New Jersey Agriculture in the Classroom

Ice Melt and Rising Sea Levels Experiment

A lesson in the NJAITC Climate Change Series

OVERVIEW: This simple experiment shows students how melting glaciers and ice sheets on land causes the level of the sea to rise.

GRADES: K-5

OBJECTIVE: Students will be able to:

- Explain why warmer temperatures cause sea levels to rise.
- Describe problems sea-level rise could cause for people.

MATERIALS:

Clear square plastic or glass container, (5x5 inches pictured)
Modeling clay, about 6 oz per container (*Play Doh will work, but because it is water soluble, some of the color may leach into the water)*
Ice cubes
Water
Ruler
Marker
Optional: the book *Understanding Climate Change, Facing a Warming World,* by Melissa McDaniel

Note: The experiment can be done as a whole class demonstration or by small groups of students. If working in small groups, students will need one set of materials per group.

BACKGROUND

Rising sea levels are one of the consequences of global climate change. Sea level rise has two causes:

- Warmer temperatures melt the glaciers and ice sheets on mountains and in the Arctic and Antarctica. The resulting liquid water eventually runs into the ocean.
- Higher air temperatures contribute to warmer ocean temperatures. As the water warms, its volume increases. This is known as thermal expansion.

About half of sea-level rise is due to ice and glacier melt and half to thermal expansion. *This experiment demonstrates to students how ice melt causes the level of the ocean to rise.*

Scientists estimate that at the current rate of global warming, the level of the ocean on the coast of New Jersey could rise by up to two feet by the year 2050.

PROCEDURE:

Optional: Read Chapter 1, The Dangers of Climate Change in *Understanding Climate Change, Facing a Warming World,* by Melissa McDaniel.

Start a discussion with students asking them if they know some of the consequences of a warming planet. Tell students that one of the consequences is that the level of the ocean will rise, causing it to flood low-lying islands or coastal areas. Explain the two reasons for sea-level rise when temperatures increase: thermal expansion and glacier and ice melt. Explain that today you are going to see how one cause, the melting of ice sheets and glaciers on mountains and on land near the North and South poles, can cause the level of the ocean to rise.

Ask students where they could find ice on land throughout the globe: at the top of the highest mountains, in the Arctic and in Antarctica. About one-tenth of the Earth's land mass is covered by ice. Explain that the temperatures all over the Earth are rising and this is causing glaciers and ice sheets to melt. When this ice melts into water, the water eventually runs into the ocean, causing the level of the ocean to rise. Explain that today you are going to do an experiment to demonstrate how this happens.

Press some clay into part of the clear container to demonstrate a land mass. Flatten the clay on top. Pour water into the container until it is about 1/4 to 1/2-inch deep. Be sure that the top of the clay land mass sits above the top of the water. Measure the depth of the water and use a marker to mark the surface of the water on the container.

Place as many ice cubes as possible on top of the clay land mass. You can push the ice cubes into the clay slightly to ensure they don't slide into the water.

Watch the experiment until all the ice melts, asking the students to observe what is happening to the water level. When all the ice is melted, measure the depth of the water and mark its surface again. Compare the resulting level of the water after the ice melts to the level at the beginning.

Discussion: Ask students to describe some of the problems that a rising sea level could cause for people who live on islands or in low-lying coastal areas.

EVALUATION:

Ask students to write a paragraph or essay about their observations of the experiment and the dangers of sea-level rise caused by a warming climate.

EXTENSION:

Read Chapter 3 Climate Change and You in *Understanding Climate Change, Facing a Warming World* by Melissa McDaniel. Discuss steps children and families can do to combat climate change.

Conduct the *Warmer Water and Rising Sea Levels Experiment* in the NJAITC Climate Change series.

New Jersey Learning Standards

Climate Change Education, Science: K-PS3-1, K-ESS3-3, 3-LS4-4, 3-ESS3-1, 4-ESS3-2