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**Topics:** Humans and the Environment

**Reading:** Chapter 30

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**Main concepts:**

- Biodiversity refers to the number of different organisms living in an ecosystem. Measures of biodiversity can also include the proportions of different species within the ecosystem.
- Ecosystem services are benefits that humans receive, directly or indirectly, from the ecosystem.
  - Direct benefits include food, fiber, medicines, and building materials.
  - Indirect benefits include soil fertility, waste decomposition, pollution control, flood control, gene repository, climate regulation, and others.
- Extinction is a natural process that has gone on for millions of years. Most organisms that have ever existed have also gone extinct.
  - Natural causes for extinction include natural disasters, climate change, and natural selection.
  - Human-caused extinctions are the result of overhunting, overharvesting, habitat destruction, overpopulation, pollution, and introducing invasive species. Of these, the most serious current threat is habitat destruction.
- Mass extinctions in the past have been caused by sudden global disasters such as an asteroid strike or massive volcanism. The present extinction event is human-caused, including the present climate change (which may have natural causes, but also has a human component).
- Conservation biology seeks to reduce human impact on biodiversity by:
  - understanding human impact,
  - restoring or preserving important habitat,
  - restoring biodiversity where possible and,
  - promoting sustainable use of resource.
- Preservation of habitat is critical for the preservation of biodiversity. Creating wildlife reserves is useful, but adding corridors that allow travel from one reserve to another increases the usefulness of the reserves.
- Sustainability means using resources no faster than nature can restore them. Using resources faster than they are restored is neither ecologically nor economically sustainable.
- Natural communities are sustainable because they:
  - are biologically diverse,
  - consist of stable populations operating at or below carrying capacity,
  - recycle materials within the ecosystem,
  - rely on a sustainable source of energy (in most ecosystems, the sun).
- Humans can borrow from nature to create sustainable communities by:
  - preserving biodiversity in nature,
  - controlling population growth (very controversial, but consider how nature controls populations),
  - using sustainable energy sources, such as solar, wind, geothermal,
  - recycling and reducing consumption to reduce bring our use of natural resources down to a sustainable level.

**Common misconceptions:**

- Many people view the earth as vast and limitless, believing that there are plenty of resources for everyone. We have seen, however, that the human population is experiencing *exponential* growth. The earth has a limited amount of farmable land to feed the growing population. Human population is growing exponentially. Farmland and other resources are not.
  - Some people believe that no matter how large our population is, scientists will invent new ways to feed people. While technology has helped in the past, new methods of food production have also resulted in larger human populations and more loss of habitat as natural areas are turned into farmland. We cannot be irresponsible and expect scientists to always fix the problems that we create.
  - Some people say, "I'm just one person. What I do doesn't matter." Anthropologist Margaret Mead said, "Neer doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has."
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## Reading notes:

- Define “biodiversity.” How is biodiversity measured?
- What benefits do humans gain from biodiversity, both directly and indirectly?
- What human-caused factors contributed to the disastrous effects of Hurricane Katrina on New Orleans? How might ecosystem preservation have helped prevent the disaster?
- What is meant by *ecological economics*?
- What were the causes of mass extinctions in the past?
- What are ways in which humans are contributing to extinctions?
- Of the known species of mammals, how many are threatened or in danger of extinction?
- What is meant by *ecological footprint*? How does it relate to the concept of *biocapacity*? Is the current human ecological footprint within the Earth’s biocapacity? Why or why not?
- Why is habitat destruction so devastating to species?
- What is the “bushmeat” trade, and how does it affect biodiversity?
- How do invasive species contribute to endangerment and extinctions?
- What types of pollution threaten the environment?
- Is global climate change a threat to the environment? Why or why not?
- Why is it necessary for conservation biology to be an integrated science?
- How can wild ecosystems be preserved?
- How can development of lands be made more sustainable?
- How can agriculture be made more sustainable?
- Why do many people believe that human population control is essential for human survival?
- What are some things that you as an individual can do to increase the sustainability of your lifestyle?

## Useful websites:

- [Population Connection](#) organization: Website of a group that supports zero population growth and advocates for human rights and social justice.
  - [Environmental Protection Agency](#): The U.S. government agency in charge of environmental regulations.
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