Science Diplomacy and International Policy

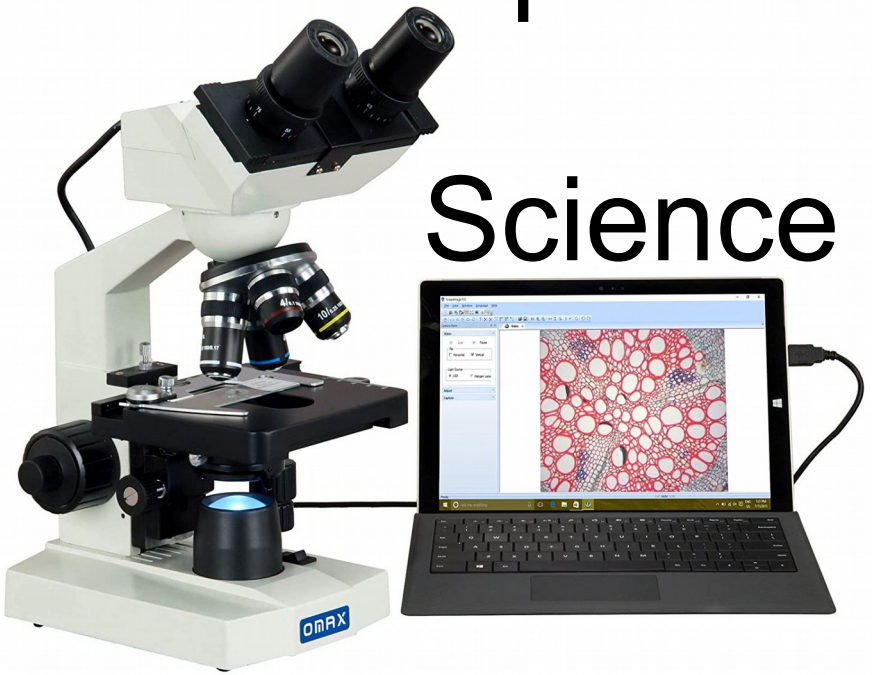
Dr. Myszka Gużkowska

Why do Diplomats need Science?

Science for Diplomacy?

Diplomacy for Science?

Science in Diplomacy?



UN Approach to Human Security

1. Environment
2. Food
3. Community
4. Health
5. Economy
6. Political
7. Personal

Environment & Food

Environment

- Climate change
- Biodiversity
- Pollution & Environmental Issues
- Alternative Energy

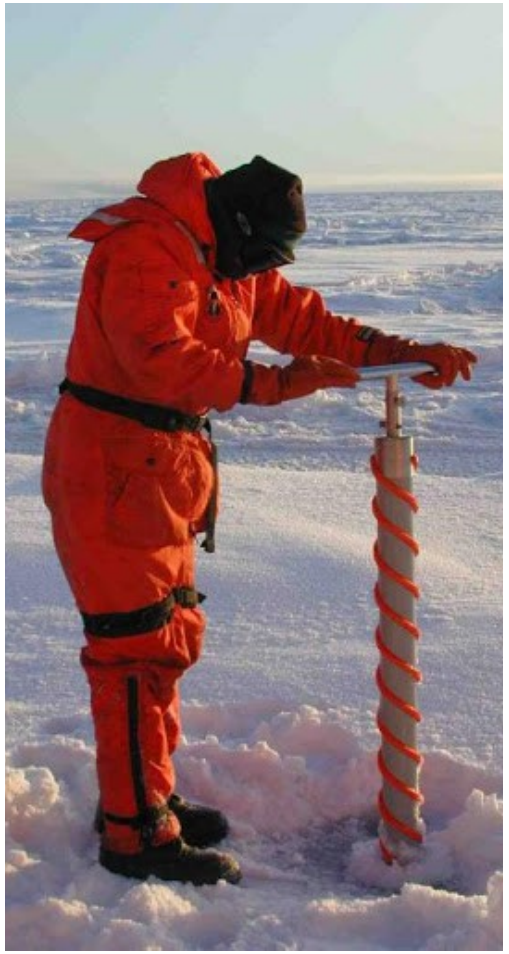
Food

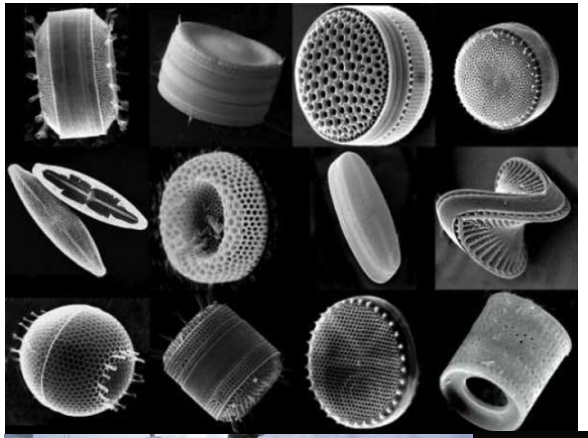
- Food & Water Insecurity
- Agriculture, Fisheries, Forestry, GMOs

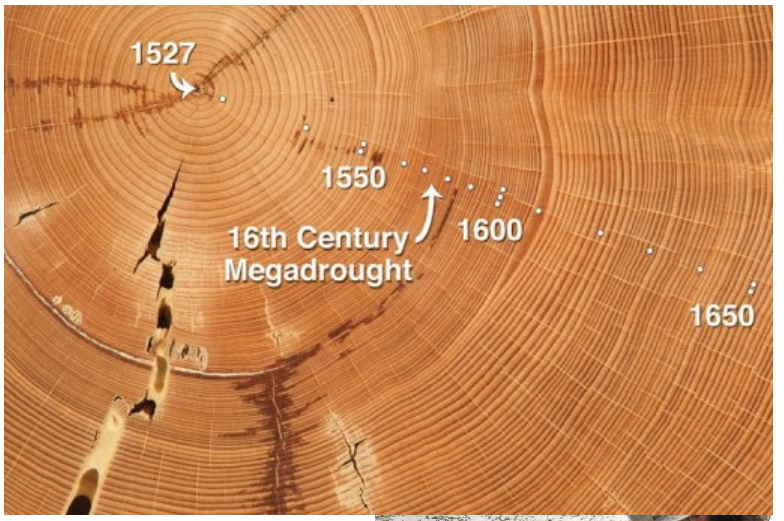
1. The Environment

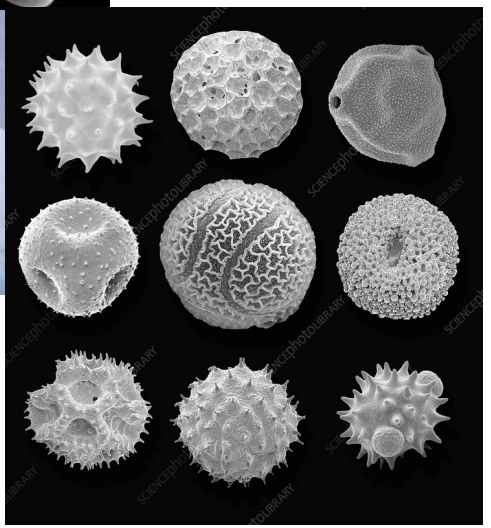
Evidence for climate change

Reconstruction based on evidence from geological record



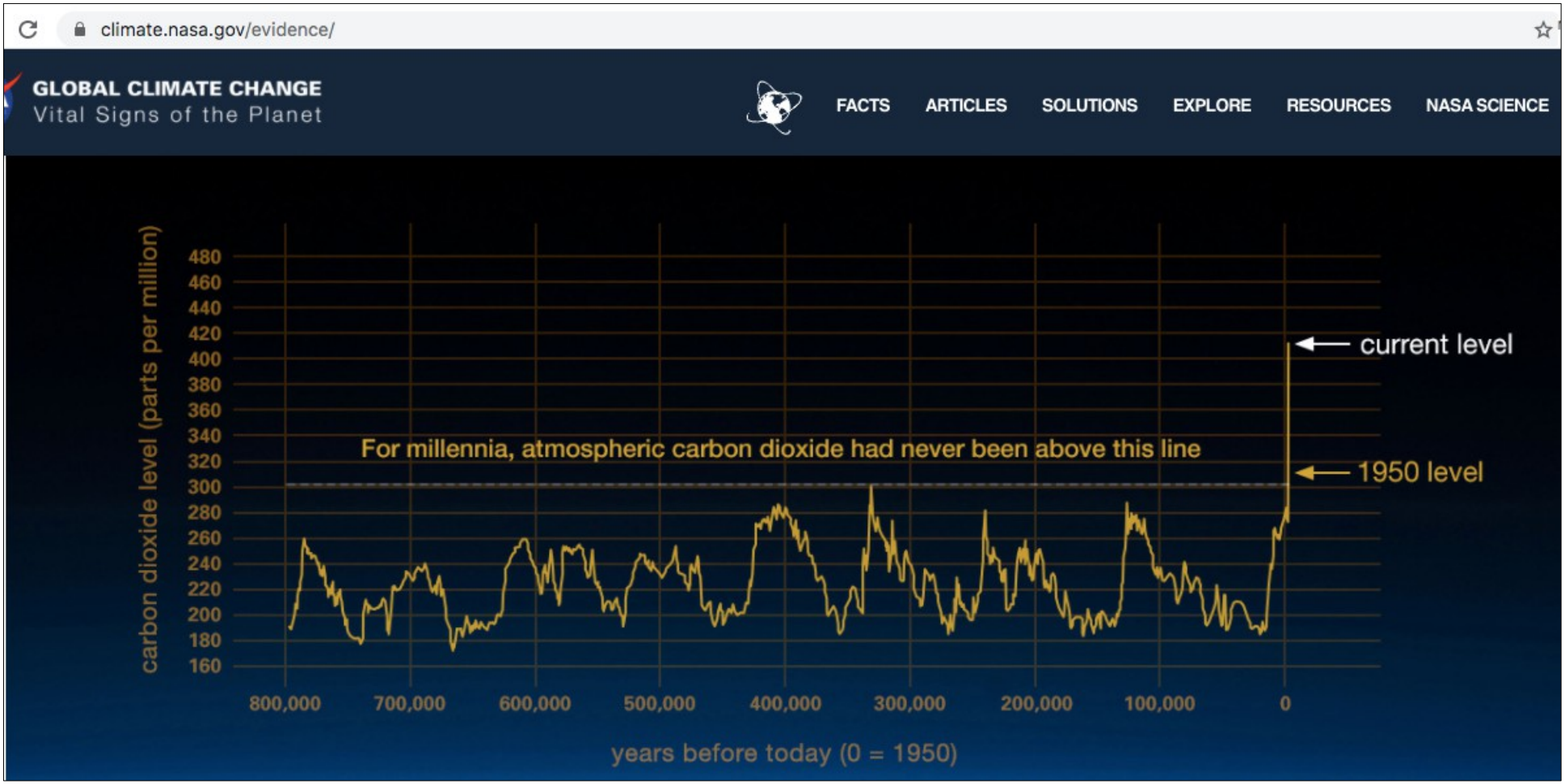






Past Climate Change

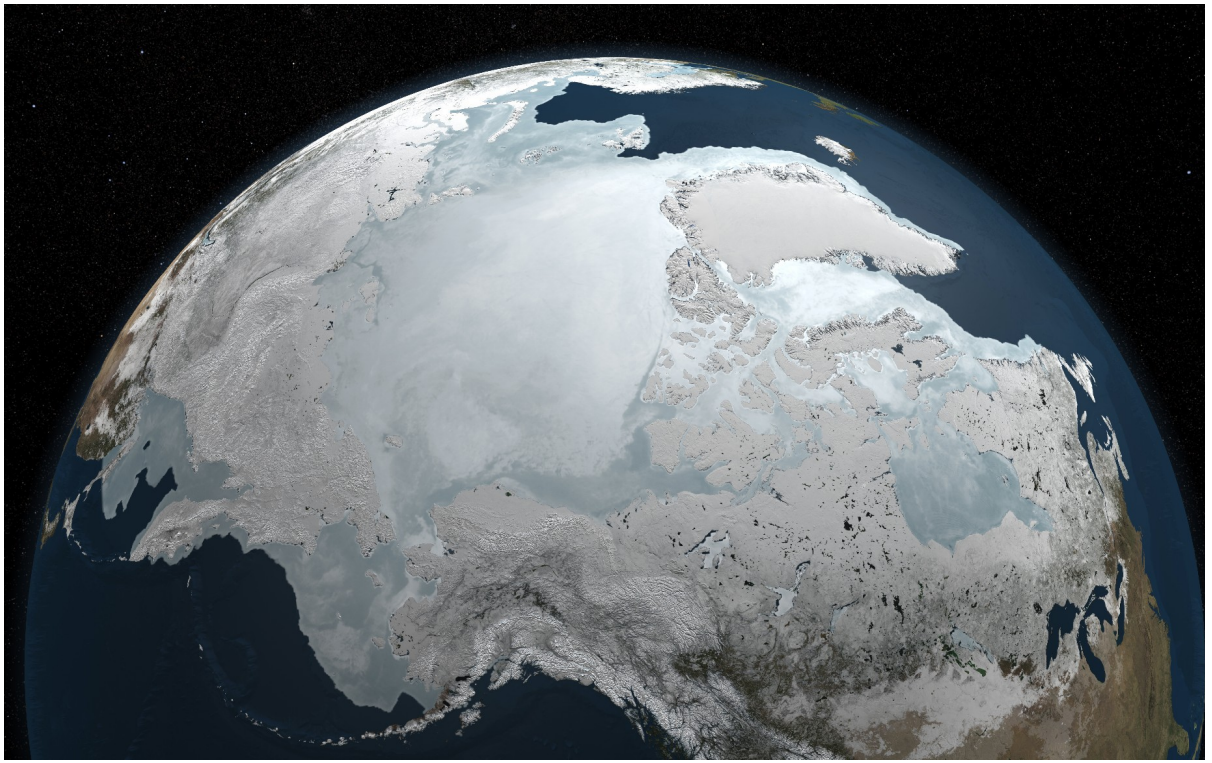
Graph showing extremes in geologic record



