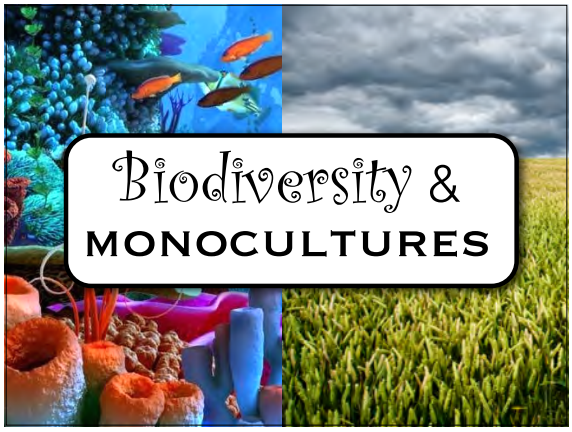
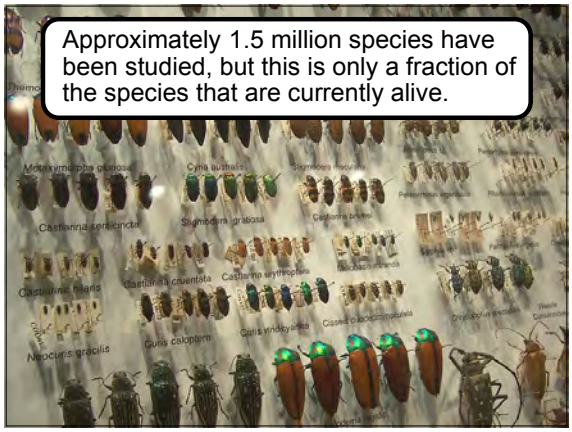
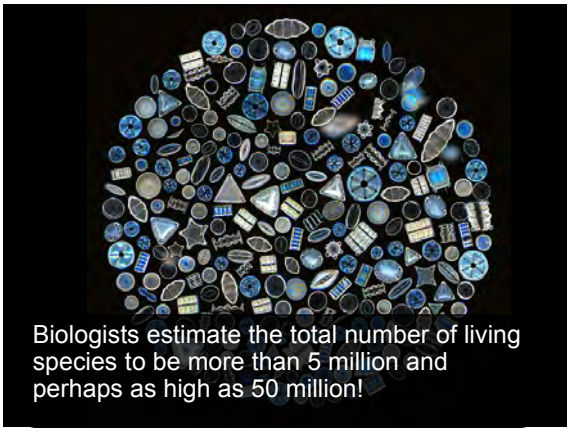
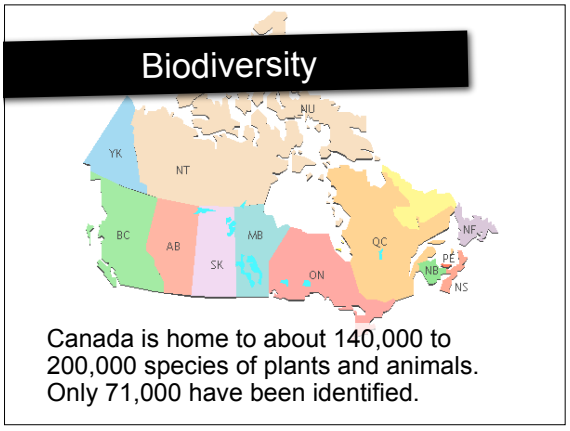

Biodiversity &
MONOCULTURES


Scientists have only begun to understand the variety of life that exists on Earth.


Approximately 1.5 million species have been studied, but this is only a fraction of the species that are currently alive.


Biologists estimate the total number of living species to be more than 5 million and perhaps as high as 50 million!


There is little doubt that most living species have yet to be identified...


