

# Climate Change and Vulnerable Populations

## Rationale

This module is designed to enhance students' ability to analyze the social impacts of the greenhouse effect and global warming, especially on vulnerable populations of the world.

This module accepts global climate change and related natural catastrophes as measurable scientific phenomenon. The module also accepts the uncertainty expressed by the scientific community of the degree to which human activity is contributing to the global warming processes. Through a research activity and a group roundtable discussion, students will improve their ability to understand and respectfully express disparate viewpoints.

## Materials

Latin America Data Base (LADB) Article, Vocabulary, Comprehension Questions, Research Activity, Group Class Activity: Roundtable Discussion

## Article Summary

### ***Flooding in Southeast Mexico Reinforces Warnings about Climate (October 19, 2011)***

New government report details impact of climate change on Mexico, as severe flooding hits Tabasco and other southern states.

## Activity

To introduce this material to the students, begin by soliciting students' prior knowledge about the social impacts of climate change. Assign the students to read the LADB article and complete the comprehension questions for homework.

Encourage students to work in pairs or small groups to discuss the article and the comprehension questions.

Students may work on the research activity during class time or be assigned the activity as a second night of homework. After reading the research material, groups of 2 -4 students will decide how their group will represent each role and interact with other roles at the roundtable discussion.

While this module focuses of the social impacts of global climate change, students' understanding of environmental causes and effects is important as well. If feasible, you may collaborate with the students' earth science curriculum, classroom, and/or teacher in order to more fully develop students' understanding of the scientific processes which contribute to global warming.

## Flooding in Southeast Mexico Reinforces Warnings about Climate Change

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By: Carlos Navarro

Mexico is no stranger to hurricanes, floods, and other natural disasters, but a recent government report suggests that problems have worsened in recent years because of the impact of climate change. The report, published by the government's statistics agency (Instituto Nacional de Estadística y Geografía, INEGI) on Oct. 11, was released to coincide with the UN-sponsored International Day for Disaster Reduction on Oct. 13. Almost as if to confirm the report, heavy rains caused severe flooding throughout southeastern Mexico and into Central America a week after INEGI released its findings. In Mexico, the floods were especially severe in Tabasco state, although serious problems were also reported in nearby states.

Mexico has seen the effects of climate change in various forms, from increased flooding and intense hurricanes to drought and even atypical cold temperatures in some parts of the country. Dry conditions resulted in record forest fires the last two years ([SourceMex, April 28, 2010](#) and [April 27, 2011](#)). The dry conditions have also threatened agricultural production, leading some experts to predict a decline in output in coming years ([SourceMex, Aug. 11, 2010](#)).

### Government report links recent severe storms with warmer ocean temperatures

The recent INEGI report emphasized the effects of climate change on the intensity of storms in Mexico. The agency said warming ocean temperatures probably contributed to the higher intensity of several storms that hit Mexico in the past two decades. The report said the first of these highly damaging storms occurred in 1998, when Hurricane Gilbert caused the Santa Catarina River in Nuevo León state to overflow its banks, killing 202 people and causing US\$10 billion in damage. Similarly devastating effects occurred from Hurricane Ismael in Sinaloa state in 1995 and Hurricanes Wilma and Stan in southern Mexico in 2005 ([SourceMex, Nov. 9, 2005](#)).

INEGI said the most devastating flooding in recent years occurred in 2007 in Tabasco state and adjacent areas of Chiapas, when heavy rain caused the Peñitas reservoir to overflow, overwhelming the Grijalva, Usumacinta, Carrizal, and Mazcalapa rivers. While the problem was blamed in part on outdated infrastructure, the rain that caused the floods was unprecedented ([SourceMex, Nov. 7, 2007](#)).

Federal and state authorities have taken steps to improve flood protection in Tabasco, but the state remains susceptible to severe flooding. This was the case again this year, when 16 of 17 municipalities were flooded by water overflowing various rivers around the state in mid-October. The only municipality not affected was Centro, site of the capital city of Villahermosa.

