

**Lesson Plan** submitted by **Carolyn Sheild**  
**COSEE-West Online Workshop: Weather, Sea Level Rise and Climate Change**  
**Nov. 3 - Dec. 5, 2008**

**Title:** Climate Change Effects on Organisms and Ecosystems: You are the Experts!

**Grade level:** 7<sup>th</sup> (Life Science)

**Time needed:** Three 45 minute periods are needed for the multi-part lesson below. One or two prior class periods would be needed to explain the basic components of global warming/climate change.

**Relevant (Life Science) Massachusetts state standards:**

**Changes in Ecosystems Over Time Grades 6-8**

- Standard 17. Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans.

**Evolution and Biodiversity Grades 6-8**

- Standard 13. Relate the extinction of species to a mismatch of adaptation and the environment.

**Adaptations of Living Things Grades 3-5 (still appropriate for 7<sup>th</sup>)**

- Standard 7. Give examples of how changes in the environment (drought, cold) have caused some plants and animals to die or move to new locations (migration).

**Main concepts/Lesson plan objectives:**

- Students will examine different ecosystems and be able to explain how climate change can affect specific organisms living there.
- Students will become “experts” about their topic and present their findings to the class using a poster, “infomercial”, skit or song.
- Students will understand how organisms may need to adapt to changing climate, migrate, or risk extinction.

**Vocabulary:** climate change, ecosystem, adaptation, migration, extinction

**Background information:**

The impact of climate change on our planet is gaining more attention. While the rate of ice caps melting and the amount of sea level rise is still under debate, most scientists agree that warming atmospheric temperatures in recent years is a trend. While many people question, “How will all this impact me?”, it is also important to consider the impact of climate change on ecosystems and the organisms of our planet.

“Climate is an integral part of ecosystems and organisms have adapted to their regional climate over time. Climate change is a factor that has the potential to alter ecosystems and the many resources and services they provide to each other and to society. Human societies depend on ecosystems for the natural, cultural, spiritual, recreational and aesthetic resources they provide.” <http://www.epa.gov/climatechange/effects/eco.html> Since continued climate change is predicted, “adapting to or coping with climate change will [therefore] become necessary in certain regions and for certain environmental systems.”

<http://www.epa.gov/climatechange/effects/adaptation.html>

Part of my job as a teacher of life science is to raise students’ awareness about the world in which we live. This lesson will help students examine the effects of climate change on certain species and the areas where they live. From an increase in mosquitoes to a decrease in

polar bears, from a change in biodiversity to loss of wetlands, it is important to consider “how rising temperatures can affect the natural world and raise questions of how vulnerable populations will adapt to direct and indirect effects associated with climate change.”

<http://www.epa.gov/climatechange/effects/eco.html>

### **Materials:**

Computers

Poster board, paper, markers

Guiding worksheet and Rubric

### **Procedure:**

#### **DAY 1:**

1. As students enter the room, they will be presented with a card that has a keyword on it. These topics are:

-**Arctic** (polar bears)

-**Coral reefs**

-**Aquatic ecosystems** (cold water fish; algae)

-**Climate-sensitive diseases**-rise of infectious diseases spread by mosquitoes and other insects

-**Birds**-nesting and feeding habitats and migratory stopover areas

-**Coastal areas/wetlands**-sea level rise

-**Forests**

2. Students will find others with the same topic card and this will be their research/presentation group.

3. Students will research their topic at the computer using the “Guiding Worksheet” (included below) and write down facts pertaining to their ecosystem/ organism. Students will be instructed to begin with the web site, [www.epa.gov](http://www.epa.gov), and then go to [ask.com](http://ask.com) for further information. The web sites listed under the ‘References’ section may be given to students if they are having difficulty accessing information.

4. Upon completion of the worksheet, students will share information with their group and consider how to present their information using either a poster, “infomercial”, skit or song.

#### **DAY 2:**

5. Students will start or continue to work on their presentations, by constructing their poster or writing their scripts. Depending on time, some groups may present toward the end of Day 2.

#### **DAY3:**

6. Students will continue to present information to the class.

7. Upon completion of presentations, reflection questions will be discussed as a class:

a) What is the most interesting fact you learned?

b) Why is it important to understand the effects of climate change on ecosystems? (The answer to this question will have been stated at the beginning of Day 1)

**Assessment:** Students will be graded individually and as part of their group according to the rubric at the end of this document.

**Tips and hints for other teachers:**

It would be important to reserve a computer lab in advance for this lesson. You as a teacher should research some of the web sites below so you know what information they contain.

As cards are given out at the beginning of the activity, consideration may be given to the various difficulties of the topics for different students, such as those with special needs or advanced ability. For example, “arctic/polar bears” is an easier topic than “forests”. A possible extension/extra credit opportunity could include the affect of climate change on oceanic planktonic calcareous organisms such as forams and the implications on the marine food web.

This lesson would be presented in conjunction with a unit on climate change. Students would be introduced to greenhouse gases, the greenhouse effect, man’s influence on climate and the history of climate change and its effect on organisms, prior to this lesson. Some helpful videos to grab students’ attention are:

<http://www.youtube.com/watch?v=qp8-7Fw1NXM> (An Inconvenient Truth-trailer)

<http://www.youtube.com/watch?v=hgCJUFHVhfs> (Tony Blair, visuals and children address global warming)

Following this lesson, (and throughout) I would stress the individual responsibility we all have to help reduce greenhouse gases, and practical actions the students could take.

