

Answers to Sample Exam

1	B	11	C
2	B	12	A
3	D	13	C
4	C	14	C
5	C	15	B
6	B	16	C
7	B	17	D
8	B	18	A
9	B	19	C
10	B	20	A

Ecosystems Conservation

Species Are Disappearing at an Alarming Rate

- Species are disappearing at an alarming rate
- Biological extinction is the eventual fate of all species, but humans are greatly increasing the extinction rate
- According to the United States Endangered Species Act, a species is declared endangered when it is in danger of becoming extinct
- A threatened species is one in which the population has become greatly diminished and will probably become endangered

National Parks: preserve ecosystems?

- The National Park System includes some of the most complete and naturally functioning ecosystems in the country, and habitat preserved within park boundaries affords many species an oasis of survival. But even park wildlife is in jeopardy.
- The boundaries of most large national parks were created primarily to protect scenery, not ecosystems. This shortcoming of the national parks became clear in 1987, when biologist William Newmark published in the journal *Nature* the results of his study of carnivores, hoofed animals, and rabbits in 14 national parks in the western United States and Canada. He discovered that 43 percent of his study species had become extinct in the areas he surveyed.

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Humans Contribute to Declining Biological Diversity

- Fragmentation of habitat for housing, agriculture leads to species decline
- Pollution greatly affects populations
- Biotic pollution (introduction of exotics) harms native species due to competition, predation, or interbreeding
 - The zebra mussel from the Caspian, introduced into the American Great Lakes
 - The ctenophore *Mnemiopsis*, introduced to the Black Sea and Caspian
 - *Caulerpa* in the Mediterranean
 - Island populations are particularly sensitive to introductions
 - Introduction of goats to Abingdon island in the Galapagos wiped out the abingdon tortoise

Zebra Mussels Clog a Pipe

- These mussels not only cause billions of dollars of damage but have displaced the native clams and mussels

Conservation Biology

- Addresses the issue of declining biological diversity
- *In situ conservation* is the establishment of preserves to protect wildlife in its natural and original habitat
- In situ conservation is the best way to preserve biological diversity
- In situ conservation preserves natural ecosystems
- The National Wildlife Refuge System of the United States includes more than 500 refuges
- Many protected areas are polluted, allow hunting or are used by the Army, Navy, or Air Force

Conservation Biology (cont.)

- *Ex situ conservation* is the protection of species in zoos and seed banks
 - Ex situ conservation is used in an attempt to save species on the brink of extinction
 - Zoos, aquaria, and botanical gardens are examples of ex situ conservation
 - Artificial insemination and host mothering may be used to increase the number of offspring
- Restoring damaged or destroyed habitats is the goal of *restoration ecology*

Prairie Restoration Started in 1935

The Same Prairie Area Today Restoration where?

- Where possible, ensure that national parks anchor large **complexes of protected, interconnected habitat** and that the Park Service is guided by an approach to ecosystem management that integrates parks with surrounding public and private lands and coordinates management as needed with other federal and state agencies.

Habitat Fragmentation

- Amount of habitat decreases (of course).

- Fragmentation increases (more fragments are created) -- up to a point after which of course number of fragments goes down until there is no habitat left at all.
- Fragments become smaller.
- Isolation between patches increases.
- Amount of edge increases

This image is a combination of Landsat TM data from 1990, 1994, and 1996. The dark areas have a low spectral response indicating they are in better condition or health than other areas that are less dark. The white and other really light areas indicate areas of clear cutting and new growth.

Greenhouse Gases: Carbon cycle out of balance

- Greenhouse gases probably cause global warming
- Carbon dioxide, methane, surface ozone, nitrous oxide and chlorofluorocarbons are increasing in concentration in the atmosphere
- Combustion of fossil fuels, burning of rain forests, leaking of old refrigerants, and decomposition all contribute these gases
- These gases all retain atmospheric heat, and contribute to the greenhouse effect

Enhanced Greenhouse Effect

- Carbon dioxide tends to reflect heat back to Earth

The Potential Effects of Global Warming

- With global warming, the sea level is expected to rise
 - Thawing of the glaciers and icecaps will cause the sea level to rise
 - Countries most vulnerable to this change are those that inhabit river deltas
- With global warming, precipitation patterns may change
 - Some areas may experience desertification; others may have more frequent flooding
- With global warming, the ranges of organisms will change
 - r-selected organisms are likely to prosper during this change
- Global warming will probably affect agriculture
 - Global warming will change productivity, and increase droughts and floods in different areas

Climate Change and Beech Trees in North America

Mean Annual Global Temperature, 1960-2000

- There is a steady trend upward in global temperature
- It is evident already

Atmospheric Carbon Dioxide 1958-1999

- Carbon dioxide concentrations have increased substantially since the late 1950s
- Small fluctuations are due to seasonal changes
- This is recorded from the top of Mauna Loa, in Hawaii (middle of the Pacific Ocean, so is good and probably conservative representation planetary CO₂)

Deal With Global Warming

- Many actions have been suggested to deal with global warming
 - Prevention, mitigation and adaptation are suggested strategies
 - We can respond by preventing the buildup of greenhouse gases in the atmosphere
- The use of solar energy is a viable alternative to the use of fossil fuels

- We can mitigate global warming to some extent
 - Planting or replanting forests prevents further harm
- We can adapt to the reality of global warming
 - Agriculture must adapt to changes in the climate

Review

- **Introduction to Science**
 - **Scientific Method**
 - **Independent variable**
 - **Dependent variable**
- **Characteristics of Life**
 - **Components of ecosystems**
 - **Trophic levels ; consumers producers etc.**
 - **Chemistry of Life systems**
 - **Chemical bonding**
 - **Organic macromolecules – proteins, carbohydrates lipids (steroids, phospholipids)**
- **Biological Diversity**
 - **Dichotomous keys**
 - **Kingdoms of Life**
 - **Definition of a species and classification**
- **Ecosystems: Energy of Life**
 - **Photosynthesis**
 - **Reactants**
 - **Products**
 - **Role of Photosystems**
 - **Calvin Cycle**
 - **Cellular Respiration**
 - **Glycolysis**
 - **Krebs cycle**
 - **Electron transport system**
 - **Compare and Contrast Photosynthesis and Metabolism**