Justice and Responsibility in a Changing Climate

The Choices Program, Brown University

In December 2015, delegates from countries and organizations will meet in Paris to negotiate a binding international agreement that will set new goals for tackling the issue of climate change. This deadline, after decades of international negotiations, raises the stakes for resolving three related and highly disputed questions: Who is responsible for climate change? How should responsibility be calculated? What is the relationship between the degree of a country's responsibility and its obligation to respond?

People in Bangladesh, one of the most vulnerable countries to the effects of climate change, have adapted in some places by building houses on stilts to protect their homes from flooding. Bangladeshis have become leaders in adapting to the changing climate on a local scale.
(Credit: Development Planning Unit University College London, CC BY 2.0)

In recent years, international attention to climate change has surged. Media coverage and political debate mean that most people today are aware of melting ice caps and the plight of polar bears. Yet we often struggle to see this apocalyptic-sounding environmental problem as an immediate social issue. Climate change involves more than just rising sea levels and UN treaties. It presents complex problems that transcend national boundaries and affect individuals around the world in drastically different ways. Climate change's effects on society range from reducing access to food and water to increasing the risk of natural disasters and disease.

Despite the severity of its anticipated impacts, developing responses to climate change that are acceptable to all members of the international community is no easy task. The challenge is to take into account the many different concerns of countries, ordinary people, businesses, and activists in creating an effective set of policies to address this shared problem. While scientists assert human-caused climate change is an urgent matter, policymakers disagree about the severity of the threat and how to respond. In addition, while climate change is a shared global concern, not all countries have emitted the same amount of greenhouse gases (the primary driver of climate change), and climate change does not affect all places and peoples evenly. This makes it difficult to decide what kind of international agreement would be fair.

Some countries are more likely to be harmed by climate change than others. For example, the country of Tuvalu, a small island in the Pacific that is home to more than 10,000 people, could become uninhabitable in the next 50 years as sea levels continue to rise. Within individual countries, impacts vary by region as well. Even within local communities, some people may be more vulnerable to the effects of climate change than others. This often depends on where they live and how closely their basic needs like food, water, and shelter are affected by changing climate conditions.

Poverty is important in determining vulnerability to climate change. People in the world's 48 poorest countries are

five times as likely to die from climate-related disasters. Poor countries are ill equipped to deal with extreme weather and health issues. They often lack effective infrastructure (like hospitals and running water systems) to deal with the impacts of climate change, and their citizens often live in homes that cannot withstand intense storms. Furthermore, poor countries are the most likely to already be experiencing issues like water scarcity, food shortages, disease susceptibility, and limited access to safe housing. Any worsening of these problems by climate change is bound to be catastrophic for these populations.

The 48 poorest countries in the world—which are home to 12 percent of the world's population—are responsible for emitting less than one percent of total greenhouse gas emissions. It is these same countries that are suffering first and worst from climate change's effects. The gap between responsibility and vulnerability is clear and raises important questions:

- Should wealthier countries that emit more greenhouse gases take on a greater share of the costs of dealing with climate change's effects?

- Should poorer countries reduce their greenhouse gas emissions, even if it slows their economic growth?

It is costly to respond to climate change. The primary cause of climate change is the burning of fossil fuels like coal and oil, which results in more greenhouse gases being released into the atmosphere. Because of this, cutting emissions means putting limits on industry by demanding less use of fossil fuels—something few countries are willing to do.

The dispute over responsibility for past and future emissions is one of the biggest obstacles to creating a unified international response to climate change. Some activists call for "climate justice" in which countries pay the costs of dealing with climate change proportionately depending on the extent of responsibility for emissions. Those countries that contributed most to the problem would pay the most. Poorer countries, bearing less responsibility for greenhouse gas emissions, would pay less. But it is difficult to motivate wealthier countries to take responsibility, particularly because they are the least vulnerable to the effects of climate change.

There is also debate over how responsibility should be calculated. On the one hand, some believe that countries that are emitting the most greenhouses gases at this moment as well as those whose emissions are expected to increase in the near future should be held responsible. This places much of the burden

of responsibility on newly developing countries like China, which currently emits the most greenhouse gases in the world. On the other hand, China has a large population, which means it does not have the highest per capita (per person) emissions. Newly developing countries like China also do not have the long histories of greenhouse gas emissions that countries like the United States have. Because there are different ways

to define responsibility, it is difficult to decide how to create a just response.

