

# 12F Ecosystem Stability

Describe how environmental change can impact ecosystem stability.

# Ecosystem Stability

Capability of an ecosystem to remain constant despite changing environment, number of species, population sizes, and interactions.

## Species diversity

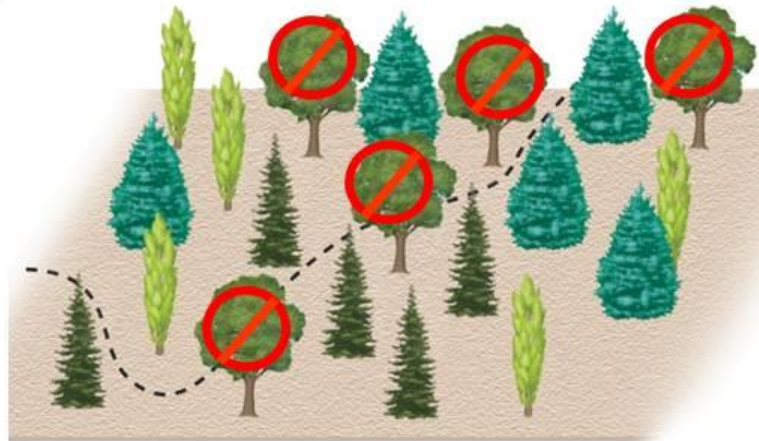
S = species no.

H = takes into account  
number of species and  
abundance of each

**Which community  
is more stable if  
one species is  
lost? Which can  
survive?**



Woodland A



Woodland B

# Biodiversity

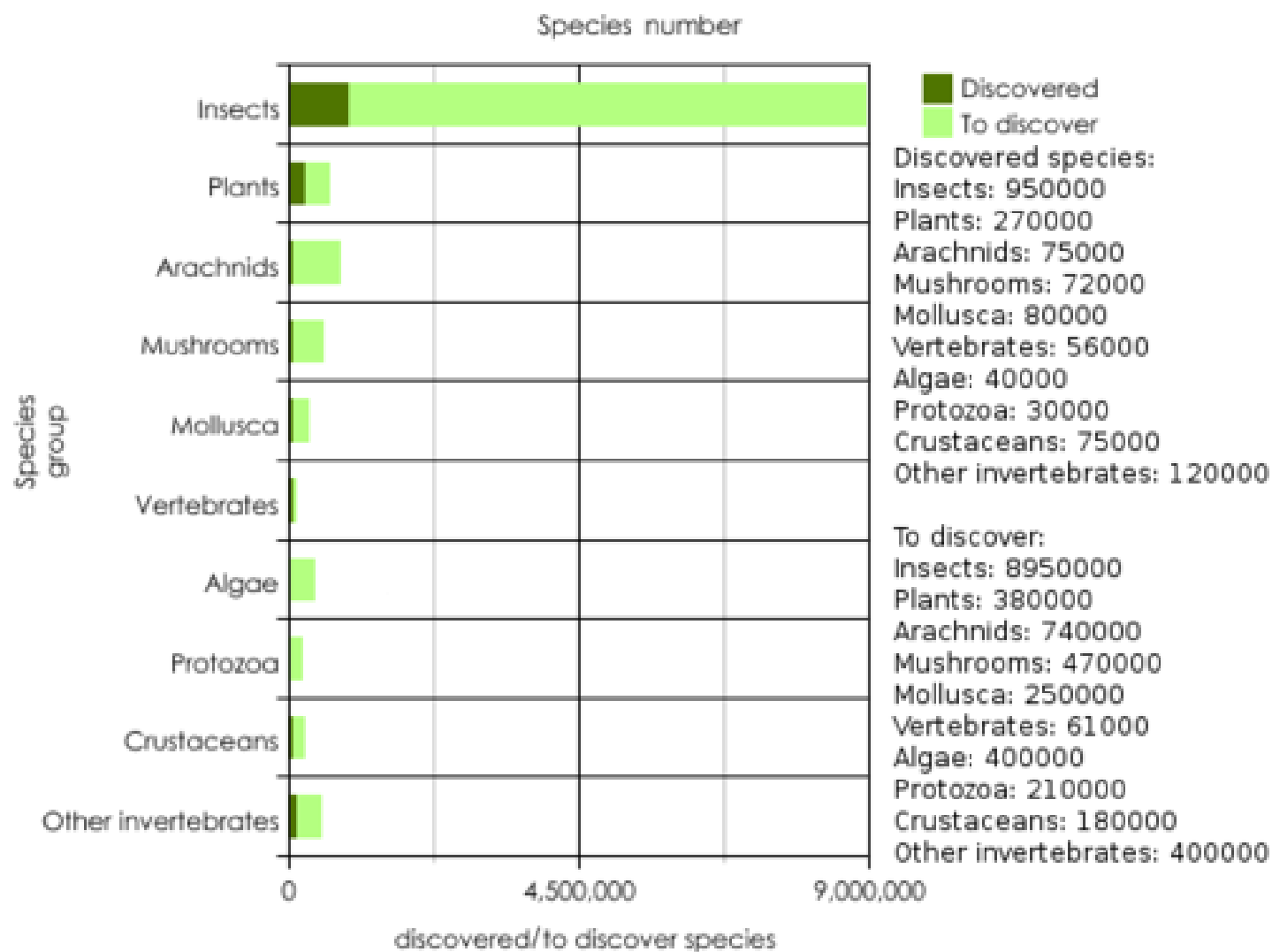
- Variety of life within an ecosystem
- Lots of different types of plants and animals means a “healthy” ecosystem













# What can alter the stability?

- if individuals within the population cannot survive and reproduce, the population size will decrease
- individuals also might move out of the area if they cannot find resources

- if a disaster occurs (fire, storms, etc..) the biodiversity might change and populations might not be able to cope with the change

# What causes loss of biodiversity?

- Global warming
- Pollution
- acid rain
- deforestation

### 3. FIRE

- Trees and other plants die
- Animals die or move away
- The topsoil is ruined, but under ground remains intact and ecological succession starts to occur









