



Chapter 18

Conservation of Biodiversity

Are We In The Mist of the 6th Mass Extinction...

- **Extinction**- when there are no longer any of the species in the world.
 - scientists view extinctions as the ultimate result in change to our environment.
- Predictions of 2-20% of species go extinct by 2020...due to human activities such as over harvesting (plant & animals) and habitat destruction.
- We are currently losing approximately 50,000 species per year.
- The recovery of biodiversity from mass extinctions took about 10 millions years.
 - * **first mass extinction in the presence of humans and is occurring at a faster rate than any other extinction.

- Scientists want to **conserve genetic diversity** so that the species can survive environmental change and inbreeding will not occur.
- **Inbreeding** occurs when individuals with similar genotypes, generally relatives, breed with each other
 - Typically produce offspring that have an **impaired ability to survive and reproduce...mutations**
 - *(Survival of the fittest - continuing generations)*
 - **Low vs. High Genetic Diversity**
- *Bottleneck effect (reduction of that species size), human causes (overharvesting-hunting, habitat destruction), predation*

Categories of Endangerment

- **Extinct**- no known species exist today
- **Endangered** – species are at serious risk of extinction
- **Threatened**- species with a high risk of extinction in the future (serious risk to become endangered)
- **Near-threatened**- species that are likely to become threatened in the future
- **Least concern**- species are widespread and abundant

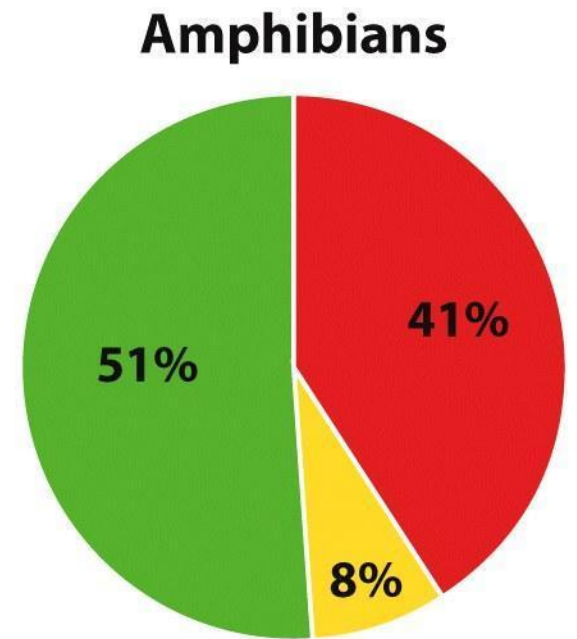
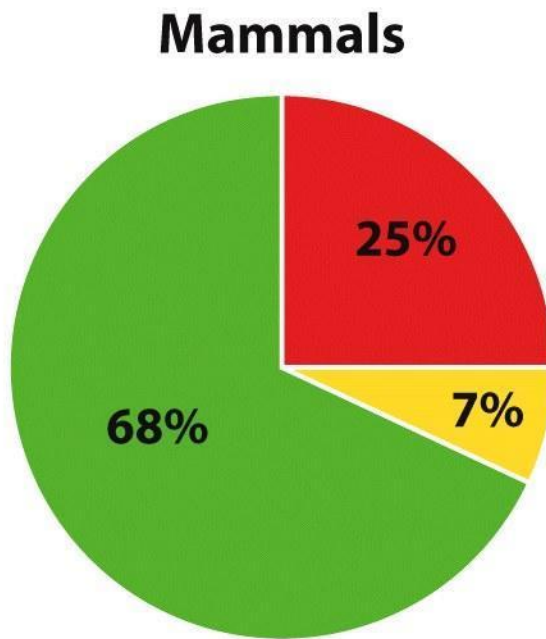
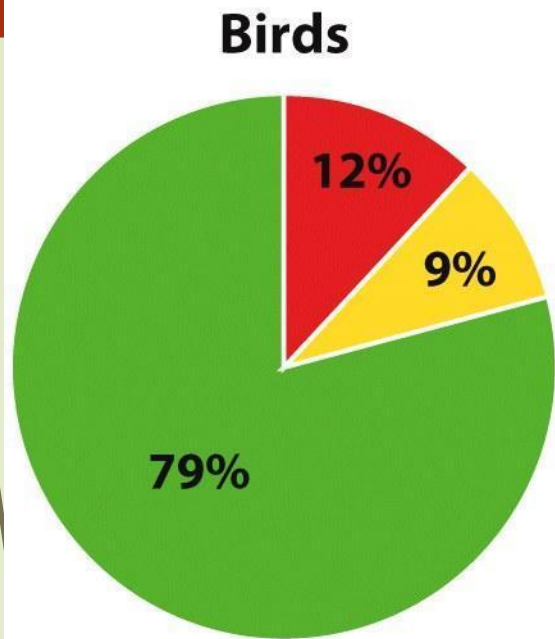