Colder Periods

Climate change through time

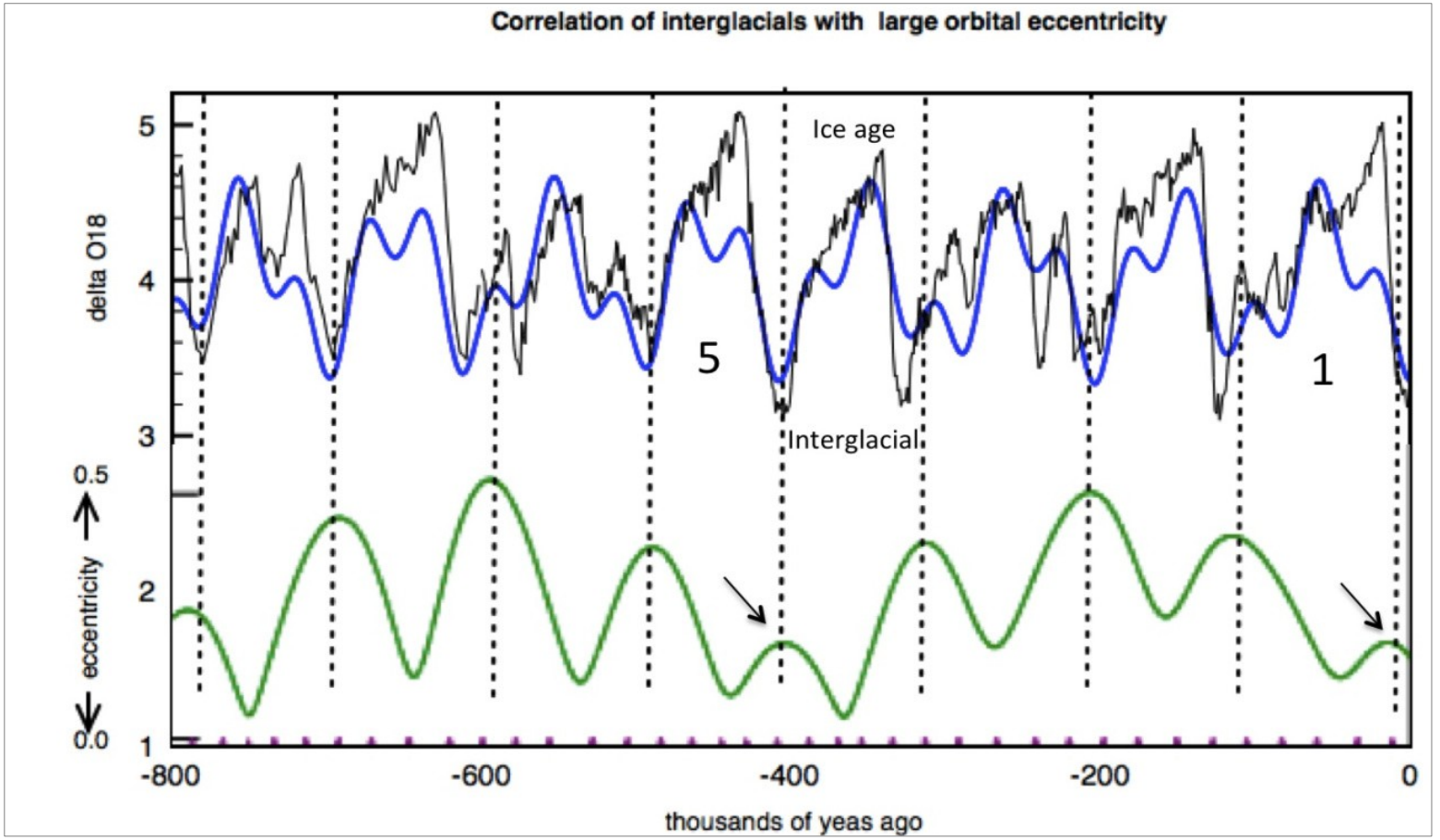
750-580 million years ago Earth covered in ice



Colder Periods

Climate change through time

8 ice ages over last 800,000 years



Colder Periods

Climate change through time

- 750-580 million years ago Earth covered in ice
- 7 ice ages over last 650,000 years

Image of continents configuration 750m yrs ago/

Map/s showing extent of ice cover in 1/more ice ages

Little picture of snow covered landscape

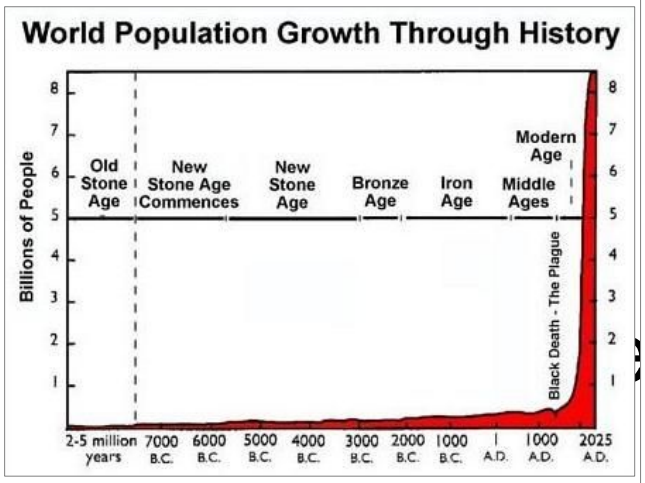
Warmer periods

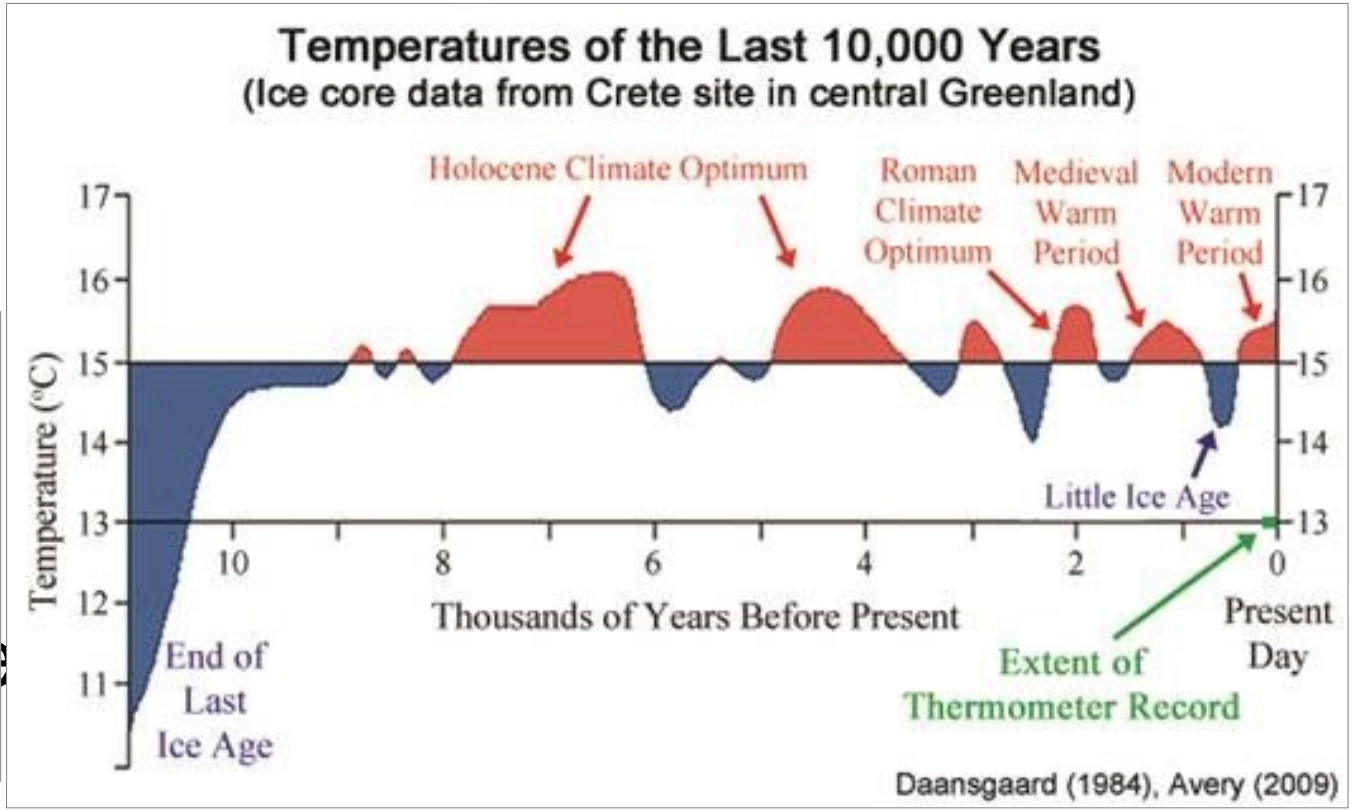
55 million years ago +5-8 degrees C

125,000 years ago +1-2 degrees C

6,000 years ago

800-1300 AD





Factors Influencing Climate Change

Solar activity

Oscillations in the earth's orbit

Greenhouse gases (eg. CO_2 and methane)

Dust thrown up by volcanoes and wind

Ice cover

Vegetation on the land (or lack of it)

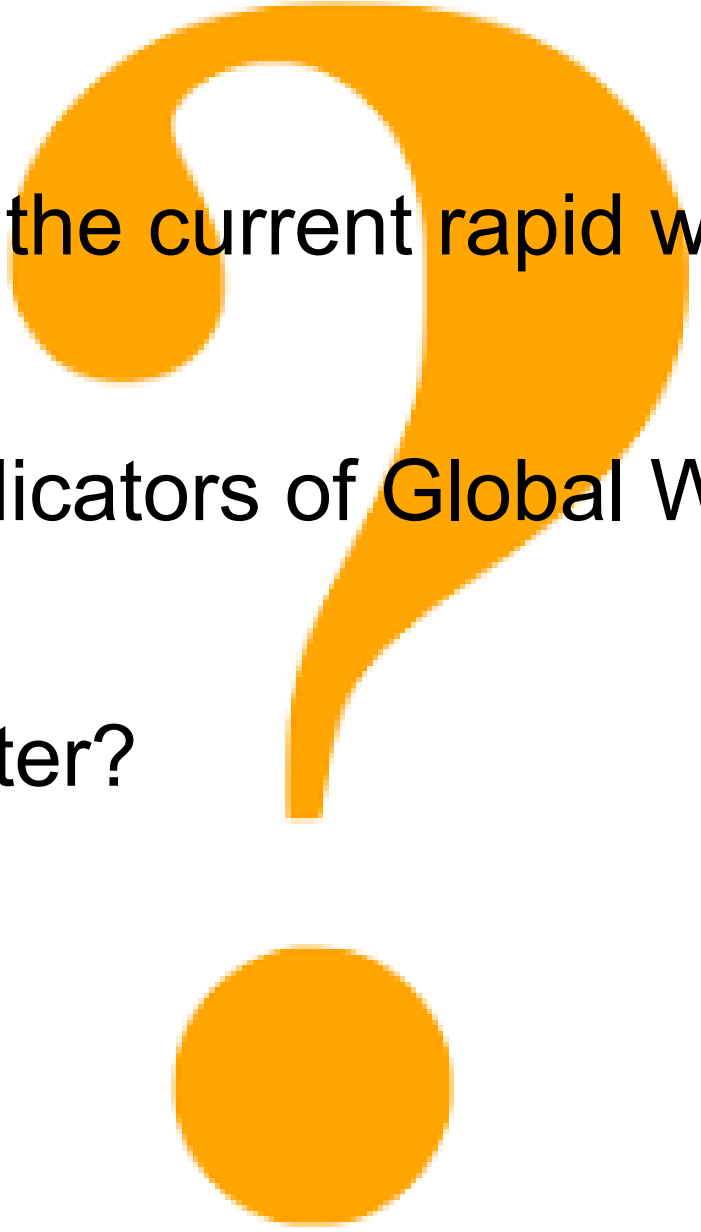
The configuration of the continents

Key Questions

What is causing the current rapid warming?

What are the Indicators of Global Warming?

Why does it matter?

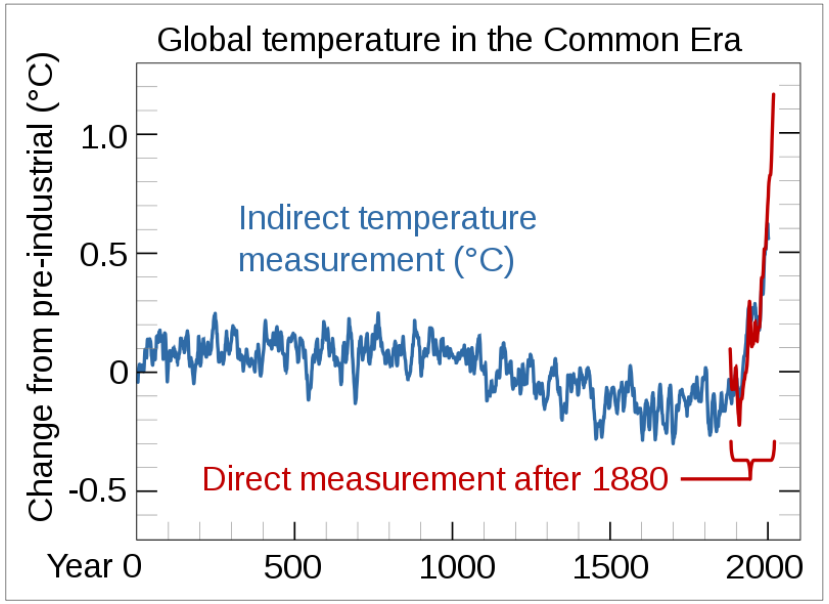


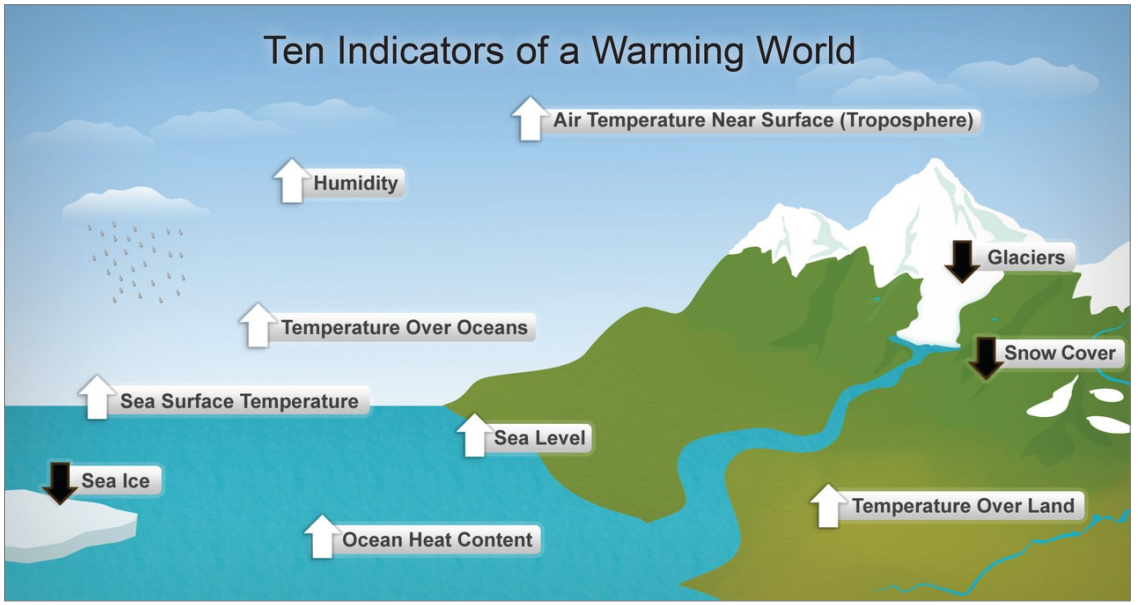
The Cause - Greenhouse gases

- Human activity since mid 20 century
- 10 times faster rate than average inter-glacial
- Caused by CO2 and human-made emissions
- CO2 has a heat-trapping effect