## 4. STORMS

(tornados, hurricanes, floods)

- Uproot trees
- kill animals
- Water is polluted

September 9, 2008



September 15, 2008





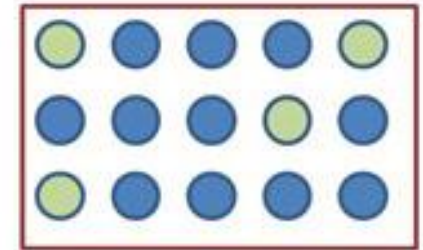
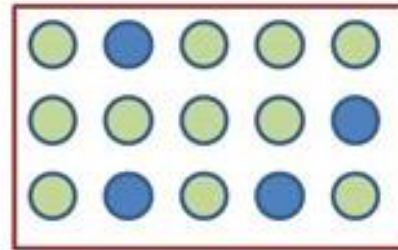
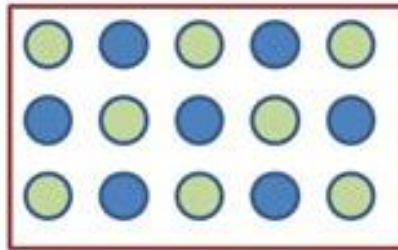


# 5. NATURAL CLIMATE CHANGE

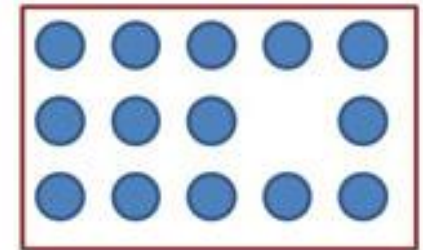
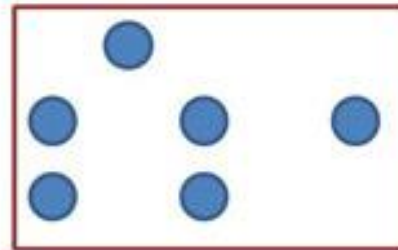
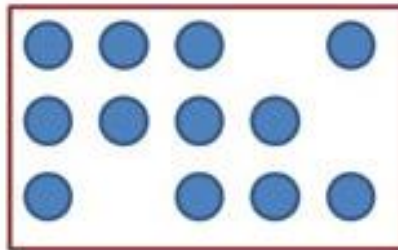
- Normal climate change (seasons) occur every year
- Sometimes droughts occur – killing plants and animals
- Sometimes a mild winter doesn't kill off insects and the summer's crops are eaten by large population of insects
- Asteroids affect the entire ecosystem



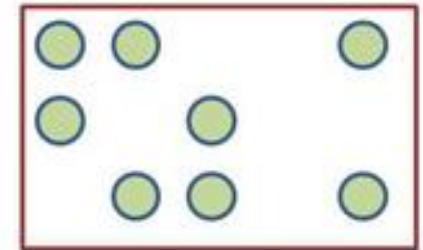
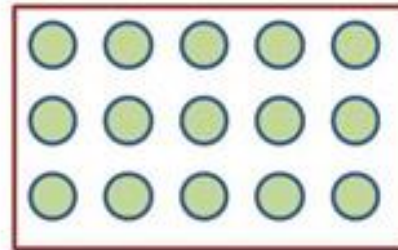
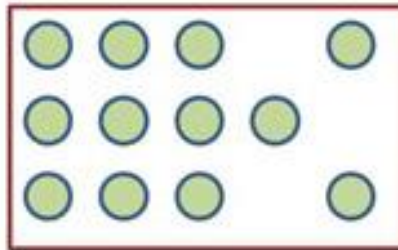
Diverse  
community



Community  
dominated  
by "blue"  
species



Community  
dominated  
by "green"  
species



Year 1: Average  
climate year

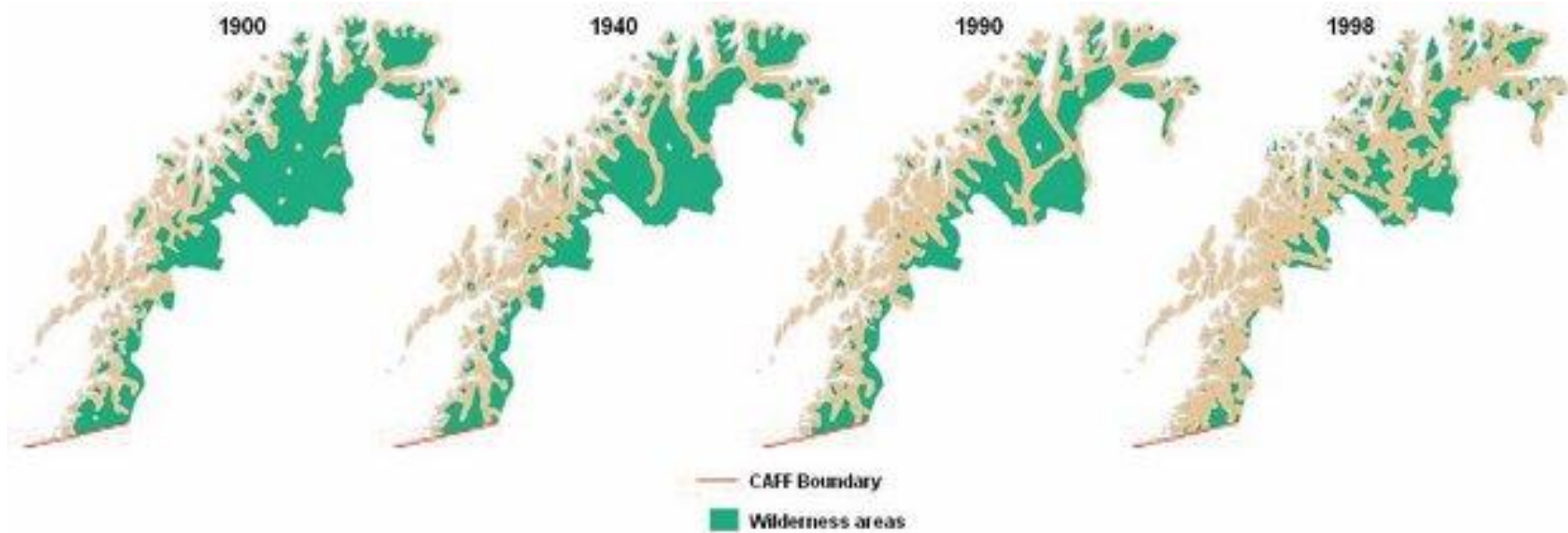
Year 2: Warm year

Year 3: Cold year



## 6. Habitat Loss

- People chopping down forests to make farmland, build roads, shopping malls, etc...
- deforestation



