

# Turning Up The Volume on The Ethical and Moral Dimensions of Climate Change

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# Goals

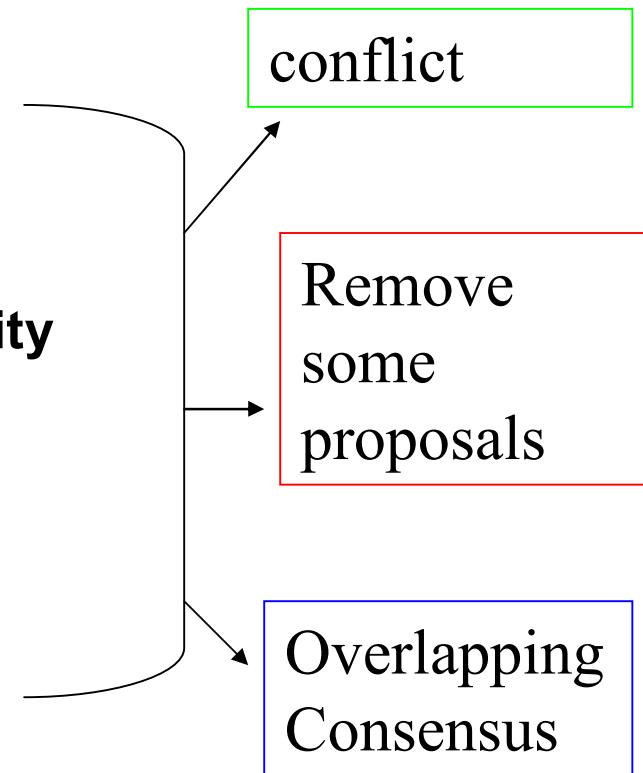
- Why is climate change an **ethical and moral issue**?
- What is the **significance** of being an ethical issue?
- What are a few of the **major ethical issues** entailed by climate change?

# Climate Change Ethics

**Ethics** - the domain of inquiry that examines statements about what is bad or good, obligatory or non-obligatory, or when duties attach to human actions

## Basis for ethical positions

- Religion (see prior slide)
- Anthropocentric
  - Utilitarian and other consequentiality
  - Relationship based ethics
  - Virtue
  - Rights based or other duty based
  - Distributive and other theories of justice
- Non-anthropocentric
  - Biocentric
  - Ecocentric



# Think about this.....



**Makes  
this  
happen  
here**

**This  
here**

**Questions of:**

**\*Damage**

**Responsibility**

**\*Distributive Justice**

**\*Welfare**

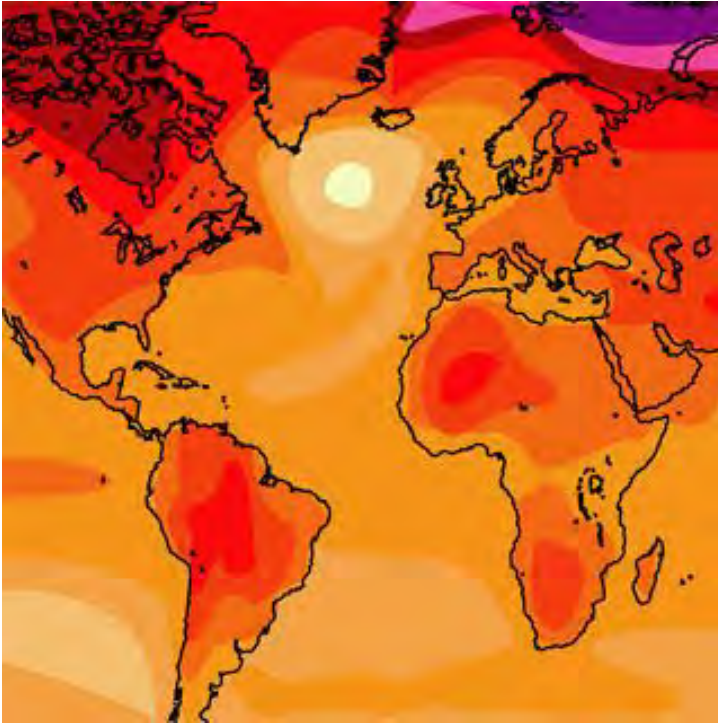
**Maximization**

**\*Procedural Justice**

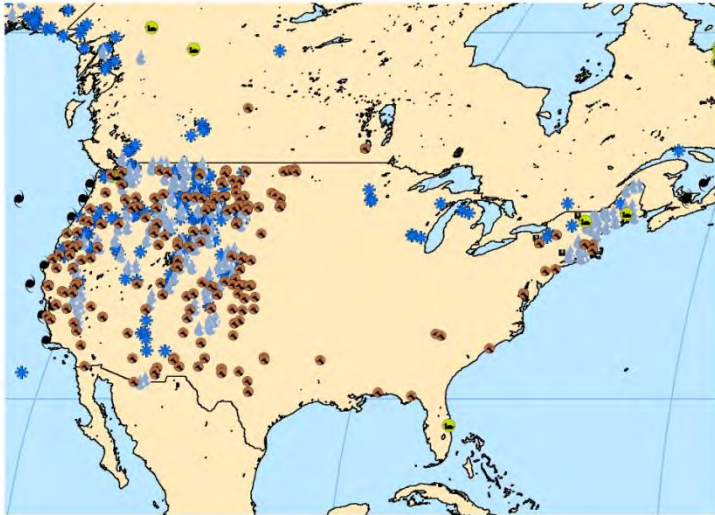


# Why are ethical questions more salient at the global scale?

The Consequences Are Potentially  
**Catastrophic**

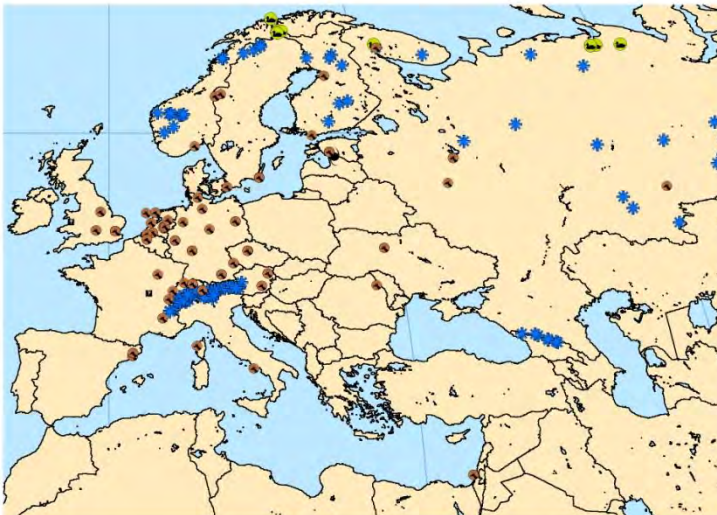


# Climate Change: Observed Impacts



Regional temperature trends in recent decades have already produced measurable impacts in physical and biological systems around the world

- terrestrial biological systems
- marine biological systems
- marine and freshwater biological systems
- hydrology
- cryosphere
- coastal processes and zones
- agriculture and forestry