In this data analysis lesson, you will consider the various frameworks for thinking about responsibility by analyzing the emissions records of a selection of countries (Bangladesh, China, Colombia, Germany, Haiti, Nigeria, and the United States). The countries were selected with geographic, social, and economic variety in mind.

You will use data to consider whether responsibility for climate change should be based on current emissions, per capita emissions, or the emissions accumulated over history. Resolving this question is a key step towards the December 2015 conference in Paris where world leaders will commit to a new international system to address the threat of a changing climate.🌐

CLIMATE CHANGE LESSON PLAN

Objectives:

Students will:

- Develop data analysis and graph reading skills.

- Analyze data on the carbon dioxide (CO_2) emissions of various countries.

- Use data to consider the question of how to determine responsibility for climate change.

Reading:

"Justice and Responsibility in a Changing Climate" (the two pages prior to this page and the top of this page)

Handouts:

"Total CO_2 Emissions in 2010"

"CO_2 Emissions Per Capita in 2010"

"CO_2 Intensity in 2010"

"Historical Emissions of CO_2 through 2010"

Background information on the seven countries featured in the CO_2 handouts

In the Classroom:

1. Setting the Stage—Review with students the dispute over responsibility for climate change from the reading. Why is determining who should be held responsible for preventing and dealing with the effects of climate change so difficult? What are a few of the ways responsibility could be determined?

2. Analyzing Data—Break students into groups of three or four

and distribute the handouts. Tell students that they will be investigating evidence of CO_2 emissions and trying to determine responsibility for climate change. Have students work in their groups to answer the questions associated with each graph.

3. Policy Implications—Return to the large group setting and have students share their answers. Address any questions that arise about what the graphs are showing. Have students consider the policy implications of the data. Which graphs do students believe are most helpful in determining responsibility for climate change? Why? Challenge students to explore the merits and drawbacks of each. What additional information would be useful in determining responsibility and developing policies to respond to climate change? Ask students which data they believe would receive the most emphasis from representatives of the United States at a climate change conference? China? The other countries included in the graphs?

Note: This lesson is excerpted from *Climate Change and Questions of Justice*, a full-length curriculum unit by Brown University's Choices Program. The curriculum includes readings, a variety of lessons, and in-depth case studies that illustrate central issues, such as climate change vulnerability, responsibility, and strategies for mitigation and adaptation. (The selection of countries for this data analysis lesson corresponds with case studies explored in the full student text.) Ultimately, students participate in a deliberative activity and consider a range of policy options that address the complex global problems that climate change presents. Find out more about the unit and other educational resources from the Choices Program at **www.choices.edu.**

The data for this exercise comes from the Carbon Dioxide Information and Analysis Center (CDIAC) at the Oak Ridge Laboratory in Tennessee, available at **http://cdiac.ornl.gov/CO2_Emission/**.

