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Summary

5–1 How Populations Grow

Important characteristics of a population are its geographic distribution, density, growth rate, and age structure. Geographic distribution, or range, is the area a population inhabits. Density is the number of individuals per unit area, such as number of people per square kilometer.

Population growth rate refers to how quickly a population is increasing or decreasing in size. Growth rate depends on how many people are added to the population or removed from it. People are added to a population through births and immigration, or movement of individuals into an area. People are removed from a population through deaths and emigration, or movement of individuals out of an area.

If a population has unlimited resources and limited predators and disease, it will grow exponentially. Exponential growth is a pattern of growth represented by a J-shaped curve. Exponential growth occurs when the individuals in a population reproduce at a constant rate. As the population grows, the number of people who are reproducing keeps increasing. This causes the population to grow faster and faster.

Exponential growth does not continue in natural populations for very long. Resources eventually are used up, and population growth slows or stops. When population growth slows or stops following a period of exponential growth, the pattern of growth is called logistic growth. Logistic growth is represented by an S-shaped curve. The population size when the growth rate stops is called the carrying capacity. Carrying capacity is defined as the number of individuals of a particular species that a given environment can support.

5–2 Limits to Growth

A factor that causes population growth to decrease is referred to as a limiting factor. Limiting factors can be either density dependent or density independent.

Density-dependent limiting factors depend on population size. They include competition, predation, parasitism, and disease. For example, in a predator-prey relationship, a decrease in the prey population will be followed, sooner or later, by a decrease in the predator population.

Density-independent limiting factors do not depend on population size. They include unusual weather, natural disasters, seasonal cycles, and human activities such as damming rivers. In response to such factors, many species have a rapid drop in population size.

5–3 Human Population Growth

Like the populations of many other organisms, the human population tends to increase with time. For most of human existence, the population grew slowly. Limiting factors such as scarce food kept population sizes low. About 500 years ago, the human population began growing faster. First agriculture and later industry increased the food supply and made life easier and safer. Improved sanitation and medicine reduced death rates. However, birthrates remained high in most places. This led to exponential growth of the human population. Exponential growth continues today in the human population as a whole.

The human population cannot keep growing exponentially forever, because Earth and its resources are limited. Factors such as war, starvation, and disease limit some human populations. Scientists also have identified a variety of social and economic factors that can affect human populations. The scientific study of human populations is called demography. Demographers study characteristics of human populations and try to predict how the populations will change over time.

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Over the past century, population growth in the United States, Japan, and much of Europe slowed dramatically. Demographers call this shift in population growth rates the demographic transition. In the transition, first death rates fell, causing a temporary increase in population growth. Then birthrates fell, causing population growth to slow. Most people live in countries that have not yet completed the demographic transition.

To help predict future population growth, demographers use models called age-structure diagrams. An age-structure diagram is a bar graph of the number of people in each age group in the population. To predict how the world's human population will grow, demographers also must consider factors such as the number of people with fatal diseases, including AIDS.