Glencoe Science

Biology

Interactive Classroom

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Mc Graw Hill Glencoe

Chapter 4 Population Ecology

EXIT

Click on a lesson name to select.

4.1 Population Dynamics

Population Density

- The number of organisms per unit area

Spatial Distribution

- Dispersion is the pattern of spacing of a population.

4.1 Population Dynamics

Population Ranges

- A species might not be able to expand its population range because it cannot survive the abiotic conditions found in the expanded region.

Common dolphin

Pupfish

4.1 Population Dynamics

Population-Limiting Factors

- There are two categories of limiting factors—density-independent factors and density-dependent factors.

4.1 Population Dynamics

Density-Independent Factors

- Any factor in the environment that does not depend on the number of members in a population per unit area is a density-independent factor.
  - Weather events
  - Fire
  - Human alterations of the landscape
  - Air, land, and water pollution

4.1 Population Dynamics

Density-Dependent Factors

- Any factor in the environment that depends on the number of members in a population per unit area is a density-dependent factor.
  - Biotic factors
  - Disease
  - Competition
  - Parasites

4.1 Population Dynamics

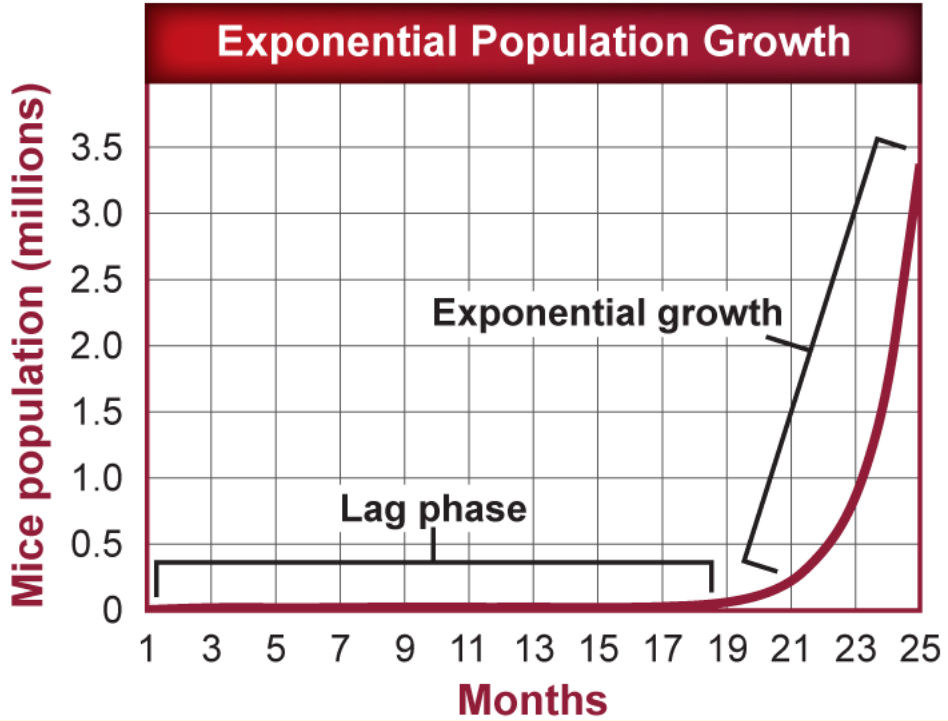
Population Growth Rate

- The population growth rate (PGR) explains how fast a given population grows.
- The natality of a population is the birthrate in a given time period.

4.1 Population Dynamics

Exponential Growth Model

- Exponential growth occurs when the growth rate is proportional to the size of the population.