<http://sedac.ciesin.columbia.edu/ddc/observed/>

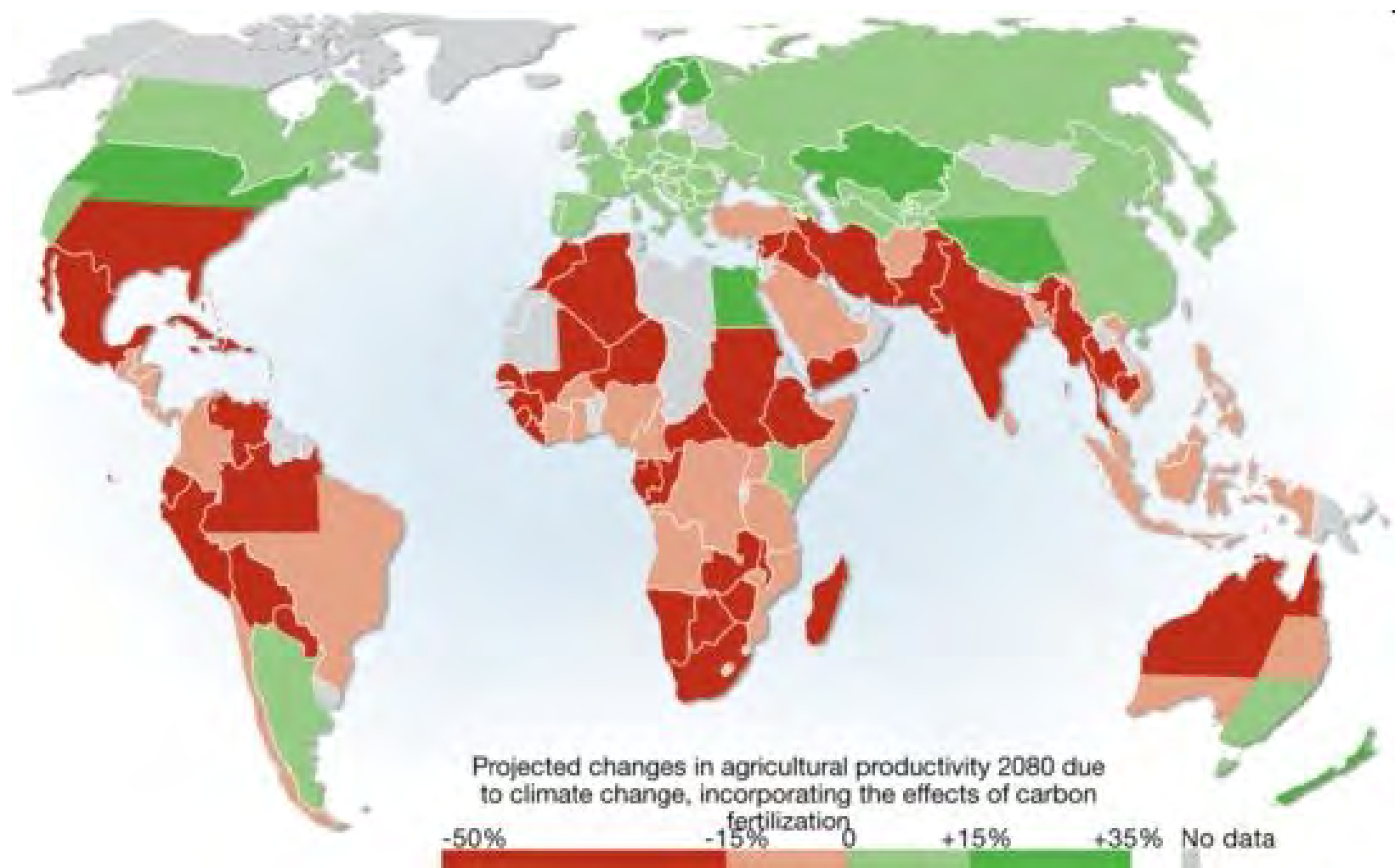
# Global Humanitarian Forum, MAY 2009

- Climate change already is killing 300,000 per year
- Will be responsible for 500,000 per year by 2030
- 4 billion at risk from climate change now and 500 million at extreme risk now
- If climate change is not gotten under control within 25 years, 250 million will have health related problems.

