**Activity #4: Landslide Hazards & Hazard Preparedness**

**Making a Mini-Landslide**

**Lesson Summary**

Students explore how landslide severity depends on materials (sand, gravel, lava rock), slope steepness and water content.

**Materials**

Each group:

* Monopoly or similar house models (5-6)
* Scissors
* 3 small paper cups: 1 for water, 1 for test material, 1 for scooping material
* 1 ft. (0.3 m) section of plastic downspout (available at hardware stores)
* 1 plastic waterproof tub with lid (2’ by 1’ approximately, depth not too significant)
* Ruler (or tape measurer)
* Play-doh or other materials to build hill (papier mâiché, large plastic tub, etc)

To share with entire class:

* 1 small bag of sand
* 1 small bag of gravel
* 1 small bag of volcanic (lava) potting rock (available at garden and landscaping stores)
* Duct tape

**Next Generation Science Standards: Performance Expectations and Crosscutting Concepts**

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| **Performance Expectations** | **Crosscutting Concepts** |
| **2-ESS1-1.** Use information from several sources to provide evidence that Earth events can occur quickly or slowly.  **4-ESS2-1.** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.  **MS-ESS2-2.** Construct an explanation based on evidence for how geoscience processes have changed Earth’s surface at varying time and spatial scales.  **HS-ESS2-5.** Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. | https://lh6.googleusercontent.com/hz6Gc2x6BSArx1AQsqwWoGfS7dsOZE-DBowpuIWl7eHDZGKAEGMwq7gFevhuKHyXC8xPtVYjJt2seO0d2npIM5eD4IiNwJ0SGSpV0VYuxaR9KiTTEPPh0cMWpyrMSz_I |

Strong connection to crosscutting concepts means that the activity has clear connections that are exemplars of the crosscutting concept. A weak connection indicates that there is either no part of the crosscutting concepts that applies to the activity or the activity would have to be modified to develop these connections.

**Teacher Background Information:**

* Landslides affect thousands of Oregonians every year
* Oregon has 41,029 recorded landslide deposits
* Average annual repair costs for landslides in Oregon exceed $10 million, and severe winter storm losses can exceed $100 million
* Common landslide triggers in Oregon include: intense rainfall, rapid snow melt, freeze/thaw cycles, earthquakes, volcanic eruptions, human effects (changing the natural slope and/or concentrating water)

**Introduction:**

Today, we are going to have some fun and learn more about landslides by creating our own mini-landslides. Building and testing models of landslide areas including buildings helps engineers and scientists predict landslide size and possible human impacts. Since landslide prone areas vary depending on earth materials and slopes, we are going to test a couple of different models.

**Procedure:**

1. Construct a hillside inside the plastic tub (figure below), filling less than half of the space. Use play-doh, papier mâché, or whatever solid materials that are available to build the slope. The angle for the slope will differ for each group in order to investigate how steepness impacts landslide processes. Possible groupings: low relief (< 30° angle); medium (~45° angle); moderately steep (~60° angle), and steep (near vertical, ~80° angle).
2. To calculate the angle of the slope, measure the length of the hill at the base of the tub and the height of the hill. Angle (θ) = tan-1 (height/length)
3. Secure the chute to the tub using duct tape.
4. Place houses beneath the hill, some safe and some unsafe from landslides. Ask students to predict which houses the landslide will be damaged.
5. Trial 1: Have each group use a small paper cup and place one cup of sand at the top of the chute. The amount of sliding will depend on the slope angle and therefore vary for each group.
6. Trial 2: Next, simulate an earthquake, a common *trigger* for landslides, by shaking the model to see how much shaking (or force) is required to move the material.
7. Trial 3: This time, place the same amount of sand in the chute and pour water from a paper cup (about ¼ full). Feel free to try again with more water as a separate trial.
8. Repeat the procedure with the other two materials (gravel and lava rock).
9. Repeat the procedure using a combination of materials (sand, gravel, and lava rock).
10. Facilitate group discussions using questions on student worksheet handout.

**Resources:**

http://www.oregongeology.org/sub/slido/

https://www.teachengineering.org/view\_activity.php?url=collection/cub\_/activities/cub\_natdis/cub\_natdis\_lesson05\_activity1.xml

http://www.oregongeology.org/sub/publications/landslide-factsheet.pdf