



No Fair! The Inequities of Climate Change

By Kate Drake and Kelsey Poole for Earth Day Network

Introduction: This lesson plan introduces students to the issues of equity surrounding climate change. Students will explore the differences between developed and developing countries and learn how climate change affects these parts of the world differently.

Grade Level & Subject: Grades 9-12. Earth Science, Environmental Science, Civics, Government, Social Studies, Economics, and Geography.

Length: Two class periods

Objectives:

- Examine developed and developing nations and their historic contributions to climate change.
- Learn how these areas will experience the effects of climate change.

Assessment: Students will be evaluated on participation in class activities, two written assignments, and a worksheet to be handed in as homework.

Standards:

- NS.9-12.1 Science as Inquiry
- NS.9-12.3 Life Science
- NS.9-12.6 Personal and Social Perspectives
- NSS-C.9-12.4 Other Nations and World Affairs
- NSS-EC.9-12.1 Scarcity
- NSS-EC.9-12.3 Allocation of Goods and Services
- NSS-EC.9-12.16 Role of Government
- NSS-GK.9-12.2 Places and Regions
- NSS-G.K-12.4 Human Systems
- NSS-G.K-12.5 Environment and Society¹

Materials:

- Computers with internet access.
- Two blank world maps per student, available online at <http://english.freemap.jp/world/img/4/1.pdf>.
- Materials to make name tags.

Warm-up: Climate Change and Global Inequalities

To begin the lesson, introduce students to the concept of climate change. Climate change is a phenomenon resulting from a change in global weather patterns over time.

¹ Education World (2008). *U.S. National Education Standards*. Retrieved March 3, 2008, from <http://www.educationworld.com/standards/national>.

One of the main attributors to this change is the greenhouse effect, a heat-trapping function of our atmosphere that in normal circumstances allows us to survive on the planet. In this process, greenhouse gases in the atmosphere, such as carbon dioxide and methane, trap the sun's heat and help the Earth maintain a habitable temperature and climate. However, human activity, mainly from the burning of fossil fuels, has created much higher concentrations of carbon dioxide, methane, and other greenhouse gases in the atmosphere. As a result, the average temperature of the Earth has been slowly rising over time, melting glaciers, rising sea levels and altering climate patterns across the globe. According to the EPA, the Earth's average surface temperature has increased about 1.2 to 1.4° F in the last 100 years, and eleven of the last twelve years rank in the twelve warmest years on record.² While climate change is a worldwide problem, the blame for this problem is not equal among all nations, and effects will be felt greater in some nations over others.

Now, introduce the idea of global inequality by discussing what it means to be “developing,” including economic status, population size, GDP growth rate, and socioeconomic indicators such as life expectancy and education.³ Make two columns on the board for developed and developing countries (selected examples of nations in each category can be found below). Note how there are more developed than developing countries. Next, ask students to name major sources of carbon emissions for each column, taking into account the scale of use for these sources. An example column can be found below. To further emphasize the point, discuss carbon emissions from a historical perspective, using the information provided in the next section.⁴

Some Developed Nations: Australia, Canada, Denmark, Faroe Islands, France, Germany, Iceland, Israel, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.⁵

Some Developing Nations: Algeria, Argentina, Bangladesh, Bolivia, Brazil, China, Democratic Republic of Congo, Djibouti, Egypt, Guyana, Haiti, India, Indonesia, Iran, Lebanon, Liberia, Madagascar, Maldives, Morocco, Nicaragua, Niger, Pakistan, Peru, Rwanda, Senegal, Sudan, Uganda, Tuvalu, and Vanuatu.⁶

Carbon emission factors to consider: Number of cars per family; average size of home; number of homes; number of luxury goods: clothes, electronics; means of food production; distance food travels; sources of energy such as renewable, oil, natural gas, or coal; level of production of goods; heating and air conditioning use; water use (baths, hot tubs, washing cars); use and exploitation of natural resources, like: hardwood forests,

² U.S. Environmental Protection Agency (Jan. 2008). *Climate Change: Basic Information*. Retrieved March 3, 2008, from <http://www.epa.gov/climatechange/basicinfo.html>.

³ For more information, see the UN's Human Development Index at <http://hdr.undp.org/en/statistics>.

⁴ For more information, see World Resources Institute's "Contributions to Global Warming" Map, <http://earthtrends.wri.org/text/climate-atmosphere/map-488.html>.

⁵ U.S. Central Intelligence Agency World Factbook (Feb. 2008). *Appendix B- International Organizations and Groups*. Retrieved March 3, 2008, from <https://www.cia.gov/library/publications/the-world-factbook/appendix/appendix-b.html>.

⁶ Ibid.

minerals, petroleum, etc. Also, where are the resources exploited and for whom?