1. Increasing temperatures

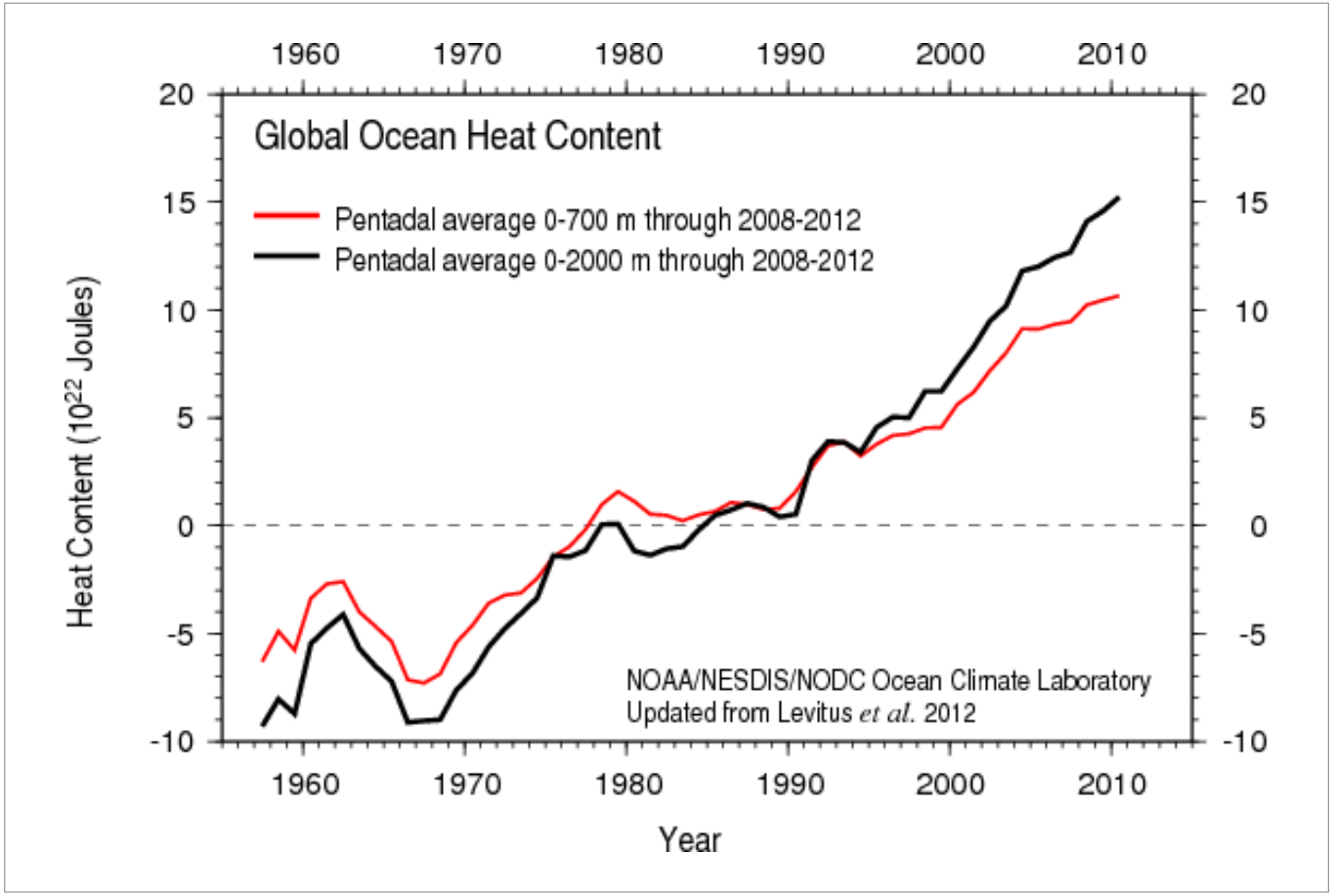
- Warming 10 x faster than ice-age recovery
- Since start of Industrial Revolution
- Most warming in last 35 years
- Warmest years since 2010





2. Warming Oceans

- Oceans have absorbed much of increased heat
- Top 700m of ocean most warming since 1969



3. Shrinking Ice Sheets

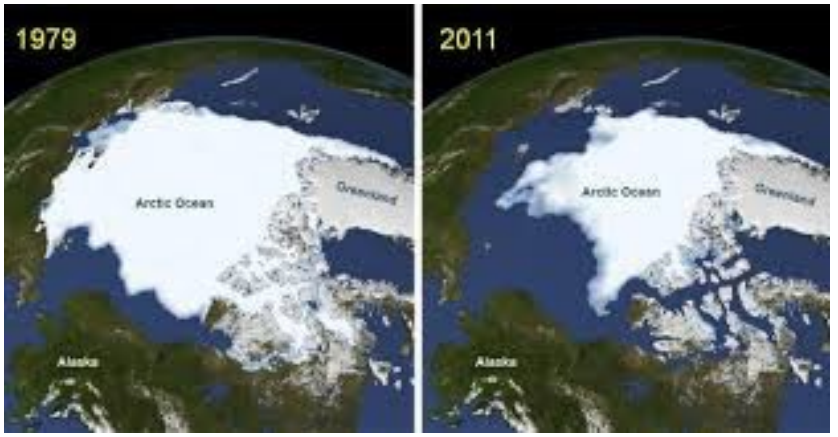
Greenland & Antarctic ice sheets decreased

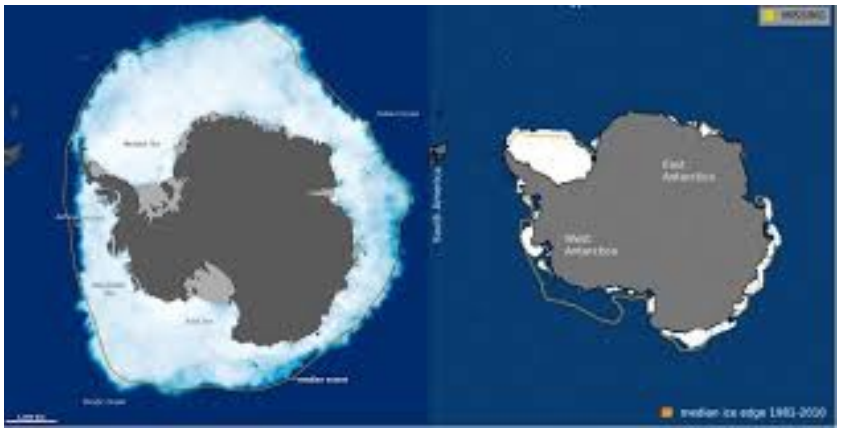
Greenland lost 286 billion tons/year

(1963-2010)

Antarctic lost 127 billion tons/year

(rate tripled in last 10 years)



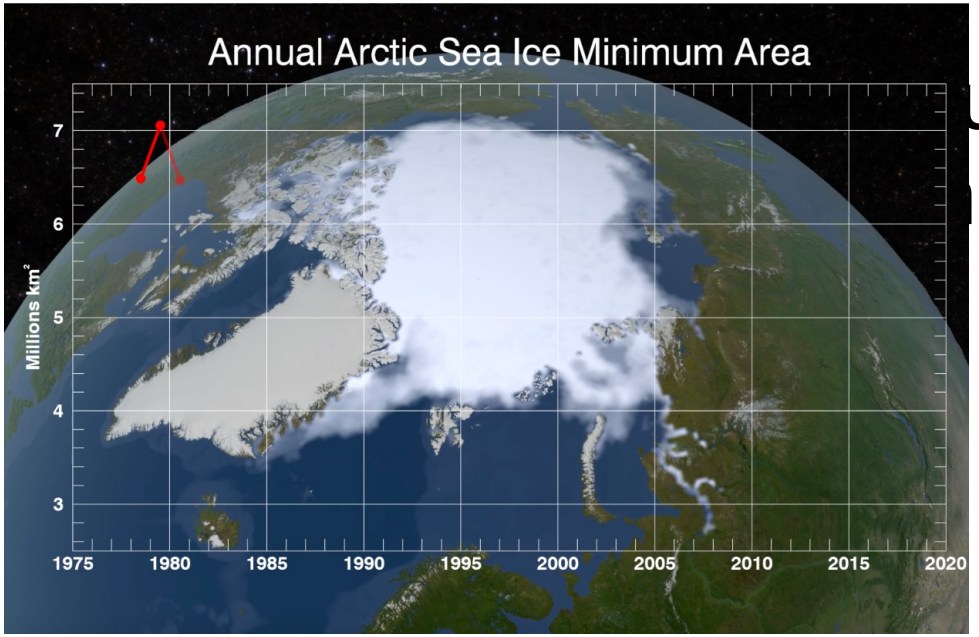


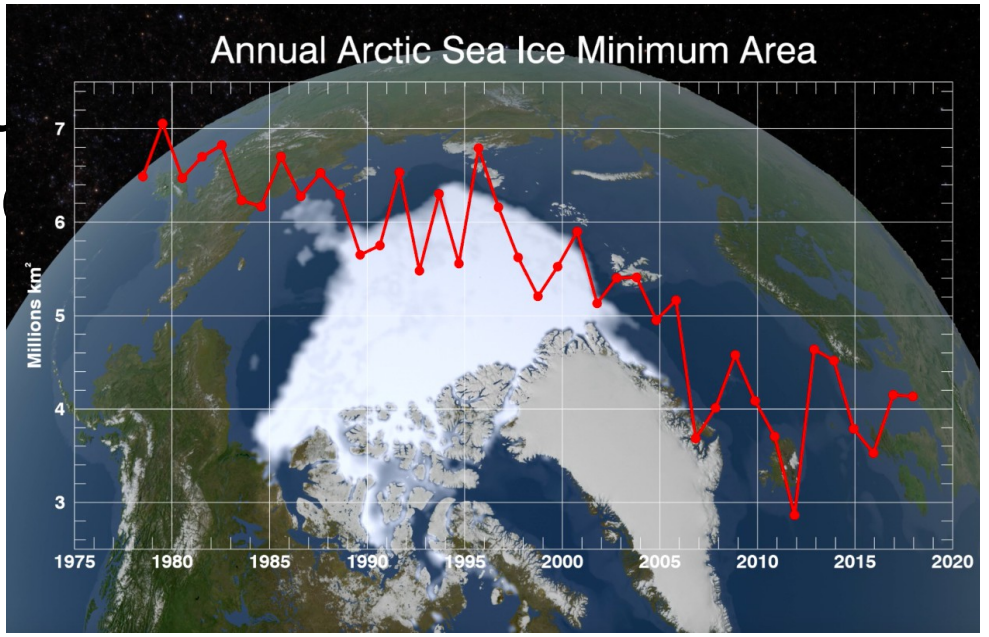
4. Declining Arctic Sea Ice

Arctic sea ice has declined rapidly over 30 years

Extent

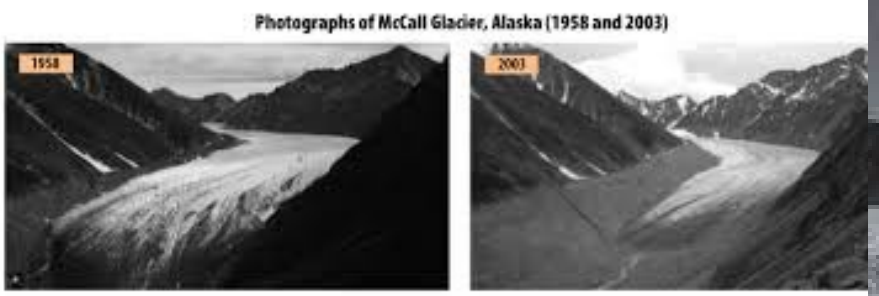
Thickness





5. Glacial Retreat

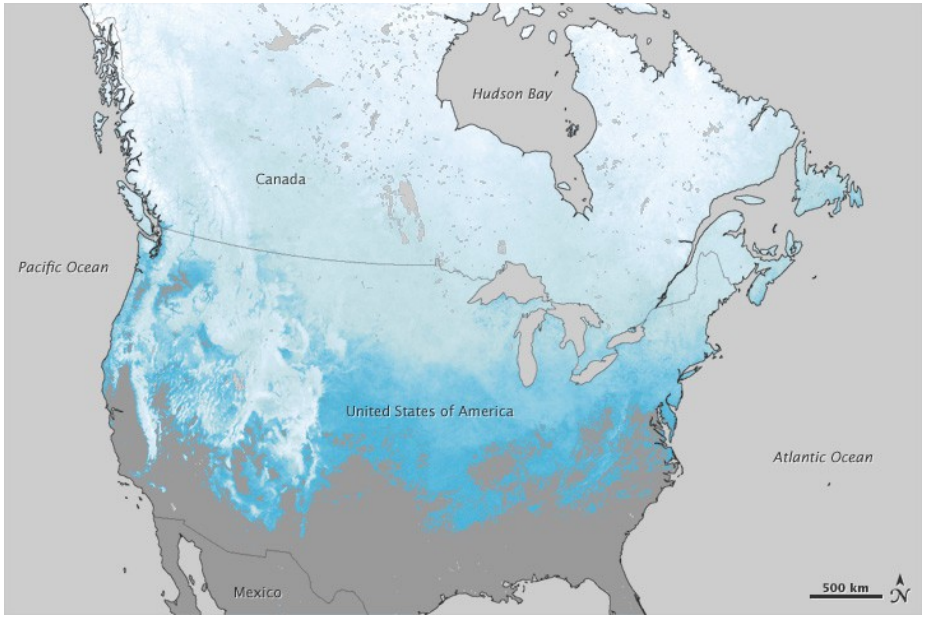
Glaciers are retreating across the world



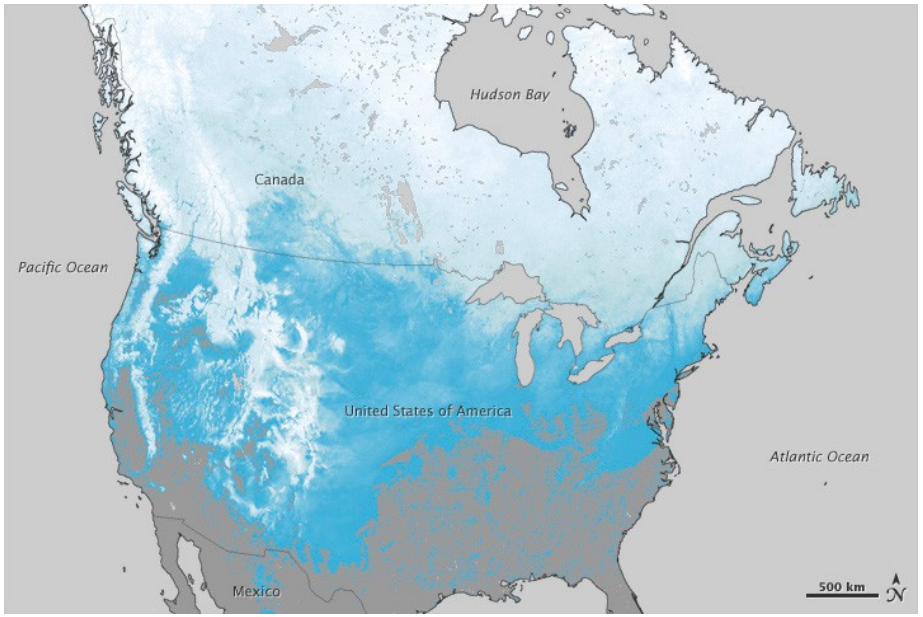
6. Decreased snow cover

These color-coded images show the percentage of days the land was covered by snow, with darkest blue indicating snow cover less than 20 percent of the time, and nearly white indicating almost complete snow cover.

October 1, 2010, to March 20, 2011



October 1, 2011, to March 20, 2012.

