

CH 5.1 How Populations Grow

SC.912.L.17.5-Analyze how population size is determined by births, deaths, immigration, emigration, & limiting factors (biotic & abiotic) that determines carrying capacity.

Hydrilla plants in Florida. [Hydrilla Image & Video](#)

Population-a group of organism of a single species that live in a given area.

Researchers study

- **Geographic range-area inhabited by population.** Hydrilla-native to India & Sri Lanka-now in every continent because of human distribution.
- **Population density & distribution**
 - Population density-number of individuals per area unit.
 - Distribution-how individuals are spaced out across the range of population (randomly, uniformly, concentrated)
- **Growth rate**-whether the population size increases, decreases, or remains the same.
- **Age structures-# of males & females of each age** (determine reproduction rates).

Factors That Affect Population Growth

- **Birth rate & Death rate**-populations grow if birth rate is greater than death rate.
- **Immigration and Emigration**
 - **Immigration**-individuals move into its range from elsewhere & population increases. Ex. **More acorns=more squirrels**
 - **Emigration**-population decreases because individuals move out of the population's range. Ex. **Food shortage, overcrowding, finding mates, establish new territories.**

Exponential Growth

- When the generation of offspring is larger than the generation before it.
- The larger the populations gets, the faster it grows.
- With unlimited resources, a population will grow exponentially-regardless if fast or slow reproduction rates. Ex. Bacteria (fast), elephants (slow), organisms in new environment (fast)

Logistic Growth

- Organisms do not cover the earth, so exponential growth does not happen for long.
- Phases of Growth
 - Phase 1-Exponential Growth-resources unlimited, ind. grow & reproduce.
 - Phase 2-Growth Rate Slows Down-population still grows, rate slows.
 - Phase 3-Growth Stops-population remains stable
- S Curve graph p.135
- **Carrying Capacity**-the maximum number of individuals of a particular species that a particular environment can support.

What Can Be Done About Invasive Species? p. 136

CH 5.2 Limits to Growth

SC.912.L.17.8: Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.

SC.912.L.17.20-predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

Humans affect regional & global environments through agricultural, development, & industry. This has impacted the quality of Earth's natural resources including soil, water, and atmosphere.

Limiting factor-controls growth of a population.

Density-Dependent Limiting Factors-caused by #

- **Competition**-more individuals the faster they use resources. Major force behind evolutionary change.
- **Predation**- More moose =more wolves, more wolves =less moose, wolves die= more moose=less trees, less trees = less moose, less moose= more trees. Harvesting fish faster than birth rates.
- **Parasitism/disease**-parasites weaken hosts=disease or death. Can spread from one host to another. Ex. Virus that kills wolves=more moose = more ticks=sick/weak moose
- **Stress from Overcrowding**-fighting, stress weakens body, females neglect offspring, lower birth rates or death.

Density Independent Factors-do not depend on population density

- **Weather or natural disaster**-fires, floods, drought, hurricanes can extinguish local populations (insects, coral reefs, fish in river)

Controlling introduced species-Ex. Hydrilla

- Density dependent population limiting factors control it (plant eating fish & insects)
- In USA, there are no fish/insect to eat hydrilla-runaway growth!
- Artificial dependent factors-herbicides & mechanical removal. Temporary &expensive.
- Grass carp (not native) eat hydrilla-so USA uses sterilized carp to control plant.

CH 5 Assessment: Q1-3,5-6, 9-16.

CH 5.3 Human Population Growth

USA has low birth rate.

Underdeveloped countries have high birth rate.

Globally-4 humans/second.

9 billion in your lifetime.

Historical Overview

- Tends to increase-rate of increases have changed dramatically.
- Early humans-growth rate slow-life was harsh.
- Past generations-large families to overcome half children would not reach adulthood.
- Industrial Revolution-civilization advanced & growth rate increase exponentially.
- Malthus-only war, famine, & disease could limit human population.
- Today-Reached peak 1962-1963 & began to drop.
 - Took 123 years to double from 1 to 2 billion. (1804-1927)
 - 33 years to increase 2 to 3 billion.
 - Since 1999-takes longer to grow

Patterns of Human Population Growth

Demographics-study of human population (birth rates, death rates, & age structure)

Demographic Transitions-dramatic changes from high birth & death rates to low birth & death rates.

- USA, Japan, & Europe –population growth slowed
- S. America, Africa, & Asia –death rate begins to fall, birth rates high
- China & India (large ongoing population)
- Our J Shaped Growth Curve may change into Logistic Growth Curve.

Age Structure & Population Growth

- USA-same population numbers in age groups. Steady growth rate.
- Guatemala-more children & teens than adults. Population will double in 30 years.

Future Population Growth

Consider-age structures, diseases like AIDS in Africa/Asia

2050-9 billion people

Will grow more slowly, but will still grow!

CH 5 Assessment: Q1-3, 5-6, 9-16.