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Causes of declining biodiversity

- **H**- Habitat Loss
- **I**- Invasive Species
- **P**- Pollution
- **C**- Climate Change
- **O**- Overharvested

Habitat Loss

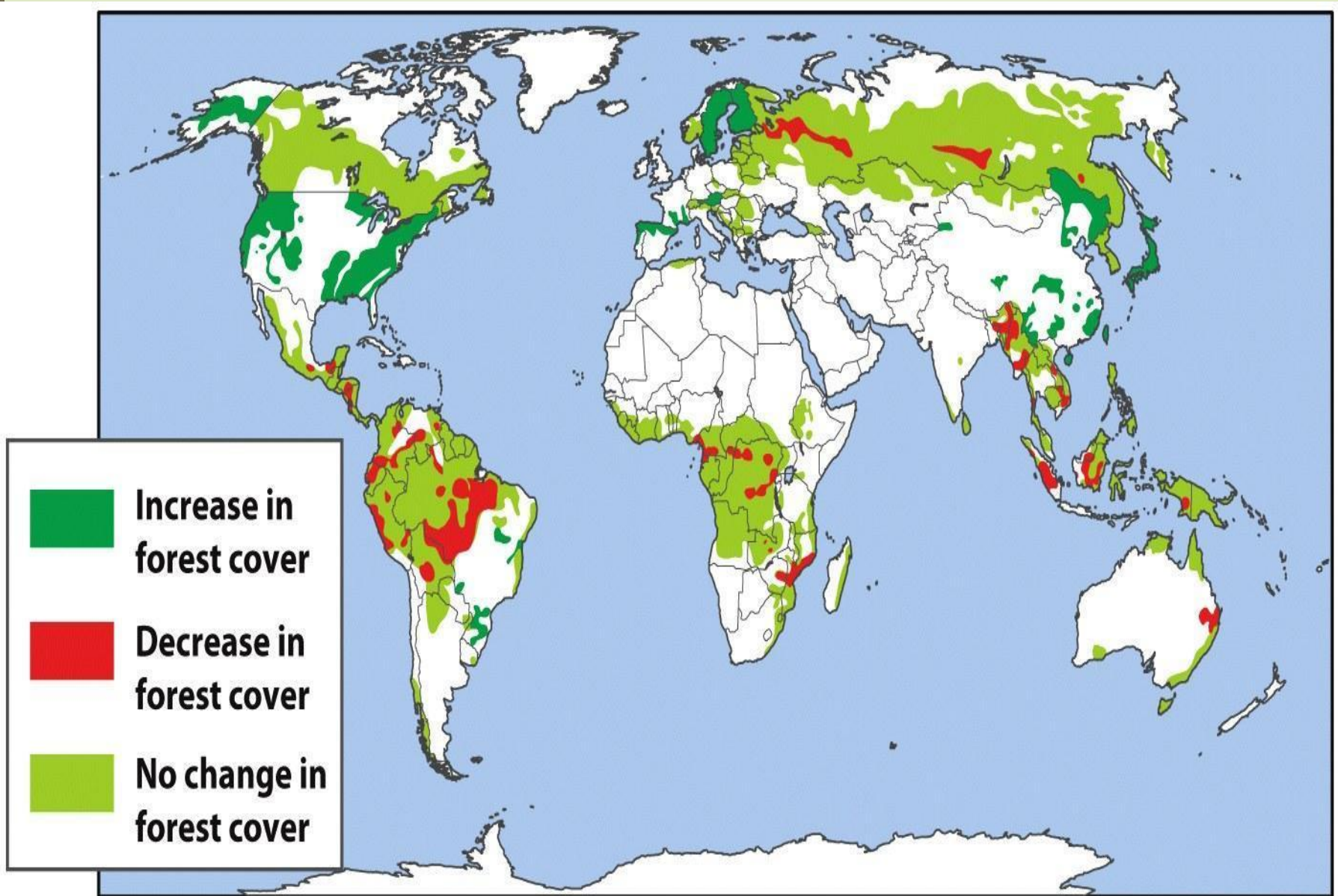
- For most species the greatest cause of decline and extinction is habitat loss.
- Most habitat loss is due to human development



Figure 18.5a
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Some regions of the world experienced large declines in the amt. of forested land from 1980-2000 while other regions have shown little change or have seen increased in forest cover.