"For a fifth consecutive year, nature is collecting its debt," said Gov. Andrés Granier Melo, who requested help from the federal government. Granier said Tabasco needs authorities in Mexico City to send funds for the state to secure pumps and rescue vessels and also to issue emergency and disaster declarations so that citizens and businesses can receive direct assistance. Nearly 115,000 Tabasco residents suffered some loss because of the floods.

Flooding was also a problem in nearby Quintana Roo, Chiapas, and Campeche states, and local authorities are also expected to seek assistance from the Fondo de Desastres Naturales (FONDEN).

The heavy rain extended into Central America, causing severe problems in El Salvador, Guatemala, and Nicaragua. The storms resulted in the death of dozens of people and the displacement of tens of thousands in the region.

During October, Mexico was also affected by a second storm system that hit the Pacific states of Jalisco, Colima, and Nayarit. Hurricane Jova generated heavy rain, which caused flooding and landslides in parts of the region. As a precaution, authorities evacuated a vulnerable community in the city of Manzanillo in Colima state. The storm, which was a Category 2 hurricane upon landfall, resulted in five deaths in western Mexico.

Some meteorologists said climate factors contributed to strengthening Jova, which was described as a dangerous hurricane as it approached land. "Jova is now approaching a region where these warm waters extend to great depth, which should allow the storm to maintain major hurricane strength until landfall," said an advisory by Dr. Jeff Masters in [weatherunderground.com](http://weatherunderground.com).

### **Mexico cites need for joint international efforts**

Mexican authorities, from Mexico City Mayor Marcelo Ebrard to President Felipe Calderón, have sounded the alarm on climate change and have taken steps to reduce greenhouse emissions and promote alternative energy (SourceMex, Nov. 17, 2010 and Aug. 10, 2011). The federal government has launched a long-term water-conservation effort that also seeks to address the impact of climate change (SourceMex, March 30, 2011).

Still, Mexico believes that it cannot take the necessary steps to reduce the effects of climate change in Mexico without financial and technological assistance from the international community. "World politicians must not forget that funds are needed to promote sustainable management of forests," Environment Secretary Juan Rafael Elvira Quesada said during a tour of Oaxaca state in October. "By restoring the forests, we can address climate change in a cheap and efficient manner and at the same time provide great benefits to society."

The environment secretary said weather changes were manifested in a variety of forms in Mexico, from flooding in the south to unprecedented freezes in the center of the country to prolonged droughts in the north. But he also pointed out that problems associated with climate change transcend borders. "At one time, climate change was a phenomenon that primarily affected tropical countries," said Elvira. "We are now seeing very dangerous hurricanes affecting Mexico, the US, and Canada."

Agriculture Secretary Francisco Mayorga, in a separate forum in October, also raised concerns about climate-change impact on Mexico's food production. The secretary acknowledged that climate factors are affecting Mexico's productivity and its ability to compete on world markets. While Mexico can do little to prevent damage from a change in the climate, Mayorga said the administration and the Congress have developed a mechanism to assist the agriculture, livestock, and fisheries industries in dealing with the impact of weather-related problems. For example, he noted that the Congress approved 1 billion pesos (US\$74 million) for the insurance program Componente de Atención a Desastres Naturales (CADENA). This year, more than 8.1 million hectares of cropland were insured in 30 states under the program. Additionally, 4,227 heads of livestock were brought into the insurance program in 18 states. [Peso-dollar conversions in this article are based on the Interbank rate in effect on Oct. 19, 2011, reported at 13.46 pesos per US\$1.00.]

## Comprehension Questions

Support your answers with passages from the article.

1. Why did INEGI, Mexico's statistic agency, choose to release their report about the increasing intensity of storms and frequency of flooding on October 13, 2011?
2. What actions has the Mexican government undertaken to address global climate change?
3. What particular ways does global climate change affect Mexico according to Environment Secretary Juan Rafael Elvira Quesada?

## Research Activity

Divide the class into 3 groups. After the entire class reviews the information found below about the "United States and Greenhouse Gas Contribution," each group will then follow the links provided below to investigate their respective topics. Group 1 will research Global Climate Change and Public Health; Group 2 will research Global Climate Change, Agriculture, and the Food Supply; and Group 3 will research Global Climate Change and New Mexico. Each student must familiarize themselves with the below material and may find additional materials if interested.

