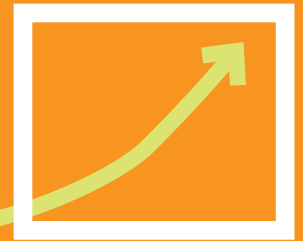


Quick Trip to 8 Billion: Infographic Scavenger Hunt



INTRODUCTION

Overall, people today 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 \$7/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 natural world, 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.

MATERIALS

Part 1

- A *Quick Trip to 8 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 the Scavenger Hunt Guide to each student.
2. Direct students to the State of the Global Family side of the poster or [e-poster](#). Allow them time to read and interpret the poster's information and then answer the questions on the Scavenger Hunt.
3. 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:

- Read and interpret graphs and charts of demographic, environmental, health, and food statistics.
- Identify actionable ways to reduce human impact on the environment and slow or reverse unsustainable trends.
- Use evidence to answer a compelling question and communicate new knowledge to peers.

SUBJECTS

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

SKILLS

Critical thinking, interpreting graphs and charts, researching, communicating conclusions

METHOD

Through collaborative analysis of visual data on the *Quick Trip to 8 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 small group.
2. Divide students into four or eight groups, depending on how many students are in your class and how large you'd like the groups. (It is important for the next Step that the number of groups be divisible by four.) Provide each group with one Question Card. 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. 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.

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.

Scavenger Hunt Guide

Name: _____

Date: _____

Look at the *Quick Trip to 8 Billion* poster and use the State of the Global Family side to complete the following Scavenger Hunt.

1. Excluding total population, select any global statistic that has changed significantly over the past 30-60 years. Explain why you think it has changed. Describe one potential positive effect of this change and one potential negative effect.
2. Starting in what year did more people live in urban areas than rural areas? What is one potential benefit and one potential challenge to having more people in cities?
3. What percentage of the global population is experiencing water stress (Medium-High to Extremely High)? Why might an increasing population lead to a higher percentage of people facing water scarcity?

4. How does energy use vary across income groups? Has this changed much over the past 30 years? Why might this be the case?

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

6. What has been the trend in child and maternal mortality from 2000 to 2020? Do you think the two trends are related? If so, how?

7. What is the difference in per capita meat production from 1974 to 2022? Why do you think we see this trend? What might be the environmental impacts of more or less meat production in the future?

8. What has been the trend in the number of international migrants since 1970 in both raw numbers and percentage of the global population? Why do you think this is the case?

9. Wildlife population sizes have decreased by 69% since 1970. Use the graphs on Disappearing Coral and Losing Forests to help explain why this might be the case.

10. The data shows that the number of malnourished people in the world steadily declined from 2000 to 2012, then remained steady for several years before a sudden increase in 2020. What do you think may have caused that sudden increase? Explain.

11. There are four types of climate-related disasters that have increased in recent decades. Which two have increased the most? How does that relate to the data on the Carbon Emissions graph?

Question Cards

Question 1

The UN estimates that world population will be over 10 billion by 2080. How might people's lives be different in a world of 10 billion people? What advances do you think would have to be made in resource management and food and water supply in order to support a global community of 10 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

People living in the least developed countries face many disadvantages that threaten their quality of life. These include inadequate access to clean water, sanitation services, energy, and health care. What can we do as a global society to address at least one of these challenges? (You may want to refer to the UN's Sustainable Development Goals for ideas: sdgs.un.org/goals)

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. Excluding total population, select any global statistic that has changed significantly over the past 30-60 years. 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 58 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.

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. What percentage of the global population is experiencing water stress (Medium-High to Extremely High)? Why might an increasing population lead to a higher percentage of people facing water scarcity?

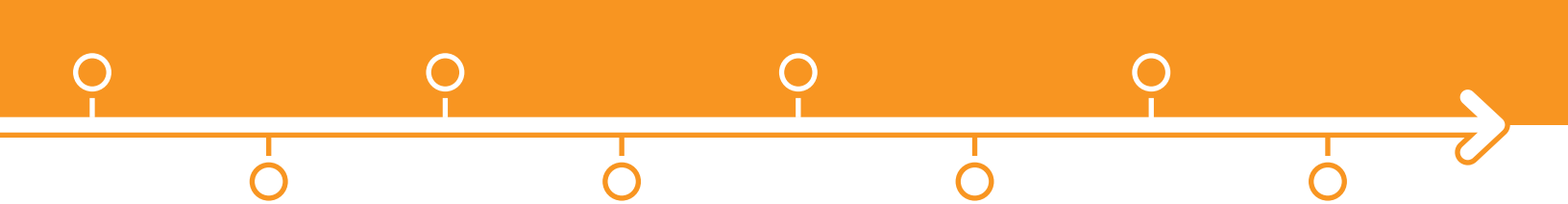
Nearly two-thirds (63 percent) of the global population is experiencing Medium-High, High, or Extremely High water stress, according to the World Resources Institute. While water is a renewable resource, it takes time to be replenished through the water cycle, and more people using it means we go through 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. 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. How does energy use vary across income groups? Has this changed much over the past 40 years? Why might this be the case?

Per capita energy use is significantly higher (by a magnitude of 47 times) in High Income Countries than Low Income Countries. This ratio has changed little over the past 40 years. The one significant change has been the rise in energy use of the countries categorized as Upper-Middle Income, where there's been the largest increase in those considered middle class. Energy use between High Income and Upper-Middle Income countries is now 2:1, but was 4:1 just 20 years ago. With the rise in the global middle class, more people own cars, live in energy-powered cities, and consume diets with more meat content – all contributing to greater energy use.