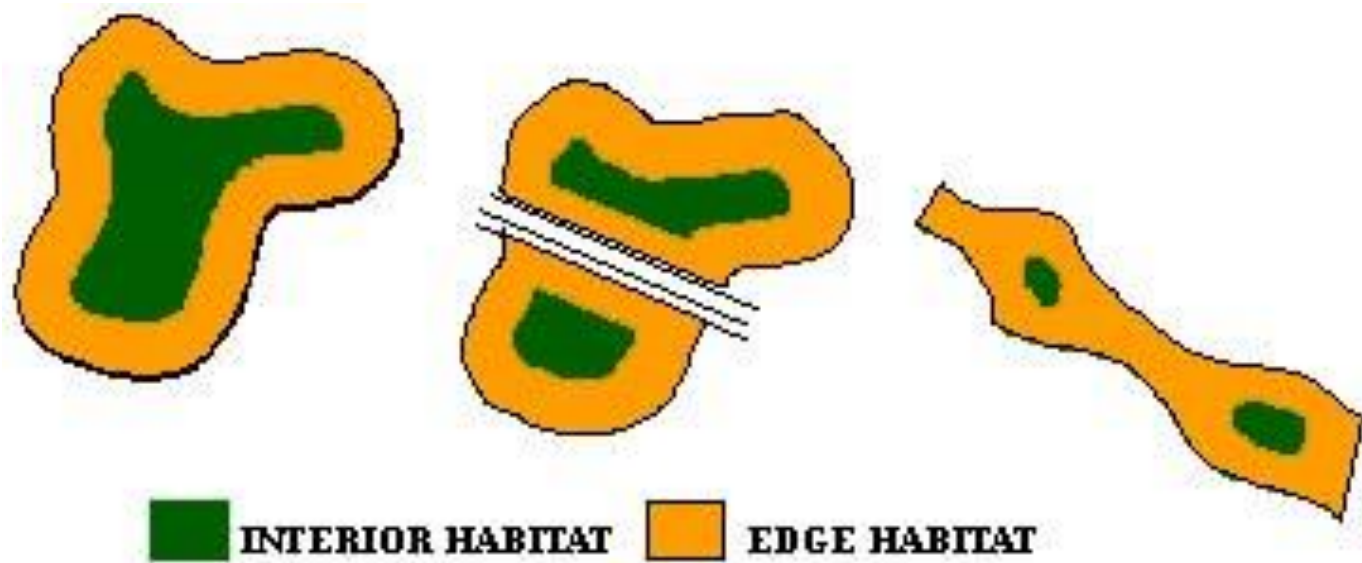
# Rainforest Deforestation



## a. HABITAT FRAGMENTATION

- When species are living in a small area of suitable habitat surrounded by areas of unsuitable habitat



