

BIODIVERSITY



The world is full of magical things
patiently waiting for our eyes to grow sharper.

Eden Phillpotts

A. Huxley
B. Huxley
C. Huxley

Biodiversity

What does “**Bio**” mean?

Bio = **Life**

Biodiversity

What does “Diversity” mean?

Diversity = V**a**riety

Biodiversity is the variety of life on Earth and the essential interdependence of all living things

- **Scientists have identified more than 1.4 million species. Tens of millions -- remain unknown (www.thecatalogueoflife.org)**
- **The tremendous variety of life on Earth is made possible by complex interactions among all living things including micro-organisms.**

There are 3 components of biodiversity

1. Diversity of genes

Chihuahuas, beagles, and rottweilers are all the same species —but they're not the same because there is variety in their genes.



Chihuahua



Beagle



Rottweilers

There are 3 components of biodiversity

2. Diversity of number of species

For example, monkeys, dragonflies, and meadow beauties are all different species.



Saki Monkey



Golden Skimmer



Meadow Beauty

There are 3 components of biodiversity

3. Variety of ecosystems

Lakes, Ponds, and Rivers are all Freshwater Ecosystems.

Rocky coast, Sand Dune, Estuary, Salt Marsh , Coral Reef are all Marine Ecosystems.



ECOSYSTEM DEFINITION

“ A self-contained community of microorganisms, animals and plants, that interact with each other and with their physical environment.”

eg a rock
pool



Within an ecosystem there can be many HABITATS

- This is the **physical and chemical** description of where a creature lives...



HABITATS might describe:

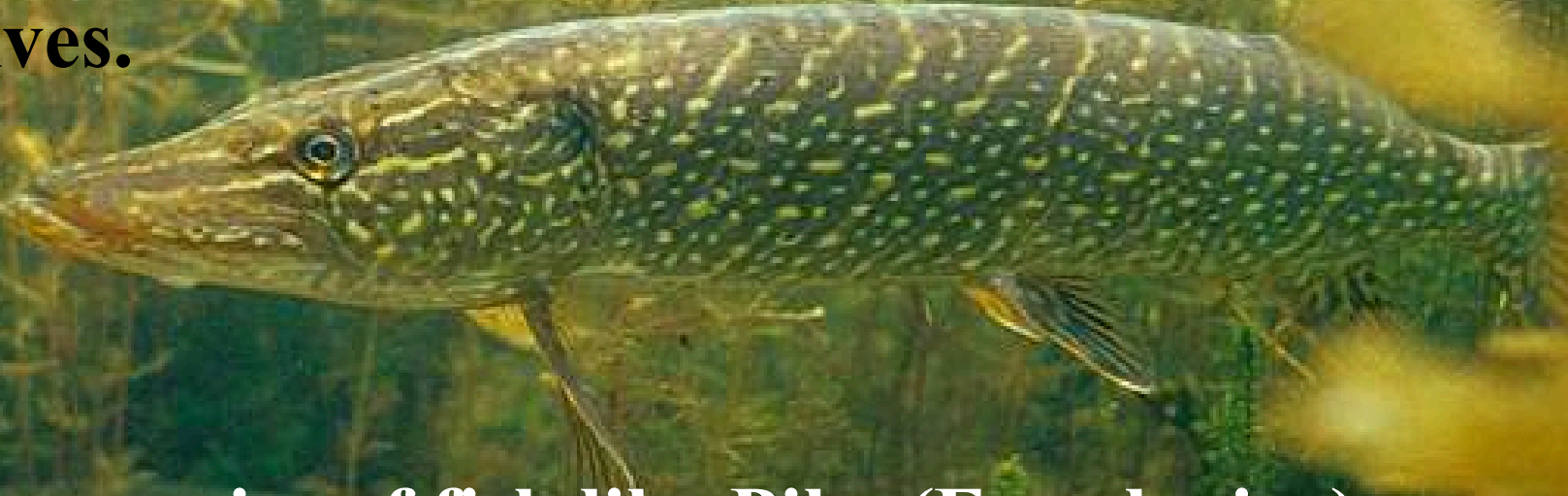
- The NAME of the place where the creature lives.
- 
- A close-up photograph of a polar bear's head and shoulders as it swims in dark, cold water. The bear's white fur is wet and matted, and its eyes are focused on the camera. The background is a blurred, dark blue-grey, suggesting a deep body of water.
- eg *Arctic Canada* is the habitat of the polar bear *Ursa maritima*.

HABITATS might describe:

- The DOMINANT VEGETATION of the place where the creature lives.
- eg *Heather* moorland is the habitat of the grouse.

HABITATS might describe:

- The **TYPE** of place where the creature lives.



- eg species of fish like Pike (Esox lucius) are found in *freshwater lakes and ponds*.

- *So what's a SPECIES??*

A species is difficult to define
exactly!!



