

Quick Trip to 7.6 Billion: Infographic Scavenger Hunt



Introduction

Overall, we are healthier, wealthier, and better educated than ever before, yet there are still great challenges ahead for our global family. Humans continue to deplete the Earth's natural resources at an unsustainable rate, nearly half of all people live on less than \$2/day, and the global population is expected to continue growing through much of this century. However, we can take steps to reduce the impact we have on the environment, both as individuals and as a global community. Examining past, current, and future data helps determine how we can protect both the environment and human well-being around the world. We must find sustainable solutions that both protect our natural resources and improve quality of life and opportunities for all 7.6 billion of us sharing the planet.

Materials

Part 1

- *A Quick Trip to 7.6 Billion* poster or e-poster
- Scavenger Hunt Guide (provided)

Part 2

- Student tablets or computers with Internet access
- Question Cards (provided)

Part 1: Our Global Footprint

Procedure

1. Distribute copies of the Scavenger Hunt Guide and direct students to the *A Quick Trip to 7.6 Billion* poster found at www.worldof7billion.org/high-res-wall-chart. Allow students time to investigate side 2 (found lower on the screen; made up of infographics), reading the information, interpreting the charts and graphs, and then answering the questions on the Scavenger Hunt.
2. Review the answers to the Scavenger Hunt as a class.

Answers to Scavenger Hunt

See Answer Key

Concept

Our global family is healthier, wealthier, and better educated than in years past, yet we continue to use resources at an unsustainable rate and social inequality abounds.

Objectives

Students will be able to:

- Analyze demographic and social factors that impact global population size and resource use trends.
- Identify actionable ways we can reduce our environmental impact and reverse unsustainable trends.
- Collaboratively answer a guiding question through data comparison and communicate knowledge to peers.

Subjects

Environmental Science (General and AP), Geography, AP Human Geography, Health, World History

Skills

Critical thinking, interpreting graphs and charts, researching, collaborating

Method

Through collaborative analysis of visual data found on the *A Quick Trip to 7.6 Billion* poster, students investigate how demographics and resource use have changed over time and how we can reduce future environmental impacts.



Part 2: What Can We Do?

Procedure

1. Before class, print and cut out the Question Cards so you have one card for each group of 4–5 students.
2. Divide students into small groups of 4–5 and provide each group one of the four Question Cards (you may have multiple groups working on the same question). This will be their Expert Group meaning they are all becoming experts on this question.
3. As they answer the question, students should share ideas and keep notes on a piece of notebook paper. Each student in the group is responsible for recording the answers and will need to be able to share with others.
4. After all groups are finished with their question, instruct students to form new groups that consist of at least one person from each Expert Group (one person from Question 1, one person from Question 2, etc.)
5. Have students take turns sharing and discussing the answers to their questions in their new group. Students should record the answers to all three additional questions using the information shared by the other experts.
6. As a class, discuss the four questions. Ask students to share out answers to questions that they were not the “expert” on using notes from their second group discussions.

Answers to Question Cards

See Answer Key

Assessment

Students are asked to briefly present the answers to a question in which they were not originally an “expert.” These share-outs can be assessed for accuracy and thoroughness.

Follow-up Activities

1. Students create their own guiding question about our future resource use based on information provided in the poster and trade questions with peers to complete.
2. Students research data for a resource use or global health issue of their choice and create an infographic displaying the information.



5. What relationship do you see between women's education levels and fertility rates? What are some possible explanations for this relationship?

6. Which has shown more progress in low-income countries since 1990: child vaccination rates or access to basic sanitation? What could be the reason for this?

7. What is the difference in per capita meat consumption from 1960 to 2016? Why do you think we see this trend? What might be the environmental impacts of more or less meat consumption in the future?

8. What do you notice about the per capita use of paper and paperboard from 1960 to 2008? How about 2008 to 2016? Do you think we are likely to see per capita paper use decrease or increase in the future, and why?

9. Find the difference between the number of ocean "dead zones" in the 1960s and in 2010. What human behavior has led to the increase in the number of dead zones over the years?

10. The data shows that the number of malnourished people in the world has steadily decreased. What years do not follow this trend? What types of events or situations might cause food prices to rise?



Question Cards

Cut out and distribute one card to each small group.

QUESTION 1

The UN estimates that world population will be over 11 billion by 2100. How might people's lives be different if this is true? What advances do you think would have to be made in education, medicine, environmental issues, and food and water supply in order to support a global community of 11 billion people?