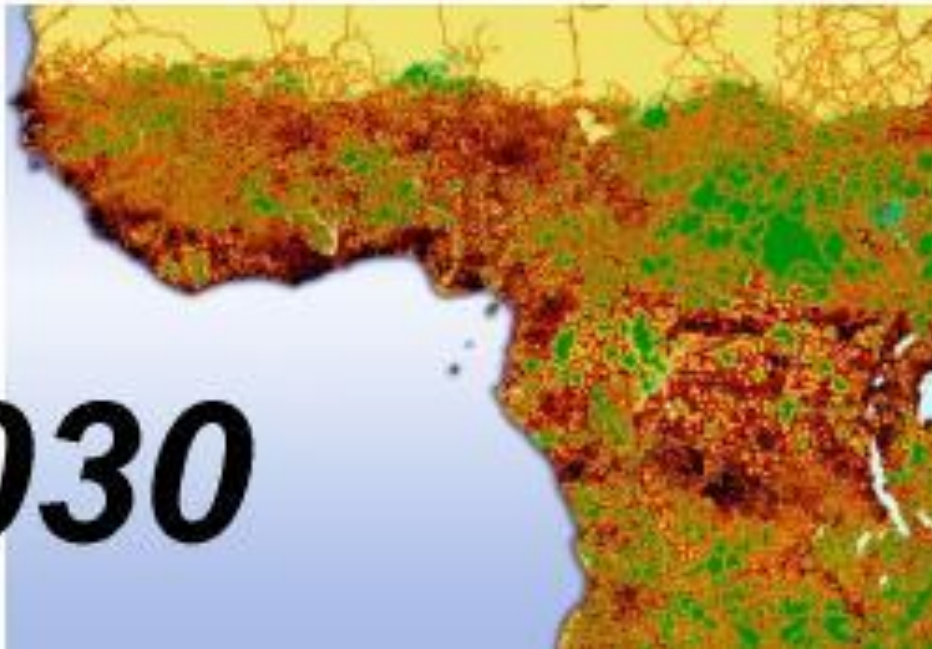


***today***

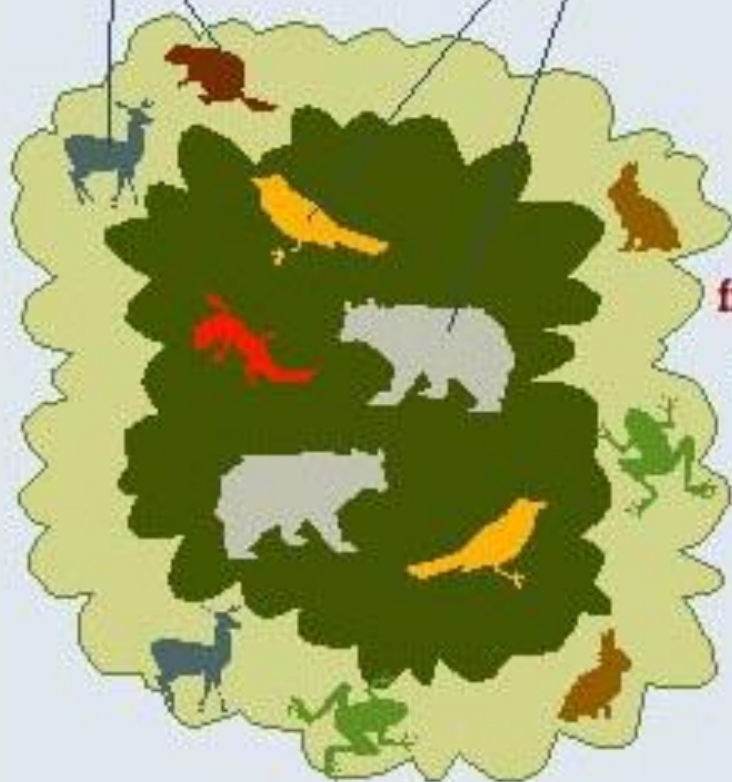


**Great  
Ape  
Habitat  
Africa**

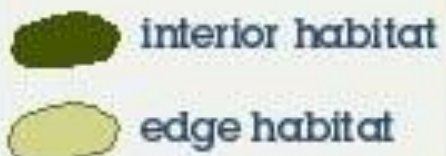
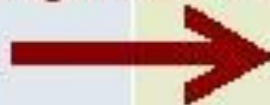
***2030***



interior species  
edge species



fragmentation



interior habitat and species **decrease**

edge habitat and species **increase**

# 7. Pollution

- Impacts both land and water
- Examples:
  - Mercury & DDT biomagnification in ospreys and pelicans
  - Oil spills
  - Might take 50+ years for ecosystem to recover



# Pollution







# DDT and affects on Brown Pelican egg





# Mercury Effects

- Mercury has been found in aquatic and terrestrial plants, and in animals, including humans. High levels of mercury have caused developmental abnormalities, impaired reproduction and survival, and in some cases with direct mortality.