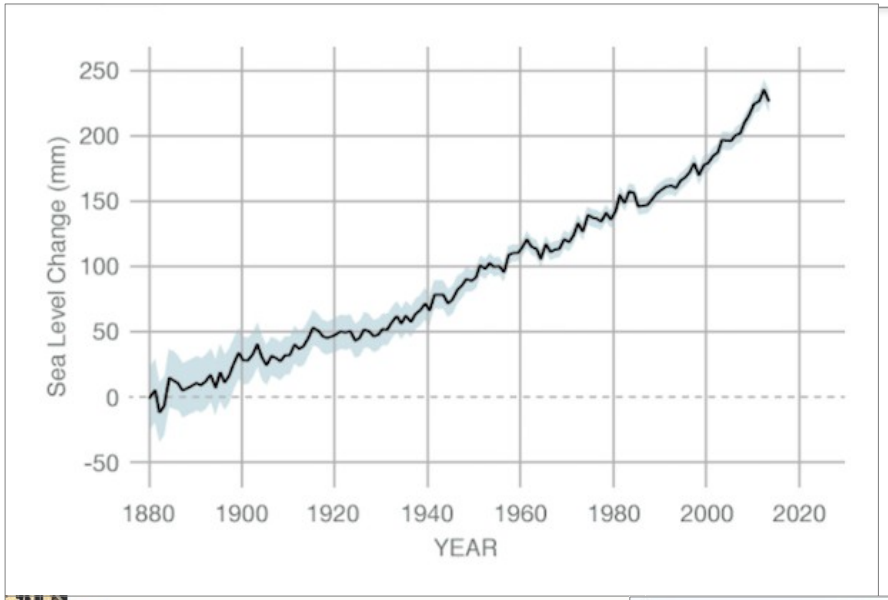


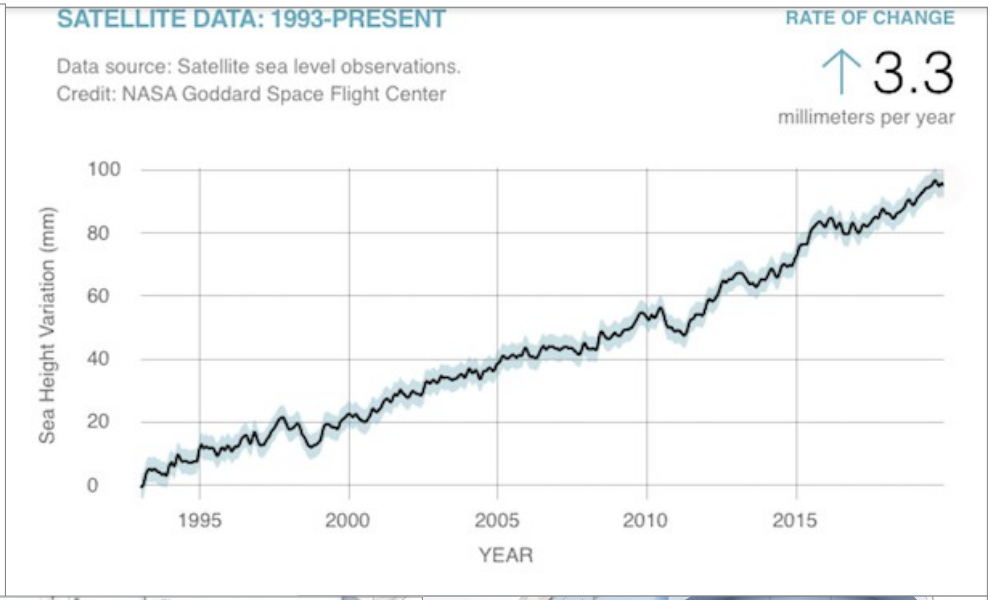
Compiled using data from the Moderate Resolution Imaging Spectroradiometer (MODIS) instrument aboard the NASA Terra satellite. Credit: NASA Earth Observatory

7. Sea Level Rise

Global S.L. rise – 21 cms in last century

Doubled rate in last 20 years & increasing

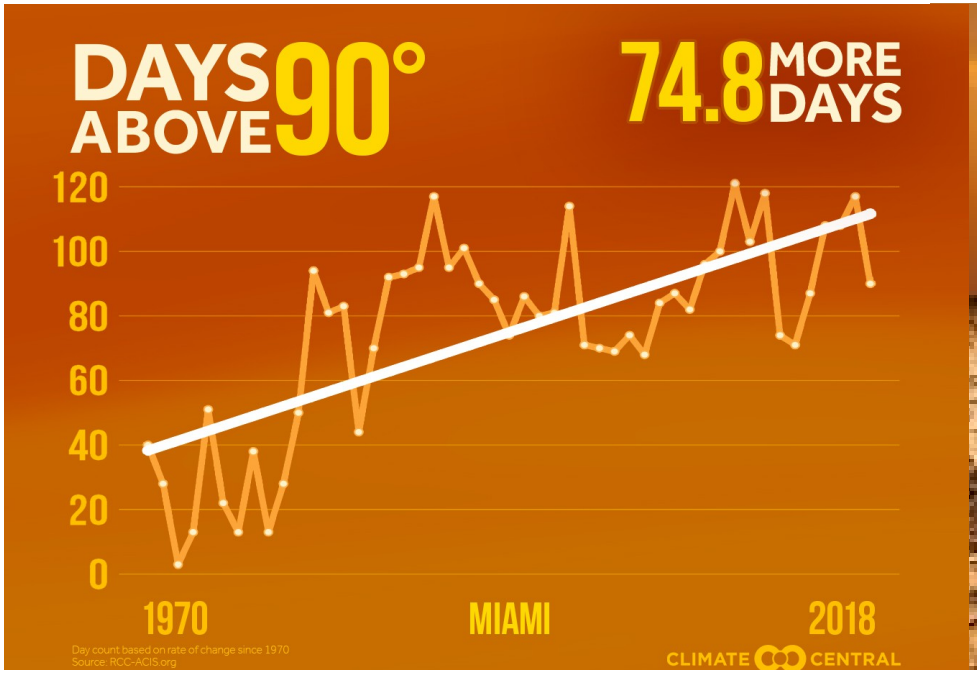




8. Extreme Events

Seasonally, these trends will get more extreme

- More record high temperature events
- Droughts
- Dry areas will get drier eg. Sub-Saharan Africa



8. Extreme Events

Seasonally, these trends will get more extreme

- More extreme rainstorms, rainfall events
- More hurricanes, cyclones
- Wet areas will get wetter eg. Nepal, Bangladesh etc

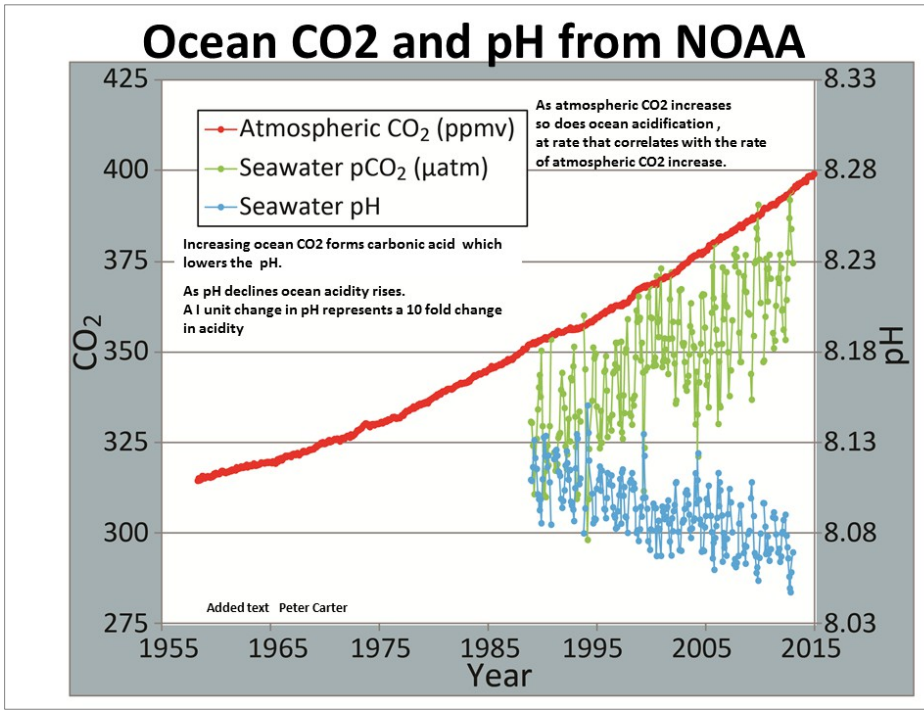


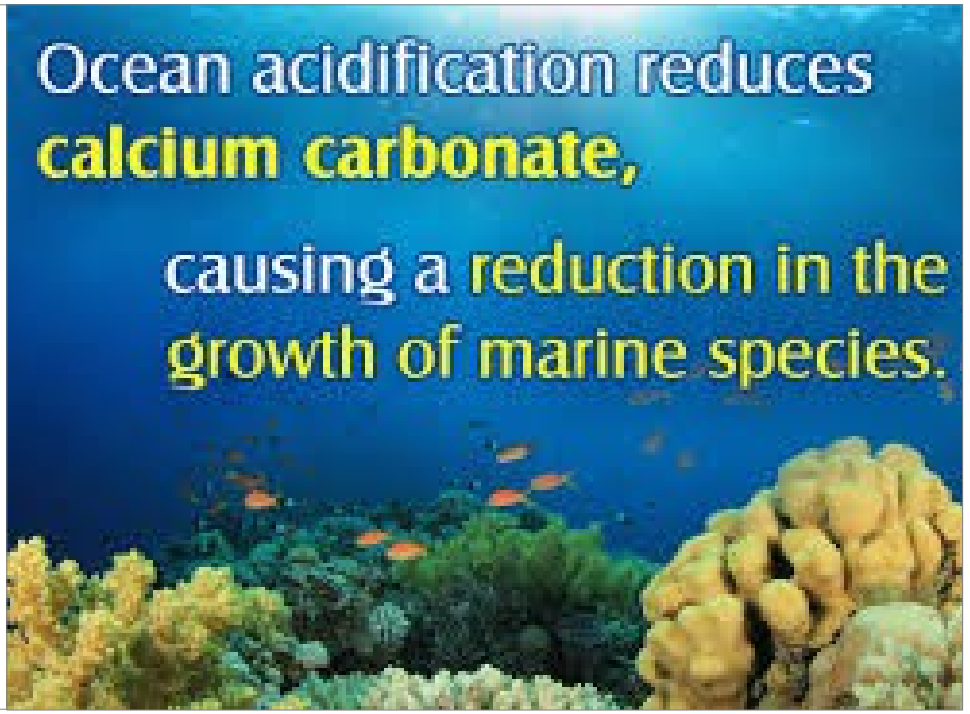
9. Ocean Acidification

Acidity of oceans increased by 30% since 1870's

CO2 absorbed by oceans up by 2 billion tons/yr

Destroying coral reefs and sea life





Effects of Global Warming

Wealthy countries least vulnerable

Poor countries (and poor people) most vulnerable

Economic Sectors impacted:

Agriculture, Fisheries, Forestry

Tourism, Recreation

Human Health

Energy

Insurance, Financial Sector

The quality of freshwater will be affected everywhere

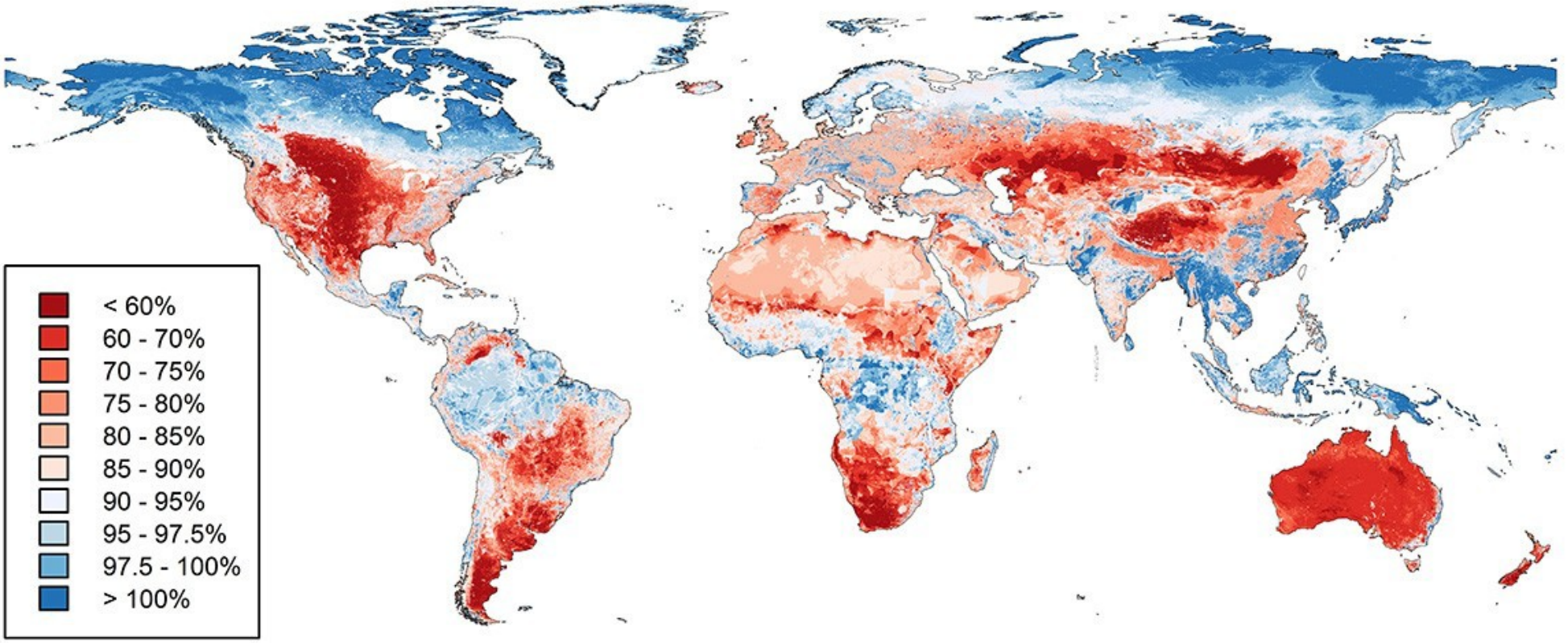
Human Migration

One of the most devastating impacts of climate change is that of large scale human migration resulting from :

- Landslides and sedimentation
- Desertification
- Flash flooding
- Fires

Discuss!

Biodiversity



This map shows the remaining populations of indigenous species as a percentage of their original populations. **Blue** areas are within proposed safe limits, and **red** areas are beyond.

Map created from the PREDICTS database (Natural History Museum nhm.ac.uk).