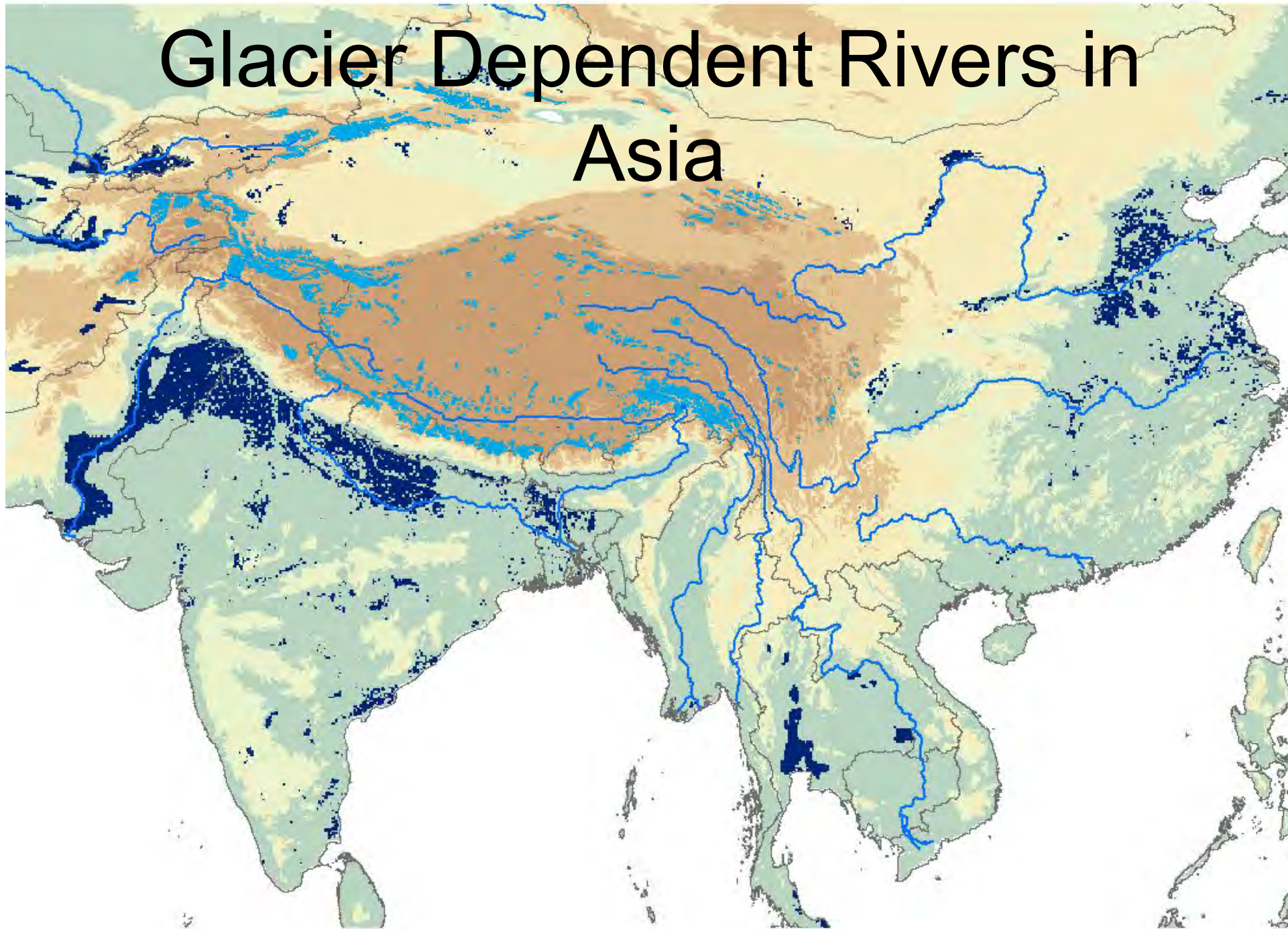
# Climate Change and Agriculture



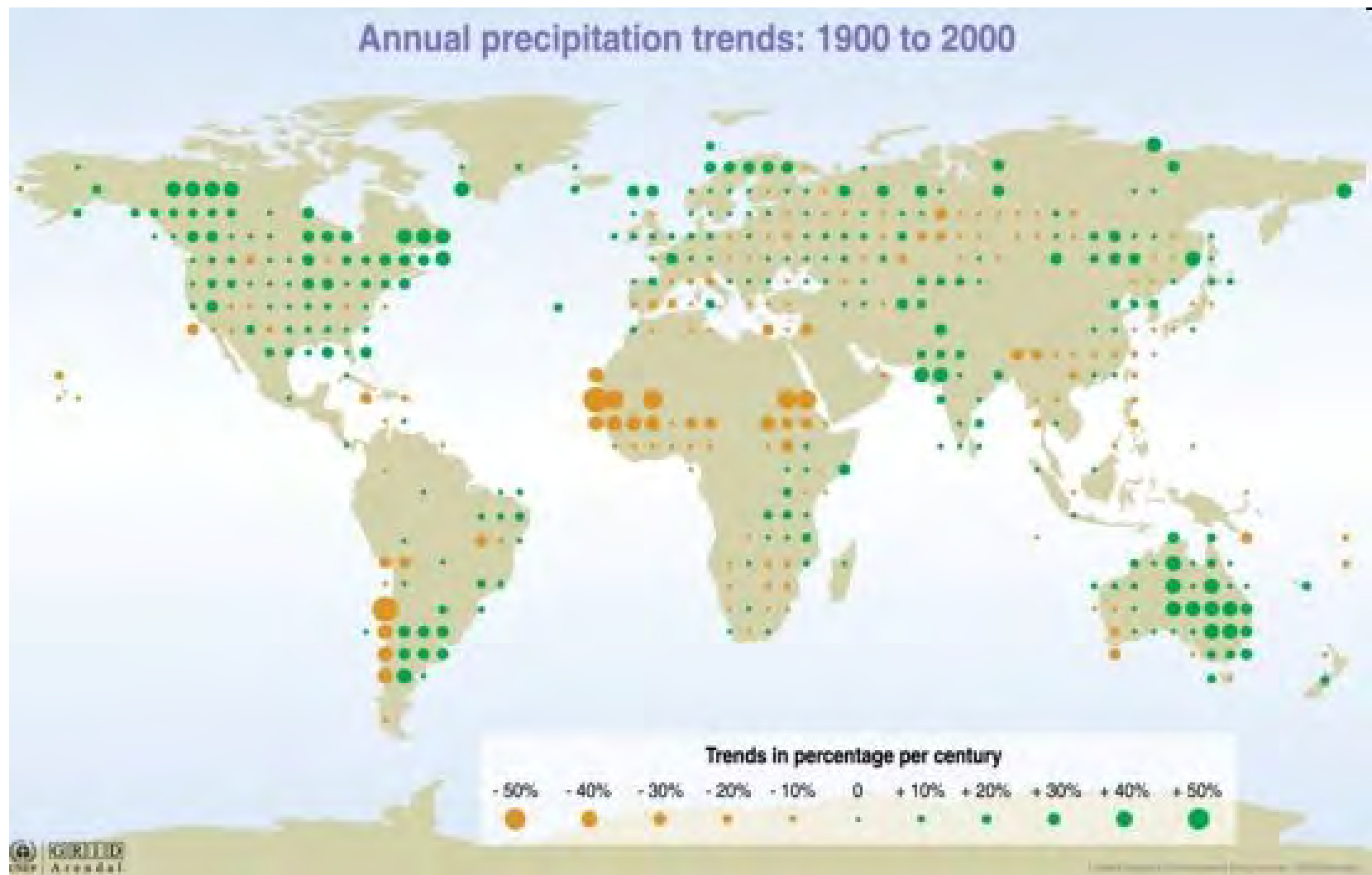




# Glacier Dependent Rivers in Asia



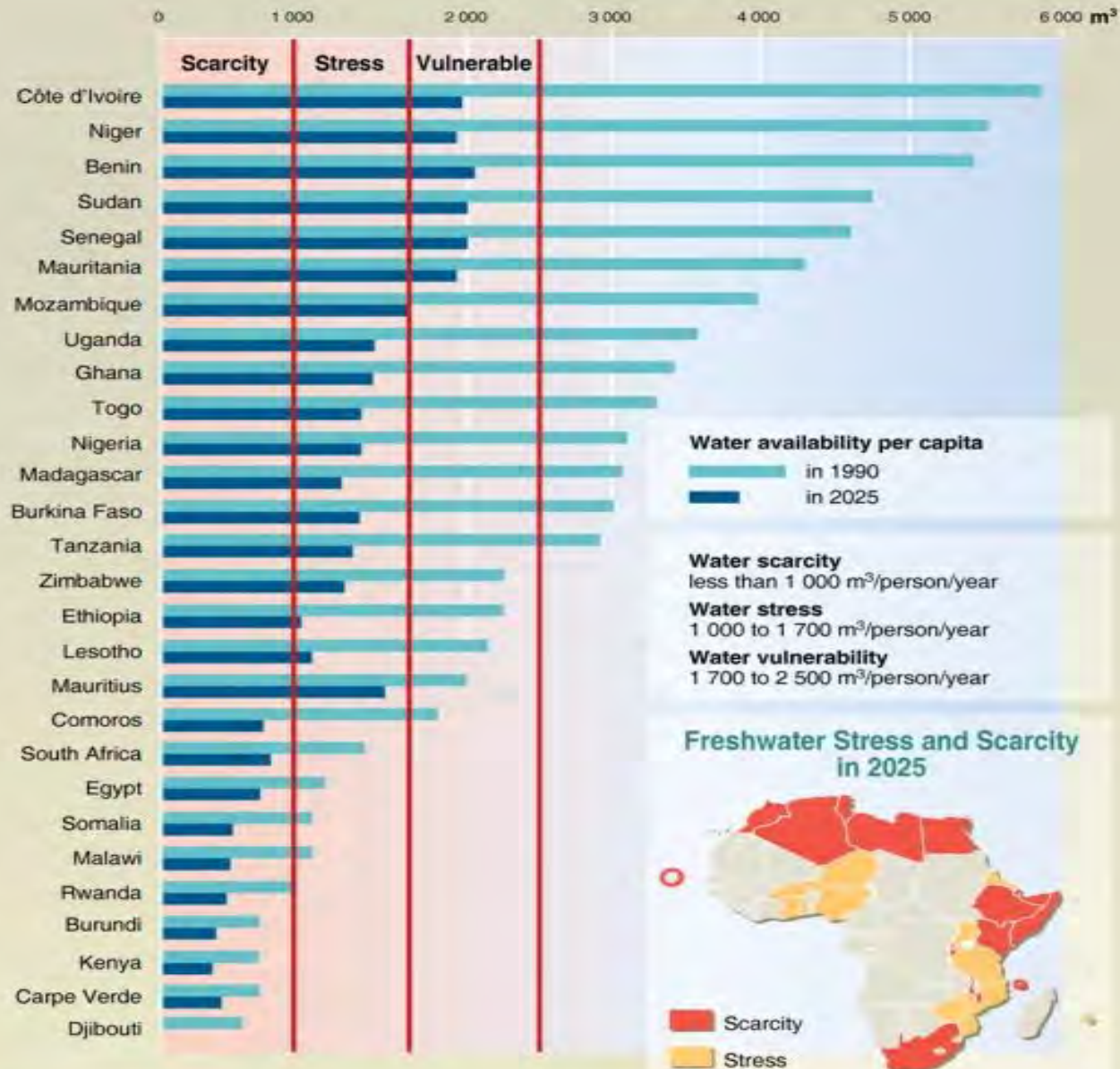
## Annual precipitation trends: 1900 to 2000