Inequity:

According to a World Resources Institution report, the causes and effects of climate change are disproportionate. It asserts that over 60% of current global carbon emissions come from the industrialized world. It also states that these nations account for about 80% of total carbon accumulated in the atmosphere since the Industrial Revolution. While greenhouse gas emissions from developing nations are often due to using old technologies to meet basic human needs in a growing population, industry in the developed world fuels a higher standard of living, where people are consuming resources and burning fossil fuels at higher amounts than is necessary.⁷

While this information shows that it is the developed nations that are exacerbating climate change, it is the developing nations that will bear the brunt of the consequences. Studies show that as climate zones shift and extreme weather events increase, consequences in these countries are likely to include: dwindling food supplies as a result of drought or floods, and increased diseases, which spread because of warmer air. Additionally, small island nations and low-lying coastal nations are at risk of disappearing due to rising sea levels. While developing nations are more likely to experience negative consequences of climate change, they also have less economic capability to cope with changes.⁸

On the other hand, developed nations have more resources to cope with and adapt to climate change, and some countries may even experience some benefits from the phenomena. Canada and Iceland, for example, are likely to experience greater crop yield as the temperature rises and the growing season expands. The UN's Human Development Report for 2007-2008 states that shifting climate zones will increase agricultural production in industrialized countries, but will severely decrease them in the rest of the world.⁹

To further illustrate the inequities of climate change, examine the UN Intergovernmental Panel on Climate Change (IPCC) report, "Climate Change: Impacts, Adaptation, and Vulnerability."¹⁰ (This can be assigned to students to read as homework.) This report examines each region of the Earth and determines the area's ability to cope with climate change and its level of risk. For example, the continent of Africa is listed as having low adaptive capacity due to a lack of economic resources and high vulnerability because of a "heavy reliance on rain-fed agriculture, frequent droughts and floods, and poverty."¹¹ Possible effects for an area such as Africa can include

⁷ World Resources Institute (n.d.). *Climate change and developing countries*. Retrieved March 3, 2008, from http://archive.wri.org/item_detail.cfm?id=1284§ion=climate&page=project_content_text&z=?..

⁸ Fields, S. (Aug. 2005) Continental Divide: Why Africa's Climate Change Burden Is Greater. *Environmental Health Perspectives*, 113. Retrieved March 3, 2008, from <http://www.ehponline.org/members/2005/113-8/spheres.html>.

⁹ United Nations Development Programme (2008). *Human Development Report 2007/2008*. Retrieved March 3, 2008, from http://hdr.undp.org/en/media/hdr_20072008_summary_english.pdf, 18.

¹⁰ Intergovernmental Panel on Climate Change (2001). *Climate Change 2001: Impacts, Adaptation and Vulnerability: Summary for Policymakers*. Retrieved March 3, 2008, from <http://www.ipcc.ch/pdf/climate-changes-2001/impact-adaptation-vulnerability/impact-spm-en.pdf>.

¹¹ Ibid.

decreasing grain yields, decreasing runoff and water availability, increased desertification, extinction of plant and animal species, and added stresses on human health and societies. North America, on the other hand, is listed as having high adaptive capacity and low vulnerability. Effects that North America can expect include initial benefits to crops from modest warming and increased CO₂; an earlier spring; reduced lake and river levels; enhanced coastal erosion; and health problems associated with decreased air quality and the spread of vector-borne diseases, like malaria and Lyme disease.¹² Information on other regions can be found on pages 14-17 of the IPCC report by clicking [here](#).

Class One

Activity One: Uneven Contributions

Step 1: Provide each student with:

- Two blank maps of the world
- **List of these countries:** Australia, Canada, France, Germany, Greece, Israel, Japan, Norway, South Africa, Spain, Sweden, Switzerland, United States, Argentina, Bangladesh, Brazil, China, Democratic Republic of Congo, Egypt, India, Indonesia, Iran, Madagascar, Maldives, Niger, Peru, Senegal.

Step 2: Have them color selected countries by their rate of carbon emissions per capita of metric tons. They can use the following website to get started:

http://en.wikipedia.org/wiki/List_of_countries_by_carbon_dioxide_emissions_per_capita

Have students color yellow the countries that emit 0-4.9 metric tons of CO₂ per capita (group 1). Then, have them color orange the countries that emit 5-9.9 metric tons per capita (group 2). Finally, have them color red the countries that emit over 10 metric tons per capita (group 3).

The students' maps should correlate with the following chart:

Developed nations			Developing nations		
Country	CO2 Emissions (metric tons/capita)	Group	Country	CO2 Emissions (metric tons/capita)	Group
Australia	16.3	3	Argentina	3.7	1
Canada	20	3	Bangladesh	0.25	1
France	6.2	2	Brazil	1.8	1
Faroe Islands	13.8	3	China	3.84	1
Germany	9.79	2	DRC	0.04	1
Greece	8.73	2	Egypt	2.21	1
Israel	10.8	3	India	1.2	1
Japan	9.84	2	Indonesia	1.69	1
Norway	19.01	3	Iran	6.31	2
S. Africa	9.2	2	Madagascar	0.15	1

¹² Ibid.