QUESTION 2

What factors will influence which population projection we reach in 2100? (Remember the UN projection variants are low, medium, and high.)

QUESTION 3

Most population growth today is happening in less developed countries where birth rates are high. Look at the graphs for the UN's three scenarios of population growth and the information in the "What Can Be Done" and "A Demographic Tale" sections of the poster. Based on this information, what can we do as a global society to help stabilize population growth, especially in less developed countries?

QUESTION 4

How can you be a part of the solution? Looking at the poster, identify at least three actions that you and the people in your community can take to ensure that Earth's finite resources will be able to support our growing global family.



Answers to Scavenger Hunt

1. Besides total population, select any global statistic that has changed significantly from 1968 to 2018. Explain why you think it has changed. Describe one potential positive effect of this change and one potential negative effect.

Answers will vary. One example may be the increase in life expectancy from 55 years to 72 years. While it's positive that people have longer, healthier lives on average, it also leads to some challenges as we will need to support elderly people and make sure they have healthcare and housing long-term. Other examples are the increase in fertilizer consumption and world fish catch could both have a positive impact in that more people are receiving nutrition, and we're able to feed more with less input. However, fertilizer use can lead to ocean dead zones and eutrophication in bodies of fresh water, and our fisheries will collapse if we continue to harvest unsustainably.

2. In what year did the majority of the world's population live in cities? What is one potential benefit and one potential challenge to having more people in cities?

In 2007 more people on Earth lived in urban areas than in rural areas for the first time. Some possible benefits of increased urbanization include better and more diversified jobs, the growth of a middle class, better access to healthcare and education options, public transit, and more housing choices. Drawbacks can include the development of informal settlements with poor living conditions, lack of infrastructure, increased risk of communicable diseases, more concentrated air pollution, and a rise in inequality.

3. In 2000, about what percentage of the population was experiencing water scarcity? How about in 2010? Why might an increasing population lead to a higher percentage of people facing water scarcity?

In 2000, about 45 percent of the global population experienced water scarcity. In 2010, this was approaching 60 percent. While water is a renewable resource, it takes time to be replenished through the water cycle, and more people using it means we go through our available supply more quickly. In addition to more people using water directly, we have seen an increase in indirect water usage, such as meat consumption and paper usage. In addition, a larger population increases our fossil fuel use, carbon emissions, and impacts of climate change – so it also indirectly leads to more water scarcity.

4. Approximately what percentage of our energy use in 2017 was from fossil fuels? What percentage should come from renewable resources by 2050 in order to stay below 2 degrees Celsius of warming? What are two things that would help achieve this goal?

Over 80 percent of the energy used in 2017 came from fossil fuels. By 2050, we need to transition to about 70 percent of our energy coming from renewable sources in order to stay below 2 degrees Celsius of global warming and avoid catastrophic climate impacts. We could increase our investment in clean energy like solar, wind, hydroelectric, and geothermal to make these sources more effective, efficient, and accessible. Additionally, we can find ways to reduce our reliance on gasoline for transportation.



5. What relationship do you see between women's education levels and fertility rates? What are some possible explanations for this relationship?

Countries where women have more years of schooling tend to have lower fertility rates; where women have less schooling, fertility rates are higher on average. More educated women not only stay in school longer, but have more career choices once their schooling is complete. Because of this, they tend to get married later and delay child-bearing thus having fewer children over the course of their lifetimes.

6. Which has shown more progress in low-income countries since 1990: child vaccination rates or access to basic sanitation? What could be the reason for this?

Vaccination rates have shown more progress than access to sanitation. It may be that vaccinations are easier to supply, require less infrastructure development, and often receive more publicity than sanitation and water issues. Vaccinations are also a one-time medical appointment (or series of appointments over a short period of time) that can last for a person's whole life; improving access to sanitation requires long-term maintenance and funding.

7. What is the difference in per capita meat consumption from 1960 to 2016? Why do you think we see this trend? What might be the environmental impacts of more or less meat consumption in the future?

Per capita meat consumption has doubled from 46 to 92 lbs., in part because more people can afford to eat more meat. Generally, as income rises, so does meat consumption. This is likely to continue as emerging economies produce a larger middle class. Environmental impacts of meat consumption include: clearcutting forest for pastures and cropland to grow feed, greenhouse gas emissions (methane), fertilizer and pesticide runoff, and water use to raise cattle and grain for feed. You may want to share with students that it's estimated that about half of all clean water worldwide is used to raise livestock.