Biodiversity
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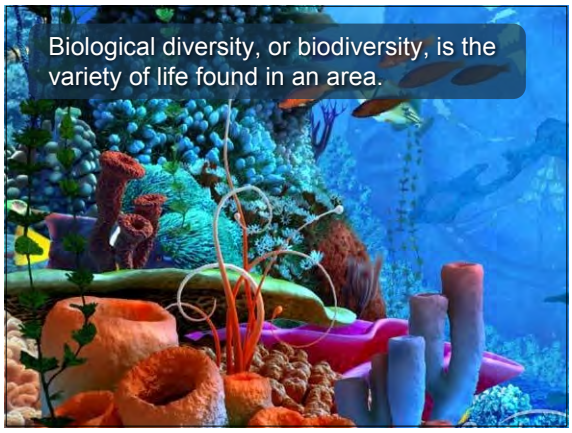
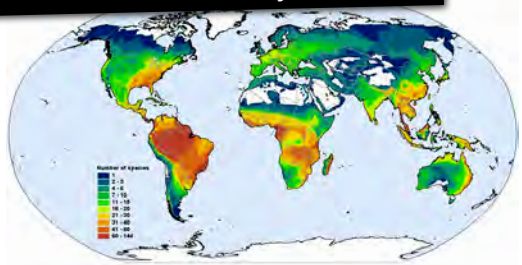
Canada is home to about 140,000 to 200,000 species of plants and animals. Only 71,000 have been identified.



Biodiversity

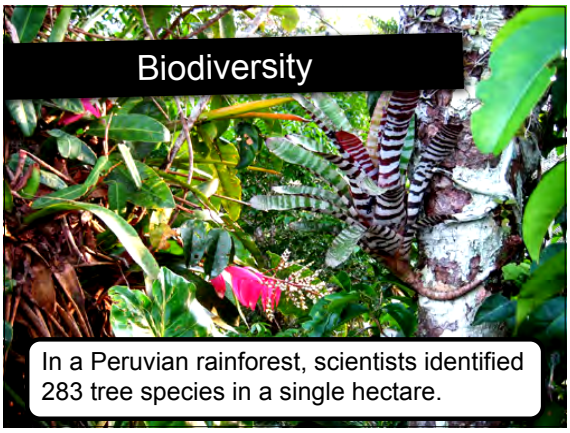
This measurement of species numbers is called species richness. A diverse ecosystem will have high species richness.

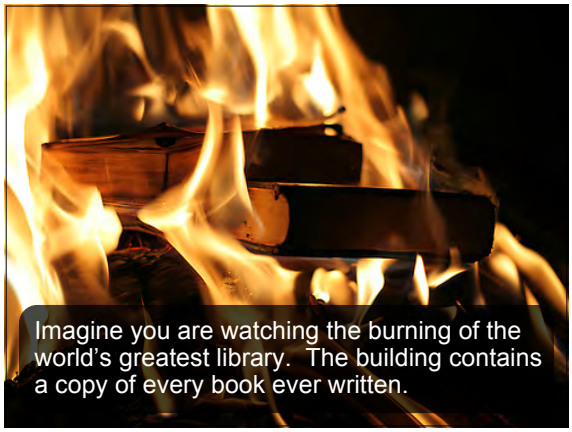
Biodiversity



In general, species richness tends to be higher close to the equator.

Biodiversity





Biodiversity Under Attack

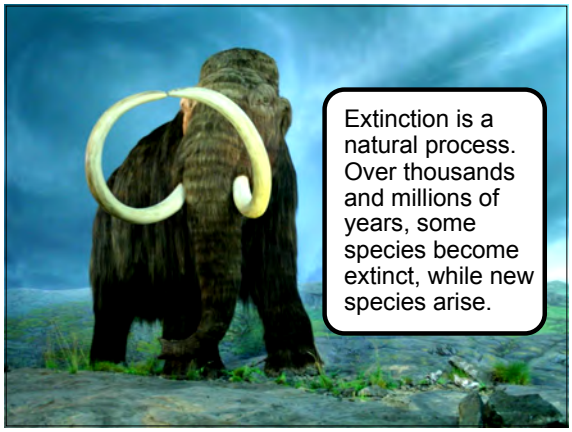
Now imagine you are told that most of these books have never been read and that no copies exist. Such a fire would be a tragic loss of human knowledge.

