

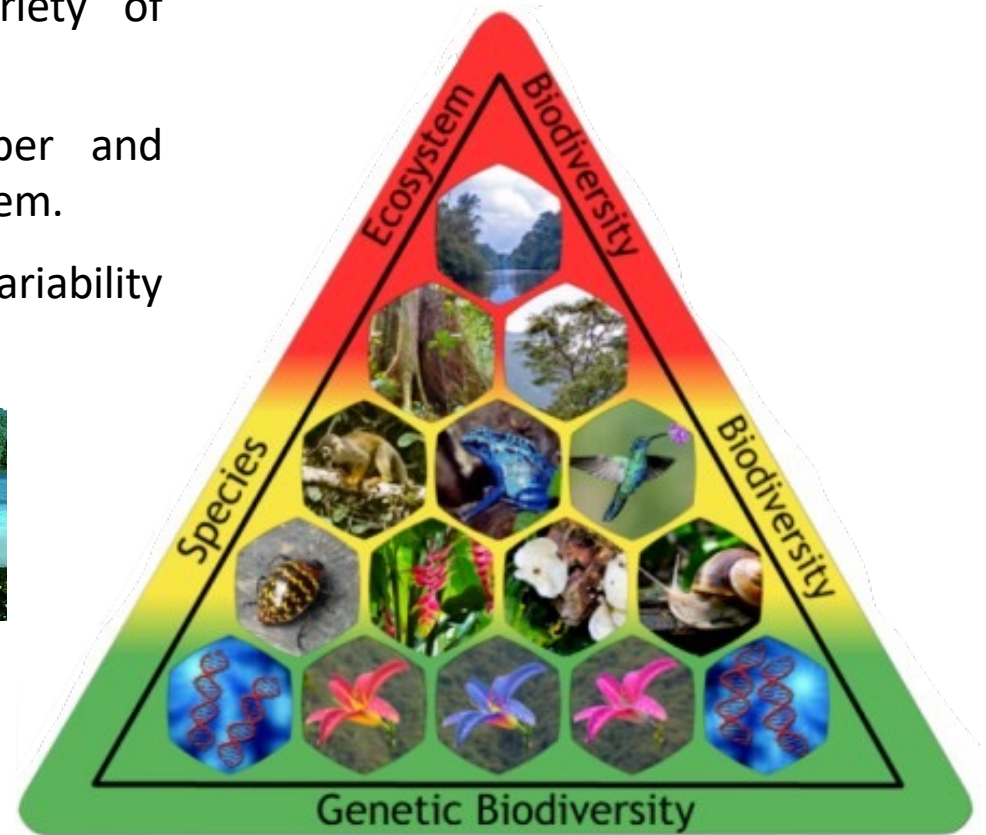
# Biodiversity



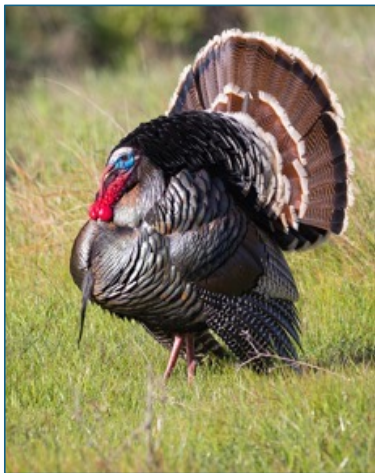
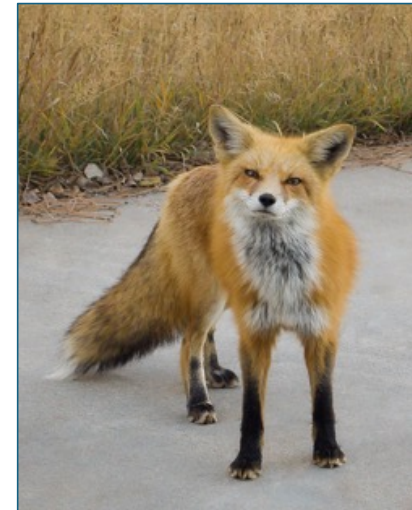
Currency images downloaded from the Costa Rica Guide <https://costa-rica-guide.com/practical/money/how-to-money-in-costa-rica/>

Biodiversity has three components:

- **Ecosystem biodiversity** is about the variety of different habitats in a given area.
- **Species biodiversity** is about the number and distribution of different species in an ecosystem.
- **Genetic biodiversity** is about the genetic variability within a population.