Name:_____

Total CO$_2$ Emissions in 2010
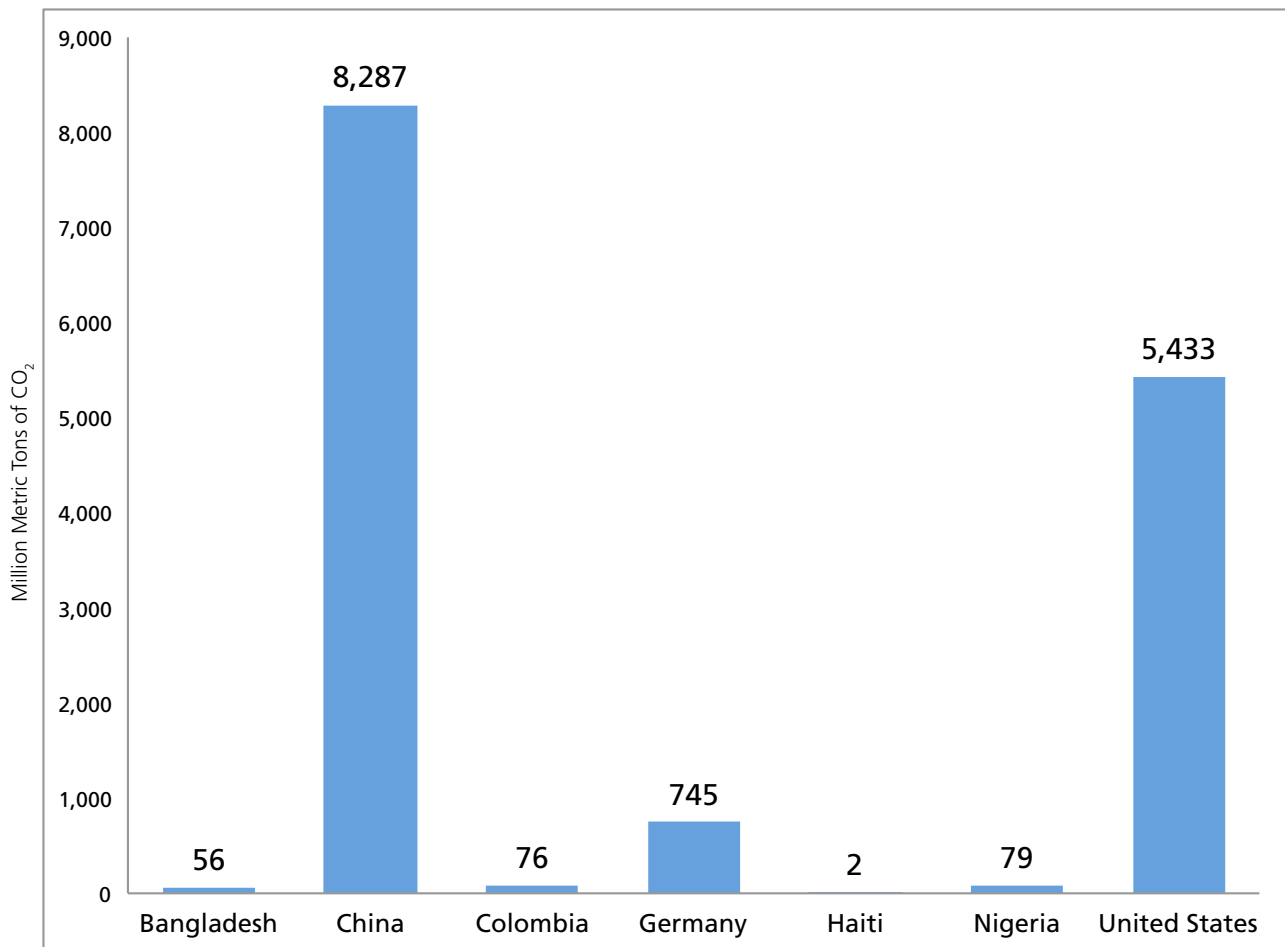
1. What information is represented on the x-axis (horizontal axis)?

2. What information is shown on the y-axis (vertical axis)?

3. Which country emitted the most CO$_2$ in 2010?

4. How many more million metric tons of CO$_2$ did China emit than the United States in 2010?

Bonus: Fill in the blank. U.S. emissions are _____ percent of Chinese emissions.
(Hint: divide U.S. emissions by Chinese emissions and multiply by 100.)

CO$_2$ Emissions Per Capita in 2010

Metric Tons of CO$_2$ per capita (per person)

Country	Value
Bangladesh	0.37
China	6.16
Colombia	1.65
Germany	9.06
Haiti	0.22
Nigeria	0.51
United States	17.27