Many species are dying out, or going extinct.

Their habitats are being destroyed through deforestation, urban and agricultural expansion, pollution and climate change.

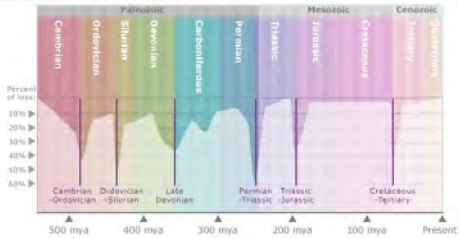
Like the books in the burning library, most of these species have not been studied.

Humans are rapidly destroying Earth's ecosystems without even knowing their biological contents.



Extinction is a natural process. Over thousands and millions of years, some species become extinct, while new species arise.

Biodiversity Under Attack



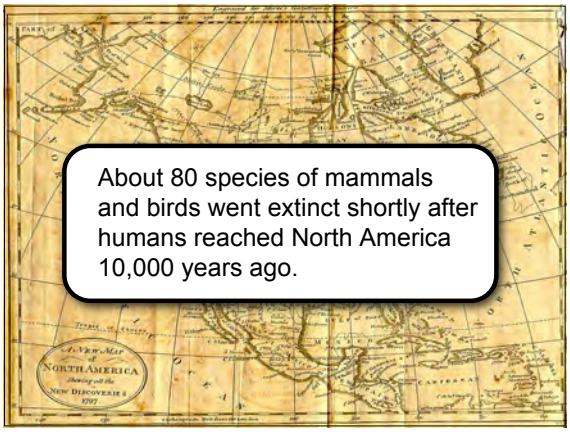
There have been at least five major extinction events in the past 1 billion years.

Extinction events are usually caused by a catastrophic event such as an asteroid impact or massive volcanic eruption.

Between such rare events, extinction rates are very low.

Biodiversity Under Attack

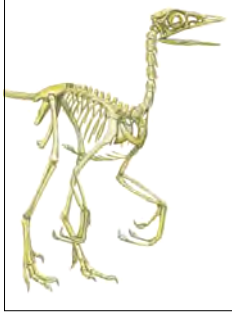
Within 200 years of their arrival in New Zealand, humans had caused the extinction of 30 species of large bird, including 26 species of giant moas.



Biodiversity Under Attack

The extinctions included saber-toothed tigers, mammoths, camels and horses, as well as several ocean species such as the Stellar's sea cow.

Biodiversity Under Attack



In the past 400 years, over 700 species of vertebrates have become extinct.

12 species have become extinct in Canada in the past 170 years.

Unfortunately, the rate of human-caused extinction is increasing.

Species at Risk

Species do not have to be driven to extinction for there to be ecological consequences.

When a population's size declines below a critical level, the species will no longer be able to fill its ecological niche.

This has consequences for the biotic and abiotic features of the ecosystem.

Species at Risk

For example, the lost of most (but not all) large sharks from a coral reef ecosystem changes the food web and damages the reef.

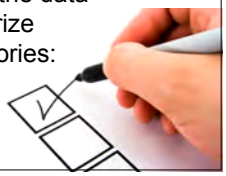
Species at Risk

In Canada, the status of species is monitored by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Species at Risk

The committee has members from governments, universities, other agencies and Aboriginal peoples.

Experts on COSEWIC use the data of species at risk to categorize them into one of four categories:



Species at Risk

Frosted Elpin Butterfly

Species are classified as extirpated when they no longer exist in the wild in a specific area but still live elsewhere.

Species at Risk

Endangered species are those that are in imminent danger of going extinct or becoming extirpated.

Wolverine

Species at Risk

Threatened species are likely to become endangered if current trends and conditions continue.

Humpback Whale

Species at Risk

Species of special concern may become threatened or endangered because of a combination of factors.

