



Investigating the Social and Environmental Impacts of Global Climate Change for College Undergraduates

NS 696 V: Weather and Climate for Educators

Materials Required:

- Access to a computer with Microsoft Excel and internet connection for 11 groups of approximately 2 to 4 students
- Temperature dataset for 12 locations provided by CMMAP & Little Shop of Physics available at <http://bioday.atmos.colostate.edu/abharper/CMMAP/>

Background Information:

Before conducting this lesson, students will have an understanding of how the climate system works, the anthropogenic causes of climate change, and evidence of anthropogenic climate change. Students will have completed readings that provide a general overview of projected social and environmental climate change impacts.

Objective:

Students will learn about the differentiation in climate change impacts in various parts of the world – in terms of both the natural and social environment. Students will gain an appreciation for the complexity of environmental and social climate change impacts globally. Human adaptive capacity, or the ability to adapt to climate change, will be discussed as well as the differences in adaptive capacity between social groups within and between countries.

Theory:

Global climate change entails variations in natural and human impacts. It is expected that different climate regions will respond to climate change in different ways. This variation in climate impacts interacts with the existing interdependence between the social world and natural world. For instance in Northern temperate climates where growing seasons are expected to lengthen, agricultural productivity may increase. But it is expected that new pests and plant diseases may also be introduced. Alternately, in dry climates that are expected to become drier, climate change will jeopardize use of once productive lands. Warmer temperatures in mountainous regions are expected to melt glaciers producing scarcity in areas where people depend on regular glacial melt for irrigation. And just as the impacts of climate change will vary by region,

human impacts of climate change vary among nations, groups, and individuals. The ability to adapt to these impacts is based on social, cultural, political, environmental and economic factors.

Lesson Structure:

Engage

Prior to this lesson, students will have completed a short reading that presents an overview of climate change impacts.

Explore

In this lesson, students will interact with climate data, calculate future climate trends, compare their findings with IPCC projection, and research social impacts of climate change. Breaking up into 11 groups, each group will examine temperature trends for one of the 5 U.S. and 6 international sites provided in the temperature dataset from 1943 to present. (The dataset from Antarctica will not be used because of low level of human inhabitants). This will highlight the variation in climate change by region that has already been seen. Projection of future climate trends will be made using trend lines calculated in Excel. Each group will compare their results with IPCC projections from the AR4 Synthesis Report¹ and Working Group II's contribution "Climate Change 2007: Impacts, Adaptation and Vulnerability"².

Students will then use their projected changes to the climate to examine potential social impacts. The CIA World Fact Book website³ will be used to gather information about the social and economic environment of international locations. The U.S. Census "State and County Quick Facts" website⁴ and the "Economic Fact Sheet"⁵ will be used for U.S. locations.

¹ http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

² http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm

³ <https://www.cia.gov/library/publications/the-world-factbook/index.html>

⁴ <http://quickfacts.census.gov/qfd/index.html>

⁵ http://factfinder.census.gov/servlet/SAFFEconFacts?_event=&geo_id=01000US&geoContext=01000US&street=&county=&cityTown=&state=&zip=&lang=en&sse=on&ActiveGeoDiv=&useEV=&pctxt=bg&pgsl=010&submenuId=busin_ess_1&ds_name=&ci_nbr=&qtr_name=®=%3A&keyword=&industry=

Explain

Students will communicate what they have learned by first discussing within their group the potential human impacts based on their calculated future climate trends and knowledge of the social and economic character of the location. Each group will then report its findings to the class.

Elaborate

Students will choose one geographic location (a state, city or small country), research the expected environmental changes (focusing, but not limited to changes in the climate), and potential social impacts. Students will complete a one page report summarizing their findings.

Evaluate

The student's understanding of the complex nature of environmental and social impacts of climate change, and their ability to navigate existing data sources, will be evaluated during both the groups verbal reporting to the class and the individual one-page report on the location of their choice.

Lesson generated by Anna Kern