1. A group of morphologically similar creatures which can:

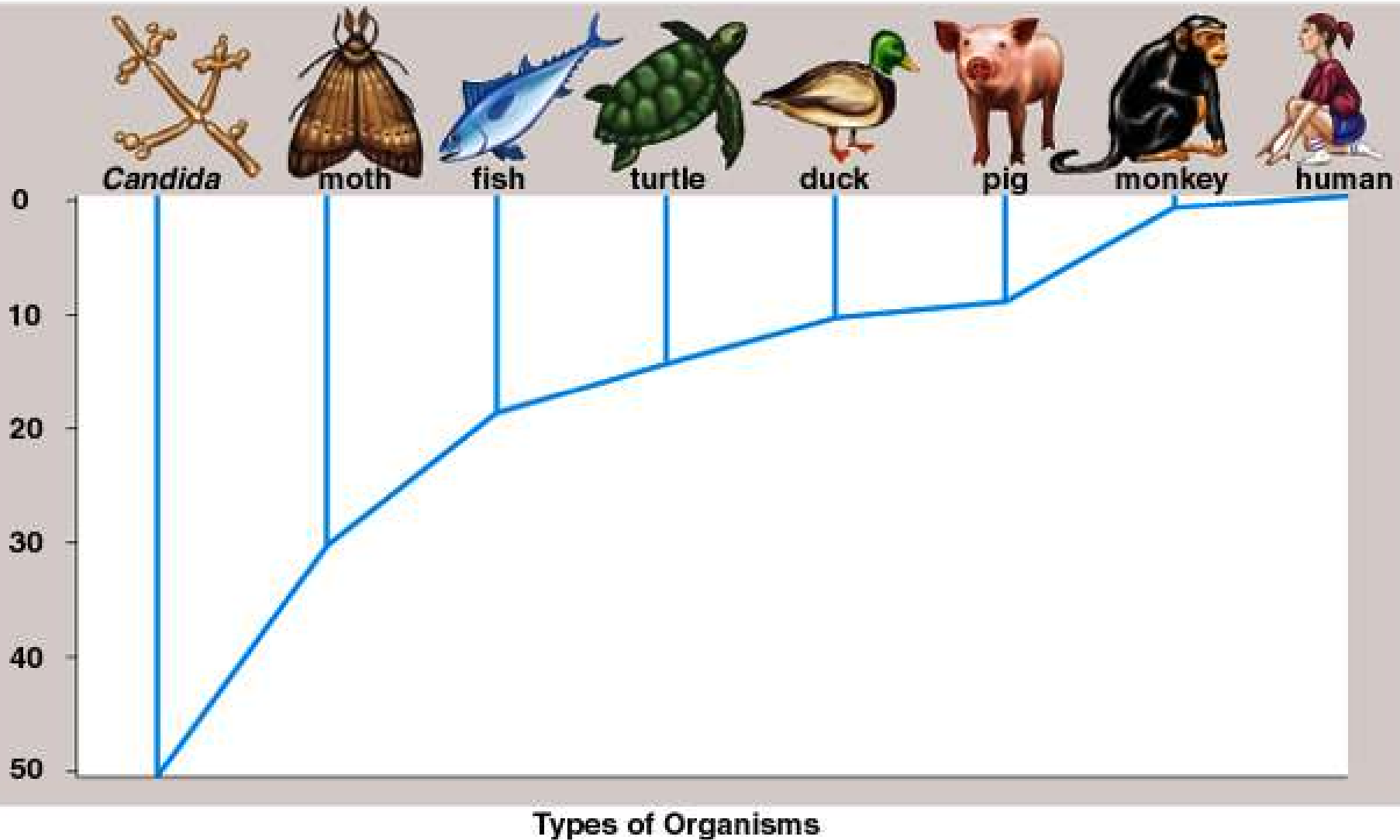
- Interbreed to produce fertile offspring
- Are 'reproductively isolated'.

2. Creatures who are related through PHYLOGENY

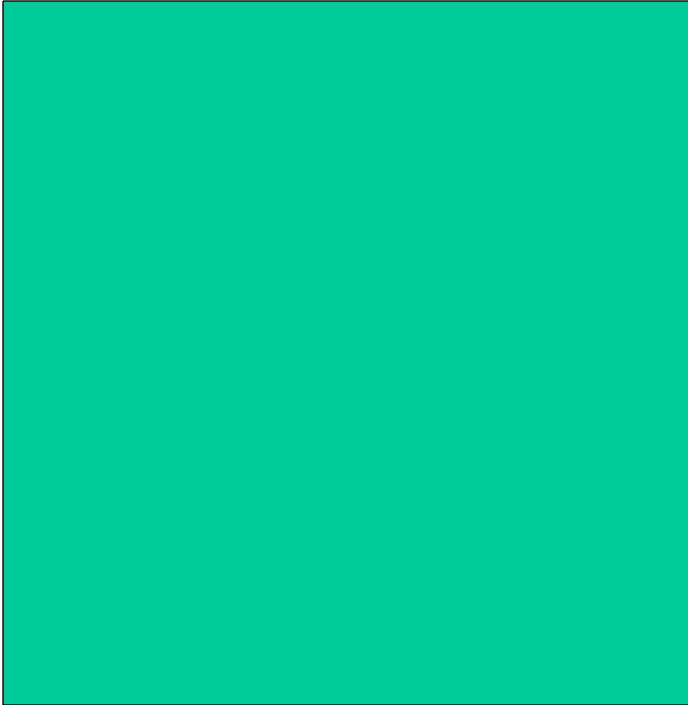
- Similar DNA
- Similar proteins eg in blood
- Similar biochemistry
- Similar embryology

Types of organisms

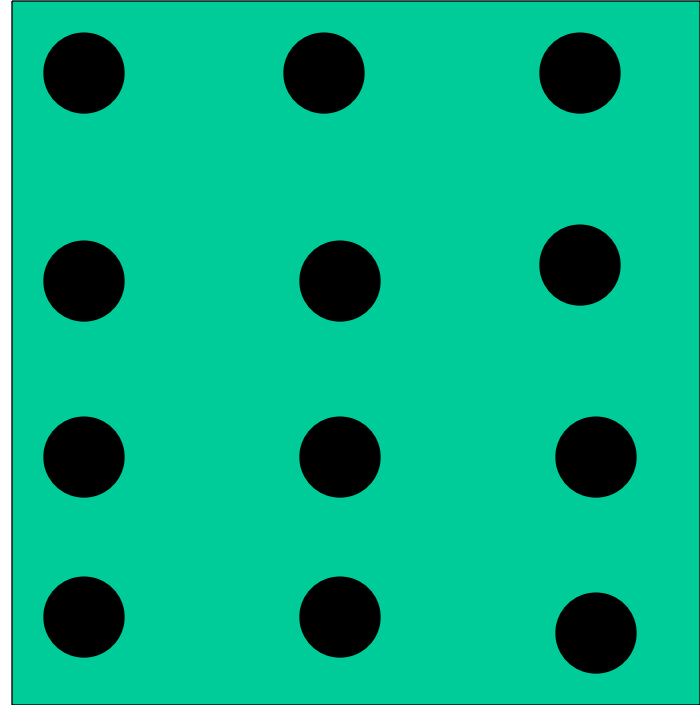
Number of Amino Acid Differences Compared to Human Cytochrome C



Which is more diverse?

