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### **How to Stop a Landslide Experiment Grade Level?**

#### **Objective**

Students will be able to examine the effects of erosion of a land mass and collaborate with peers to create a barrier, using various materials provided, that would mimic the stopping of erosion in the real world.

#### **Big Idea**

How does water cause erosion of a hillside?

How can we stop erosion from occurring?

What materials can be used in this experiment to stop erosion from occurring?

What do the materials you used in your demonstration experiment represent in real life that may be used to stop erosions?

#### **Setting the Stage:**

In this Mystery, students compare multiple solutions for preventing erosion. In the activity, they design and test ways to keep water from washing away a hill modeled out of cornmeal.

Weathering and erosion work together to change the environment. In nature, large things get broken down into smaller things. This can take a really long time, but sometimes it happens fast! Keep reading to find out more about weathering and erosion.

Erosion is what moves the soil and tiny rocks that weathering leaves behind. The wind and water carry the sediment (small pieces of rock or sand) to a new location. Erosion can happen because gravity pulls soil downhill. It can also happen because of strong weather, like rain or wind. Erosion is a very slow process. It happens over many, many years.

Today we are going to investigate erosion and work together to figure out ways to stop erosion from happening and destroying hillsides.

#### **Next Generation Science Standards**

**2-ESS2-1.** Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

**2-ESS2-2.** Develop a model to represent the shapes and kinds of land and bodies of water in an area.

## Science and Engineering Practices in the Next Generation Science Standards

### Practice 2 Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Compare models to identify common features and differences.
- Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).
- Develop a simple model based on evidence to represent a proposed object or tool.

### Structure and Function

In this lesson, the students work collaboratively with peers to create model of a hillside that is undergoing a landslide and use various materials provided to create a barrier in order to prevent the land slide from occurring. Students will investigate and be able to visualize how a landslide would occur in real life and begin to think about what measures can be taken to prevent landslides based on their experiment.

### Background Knowledge:

Students have already learned about erosion and weathering as well as landslides that occur in certain areas and have discovered certain measurements that are taken in order to prevent such occurrences. Students collaborate in groups using the scientific method and science process skills (observe, infer, form a hypothesis, predict, record procedure, results, and draw conclusions) and will fill out a “think like a scientist” worksheet with their groups. I establish rules and procedures during all science and technology investigations.

### Materials:

#### Each student needs:

- 1 paper plate
- 1 plastic plate
- 1 paper towel
- 1 3-oz cup

#### Each pair of student needs:

- 10 toothpicks
- 10 cotton balls
- 4 paper-towel strips, each about 1” x 5”
- 2 pieces of aluminum foil, each about 1½” square
- 2 3-oz cups

**Each group of students:**

- newspaper or plastic for covering the table
- a food storage container
- a cup of water to mimic rain

**In order to create the mimicked land mass:**

- a mixing bowl
- measuring cups
- salt
- cornmeal
- water

**Roles:**

Materials Manager/Traveler (SPY)

Checker

Recorder/Reporter

Observer/Illustrator

The activity will begin by having the instructor assign materials manager/spy, checker, recorder/reporter, illustrator/observer. The materials managers will be provided with the “Think Like a Scientist” worksheet that will enable the team to begin with the scientific process.

**Commented [SFB1]:** What will be the strategy, intention for forming the groups?

**THE 5-E FRAMEWORK**

**ENGAGE**

**CHECKER**

5 MINUTES

Lead your team in defining erosion and in what regions and what kind of landforms erosion is most likely to occur in.

**EXPLORE**

15-20 MINUTES

Developing Questions

Lead your team in understanding that they will create a model of a real-life hillside and conduct a project-based experiment to answer the question: How can we create a barrier to prevent landslides from occurring? Students will continue the lesson in groups.

**Observe and ask questions**

What questions does your team have about the materials available for use?

**RECORDER**

Record responses on the team's *Think Like a Scientist* lab sheet.

TRAVELER (SPY) Groups are permitted to send their SPY to share models and designs so that other groups can also gather ideas.

**Form and record the hypothesis-** Create a hypothesis that outlines why your model will be successful in preventing the landslide from occurring.

**EXPLAIN**

**ALL GROUP MEMBERS**

**ILLUSTRATOR**

**Plan a sketch of the model and a procedure**

**25 Min**

Students are asked to create a sketch of a model they will design and a procedure through which that model will be created. They will engage in discussion and agreement on:

What material do you need?

How will you arrange the materials?

How many of each material will you use?

Once the instructor observes the model and steps that students have agreed upon, they may begin creating the model.

**ELABORATE** Inform the students that their structure should be secure enough to endure the impact of the landslide when the rainmaker (cup of water) begins to be spilled upon the model hillside) students will be prepared to explain the thinking and hypotheses behind their design and elaborate on why they believe it will be successful

**AFTER MODEL IS CREATED:**

Each group will take turns, while the teacher creates "rain" to observe whether the model built was able to withstand the landslide.

**ILLUSTRATE**

**ILLUSTRATOR**

On the lab sheet provided, illustrate the result.

**EVALUATE**

10 MINUTES

**Draw conclusions. Communicate results.** Students will state whether their hypothesis was true or false. Based on your results: why do you think your model was successful or why do you think your model was unsuccessful. What changes would you make to your model to be able to withstand the landslide.

Each group is then given an opportunity to share their results with the class and describe the changes they would make.

**Commented [SFB2]:** You have successfully designed a lesson that embeds the 5eframework within a cooperative learning structure. However, you need to provide students with the formative assessment support of the content outcomes you expect; and the team performance assessment that assures successful, group engagement and collaboration. Please resend this with inclusion of these missing items.