Polar Bears on Ice

Lesson Overview:
Many unforeseen consequences are arising from global warming, some of them in the polar areas of the world. Even polar bears are being affected by higher temperatures because they depend on ice thick enough to hold their massive weight while they hunt. As ice thins and breaks up, the world's largest bears are going hungry.

Grade Level:
Grade 5

Time Required: 60 minutes with a possible extension into a second period

Curriculum Connection for British Columbia and Yukon
Grade 5 Social Studies
This lesson, in the form of a Webquest, also connects with the Grade 5 science Integrated Resource Package (IRP) that includes a major focus on renewable and non-renewable resources

Links to Canadian National Standards for Geography:

Essential Element #5: Environment and Society
  ▪ Environmental issues (e.g. water supply, air quality, solid waste)

Geographic Skill #5: Answering Geographic Questions
  ▪ Using methods of geographic inquiry to acquire geographic information, draw conclusions, and make generalizations.

Link to Canadian Atlas Online (CAOL)
  ▪ Use the “Explore the Maps” section to find Hudson Bay and Churchill
  ▪ Use the “Explore by Themes – Issues” for information on Climate Change

Additional Resources, Materials, and Equipment Required:
  ▪ A picture of a polar bear (there are many online)
  ▪ Computer lab time
  ▪ A globe

Main Objective:
To determine how polar bears are affected by global warming

Learning Outcomes: By the end of the lesson, students will be able to:
  • Explain why and how polar bears are affected by global warming.
  • Explain how each person can slow the rate of global warming.
The Lesson:

<table>
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<tr>
<th>Teacher Activity</th>
<th>Student Activity</th>
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<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td><strong>Student Activity</strong></td>
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<tr>
<td>Show a picture of the polar bear and ask students what they know about the animal.</td>
<td>Students demonstrate their prior knowledge of polar bears and issues surrounding polar bears.</td>
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<tr>
<td>Use responses from the students to facilitate an initial discussion about global warming and ask students what they know or think about how global warming might be affecting polar bear habitat.</td>
<td>Students offer to share their knowledge about these issues.</td>
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10 minutes

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<tr>
<th><strong>Lesson Development</strong></th>
<th><strong>Student Activity</strong></th>
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<tbody>
<tr>
<td>Set the scene for students by telling them that they are investigative scientific journalists out to uncover the information behind the plight of the polar bear.</td>
<td>Students work on their own (with teacher support where necessary) to fully complete Webquest.</td>
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<td>Mention that students will be able to explain the connections between global warming and some of the difficulties polar bears are currently facing.</td>
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40 minutes

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<tr>
<th><strong>Conclusion</strong></th>
<th><strong>Student Activity</strong></th>
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<td>Ask for volunteers to share some of the solutions.</td>
<td>Students share information with the whole class, using maps as references where desired.</td>
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10 minutes

**Lesson Extension:**
- View sections of DVD *An Inconvenient Truth* that pertain to polar bears and ice
- Access some of the many excellent on-line resources available

**Assessment of Student Learning:**
- student self-assessment rubric (attached)

**Further Resources:** *An Inconvenient Truth* – DVD resource explaining global warming in a popular, graphically relevant, and engaging style. Has a section on the plight of the polar bear.
### The Plight of the Polar Bear

#### Student Self-Assessment Rubric

<table>
<thead>
<tr>
<th>Completion of Questions</th>
<th>I Exceeded Expectations (4)</th>
<th>I Fully Meet Expectations (3)</th>
<th>I Meets Expectation Minimally (2)</th>
<th>I am Not Yet within Expectations (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have fully answered each question in the Webquest</td>
<td>I have answered each question in the Webquest</td>
<td>I have answered most questions in the Webquest</td>
<td>My answers are off-topic or incomplete</td>
<td></td>
</tr>
<tr>
<td>Notes</td>
<td>My notes are proper point-form and are consistently relevant to the question asked</td>
<td>My notes are proper point-form and are mostly relevant to the question asked</td>
<td>My notes are present and are sometimes relevant to the question asked</td>
<td>My notes are non-existent or minimal and don't really address the questions</td>
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Student Worksheet

Webquest: *Polar Bears on Ice*

You are an investigative journalist working for a local radio station and you have heard about this thing called “global warming”. In fact, you’ve seen pictures lately of polar bears that appear way too skinny and hungry-looking, and you are wondering if there is any connection to this global warming phenomenon. Being curious, intelligent, and resourceful you decide to look into this issue yourself…

Click on [http://www.cbc.ca/story/news/?/news/2002/01/21/skinny_bears020121](http://www.cbc.ca/story/news/?/news/2002/01/21/skinny_bears020121) and find out the following:

- Where has Dr. Stirling been studying polar bears?
- On what huge body of water is Churchill located?
- What is one kind of animal polar bears eat? Why do polar bears have less time to feed on this animal?


Click on [http://www.ngo.grida.no/wwfap/polarbears/risk/climate.html](http://www.ngo.grida.no/wwfap/polarbears/risk/climate.html), the World Wildlife Fund website, and find out the following:
How do rising temperatures in the Arctic cause trouble for the polar bear?

How much has the average Arctic air temperature increased over the last 100 years?