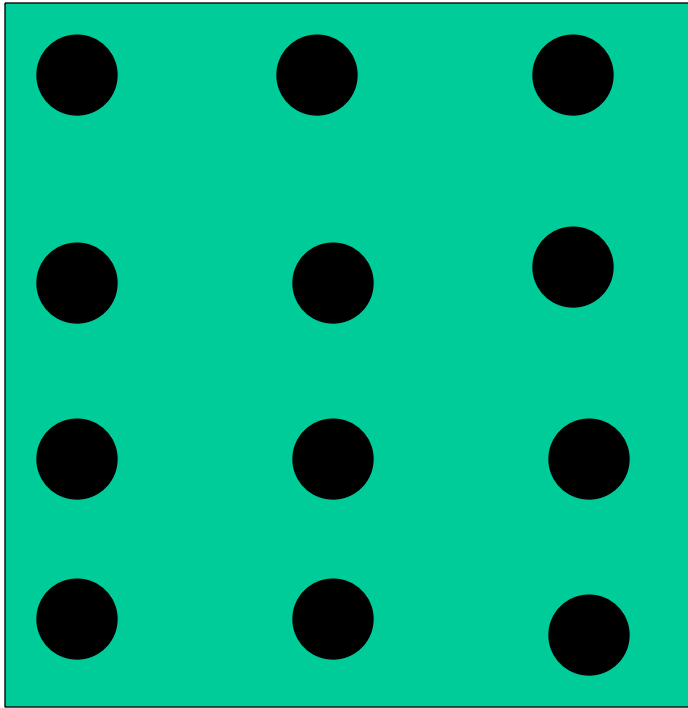


A

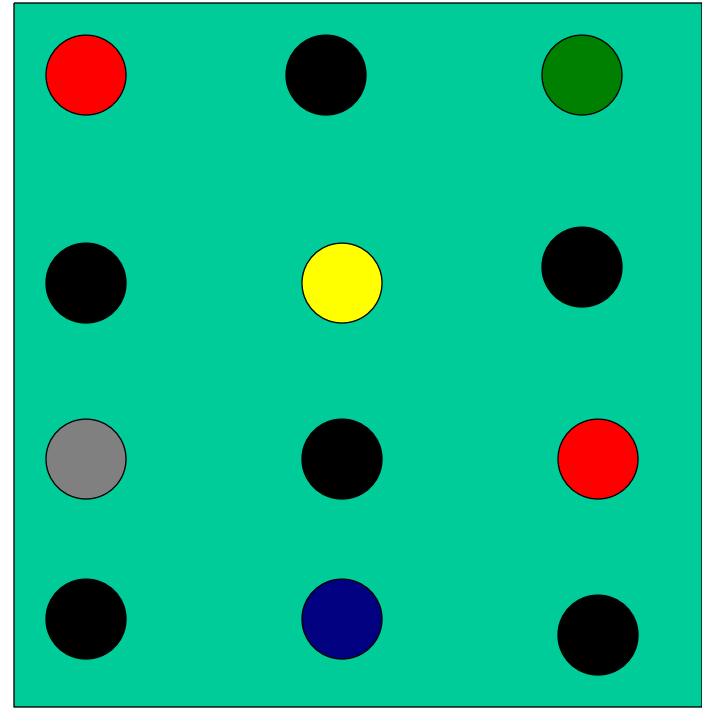


B

Which is more diverse?

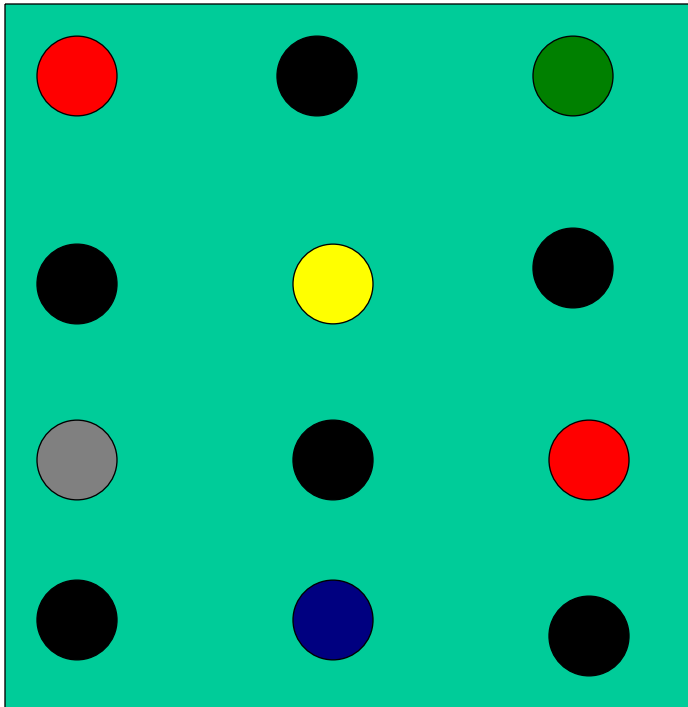


A

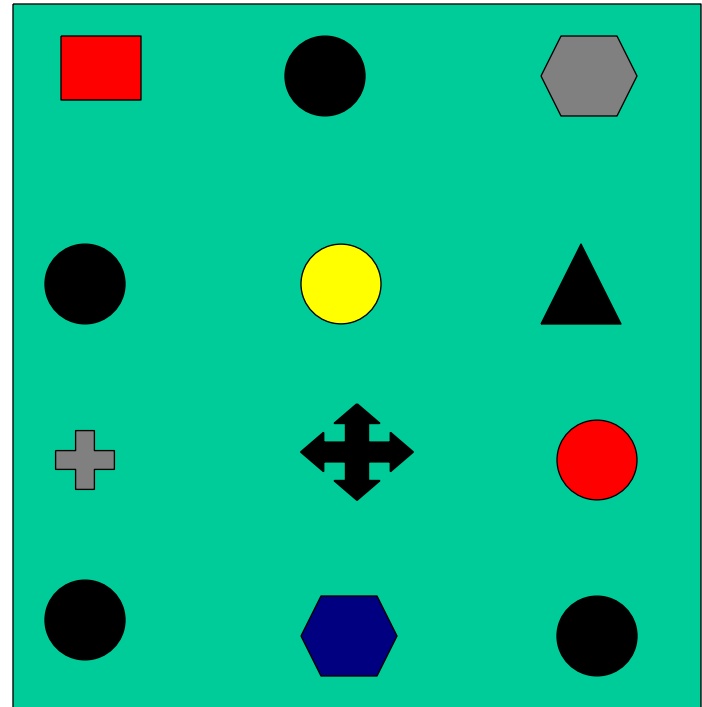


B

Which is more diverse?

