

CHAPTER 22—HUMANS AND THE ENVIRONMENT

MULTIPLE CHOICE

1. Which of the following processes is not primarily caused by humans?
- air pollution
 - the greenhouse effect
 - thinning of the ozone layer
 - increased carbon dioxide levels

ANS: B DIF: 2 OBJ: 22-1.3

2. The extinction of species
- is a problem limited to the tropics.
 - has been accelerated by the activities of people.
 - is a problem only where topsoil and groundwater are limited.
 - will not be a problem in the coming century.

ANS: B DIF: 1 OBJ: 22-2.4

3. Which of the following groups includes the greatest number of species?
- mammals
 - insects
 - plants
 - vertebrates

ANS: B DIF: 1 OBJ: 22-1.5

4. Ecosystem disruption
- threatens the existence of thousands of species.
 - increases biodiversity.
 - protects natural habitats.
 - has no effect on biodiversity.

ANS: A DIF: 1 OBJ: 22-2.5

5. Which of the following is a benefit of biodiversity to humans?
- food
 - timber
 - medicines
 - All of the above

ANS: D DIF: 1 OBJ: 22-1.5

6. The steps needed to solve environmental problems include
- waiting for the affected species to leave an ecosystem that is in trouble.
 - leaving the problems for the next generation to address.
 - educating the public about the problems and the costs of their solutions.
 - taking any necessary action, regardless of the consequences or adverse effects.

ANS: C DIF: 1 OBJ: 22-3.4

7. The biggest threats to the survival of endangered species include each of the following *except*
- invasive species.
 - habitat destruction.
 - ecotourism.
 - hunting.

ANS: C DIF: 2 OBJ: 22-2.4

8. The plan for restoring Everglades National Park includes
- planting more melaleuca trees.
 - building a dam to prevent further water loss from the area.
 - restoring some of the water pathways to their previous, natural courses.
 - building more drainage canals.

ANS: C DIF: 1 OBJ: 22-3.2

9. The destruction of the ozone layer could cause an increase in
- global warming.
 - acid precipitation.
 - biological magnification.
 - skin cancer.

ANS: D DIF: 1 OBJ: 22-1.3

10. Chlorofluorocarbons (CFCs) in the atmosphere
- cause ozone to be broken down.
 - change oxygen into ozone.
 - convert sunlight into ozone.
 - convert ozone into methane.

ANS: A DIF: 1 OBJ: 22-2.1

11. Chlorofluorocarbons (CFCs) are a problem because they
- corrode aerosol cans and release iron oxide into the atmosphere.
 - are released by air conditioners into the groundwater.
 - attack ozone molecules in the upper atmosphere.
 - were once thought to be a hazard, but avoiding them now causes unnecessary expense for industry.

ANS: C DIF: 1 OBJ: 22-2.1

12. Chlorofluorocarbons (CFCs) were once used
- in plastic-foam manufacturing.
 - as refrigerants.
 - as aerosol propellants.
 - All of the above

ANS: D DIF: 1 OBJ: 22-2.1

13. Ozone in the upper atmosphere
- leads to formation of acid precipitation.
 - combines readily with water vapor.
 - absorbs harmful radiation from the sun.
 - All of the above

ANS: C DIF: 1 OBJ: 22-1.3

14. As a result of the discovery of the ozone hole,
- tall smokestacks were placed on power plants.
 - the production of most chlorofluorocarbons (CFCs) was ended during the 1990s.
 - most countries have agreed to reduce the amounts of carbon dioxide they produce.
 - DDT was banned in Europe, the United States, and Canada in the 1970s.

ANS: B DIF: 1 OBJ: 22-2.1

15. The heat-trapping effect of some gases in the atmosphere can be compared to
- the way snow melts on a sunny day.
 - the way glass traps heat inside a greenhouse.
 - the way water condenses on a glass of ice.
 - the way a teakettle holds water on a stove.

ANS: B DIF: 1 OBJ: 22-1.3

16. Scientists strongly suspect that temperatures are increasing on Earth because
- decomposers essential to recycling matter are being destroyed.
 - too much oxygen is being given off by plants.
 - increasing carbon dioxide in the atmosphere is trapping more heat.
 - Earth is tilting further toward the sun in the summer.

ANS: C DIF: 1 OBJ: 22-2.2

17. Rising coastal sea levels are expected to result from
- increased volcanic activity on the ocean floor.
 - global warming.
 - ozone layer depletion.
 - acid precipitation.