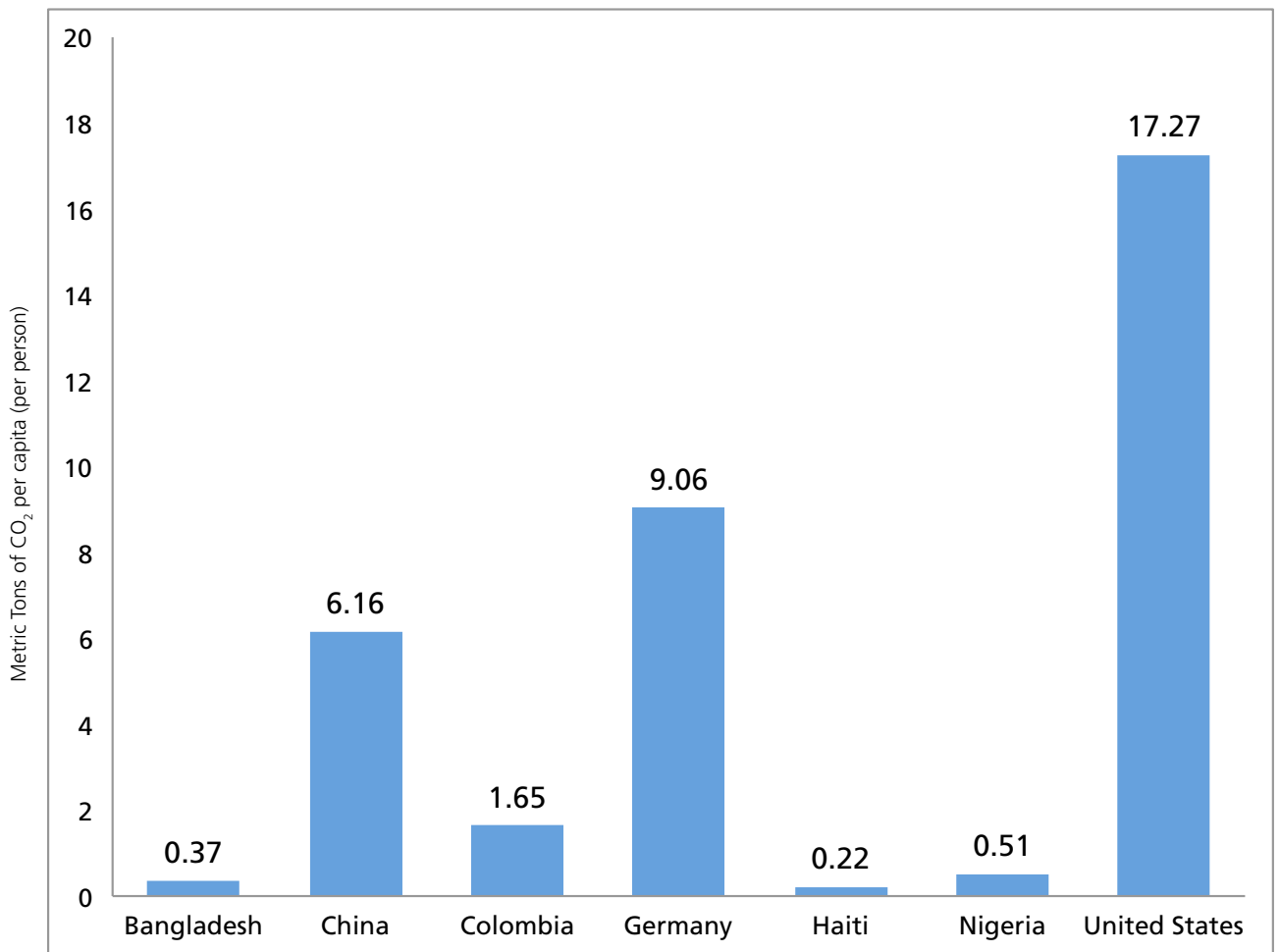Data from Carbon Dioxide Information Analysis Center (CDIAC) http://cdiac.ornl.gov/CO2_Emission/.