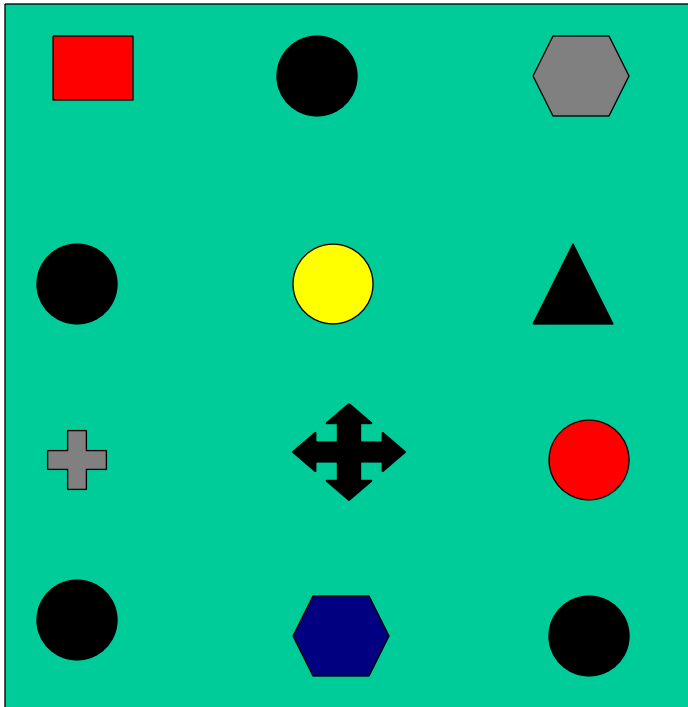


A

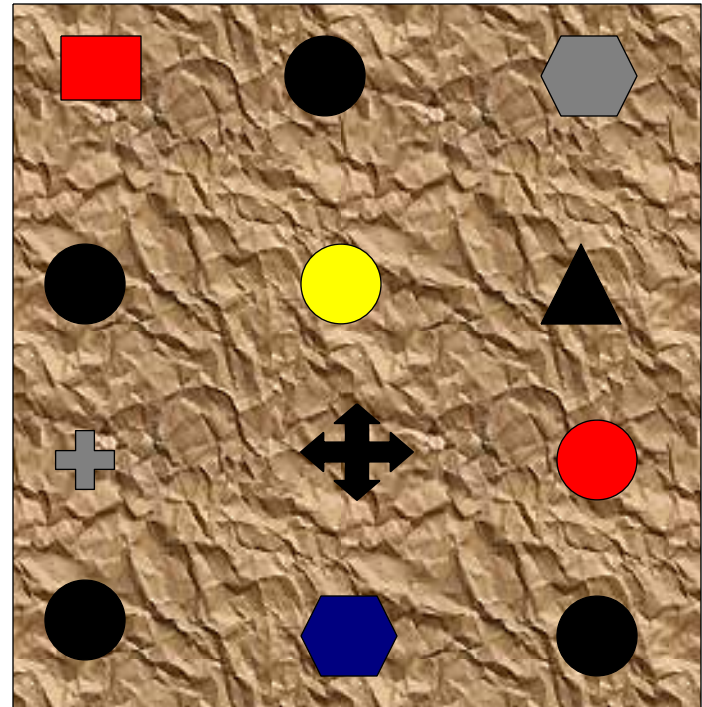


B

Which is more diverse?

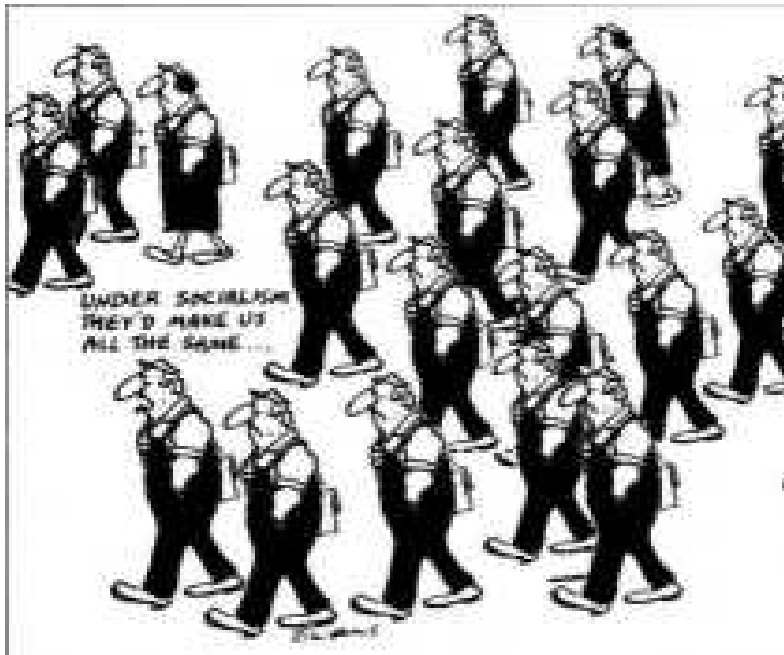


A



B

Which has more cultural diversity?



A



B

Which has more biodiversity?



A



B

Which has more biodiversity?



A



B

What do we get from biodiversity?

Oxygen

Food

Clean Water

Medicine

Aesthetics

Ideas

Should we be concerned about biodiversity?

What we know:

The Earth is losing species at an alarming rate

Some scientists estimate that as many as 3 species per hour are going extinct and 20,000 extinctions occur each year.

- when species of plants and animals go extinct, many other species are affected.