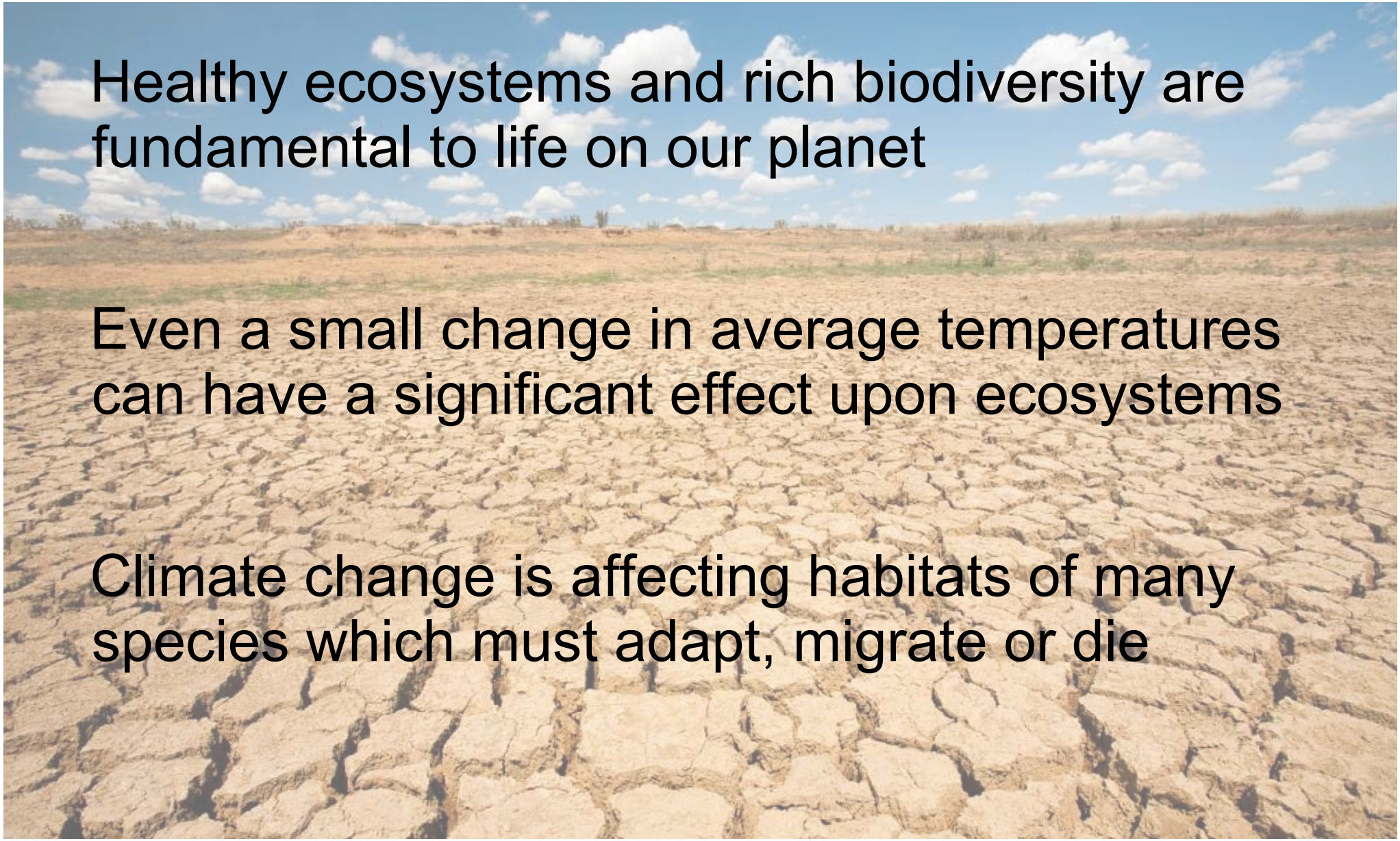
What is Biodiversity?

Biodiversity is the biological variety of life on Earth and includes the :

- No of species of plants, animals, micro-organisms
- Enormous diversity of genes in these species
- Different ecosystems on the planet
  - eg. rainforests, deserts, coral reefs

These are all part of a biologically diverse Earth

Biodiversity and Ecosystems



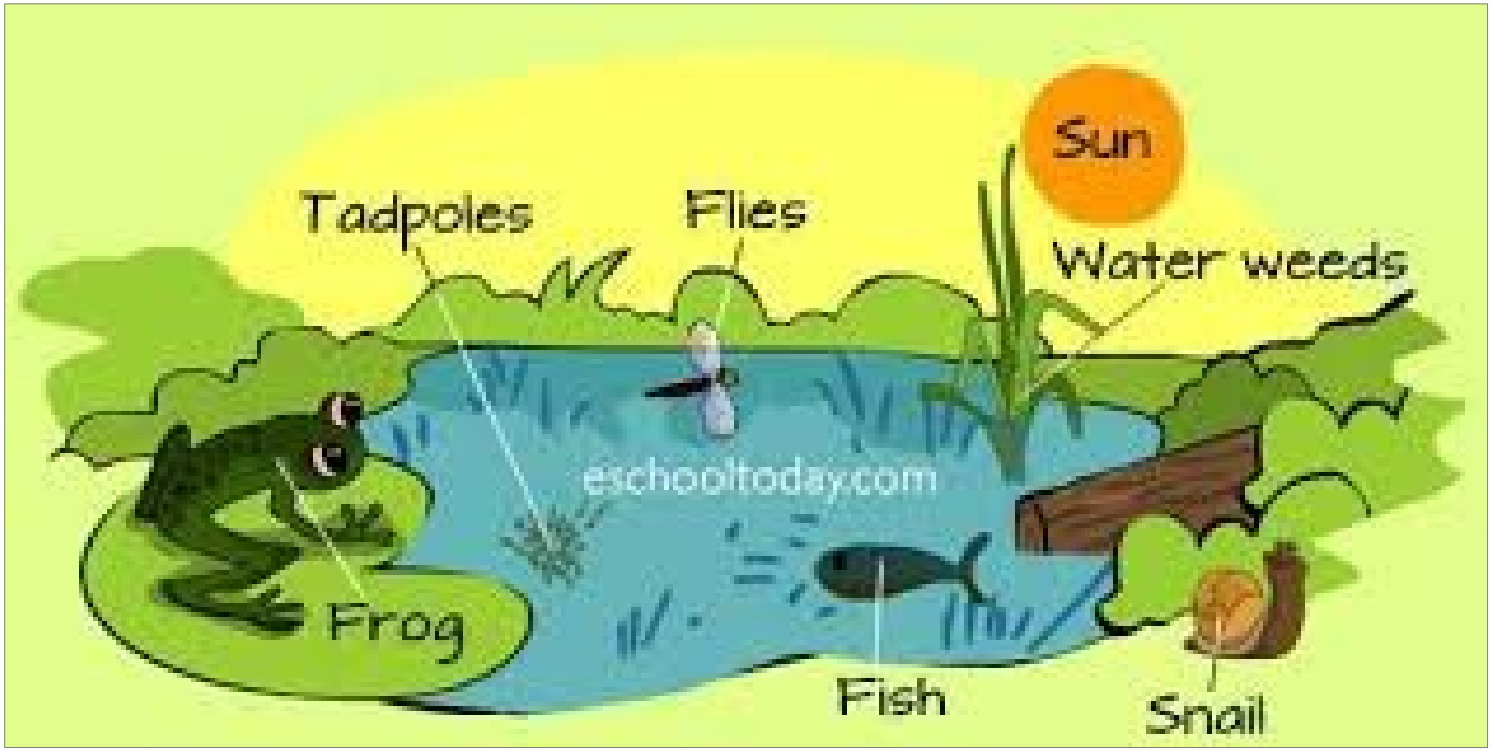
Healthy ecosystems and rich biodiversity are fundamental to life on our planet

Even a small change in average temperatures can have a significant effect upon ecosystems

Climate change is affecting habitats of many species which must adapt, migrate or die

What is an ecosystem?

An ecosystem is a community of living organisms that live in conjunction with the non-living components of their environment. They interact as a system and are linked together through nutrient cycles and energy flows.



Why does it matter?

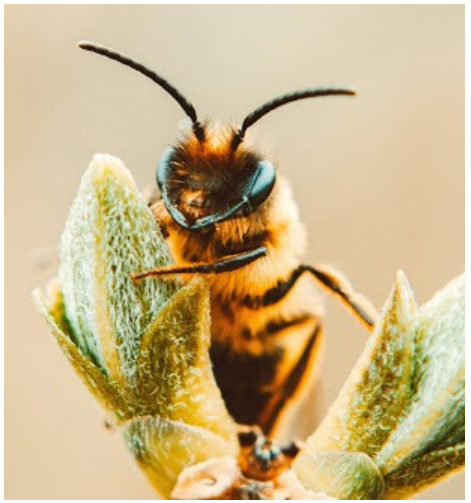
IPBES Intergovernmental Panel, 2019

>1 million species at risk of extinction

2 billion people rely on wood fuel for energy

4 billion people rely on natural medicines

¾ of our food crops need insects for pollination



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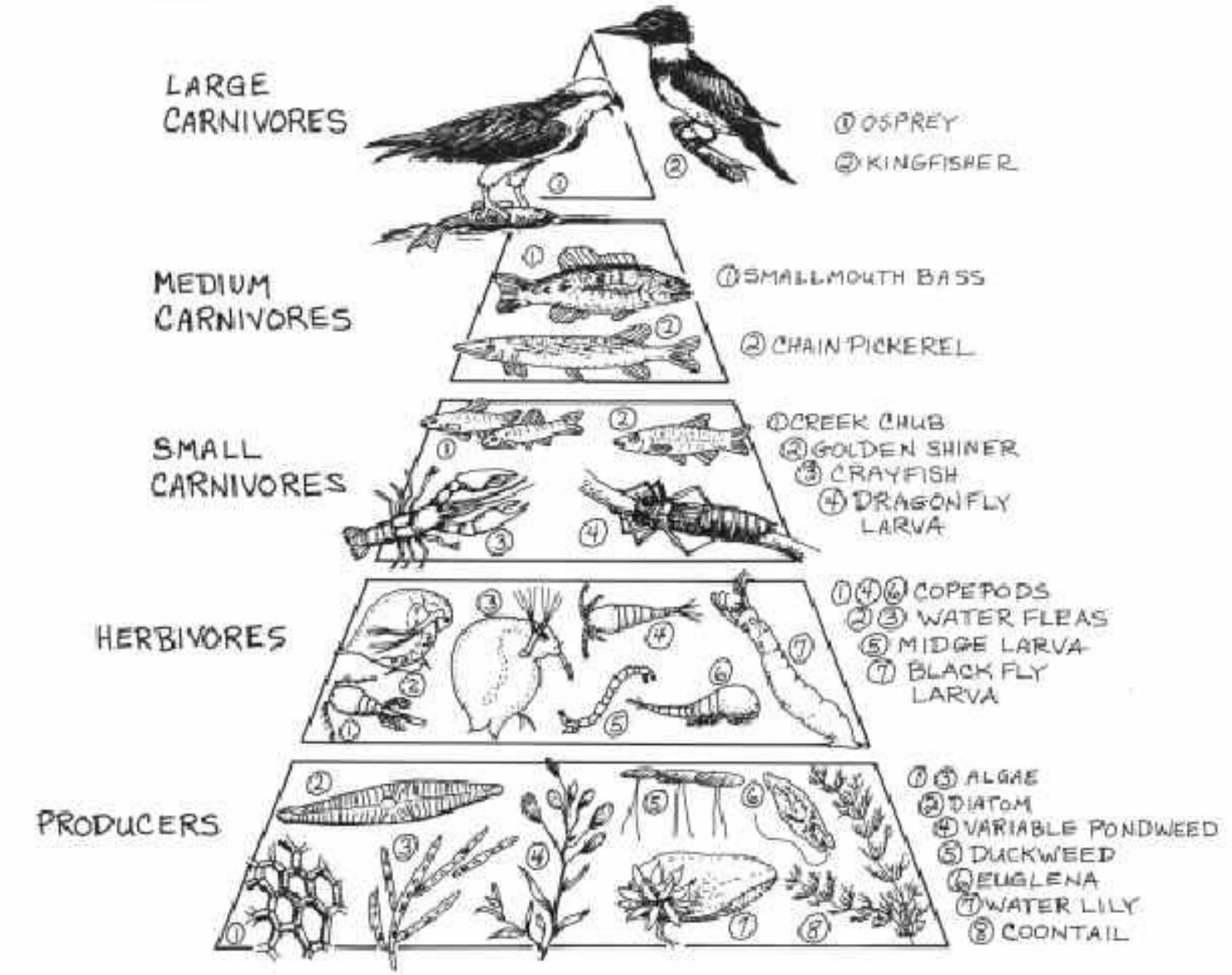