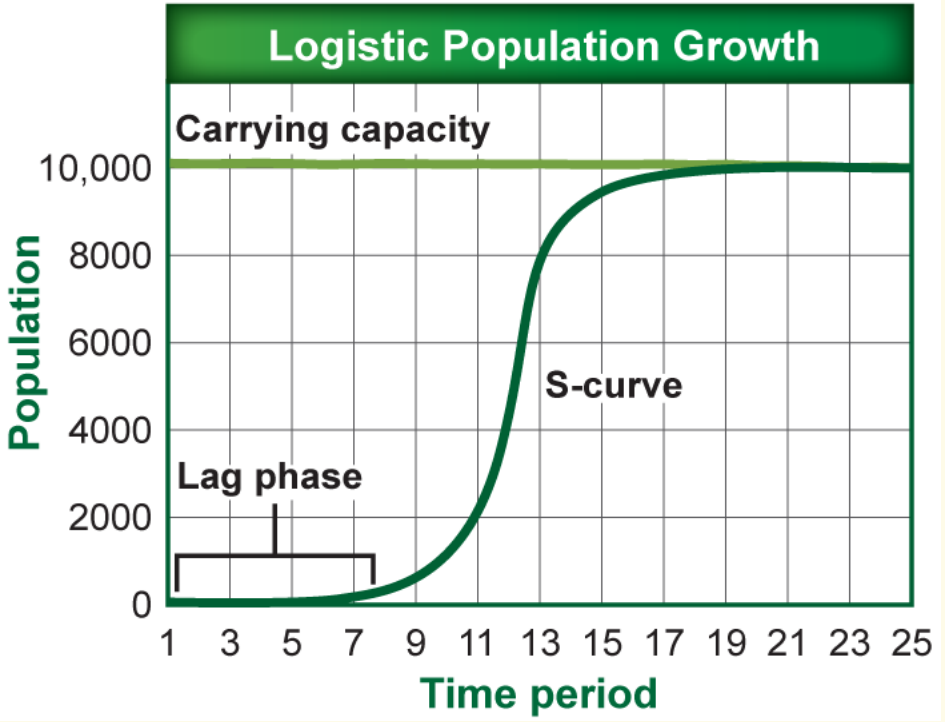


- All populations grow exponentially until some limiting factor slows the population's growth.

4.1 Population Dynamics

Logistic Growth Model

- The population's growth slows or stops following exponential growth, at the population's carrying capacity.

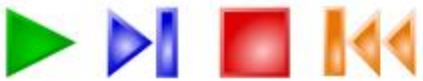


4.1 Population Dynamics

- A population stops increasing when the number of births is less than the number of deaths or when emigration exceeds immigration.

Concepts In Motion

Characteristics Of Population Growth



4.1 Population Dynamics

Carrying Capacity

- The maximum number of individuals in a species that an environment can support for the long term is the carrying capacity.
- Carrying capacity is limited by the energy, water, oxygen, and nutrients available.

4.1 Population Dynamics

Reproductive Patterns

- Species of organisms vary in the number of births per reproduction cycle, in the age that reproduction begins, and in the life span of the organism.

4.1 Population Dynamics

- The rate strategy, or *r*-strategy, is an adaptation for living in an environment where fluctuation in biotic or abiotic factors occur.
- An *r*-strategist is generally a small organism.
- Short life span
- Produces many offspring

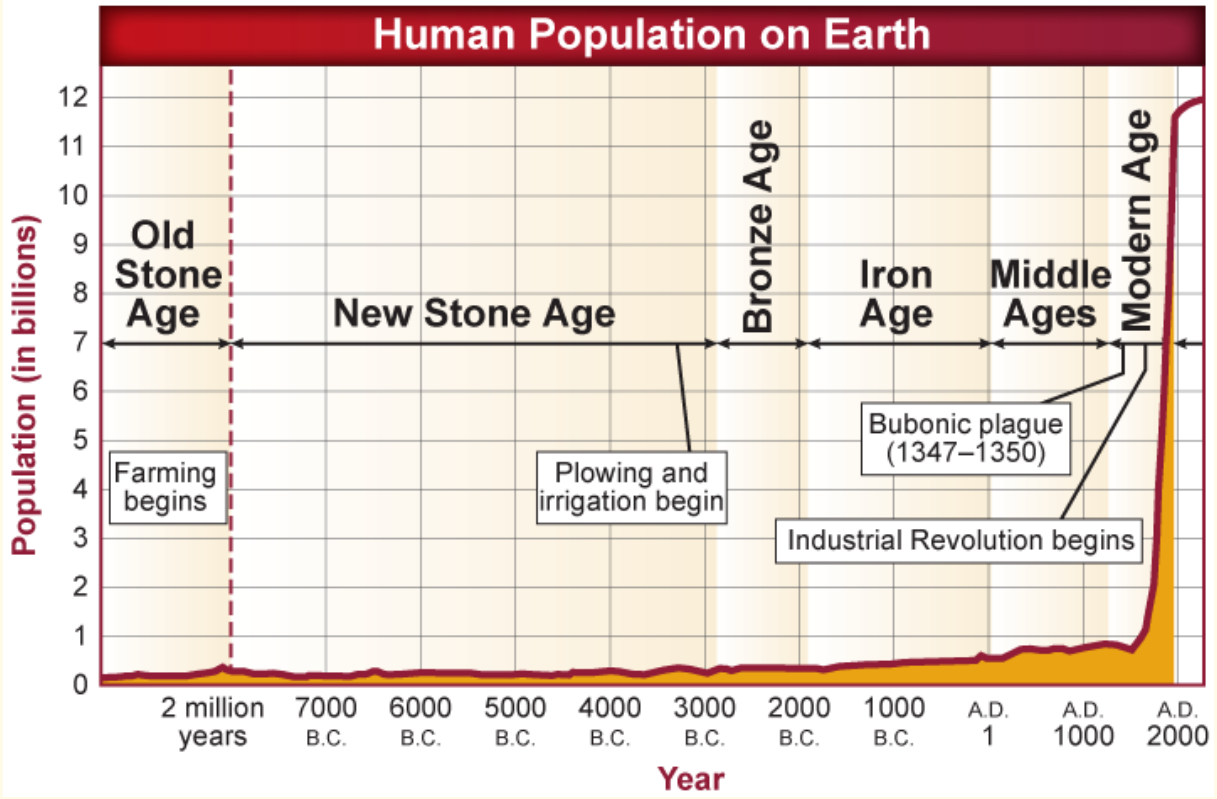
4.1 Population Dynamics

- The carrying-capacity strategy, or *k*-strategy, is an adaptation for living in stable environments.
- A *k*-strategist is generally a larger organism.
- Long life span
- Produces few offspring

4.2 Human Population

Human Population Growth

- The study of human population size, density, distribution, movement, and birth and death rates is demography.