Threats to biodiversity

Habitat destruction

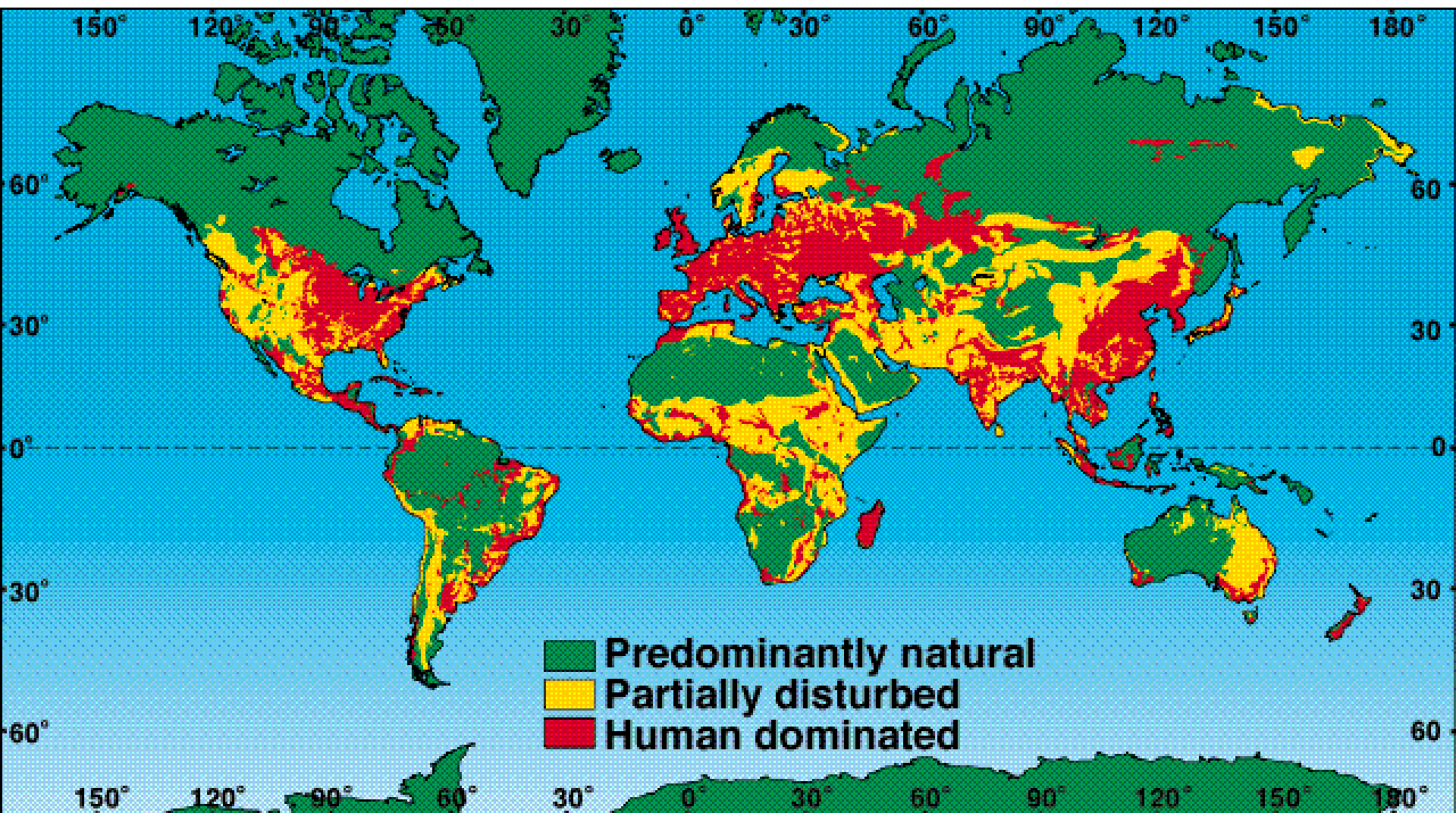
Pollution

Species Introductions

Global Climate Change

Exploitation

A human-disturbance map.





GOALS OF CONVENTION ON BIODIVERSITY

“The conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources”

“Biodiversity is a common concern of humankind and an integral part of the development process”

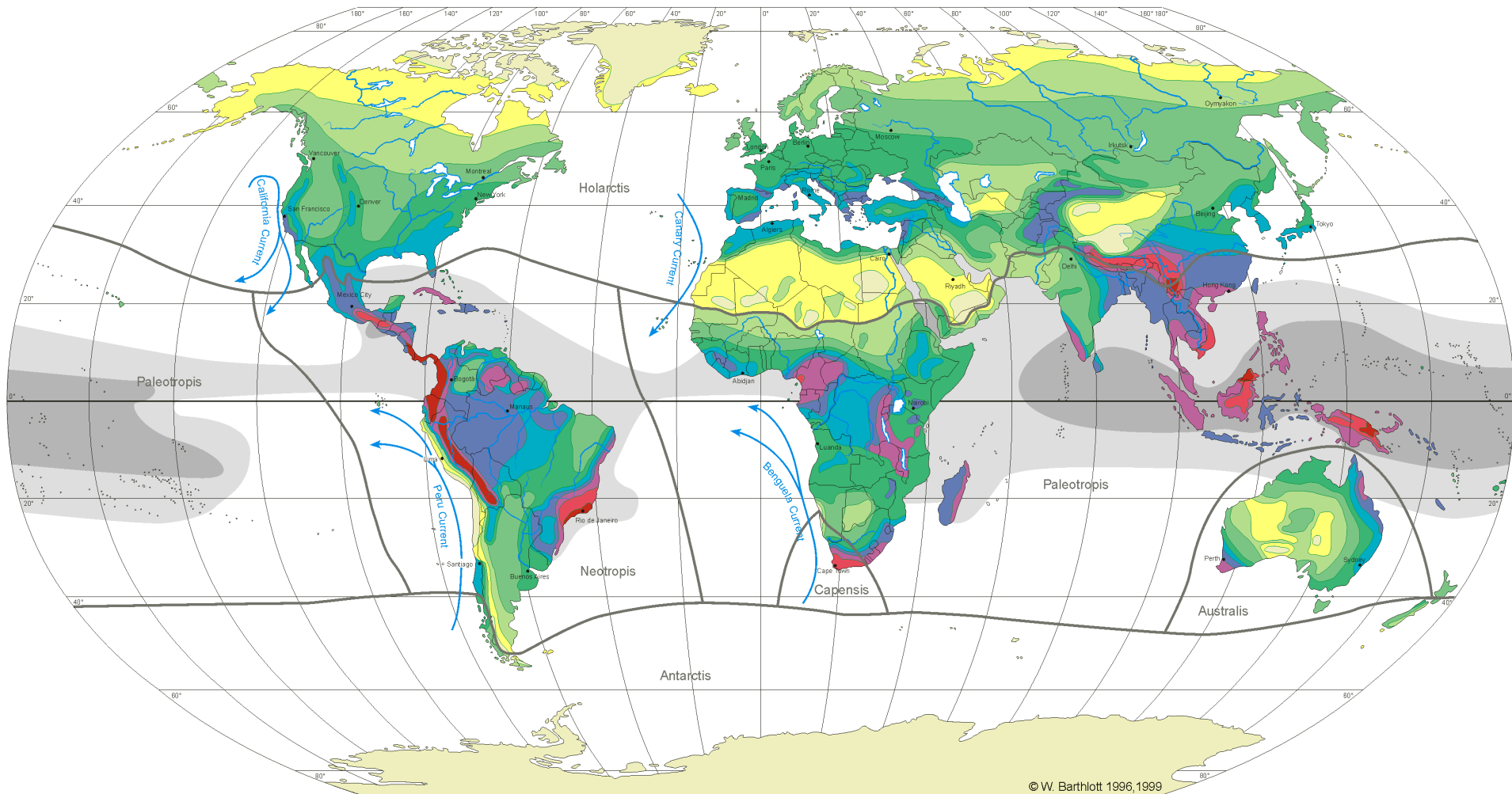
- > 100,000 plant/animal species lost in last 5 years
- Habitat loss is biggest current threat to biodiversity
- Deforestation and forest degradation has increased since the Rio Earth Summit



BIODIVERSITY

- How many species are there?
 - 1.4 million *named* species (70% of which are invertebrates)
 - estimated 3 to 50 million species alive!

