

## Lesson Plan

**Title:** On the Rise . . . Sea Level and Global Warming

**Target Learners:** 9<sup>th</sup> grade earth science students

**Background:** This lesson is part of a climate change unit. It is one of a series of activities which explores the effects of global warming on the earth system.

**Content Standards (State of Michigan):**

- Based on evidence . . . explain how the current melting of polar ice caps can impact the earth system.

**Objective:**

- Students will be able to explain the effect of melting sea ice and glaciers on sea level.

**Key Vocabulary:** sea level, glacier, ice shelf, iceberg

**Materials:**

- *On the Rise . . . Sea Level and Global Warming* handout
- 2 plastic tubs / group of students
- water
- silicon tart forms
- blue food coloring
- 2 ice blocks/group of students
- 2 strips of white laminated card stock/ group of students (depth strips)
- 1 permanent marker/ group of students
- 3 rulers / group of students

**Procedures:**

- Fill tart forms with blue water and freeze.
- Remove ice from forms and store in large freezer bag.
- Place the following at each lab station: 2 plastic tubs, water, 2 blocks of ice, 3 rulers, 2 depth strips, 1 permanent marker, 4 copies of handouts
- Students will work in groups of four to complete the lab.

**Assessment:**

Analysis and Conclusion questions will serve as the assessment for this lab.

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_ HOUR: \_\_\_\_\_

## **On the Rise . . .**

### **Sea level and Global Warming**

*2.15% of Earth's water, roughly 25 million km<sup>3</sup>, is frozen as glacial ice. Some of this ice is found high in the mountains in alpine glaciers while still more is frozen in continental glaciers on Greenland and Antarctica. A large expanse of ice also covers the Arctic Ocean. As the earth's climate warms, the ice melts. How would our Earth be different if all of the ice was to melt? How would sea level be affected?*

**As Artic sea ice melts, how is sea level affected?**

*Hypothesis:*

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**As alpine (*mountain*) and continental (*Greenland & Antarctica*) glaciers melt, how is sea level affected?**

*Hypothesis:*

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**Procedure:**

1. Fill each tub with warm water to line indicated.
2. Place one block of ice in tub 1. Draw a line on the depth strip at sea level. This ice block represents sea ice.
3. Place three rulers across tub 2.
4. Place a block of ice on the rulers. Draw a line on the depth strip at sea level. This ice block represents glacial ice on land.
5. Wait for the ice to melt.
6. When the ice is entirely melted, draw a line on each depth strip at sea level.
7. Remove each depth strip and label each sea ice or glacial ice.
8. Use your ruler to measure how much sea level changed in each tub after the ice melted. Record your data in the table below.

**Data:**

	<b>Tub 1 (sea ice)</b>	<b>Tub 2 (glaciers)</b>
<b>Change in Sea Level (mm)</b>		

**Analysis:** Compare the change in sea level that resulted from the melting of the sea ice and the glaciers.

▪ *When sea ice melts, sea level [rises, falls, remains the same]. Circle your answer.*

▪ *What causes this?*

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▪ *When glaciers melt, sea level [rises, falls, remains the same]. Circle your answer.*

▪ *What causes this?*

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***Conclusions:***

▪ *Sea level will be most affect by the melting of the earth's [sea ice, the glaciers]. Circle your answer.*