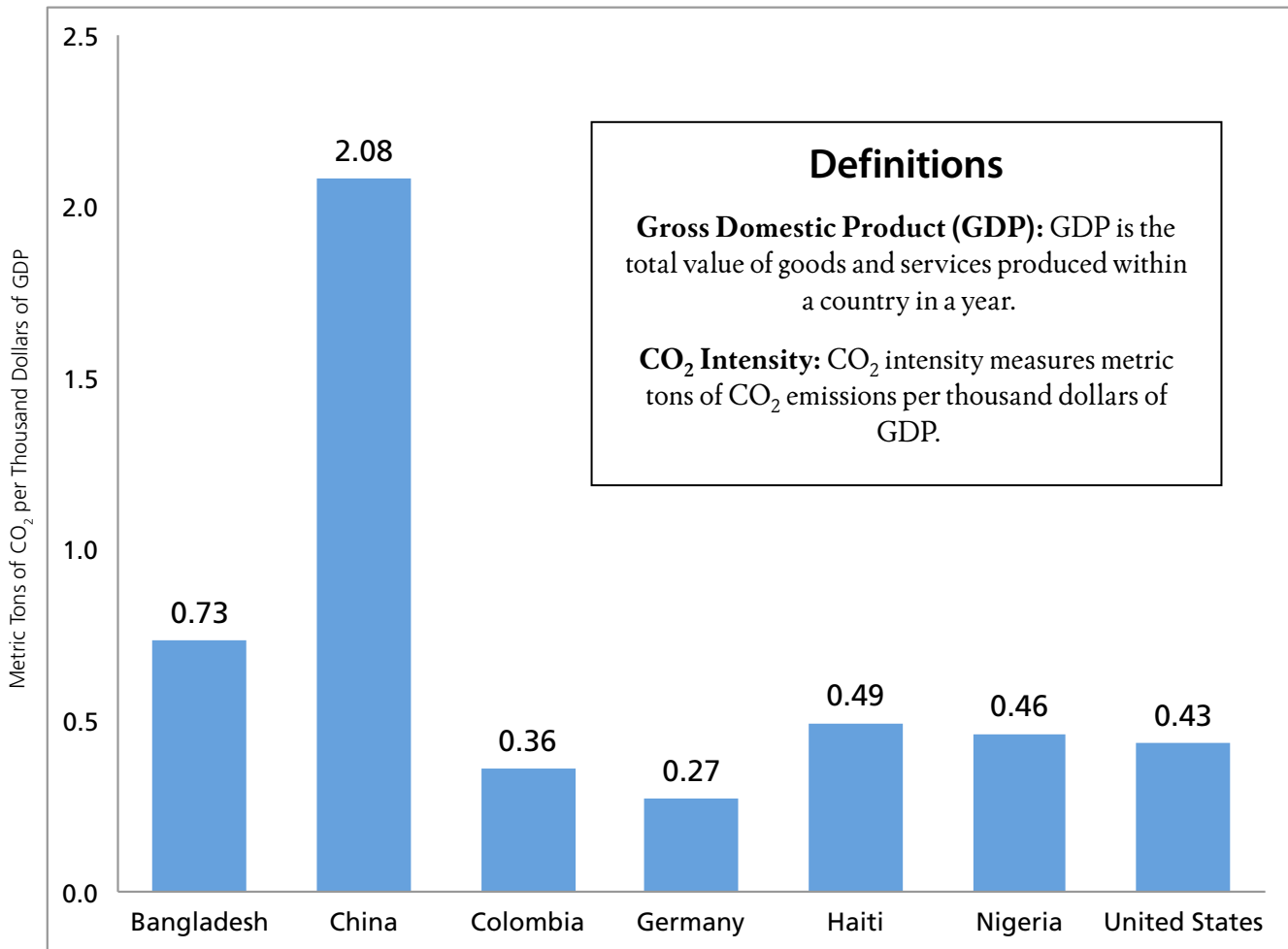
1. What information is represented on the x-axis (horizontal axis)?