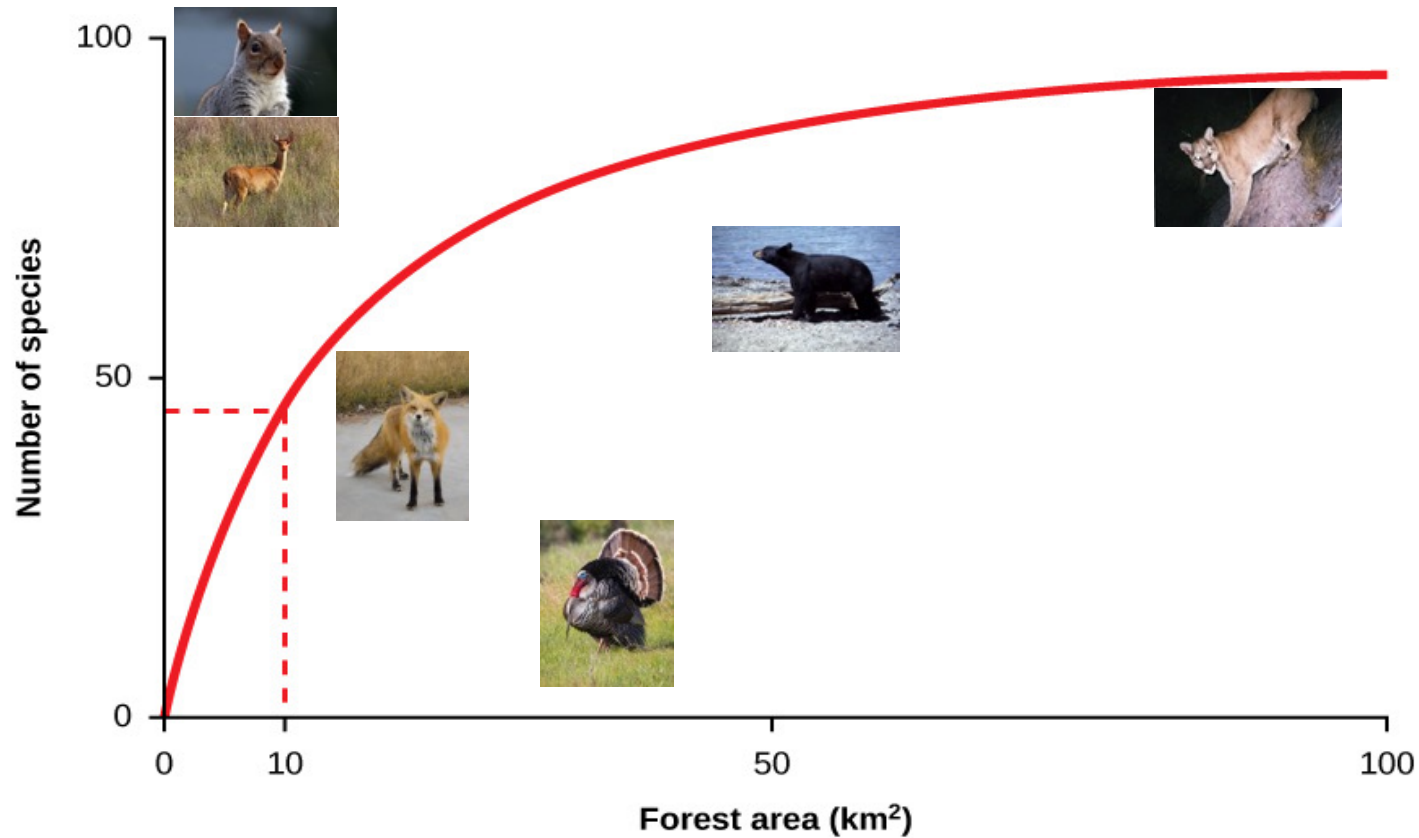


Rate from 0-10 the likelihood of you seeing one of these species on a weekly basis:



Biodiversity is largely a function of ecosystem size.