4.2 Human Population

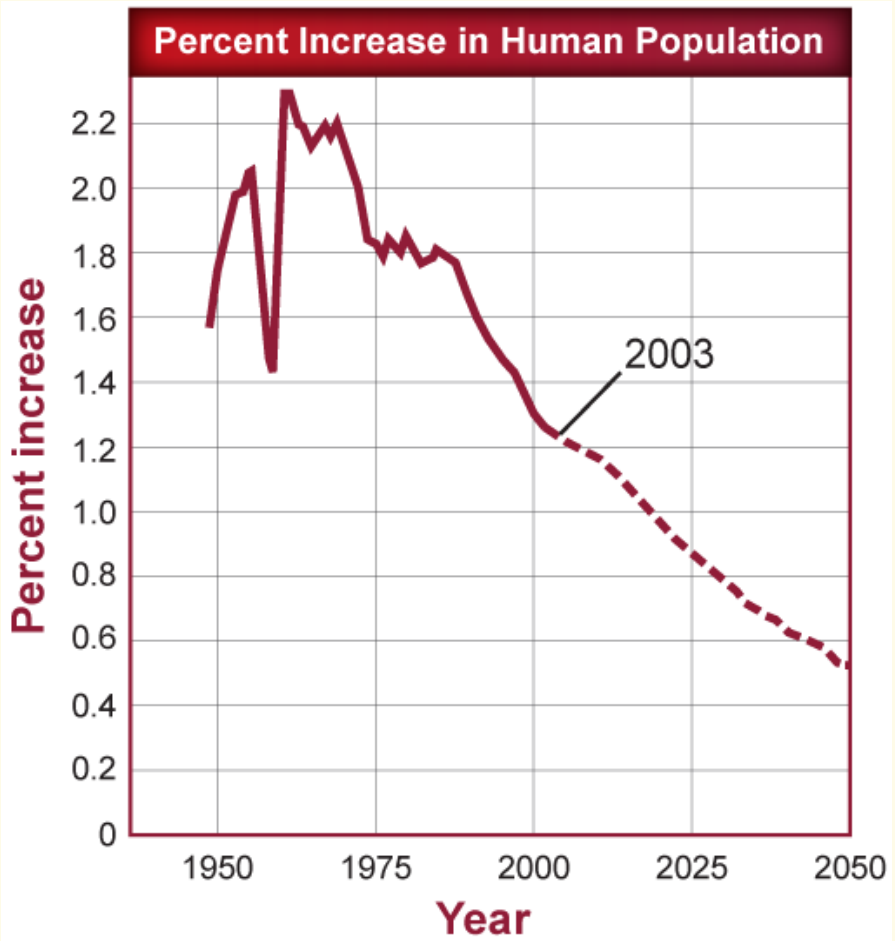
Technological Advances

- For thousands of years, environmental conditions kept the size of the human population at a relatively constant number below the environment's carrying capacity.
- Humans have learned to alter the environment in ways that appear to have changed its carrying capacity.

4.2 Human Population

Human Population Growth Rate

- Although the human population is still growing, the rate of its growth has slowed.



4.2 Human Population

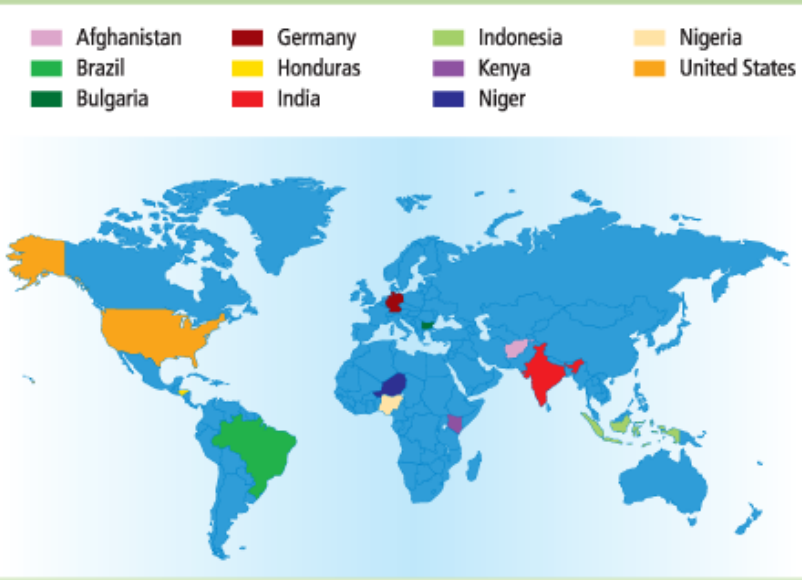
Trends in Human Population Growth

- Population trends can be altered by events such as disease and war.
- Human population growth is not the same in all countries.

