

Essential Questions – Day 5

- What happens when animals cannot adapt?
- How do humans affect biodiversity?



Slender Loris



California Condor





Biodiversity

- *Biodiversity* - short for biological diversity - variety of all living organisms and their interactions.
 - Scientists often speak of three levels of diversity - species, genetic, and ecosystem diversity.



- **Threatened species** – likely to become endangered if not protected
- **Endangered species** – numbers have fallen so low it is likely to become extinct
- **Critically endangered** – species that has very high risk of going extinct in the wild as determined by the International Union for Conservation of Nature (IUCN)

<http://www.iucnredlist.org/>

Endangered Species Act

- First went into effect in 1973
- Designed to **identify** and **protect** any plant or animal in danger of extinction
- Four Provisions
 - 1. Compile list of endangered or threatened species
 - 2. These species must not be caught or killed
 - 3. Gov. may not carry out projects that jeopardize their long-term survival
 - 4. Species recovery plan for those in danger of extinction





- Convention on International Trade in Endangered Species (CITES)
 - Slowed the poaching of Elephants by making ivory trade illegal
 - Restricts trade of animal parts for use in Chinese medicine
- Earth Summit & Biodiversity Treaty – encourages wealthy countries to give \$\$\$ to poorer countries for the protection of individual species

What happens when animals cannot adapt?

A monarch butterfly with orange and black wings is shown feeding from a yellow flower. The background is a soft, light green gradient.

- **Extinction** = occurs when the last member of a species dies and the species ceases to exist
- **Extirpation** = the disappearance of a population from a given area, but not the entire species globally
 - Can lead to extinction
- Extinction is a natural process
 - 99% of all species that ever lived are now extinct
- **Background rate of extinction** = natural extinctions
 - For mammal or marine species: each year 1 species out of every 1–10 million goes extinct

Endemic Species

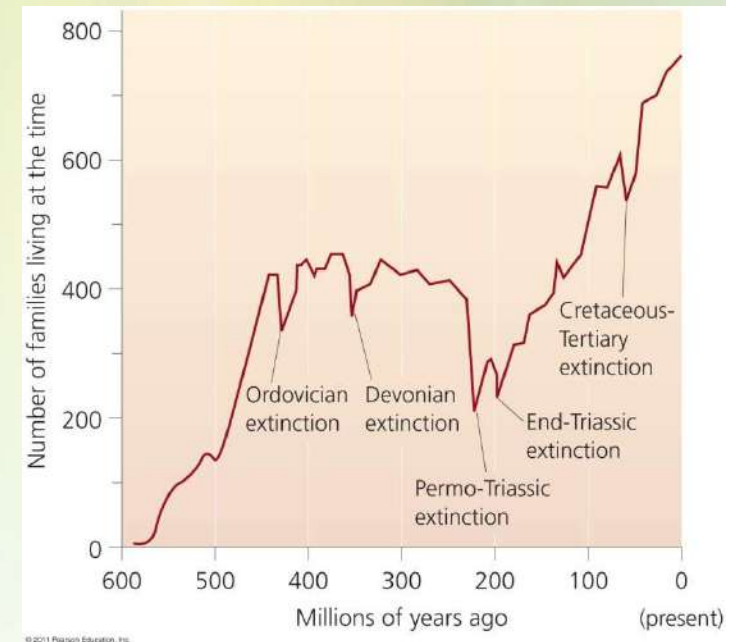
- Native species found **ONLY** in a particular area (geographic isolation)
- adapted to a very particular niche
 - Ex. found only in a single river or at a specific elevation of a mountain
- at a great risk for extinction due to limitations on where they can live
 - Ex. Galápagos tortoise



Earth has had five mass extinctions



- Earth has had five **mass extinctions** in the past 440 million years
 - Each event eliminated at least 50% of all species
- Humans are causing this sixth extinction event
 - We will suffer as a result



Factors Leading to Biodiversity Loss

- **H**abitat Destruction
- **I**nvasive Species
- **P**ollution
- **P**opulation
- **O**verharvesting
- **G**lobal Warming



