Title: Glacial Movement

Grade Level: 5th

Objective:

Students will be able to:

- Identify what a glacier is.
- Know how glaciers are formed.
- Observe how glaciers move on land.
- Realize how global warming has influenced the melting of the glaciers.

Rational or Purpose:
To introduce what glaciers are and how they are formed. To observe how glaciers melt and move on land. To see what kinds of landforms glaciers can make.

Source:
http://geologyonline.museum.state.il.us/tools/lessons/6.1/lesson.pdf

Materials:

- Access to a freezer
- One gallon milk jug
- 2 foot by 1 foot plank of wood
- one big tub
- sand
- water
- lamp or source of light
- Pictures of glaciers (great source of pictures from the National Oceanic and Atmospheric Administration: http://www.arctic.noaa.gov/gallery.html)

Lesson Duration: 1 hour

TEKS Objectives:
Science, Grade 5:
(11) Science concepts. The student knows that certain past events affect present and future events. The student is expected to:
(A) identify and observe actions that require time for changes to be measurable, including growth, erosion, dissolving, weathering, and flow;
(B) draw conclusions about "what happened before" using data such as from tree-growth rings and sedimentary rock sequences.
(12) Science concepts. The student knows that the natural world includes earth materials and objects in the sky. The student is expected to:
(A) interpret how land forms are the result of a combination of constructive and destructive forces such as deposition of sediment and weathering.

Background Information:

How Glaciers are formed
Glaciers are made up of fallen snow that, over many years, compresses into large, thickened ice masses. Glaciers form when snow remains in one location long enough to transform into ice. It is easy to see how glaciers on Antarctica are formed since it is always so very cold there. What makes glaciers unique is their ability to move.

Due to sheer mass, glaciers flow like very slow rivers. Some glaciers are as small as football fields, while others grow to be ice sheets, which are over a hundred kilometers long! From their movement, glaciers can make landforms, which include glacial lakes, kettle lakes, till, and moraines.

Landforms made from the movement of glaciers:
Till is material that is deposited as glaciers retreat, leaving behind mounds of gravel, small rocks, sand, and mud. It is made from the rock and soil ground up beneath the glacier as it moves. Glacial till can form excellent soil for farmland.

Material that a glacier picks up or pushes as it moves forms **moraines** along the surface and sides of the glacier. As a glacier retreats, the ice literally melts away from underneath the moraines, so they leave long, narrow ridges that show where the glacier used to be. Glaciers don't always leave moraines behind, because sometimes the glacier's own melt-water carries the material away.

Streams flowing from glaciers often carry some of the rock and soil debris out with them. These streams deposit the debris as they flow. Consequently, after many years, small steep-sided mounds of soil and gravel begin to form adjacent to the glacier. These mounds are called **kames**.

Kettle lakes form when a piece of glacial ice breaks off and becomes buried by glacial till or moraine deposits. Over time the ice melts, leaving a small depression in the land, filled with water. Kettle lakes are usually very small and are more like ponds than lakes.

Glaciers leave behind anything they pick up along the way, and sometimes this includes huge rocks. Called **erratic boulders**, these rocks might seem a little out of place, which is true, because glaciers have literally moved them far away from their source before melting away.

Procedure:
The teacher gives an introduction: “Today we are going to be talking about glaciers and how they move. Has anybody seen a real glacier before?”
If someone has, ask them to describe how one might look.
“Here are some pictures of glaciers that I have found on the Internet. What do you see in these pictures? What do you think a glacier is or how would you define one? How do you think glaciers are formed?”
“Today we are going to do an experiment in order to find out how glaciers melt and move on land.”

(Already you can have the experiment set up so there is time for the “glacier” to melt. To set this experiment up, you would need to put water in a milk jug or some big plastic container to make your glacier. Then make your land by putting the piece of wood at an angle in the tub. Do not have the wood too steep so that it will be unstable when you put the glacier upon it. Once you have the land to your liking, put some sand on the wood to make it more realistic as to how the glacier moves. Make sure the land is in the tub so that it will catch the melted water. Have a lamp on the slope side of the land to have energy or global warming to melt the glacier.)

Show the students the model that you have set up and ask these questions:
“I have put water in a milk jug and kept it in the freezer over night. What do you think this would be in this experiment? (Glacier) I have also set this piece of wood in this tub with sand on it. What would this be?” (Land). You might want to say that the tub is the sea since it collects the water.

To simulate how glaciers move, put the ice on the top part of the board. Tell the students that you are now going to put the lamp on so that the glacier may melt. Ask the students what might the source of energy would come from that is represented by the lamp? (Sun or Global Warming)

Now we are going to mark on the board where the bottom most part of the glacier is so we know how far the glacier moved.

While the experiment is going, the teacher may ask the students to predict how far the glacier would move by the end of the class. Also let the students predict how much water will be collected by the tub.

While the experiment is going on, tell the students that they will discuss and learn about glaciers.

Talk about glaciers, and use the background information. Talk about how they are formed and what may happen when the glaciers move with the different land forms.

With 10 to 15 minutes left, have the class go observe what has happened to the glacier.

Ask some students to measure how far the glacier moved. Let the students observe the tracks the glacier may have made from the sand on the board. Remind the students that this is the same process of the picture of till. Also show the students what the melted water has formed. Let them think of the connection that the melted water is streams or rivers. Then help the students move the setup out of the tub. Ask some students to gather the water in a beaker then measure the amount of water more accurately by pouring the water from the beaker to a graduated cylinder.

Ask the students where the water would go. (To the ocean or to make a lake) Discuss how this process might happen.

With 5 minutes left, give the students the quiz attached to evaluate what has been learned.

Name: _____

Glacier Movement Quiz

1. What is till?

2. What do glaciers make when they move on the ground?

3. In your own words describe how a glacier may be formed.

4. Draw a diagram of the experimental setup done today. Please label everything and what it represented.