# Climate Change And Drought



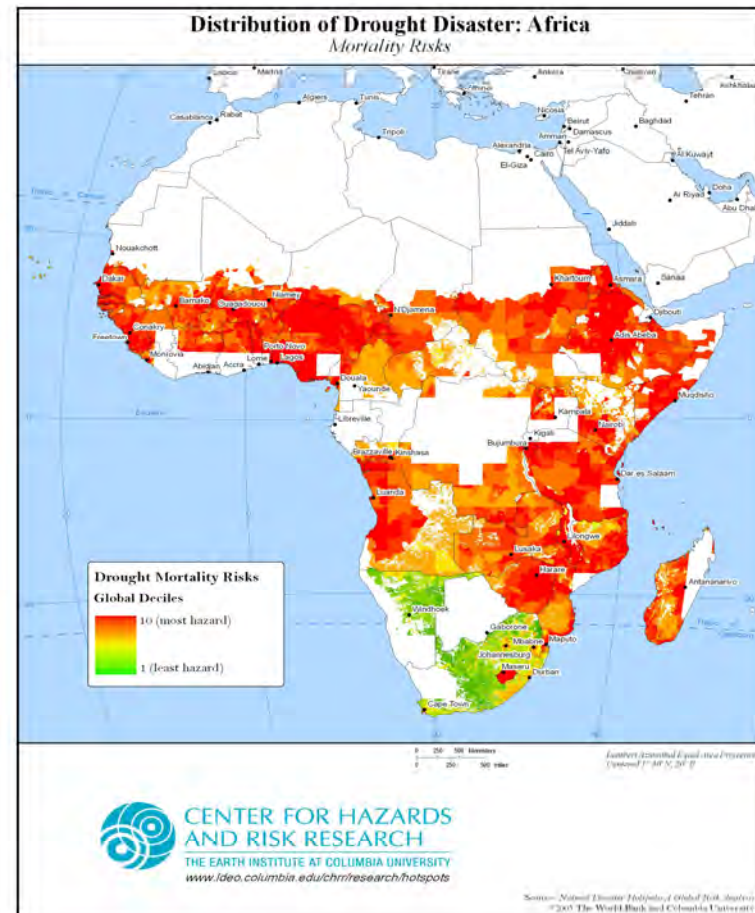
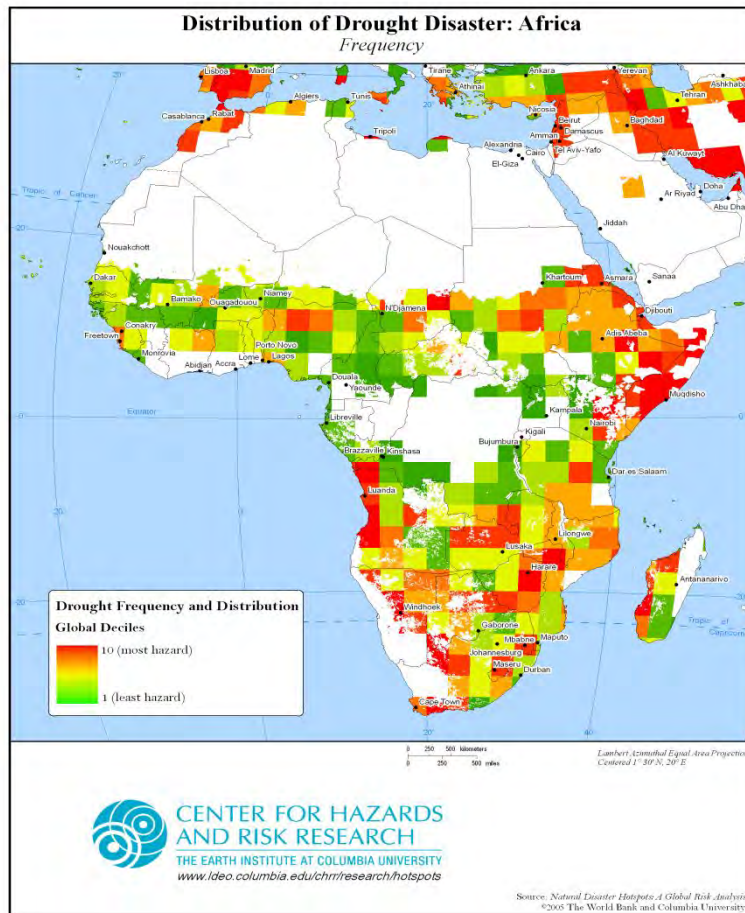
# Water Availability



