Objectives
- To learn the language and tools used to study populations characteristics.
- To discuss factors influencing changes in population numbers in developing and developed countries.
- To discuss some of the controversies surrounding population growth.
- To define carrying capacity and how it effects population growth.

Species with different reproductive strategies have different life expectancies

Dispersion Patterns

What characterizes opportunistic or r-Selected Species?
1. .................................................................
2. .................................................................
3. .................................................................
4. .................................................................
5. .................................................................

What characterizes competitor or K-Selected Species?

**General Types of Simplified Population Change Curves Found in Nature**

- **Stable Populations**
  - Populations where the number of individuals remains relatively constant over time.

- **Growing Populations**
  - Populations that are increasing in size due to more births than deaths.

- **Declining Populations**
  - Populations that are decreasing in size due to more deaths than births.

**Carrying Capacity**

1. **Carrying capacity** is the number of individuals who can be supported in an area within natural resource limits, without degrading the natural social, cultural & economic environment for present & future generations.

2. The carrying capacity for any given area is not fixed. It can be altered by improved technology, but usually it changes for the worse by pressures which accompany a population increase.

3. As the environment is degraded, carrying capacity shrinks. No population can live beyond the environment's carrying capacity for very long.

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**What Happens if the Population Size Exceeds the Carrying Capacity?**

1. Give an example with humans.

2. Give an example with animals.

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**Conservation Biology: Sustaining Wildlife Populations**

**Definition:** A multi-disciplinary science that uses science to take action to preserve species and ecosystems.

1. Biodiversity is necessary to life on earth.
2. Humans should not cause the extinction of wildlife populations and species, or disrupt vital ecological processes.
3. The best way to preserve earth's biodiversity and ecological functions is to protect ecosystems.

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**Do Predators Control Population Size?**

**Some of the time, all the time?**

- **Top Down Hypothesis:** When primary production controls population size.
- **Bottom Up Hypothesis:** When primary production controls population size.

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What is population dynamics?

How populations change in:
1. Size
2. Density
3. Dispersion
4. Age distribution

In response to environmental stress or changes in environmental conditions.

The Human Population: Growth and Distribution

The population of the city has increased from less than 5 million in 1965 when the first picture was taken, to more than 30 million in 1998. Population densities within the city are some of the highest in the world and the urban area has doubled to more than 600 square km, with a predicted population of 14 million by 2015 (UN Population Division).

What determines population change?

1. **Crude Birth Rate**: number of live births per 1000 people/year
2. **Crude Death Rate**: number of deaths per 1000 people/year
3. **Immigration and Emigration**

Key Demographic Indicators

Annual World Population Growth

Crude Birth & Death Rates
Fertility Rates

1. Replacement Fertility Rate: number of children a couple gives birth to, in order to replace themselves.

1. Total Fertility Rate: Estimate of the average number of children a woman will have during her childbearing age (15 – 49 years)

What Limits Population Growth?

1. ..............................................................
2. ..............................................................
3. ..............................................................
4. ..............................................................

Population Change =

\[(1 + 2) - (3 + 4)\]

When do you get zero population growth?

Changing Fertility Rates in the US

US Population increased from 76m (1900) to 285 m (2001)
Growth rate is 1% per year (3 million people in 2001)

Global: Births per Woman

Age-Sex Pyramids

How does age structure affect population growth?

Animated pyramids

Pyramids from around the world
http://www.census.gov/ipc/www/idbpyr.html