Habitat Destruction

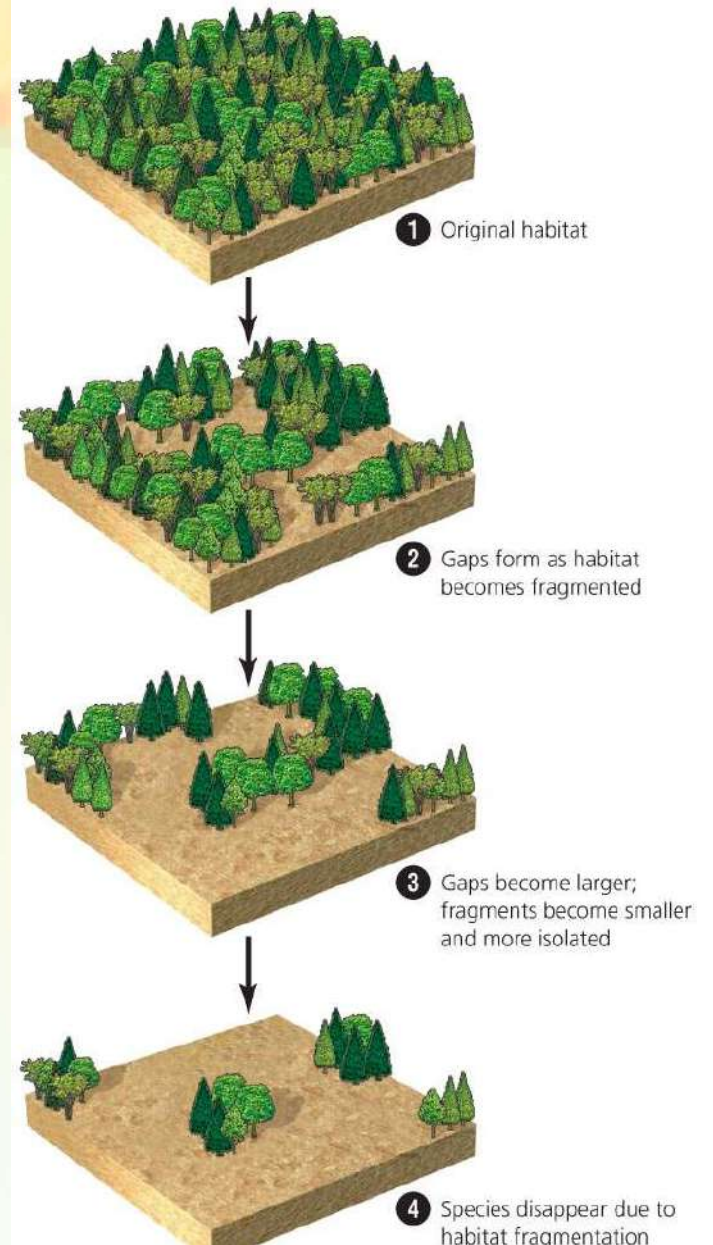


Predicted that 1/5 of species in the world will be extinct within the next 100 years due to deforestation in Southeast Asia alone (Brook 2003).