# Vulnerability to Drought: Exposure + Sensitivity

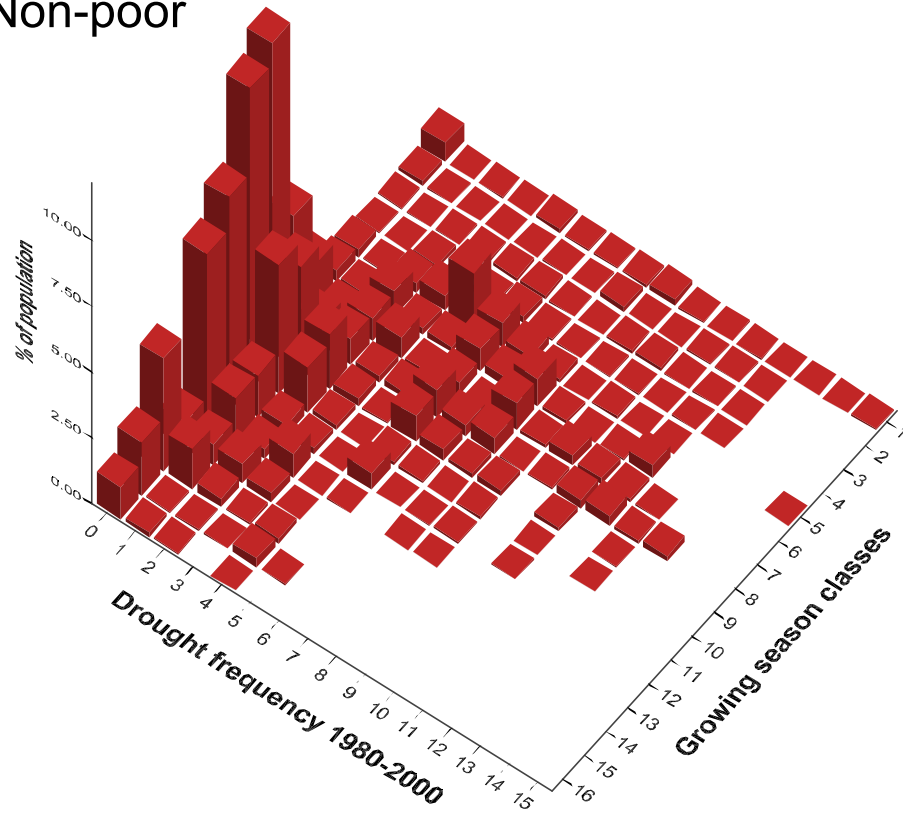
Frequency

Mortality

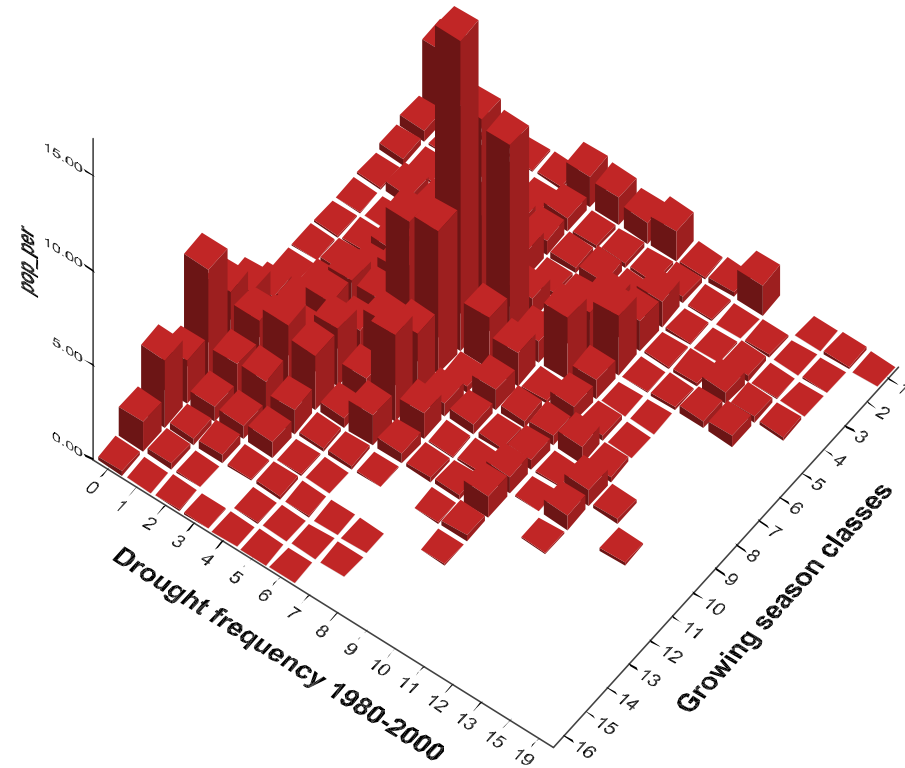


Compared with the non-poor, poor people are more likely to be found in drought-prone areas with shorter growing seasons

