

Theme

B

Economic Development and Air Pollution

Stacy Erickson
Mill Creek Middle School

PURPOSE

To create a correlation between Chinese and Japanese economic growth and greenhouse gas emissions.

THEME STATEMENT

Technology, Production, Distribution & Consumption (TPDC): Decisions revolving around exchange and economic policies, production, distribution, consumption, and technology (along with well-being) are global in scope.

SUGGESTED TIME

One hour, depending on student graphing ability.

KEY VOCABULARY & CONCEPTS

- Gross Domestic Product (GDP)
- greenhouse effect
- greenhouse gases
- emission

MATERIALS NEEDED

- statistics on greenhouse gas emissions (Student Handouts #1 and #2)
- statistics on GDP for China and Japan (1980-1990) (Student Handout #3)
- graph paper
- each student must have two different colored writing utensils

BACKGROUND INFORMATION

This lesson is a good introduction to East Asian economic growth. Students need to have a basic understanding of the effects of greenhouse gases. Also, students will be expected to be able to create a line chart graph. If students are unable to do this, this lesson can be expanded to include graphing instructions.

SUMMARY

Adaptable Levels
Grades 6-12

Related Themes
PPE, USGC, IPG

Values
Caring,
environmental concern

Skills
Graphing, comparisons,
analysis

Integration
Science, math, social studies

INITIATION (Inquiry, Preview, Involvement)

1. Have students brainstorm the causes of air pollution.
2. As they brainstorm, have a representative write all the responses on the board.
3. Have students brainstorm the areas of the world where they believe air pollution is the greatest.

DEVELOPMENT (Instruction, Data Collection, Organization)

1. Show students the pie chart of the world's greenhouse gas emissions (Student Handout #1).
2. Have students compare this chart with the regions that they had brainstormed in #3 above.
3. Show students the pie chart of the Asian greenhouse gas emissions (Student Handout #2).
4. Using the causes of greenhouse gas that they generated in #1 above, ask why China and Japan may have such high emission rates.
5. For the correlation to economic development, give students a piece of graph paper and make sure that they have two different colored writing utensils.
6. Have the students label the X-axis in one-year increments from 1980 to 1990. The Y-axis is for GDP and should be labeled in US\$100 billion (1980 dollar value).
7. Using the GDP statistics (Student Handout #3), have students complete their graph using one color for Japan's statistics and one color for China's statistics.
8. Discuss with the students their observations as they examine their graphs.

EXTENSION/ENRICHMENT (Idea Articulation, Ownership, Experimentation)

Ask students to create a correlation between the charts that they just created and the Asian greenhouse gas pie chart (Student Handout #2) that they were introduced to earlier.

ASSESSMENT OF ACHIEVEMENT

Have students choose either Japan or China and write a paragraph describing the country's economic growth and its contribution to greenhouse gas emissions in Asia and the world. Have students provide a possible solution to the problem, explaining their reasoning thoroughly.

Construct a rubric for assessment, such as the following:

- 4 = Student clearly identifies and describes the correlation between economic growth and emissions; presents a plausible solution.
- 3 = Adequately describes the correlation between economic growth and emissions; explanation not as clear as a "4" description; presents a possible solution.
- 2 = Minimally describes the correlation between economic growth and emissions; reasoning is not well explained; presents no reasonable solution.
- 1 = Little to no correlation is established between economic growth and emissions; no solution is presented.

KEY QUESTIONS

Engage the class in exploring the following questions. For each country, ask:

- In which direction has the economy gone?
- What reasons might there be for this direction in “growth”?
- What country has the most greenhouse gases? What might be some reasons why?

Examining both countries comparatively, ask:

- Why might China and Japan have such high emissions?
- Do you think that these countries are trying to lower their emissions? How might you propose that they reduce emissions?

ALTERNATIVES

- Have students search for their own data on air pollution, especially as environmental data becomes more readily available.
- Incorporate more countries into the lesson, perhaps ones that the class has already studied, in order to present a more complete view of Asia (or the world), again as data becomes more available.
- Present a similar lesson which includes other types of pollution (*e.g.*, soil, water) in Asian countries.