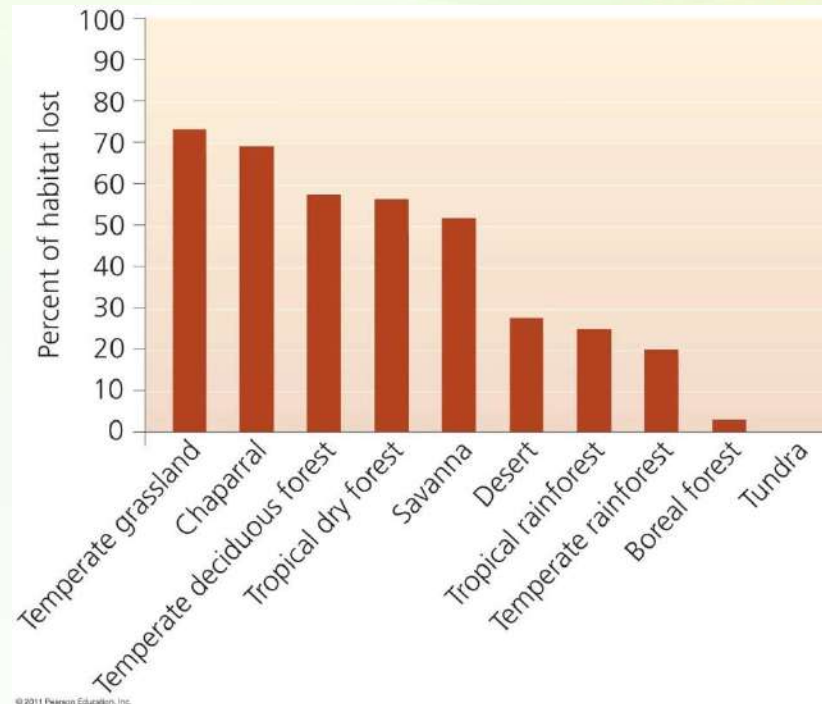


Habitat fragmentation

- **Habitat fragmentation**
= gradual, piecemeal degradation of habitat
 - Farming, roads, logging, etc.
- Continuous habitats are broken into patches
 - Species needing that habitat disappear



Habitat loss occurs in every biome



- Habitat loss is responsible for declines for 83% of mammals and 85% of birds
- 99% of U.S. prairies have been converted to agriculture
 - Grassland birds have declined 82–99%

Invasive Species

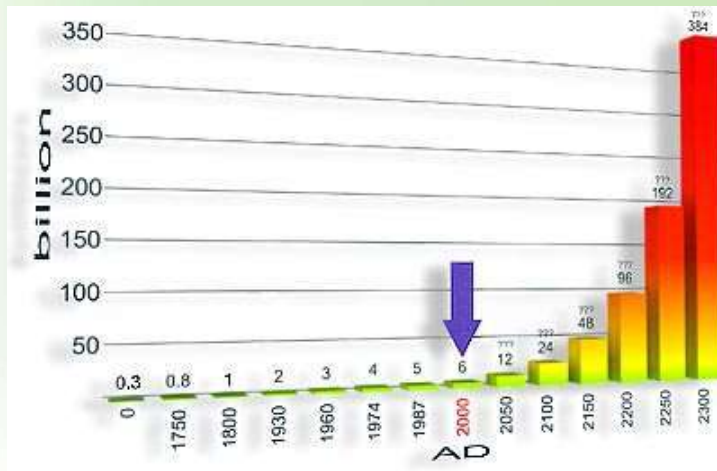


The Nile perch has been the principal contributor to the extinction of over 200 endemic fish species since its introduction to Lake Victoria in 1954 (ISSG Database).



Human Population Explosion

- The current threat to biodiversity, and thus to the biosphere as we know it, stems primarily from expanding human populations and increased human consumption of natural resources.



THE WORLD POPULATION HAS TRIPPLED IN THE LAST 70 YEARS.

Based on the present rate of population growth.

One could conservatively predict the population to be by the year:

2,050 AD	12 Billion ???
2,100 AD	24 Billion ???
2,150 AD	48 Billion ???
2,200 AD	96 Billion ???
2,250 AD	192 Billion ???
2,300 AD	384 Billion ???

<http://www.edu.ue-foundation.org/worldpop.html>

Pollution



There has been widespread death of thousands of seals in recent years, likely due to the accumulation of chlorinated hydrocarbons (DDT, PCB's) and dioxins in fat (Cunningham, Cunningham 2003).



Over-harvesting



Over-harvesting has triggered the Red-Listing of 14% of threatened mammals and 11% of birds globally (Rosser 2002).



Global Warming



Global Warming has already caused one species level extinction, that of Costa Rica's golden toad (Pounds 1999).

A conservative estimate states 24% of the world's species will become extinct within the next 50 years due to global warming (Thomas 2004).

