Section A1: The Biodiversity Crisis

1. The three levels of biodiversity are genetic diversity, species diversity, and ecosystem diversity
2. Biodiversity at all three levels is vital to human welfare
Introduction

• **Conservation biology** is a goal-oriented science that seeks to counter the **biodiversity crisis**, the current rapid decrease in Earth’s variety of life.

• Extinction is a natural phenomenon that has been occurring since life evolved on earth.
  
  • The current *rate* of extinction is what underlies the biodiversity crisis.
  
  • A high rate of species extinction is being caused by humans.
1. The three levels of biodiversity are genetic diversity, species diversity, and ecosystem diversity.
• Loss of genetic diversity.
  • If a local population becomes extinct, then the entire population of that species has lost some genetic diversity.
  • The loss of this diversity is detrimental to the overall adaptive prospects of the species.
• Loss of species diversity.
  • Much of the discussion of the biodiversity crisis centers on species.
  • The U.S. Endangered Species Act (ESA) defines an endangered species as one in danger of extinction throughout its range, and a threatened species as those likely to become endangered in the foreseeable future.
• Here are a few examples of why conservation biologists are concerned about species loss.

• The IUCN reports that 13% of the known 9,040 bird species are threatened with extinction. That is 1,183 species!!!

• The Center for Plant Conservation estimates that 200 of the 20,000 known plant species in the U. S. have become extinct since records have been kept, and another 730 are endangered or threatened.

• About 20% of the known freshwater species of fish in the world have become extinct or are seriously threatened.
• Since 1900, 123 freshwater vertebrate and invertebrate species have become extinct in North America, and hundreds more are threatened.

• Harvard biologist Edward O. Wilson has compiled a list called the Hundred Heartbeats Club, a list of species that number fewer than one hundred and are only that many heartbeats from extinction.
• Several researchers estimate that at the current rate of destruction, over half of all plant and animal species will be gone by the end of this new century.

• Extinction of species may be local, but it may also be global.
• Loss of ecosystem diversity.
  • The local extinction of one species, like a keystone predator, can affect an entire community.
  • Some ecosystems are being erased from the Earth at an unbelievable pace.
  • For example, an area the size of the state of West Virginia is lost from tropical forests each year.
2. Biodiversity at all three levels is vital to human welfare

- Why should we care about biodiversity?
- Benefits of species diversity and genetic diversity.
• Biodiversity is a crucial natural resource, and species that are threatened could provide crops, fibers, and medicines for human use.

• The loss of species also means the loss of genes.
  • Biodiversity represents the sum of all the genomes on Earth.
• One large scale experiment illustrates how little we understand ecosystem services.
• Biosphere II attempted to create a closed ecosystem, and had a forest with soil, miniature ocean, and several other “ecosystems.”

• In 1991, eight people entered and were supposed to be isolated for two years.

• The experiment failed and had to be stopped after 15 months.