Invasive Species

- **Native species** - are species that live in their historical range, typically where they have **lived for thousands or millions of years**
- **Alien species** (exotic species)- species that **live outside their historical range.**
- **Invasive species**- when **alien species spread rapidly** across large areas.
 - Ex- Kudzu Vine, Zebra Mussel, Silver Carp



Figure 18.9a
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Fast-growing **Kudzu Vine** is native to Asia, but was introduced to the U.S. to control erosion. It has since spread rapidly growing over the top of nearly anything that does not move.

Zebra Mussels was accidentally introduced to the Great Lakes and has covered all hard surfaces, including the water intake and outlet pipes of industries that use the water



Figure 18.9b
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Pollution

- Water & Air pollution can hurt the ecosystem.... **Threats to biodiversity can come from toxic contaminants** such as **pesticides, heavy metals, acids, and oil spills.**
 - **Endocrine disrupter**, can prevent or inhibit reproduction
 - Release of nutrients that cause **Algal bloom** (rapid increase of algal causing hypoxia in the water) & potential **Dead zones** may occur
 - **Thermal pollution** can make bodies of water too warm for species to survive

Climate Change

- The concern is how climate change will affect temperature and precipitation around the world, and how this will impact biodiversity.
- Depending upon the neighboring ecosystems/habitats; some species migrate to more suitable to the species' niche....however, in many cases this is not possible.

Overharvesting


- When individuals of a species are removed at a rate faster than the population can replace them.
- Ex- dodo, American bison, passenger pigeon.

Hunting, fishing, and other forms of harvesting (poaching) are the most direct human influences on wild populations of plants and animals.

To prevent the overharvesting, U.S state and federal regulations restrict hunting & fishing of game animals to particular times of the year & limit the number of animals harvested.



In extreme cases, overharvesting can cause extinction. Ex. Dodo bird

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- A decorative graphic on the left side of the slide, featuring a dark red arrow pointing right at the top, and several thin, curved grey lines extending downwards from the arrow's base.
- One of the earliest laws in the U.S. to **control the trade of wildlife** was the ***Lacey Act***.
 - First passed in 1900, the act **prohibited the transport of illegally harvested game animals, primarily birds and mammals, across state lines.**

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- *Convention on International Trade in Endangered Species of Wild Fauna and Flora*
 - Developed in 1973 to control the international trade of threatened plants and animals.
 - Today, *CITES* is an international agreement between 175 countries of the world.
 - The IUCN keeps a list of threatened species, known as the **Red List**.
 - Each country has its own way to monitor and regulate the import and export of animals on the list.



“Black Market”

- Despite international agreement, animal trade still occurs throughout the world
- In 2008, Congressional Research Services estimated that **illegal trade in wildlife was worth \$5-\$20 Billion annually** (*including exotic pets, fur for merchandise, body parts for medicinal value or food*)

Conservation Legislation

- Marine Mammal Protection Act- **prohibits** the **killing** of **all marine mammals** in the U.S. and prohibits the **import or export** of any marine mammal body parts.



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Endangered Species Act

-first passed in 1973, it authorizes the U.S. Fish and Wildlife Service to determine which species can be listed as threatened or endangered and prohibits the harming of these species (protect the species and its habitat).

- Trading these species is also illegal.
- The act also authorizes the government to purchase habitat that is critical to the species.