Non-poor

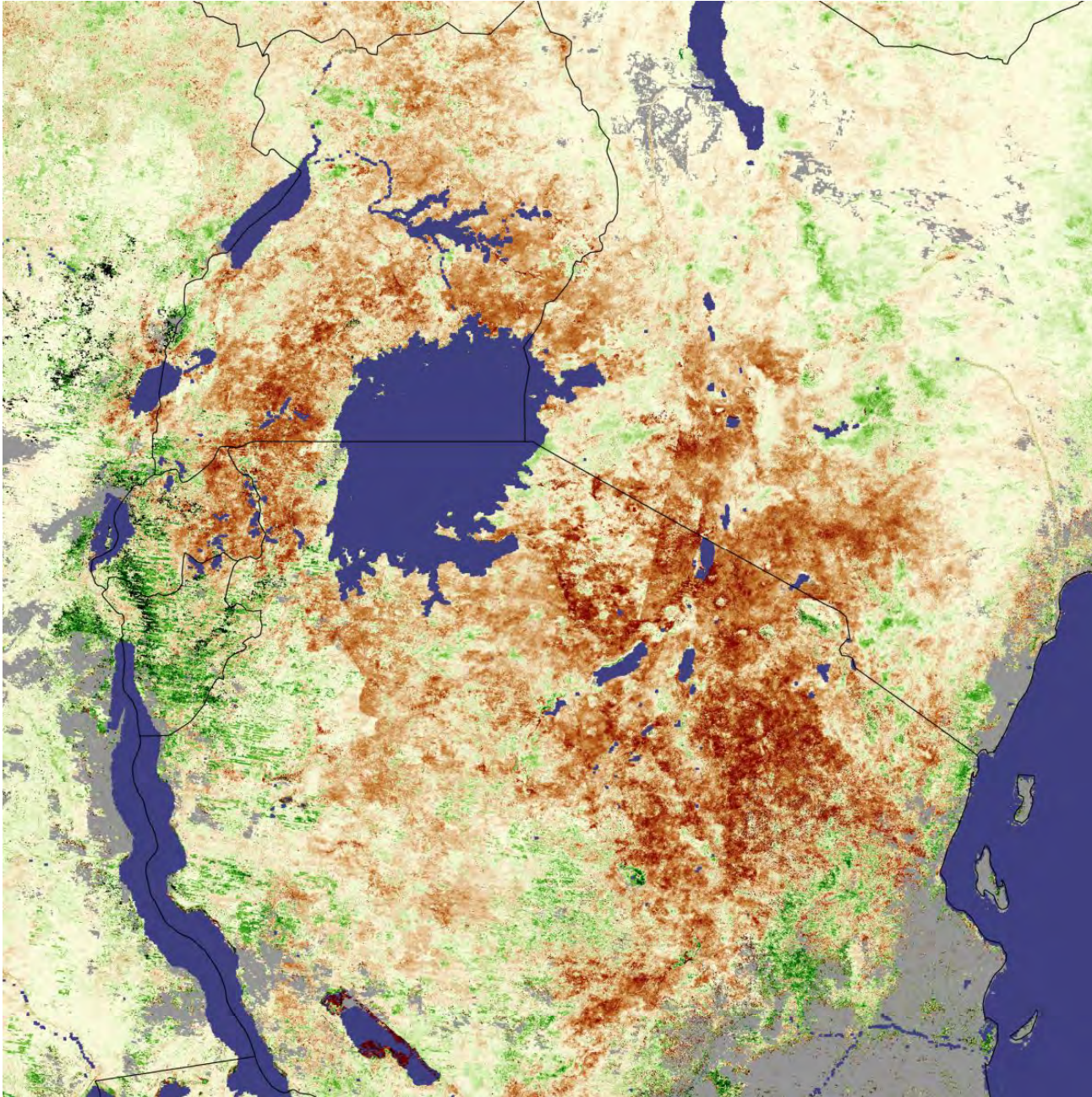


Poor









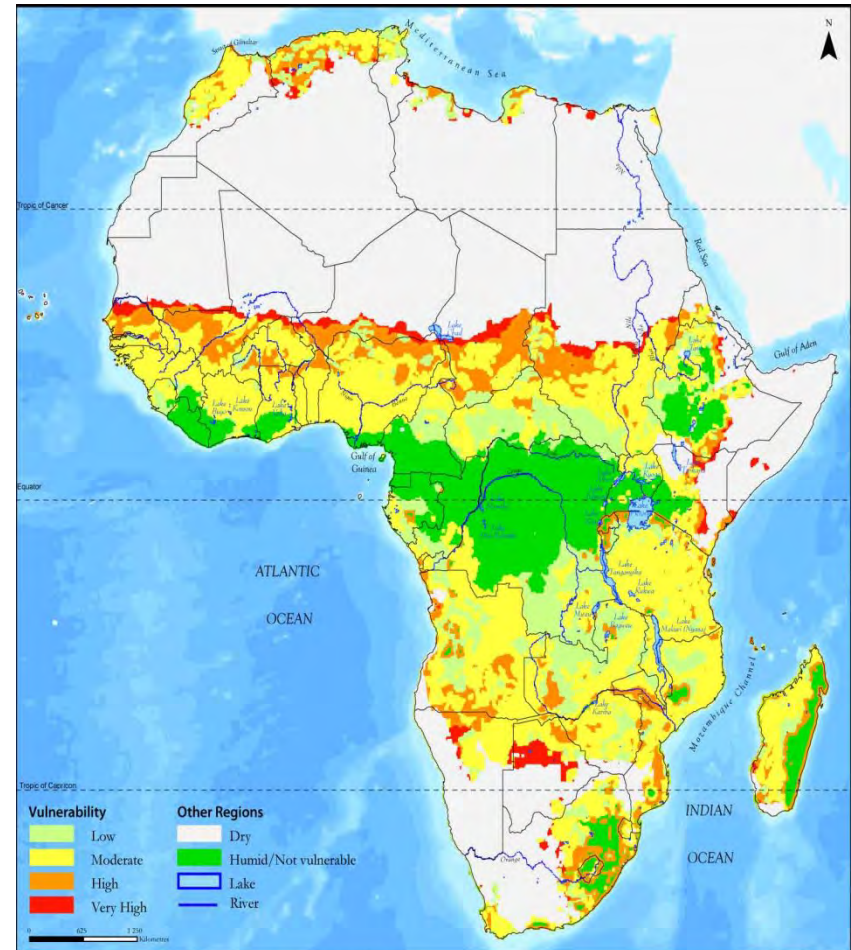


Lake Nakuru,  
Kenya

Some countries are experiencing drought  
and desertification.