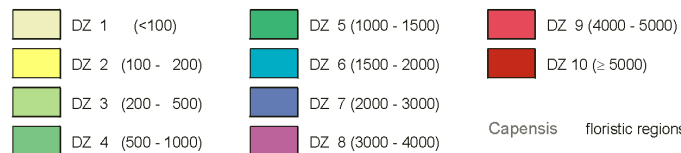
GLOBAL BIODIVERSITY: SPECIES NUMBERS OF VASCULAR PLANTS



© W. Barthlott 1996, 1999

Robinson Projection
Standard Parallels 38°N und 38°S

Diversity Zones (DZ): Number of species per 10 000km²



sea surface temperature



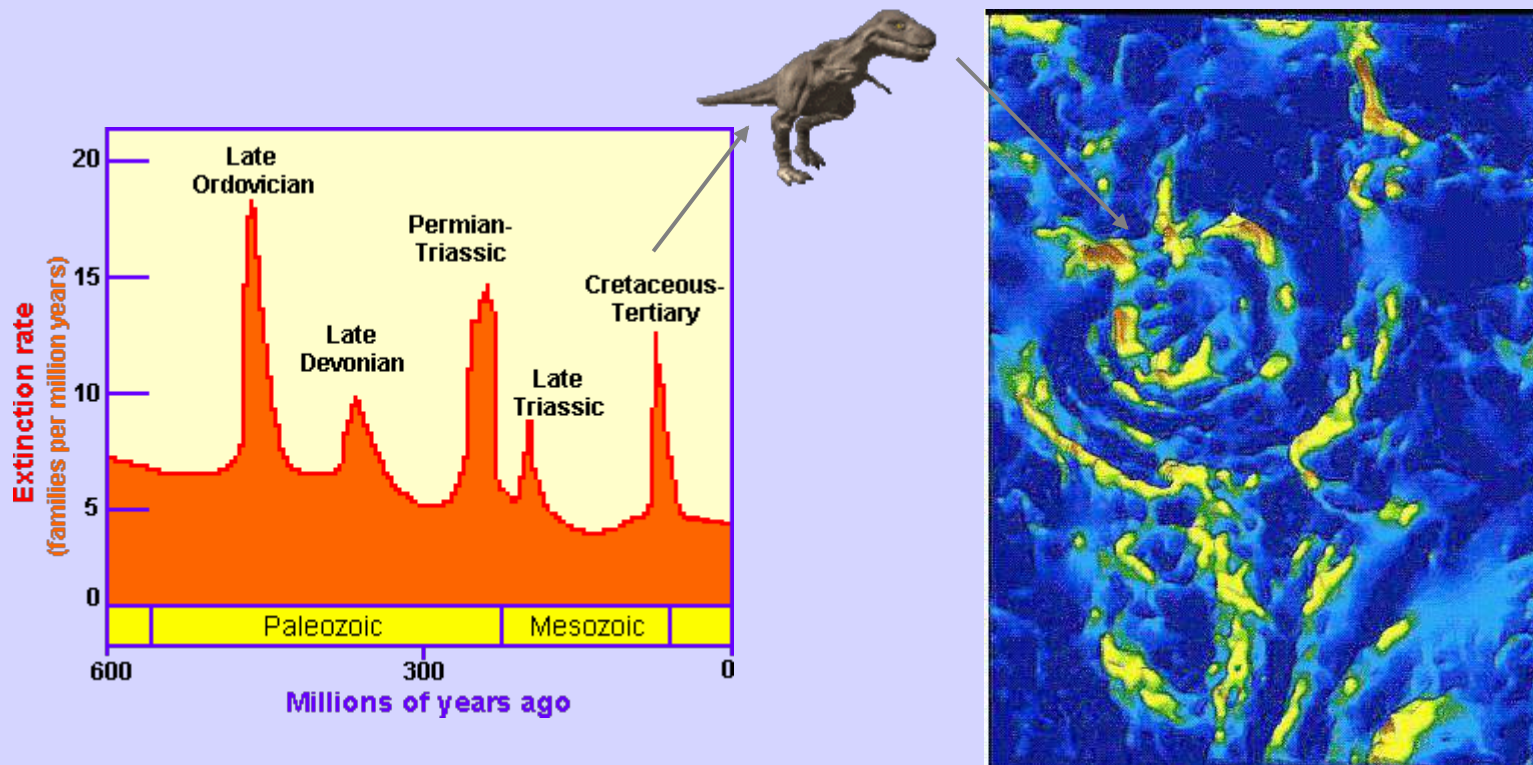
cold currents

Capensis floristic regions

W. Barthlott, N. Biedinger, G. Braun, F. Feig, G. Kier,
W. Lauer & J. Mutke 1999
modified after
W. Barthlott, W. Lauer & A. Placke 1996
Department of Botany and Geography
University of Bonn
German Aerospace Research Establishment, Cologne
Cartography: M. Gref
Department of Geography University of Bonn

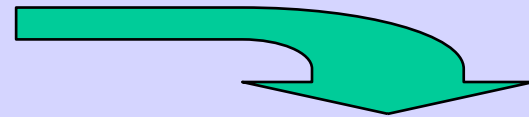
WHAT THREATENS BIODIVERSITY?

