

Activity: Population – More is Less



Background Information

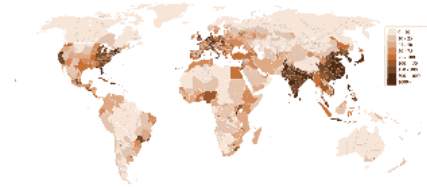
What is the most pressing environmental issue of our time? Is it acid rain? Air pollution? Deforestation? While some authorities might answer differently, most would agree that the problem of human **population** growth is of major importance.

To see why this is so, we need to consider two aspects of human population growth: the **quantity** of human life and the **quality** of human life. First let us consider the quantity of human life.

Population growth occurs when the number of organisms entering a population exceeds the number of organisms leaving it. The population of a city, for example, grows if the people moving into it (**immigration**) plus the number of people born in it is greater than the sum of the number of people moving out (**emigration**) and the number of deaths. When considering the Earth, we need to consider the **birth rate** (number of live births per 1,000 people in a year) as compared to the **death rate** (number of deaths per 1,000 people per year). For most of human existence, the death rate nearly equaled the birth rate, and the population grew very slowly. It took perhaps 2 billion years for the human population to reach 1 billion, around the year 1810. It took only 117 more years to add the second billion (1927), only 33 years to add the third billion (1960), 14 years to add the fourth billion (1974), and only 13 more years to reach 5 billion in 1987. In 2009 the world population was 6,789,213,560 and in 2016 the population was 7,432,283,425 people with a predicted population growth of 9,000,000,000 billion people by 2038 then predicted to rise to 13 billion by 2067. This type of growth is called “**exponential growth**”. As you do work through this activity, keep the following current growth rates in mind:

The World = 1.2% per year
United States: 0.73% per year
Mexico = 1.27% per year
Europe = 0.3%
Afghanistan = 2.59%
Canada = 0.9%

Africa = 2.9%
Asia = 1.9%
Latin America = 2.1%
China = 0.46%
India = 1.2%
Iraq = 3.09%



Increased population growth generally represents problems for a country - it means increased need for food, infrastructure, and services. These are expenses that most high-growth countries have little ability to provide today, let alone if population rises dramatically.

Those who study populations, **demographers**, often consider the doubling time for a population. We can see that the population of Earth doubled between 1960 and 2009, a doubling time of only 49 years! Compare this to the 117 years that it took to double from 1 billion in 1810 to 2 billion in 1927, and the 47 years that it took to double again to 4 billion!

Any place on Earth can support only certain numbers of any type of organism, including humans. This is called the **carrying capacity**. The human population growth curve is currently following an exponential curve.

Common sense tells us that such growth cannot continue - otherwise within a few hundred years every square foot of the Earth's surface would be taken up by a human. Furthermore, experience with other species tells us that, ultimately, resource limitations and/or habitat degradation will force the human population curves to approach an upper limit or the carrying capacity. It is very natural to ask the linked questions - does humanity have a carrying capacity and, if so, what is it - and when will we reach or overshoot this limit? Some demographers feel that we have already exceeded it. Others think that our ability to manipulate our environment will enable us to support even more people. Regardless of how many people can possibly exist on Earth, how many of us should there be? Is our goal to have as many people as possible existing on Earth, or is our goal for people to have happy, healthy, fulfilling lives?

The United States has about 4.38% of the world's population but uses about 30% of the resources that are consumed each year. Is it possible for *all* people to achieve the standard of living that we in the United States now enjoy? Is it possible for the United States and other developed countries to continue consuming at their current rates? As individuals we need to start asking ourselves these questions and taking a hard look at the unsettling answers.

Activity: Population – More is Less

Part 1

Read the Background Information page then Answer the following questions...



1. What is the most pressing environmental issue of our time?
2. What two aspects of population growth do we need to consider when discussing this issue?
3. When does population growth occur?
4. Describe the following:
 - a. Immigration:
 - b. Emigration:
 - c. Birth rate:
 - d. Death rate:
5. How long did it take the human population to reach 1 billion people?
6. How long did it take the human population to go from 4 billion people to 5 billion people?
7.
 - a. What is the current growth rate of the World? _____
 - b. What is the current growth rate of the United States? _____
 - c. What is the current growth rate of Afghanistan? _____
8. What are some problems associated with increased population growth?
9. What name is given to those who study populations?
10. What does the term “carrying capacity” mean?
11. What type of population growth is the World currently following?
12. What will eventually slow the population growth of the World as it reaches its carrying capacity?

13. Even though the United States only hosts 4.3% of the World's population how much of the World's resources does the United States use?

Part 2

Directions:

- Review the rules of graphing that we have gone over
- Construct a line graph comparing a Linear Growth Rate of 1% to an Exponential Growth Rate of 3%.
- Label the X-axis in Years (1 - 20)
- Label the Y-axis in Population Count.
 - Use increments of 2 starting at 100. (100 – 176)
- Graph the **Linear Growth** rate data using the color **GREEN**
- Graph the **Exponential Growth** rate data using the color **RED**
- Put a descriptive title on your graph
- Make a Key for your graph

| Linear Growth Rate of 1% | | | | |
|---------------------------------|-------------------------|--|-------------|-------------------------|
| Year | Population Count | | Year | Population Count |
| 1 | 100 | | 11 | 112 |
| 2 | 102 | | 12 | 113 |
| 3 | 103 | | 13 | 114 |
| 4 | 104 | | 14 | 115 |
| 5 | 105 | | 15 | 116 |
| 6 | 106 | | 16 | 117 |
| 7 | 107 | | 17 | 118 |
| 8 | 108 | | 18 | 120 |
| 9 | 109 | | 19 | 121 |
| 10 | 110 | | 20 | 122 |

