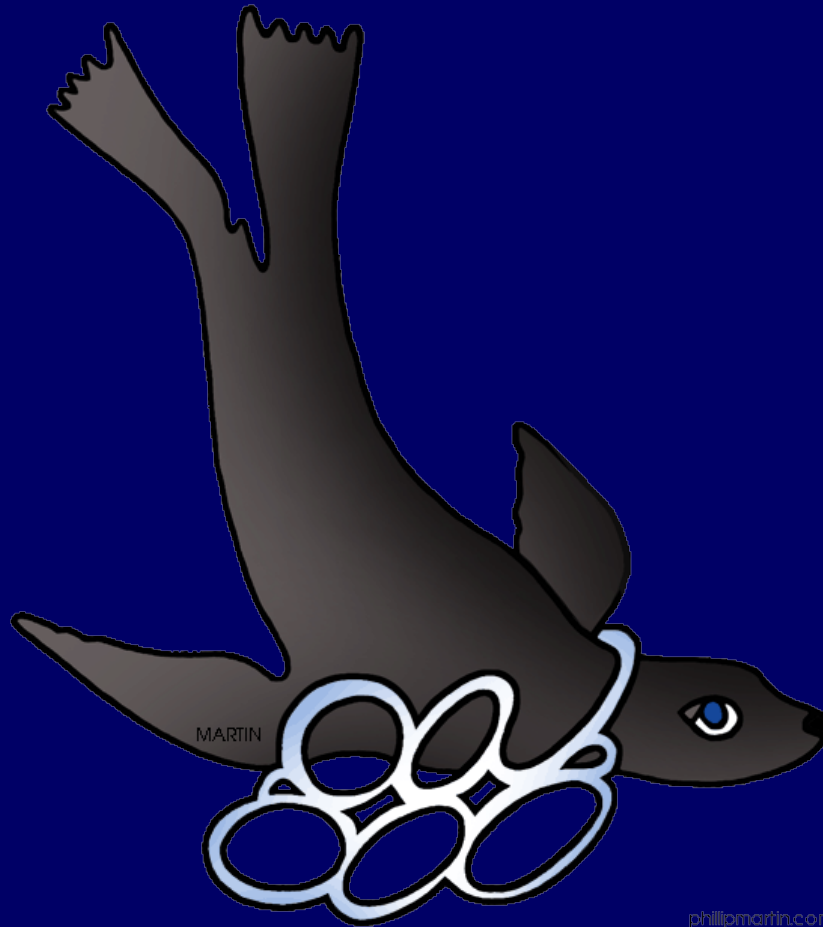


Loss of Biodiversity



Essential Standard 2.7

Explain how the lithosphere, hydrosphere, and atmosphere individually and collectively affect the biosphere.

Learning Objective 2.7.3

Explain how human activities impact the biosphere.

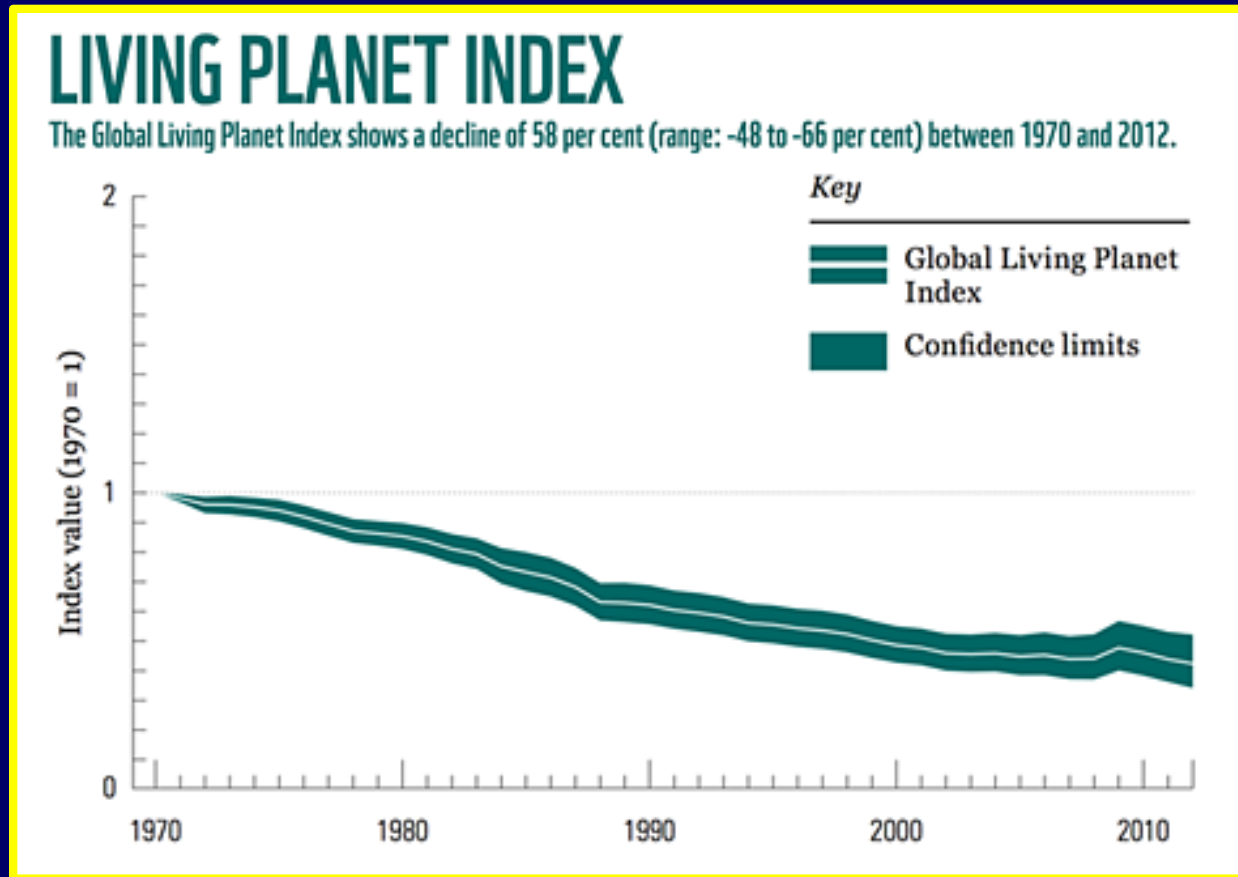
I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can explain how an increase in human population has resulted in a change in the amount of species in the past 50 years.
- I can explain how human activity has led to a loss of biodiversity through loss of habitat; over hunting and over fishing; pollution; disease; and introduction of non-native species; and global climate change.

