# CASE TEACHING NOTES
# for
# "The Petition: A Global Warming Case Study"

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## INTRODUCTION / BACKGROUND

This case is complex, important, and timely. It can be used in a variety of courses such as biology, geology, chemistry, physics, meteorology, economics, political science, and ethics.

The way the case plays out will depend upon which course is involved, the resources and reading provided, and the classroom time devoted to it. We have used it twice, once in a general biology class of 20 students working in cooperative learning teams of five members with one instructor. On a second occasion it was used in a faculty development workshop with 200 people. There, 16 faculty facilitators trained in problem-based learning ran 70-minute sessions with a dozen faculty in each team. This was preceded and followed by 30 minutes of introduction and closure. The faculty ranged the entire spectrum of academic disciplines. Below is a partial list of objectives they identified for the case.

### Objectives

After completing this case, students should have an increased understanding of the following:

- the greenhouse effect;
- global warming and its possible causes;
- how temperature and $CO_2$ changes can be estimated;
- what controls weather patterns;
- geochemical cycles;
- how to read graphs and interpret data;
- how humans may impact the earth's environment;
- the politics and economics of scientific issues;
- how and why experts may differ; and
- faculty responsibility in dealing with ethical and political issues.

## BLOCKS OF ANALYSIS

There are many issues embedded in the case, but perhaps the most important to examine early on is what people mean when they use the phrase "global warming". Below are additional big questions raised by the case, for which we have sketched responses in the answer key.

1. What is the evidence that global warming is occurring?
2. What is the evidence that humans are the cause of global warming?
3. What are the consequences of global warming?
4. Can we do anything about global warming?
5. Should the United States sign the Kyoto agreement?

### Answer Key

Answers to the questions posed in the case study are provided in a separate answer key to the case. Those answers are password-protected. To access the answers for this case, go to the key. You will be prompted for a username and password. If you have not yet registered with us, you can see whether you are eligible for an account by reviewing our password policy and then apply online or write to answerkey@sciencecases.org.

## RUNNING THE CASE

If this case is run as a general discussion, students should prepare by researching answers to the study questions that appear at the end of the case. Alternately, graphs and tables can be given to the student as appendices to the case (see below).

The case is best considered by teams of students working in the problem-based learning tradition over several days. Although the case is not written in three parts, students can consider the case in distinct steps. For instance, first, they might deal with the evidence and causes of global warming. Second, they might deal with its possible consequences. Third, they might consider whether we can do anything about it. At each step they must decide what they need to find out in order to answer the questions, then do the research. A way of closing the topic is to have a wrap-up discussion where the students are asked, "Would you sign the petition to stop the United States from signing the treaty?"

## REFERENCES

### Print


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- Wildavsky, A.B. 1995. "Who's on First? A Global Warming Scorecard" in *But Is It True? A Citizens Guide to Environmental Health and Safety Issues.* Harvard Univ. Press. Cambridge, MA. pp 340–374.


## Internet—Graphs and Tables


- Table: Human Activities That May Cause Global Warming
  http://ublib.buffalo.edu/libraries/projects/cases/picture1.html
- Graph: Temperature / Carbon Dioxide Concentration Change From 1950–1979
  http://ublib.buffalo.edu/libraries/projects/cases/picture2.html
- Graph: Temperature / Carbon Dioxide Concentration Change From Present
  http://ublib.buffalo.edu/libraries/projects/cases/picture3.html
- Slides—EPA Climate Change and Impacts
  http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPresentations.html
- Figure: Temperature Trends Over 20 Millions Years
  http://greenwood.cr.usgs.gov/pub/fact-sheets/fs-0071-97/figure_1.gif
- Tree Ring Data
  http://more.abcnews.go.com/sections/science/dailynews/warm980422.html
- Graph: Total U.S. Greenhouse Gas Emissions by Gas: 1995 (MMTCE)
  http://www.epa.gov/globalwarming/presentations/emissions/stock/total_us.pdf
- Map of U.S.: Change in Regional Crop Production in 2060 with $5^{o}$ F Warming; 7% Increase in Precipitation; 530 ppmv $CO_2$
  http://www.epa.gov/globalwarming/presentations/impacts/stock/ag_prod.pdf
- Figure: The Greenhouse Effect
  http://geochange.er.usgs.gov/pub/carbon/fs97137/grnmhse85.jpg
- Graph: U.S. Costal Lands at Risk from a 20-inch Sea Level Rise in 2010
  http://www.epa.gov/globalwarming/presentations/impacts/stock/coastal_risk.pdf

- Graph: U.S. Carbon Dioxide Emissions from Fossil Fuel Combustion: 1995
  http://www.epa.gov/globalwarming/presentations/emissions/stock/co2_fossil.pdf
- Graph: Historical and Projected Future $CO_2$Concentrations
  http://www.epa.gov/globalwarming/presentations/science/stock/co2_conc.pdf
- Graph: Atmospheric $CO_2$ Concentration in Parts per million by volume, ppm at Mauna Loa, Hawaii
  http://www.oism.org/pproject/s33p36.htm

## Internet—Additional Information

- Global Warming Petition Project
  http://www.oism.org/pproject/
- Final Version of the Kyoto Protocol
  http://unfccc.int/resource/protintr.html
- "A Small Price to Pay: U.S. Action to Curb Global Warming is Feasible and Affordable" Union of Concerned Scientists and Tellus Institute, July 1998
  http://www.ucsusa.org/documents/smallprice.pdf

**Revised:** 09/06/02 nas

Originally published at http://www.sciencecases.org/petition/petition_notes.asp