# Acid Precipitation



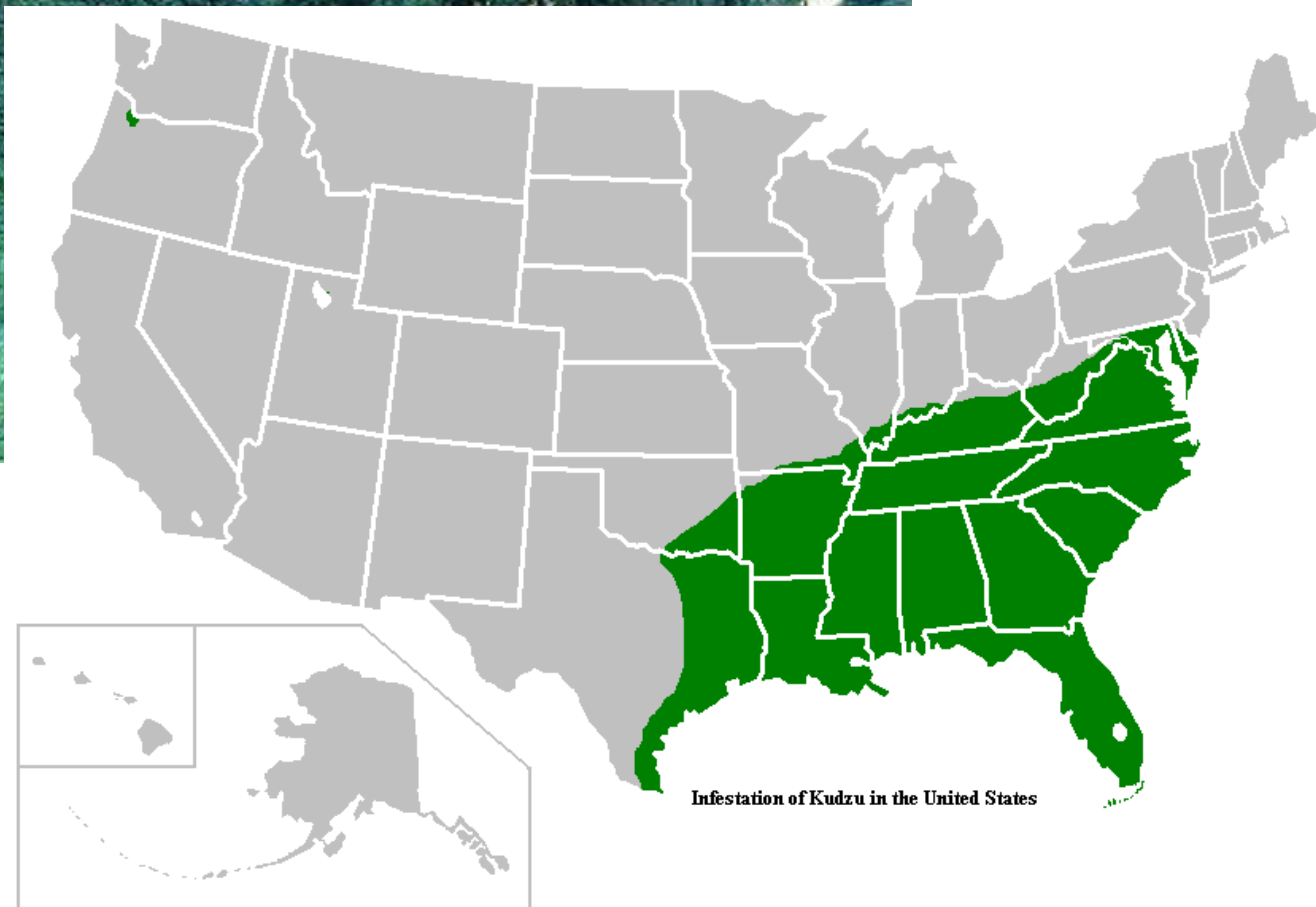


# ACID RAIN

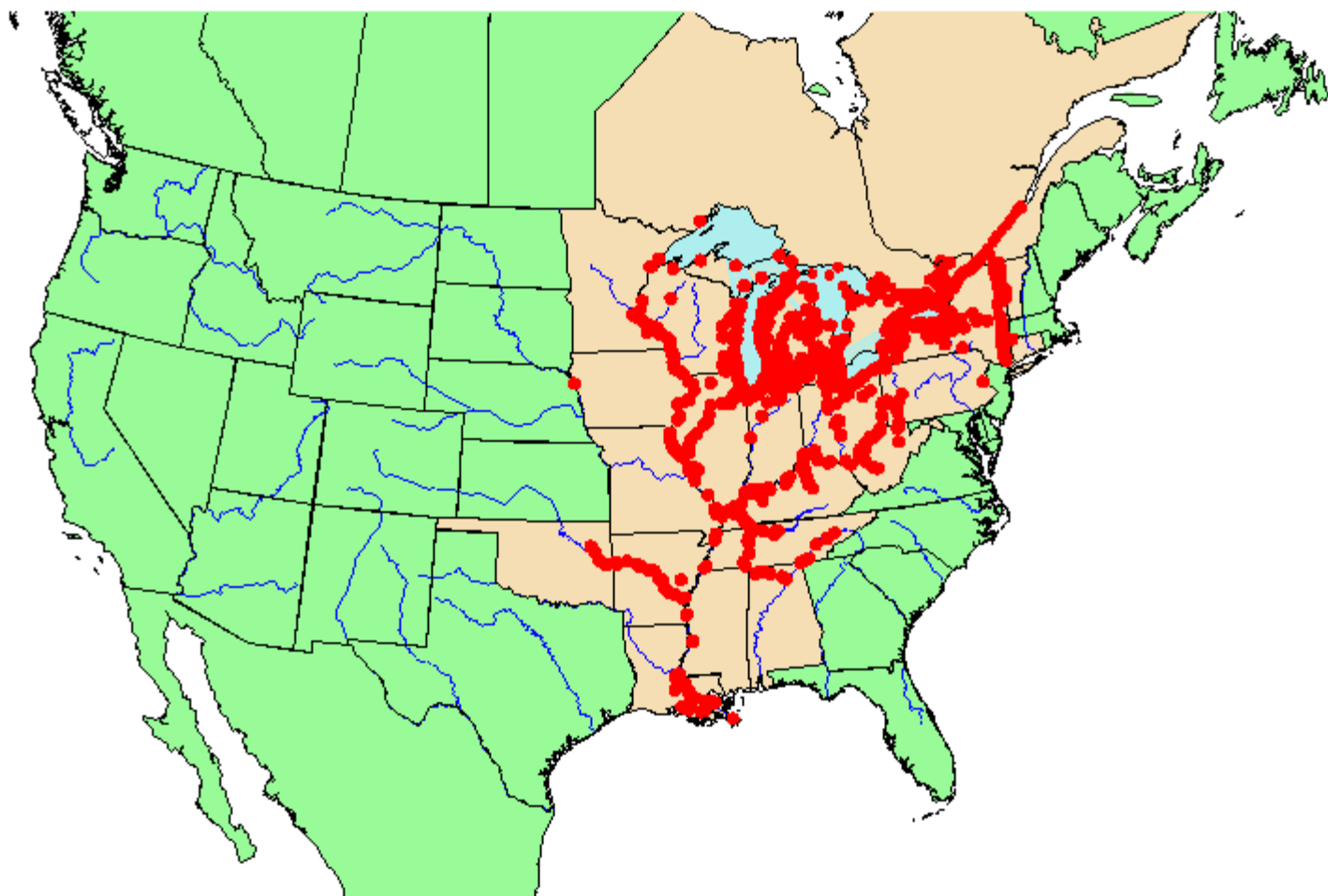


## 8. Invasive Species

- An organism not normally found in a particular ecosystem
- Brought in by accident – on boats fishing from lake to lake or people release aquarium fish in nearby waters
- Or brought in by man – kudzu plant was brought in for livestock feed and erosion control



November 2000



**States with zebra mussels in inland and adjacent waters.**



# 9. Global Climate Change

- Levels of CO<sub>2</sub> rising in the earth's atmosphere for the past 100 years
- Trapped CO<sub>2</sub> causes earth's temperature to rise.
- More or less rain in some areas (drought, flooding)
- Milder winters, hotter summers