Loss of Biodiversity

Since 1970, the number of non-human, vertebrate (backbone) animals have decreased by 60%.



Loss of Biodiversity

For every 10 animals that were here in 1970, only 4 remain or have been replaced by a new generation.



50 Years



Loss of Biodiversity

The greatest loss in numbers has been to freshwater animals, especially frogs and salamanders.



- 38 %

**Terrestrial
Animals**



- 81 %

**Freshwater
Animals**

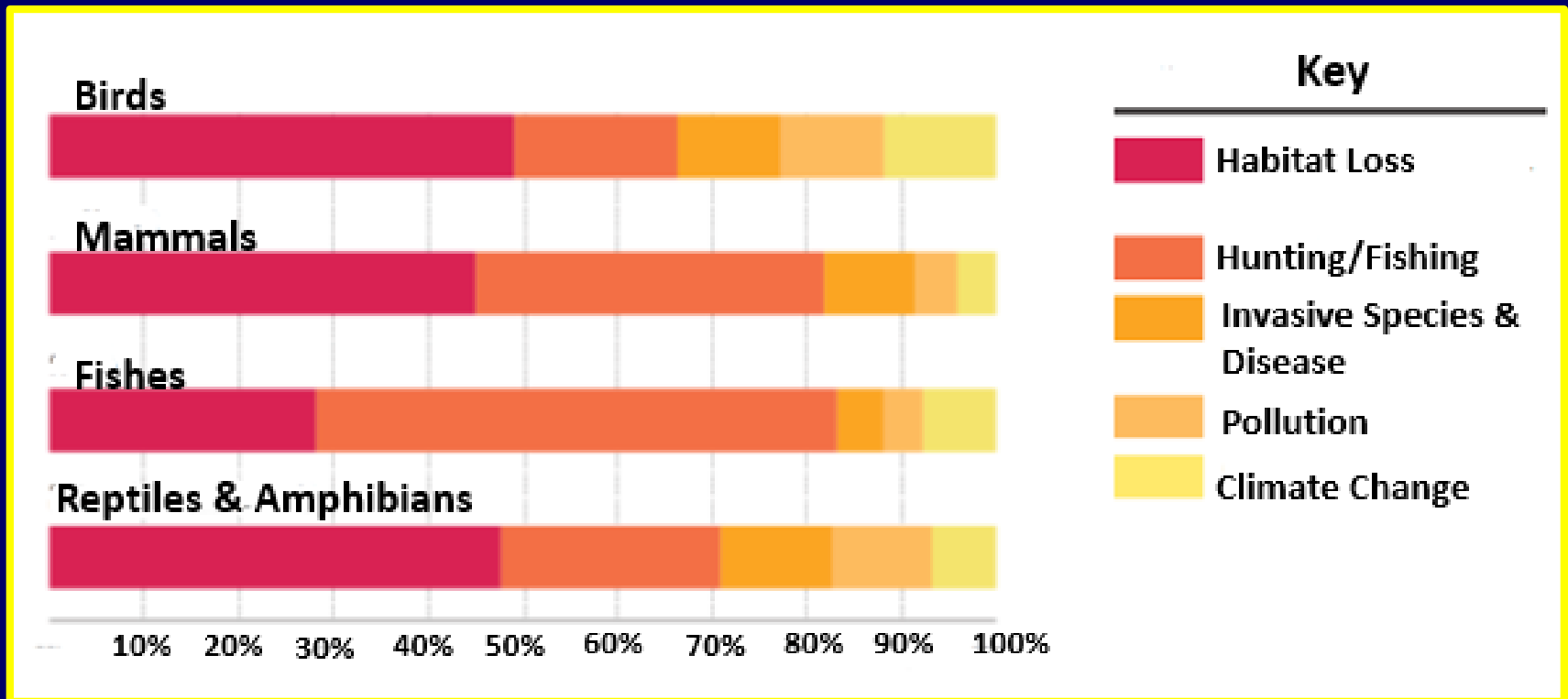


- 36 %

**Marine
Animals**

Loss of Biodiversity

Habitat loss and hunting/fishing accounts for over two thirds of the decline in the number of vertebrate animals since 1970.



Threatened, Endangered, Extinct

Threatened species are those in danger of becoming extinct in the future.



