Human Impacts on Biodiversity

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What is Biodiversity?
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• …the organization of life at all levels of biological organization
• …the relative diversity among organisms in different ecosystems
• …totality of genes, species, and ecosystems of a region
• …the variability among living organisms from all sources, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems” - 1992 United Nations Earth Summit
What is Biodiversity?

- www.thewildclassroom.com/home/ecogEEKSVideos/biodiversity.html
Impacts of Biodiversity

• Why do we care about biodiversity?
• What are the positive impacts of biodiversity?
  – For humans?
  – For ecosystems?
Impacts of Biodiversity

- **Food** - humans use at least 40,000 different species of animals and plants for food every day
Impacts of Biodiversity

- **Pharmaceuticals** - about 40% of pharmaceuticals produced in the U.S. are manufactured using compounds derived from plants and animals

- the vast majority of organisms on the planet have not been assessed for their pharmaceutical potential

Impacts of Biodiversity

- *Industrial/Building Materials* - a wide variety of materials are gathered from biological sources
Impacts of Biodiversity

- **Ecosystem Services** - water filtration, atmosphere chemistry, pollination, decomposition, nutrient cycling, resistance to invasion
Impacts of Biodiversity

• Leisure, cultural, and aesthetic value - hardest to quantify
Patterns of Biodiversity

- *Latitudinal Gradient* - tendency for taxonomic diversity to increase as you approach the equator

new world bird diversity

atlantic coast gastropod diversity - from Fischer 1960
Patterns of Biodiversity

- **Biodiversity Hot Spots** - areas of locally high species richness
Patterns of Biodiversity

- *Biodiversity through time*

![Biodiversity during the Phanerozoic](image)
Human Impacts on Biodiversity

- What are some of the ways humans have impacted biodiversity?
  - globally
  - locally
Human Impacts on Biodiversity

- Conversion of rain forest to agriculture and grazing
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• *Conversion of rain forest to agriculture and grazing*
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• *Changes in Forest Cover in U.S.*
Human Impacts of Biodiversity

- *Invasive Species* - can displace, outcompete, or directly prey upon native biodiversity

- [www.actionbioscience.org/biodiversity/simberloff.html](http://www.actionbioscience.org/biodiversity/simberloff.html)
Biodiversity Sampling Exercise
Importance of Genetic Diversity
Food Agency Calls for Banana Diversity
Risks for species with low levels of genetic diversity

- Disease susceptibility
- Inability to adapt
- Inbreeding
- Bottleneck effect
Benefits of genetic diversity

• Evolutionary potential

• Genetic repository for disease resistance

• Competitive advantage

• Optimize niche availability

• Maintains species diversity

• Influences colonization success
Human Induced Declines

- Fragmentation of habitat
  - Limits gene flow

- Selective Breeding
  - Dogs and other domesticated animals

- Agricultural Production

- Overharvesting/ excessive hunting
Other Genetically Depauperate Species
Preservation of genetic diversity

- Genebanks
- Planting locally native genotypes
- Encouraging diversity in food types
- Avoiding excessive harvesting