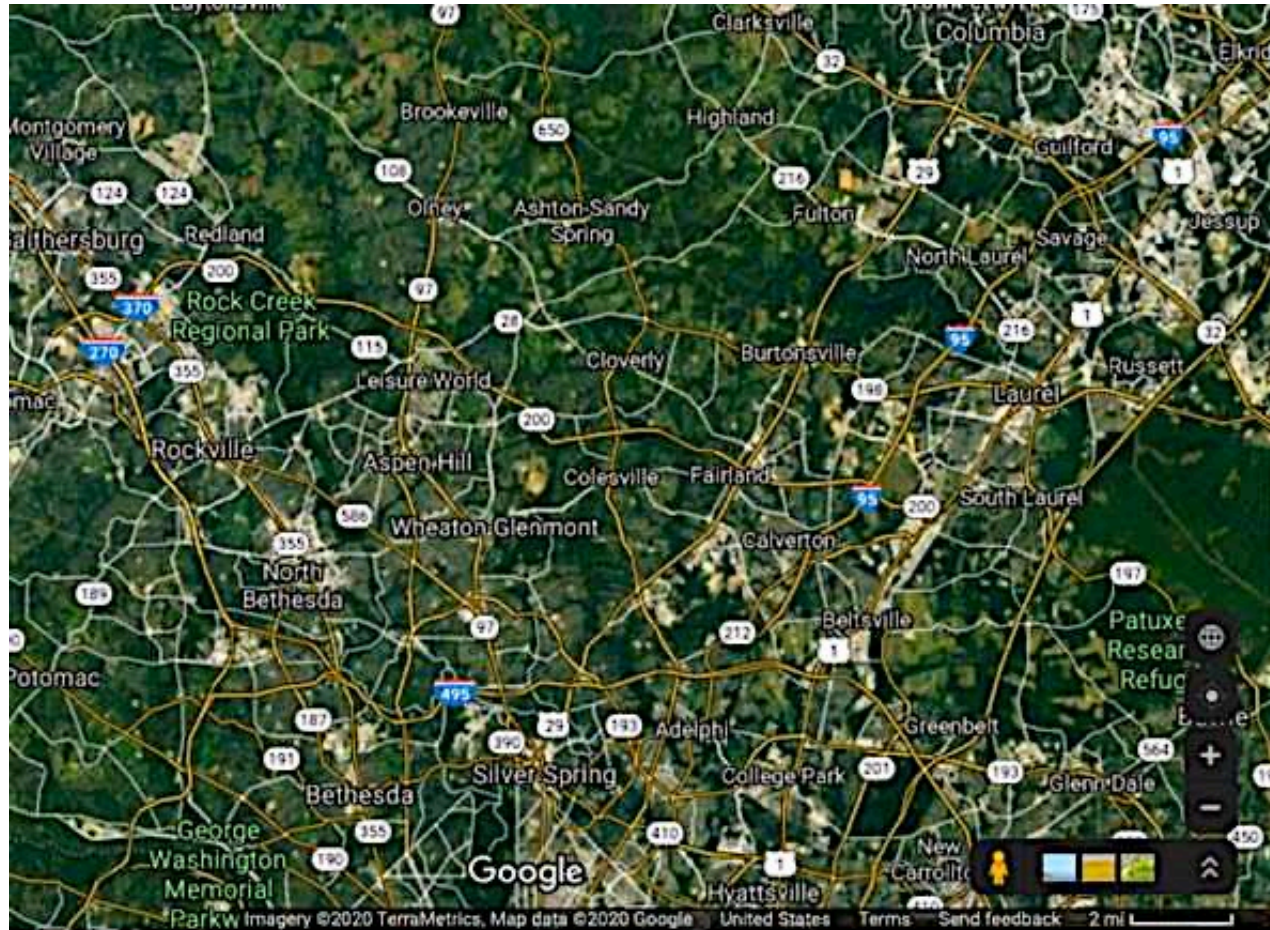
Larger forests have more species because they are able to accommodate top predators that enhance biodiversity by preying upon species that would otherwise dominate the habitat.



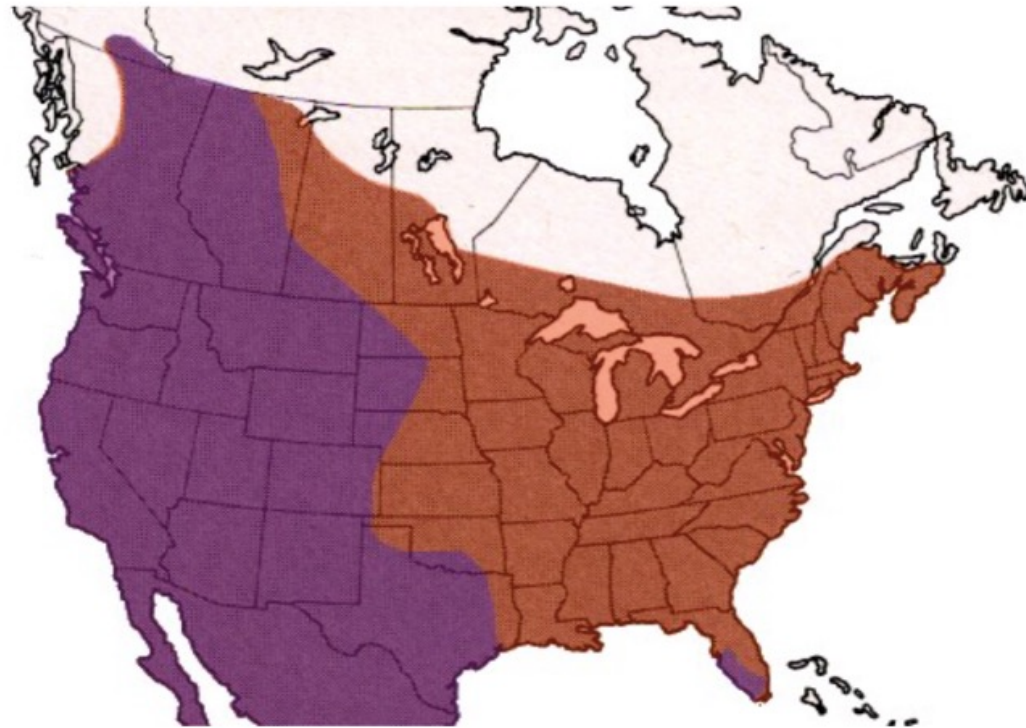
Shenandoah National Park is biodiverse because it contains large areas of uninterrupted forest.



The suburbs of Maryland contain many green spaces, but they are fragmented by highways, shopping centers, and housing developments.