Population Growth Rates of Countries

Country	Population growth rate (percent)
Afghanistan	4.77
Brazil	1.06
Bulgaria	−0.89
Germany	0.0
Honduras	2.16
India	1.40
Indonesia	1.45
Kenya	2.56
Niger	2.63
Nigeria	2.37
United States	0.92

Location



Concepts In Motion

Table 4.1 Population Growth Rates of Countries

Country	Population growth rate (percent)	Location
Afghanistan	4.77	
	0.92	
	-0.89	
Germany	0.0	
	2.56	
	1.40	
	1.45	
	2.16	
Niger	2.63	
	2.37	
	1.06	

Afghanistan Germany Indonesia Nigeria
Brazil Honduras Kenya United States
Bulgaria India Niger

United States | Bulgaria | Brazil | Kenya | Nigeria

Honduras | Indonesia | India

Drag each option to its corresponding population growth rate

Reset Submit Show me

4.2 Human Population

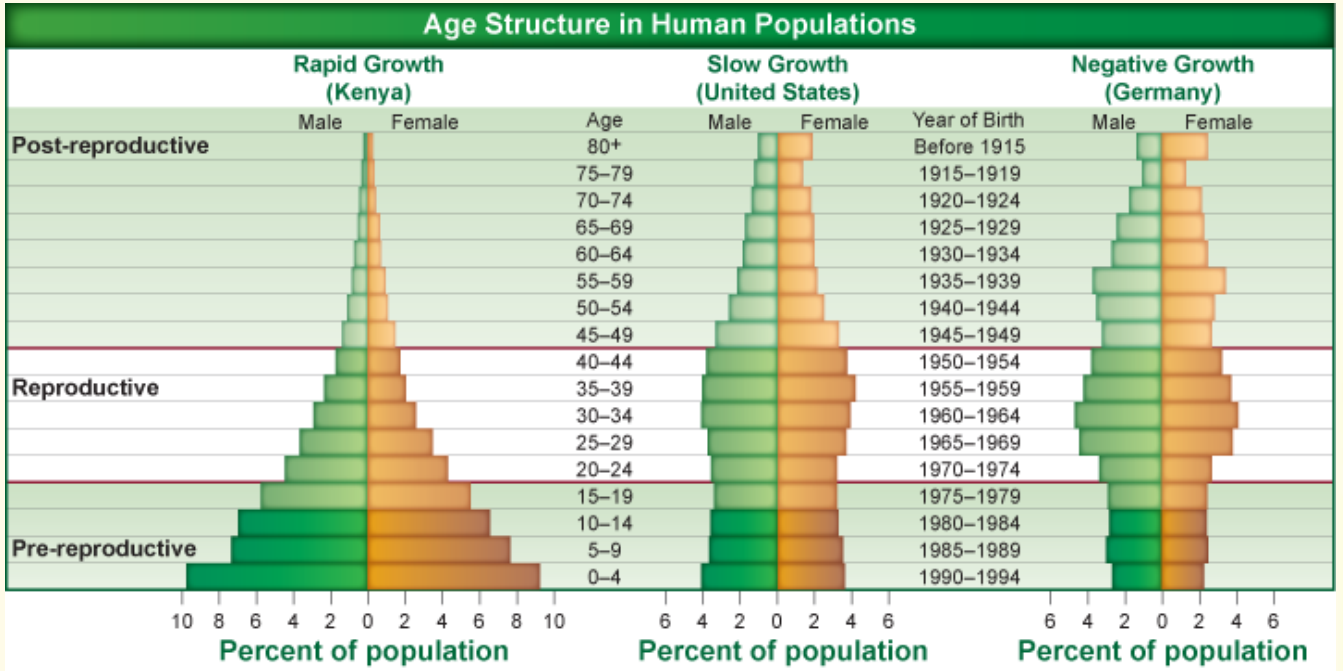
Zero Population Growth

- Zero population growth (ZPG) occurs when the birthrate equals the death rate.
- The age structure eventually should be more balanced with numbers at pre-reproductive, reproductive, and post-reproductive ages being approximately equal.