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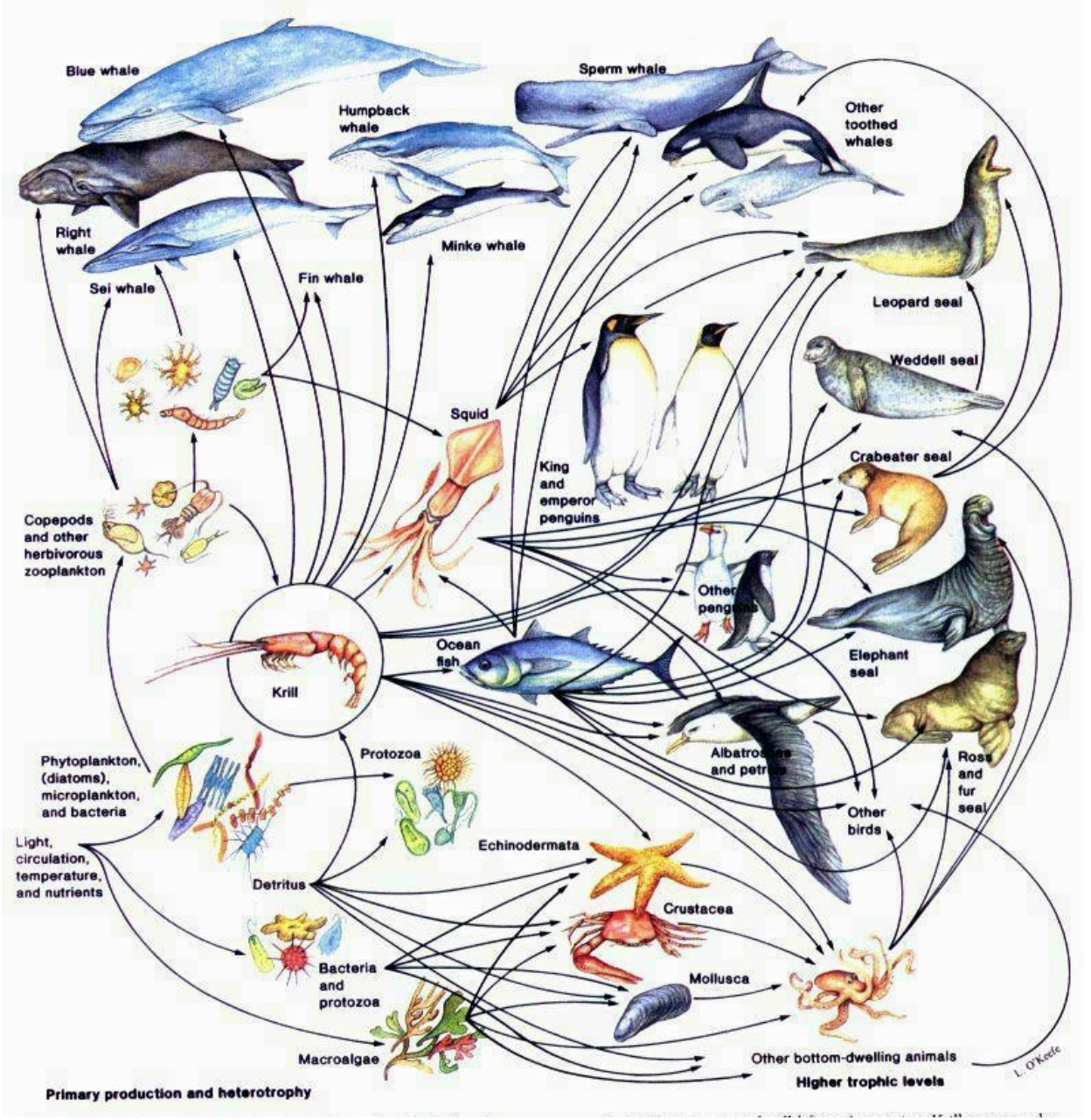
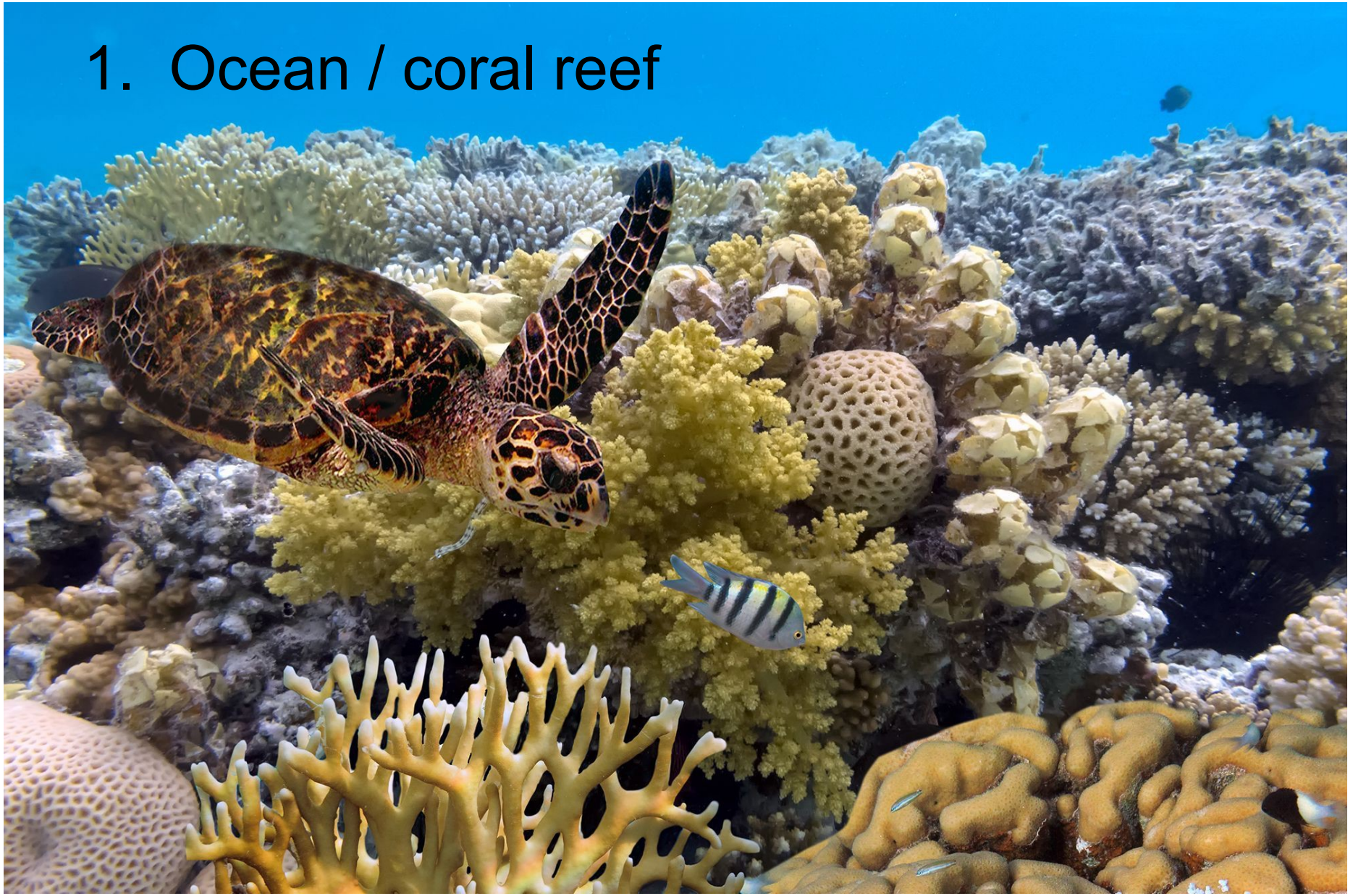


3 examples of ecosystems

1. Ocean / coral reef



3 examples of ecosystems

2. Lake Chad

3 examples of ecosystems

3. Semi-deciduous forests eg. Australia

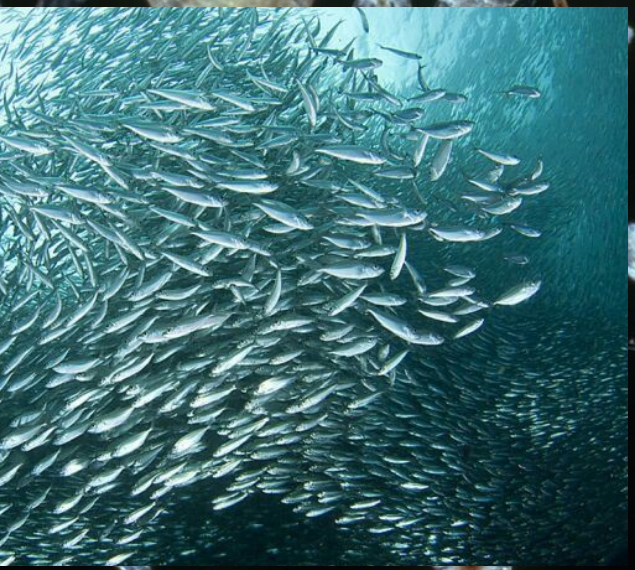
Oceans

Changes in temperature, salinity and pH

Destroys plankton

No plankton = no fish

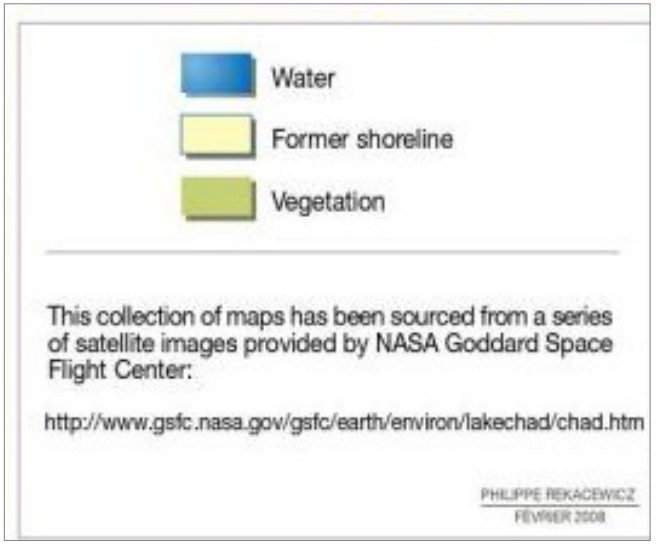
Fish is a staple food for millions of people

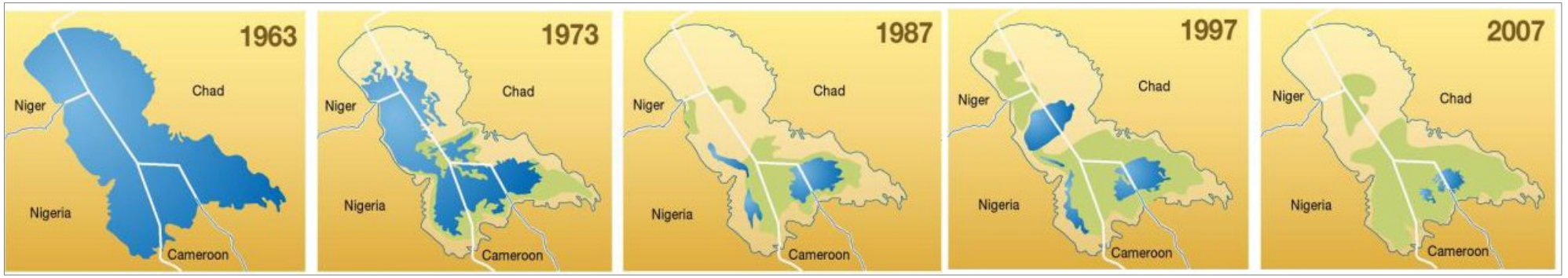


Lakes

Lake Chad

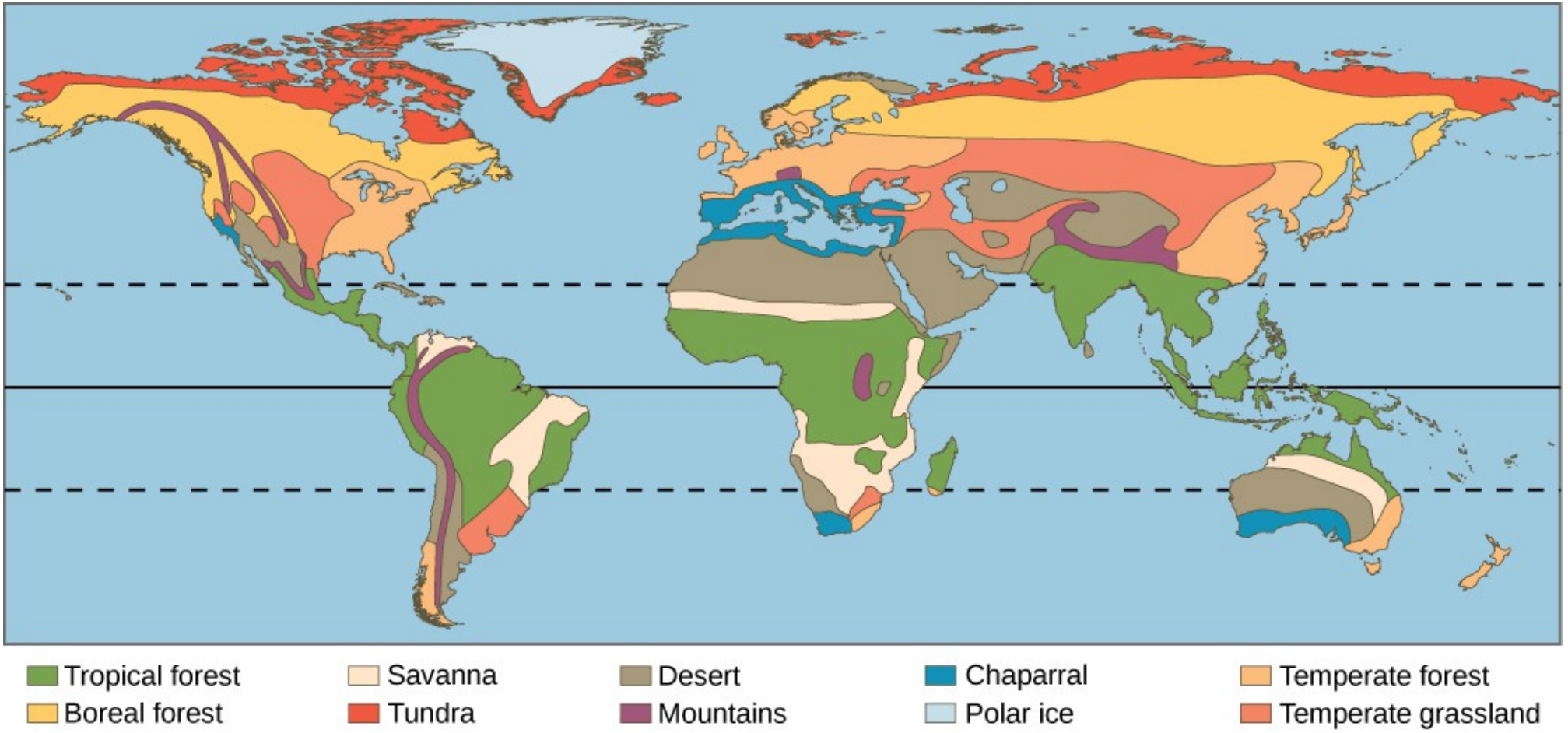
- Closed lake – unique ecosystem
- Supports 40 million people
- 10,000km2 – 1,200km2 in 50 years