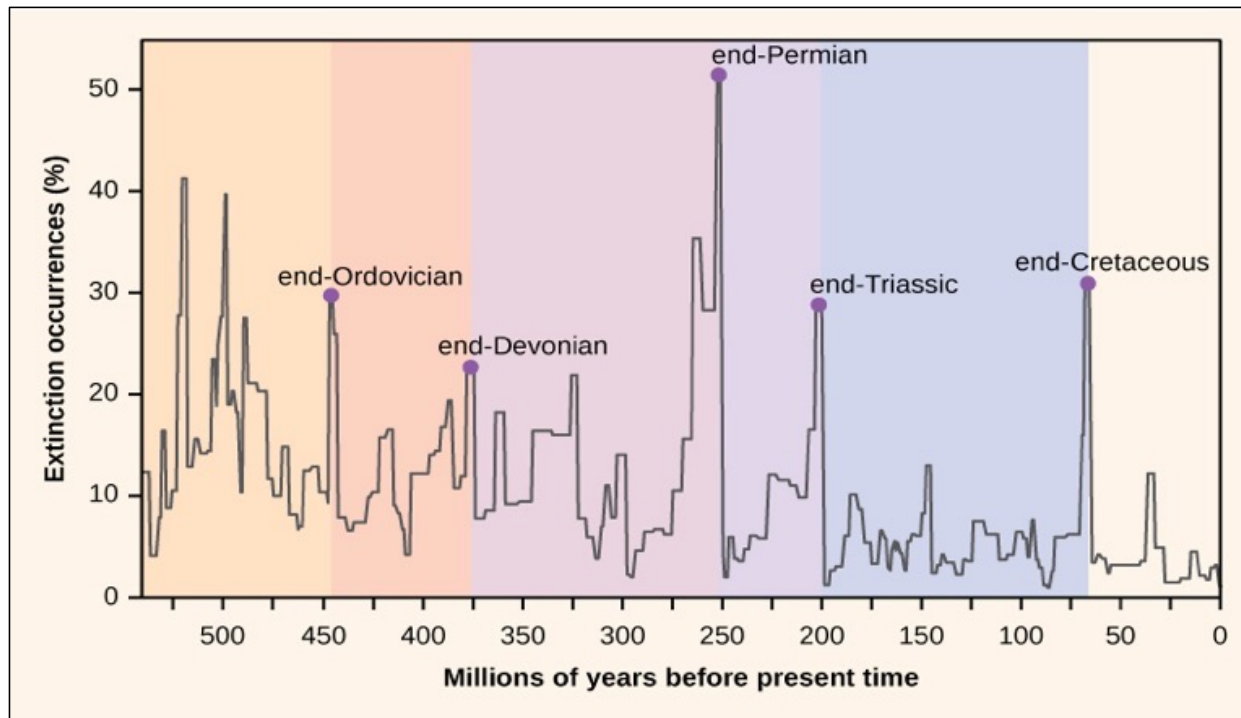


At one time cougars ranged throughout the continental US, but today they are found almost exclusively west of the Mississippi River.



**Current range of cougars in Canada and the US (purple). Reddish areas show the former extent of the cougar's range in eastern North America. (After Wrigley, 1986, and Canadian Wildlife Service - HWW.ca)**