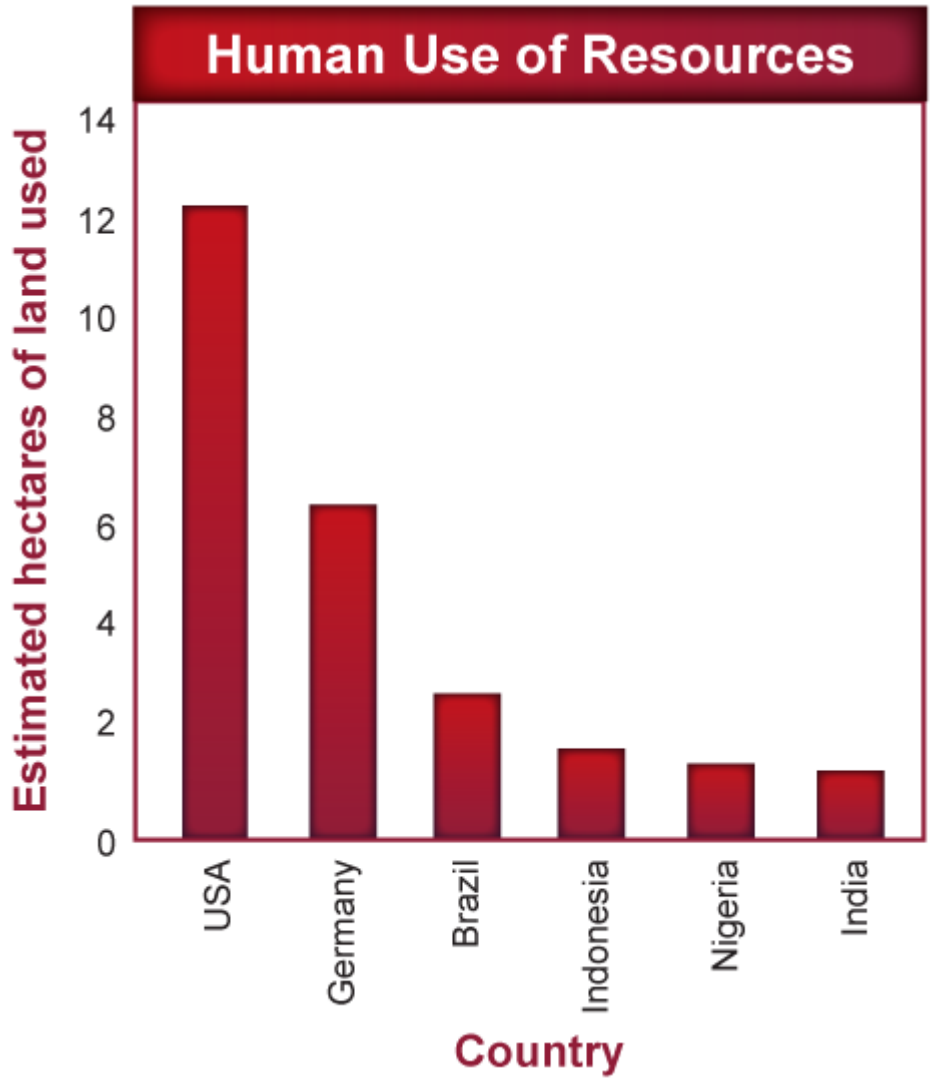
4.2 Human Population

Age Structure

- A population's age structure is the number of males and females in each of three age groups: pre-reproductive stage, reproductive stage, and post-reproductive stage.



4.2 Human Population



Human Carrying Capacity

- Scientists are concerned about the human population reaching or exceeding the carrying capacity.
- An important factor is the amount of resources from the biosphere that are used by each person.

Chapter Resource Menu

Click on a hyperlink to view the corresponding lesson.

Chapter Diagnostic Questions

CheckPoint

What term is used to describe the number of individuals moving into a population?

A. emigration
B. imitation
C. immigration
D. migration

Chapter Diagnostic Questions

CheckPoint

What is population density?

A. pattern of spacing of a population in an area

B. number of organisms in an area

C. characteristics of a population

D. manner in which a population grows

Chapter Diagnostic Questions

CheckPoint

When does zero population growth occur?

A. when birth rate equals death rate

B. when death rate exceeds birth rate

C. when birth rate exceeds death rate

D. when there are zero births

4.1 Formative Questions

CheckPoint

Which is a density-dependent factor?

A. disease

B. fire

C. flooding

D. weather

4.1 Formative Questions

CheckPoint

Which is a density-independent factor?

A. competition

B. extreme cold

C. parasites

D. predation

4.1 Formative Questions

CheckPoint

Which factor can limit the carrying capacity of a population?

A. emigration

B. predation

C. available nutrients

D. extreme temperatures

4.2 Formative Questions

CheckPoint

The study of the size, density, distribution, and movement of the human population is _____.