- Background extinction (95% of all extinctions)
- Mass extinction



BIODIVERSITY

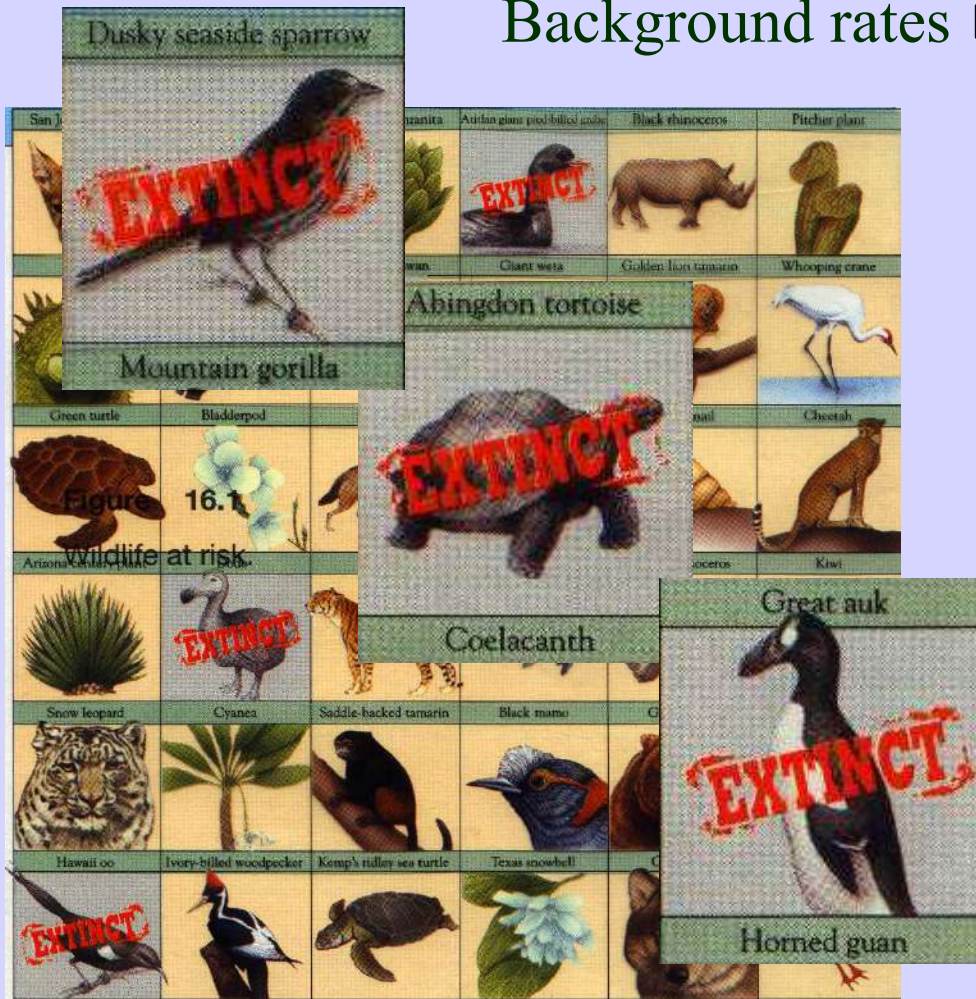
Background rates



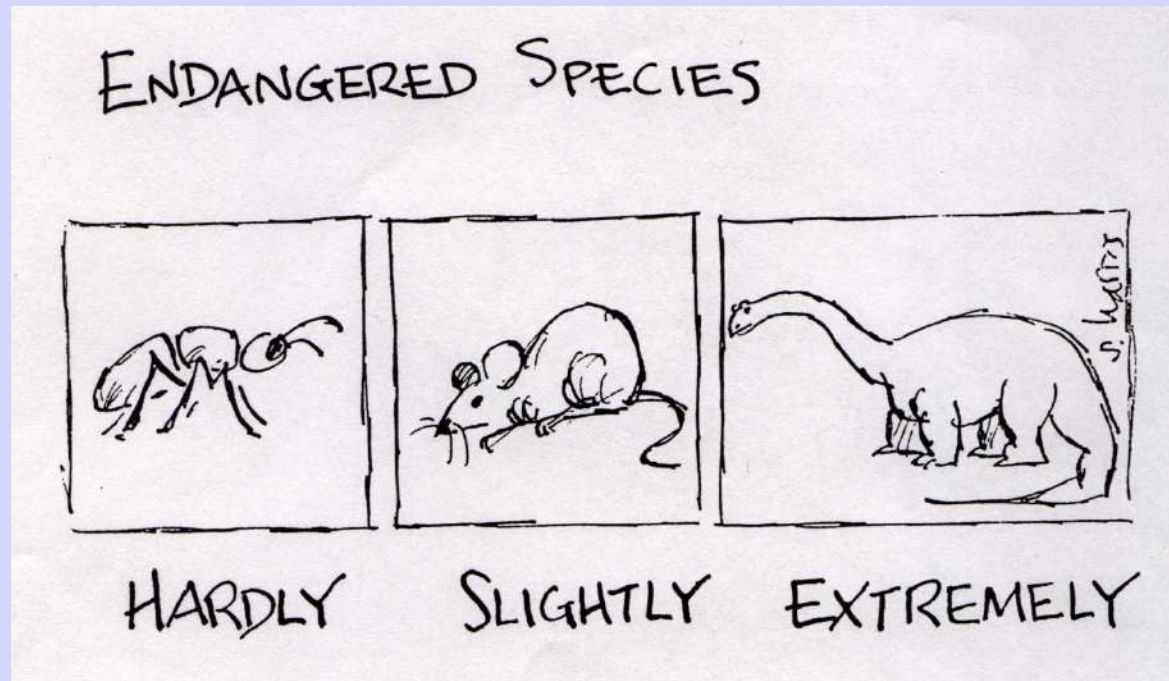
- 1 mammal species every 400 years
- 1 bird species/200 yrs

Now.....

- 10,000 times the background rate!
- 20-75 plant/animal species each day?



