

AP Environmental Science

Chapter 6: Populations

Objectives: Students should be able to...

6.1 - list the levels of complexity found in the natural world.

6.1.1 Define the following and describe what scientists study at each level.

6.1.1.1 Individual

6.1.1.4 Ecosystem

6.1.1.2 Population

6.1.1.5 Biosphere

6.1.1.3 Community

6.2 - contrast the ways in which density-dependent and density-independent factors affect population size.

6.2.1 Define the following population characteristics and explain why scientists study them.

6.2.1.1 Population size (N)

6.2.1.4 Population sex ratio

6.2.1.2 Population density

6.2.1.5 Population age structure

6.2.1.3 Population

distribution

6.2.2 Define and give examples of density-dependent factors.

6.2.2.1 Relate the terms limiting resources and carrying capacity to each other.

6.2.3 Define and give examples of density-independent factors.

6.3 - explain growth models, reproductive strategies, survivorship curves, and metapopulations.

6.3.1 Define intrinsic growth rate.

6.3.2 Sketch and describe the exponential growth model.

6.3.3 Sketch and describe the logistic growth model.

6.3.4 Explain how overshoots and die-offs relate to carrying capacity.

6.3.5 Describe how predation can affect populations of both the predator and prey (Figure 6.10)

6.3.6 Compare K-selected species characteristics with r-selected species characteristics.

6.3.7 Correlate K-selected species and r-selected species with their appropriate survivorship curves.

6.3.8 Explain why corridors are important to metapopulations.

6.4 - describe species interactions and the roles of keystone species.

6.4.1 Explain how the competitive exclusion principle leads to resource partitioning.

6.4.2 Describe the four different types of predators and explain why predation is beneficial.

6.4.3 Describe different defense mechanisms that prey have evolved in response to predators.

6.4.4 Define and give examples of the following symbiotic relationships.

6.4.4.1 Mutualism

6.4.4.2 Commensalism

6.4.4.3 Parasitism

6.4.5 Describe the role and characteristics of keystone species.

6.4.6 Define and give an example of an ecosystem engineer.

6.5 - discuss the process of ecological succession.

- 6.5.1 Define ecological succession.
- 6.5.2 Define and diagram primary succession and give examples of when this might occur.
- 6.5.3 Describe the soil formation process in primary succession.
- 6.5.4 Explain why weeds, grasses and wildflowers make good mid-successional plants.
- 6.5.5 Define and diagram secondary succession and give examples of when this might occur.
- 6.5.6 Describe the role pioneer species plays in succession. Give one example.
- 6.5.7 Explain how aquatic succession occurs.

6.6 - explain how latitude, time, area, and distance affect the species richness of a community.

- 6.6.1 Describe the trend of species richness in terms of latitude and time.
- 6.6.2 Define and describe the theory of island biogeography.
- 6.6.3 List three reasons why larger habitats contain more species.
- 6.6.4 Describe the trend between species richness and distance.
- 6.6.5 How does the theory of island biogeography relate to conservation?

AP Environmental Science

Chapter 18: Conservation of Biodiversity

Objectives: Students should be able to...

18.1- Describe inbreeding depression and explain how lack of genetic diversity causes inbreeding depression.

- 18.1.1 How does a population bottleneck cause decreased genetic diversity? Give an example.
- 18.1.2 How has the shift in farming from diversity based on environmental conditions to production based diversity created a decline in agricultural genetic diversity?
- 18.1.3 Differentiate between the five categories data deficient, extinct, threatened and near threatened and least concerned.
- 18.1.4 What would cause a species to be in a data deficient category?
- 18.1.5 Identify problems with placing species in the IUCN categories.
- 18.1.6 How does the decline in biodiversity affect declines in the functions of ecosystems?

18.2 - identify the causes of declining biodiversity.