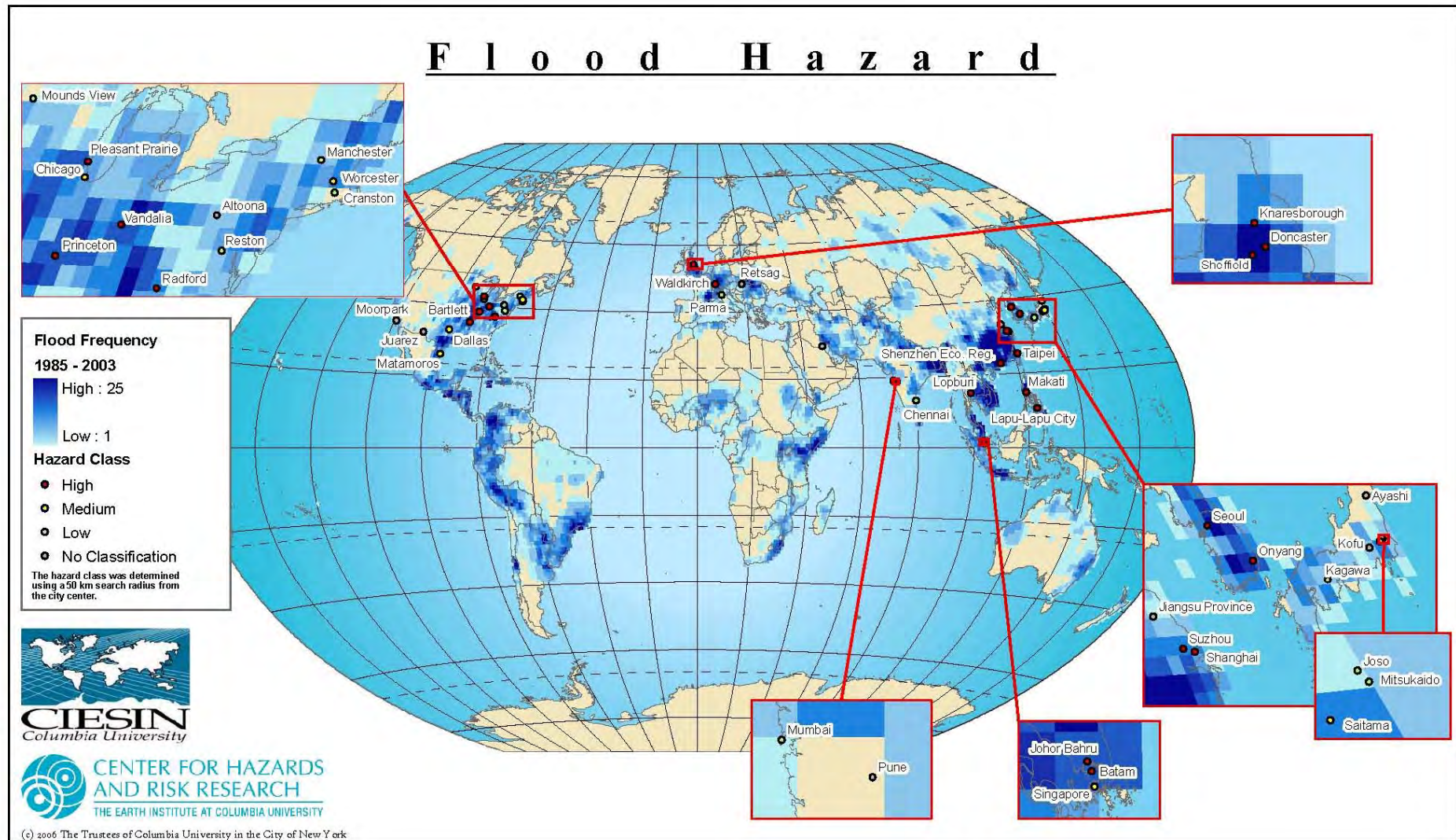


# Climate Change and Desertification



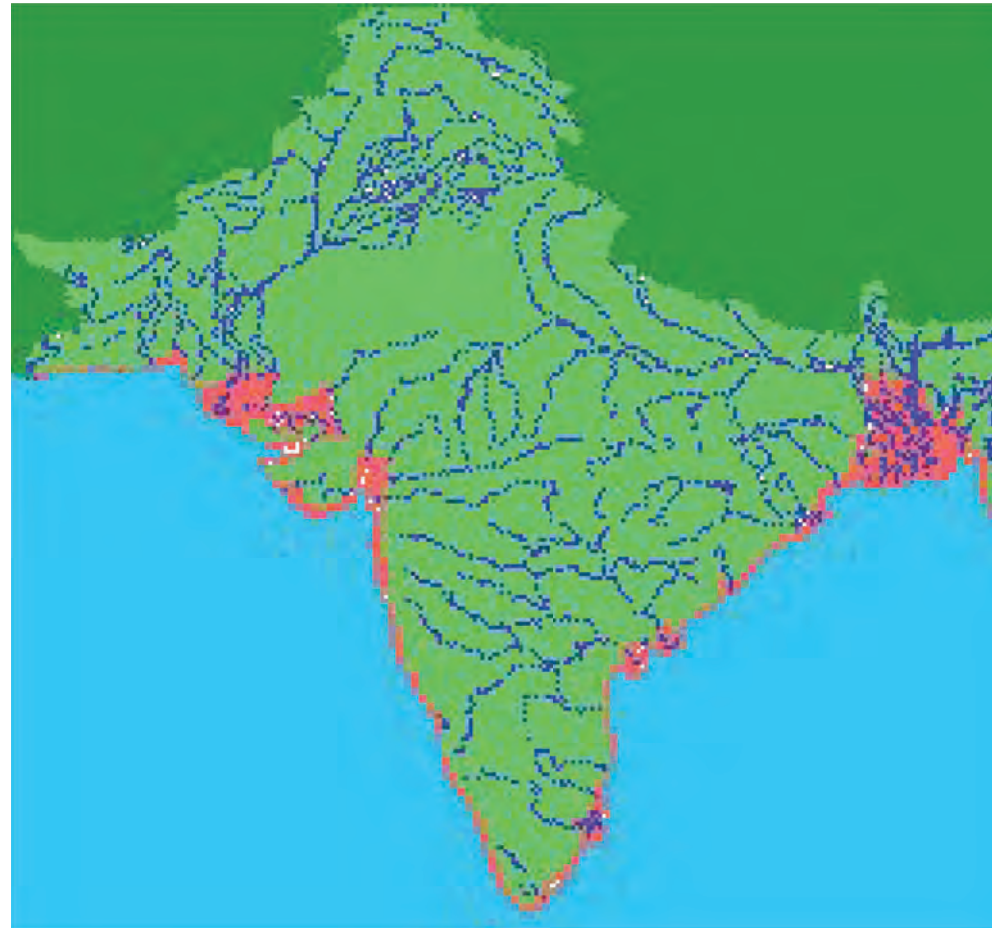
# Exposure to Current Climate

.. .

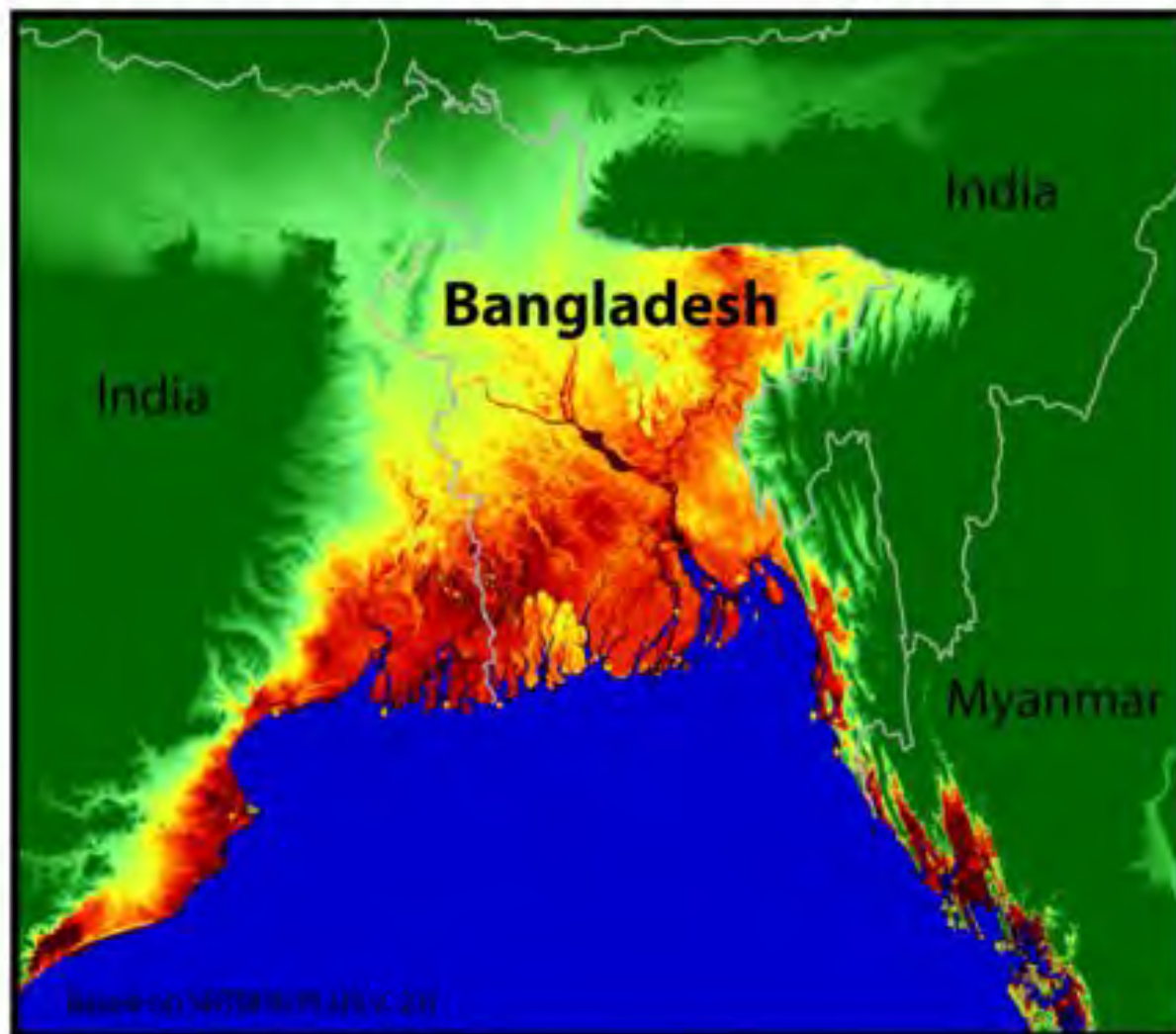


Source: Dilley, M., R.S Chen, U. Deichmann, A. Lerner-Lam and M. Arnold (2005), *Natural Disaster Hotspots: A Global Risk Analysis*, World Bank, Washington DC.