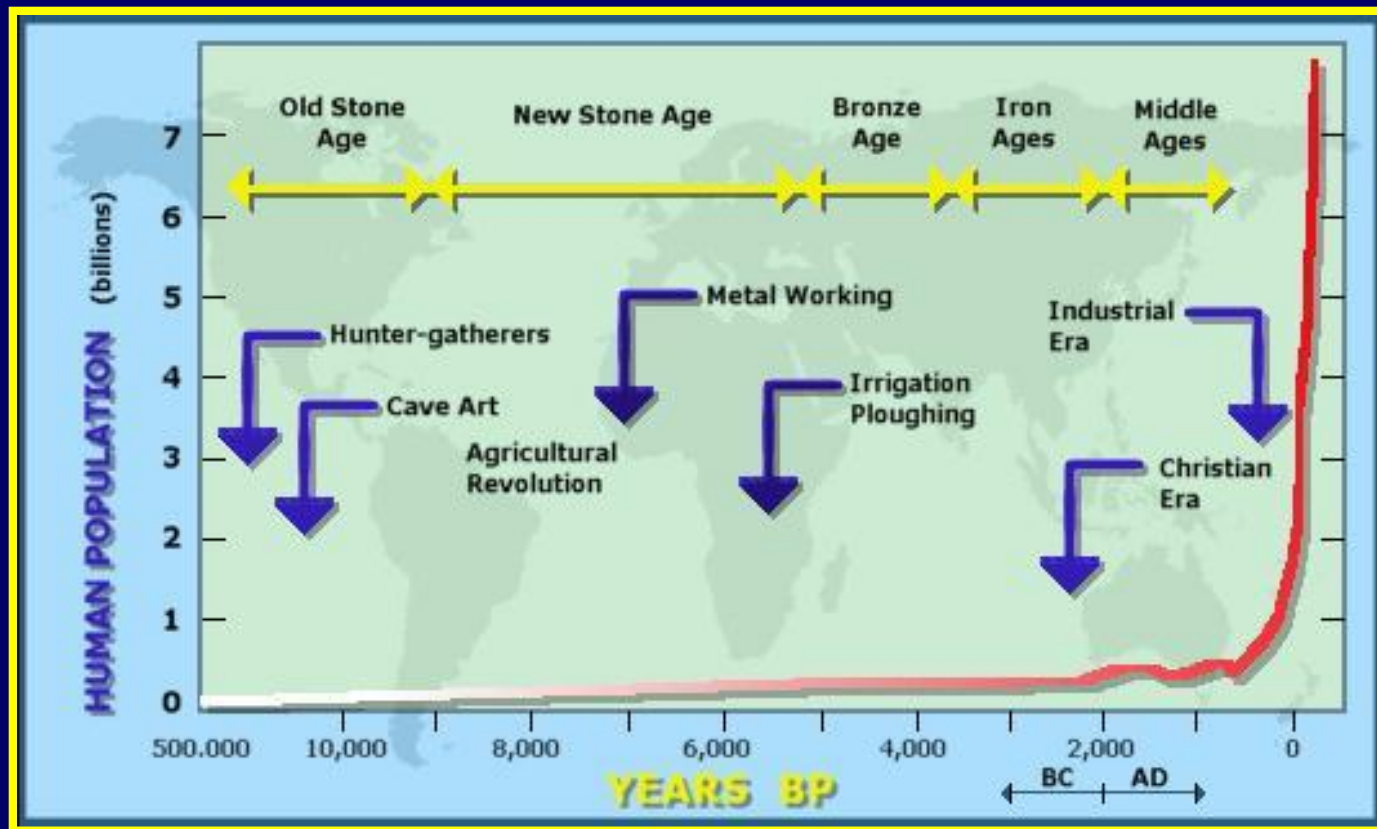
Endangered species are those on the brink of extinction now.



Extinct species are those which can no longer be found in the wild.

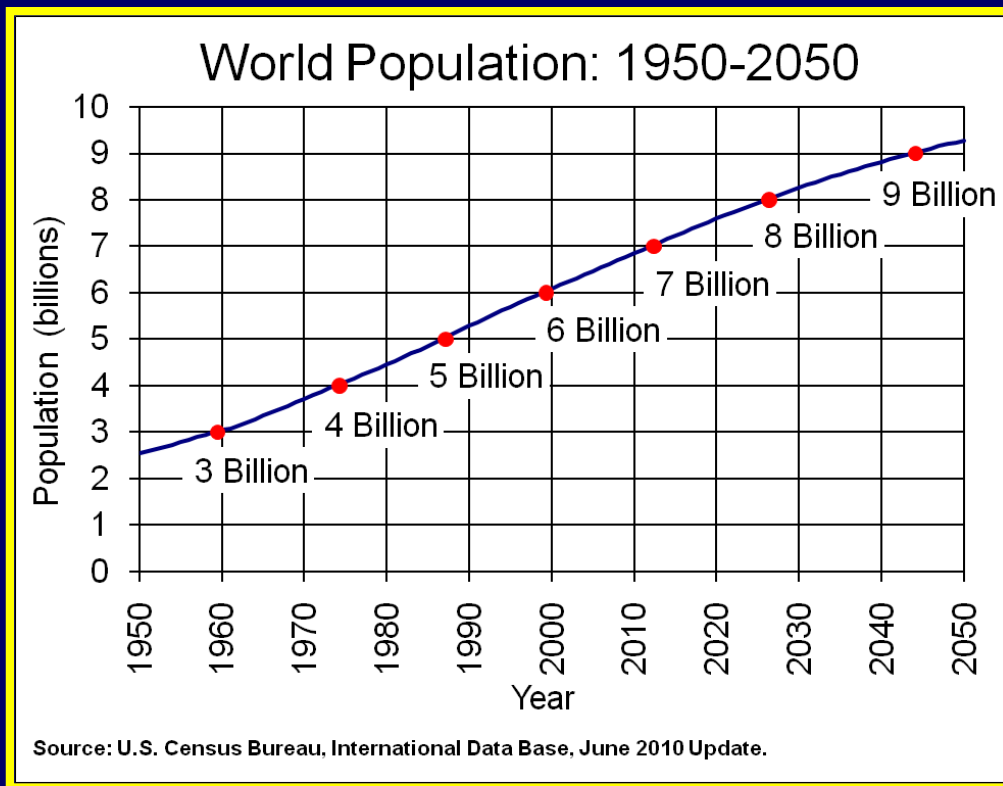
Human Impact

Since the industrial revolution, the human population has increased exponentially from 1 billion people, in 1830, to 7.8 billion, today.



