.

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