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.

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6. What has been the trend in child and maternal mortality from 2000 to 2020? Do you think the two trends are related? If so, how?

Child and maternal mortality decreased significantly during that 20-year span. Both trends were influenced by more accessible health care, higher use of contraceptives, more skilled health care providers, cleaner water and improved sanitation, and improved education. When mothers have the means to delay childbearing until they are adults, space out births, and have only the number of children they desire and can care for, the outcomes are better for mothers and babies.

7. What is the difference in both overall and per capita meat production from 1974 to 2022? Why do you think we see this trend? What might be the environmental impacts of more or less meat production in the future?

Overall meat production tripled between 1974 and 2022 (from 113 million metric tons to 360 million metric tons). At the same time, per capita meat production and consumption increased by about 60 percent (from 62 pounds to 99 pounds per capita per year), 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 production 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 has been the trend in the number of international migrants since 1970, in both raw numbers and the percentage of the global population? Why do you think this is the case?

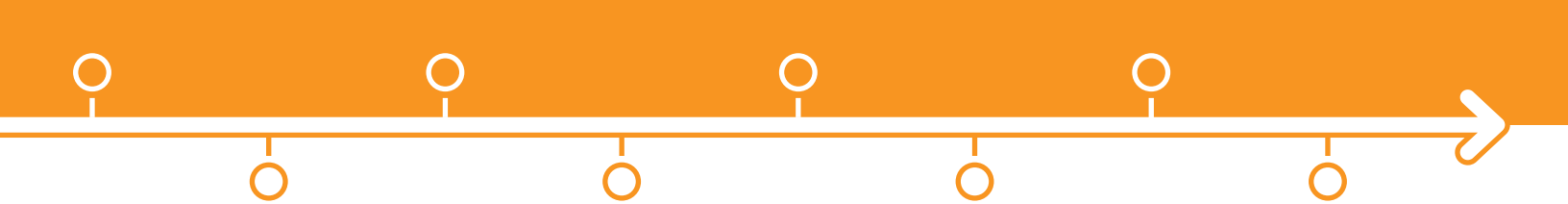
The annual number of international migrants has more than tripled since 1970 (84 million to 281 million). This has represented an increasing percentage of the global population (from 2.3 percent to 3.6 percent). There are a number of "push/pull" factors that lead to migration including war, persecution, financial collapse, or an inhospitable environment. They might also include opportunities for a better education, employment, or reuniting with family. Recent trends in "climate migration" due to an increase in extreme weather affecting agricultural production is one reason for the uptick in overall migration. Conditions affecting specific world regions (such as war, regime change, and financial crises) have also contributed to greater international migration in recent years.

9. Wildlife population sizes have decreased by 69% since 1970. Use the graphs on Disappearing Coral and Losing Forests to help explain why this might be the case.

Coral reefs and tropical forests are home to a large percentage of the world's animal and plant species, so declines in these ecosystems affect global biodiversity. Coral reefs support an estimated 25 percent of all known marine species, so their demise has an impact on marine biodiversity. Tropical rainforests are the most biologically diverse terrestrial ecosystems in the world, home to half of all living animal and plant species.

10. The data shows that the number of malnourished people in the world steadily declined from 2000 to 2012, remained steady for several years before a sudden increase in 2020. What do you think may have caused that sudden increase? Explain.

The rise in world hunger in 2020 coincided with the start of the COVID-19 pandemic, which had a severe impact on employment and income in countries throughout the globe. This made food unaffordable for many, sharply adding to the numbers of undernourished people.

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11. There are four types of climate-related disasters that have increased in recent decades. Which two have increased the most? How does that relate to the data on the Carbon Emissions graph?

The largest increase in the number of disasters was for Extreme Temperatures (more than tripled from 1980-1999 to 2000-2019). This was followed by Floods, which more than doubled during that same time. As carbon emissions have steadily increased, so has the concentration of CO₂ in the atmosphere (a 21 percent increase from 339 ppm to 411 ppm from 1980 to 2019), which led to warmer temperatures around the globe, and thus more episodes of extreme heat that has had deadly consequences. The changing climate has also changed precipitation levels, creating conditions for both floods and droughts.



Suggested Answers to Question Cards

QUESTION 1

The UN estimates that world population will be over 10 billion by 2080. How might people's lives be different in a world of 10 billion people? What advances do you think would have to be made in resource management and food and water supply in order to support a global community of 10 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 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 birth rates. Students may also consider the possibility of changes to the death rate and catastrophic events that we cannot predict, such as global conflict or illness.

QUESTION 3

People living in the least developed countries face many disadvantages that threaten their quality of life. These include inadequate access to clean water, sanitation services, energy, and health care. What can we do as a global society to address at least one of these challenges? (You may want to refer to the UN's Sustainable Development Goals for ideas.)

Answers will vary. Students may take suggestions from the Sustainable Development Goals that address actions and benchmarks for reducing poverty, ensuring safely managed water and sanitation, or increasing access to health care and energy. Achieving most of these goals would require financial commitments from high income countries to help build infrastructure (facilities, utilities, trained personnel, etc.).

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 and electric vehicles.