A. bioinformatics

B. demography

C. ecology

D. ethnography

4.2 Formative Questions

CheckPoint

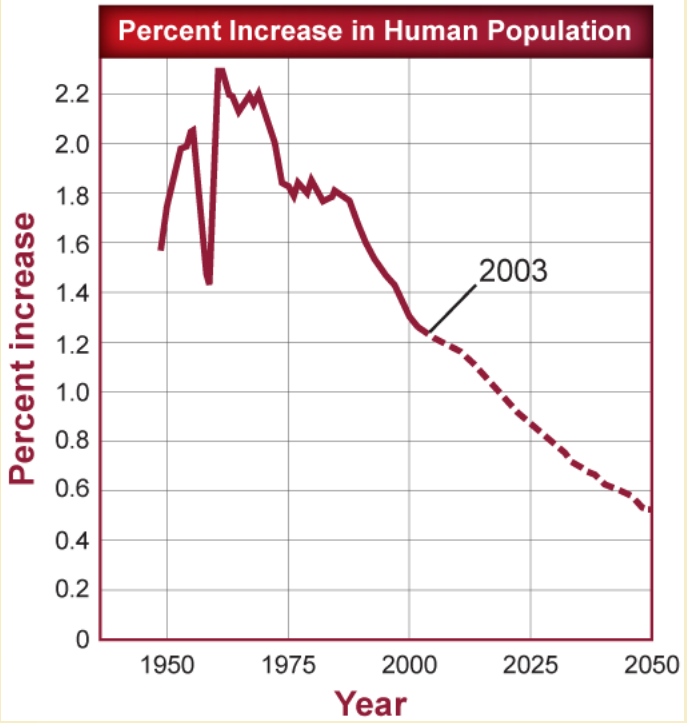
Which is a primary reason for the decline in the percent growth of the human population after 1962?

A. decreased agriculture

B. famine and wars

C. setbacks in medicine

D. voluntary population control



4.2 Formative Questions

CheckPoint

What will happen to the human population when the birthrate equals the death rate?

A. CDC

B. HPG

C. PGR

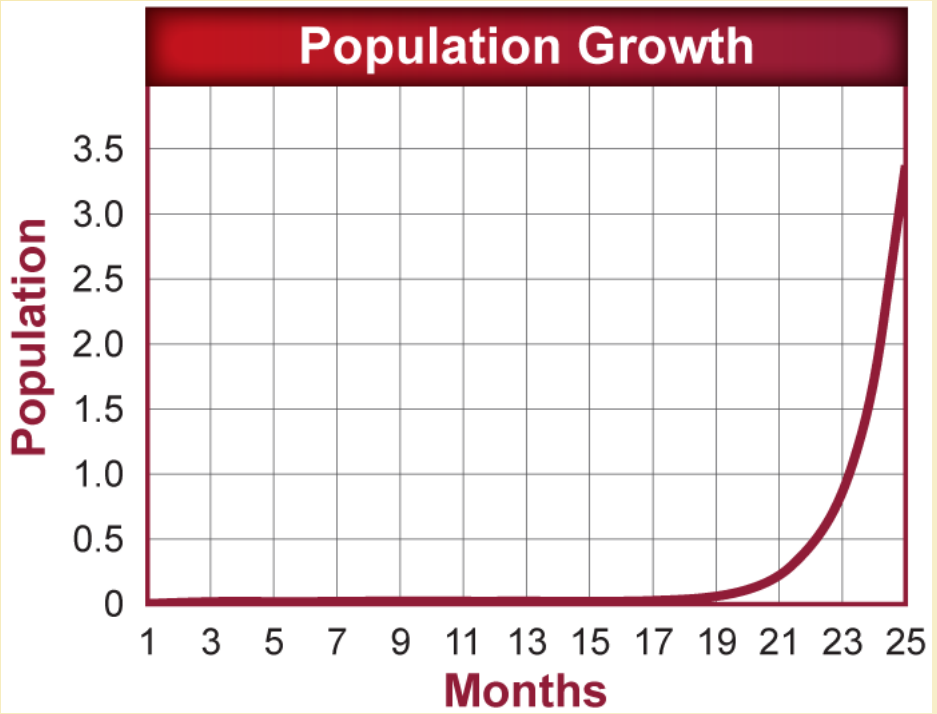
D. ZPG

Chapter Assessment Questions

CheckPoint

Which type of population growth model does this graph represent?