8. What do you notice about the per capita use of paper and paperboard from 1960 to 2008? How about 2008 to 2016? Do you think we are likely to see per capita paper use decrease or increase in the future, and why?

An increase may be the result of more global industry – overall global wealth and consumerism has led to more paper and packaging. However, in the past decade more business, communication, and advertising is conducted fully online. With more people using electronic media all over the world, we may continue to see a decline in per capita paper use in the future.

9. Find the difference between the number of coastal and ocean "dead zones" in the 1960s and in 2010. What human behavior has led to the increase in the number of "dead zones" over the years?

The difference is 640 minus 65, or 575 new dead zones that have developed over 50 years. While dead zones can occur naturally, most of the dead zones in the world today are the result of human behavior. Dead zones can be caused by use of fertilizers and pesticides, as well as runoff from sewage and urban land use.



10. The data shows that the number of malnourished people in the world has steadily decreased. What years do not follow this trend? What types of events or situations might cause food prices to rise?

There is a spike in the number of malnourished people between the years 2000-2002 and 2005-2007. Food prices might rise if there is a drought or natural disaster that limits crop production. Food prices can also be affected by oil prices – when oil prices spike, the cost of fertilizers, food production, and food transportation increases, leading to an increase in food price for the consumer. Students may also mention the use of crops for biofuels, like ethanol, or growing cotton for clothing. Answers will vary regarding if and how we could prevent a spike in food costs in the future. One major way would be to slow climate change. If greenhouse gas emissions continue to increase, we will see more frequent and severe weather events, increased droughts, and sea level rise, all of which negatively impact crops and drive up food prices.



Suggested Answers to Question Cards

QUESTION 1

The UN estimates that world population will be over 11 billion by 2100. How might people's lives be different if this is true? What advances do you think would have to be made in education, medicine, environmental issues, and food and water supply in order to support a global community of 11 billion people?

We will live in a more crowded world and we will have to share our resources even more than we do today. There will be a greater risk of civil conflict as a result of resource competition, a risk of progressing climate change, and greater risk of food and water shortages. Students may mention the need for better distribution of food and clean water, more efficient growth of food (using less water and/or land), more equitable wealth distribution, use and development of renewable energy sources, and medical advances.

QUESTION 2

What factors will influence which population projection we reach in 2100? (Remember the UN projection variants are low, medium, and high.)

Fertility rates are the main determinant of population growth. Most population growth today is occurring in less developed countries. Future population numbers will depend on birth rates in these countries, which are tied closely to women's empowerment and education, decreasing infant and child mortality, and improving access to contraceptives and other healthcare. Urbanization may also play a role in fertility rates, as urban settings have different, and typically more, resources and jobs available than rural areas. Global population growth will also depend on the trends in more developed countries – if countries that have reached replacement level fertility continue to have 2-child families and if countries with aging populations see continued declines in their birth rates. Students may also consider the possibility of changes to the death rate and catastrophic events that we cannot necessarily predict, such as global conflict or illness.

QUESTION 3

Most population growth today is happening in less developed countries where birth rates are high. Look at the graphs for the UN's three scenarios of population growth and the information in the "What Can Be Done" and "A Demographic Tale" sections of the poster. Based on this information, what can we do as a global society to help stabilize population growth, especially in less developed countries?

Improving quality of life in less developed countries will impact population growth. Educating women, increasing life expectancy, decreasing infant mortality rates, increasing access to clean water and sanitation, and providing access to comprehensive family planning will all play a part in stabilizing global population growth. Educated women tend to delay childbearing until later in life due to school and job opportunities, which decreases total fertility. Access to clean water and sanitation decreases risk of disease, decreasing infant mortality rates and improving life expectancy. When people are confident that their children will survive, they tend to have smaller families. And finally, providing access to family planning gives couples the decision-making power to determine the number and spacing of their children, which often results in smaller families than in places without reproductive healthcare access.



QUESTION 4

How can you be a part of the solution? Looking at the poster, identify at least three actions that you and the people in your community can take to ensure that Earth's finite resources will be able to support our growing global family.

Answers may include: supporting micro-lending projects that allow more children (especially girls) to attend school, supporting organizations that provide access to family planning, decreasing food waste, reducing meat consumption, focusing on reusable and durable items, refusing single-use plastics, reducing your energy use and using renewable energy wherever possible, driving less and increasing use of shared vehicles.