How much has sea ice reduced since the 1970s?

What is the main cause of death for polar bear cubs in Hudson Bay?

Now go to http://www.nwf.org/polarbearsandglobalwarming/ and use a few point-form notes to explain how is global warming threatening the polar bear:

Try http://www.nwf.org/nationalwildlife/article.cfm?issueID=66&articleId=880 and find answers to these questions;

♥ What time of year does a mother polar bear emerge from her den?
♥ She will have fasted for eight months and lost about how many pounds during that time? What does “fast” mean in this context? (Ask someone, or use a dictionary to find out. Hint: it’s a verb.)

♥ What is the mother bear’s “primary’ prey (most important prey)?

♥ What is the problem if mom becomes too “lean” (skinny)?

♥ What is the polar bear’s scientific name, and what does it mean? (This information can be found in the fifth paragraph.)

You are becoming convinced that global warming is affecting the polar bears and the last thing you want to see is for them to become extinct (which is a possibility if things continue the way they are). What can you do about it, though? Well…

Global warming has natural causes, for example the release of methane gas from arctic tundra and wetlands. Methane is a greenhouse gas. A greenhouse gas is a gas that traps heat in the earth’s atmosphere. Another natural cause is that the earth goes through a cycle of climate change. This climate change usually lasts about 40,000 years. There is nothing we humans can do about these natural causes.

There are, however, human-made causes that we can do something about. Check in at http://library.thinkquest.org/J003411/causes.htm and jot down at least three good ways that you can help slow down the rate of global warming.
Teacher Response Sheet

Webquest: Polar bears on Ice
You are an investigative journalist working for a local radio station and you have heard about this thing called “global warming”. In fact, you’ve seen pictures lately of polar bears that appear way too skinny and hungry-looking, and you are wondering if there is any connection to this global warming phenomenon. Being curious, intelligent, and resourceful you decide to look into this issue yourself…

Click on http://www.cbc.ca/story/news/?/news/2002/01/21/skinny_bears020121 and find out the following:

➢ Where has Dr. Stirling been studying polar bears? (CHURCHHILL, MANITOBA)

➢ On what body of water is Churchill? (HUDSON BAY)

➢ What is one kind of animal polar bears eat? (SEALS) Why do polar bears have less time to feed on this animal? (Ice is breaking an average of two weeks earlier than in recent years, giving the bears less time to feed on seals.)

Head for http://www.canadiangeographic.ca/atlas/intro.aspx?lang=En, click on “explore the maps,” and see if you can locate Hudson Bay and Churchill, Manitoba.

Click on http://www.ngo.grida.no/wwfap/polarbears/risk/climate.html, the World Wildlife Fund website, and find out the following:

➢ How does rising temperatures in the Arctic cause trouble for the polar bear? (Ice melts, they have less time to hunt seals, which they do on ice)

➢ How much has the average Arctic air temperature increased over the last 100 years? (5°C)

➢ How much has sea ice reduced since the 1970s? (14%) 

➢ What is the main cause of death for polar bear cubs in Hudson bay? (In Hudson Bay, scientists have found the main cause of death for cubs to be either lack of food or lack of fat on nursing mothers.)

Now go to http://www.nwf.org/polarbearsandglobalwarming/ and use a few point-form notes to explain how global warming is threatening the polar bear:
• polar bears adapted for living and hunting on sea ice (primary food source: seals)
• global warming is melting the Arctic sea ice at an alarming rate (more than 23,000 square miles per year or nearly nine percent per decade!)
• unable to swim increasingly longer distances between land and receding sea ice
• ice forming later in the fall and breaking up sooner in the spring, the time period bears can forage for food shrinking every year
• only about 43% of the polar bear cubs in Beaufort Sea survive their first year as a result of shrinking ice habitat
• U.S. Fish and Wildlife Service recently proposed listing the polar bear as threatened under the Endangered Species Act

Try http://www.nwf.org/nationalwildlife/article.cfm?issueID=66&articleId=880 and find answers to these questions;

♥ What time of year does a mother polar bear emerge from her den? (MARCH)

♥ She will have fasted for eight months and lost about how many pounds during that time? (400 lbs) What does “fast” mean in this context? (Ask someone, or use a dictionary to find out. Hint: it’s a verb.) (TO ABSTAIN FROM ALL FOOD)

♥ What is the mother bear’s ‘primary’ prey (most important prey)? (RINGED SEALS)

♥ What is the problem if mom becomes too “lean” (skinny)? (she’ll stop producing milk and her cubs will die.)

♥ What is the polar bear’s scientific name, and what does it mean? (This information can be found in the fifth paragraph.) (Ursus maritimus, the "bear of the sea.")

You are becoming convinced that global warming is affecting the polar bears and the last thing you want to see is for them to become extinct (which is a possibility if things continue the way they are). **What can you do about it, though? Well…**

Global warming has natural causes, for example the release of methane gas from arctic tundra and wetlands. Methane is a greenhouse gas. A greenhouse gas is a gas that traps heat in the earth’s atmosphere. Another natural cause
is that the earth goes through a cycle of climate change. This climate change usually lasts about 40,000 years.) There is nothing we humans can do about these natural causes.

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