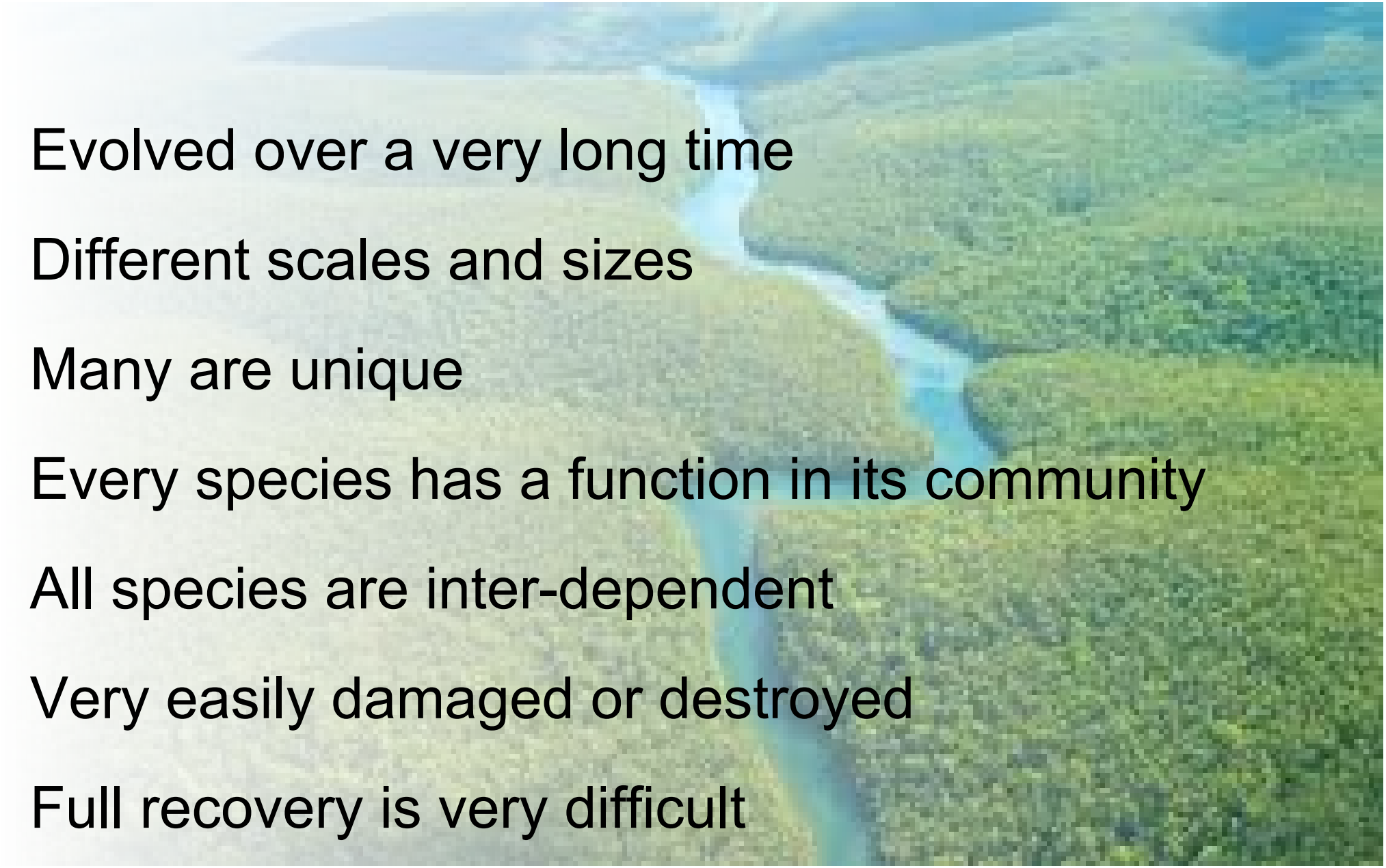


Changing lake area 1963 to 2007

Semi-deciduous forest



Ecosystems are Dynamic



Evolved over a very long time

Different scales and sizes

Many are unique

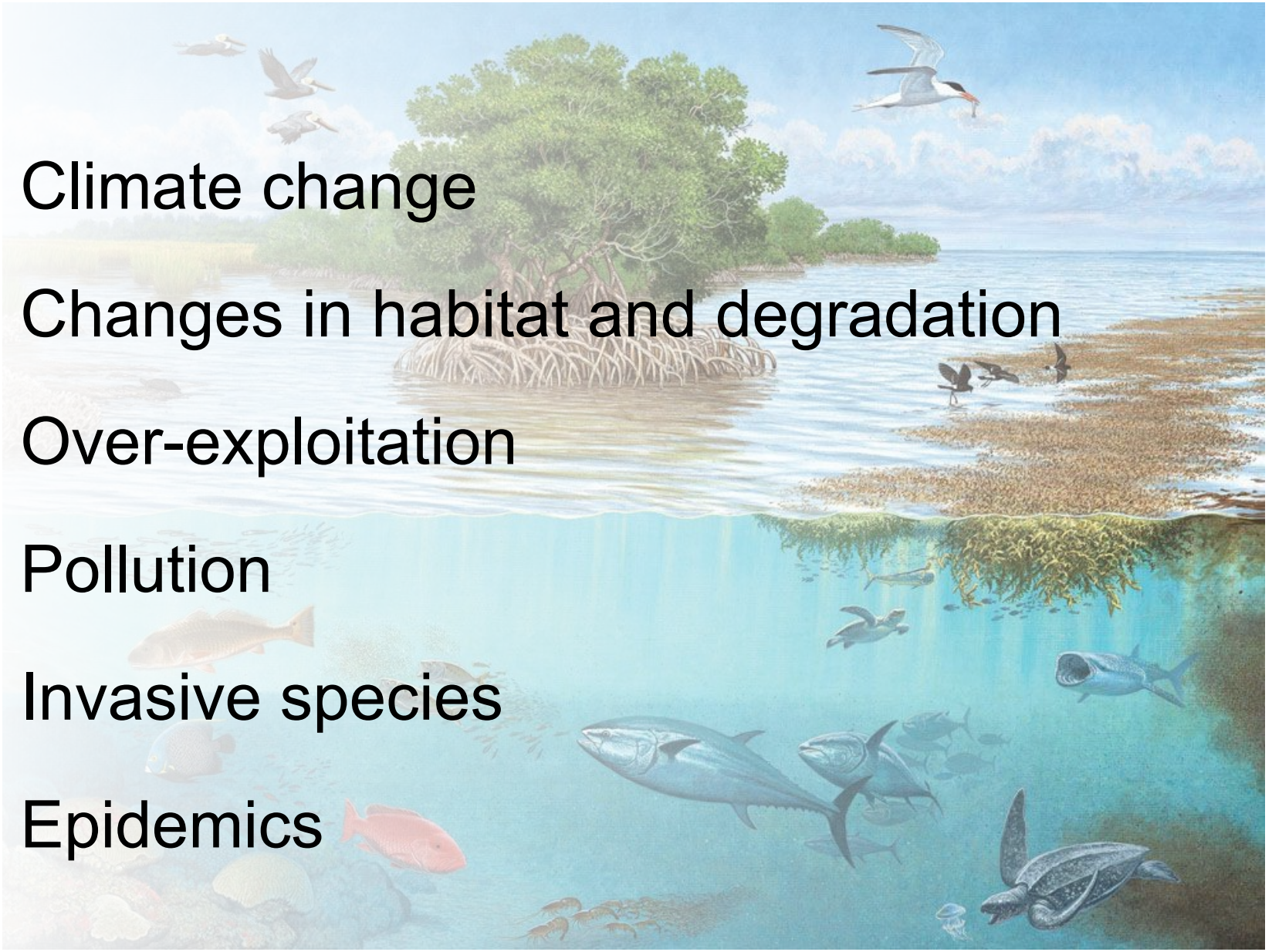
Every species has a function in its community

All species are inter-dependent

Very easily damaged or destroyed

Full recovery is very difficult

6 major drivers of biodiversity change

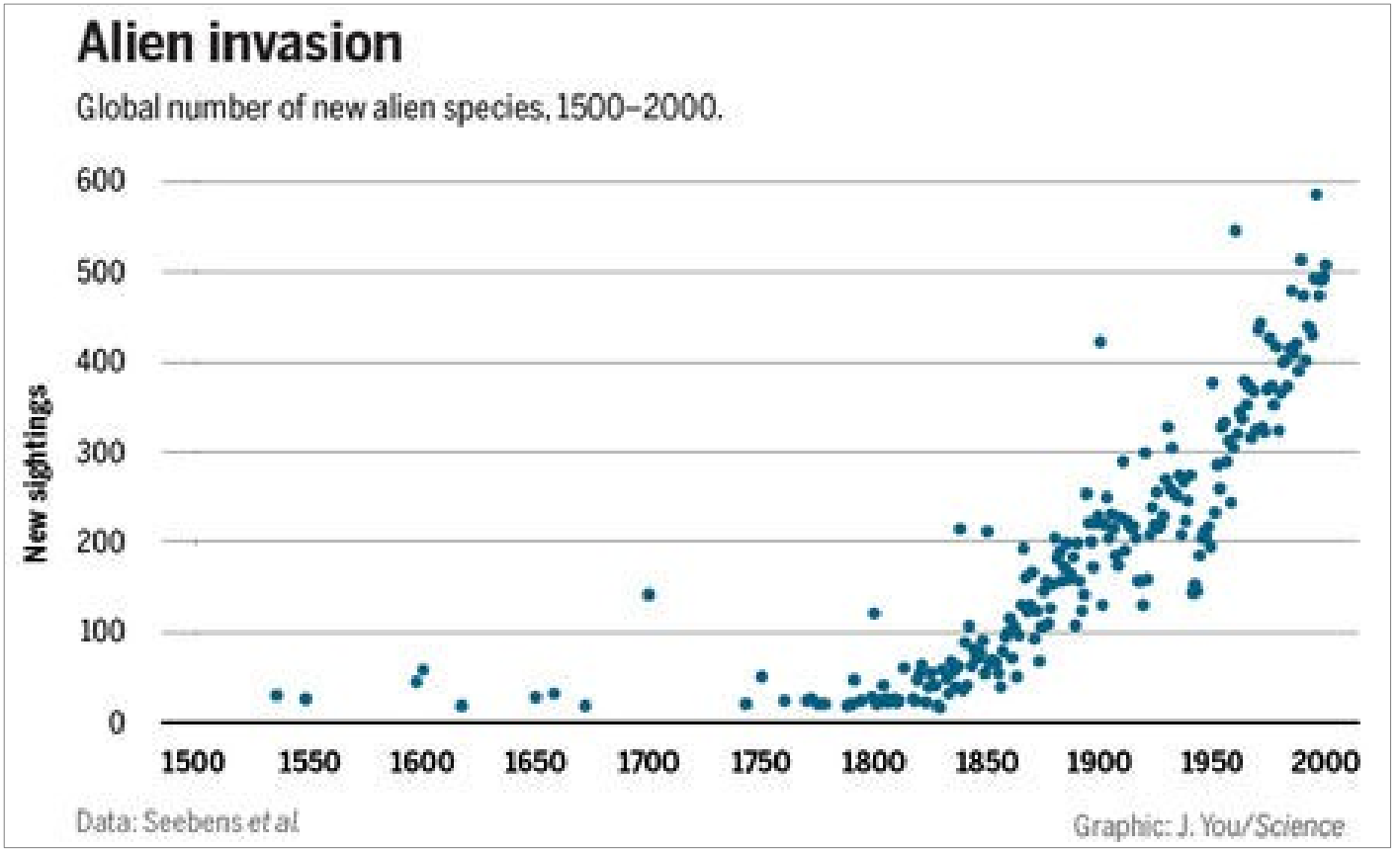


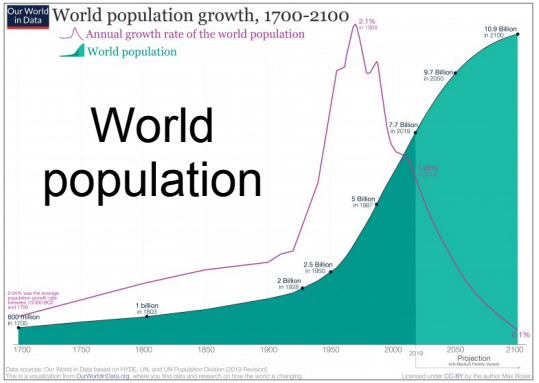
1. Climate change
2. Changes in habitat and degradation
3. Over-exploitation
4. Pollution
5. Invasive species
6. Epidemics

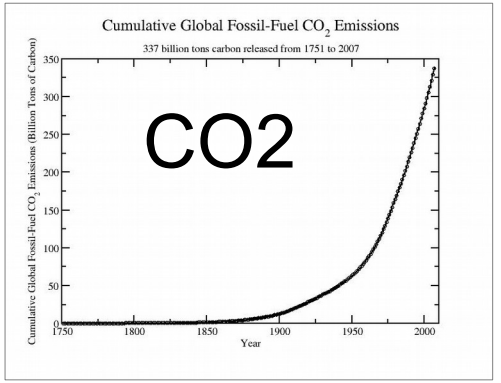
Discuss!

Invasive Species

Scale of the Problem







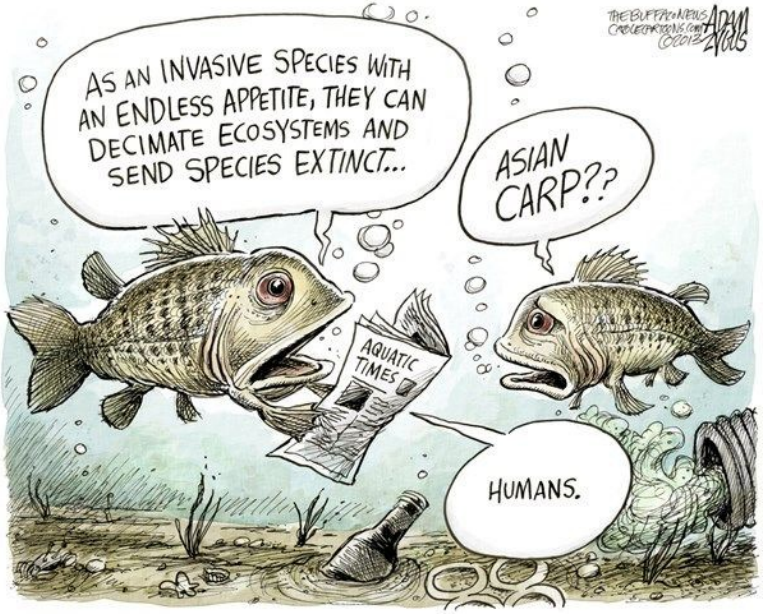
Invasive Species

A species that is not native to a specific location

No natural predators

Spreads out of control

Invades economically, environmentally, or ecologically



1. European Rabbit in Australia

Prey for foxes, wolves, lynxes, badgers

1859: 24 rabbits released for hunting in Australia

No natural predators in Australia

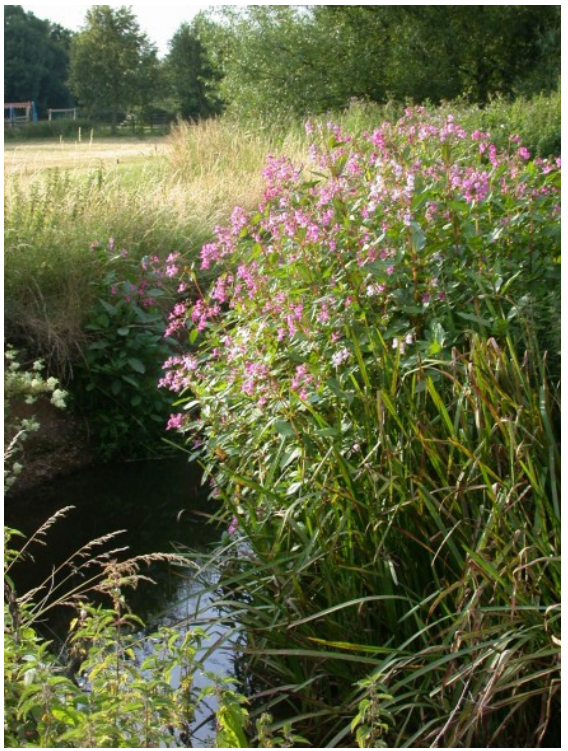
1910: rabbits spread throughout continent (10 bill)

Numerous massive rabbit plagues 2010: 200million

Discuss!