Human Impact

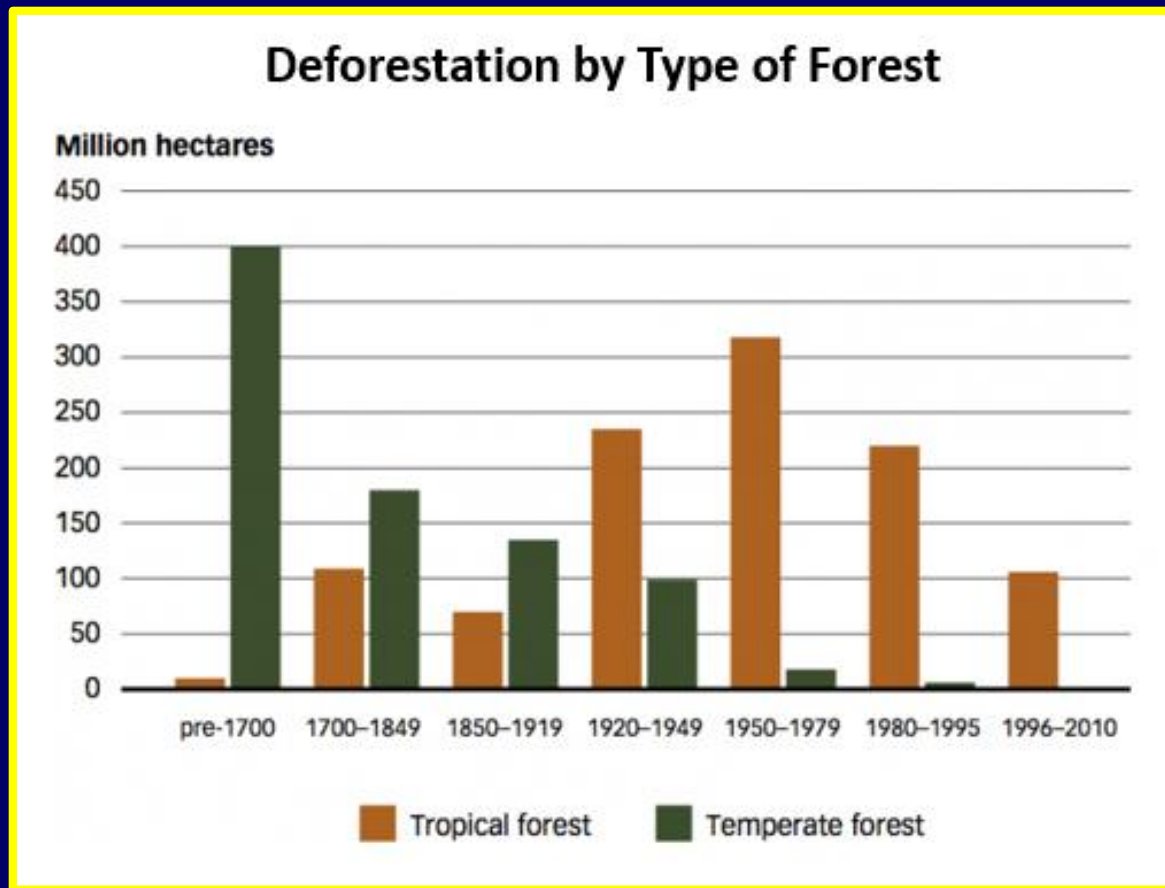
Just since 1970, the entire human population has doubled.



The increasing human population has increased demand for resources as well as space, putting increasing pressure on the natural environment.

Deforestation

The greatest loss in habitat, worldwide, has been due to deforestation.

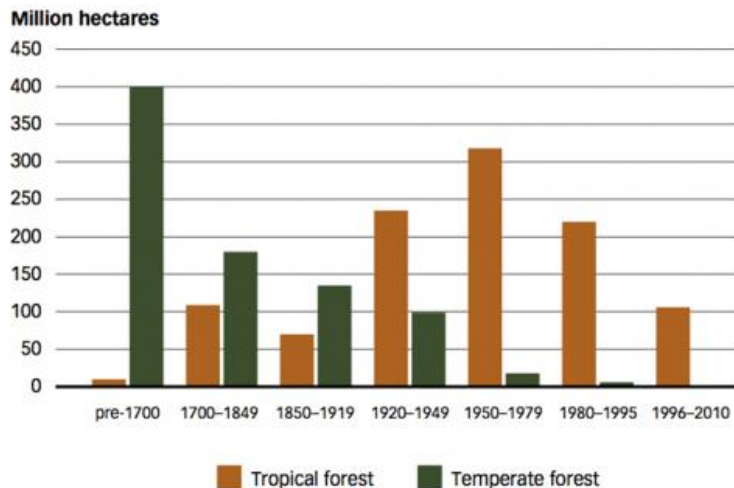


Deforestation

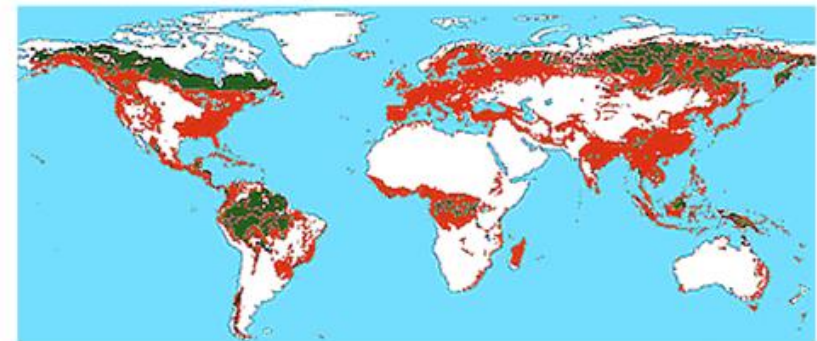
Prior to the colonial times, travel was difficult, and nearly all deforestation occurred in temperate forests in Europe, where human populations were increasing.



