

SNC1P

1.7: Changes in Populations

Population Growth Patterns

There are two types of Growth Patterns – Linear and Exponential



Factors That Affect Population Size

Natality (births): the number of offspring of a species born in one year

Mortality (deaths): the number of individuals of a species that die in one year

Immigration: the number of individuals of a species moving into an existing population

Emigration: the number of individuals of a species moving out of an existing population

Population Growth = (births + immigration) – (deaths + emigration)

When these factors are in balance, Population Growth = Zero, it is referred to as **dynamic equilibrium** or a **steady state**.

Open and Closed Populations

When all four factors that affect population size are acting on each organism in an ecosystem, the population is said to be an **open population**. However, immigration and emigration do not happen in laboratory settings and in some game reserves, so populations or organisms in these situations are considered **closed populations** – only natality and mortality affect their population size.

Examples: Open population – human population of Canada

Closed population – population of trout in a lake

Note: the global population of humans or any other type of organism is considered a closed population.

The current growth rate of the global human population is about 2.7 times as many births as deaths, which means that in 1996 Earth's population of 5.8 billion increased by 89.9 million people, or by 246 200 people each day. The human population is not in dynamic equilibrium

Population Histograms

Age distribution: dispersion of the individuals within a population based on age

Population histograms are useful when studying populations of long-lived organisms, such as humans. Double histograms are often used to provide a profile of age groups by sex. These histograms allow you to examine the population of an organism in terms of its age structure and the proportions of males and females at a specific instant in time.

The shape of the pyramid allows you to predict changes in the population. A pyramid with a wide base is characteristic of a rapidly growing population. It means that the number of births has been high recently. Another indicator of future growth is the number of individuals capable of reproduction.

When there is very little difference in the width throughout the pyramid, the population is fairly stable. This population is growing very slowly.

Lastly, when the base is very narrow compared to the middle of the pyramid, the histogram is showing a population that is declining.

Worksheet 1.7: Changes in Populations

1. In your own words, explain the difference between populations with linear and exponential growth rates. Provide examples in your answer.
2. What type of growth pattern has the human population followed? Explain your answer?
3. Four factors regulate population growth. Using an example of a nonhuman population, explain how each factor would affect the population size.
4. In your own words, explain the difference between open and closed populations and give two new examples of each.
5. In January, 2008, the population of varying hares in a mixed woodland ecosystem was 60. During 2008, the following data on the hare population were obtained:
Births = 20 Deaths = 25
Immigration = 3 Emigration = 7

Calculate the population of hares in January, 2009.