Impact on primary industries

Lost production of crops, pasture & animal husbandry, forestry seedlings, horticulture through:



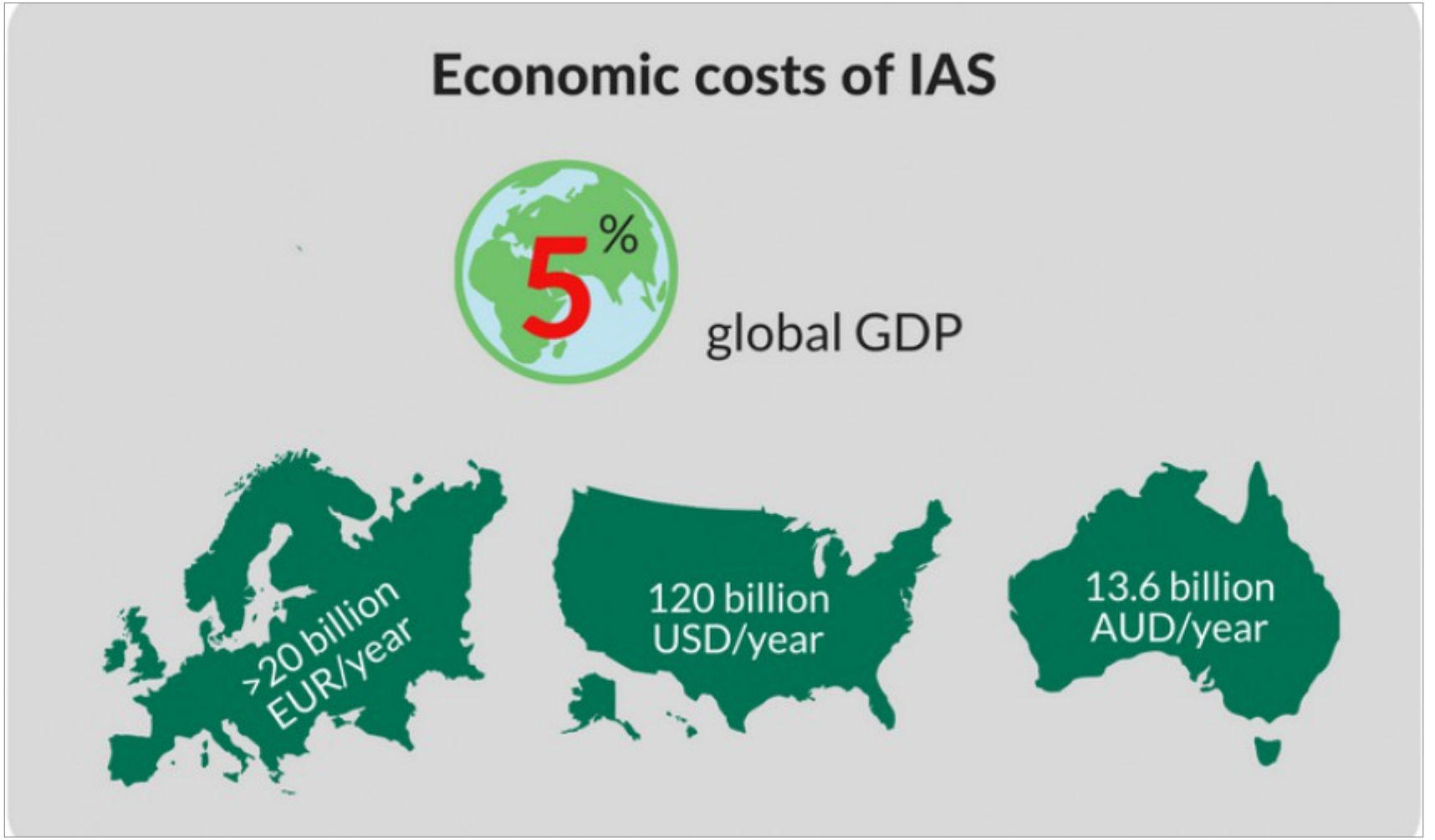
soil erosion

impact on water

associated impacts on infrastructure

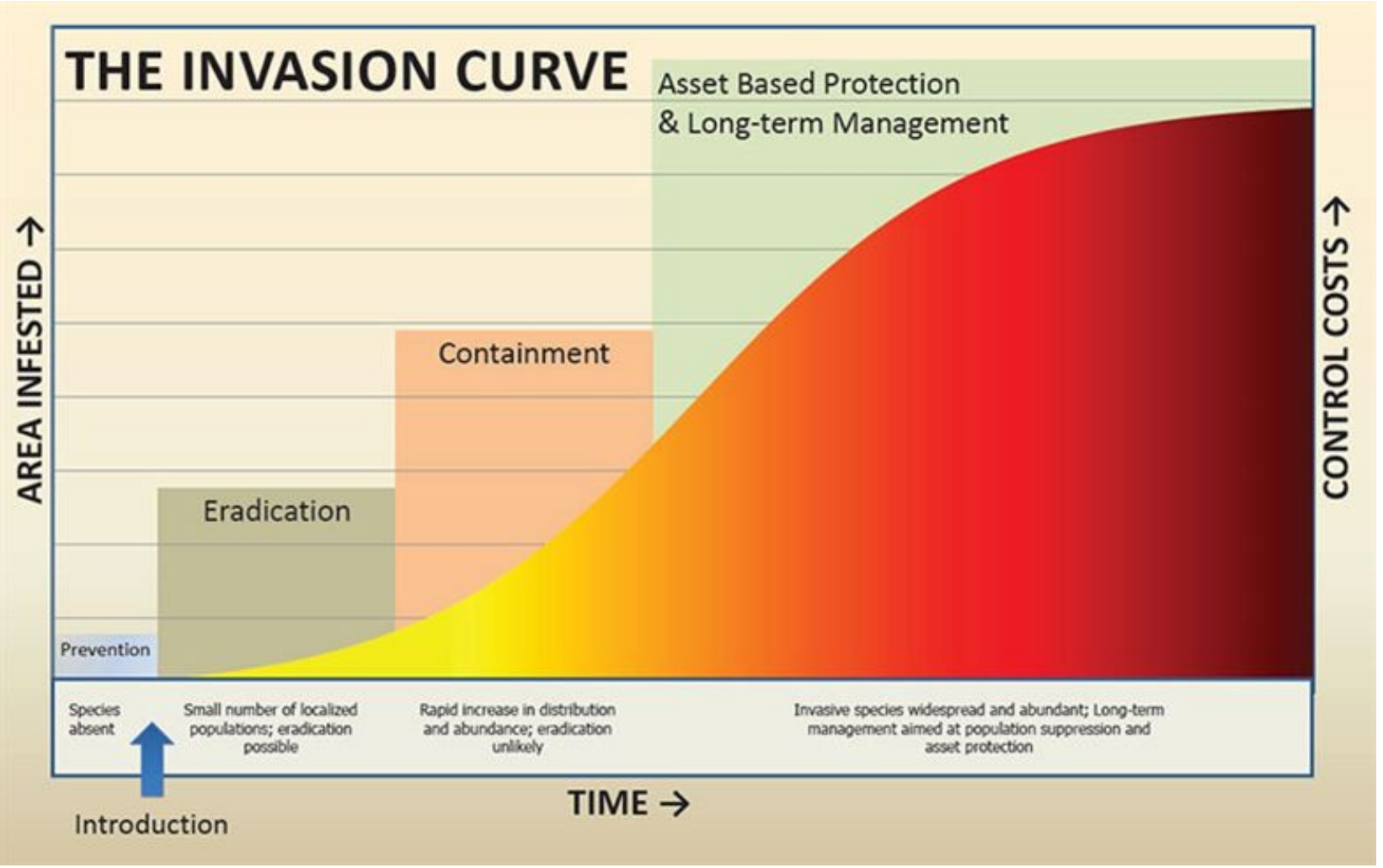
Impact on primary industries

Associated economic impact



Impact on primary industries

Control costs



Impact on native ecosystems

Competition for food and shelter

Selective grazing of plant species, resulting in ecological change

Maintaining fox and feral cat populations, resulting in increased predation of native animals and to the extinction of some species

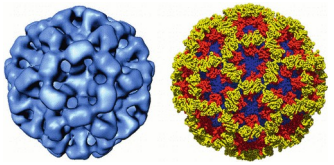
Soil erosion, and associated impacts on vegetation, wetlands and watercourses

Harm to other animals from control measures like baiting and fumigation

Controls

No natural rabbit diseases in Australia

1950's : Myxamotosis - pox virus

1980's : Calicivirus 

Viral controls are very high risk

Predators destroy other indigenous fauna

Less risky methods : live trapping, shooting, gassing

2. Dutch Elm Disease

Dutch Elms are a very high value timber trees

Native to UK + Europe in mixed deciduous forests

1960: elms started to die in the UK

1970: almost every elm tree in the UK gone

1980: almost every elm in N. Europe gone

Devastating economically and ecologically



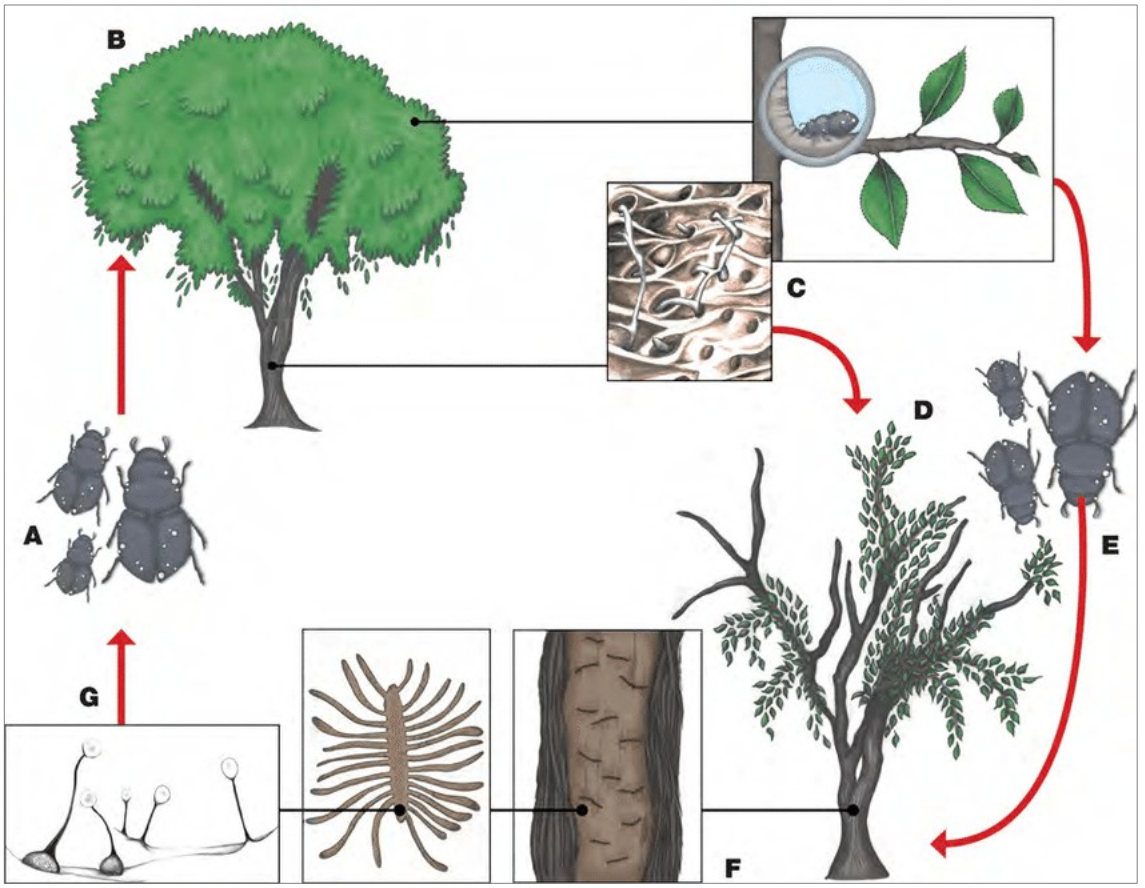

The Disease

Spread by beetles, who bore through elm bark

Beetles carry fungus and prefer cut, dead trees

Fungus blocks water & food channels

Tree dies & attracts more beetles



Where did it come from?

The beetle is not native to Europe

Accidental introduction to UK in shipment of timber from Canada - so no natural controls in our ecosystems

Similar diseases exist for most plant species but Forestry is very vulnerable

Discuss!

Can it be controlled?

Remove dying/dead materials in forests

Border controls to prevent vectors (fumigation)

Develop resistant hybrids

Identify elms that have developed resistance

Wait for all elms to die and use seed banks

Develop national/international programme to prevent spread

Apply principles to any plant species

Japanese knotweed

Fast growing species / very strong root system

Native to Japan

Now rampant across Europe and N. America

World Conservation Unit lists it as one of the world's worst invasive species

Impact

Destroys all man-made structures

- roads,
- concrete foundations,
- properties
- flood defences

Reduces the capacity of flood prevention channels to carry water

Control

Chemical Treatment – slows it down

Physical Treatment

remove entire plant, roots, soil

repeatedly for several years

combined with right herbicide

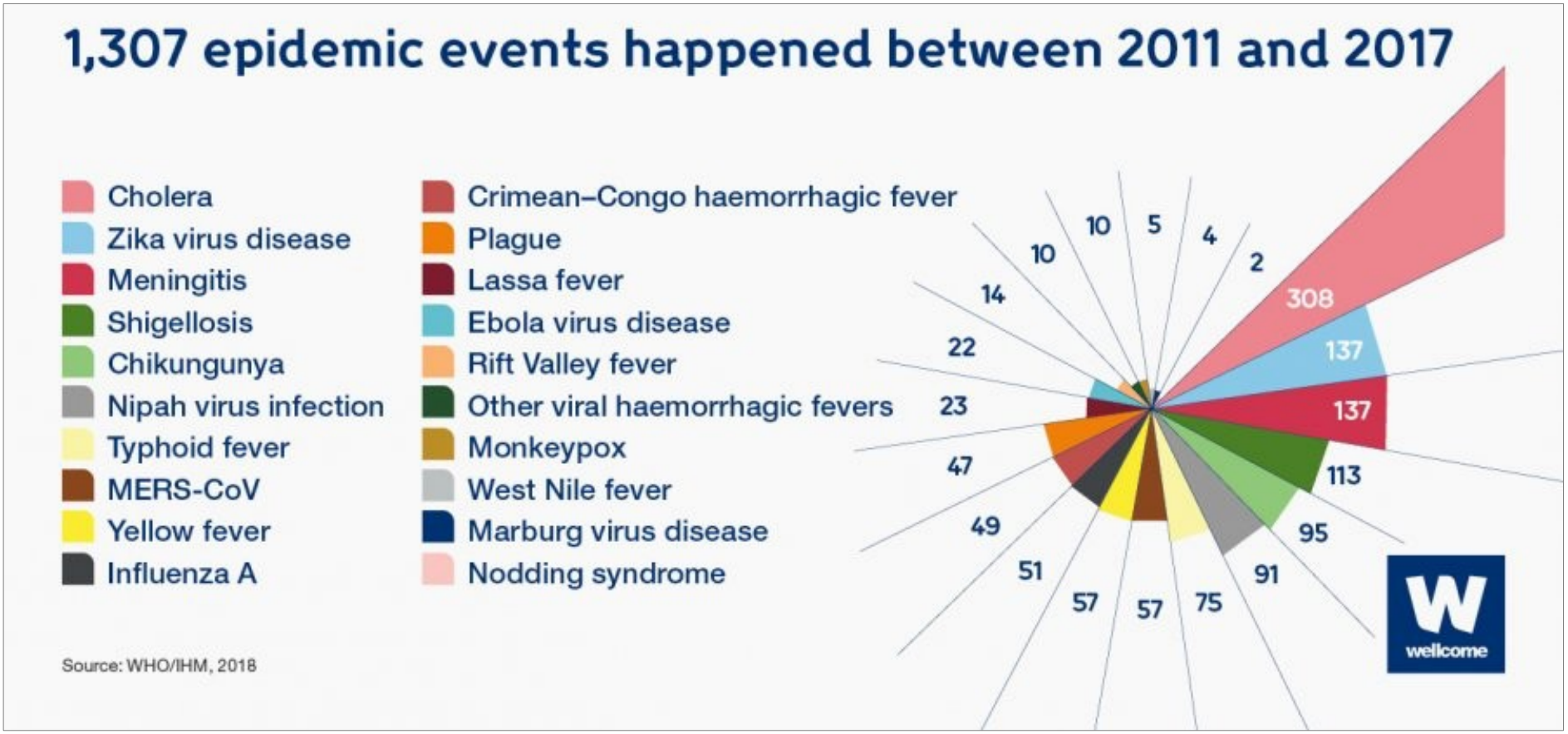
Safe disposal

in UK, disposal regulated by law

Biological solution not yet found

Epidemics

"A widespread occurrence of an infectious disease in a community at a particular time"



Discuss!