2. What information is shown on the y-axis (vertical axis)?

3. Fill in the blanks. Germany emitted _____ metric tons of _____ per person in 2010.

4. Which country emitted the most CO$_2$ per person in 2010?

Name:_____

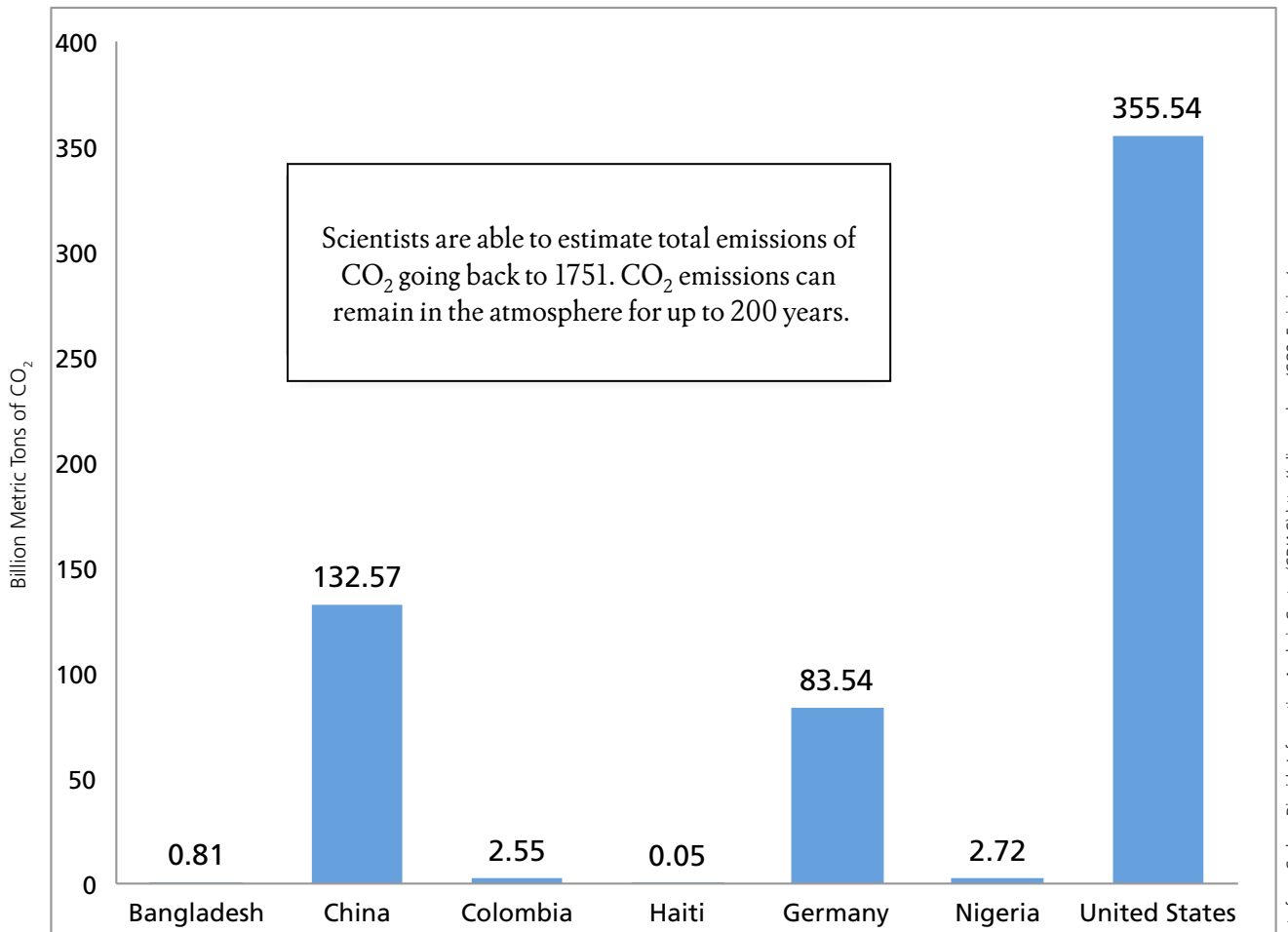# CO$_2$ Intensity in 2010

Definitions

Gross Domestic Product (GDP): GDP is the total value of goods and services produced within a country in a year.

CO$_2$ Intensity: CO$_2$ intensity measures metric tons of CO$_2$ emissions per thousand dollars of GDP.

Y-axis: Metric Tons of CO$_2$ per Thousand Dollars of GDP

Bars: Bangladesh 0.73, China 2.08, Colombia 0.36, Germany 0.27, Haiti 0.49, Nigeria 0.46, United States 0.43

Data from Carbon Dioxide Information Analysis Center (CDIAC) http://cdiac.ornl.gov/CO2_Emission/.

1. Which country has the highest level of CO$_2$ intensity?

2. Fill in the blanks. Bangladesh produces _____ metric tons of CO$_2$ for every _____ dollars of GDP.

3. Why might a country have a high level of CO$_2$ intensity?

Bonus: Fill in the blank. The U.S. has <u>high</u> emissions levels and a <u>high</u> GDP. This graph shows that the U.S. and Haiti have <u>similar</u> CO$_2$ intensities. The graph of total CO$_2$ emissions by country on page 38 shows that Haiti has <u>low</u> emissions levels. Given this information, Haiti's GDP <u>must be</u>_____. Briefly explain your reasoning. (Hint: Refer back to the definition of CO$_2$ intensity and how it is calculated.)

Historical Emissions of CO$_2$ through 2010

Scientists are able to estimate total emissions of CO$_2$ going back to 1751. CO$_2$ emissions can remain in the atmosphere for up to 200 years.