Spain	7.72	2	Maldives	2.5	1
Sweden	5.89	2	Niger	0.1	1
Switzerland	5.47	2	Peru	1.17	1
United States	20.4	3	Senegal	.44	1

Step 3: On the second map, students should rank the same countries based on the predicted impacts of climate change. Low-risk countries are those that will be mostly unaffected or can absorb the costs of climate change. Medium-risk countries will be more affected and have less financial resources available. High-risk countries will be greatly affected by the effects of climate change, but will not have the resources needed to adapt.

When filling in their map, students should keep in mind geographic location, such as coastal and low-lying areas which are at risk from rising sea-levels, areas that might be more susceptible to extreme weather conditions, and economic ability to cope with a changing climate. Students can utilize online resources to help them fill in their maps. The IPCC website listed above and the following link from the UN Human Development Report will help them get started:

http://hdr.undp.org/en/media/hdr_20072008_summary_english.pdf.

Step 4: To demonstrate comprehension of the material, have each student compare the two maps, noting the nations that contribute the most to climate change and those that will be most affected. Have them select three of the illustrated countries on their map and discuss the potential consequences of climate change for each, as well as the ways in which that country has contributed to climate change. Note, each country they select should be from a different region.

Activity Two: Impacts of Climate Change

Step 1: Assign each student a developed or developing country. Next, have students research the country's economy and government, in addition to their history with environmental legislation. A sample worksheet outlining the necessary information they should have is provided after Activity Three.

Step 2: Now, each student should hold a sign or wear a nametag so the other students know who represents what country. Establish one side of the room as the "agree" side and the other side as the "disagree" side. Next, designate a starting line in the middle of the room. Then, tell the students you are going to read them statements, and that they should react on behalf of their country by going to either the "agree" side of the room or the "disagree" side of the room. For example, a student would take one step forward towards the "agree" side of the room, thus students should end up in various positions. Some ideas for statements are below:

- I can afford to buy renewable energy.
- Climate change will strongly impact my way of life.
- I am opposed to the Kyoto Protocol.
- I am more concerned with feeding my family than preserving endangered species.
- I am able to obtain medicine if I get a disease.

- Many of my carbon emissions come from the production and use of luxury goods, such as my computer, mp3 player, television, and car.
- Climate change will threaten my food security.
- My nation's government is able to provide emergency aid in the event of a natural disaster.

Step 3: After each statement, discuss the countries found on either side of the classroom and the level of agreement. For instance, countries who are seriously impacted by climate change are oftentimes not the countries who can afford to buy medicine or respond to a natural disaster.

Homework assignment: Tell students they will use the following class period for a climate change treaty negotiation. Have them study the country they were assigned in Activity Two, prepare a written statement concerning their wishes for the treaty, and also research their country's current stance on the Kyoto Protocol. You can grade them on their written statement as well as their participation in the treaty negotiation.

Class Two

Activity Three:

Have students participate in an informal climate change treaty negotiation. From the perspective of their country from Activity Two, they should make an opening statement explaining their country's wishes for the conference and use the remaining time to discuss and negotiate what they would support or not support in such a treaty. Make sure they acknowledge the feasibility of their proposed treaty. The teacher should manage the debate and push for negotiation.

Homework assignment: Each student discuss their thoughts on the debate and bring to class a written statement reflecting these thoughts. Some questions that should be answered include:

1. Do they think the negotiated treaty would be effective to address climate change?
2. Was the treaty fair to all countries involved?
3. Was there anything that made you examine climate change from a different perspective?
4. How does their experience in treaty-making relate to what is really happening with climate change negotiations? Were the final decisions controversial?

Assessment: Students will be assessed on their overall participation in discussions and activities, including performance on the worksheet from Activity Two, the prepared statement for the class treaty negotiation, and the written assignment from Activity Three.

Conclusion: At the end of this lesson, students should demonstrate an understanding of the gap between developing and developed countries, particularly in relation to the impacts associated with climate change. They should also be more aware of the Kyoto Protocol and the often difficult implementation of climate change treaties.

For more information on climate change and equity, see "Climate Change and Developing-Country Cities: Implications for Environmental Health and Equity" in the

Journal of Urban Health, online at
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1891643>.

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Worksheet for Activity Two:

Name _____

Date _____

Impacts of Climate Change

You will be assigned a country to research. Use the information you find to answer the questions below.

1. My country is _____.

3. Is your country (circle one): Developed Developing

2. What type of government does your country have? Who are the leaders? How is legislation passed?

3. Is your nation's economy growing, decreasing, or stagnating? Why? (Hint: Look at the GDP and the GDP growth rate).

4. What are the main sources of carbon emissions for your country?

5. What is your country's history of environmental legislation? Does it have any? Has your country voted for or against any international legislation, such as the Kyoto Protocol?

6. How will your country be impacted by climate change? Is it equipped to cope with these effects? _____