Canadian Species at Risk

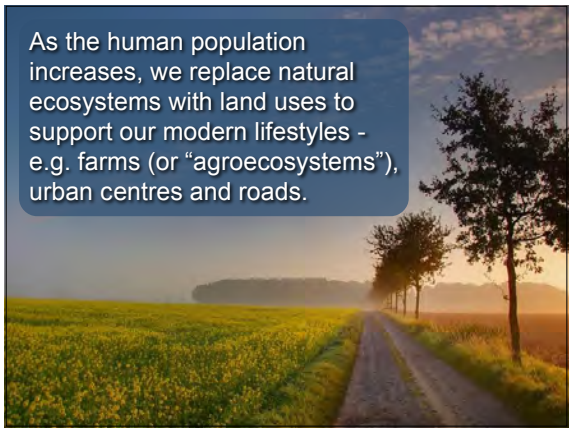
Classification	# of Species	Examples
extinct	13	• great auk • passenger pigeon • sea mink
extirpated	23	• paddlefish • Atlantic walrus
endangered	238	• barn owl • swift fox • northern cricket frog
threatened	146	• humpback whale • wood bison • Kentucky coffee tree
special concern	157	• polar bear • red-headed woodpecker • Atlantic cod

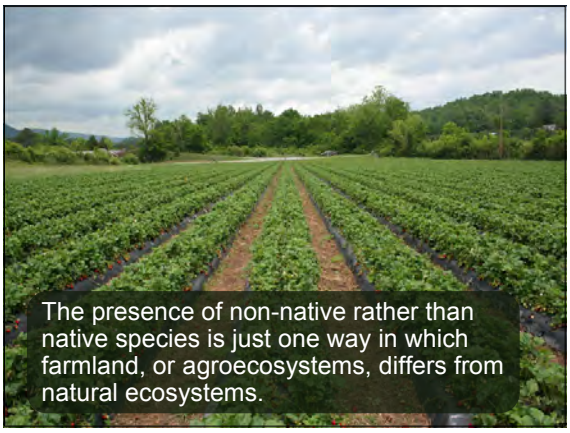
When a species is placed in the endangered or threatened category, another agency called RENEW (Recovery of Nationally Endangered Wildlife) prepares an action plan to ensure the recovery of the species.

We must act now to reduce habitat loss, urban expansion and pollution to protect Earth's biodiversity.

Engineered Ecosystems

Engineered ecosystems cover a large portion of Earth's land area.





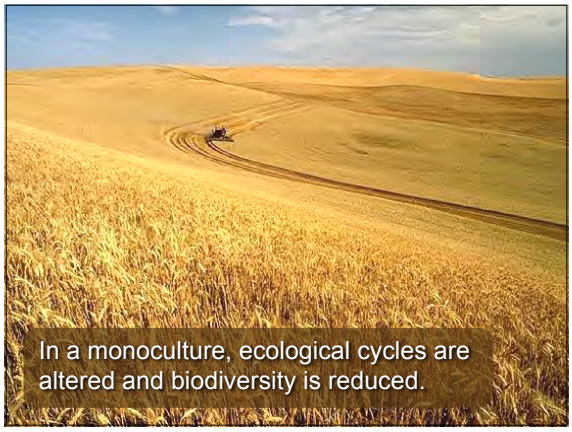
Engineered Ecosystems

In natural ecosystems, many species interact, participating in and maintaining natural cycles.

Engineered Ecosystems

In general, when compared to natural ecosystems agroecosystems have more uniform abiotic features, lower biodiversity, and are more intensively used by humans.

On agroecosystems farmers grow crops in monocultures of non-native species where only one species is grown in a large field.



Engineered Ecosystems

Consumers that feed on crops are considered pests.

Engineered Ecosystems

Farmers manage abiotic and biotic conditions to maximize the success of growing monocultures.

They attempt to create ideal and uniform growing conditions and to eliminate competitors, diseases and pests.

Engineered Ecosystems

Ploughing, weeding, fertilizing, irrigating and the spraying of pesticides are examples of such management techniques.