ANS: B DIF: 2 OBJ: 22-2.2

18. burning of fossil fuels : atmospheric carbon dioxide ::
- greenhouse effect : CFCs
 - atmospheric carbon dioxide : global warming
 - ground level ozone : carbon dioxide
 - ozone : global warming

ANS: B DIF: 2 OBJ: 22-2.2

19. Which of the following statements provides the best explanation for the disruption of ecosystems by pollutants?
- Pollutants differ chemically from naturally occurring substances.
 - Only humans have uses for pollutant chemicals.
 - Chemicals can undergo biological magnification and become highly concentrated in certain organisms.
 - All pollutants are chemicals that can never be broken down, so they accumulate in ecosystems.

ANS: C DIF: 3 OBJ: 22-2.3

20. How can human populations live in a sustainable way?
- by slowing or reversing human population growth
 - by developing new technologies
 - by reducing consumption of natural resources
 - All of the above

ANS: D DIF: 1 OBJ: 22-2.6

COMPLETION

1. Rock layers in Earth's interior are part of the _____.

ANS: geosphere

DIF: 1 OBJ: 22-1.2

2. The field of study called _____ uses biological principles to look at the relationships between humans and the biosphere.

ANS: environmental science

DIF: 1 OBJ: 22-1.1

3. Scientific evidence suggests that the release of large quantities of chlorofluorocarbons (CFCs) has resulted in thinning of the _____ in the upper atmosphere.

ANS: ozone layer

DIF: 1 OBJ: 22-2.1

4. Evidence suggests that the atmospheric levels of _____ have increased significantly in the last two hundred years and may result in a significant warming of Earth's atmosphere.

ANS: carbon dioxide

DIF: 1 OBJ: 22-2.2

5. A location that has 17 species of birds has greater _____ than a location that has 10 species of birds.

ANS:
species richness
species diversity

DIF: 1 OBJ: 22-1.4

6. A strategy for conserving biodiversity in developing countries is _____, in which people who want to visit the local ecosystem pay money for guides, food, and lodging.

ANS: ecotourism

DIF: 1 OBJ: 22-3.3

7. A crucial argument made by promoters of biodiversity conservation is that there are many undiscovered _____ that have potential value to humans and that are primarily located in areas being subjected to habitat destruction.

ANS: species

DIF: 1 OBJ: 22-1.5

8. The field of study called _____ seeks to identify and maintain natural areas.

ANS: conservation biology

DIF: 1 OBJ: 22-3.1

9. Many migratory birds have winter _____ outside the United States, so conservation efforts must be international.

ANS: habitats

DIF: 1 OBJ: 22-3.3

10. The amount of _____ habitat present in the Florida Everglades had declined by about 50 percent by the end of the 20th century.

ANS: wetland

DIF: 1 OBJ: 22-3.2

11. The phenomenon called the _____ is the mechanism that keeps some of the energy absorbed by Earth from radiating back out to space.

ANS: greenhouse effect

DIF: 1 OBJ: 22-1.3

12. Chemicals called _____ catalyze the breakdown of ozone into molecular oxygen.

ANS:

CFCs

chlorofluorocarbons

chlorofluorocarbons (CFCs)

CFCs (chlorofluorocarbons)

DIF: 1 OBJ: 22-2.1

13. Pollutants called _____ can convert ozone in the atmosphere into oxygen, thereby diminishing the protective ozone layer.

ANS:

CFCs

chlorofluorocarbons

chlorofluorocarbons (CFCs)

CFCs (chlorofluorocarbons)

DIF: 1

OBJ: 22-2.1

14. The natural heat-trapping ability of carbon dioxide, methane, and nitrous oxide in the atmosphere is known as the _____.

ANS: greenhouse effect

DIF: 1

OBJ: 22-1.3

15. Many scientists have hypothesized that the increased levels of carbon dioxide in the atmosphere are causing global _____.

ANS: warming

DIF: 1

OBJ: 22-2.2

16. The ability to fulfill human needs in a way that allows the human population to survive indefinitely is called _____.

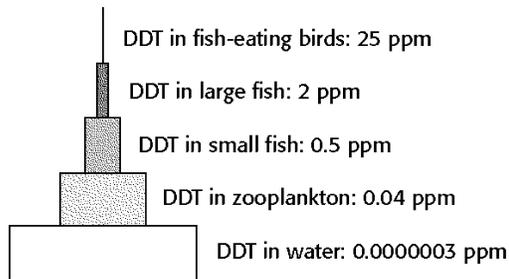
ANS: sustainability

DIF: 1

OBJ: 22-2.6

PROBLEM

1. The diagram below shows the concentration of the pesticide DDT in water and in a number of organisms that make up a food chain.