Deforestation by Type of Forest



Ancient Forests

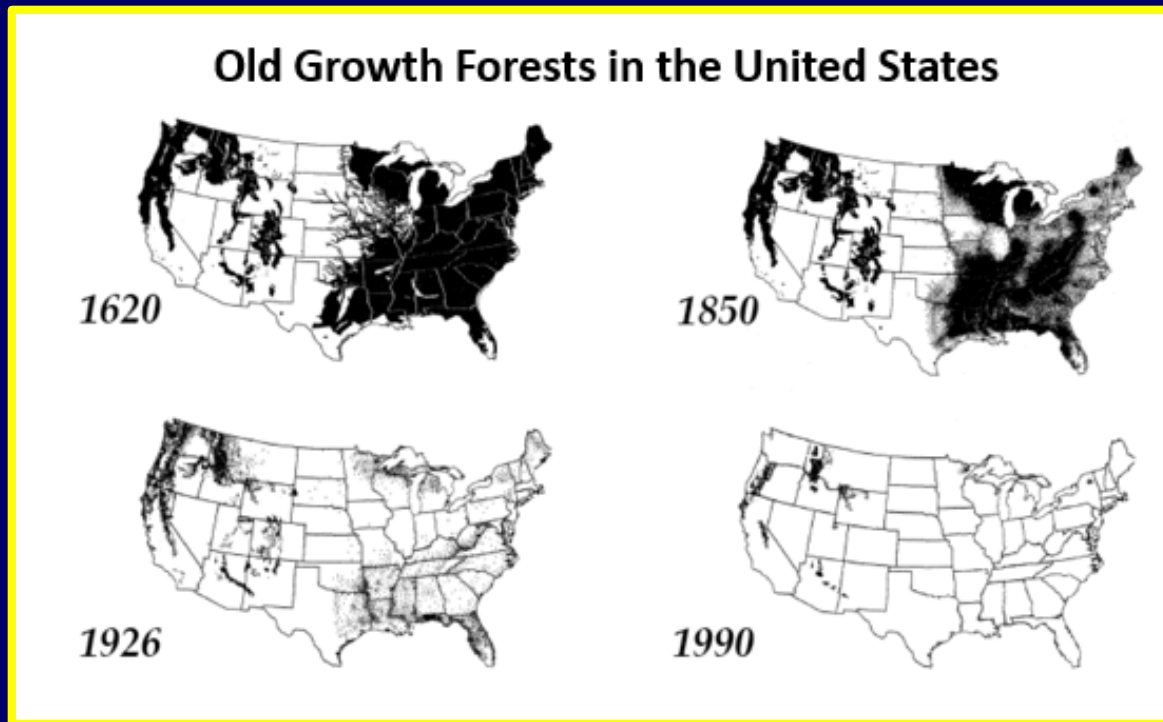


Red: Ancient forests already destroyed

Green: About 20% of the world's large ancient forests remain intact

Deforestation

During colonial times, as populations moved to other continents such as North America, deforestation of temperate forests still dominated as land was cleared for farming, towns, and cities.



Deforestation

During 20th century, most of the temperate forests had been cleared and turned into farmland, towns, and cities.



Conservationists, such as George Vanderbilt, began to try to preserve what was left of the temperate forests and the practice of forestry began.

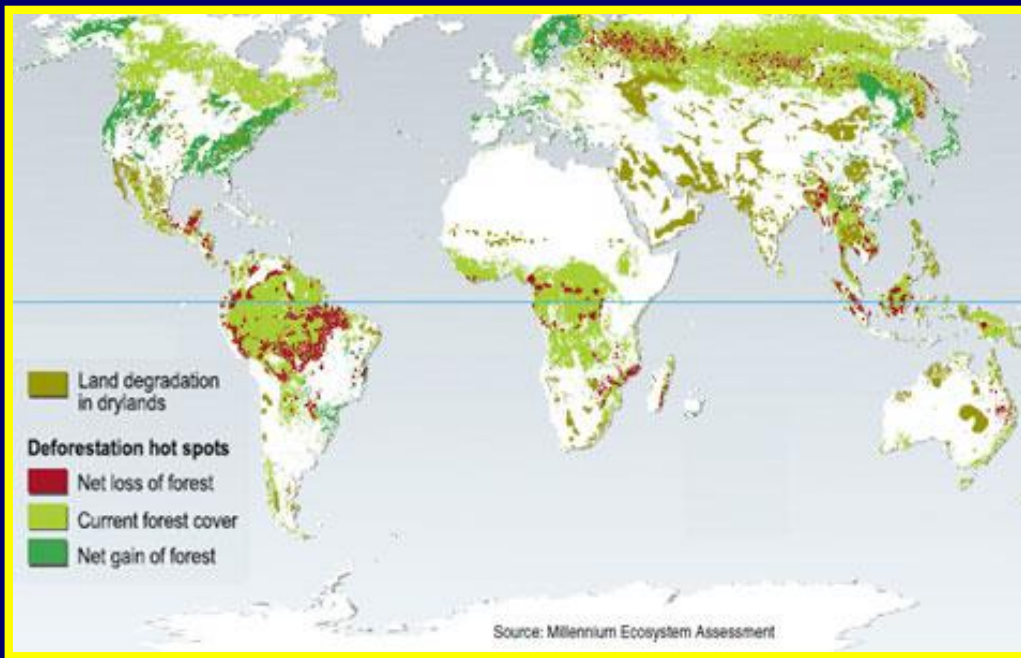
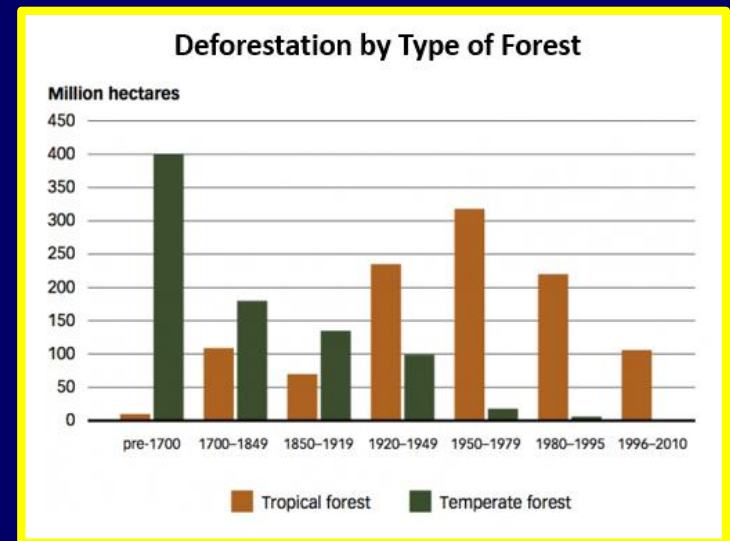
Deforestation

The largest threat today, to temperate forests in the United States, is from mountain top removal for surface coal mining.



Deforestation

In the 1900's, deforestation of rainforests began to dominate and continues today.



Over the last 50 years, 17% of the Amazon rainforest has been completely cleared.

Deforestation

Deforestation for agriculture has led to the loss of over 17% of the Amazon rainforest in the past 50 years.



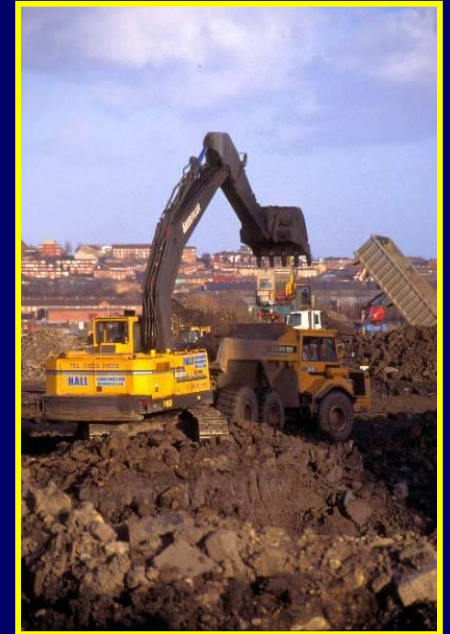
Most of the rainforests has been cleared for livestock farming.

