NASHUA RIVER WATERSHED ASSOCIATION

Nashua River Watershed Investigations for Grades K-8

Lesson # 4-1

Title: 4-1 The Power of Ice!

Grade level and Standard: Grade 4

4-ESS2-1 Make observations and collect data to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering and moved around through erosion. (Erosion can include movement by blowing wind, flowing water and moving ice).

Objective: Students will observe how ice can cause mechanical weathering (breaking of rocks into smaller pieces) and erosion (movement of particles). They will make “glacier goo” and place their “glacier” on a slope with small rocks and pebbles. Students will observe erosion caused by the glacier moving downhill. Students will also note what happens to the rocks and pebbles.

Vocabulary:

- **Glacier:** a large area of thick ice that remains frozen from one year to the next. Glaciers also slowly flow over the land. Thousands of years ago, large parts of the world were covered with glaciers.
- **Erosion:** movement of soil or rock particles by blowing wind, flowing water, and moving ice.

© Nashua River Watershed Association, Inc. Duplication permitted other than for commercial purposes.

Materials:

- Glacier Goo:
  - Two 8-oz. (237 mL) bottles of white glue
  - Borax (a powdered soap found in the grocery store)
  - Large mixing bowl
  - Plastic cup (8-oz. [237 mL] size works well)
  - Spoon
  - Cookie sheet or plastic tray
  - Measuring cup
  - Blue food coloring
  - Water
  - Paper towel
  - Zipper-lock bag (to keep it when you're done)
- Model mountain (Styrofoam, cardboard, or other smooth material).
- Small rocks and gravel

Procedure:

1. Make the Glacier Goo with the recipe below.

2. Create your mountain with a slope that is 30° to 45° degrees. A valley can be created in the center of the mountain.

3. Place the Glacier Goo at the top of the slope. Then place small rocks in front of and on top of the "glacier".

4. Let the glacier flow down slope. Watch what happens and record observations on Data Sheet 4-1.

© Nashua River Watershed Association, Inc. Duplication permitted other than for commercial purposes.

GLACIER GOO RECIPE:

Start with the glue. Empty one 8-oz. (240 mL) bottle of white glue into a mixing bowl. Fill the empty bottle half-full with warm water and shake. Pour the glue-water mixture into the mixing bowl and use the spoon to mix. You can add a few drops of blue food coloring if you want it to be ice blue!

Mix the Borax. Measure ½ cup (120 mL) of warm water into the plastic cup and add a heaping teaspoon of Borax powder to the water. Stir. Don't worry if all the powder doesn't dissolve.

Add Borax to glue. While stirring the glue in the mixing bowl, slowly add a little of the Borax solution. You will **feel the long strands of molecules start to connect**.

Abandon the spoon and **use your hands to mix**. Keep adding the Borax solution to the glue mixture until the goo has a putty-like consistency. You should be able to roll it on the table like dough. Let it rest for a little bit and it will spread itself out.

Example of a mountain slope with a glacier and rocks photo Stacey Chilcoat

Data Sheet: (attached)

- The Power of Ice!

© Nashua River Watershed Association, Inc. Duplication permitted other than for commercial purposes.

HOW DO GLACIERS SHAPE THE LAND?

1. Unpack the "GLACIER GOO" and place it all at the TOP of the valley. Observe – BE PATIENT!

2. Place rocks in the "valley" around and below the glacier.

3. Describe how the glacier moves. What happens when it reaches the rocks?

_____

_____

4. Place one or two rocks on the glacier. What happens to the rocks?

_____

_____

(www.weebly.com)

© Nashua River Watershed Association, Inc. Duplication permitted other than for commercial purposes.