| Exponential Growth Rate of 3% | | | | |
|--------------------------------------|-------------------------|--|-------------|-------------------------|
| Year | Population Count | | Year | Population Count |
| 1 | 100 | | 11 | 134 |
| 2 | 103 | | 12 | 138 |
| 3 | 106 | | 13 | 143 |
| 4 | 109 | | 14 | 147 |
| 5 | 113 | | 15 | 151 |
| 6 | 116 | | 16 | 156 |
| 7 | 119 | | 17 | 160 |
| 8 | 123 | | 18 | 165 |
| 9 | 127 | | 19 | 170 |
| 10 | 130 | | 20 | 175 |

Staple your graphs to this paper when finished!

1. Which growth rate graph shows the type of population growth that the World is currently following?
2. Thinking back to the background information you read prior to constructing these graphs, Make a claim as to why the Earth cannot sustain an exponential growth rate such as the one you just constructed. Use examples and evidence to support your claim. *(FYI – this is a LONG answer!)*

Part 3

Directions:

- Decide whether each is mostly “good” for people and the environment OR... Is mostly “harmful” for the people and the environment.
- If it is “good”, place a **GREEN “+”** in the space beside the item
- If it is “harmful”, place a **RED “-”** in the space beside the item

Example:

National Parks +(good) vs. Trash – (bad)

Clean water _____

Energy _____

Noise _____

Buildings _____

Overgrazing _____

Hunger _____

Material luxuries _____

Polluted air _____

Minerals _____

Space to live _____

Cars & Roads _____



Unemployment _____

Soil erosion _____

Forests _____

Food _____

Wildlife _____

Acid Rain _____

Garbage _____

Poverty _____

Oil spills _____

Crowded cities _____

Opportunities for solitude _____

Endangered species _____

Contagious disease _____

Traffic congestion _____

Available housing _____

International conflicts _____

Recreational space _____

Questions:

1. Which of the above item choices were hard to make a distinction between if it was “good” or “bad” when trying to consider people AND the environment in your decision making process? Why?

2. If YOU could increase just ONE of the “good” item choices from above which one would it be and why?

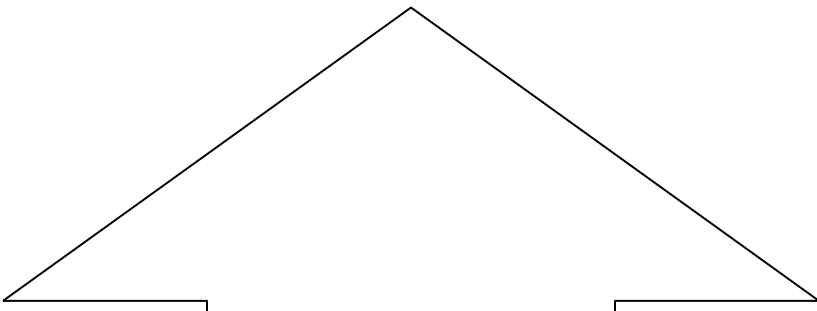
Part 4

Now consider the effect of a significantly increased human population on each item from Part 3...

- If increasing the human population would tend to **increase** the item, write the item inside the arrow pointing **upward**.
- If increasing the human population would tend to **decrease** the item, write the item inside the arrow pointing **downward**.
- Use a **GREEN** writing tool for the “good” items - **See part 3
- Use a **RED** writing tool for the “harmful” items - **See part 3

Increases human population tends to
Increase these items from Part 3:

Increases human population tends to
Decrease these items from Part 3:



Analysis Questions:

Answer the following questions on a SEPARATE piece of paper! Use complete sentences! Staple when done.

1. How many “good” items did you write in the arrow pointing upward (increasing)?
2. How many “harmful” items did you write in the arrow pointing upward (increasing)?
3. What is the trend you see in the amount of “good” items continuing if there is a significant increase in human population?
4. Make a claim as to why you think this trend is a positive or negative thing for the human population. Use examples, and evidence to support your claim.

Consider this...*Drought, floods, severe weather and other effects of climate change have begun to threaten communities in many parts of the world. These impacts will worsen in the future, contributing to growing human migration as vulnerable people seek safer, more stable living conditions. This expected migration of hundreds of millions of people can negatively affect human wellbeing and political stability.*

Rapid population growth in areas vulnerable to climate change will contribute to migration pressures by further straining limited natural resources and increasing population density in areas exposed to climate risks, including sea level rise. Estimates of future “climate migrants” range from 200 million to 1 billion by 2050. Climate change is considered a “threat multiplier” by experts in the security community, and climate induced mass migration can contribute to heightened tension in the world. Impaired access to food and water and severe weather are challenges that have historically led to tension and conflict. As more and more people are displaced or compelled to migrate in the face of these challenges, political, ethnic and religious tensions may result. “Many receiving nations,” the NIC warns, “will have neither the resources nor interest to host these climate migrants.”

5. In your own words, describe how Climate Change, Population Growth, Availability of Natural Resources, and Migration are related. Include how you think these factors will be affected in the future.
6. What is ONE change you could make in your everyday life to make the environment a better place?