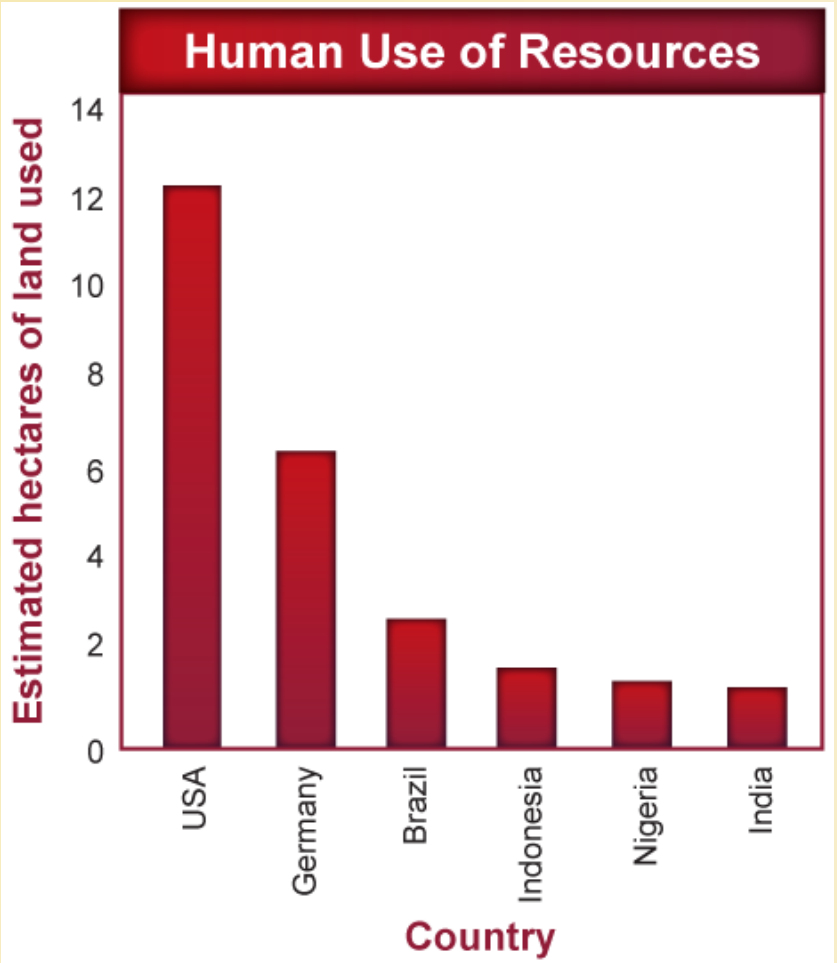
A. exponential
B. spatial
C. genetic
D. logistic



Chapter Assessment Questions

CheckPoint

Based on the information in the graph, infer which statement accurately represents the information provided.



Chapter Assessment Questions

CheckPoint

A. India has very little land for farming.

B. Germany is smaller per acre than the United States.

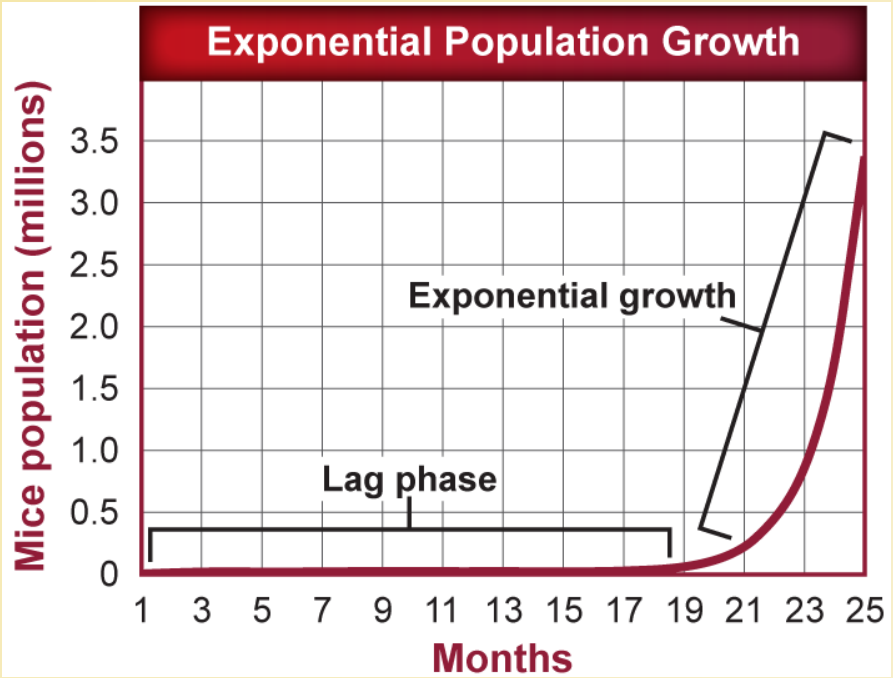
C. More land is used to support an individual in the United States.

D. A person in Indonesia requires more land than a person in Brazil.

Chapter Assessment Questions

CheckPoint

Use the graph to explain the growth of the mice population.



Chapter Assessment Questions

CheckPoint

Answer: If two adult mice breed and produce a litter and their offspring survive to breed, then the population grows slowly at first. This slow growth is defined as the lag phase. The rate of population growth begins to increase rapidly because the total number of organisms that are able to reproduce has increased. Exponential growth occurs when the growth rate is proportional to the size of the population. All populations grow exponentially until some limiting factor slows the population's growth.

Standardized Test Practice

CheckPoint

An ecologist estimates a population density of 2.3 lemmings per square meter of tundra. What would be the approximate number of lemmings over 1000 square meters of tundra?

A. 0.23

B. 23

C. 230

D. 2300

Standardized Test Practice

CheckPoint

The ecologist finds that over a 1000m^2 plot of tundra, lemmings tend to concentrate in clumps in drier areas. What is the term for this pattern of spacing?