# Warming Trend

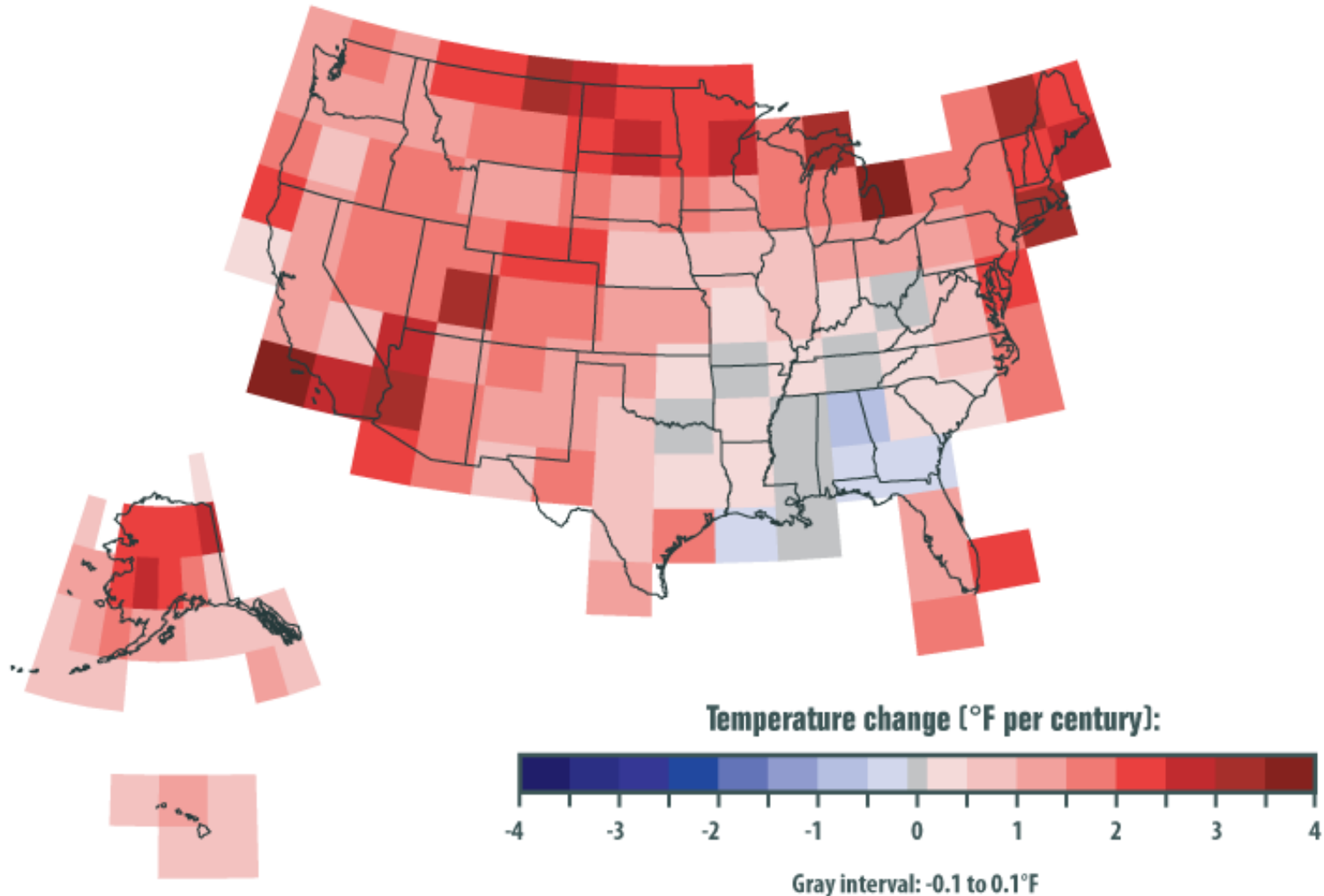
