The Impact of Climate Change on Great Lakes Water Levels

Region: Great Lakes

Grade Level(s): 9-10

Time Required: One-two class periods

Focus Question:
- What has been the impact of climate change on the Great Lakes?

Learning Objectives:
- The students will construct and explain theories for the decline in water level of the Great Lakes.
- The students will be able to describe the effects of global warming on coldwater fish in the Great Lakes.

Materials:
- 1 map of the United States
- 1 map of the world
- CNN news article, "Mild Winters, Intense Summers Drain Great Lakes' Water Supply" - http://archives.cnn.com/2000/fyi/news/04/27/lakes/index.html
- Rubric created by teacher by which presentations will be graded.

Procedures/Instructional Strategies:

1. Have students locate the Great lakes on a map of the United States. Have them look at other lakes on a map of the world to compare the size of the Great Lakes to other lakes. Ask students to list ways in which bodies of fresh water are important to human populations.

2. Discuss global warming as an issue to discover what students already know about polar ice cap melting and water evaporation. Have students hypothesize what might happen in the short term if global temperatures continue to rise. Remind them that many scientific experts believe that sea levels will rise as a result of global warming, due to melting of the polar ice caps.

3. Have students discuss the effects of changes in lakes on coldwater fish populations.

4. Have students read the CNN news story.

5. For review, ask:
    - Where are the Great Lakes located? Why are they in the news?
    - What are the positive and negative effects of lower water levels on: business on and near the Great Lakes? The environment? Recreation?

- How far below the average water mark are current water levels?
- What are the suspected causes of the declining water level?
- What is happening to the coldwater fish population as temperature and water levels change?

6. Ask students to consider these seemingly contradictory events: water is evaporation and water levels are declining in some places in the world (such as the Great Lakes region), while at the same time polar melting is occurring, creating an increase in water. Scientists have theorized that the current warming trend will raise sea levels.

7. Divide students into groups and have them develop a hypothesis to explain the water level decline in the Great Lakes. Have the students search for evidence to support their hypotheses. Each group should have at least three pieces of supporting evidence for their theory.

8. Have each group present their theory to the class, and have the class subject the theory to scientific scrutiny.

Extensions:

- Have students research water pollution laws in cities around the Great Lakes. Have students compare the laws and the impacts they have on water quality.

National Science Education Standards:

Science as Inquiry

- Developing the abilities necessary to do scientific inquiry.

- Developing understandings about scientific inquiry.

Science in Personal and Social Perspectives

- Developing an understanding of natural resources.

- Developing an understanding of natural and human-induced hazards.

- Developing an understanding of science and technology in local, national and global challenges:
    - Natural ecosystems provide an array of basic processes that affect humans. Those processes include maintenance of the quality of the atmosphere, generation of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients. Humans are changing many of these basic processes, and the changes may be detrimental to humans.
    - Materials from human societies affect both physical and chemical cycles of the earth.

References:

1. Garsten, E., April 27, 2000, *Mild Winters, Intense Summers Drain Great Lakes' Water Supply*: CNN, at http://archives.cnn.com/2000/fyi/news/04/27/lakes/index.html

2. Lesson Plan: Warming drops Great Lakes to historic lows: CNN, at http://archives.cnn.com/2000/fyi/teacher.resources/lesson.plans/04/27/lakes/index.html