ENDANGERED VS THREATENED



Threatened: population low but extinction less imminent

Endangered: nos so low that extinction imminent

THE GREATEST THREAT



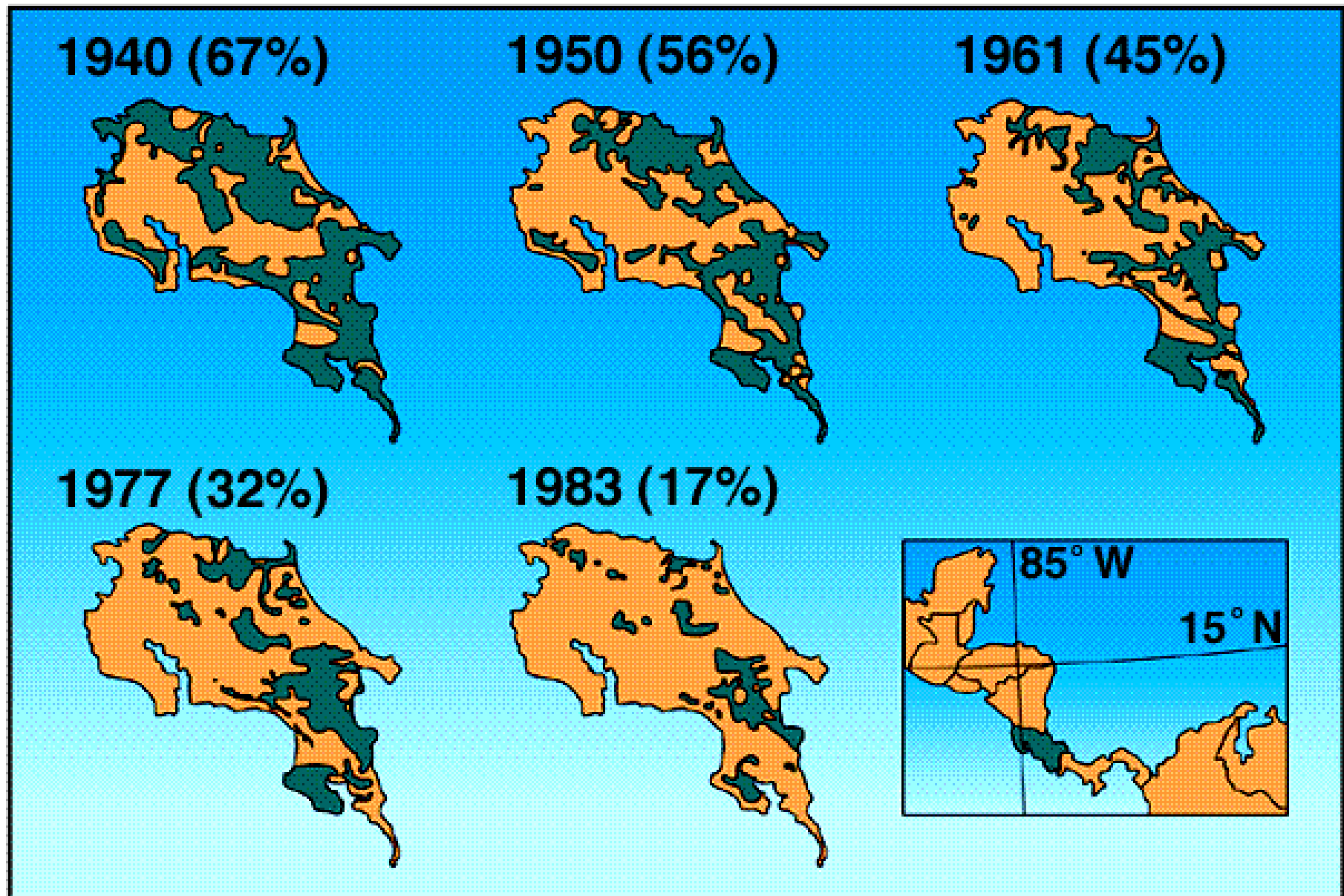
HABITAT FRAGMENTATION











**Loss of primary forest in
Costa Rica 1940-1983.**

CAUSES



• Slash and burn agriculture

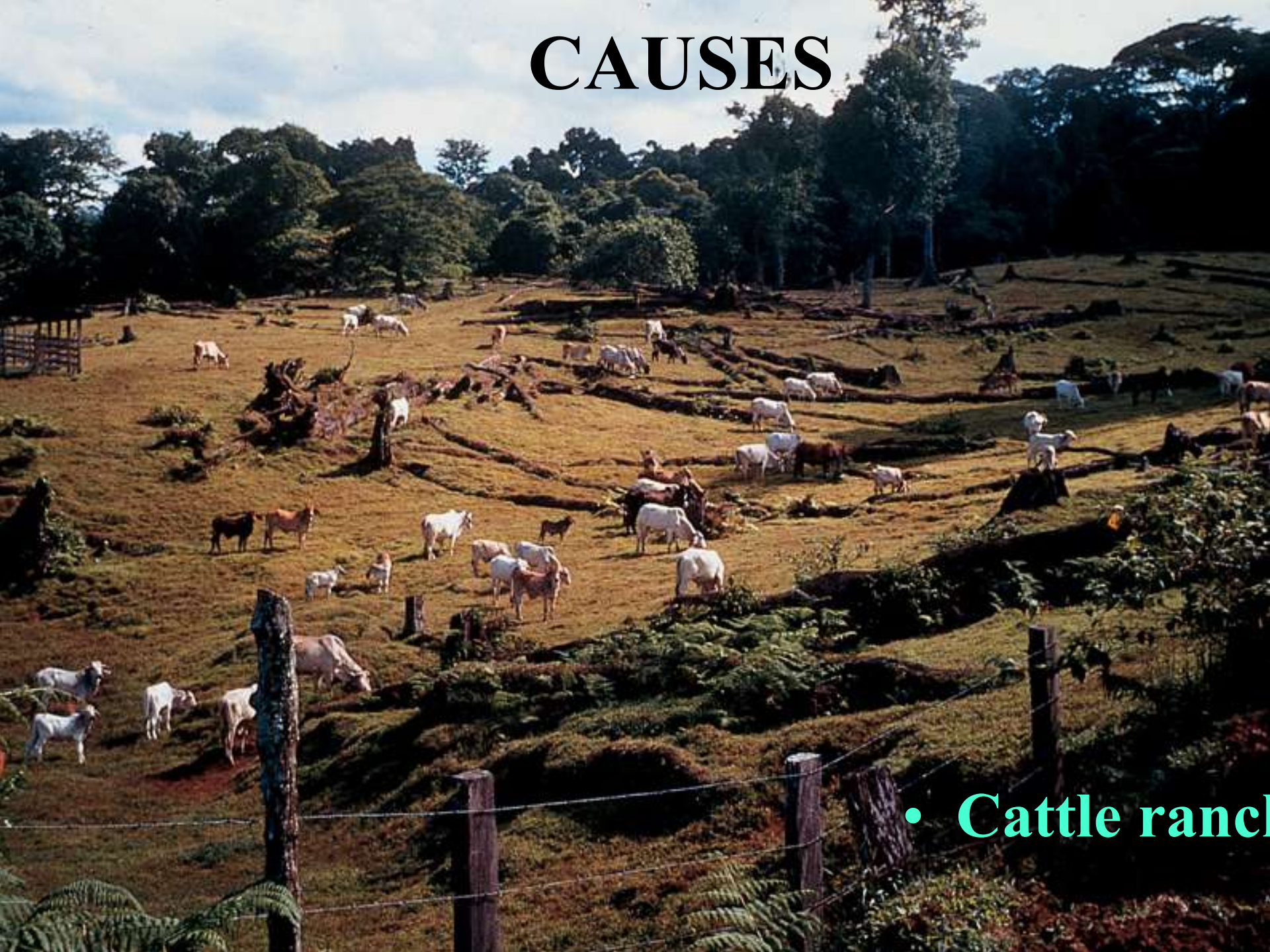


CAUSES



- Commercial logging

CAUSES



- Cattle ranch

WHAT CAN BE DONE?

1. The need to preserve intact sections of tropical forest
2. Endangered Species Act (1973)

