Conservation biology
We are limited on resources. Whatever matter exists on our planet is all we’ll ever have.

Conservation biology is a new field of science. It focuses on ensuring diversity of species on our planet, one way or another.

It also deals with ethical questions of diversity, conservation tactics, human involvement, and extinction.
Conservation biology supports the following four principles:

1) Biodiversity is desirable for the biosphere and, thus, for humans.

2) Extinctions, due to human actions, are undesirable.
   * What about extinctions not due to human actions?

3) Interactions in ecosystems support biodiversity and are desirable.

4) Biodiversity brought about by evolutionary change has value in itself, regardless of any practical benefit.
   * Benefits are not always monetary, or human based.
Biodiversity is the variety of life in a given area.

It is generally accepted, though not officially proven, that the greater biodiversity an area has, the greater the chance of the species in that area surviving.

- 1846 potato famine of Ireland

The hotspots of biodiversity, where 20% of all species on earth live, are in areas of great nutrient resources and low predators.

They also can be areas of high human activity.

- Great Barrier Reef, Madagascar, Congo, Amazon River Basin
Biodiversity is measured both in # of species in an ecosystem, and # of organisms in each species.

- Low numbers of species mean low biodiversity
- Low numbers of organisms indicate a species may become threatened or endangered
- Endangered species show continuous drop in population size without signs that the species can rebound in its environment
- Threatened species are species that are likely to become endangered due to environmental circumstances.

It’s not about total numbers. It’s about population rise or decline.
- World population of Wild Bison: 15,000 → Not in danger
- World population of African Lion: 46,000 → Endangered
The Value of Biodiversity

* Why should we care about biodiversity?
* Before discussing, what would make you care about biodiversity, or the number of species on the planet?
  * Ethics?
  * Money?
  * Exploration and Discovery?
  * I don’t care?
Only in the past 60 years have laboratories been used to “build” medicines. Prior to this, medicines were always taken from natural specimens.

- *Penicillum commune (F)*
  - Penicillin, an antibacterial medicine.
- *Cephalus ipecacuanha (Pl)*
  - Ipecac, a vomit inducer
- *Erythroxylum coca (Pl)*
  - An old anesthetic known as “cocaine.”
- *Limulus polyphemus (A)*
  - Horseshoe crab blood, a bacterial disinfectant for pacemakers.

Estimates are that 328 drugs have yet to be found.
Anyone who has ever eaten a fruit, vegetable, grain, dairy or meat product knows the benefits of agricultural conservation.

We can experiment with plant genes far more than any other organism, which helps with research needs.

It also means that should a problem arise with one crop, entire economies and populations can suffer.

- Mites and bees
Consumptive use refers to products we harvest/build/transform from natural resources

- Skins
- Fibers
- Rubber
- Lumber
- Pollinators (not only for honey and wax, but to help agricultural crops reproduce)

As long as the organism is alive and thriving, we can obtain resources from it as well.
Other, indirect value uses

* Organisms aid humans in ways that are not always monetary or economic
  * Waste disposal
  * Water storage and the “sponge affect”
    * Where would rainwater go without plants to absorb it?
    * The “umbrella affect”
  * Climate regulation
  * Tourism
Humans are organisms in this world too. But we have greater power than almost any other organism the world has ever known

* We have the right to survive and be happy, like any other organism
* At how much expense though?

There’s a great outcry in the past 30 years to make sure the human “footprint” is exactly the right size and does not trample on any other organism
Whether by destroying land or taking it over, humans impact other organisms’ habitats

Habitat loss causes fragmentation
- Species are separated from one another, or worse, from vital resources

Habitat loss disrupts cycles
- Removing one link from a chain can indirectly harm the rest
- What’s the impact on wolves if a meadow is mowed down?
  - No meadow means no food for deer.
  - Deer will tend to find food in the forest instead
  - It’s harder for wolves to find them now
Alien species are species that thrive in an area they do not belong to

- The dandelion is from England, and was never found in America until brought over by the Pilgrims
- When ships sailing from Japan emptied their ballast water into Coos Bay, Oregon, they emptied zebra mussels as well.

Name an infamous alien species in Clark County, Washington

- Blackberries, Bullfrogs
Pollution

- Pollution is any environmental change that negatively affects the organisms within the environment
  - Acidity levels
  - Eutrophication (algae growth)
  - Ozone depletion and Global Warming
Edge Effect

- Every ecosystem has an edge, and every edge is different than the interior due to the mixing abiotic and biotic factors.
- For the most part, the edge is uninhabitable to most species in each ecosystem:
  - Stream next to grasslands
  - Mountain forest leading up to rocky glaciers
  - Canopy roof and canopy floor
- The edge almost never changes in size no matter the size of the overall area.
  - So if we shrink the population range, the edge will NOT shrink an equivalent amount. 100% of the land loss is the habitable areas.
This area is influenced by edge effects.

Habitat patch

This area is not influenced by edge effects.

Because the width of the edge is relatively constant, as the total area becomes smaller, the edge becomes proportionately larger.

30.55%

43.75%

64%

88.8%

Low

Percentage of patch influenced by edge effects

High

LIFE 8e, Figure 57.5

Too much of something can be a bad thing if you don’t give it a chance to recover

- Illegal trade of exotic pets
- Clear-cutting
- Over-fishing
  - In the pacific northwest, herring had been overfished 20 years ago
  - The lack of herring meant sea otters died out
  - Since orcas fed on sea otters, their populations died out too
  - Meanwhile, sea urchins, the food of otters, began to thrive
  - Sea urchins, who feed on kelp, decimated the kelp populations
From 1932-1968 the chemical factory in Minamata, Japan released wastewater into the Minamata Bay. The waste contained a dangerously high level of methylmercury which was absorbed by shellfish in the bay. Fish in the bay would feed on the shellfish, then humans would feed on the fish. Methylmercury is toxic to all animal species, but which species (shellfish, fish, or humans) was most affected by the toxin? Explain your answer in 1-2 sentences.