Every group will look at *United States and Greenhouse Gas Contribution* at [http://en.wikipedia.org/wiki/List\\_of\\_countries\\_by\\_greenhouse\\_gas\\_emissions\\_per\\_capita](http://en.wikipedia.org/wiki/List_of_countries_by_greenhouse_gas_emissions_per_capita)

### **1. Global Climate Change and Public Health**

(World Health Organization)

<http://www.who.int/bulletin/volumes/85/3/06-039503/en/>

### **2. Global Climate Change, Agriculture, and the Food Supply**

(Environmental Protection Agency)

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

(United States Department of Agriculture)

<http://www.ers.usda.gov/publications/aib765/aib765-8.pdf>

### **3. Global Climate Change and New Mexico**

New Mexico Advisory Board

[http://www.nmenv.state.nm.us/aqb/cc/Potential\\_Effects\\_Climate\\_Change\\_NM.pdf](http://www.nmenv.state.nm.us/aqb/cc/Potential_Effects_Climate_Change_NM.pdf)

Students are encouraged to research these topics individually and then come together into the small groups distinguished above to share and discuss their findings.

## Group Class Activity: Roundtable Discussion

“Mexico believes that it cannot take the necessary steps to reduce the effects of climate change in Mexico without financial and technological assistance from the international community. ‘World politicians must not forget that funds are needed to promote sustainable management of forests,’ Environment Secretary Juan Rafael Elvira Quesada said during a tour of Oaxaca state in October. ‘By restoring the forests, we can address climate change in a cheap and efficient manner and at the same time provide great benefits to society.’”

After reading the research material, groups of 2 -4 students will decide how their group will represent each role and interact with other roles at a roundtable discussion focused on the above passage. The students’ roles can either be assigned randomly through a hat drawing, or chosen by the students. The roles can include:

- Mexican officials working for Environmental Secretary Juan Rafael Elvira Quesada
- Mexican farmers affected by flooding
- Representatives of an environmental NGO in the United States
- Representatives of an environmental NGO in New Mexico
- Government officials in the United States Environmental Protection Agency’s Climate Research council

At the roundtable each group representing the above roles will discuss why they support or do not support financial and technological assistance to the maintenance of Mexican forestland.

## Standards

### National Council of Social Studies <http://www.ncss.org/>

- People Places and Environment**  
The study of people, places, and environments enables us to understand the relationship between human populations and the physical world. During their studies, learners develop an understanding of spatial perspectives, and examine changes in the relationship between peoples, places, and environments.
- Science, Technology, and Society**  
Science, and its practical application, technology, have had a major influence on social and cultural change, and on the ways people interact with the world. There are many questions about the role that science and technology play in our lives and in our cultures.
- Global Connections**  
What is needed for life to thrive on an ever changing and increasingly interdependent planet? Analyses of the costs and benefits of increased global connections, and evaluations of the tensions between national interests and global priorities, contribute to the development of possible solutions to persistent and emerging global issues.
- Civic Ideals and Practices**  
What is the balance between rights and responsibilities? What is civic participation? How do citizens become involved? What is the role of the citizen in the community and the nation, and as a member of the world community? Students will explore how individuals and institutions interact. They will also recognize and respect different points of view. Students learn by experience how to participate in community service and political activities and how to use democratic processes to influence public policy.

### Common Core <http://www.corestandards.org/>

<i>Reading Standards for Literacy in History/Social Studies</i>	
Grade 9-10	Grade 11-12
1. Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.	1. Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.
2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.	2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.
3. Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.	3. Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.



Written by LAII staff, News in the Classroom modules provide an excellent way to bring Latin American current events into the classroom, while also encouraging literacy development. Each module is based upon an article in the Latin America Data Base (LADB), a subscription news service for which teachers can register to receive free access. For more information, visit <http://lail.unm.edu/>. This module was prepared by Kathryn Peters, LAII Graduate Assistant.