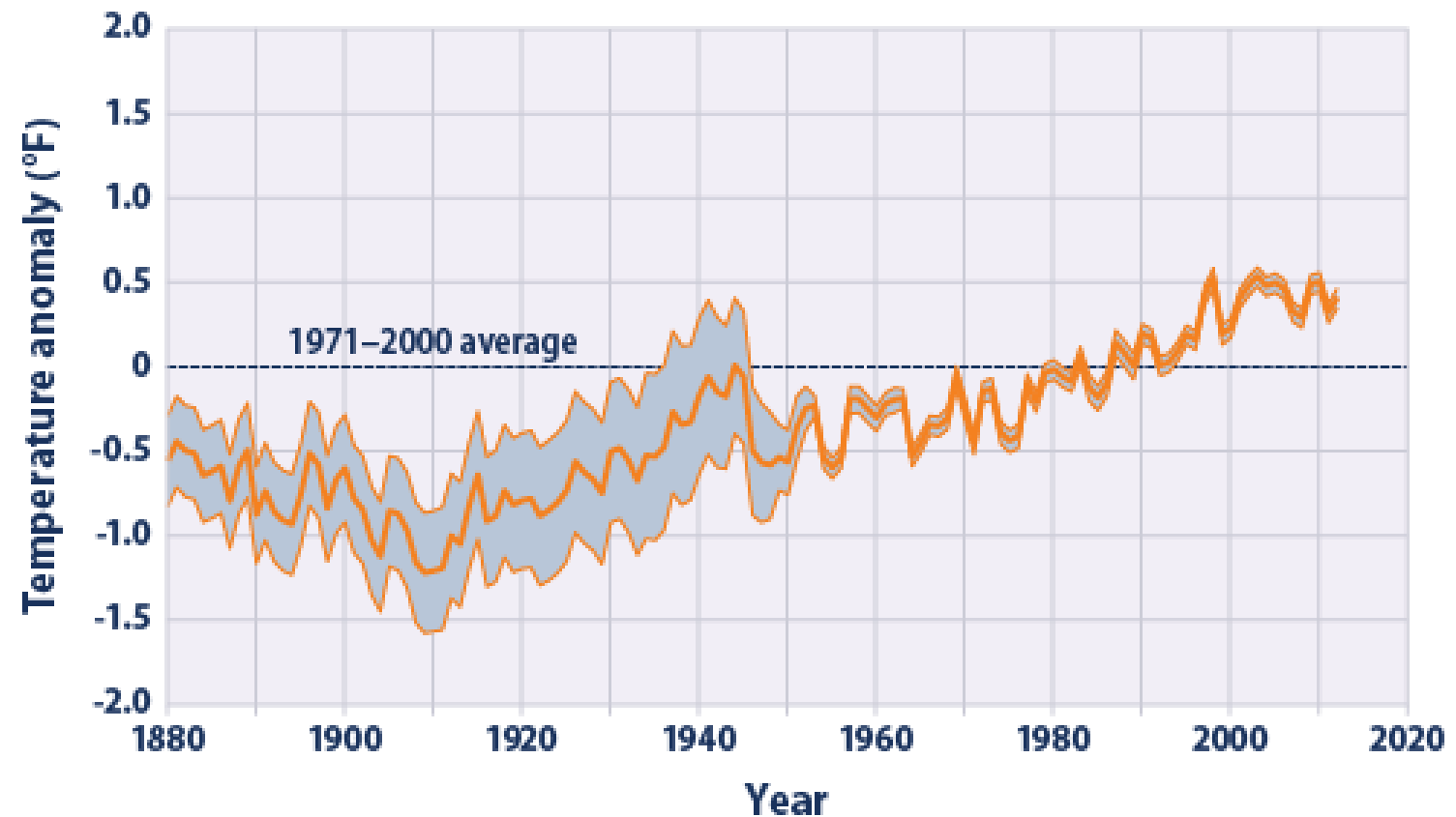
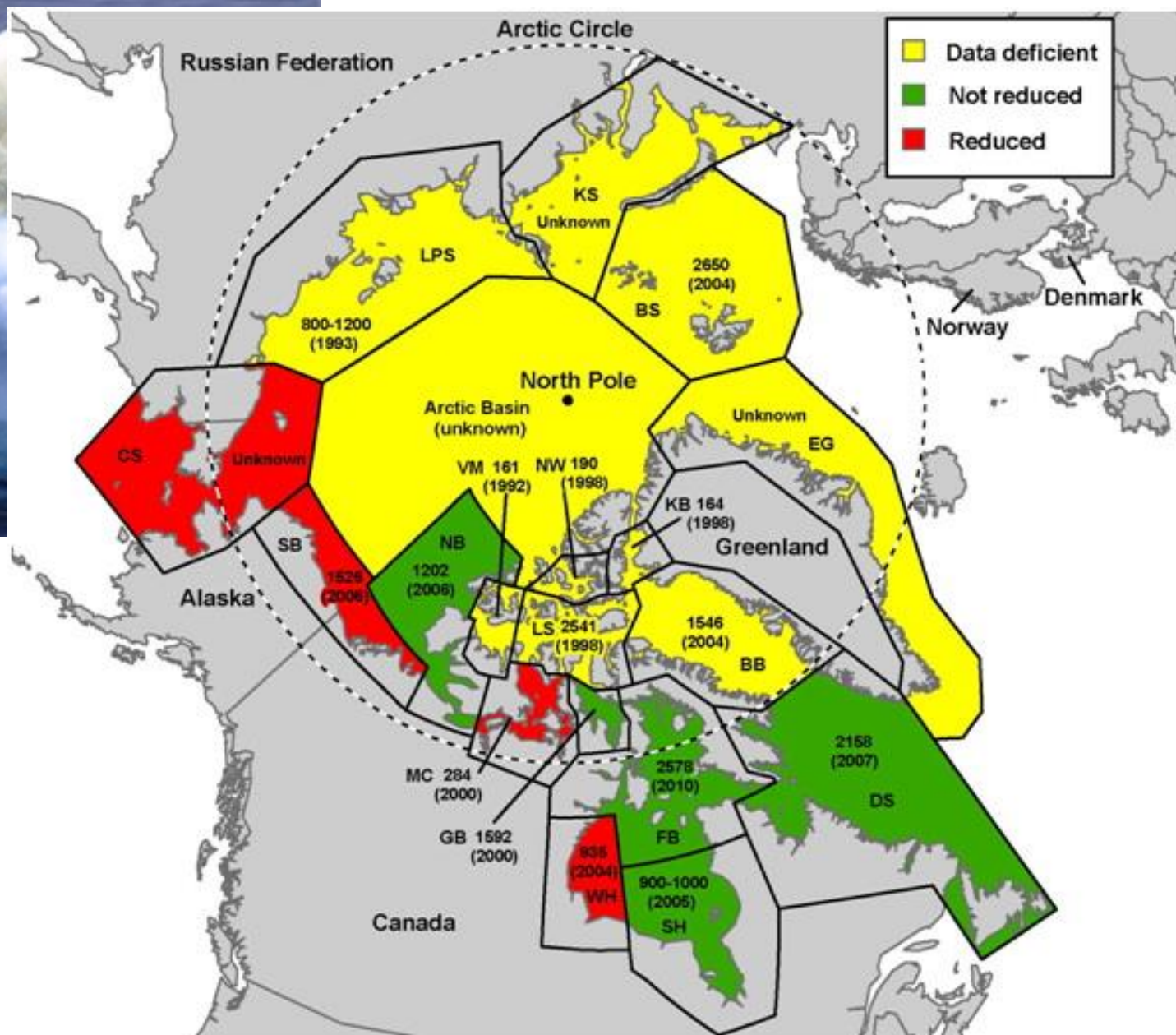