Refer to the illustration above. Explain how DDT and other toxic substances can become concentrated in organisms and how the substance is transferred up through a food chain. Write your answer in the space below.

ANS:

If there is a toxic substance such as DDT in an organism's food, it will pass through the organism's body. These substances are often taken up and stored in body tissues. When another organism ingests the organism containing stored toxins, it can also take up and store the toxins. The toxic substances become increasingly concentrated as they move up through the food chain because each successive organism consumes several contaminated organisms. This increased concentration is called biological magnification.

DIF: 3

OBJ: 22-2.3

2. Nitrogen fertilizer is added to soil in virtually all agricultural areas of the world. The use of nitrogen fertilizer greatly increases the amount of food produced. However, nitrogen fertilizer can also affect the ecology of an area. The data presented in the table below were obtained in an experiment conducted to evaluate the effects of nitrogen fertilizer on grass species diversity. Nitrogen fertilizer was applied yearly to an experimental plot, beginning in 1856.

Year	1856	1872	1949
Total number of grass species	49	15	3
Number of species producing more than 10% of the total dry weight of all species combined	2	3	1
Number of species producing more than 50% of the total dry weight of all species combined	0	1	1
Number of species producing more than 99% of the total dry weight of all species combined	0	0	1

Write your answers to the following in the space below.

- Write three inferences you can make from the data.
- How could this experiment have been designed differently to make it a better test of the effects of nitrogen fertilizer on grass species diversity?

ANS:

- The following are some possible inferences:
 - The total number of grass species decreased over time and with exposure to nitrogen fertilizer.
 - At the beginning of the experiment, there was no one dominant species of grass. Over time and with exposure to nitrogen fertilizer, a few species became dominant.
 - Prolonged use of nitrogen fertilizer encourages the growth of one or at least only a few dominant species.
- The experiment should have included a control plot that did not receive nitrogen fertilizer. With the experiment as presented, the effects of nitrogen fertilizer cannot be distinguished from the effects of time.

DIF: 3

OBJ: 22-1.5

ESSAY

- Explain how species richness and species evenness differ. Write your answer in the space below.

ANS:

Species richness is the number of species in an area. Species evenness takes into account the relative number of individuals of each species in an area.

DIF: 1

OBJ: 22-1.4

2. How many species of organisms are there in the world? Explain your answer. Write your answer in the space below.

ANS:

No one is certain how many species there are. About 2 million have been named and described, but the total number may be between 2 million and 100 million.

DIF: 1 OBJ: 22-1.4

3. Compare and contrast restoration biology and conservation biology. Write your answer in the space below.

ANS:

Restoration biology is concerned with rebuilding badly damaged ecosystems. Conservation biology is concerned with protecting areas that retain most of their biodiversity. Both disciplines use biological knowledge to help conserve biodiversity.

DIF: 1 OBJ: 22-3.1

4. Why must efforts to conserve migratory birds be international? Give an example of such efforts. Write your answer in the space below.

ANS:

Conservation efforts must be international because migratory birds fly long distances and live in different countries at different times of the year. One example is the effort by the United States and Canada to save the whooping crane.

DIF: 1 OBJ: 22-3.3

5. How did the diversion of water from the Everglades lead to environmental problems? Write your answer in the space below.

ANS:

The diversion of water from the Everglades reduced the amount of groundwater, leading to water shortages in Miami and surrounding areas and to changes in the native ecosystems. Florida Bay, south of the Everglades, became excessively salty because it no longer received the fresh water that had passed through the Everglades.

DIF: 1 OBJ: 22-3.2

6. Relate the greenhouse effect to global warming. Write your answer in the space below.

ANS:

The greenhouse effect is the natural phenomenon in which certain gases in the atmosphere, such as carbon dioxide and water vapor, absorb heat and reflect it back onto Earth, resulting in the warming of Earth. This effect is intensified by increased concentrations of the greenhouse gases in the atmosphere due to human activities. The increase in these gases causes an increase in the atmosphere's ability to trap heat, thus causing temperatures to rise gradually—a trend known as global warming.

DIF: 2 OBJ: 22-1.2

7. Many environmental problems require international cooperation between governments. However, individuals can also have an impact on the environment. List four things that you or your classmates could do to help solve environmental problems. Write your answer in the space below.

ANS:

Answers will vary but could include the following: recycle or reuse materials; buy recycled paper and other recycled products; carpool; use public transportation, walk, or ride a bike instead of driving; turn off lights when not in use; turn off water when not in use; use water- and energy-saving devices or appliances; and plant native plants.

DIF: 2

OBJ: 22-3.5