Convention on Protection of Biological Diversity

- In 1992, world nations came together and made a treaty to protect biodiversity.
- The treaty had three objectives:
 - 1. **Conserve/Protect biodiversity**
 - 2. **Sustainably use biodiversity**
 - 3. **Equitably/Fairly share the benefits that emerge from the commercial use of genetic resources such as pharmaceutical drugs.**

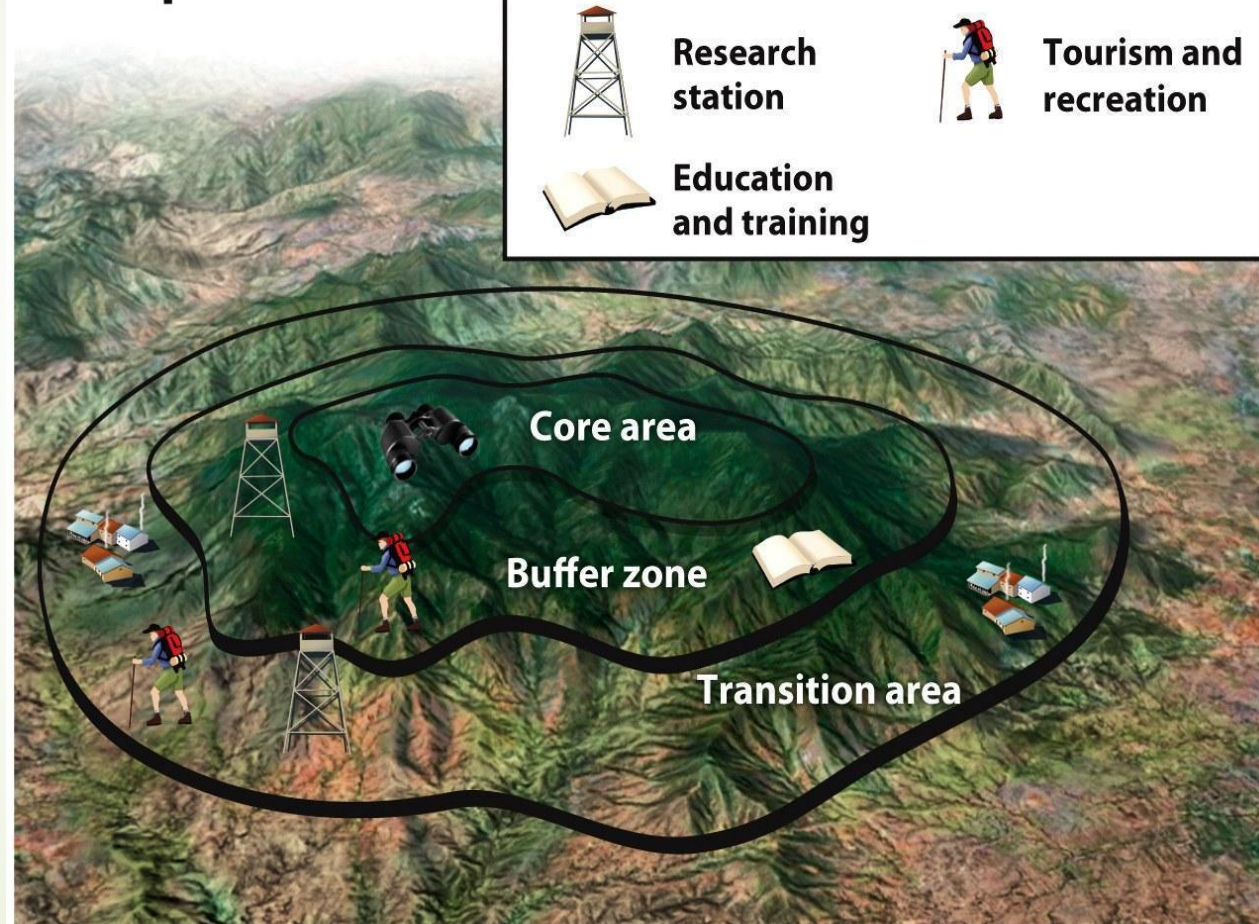
Size, Shape and Connectedness

- When **designing and managing protected areas** we must consider how **close to another area** they should be, how **large the area is**, and the amount of **edge habitat** the area contains (*theory of island biogeography* –size & distance btwn island).
- **Edge habitat**- the area **where two different communities come together**, typically forming an abrupt transition. Ex. A grassy field meeting a forest.

Biosphere Reserves

- Protected areas consisting of zones that vary in the amount of permissible human impact.

Zonation system of biosphere reserves



Core areas have minimal human impact and **outer zones** have increasing levels of human impacts