A. density

B. dispersion

C. logistic spacing

D. spatial distribution

Standardized Test Practice

CheckPoint

Brine shrimp are able to survive only in certain lakes that have a very high salt concentration. Which is the correct population characteristic of brine shrimp?

A. It is density-dependent.

B. It is limited by biotic factors.

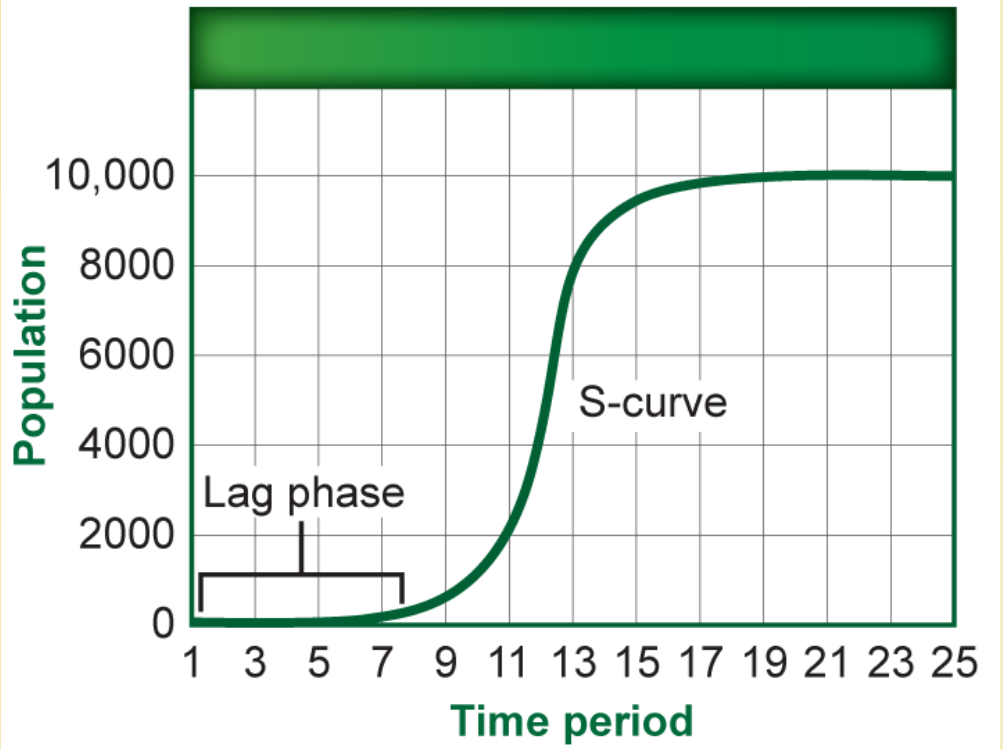
C. It has a limited spatial distribution.

D. It is randomly dispersed in the environment.

Standardized Test Practice

CheckPoint

Why does the population growth level off at 10,000?



Standardized Test Practice

CheckPoint

A. Biotic factors have made survival difficult.

B. The population has reached its carrying capacity.

C. Density-independent factors have slowed the growth of the population.

D. Immigration into the population has reached the maximum limit.

Standardized Test Practice

CheckPoint

Which organism is the best example of a *k*-strategist?

A. wolf

B. grasshopper

C. rabbit

D. whale

Glencoe Biology Transparencies

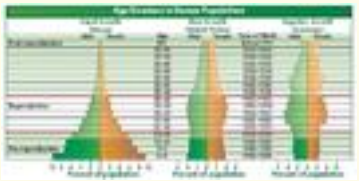
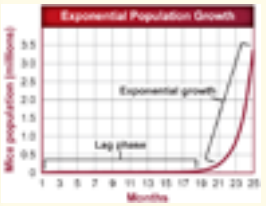
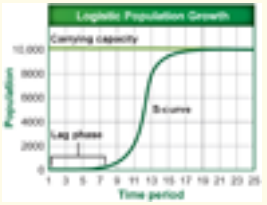
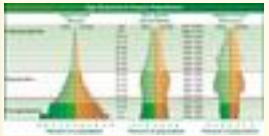


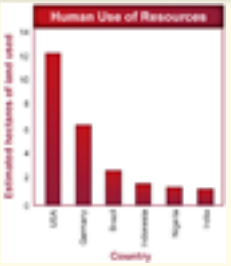
Image Bank


Exponential Population Growth
Exponential growth
Lag phase
Months


Logistic Population Growth
Carrying capacity
S-curve
Lag phase
Time period


Percent increase in Human Population
Percent increase
2000
Year




Human Use of Resources
Country

Vocabulary

Section 1

- population density
- dispersion
- density-independent factor
- density-dependent factor
- population growth rate
- emigration
- immigration
- carrying capacity

Vocabulary

Section 2

- demography
- demographic transition
- zero population growth (ZPG)
- age structure

Animation

Concepts In Motion

- Visualizing Population Characteristics
- Characteristics of Population Growth