Figure 1. Average Global Sea Surface Temperature, 1880–2012

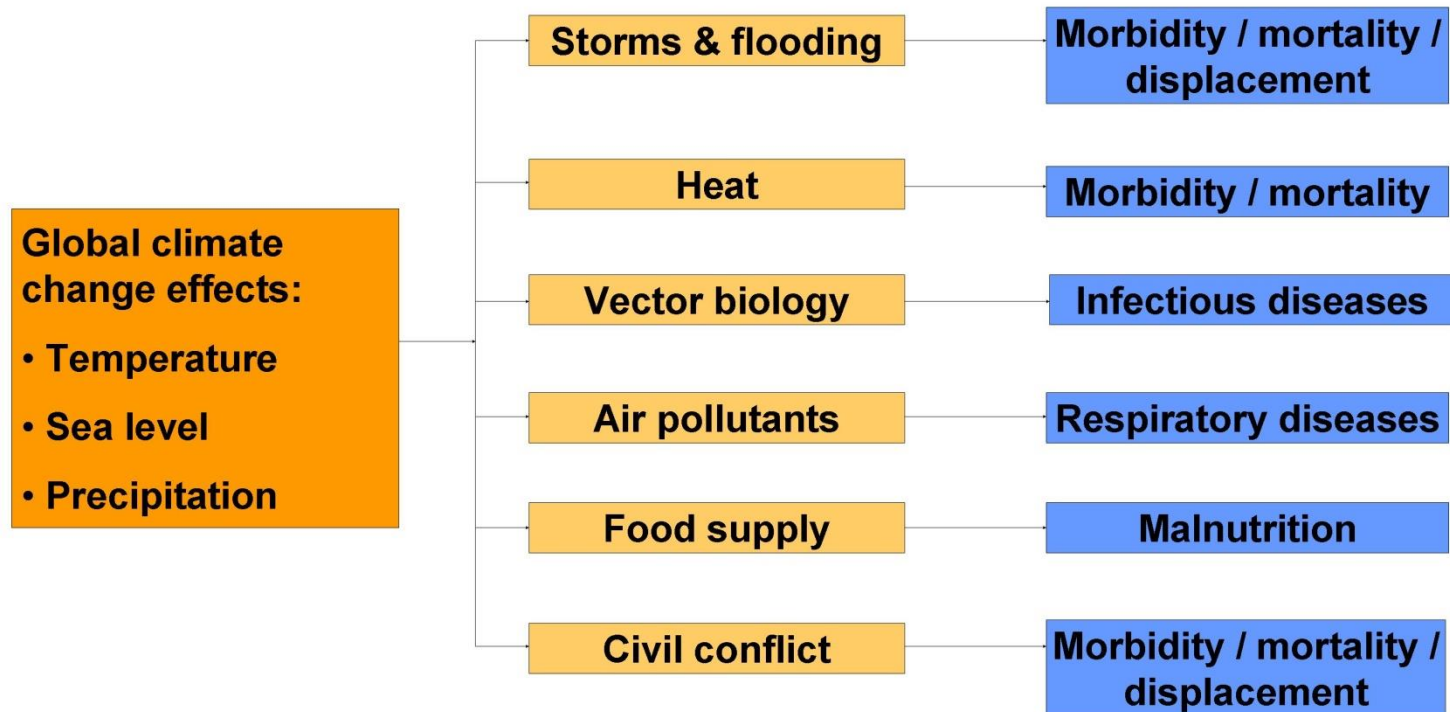




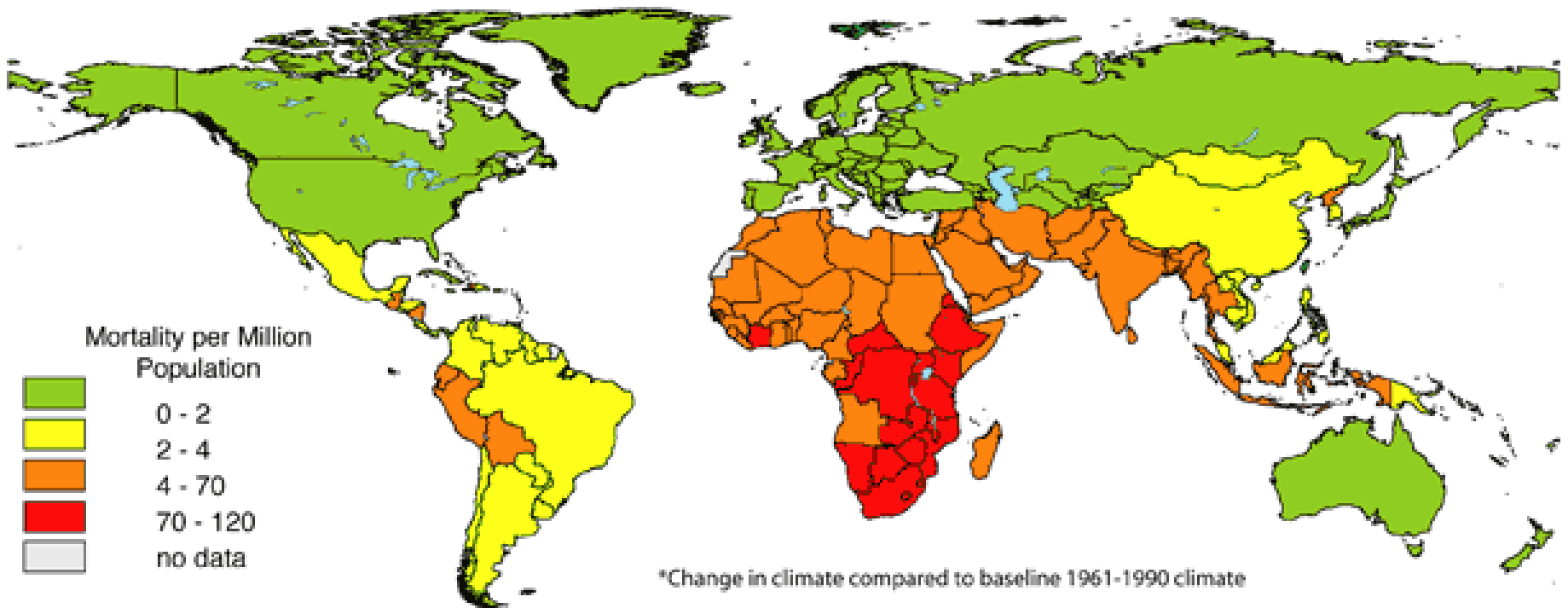




# Potential Impacts of Global Climate Change on Human Health



## Estimated Deaths Attributed to Climate Change in the Year 2000, by Subregion\*



Data Source:

McMichael, JJ, Campbell-Lendrum D, Kovats RS, et al. Global Climate Change. In Comparative Quantification of Health Risks: Global and Regional Burden of Disease due to Selected Major Risk Factors. M. Ezzati, Lopez, AD, Rodgers A., Murray CJL. Geneva, World Health Organization, 2004



Maps produced by the Center for Sustainability and the Global Environment (SAGE)