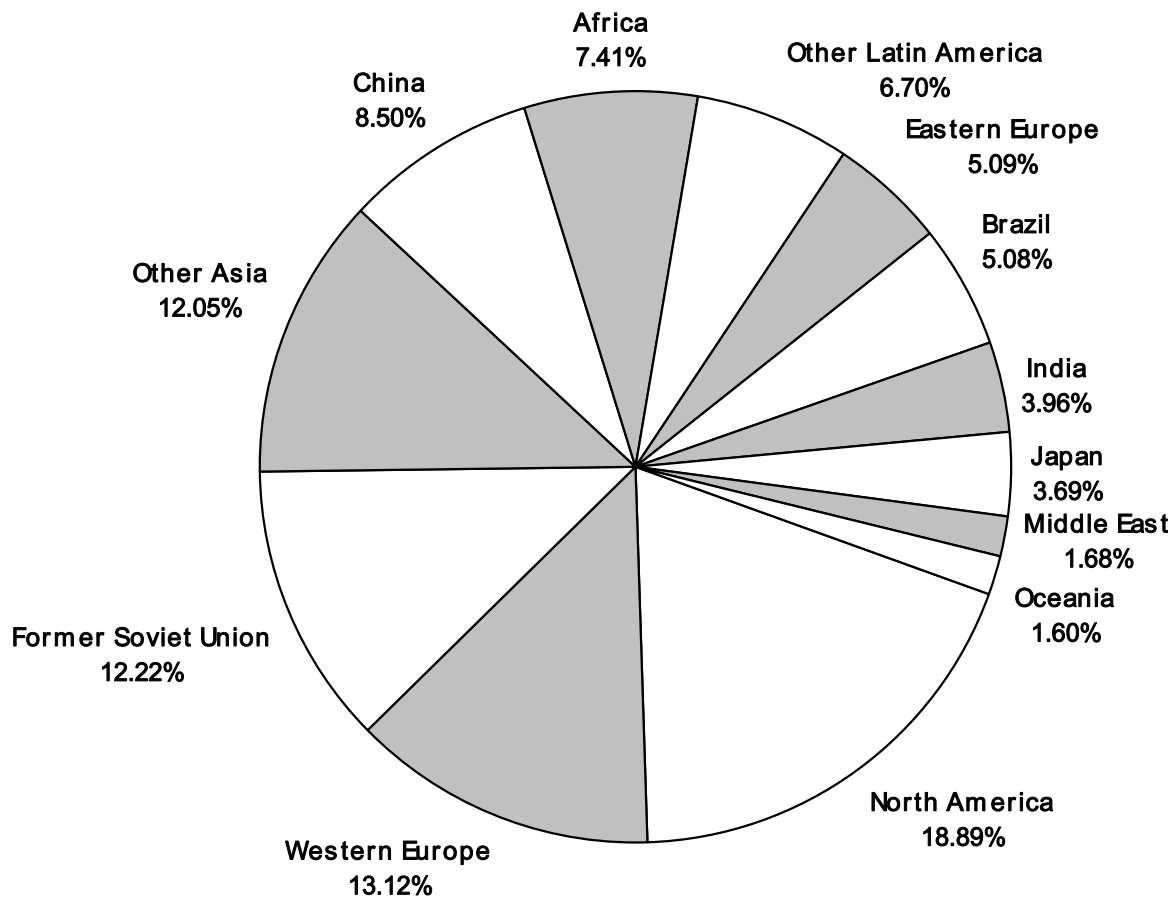
REFERENCES & RECOMMENDED RESOURCES

- various world almanacs
- *CIA World Factbook*: <http://www.odci.gov/cia/publications/nsolo/wfb-all.htm>

STUDENT HANDOUT #1:

Regional Rankings of Global Greenhouse Gas Emissions

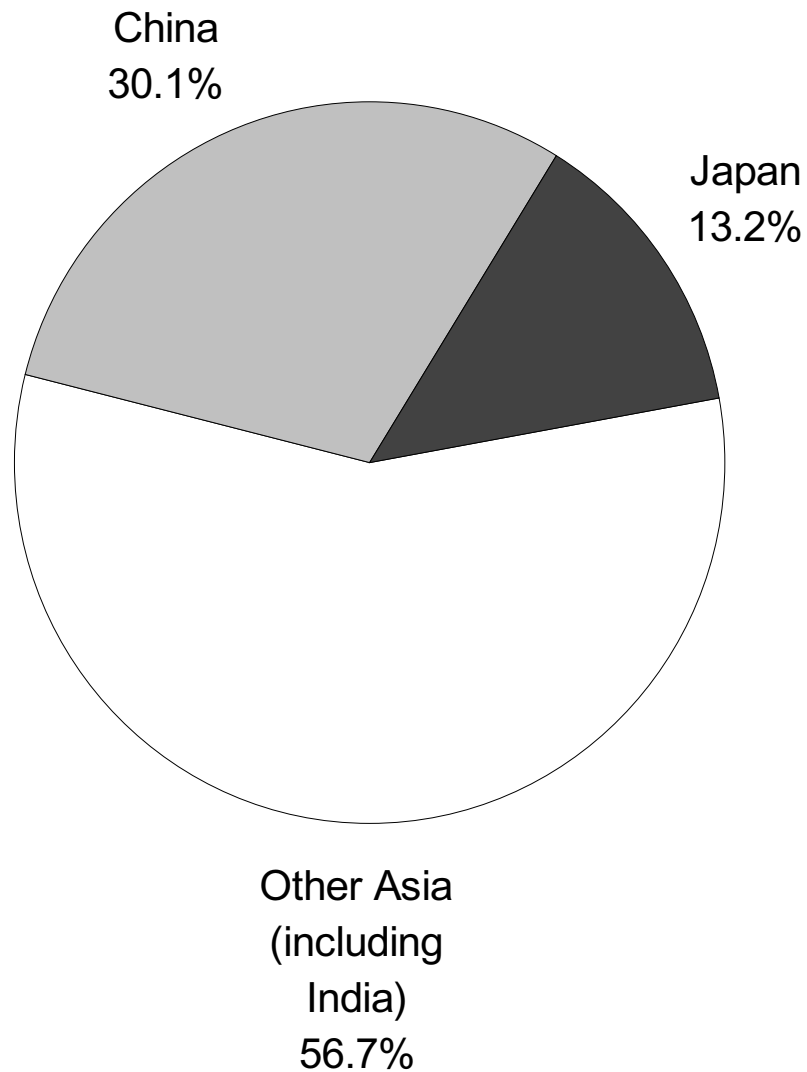
[Source: Ebert, Craig, and Adyd Karmali. Uncertainties in Estimating Greenhouse Gas Emissions. *World Bank*, 1992.]



STUDENT HANDOUT #2:

Regional Rankings of Global Greenhouse Gas Emissions

[Source: Ebert, Craig, and Adyd Karmali. Uncertainties in Estimating Greenhouse Gas Emissions. *World Bank*, 1992.]



STUDENT HANDOUT #3:

Gross Domestic Product (GDP) in China & Japan

[Source: Reddy, Marlita. *A Statistical Abstract of the World*. New York: Gale Research Inc., 1994.]

	1980	1985	1990
China	2.86716	4.59012	6.62193
Japan	10.593	12.724	15.921

[All figures in US\$100 billion]