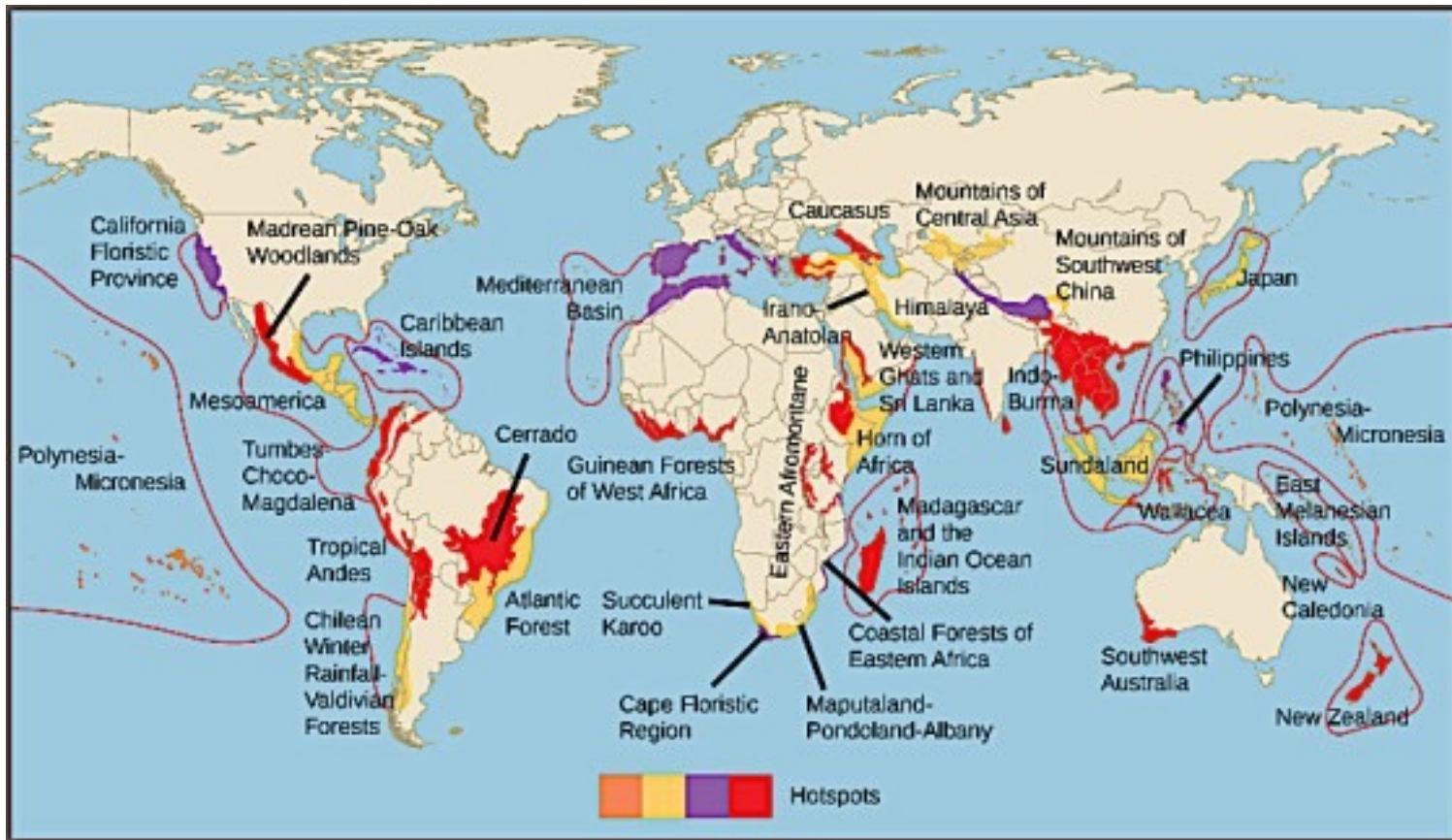
Mass extinctions are not a new phenomenon. The most famous extinction event was the disappearance of the dinosaurs at the end of the Cretaceous about 60 million years ago. Nevertheless, ongoing environmental pressures from human activity increasingly endanger the continued existence of vulnerable species of flora and fauna worldwide.



Graph from "Environmental Issues" by Andrew Frank <https://pressbooks.bccampus.ca/environmentalissues/front-matter/introduction/>



Less affluent nations and islands make up most of the current hotspots for endangered species.



Graph from "Environmental Issues" by Andrew Frank <https://pressbooks.bccampus.ca/environmentalissues/front-matter/introduction/>

Species vulnerable to extinction share one or more of these traits:

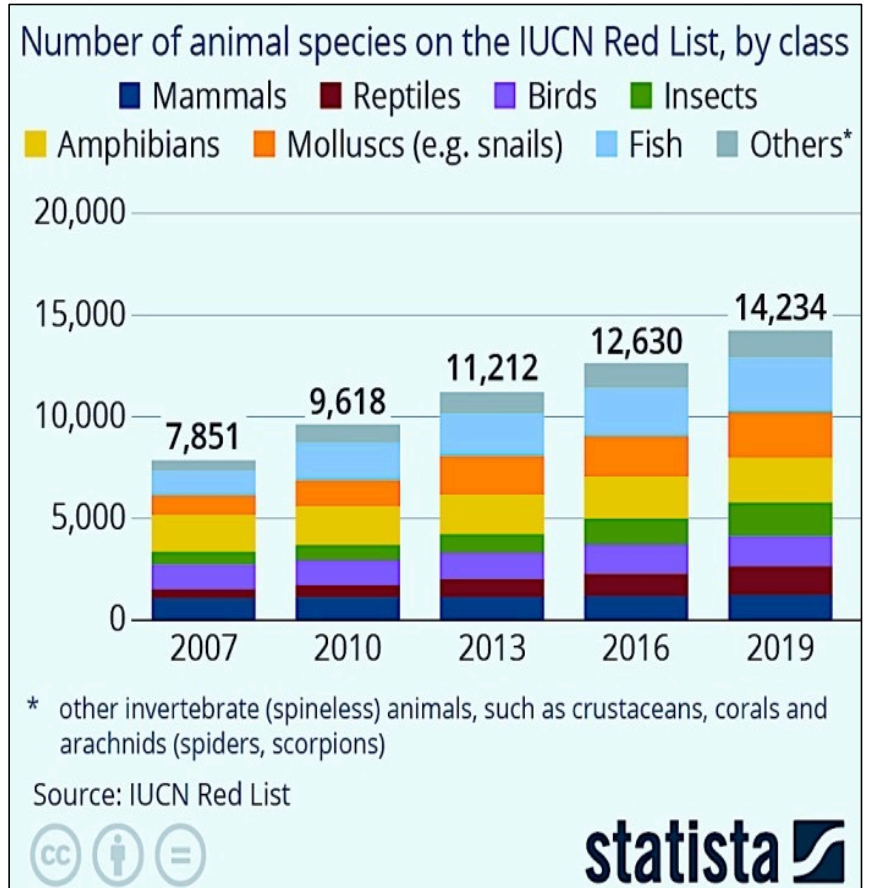
- Slow Reproduction
- Large Territorial Requirement
- High on the Food Chain
- Economically Valuable
- Endemic