**References and sources of information:**

**Note:** These web sites are only a starting point; many other web sites could be accessed during this lesson. After investigating many sites, I determined these would be appropriate for middle school students.

<http://www.epa.gov/>

<http://www.epa.gov/climatechange/effects/eco.html>

[http://www.epa.gov/climatechange/effects/eco\\_animals.html](http://www.epa.gov/climatechange/effects/eco_animals.html)

[http://www.grida.no/climate/ipcc\\_tar/wg2/561.htm](http://www.grida.no/climate/ipcc_tar/wg2/561.htm)

<http://www.epa.gov/climatechange/effects/coastal/index.html>

<http://www.epa.gov/climatechange/effects/forests.html>

<http://www.epa.gov/climatechange/effects/health.html>

[http://yosemite.epa.gov/oar/globalwarming.nsf/uniqueKeyLookup/SHSU5BNNUT/\\$file/ccandbirds.pdf?OpenElement](http://yosemite.epa.gov/oar/globalwarming.nsf/uniqueKeyLookup/SHSU5BNNUT/$file/ccandbirds.pdf?OpenElement) (PDF flyer)

[http://yosemite.epa.gov/oar/globalwarming.nsf/uniqueKeyLookup/SHSU5BNNWD/\\$file/ccandcoldwaterfish.pdf?OpenElement](http://yosemite.epa.gov/oar/globalwarming.nsf/uniqueKeyLookup/SHSU5BNNWD/$file/ccandcoldwaterfish.pdf?OpenElement) (PDF flyer)

<http://www.epa.gov/climatechange/effects/polarregions.html>

[http://www.epa.gov/climatechange/effects/eco\\_coral.html](http://www.epa.gov/climatechange/effects/eco_coral.html)

<http://www.epa.gov/climatechange/effects/adaptation.html>

[http://www.srs.fs.usda.gov/pubs/ja/uncaptured/ja\\_stolte002.pdf](http://www.srs.fs.usda.gov/pubs/ja/uncaptured/ja_stolte002.pdf) (forests-p.1299 & 1300)

<http://www.timesonline.co.uk/article/0,,2087-1938132,00.html> (polar bears drown)

<http://www.gm.tv/index.cfm?articleid=12180> (polar bears pushed toward extinction)

[http://www.nasa.gov/centers/goddard/news/topstory/2006/forest\\_changes.html](http://www.nasa.gov/centers/goddard/news/topstory/2006/forest_changes.html) (how climate change affects forests)

[http://www.ucusa.org/global\\_warming/solutions/recognizing-forests-role-in-climate-change.html](http://www.ucusa.org/global_warming/solutions/recognizing-forests-role-in-climate-change.html)

<http://www.ipsnews.net/news.asp?idnews=35548> (Will forests adapt to a warmer world?)

<http://www.solcomhouse.com/coralreef.htm>

<http://www.marinebiology.org/coralbleaching.htm>

<http://www.nature.org/initiatives/climatechange/strategies/art21202.html> (biodiversity)

<http://www.sciencedaily.com/releases/2003/03/030326073630.htm> (migratory birds)

Aquatic Ecosystems and Global Climate Change by H.Poff, M.Brinson, J.Day, Pew  
Center on Global Climate Change, January 2002

<http://yosemite.epa.gov/OAR/globalwarming.nsf/content/ImpactsFisheries.html>

<http://www.pfel.noaa.gov/research/climatemarine/>

<http://www.e-greenguide.com/doc/91/landrigan> (climate change and infectious disease)

Your Name \_\_\_\_\_ Partner(s) \_\_\_\_\_  
Date \_\_\_\_\_ Class \_\_\_\_\_

Guiding Worksheet: **Climate Change Effects on Organisms and Ecosystems:**  
**You are the Experts!** (to go with Carolyn Sheild's lesson)

**List your topic here:** \_\_\_\_\_

1. Do some background research on your topic to familiarize yourself with how climate change is currently impacting your species/ecosystem. Write notes below:

2. Consider the future of your species/ecosystem. What do you think could happen? Do the organisms you are researching have a specific climate tolerance? Will they need to adapt or migrate? May they face extinction? What elements of climate change could lead to species demise?

**EXTRA CHALLENGE:** How will changes in your ecosystem/organism affect other ecosystems/organisms on the planet? (including humans)

3. Write any additional interesting information about your topic below:

**Sources (list web sites)**

\_\_\_\_\_  
\_\_\_\_\_

**Climate Change Effects on Organisms and Ecosystems Rubric** (to go with Carolyn Sheild's lesson)

**Group Topic:** \_\_\_\_\_ **Names** \_\_\_\_\_

	<b>Possible score</b>	<b>Your score</b>
Worksheet filled in.....	5	
Presentation content accuracy, organization and creativity.....	10	
Presentation delivery (eye contact, loud voice, etc.).....	5	
Completeness of information (addressed questions on ws).....	5	
Individual effort (research).....	2	
Group cooperation (working on presentation).....	3	
<b>TOTAL:</b>	<b>30</b>	

Since each student will be graded individually for their worksheet, presentation delivery, and individual effort, grades within the group could vary. This puts responsibility on each student as well as the group working as a whole. Thirty points equals a quiz grade in my course.