But clearing of the rainforests for cash crops, like palm oil, is increasing.



Habitat Degradation

Besides complete removal of forests, increased development on the fringes of natural land has also led to loss of habitat or degradation of habitats.



As we decrease wild animal habitat, the animals are forced to come in contact with humans and often results in them being killed as threats.

Habitat Degradation

As we build roads through natural areas, habitats become fragmented, forcing wildlife to cross roads and become road kill.



Coral Reef Destruction

One quarter of the world's coral reefs are considered damaged beyond repair with another two-thirds under serious threats.



Coral Bleaching due to warmer sea temperatures

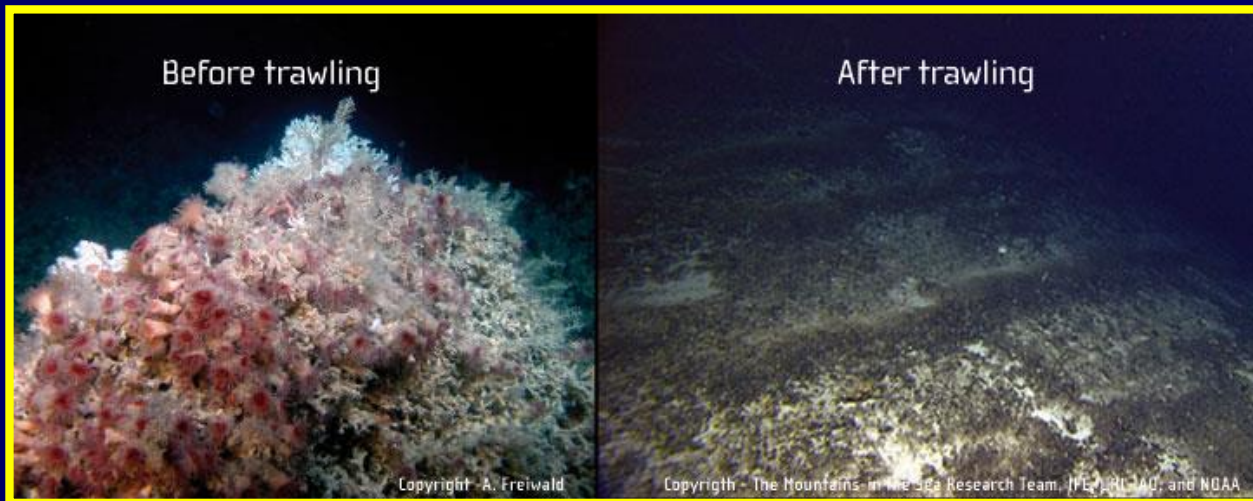


Coral Reef Destruction

Coral Reefs are also being damaged from eutrophication and sedimentation, as well as damage from fishing techniques like trawling.

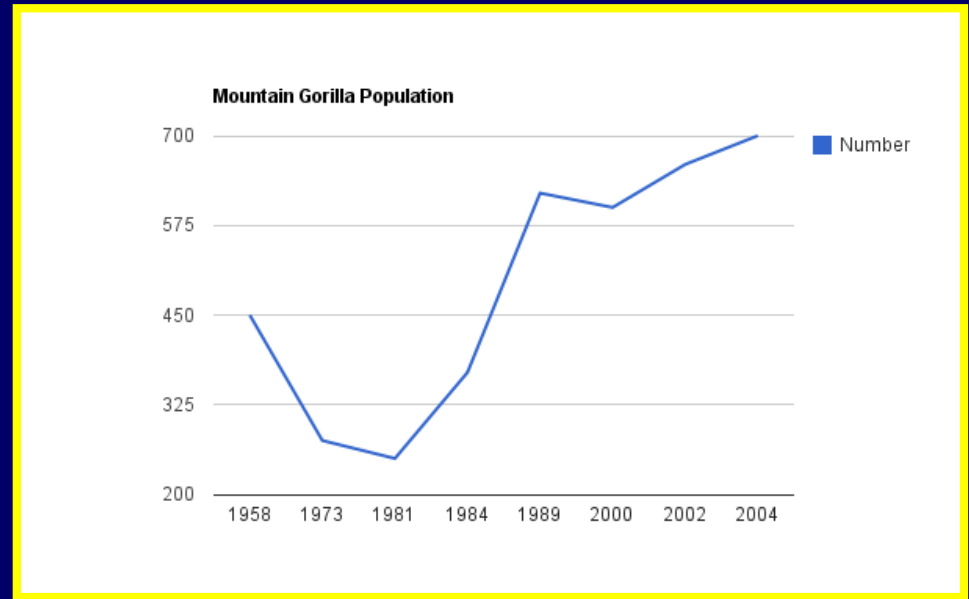


Trawling with a net



Over-Hunting

Over-hunting has also taken its toll on biodiversity.



Mountain gorillas became known to the western world, in the early 1900's. By the 1960's, they were nearly wiped out. Conservation efforts have increased their numbers to about 880 gorillas, today.

Poaching

Even though species are put on endangered species lists and the hunting of them is banned, poaching for the illegal black market still continues to threaten the numbers of many endangered species.



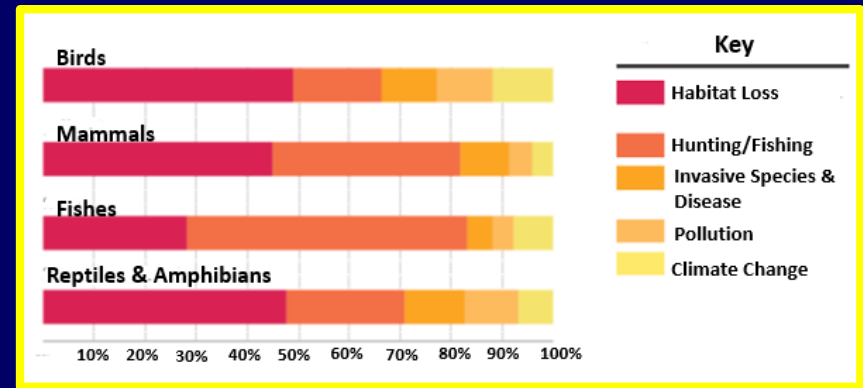
In 2011, 23 metric tons of ivory from 25,000 African elephants was seized.