Siberian Tiger

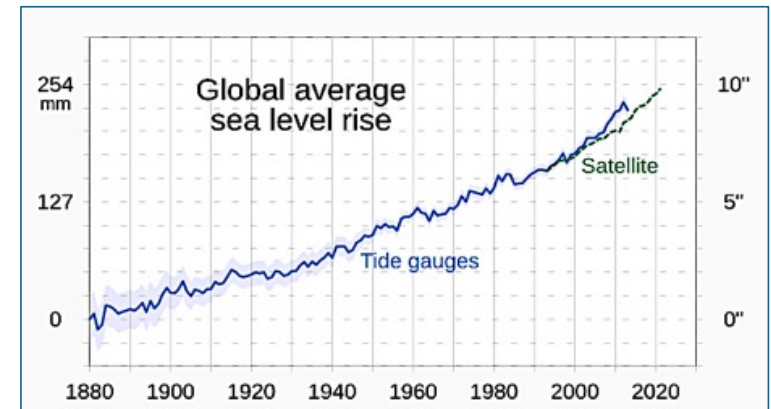


Hawaiian Monk Seal



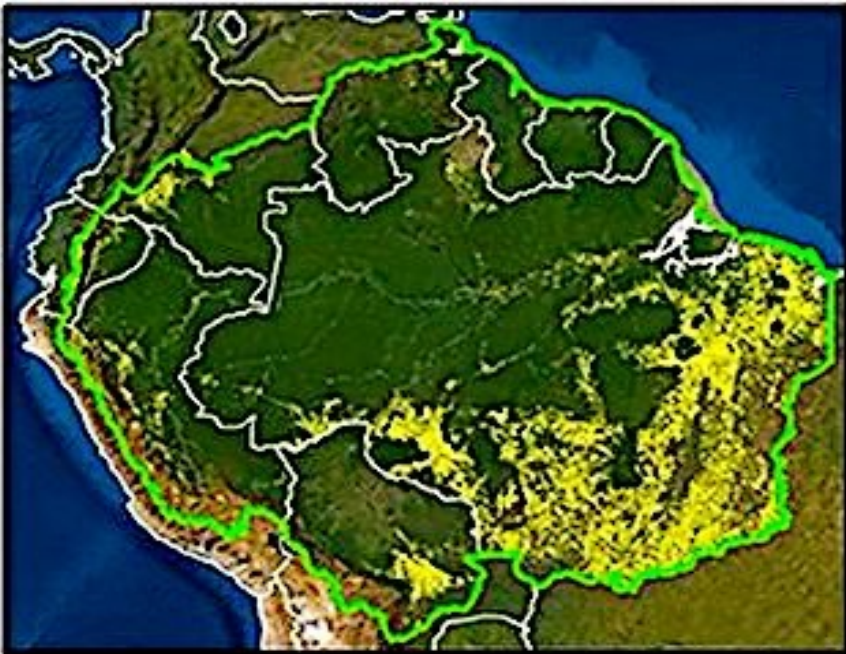
Biodiversity is not only aesthetically pleasing, it also enhances ecological services like soil integrity, pest control, pollination, and sources of future medicines. Anthropogenic threats to biodiversity include:

- Habitat Loss
- Pollution
- Invasive Species
- Overharvesting
- Climate Change

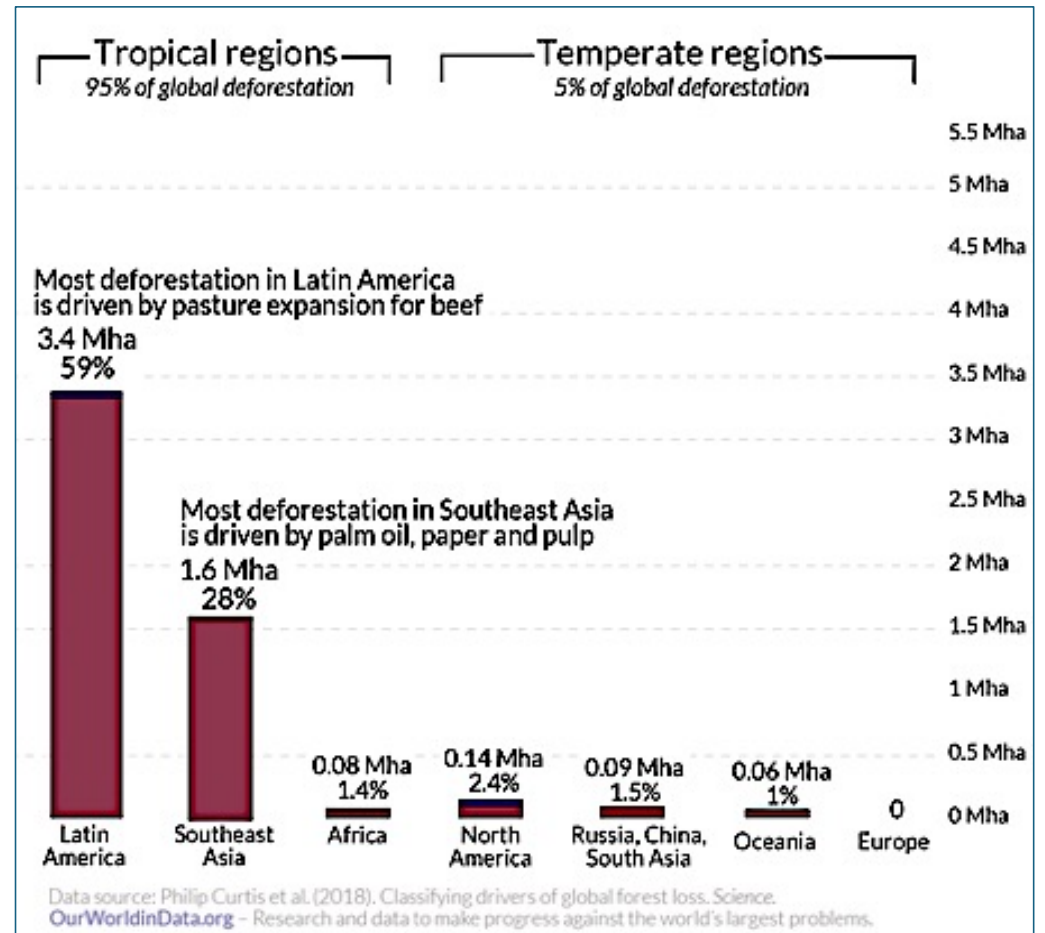


The most common form of **habitat destruction** is **deforestation**.

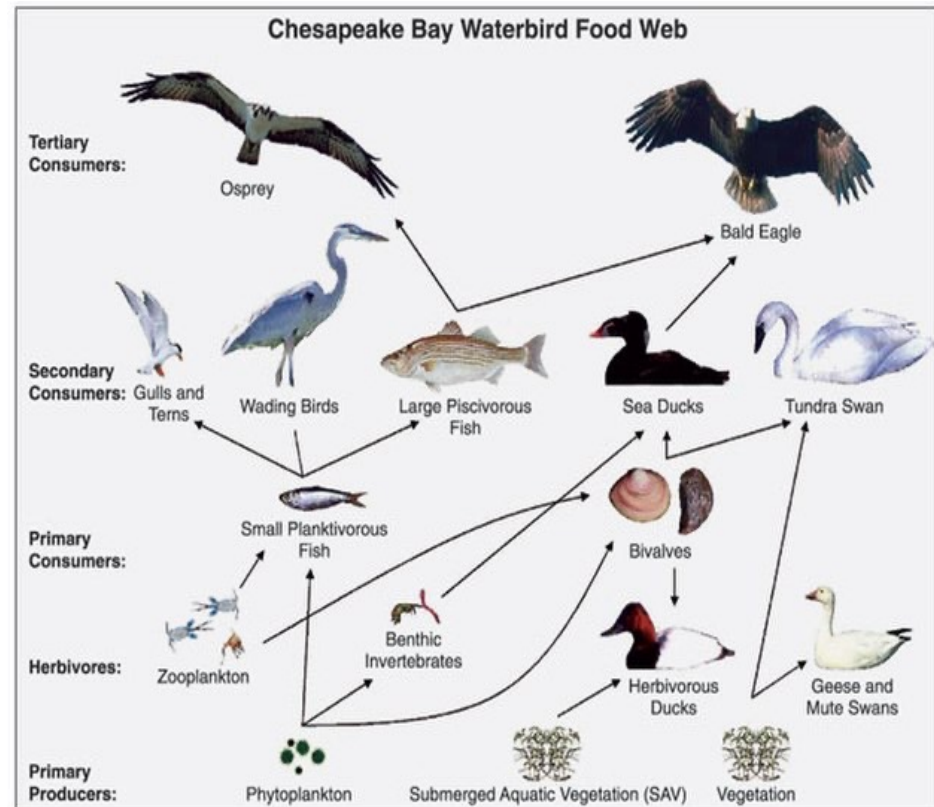
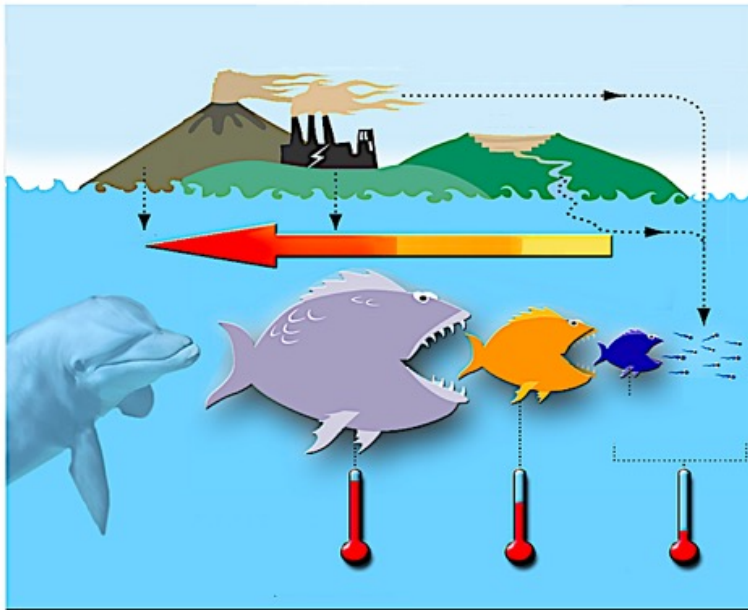
Worldwide, most deforestation takes place in **Latin America** and **Southeast Asia**.