Billion Metric Tons of CO$_2$

Bangladesh	China	Colombia	Haiti	Germany	Nigeria	United States
0.81	132.57	2.55	0.05	83.54	2.72	355.54

Data from Carbon Dioxide Information Analysis Center (CDIAC) http://cdiac.ornl.gov/CO2_Emission/.

1. Which country has the highest level of historical CO$_2$ emissions?

2. Approximately how many more billion metric tons of CO$_2$ has the United States emitted than China?

3. Give a one sentence explanation of why you think Bangladesh's historical CO$_2$ emissions are nearly undetectable on this graph.

Background Information

Bangladesh

Bangladesh is among the most densely populated countries in the world. One of the most prominent geographic characteristics of Bangladesh is the Ganges Delta, where the Ganges, Brahmaputra, and Meghna Rivers come together. This merging of the three rivers means that the area has richly fertile soil and expansive wetlands (areas of swamps and marshes). Because it is dominated by rivers and coastlines, Bangladesh is one of the world's most vulnerable countries to flooding.

A river scene in Bangladesh. Rivers and wetlands are a prominent part of Bangladesh's landscape.

Credit: Australian Aid Photolibrary (CC By 2.0) via Flickr.

China

The People's Republic of China is the world's largest country by population size and the second largest by land area. The vastness of the country means that there is huge variation in culture, living standards, and environmental conditions across provinces. For more than 30 years, China's economy has been steadily growing, which has drastically reduced poverty. At the same time, there has been a rise in inequality between China's rich and poor.

Thick smog blanketing the city of Shanghai. China has some of the most densely populated cities in the world and has a strong manufacturing industry. Health concerns related to smog from coal plants were one reason behind China's recent agreement with the United States to reduce its greenhouse gas emissions for the first time ever.

Credit: BriYYz (CC By SA 2.0) via Flickr.

Colombia

Colombia is the fourth largest country in South America by land area, and it has the third largest economy in the continent, though a large portion of its population lives in poverty. The country has highly varied geography, with densely populated mountainous regions in the northwest, tropical rainforests in the southeast, and low-lying coasts on both the Pacific and Atlantic Oceans. Despite political instability and violence associated with the drug trade, Colombia's economy is quickly growing and it is becoming a more important player on the global stage.

The Valle de Cocora (Cocora Valley) is part of a national park in the "Coffee Triangle" of Colombia. Colombian coffee is famous and is an important part of the national economy.

Credit: McKay Savage (CC BY 2.0) via Flickr.

Germany

Germany is a member of the European Union and one of the most important economies on the continent, with the fourth largest GDP in the world. Boasting the world's oldest universal health care system, Germany has a high standard of living. The country is a leader in committing to the use of renewable energy and green technology.

Bicycles in Freiburg, Germany, a city that prioritizes environmental concerns through discouraging the use of cars and investing in renewable energy sources (such as solar panels).

Haiti

Haiti is one of two separate countries that occupy the island of Hispaniola in the Caribbean Sea. Haiti was a French sugar plantation colony populated largely by slaves that won its independence from France in 1804. Nearly 60 percent of Haiti's population lives on less than $1.25 a day. Haiti's economy depends on farming and about 60 percent of Haitians work in agriculture.

Port-au-Prince, Haiti, after Hurricane Tomas. The flooding caused by the hurricane intensified outbreaks of cholera around the country.

Nigeria

Nigeria is a multiethnic, multireligious country in West Africa. It is situated directly south of the Sahel (the transition area between the Sahara Desert and sub-Saharan Africa), and its southern border is located on the coast of the Gulf of Guinea. Nigeria is one of the top oil producing countries in the world, processing more than 2.5 million barrels of oil a day.

Lagos, Nigeria's most populous city, is the largest city in Africa.

United States

The United States is the world's fourth largest country by area and third largest by population. It is one of the most ethnically and culturally diverse countries in the world and has a varied geography, from sub-tropical forests in the southeast to cool mountainous areas in the north and desert areas in the southwest. The United States has the largest GDP in the world and is considered to have the most powerful military.

Los Angeles (L.A.) is the most populous city in California and the second most populous in the United States. L.A. is home to Hollywood, the center of the entertainment industry.