- 18.2.1 Describe the anthropogenic causes of habitat loss in land and marine ecosystems.
- 18.2.2 Differentiate between alien and invasive species. Give 2 examples of invasive species.
- 18.2.3 Define overharvesting. What human activities lead to overharvesting?
- 18.2.4 Describe 2 major pieces of legislation that regulate the trade of plants and animals.
- 18.2.5 How do pollution and climate change affect biodiversity?

18.3- describe the single-species approach to conserving biodiversity including the major laws that protect species.

- 18.3.1 Describe the single species approach to conservation.
- 18.3.2 Summarize the major laws that focus on single species approach to conservation.

18.4- explain the ecosystem approach to conserving biodiversity and how size, shape, and connectedness affect the number of species that will be protected.

- 18.4.1 Explain SLOSS? Describe the benefits of each approach to ecosystem conservation.
- 18.4.2 Why are edge habitats considered in size and shape of protected areas?
- 18.4.3 What is a biosphere reserve and describe the zonation system.

Objectives: Students should be able to...

18.1 - understand how genetic diversity, species diversity, and ecosystem function are changing over time.

- 18.1.1 Identify the current rate of species extinction
- 18.1.2 Identify the characteristics that make the current 6th mass extinction different than previous extinctions
- 18.1.3 Define inbreeding depression and be able to explain the genetics behind why it is harmful
- 18.1.4 Identify examples of inbreeding depression
- 18.1.5 Explain why and how humans have altered the biodiversity of livestock and crops
- 18.1.6 Describe the changes that have crops have experienced over the past century and the possible dangers of these dangers
- 18.1.7 Explain what scientists have done in response to the decline in seed diversity
- 18.1.8 Differentiate between the categories of species as defined by IUCN
 - 18.1.8.1 Data-deficient
 - 18.1.8.2 Extinct
 - 18.1.8.3 Threatened
 - 18.1.8.4 Near-threatened
 - 18.1.8.5 Least concern
- 18.1.9 Compare and contrast the percentage of least concern, near threatened, and threatened species of mammals, birds, and amphibians

18.2 - identify the causes of declining biodiversity.

- 18.2.1 Identify the greatest cause of species decline and extinction
- 18.2.2 Explain why habitat loss can be so disruptive to species
- 18.2.3 Compare and contrast forest loss in different countries and the reasons for the gain or loss in forests

- 18.2.4 Differentiate between the following terms and list examples of each
 - 18.2.4.1 Native species
 - 18.2.4.2 Alien or exotic species
 - 18.2.4.3 Invasive species
- 18.2.5 Identify the method of transportation, native location, new location, and explain the effects of each of the following species
 - 18.2.5.1 Kudzu vine
 - 18.2.5.2 Zebra mussel
 - 18.2.5.3 Silver carp
- 18.2.6 Explain why invasive alien species can be harmful to an ecosystem
- 18.2.7 Define overharvesting and list the human activities that can lead to overharvesting.
- 18.2.8 Describe what the following pieces of legislation mean for conservation of biodiversity
 - 18.2.8.1 Lacey Act
 - 18.2.8.2 CITES
- 18.2.9 Explain the connection between pollution and biodiversity as well as climate change and biodiversity
- 18.3 - describe the single-species approach to conserving biodiversity including the major laws that protect species.**
 - 18.3.1 Describe how the following pieces of legislation help conserve single species biodiversity
 - 18.3.1.1 Marine Mammal Protection Act
 - 18.3.1.2 Endangered Species Act
 - 18.3.1.3 Convention on Biological Diversity
 - 18.3.2 Explain the controversy surrounding the Endangered Species Act and identify the examples given
- 18.4 - explain the ecosystem approach to conserving biodiversity and how size, shape, and connectedness affect the number of species that will be protected.**
 - 18.4.1 Explain the connection between the theory of island biogeography and planning of protected areas
 - 18.4.2 Define SLOSS and why there is a debate surrounding it
 - 18.4.3 Connect edge habitat to SLOSS and the effects of edge habitat
 - 18.4.4 Define biosphere reserves and identify the characteristics that make them unique