IN 2016, poaching of tigers surged to its highest level in the past 15 years.



Over-Fishing

Over-fishing has been incredibly devastating to fish populations.



Most of the major fish populations have declined within the past 50 years, due to advanced fishing techniques and just more fishing boats.



400 tons of Mackerel



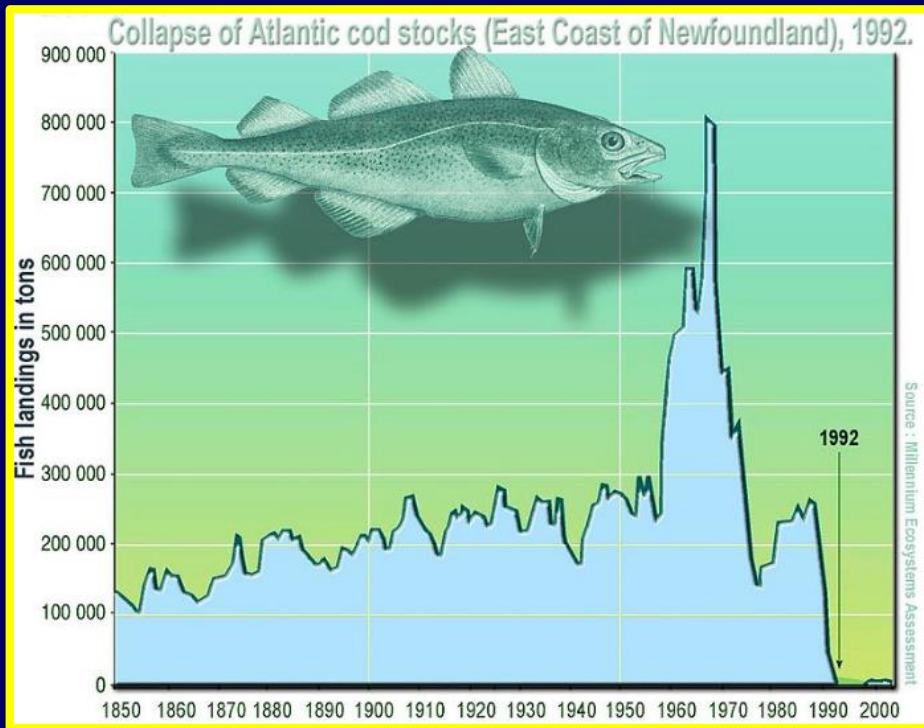
Blue Fin Tuna



Alaska (Fish Type ?)

Over-Fishing

Over-fishing has been incredibly devastating to fish life.



Codfish used to be the largest fish market as codfish was used for fish sticks and fish fillets.

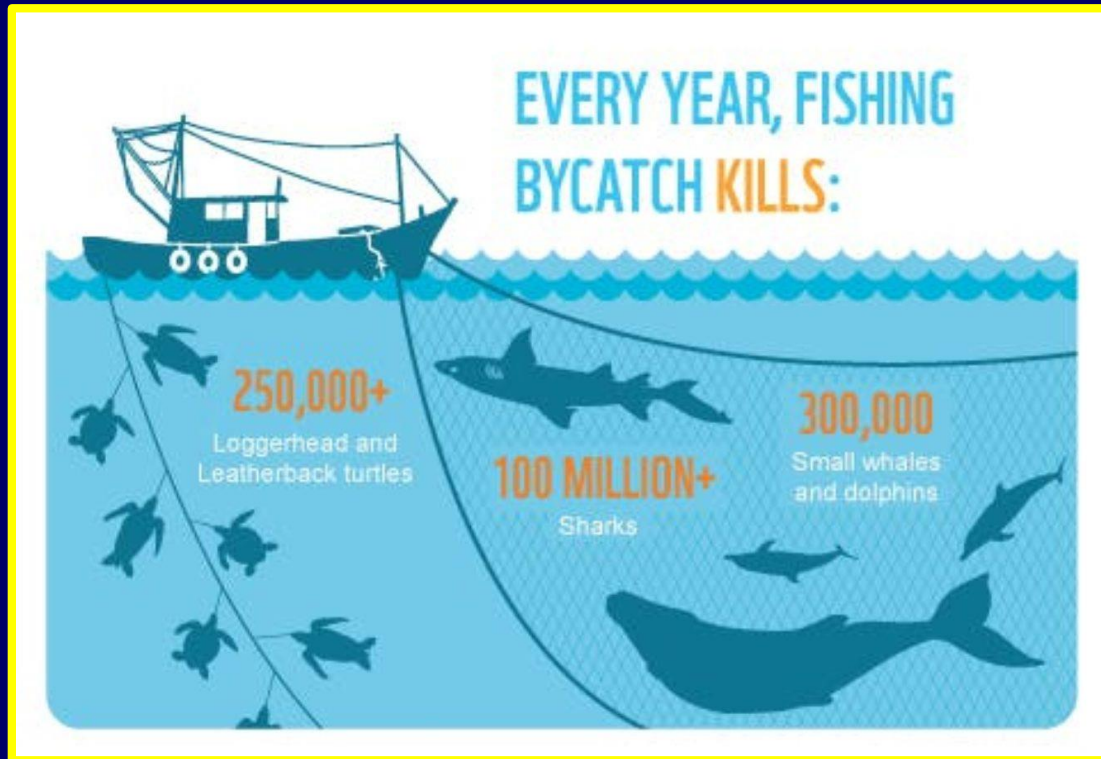
By the early 1990's, the codfish populations had collapsed.



Now whitefish is used in fish sticks & fish fillets.

By Catch

Advanced techniques in fishing has also led to the death of large amounts of sea turtles, sharks, and marine mammals, as they get caught in the nets and discarded as bycatch.



Dolphin Safe Tuna

Until the 1990's, US fisherman used dolphins to round up schools of tuna fish. In the process of catching the tuna, dolphins were also killed as by catch.



As people became educated about what was going on, they began boycotting tuna.

Today, most US supermarkets will only stock tuna that is labeled as Dolphin Safe Tuna, meaning that it was caught without any dolphins being killed.

