**Human Population Growth**

**OBJECTIVES:**

* Understand human population growth in various parts of the world
* Describe the various factors that affect population growth through the world
* Consider the impacts of population growth on natural resources

**INTRODUCTION:**

Growth curves are used to reflect how the various factors cause a population to grow or decline. There are two major types of growth curves: exponential and logistic.

We’ll consider **exponential growth** first. What does exponential mean? Well, let’s say we start out with 10 and double it. Now we have 20. If we double it we have 40. Double that, and you get 80. Double 80, and you get 160. Double that, and you have 320. The population grows faster and faster as it gets bigger and bigger. Because it looks like the letter J, exponential growth is sometimes called J-curve growth. When a population is experiencing exponential growth, it is growing at its **biotic potential** (maximum reproductive rate). **Environmental resistance** (biotic and abiotic factors that can decrease a population’s size) is NOT limiting growth.

Can a population grow exponentially forever? Of course not! Eventually it will run out of food, space, water, etc. For most populations, exponential growth is pretty unrealistic. In most populations, there is a balance between environmental resistance and biotic potential. This is **logistic growth**. It is also called the S-curve, based on its shape. At first biotic potential causes exponential growth (look at the two curves early on the left side…see how they have the same shape). But then environmental resistance kicks in. When deaths equal births, we are at population equilibrium. **Carrying capacity** is the maximum population of an organisms that a given habitat can sustainably support.



Factors that influence the size of a population can either be density-dependent or density-independent. **Density-dependent factors** are those that have a greater influence the greater the density of the population. **Density-independent factors** affect a population regardless of its size.

Let’s look at the trend in world human population. As you can see in this graph, our population size did not explode until modern times (mid-1800s through the present). The current population is over 7 Billion people, and it continues to grow exponentially. The question is, when will humans reach carrying capacity?

We can examine patterns in population growth using several different tools. One is to study the **demographic transition**. The demographic transition is a model that shows how birth rates and death rates change in a society as it progresses from a pre-industrial to industrialized economic system. The wider the gap between birth and death rates, the faster the population is growing.



**ACTIVITY:**

Work in groups of two or three. Use the information in the introduction, the website listed below, and your other knowledge on the subject to answer the questions below. Be sure to write your answers in coherent, grammatically correct full sentences.

Go to: http://www.prb.org/pdf14/2014-world-population-data-sheet\_eng.pdf

1. Find the organization’s website. Who is responsible for this publication? How is this group funded?
2. What is the most recent world population estimate?

From what source is this estimate?

1. What is meant by the **Rate of Natural Increase** (RNI)?
2. One property of exponential growth is that you can predict how long it will take for the population to double. The equation is:

$$\frac{70}{\% growth rate}=years to double population$$

* 1. What is the current growth rate for the world population?
	2. How long should it take for the world population to double? Show your work!
	3. The world population is growing exponentially. Does this mean that it will double in the year calculated above? Why or why not?
1. List three *countries* with very high rates of natural increase. Where do they stand economically?
2. What *regions* of the world seem to be experiencing:

 a. Low rates of increase?

 b. Medium rates of increase?

 c. High rates of increase?

1. a. What country had the highest population in 2014?
2. What country will likely be the highest population in 2050?
3. Why do you think this is?
4. What is the U.S. *rank* in total population in 2014? 2050?
5. a. Draw the population pyramids (aka, age-class or age structure histograms) of developing (ie, Africa) vs developed (ie, Europe) regions of the world:

b. In which age groups do you find most of the population in a typical developing country? Why do you think this is the case?

c. How does your answer to the above question relate to the rate of population growth in developing countries?

1. Compare Bolivia and Austria with regard to the % populations under 15 and over 65
2. Which country has higher % of population under 15?
3. Which country has higher % of population over 65?
4. Are both countries growing? Explain:
5. What do you think Bolivia’s growth rate will look like in the next 20 years? Why?
6. a. What benefits could come from population growth?

b. What would be some of the drawbacks of population growth?

1. a. What benefits could come from a population decrease?

b. What would be some of the drawbacks of a population decrease?

1. a. What are potential strategies to reduce population growth? List at least three.

b. What types of issues surround those actions?

1. a. In which phase of the demographic transition are most developing countries?

 b. According to the demographic transition model, why are these countries experiencing rapid growth?

1. a. In what *region* is AIDS/HIV the highest? Why do you think this is?

b. What *region* of the world has the lowest use of women using birth control? Why do you think this is? How is this related to the question in part a?

16. a. What is population density?

1. What countries have the lowest population density? (pick a few)
2. What countries have the highest? (pick a few)
3. What do you think increasing human population density means for natural habitats and resources?
4. Observations show that, the larger the gap between rich and poor, the greater the damage to natural resources. Why do you think this is?
5. Populations are said to be under both density dependent and density independent controls.

a. List examples of density dependentlimits to human population growth.

1. List examples of density independent limits to human population growth.
2. a. What type of growth curve is shown below?

b. Where on the curve do you think density dependent controls are important? Why?

1. Where on the curve do you think density independent controls are important? Why?
2. Where on the curve do you think world population is as of today?

Carrying capacity

Pop size