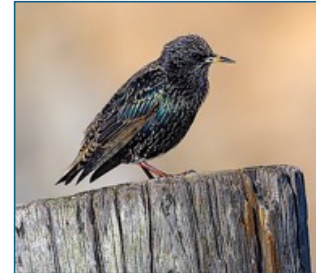
Deforestation for agriculture in the Amazon basin 2001-2019



**Pollution** adversely affects nearly all organisms, but pollutants that **bioaccumulate** up the **trophic pyramid** have a **disparate impact** on the **apex predators**.



**Starlings** are native to Europe. They were imported to the US by a literary enthusiast who wanted to import all birds mentioned in Shakespeare plays. Starlings are **invasive** because they are prolific breeders that outcompete many native species in North America.



**Nutria** are native to South America. They were imported to the Louisiana to raise them for their fur. Nutria are **invasive** because their large burrows and voracious appetite for aquatic vegetation cause damage to shorelines.



**Kudzu** is native to Japan. It was imported to the US in the late 19<sup>th</sup> century as an ornamental plant and later used to control erosion. It is **invasive** because it grows so quickly that it outcompetes native species of plants for sunlight.



**Fire ants** were imported to the US through lumber shipments from South America. Fire ants are **invasive** because they outcompete other ants and their painful stings displace birds and mammals native to North America.



The **poaching** of endangered species in Africa is driven by the demand for **bushmeat** and **exotic products**.

**Overfishing** has also become a serious problem due to modern fishing technology. This problem is managed through enforcement of **fishing quotas** based on information derived from the monitoring of fish populations.



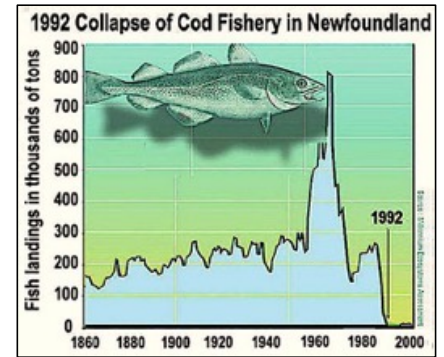
Dried Pangolin Meat



Fresh Lemur Meat



Rhinoceros Horn



The **Key deer** is endemic to the Florida Keys. Its habitat was greatly reduced through by the growth of waterfront property during the 20<sup>th</sup> century.

Now it faces the additional threat of **rising sea levels** attributed to **climate change**.





Strategies for mitigating biodiversity declines include:



- Wildlife refuges.
- Habitat restoration.
- Seed vaults that keep genetically diverse legacy crops in cold storage.
- Captive breeding of endangered species.
- Legislation to prevent the harming of endangered species such as:
  - Endangered Species Act (US)
  - Convention on International Trade of Endangered Species (International)



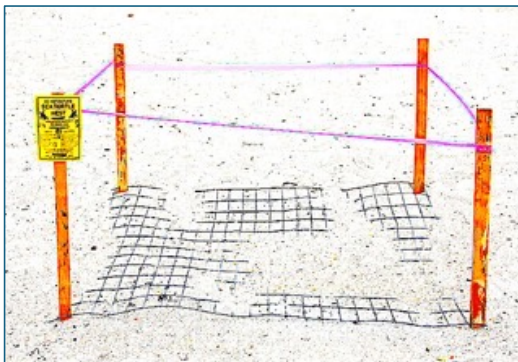
Seed vault in Svalbard, Norway



The captive breeding image shows a California condor chick being feed with a condor puppet to simulate natural parenting.

**Endangered Species Act of 1973** addresses biodiversity in the US by **regulating public and private land use** and by developing plans to assist in the recovery of threatened and endangered species.

**Kemp's ridley sea turtle** populations declined dramatically in the 20<sup>th</sup> century due to pollution, harvesting of turtle eggs, and habitat destruction. Under the **ESA**, nesting sites are fenced off and monitored to maximize the number of hatchlings successfully returning to the sea.



**The Convention on International Trade of Endangered Species of 1975** is an international agreement that bans the **trafficking of endangered species** and their associated products. In the US, **CITES** is enforced by US customs.



Endangered species products seized by US customs.



## Acknowledgement:



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