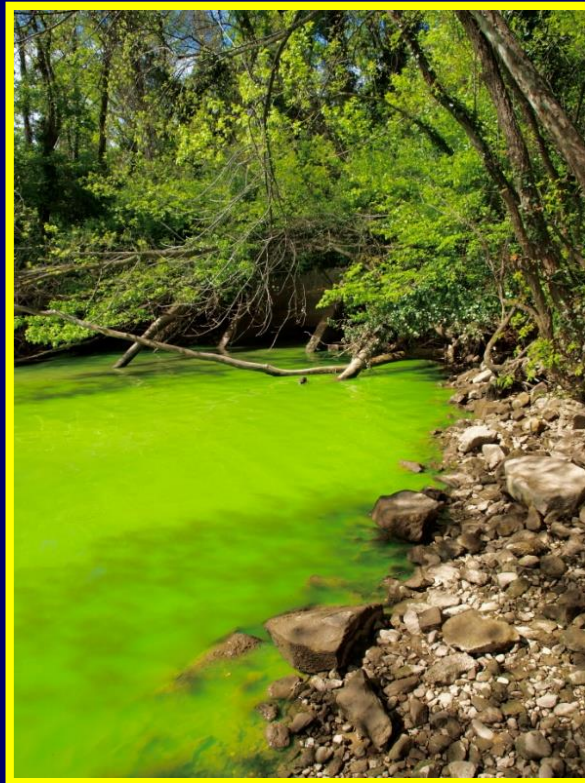


Pollution

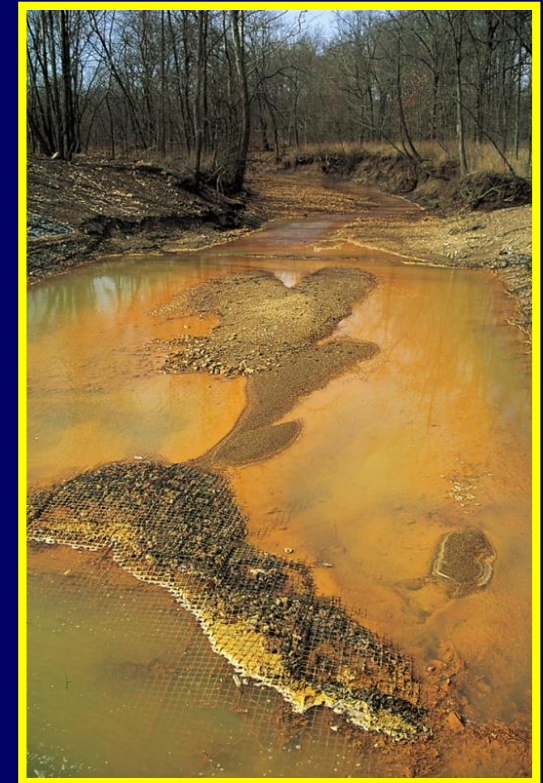
Pollution can either completely destroy a habitat or it may degrade a habitat making so it does not support life as well as it once did.



Oil Spills



Eutrophication



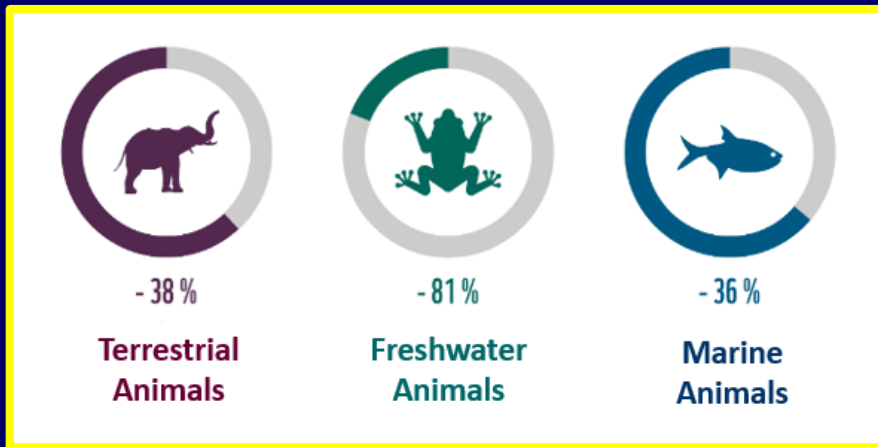
Acid Mine Drainage



Industrial Pollution

Pollution

Recall that the greatest loss in the number of animals since 1970 has been to freshwater animals, especially salamanders and frogs.



“Toughie” – the last of the Rabbs Tree Frog – died in 2016.

Since 1970, over 200 species of frogs have gone extinct and over half of the salamander species are on the list of threatened species as their numbers have continued to drop dramatically since the 1970's.

Pollution

Amphibians breathe through their skins. Some salamanders breathe through only their skins their entire lives. But most adult frogs and salamanders breathe through their skin as a supplement.



Pollution and Disease

Low dissolved oxygen levels in the water due to eutrophication, sedimentation, and warmer waters sometimes leads to deaths in salamanders and frogs outright.



But more often, it puts stress on their systems and lowers their resistance to disease.

Batrachochytrium dendrobatidis, known as BD, is a fungal disease that infects amphibian skin cells and can kill a population within a matter of weeks.

Non-Native Species

Introducing non-native invasive species also reduces biodiversity in ecosystems when the prey upon or out-compete native species.



The accidental introduction of the brown tree snake to Guam during WW2, has led to the extinction of 12 of Guam's native bird species.

Being non-native, the introduced species is not part of the ecosystem, so there are no natural predators and the prey have no natural defenses, that have been built up over generations.

Non-Native Species

Introducing non-native invasive species also reduces biodiversity in ecosystems when they prey upon or out-compete native species.



Zebra Mussels



Kudzu

Non-Native Species

Like the brown tree snake in Guam, many non-native invasive species are introduced by accident, usually through the trade business.



Zebra mussels were introduced to the United States from Europe, in the ballast water of ships.

In Europe, natural competitors kept their populations under control, but in US waters, they out competed the native species and the zebra mussel population soared.



Non-Native Species

Sometimes the introduction of a non-native, invasive species was intentional.



Kudzu was brought over from Japan in the late 1800's for use as an ornamental plant.

After the Dust Bowl, the US government began paying farmers to plant kudzu on any unused land.



Global Climate Change

A changing global climate is also resulting a loss of habitat and biodiversity.



In Alaska, the ice sheets are forming later and melting sooner. This gives polar bears less time to hunt for their main food source of seals and results in a decrease in the polar bear population.

The End