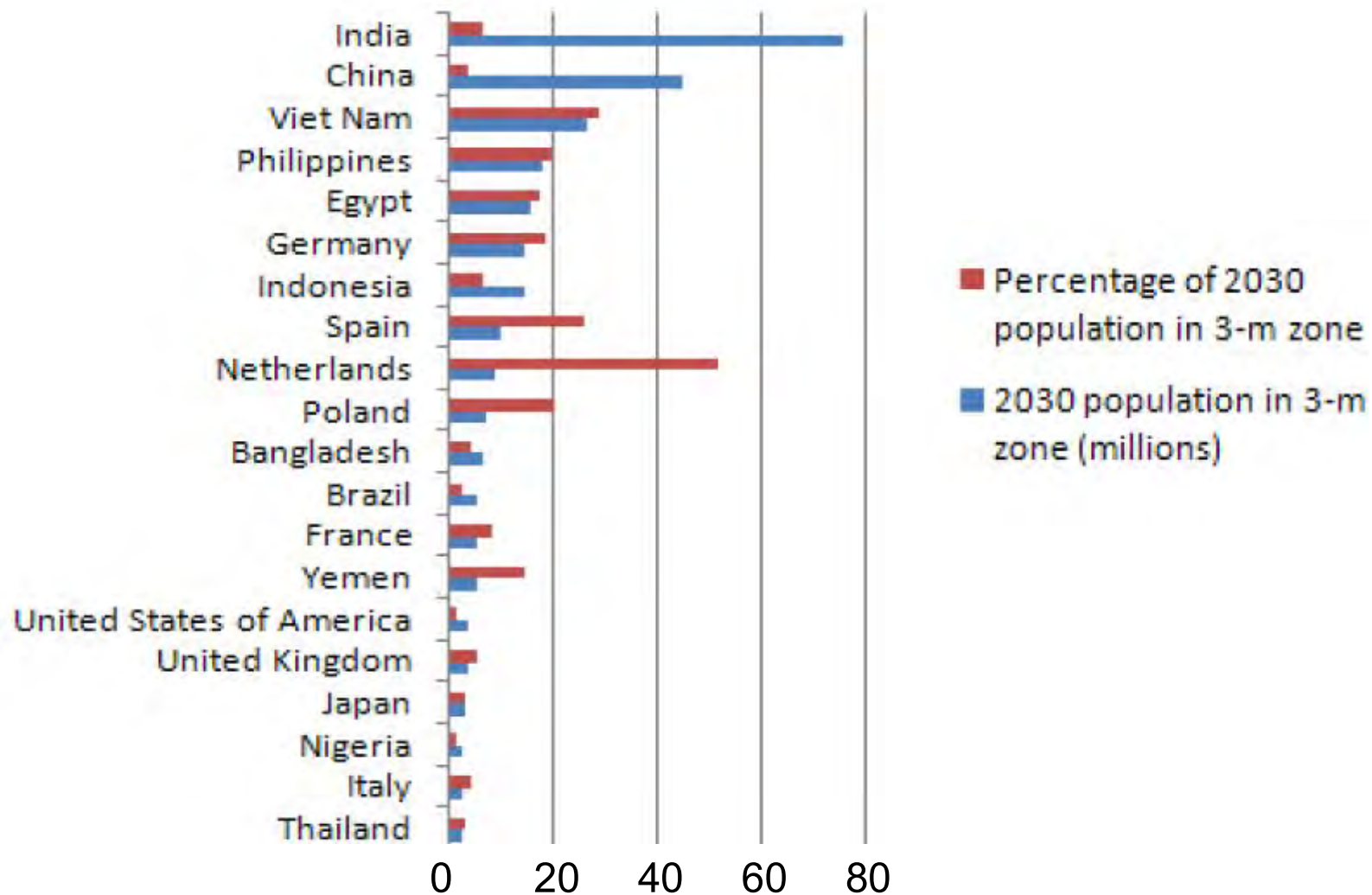
# Sea Level Rise



# Sea Level Risks - Bangladesh



# Population – Total and % in the 3m zone



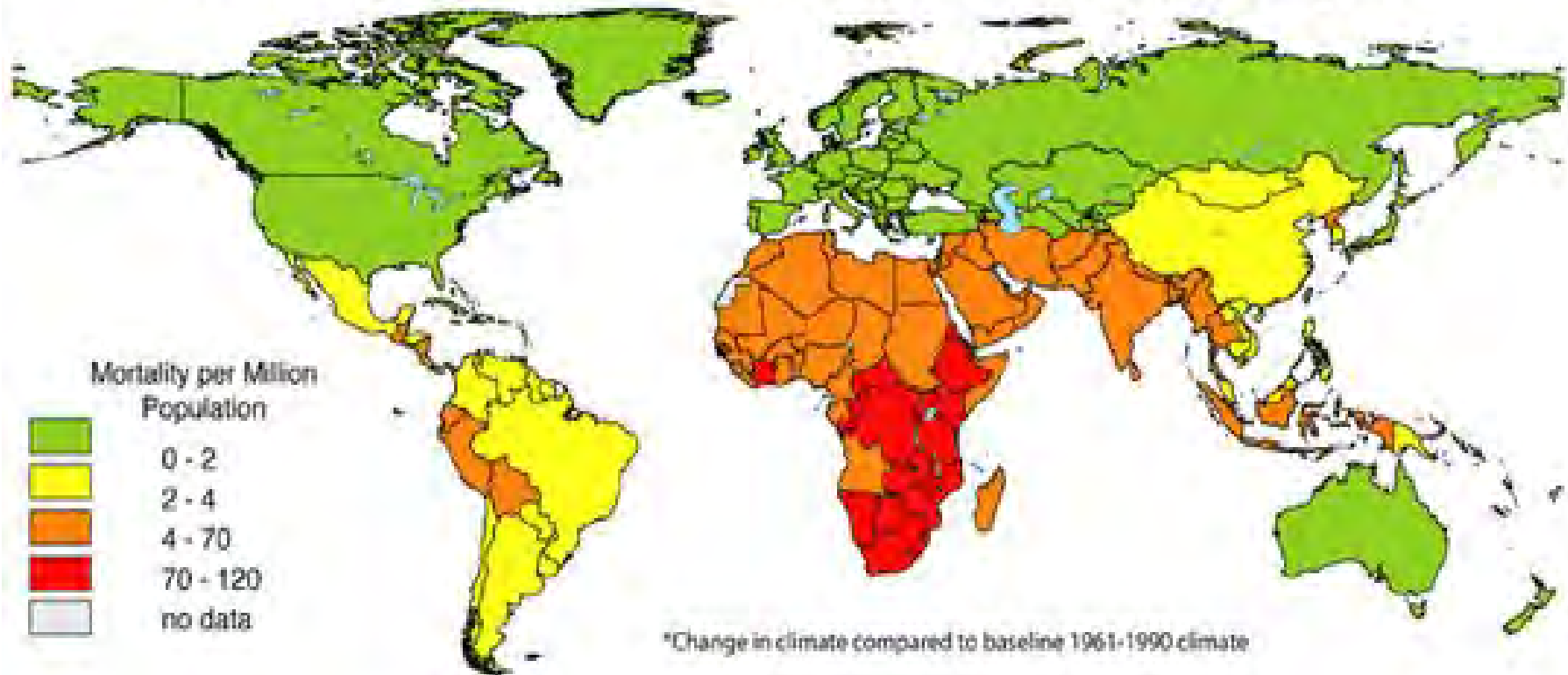


# Which country has the greatest share of its population living in the LECZ?

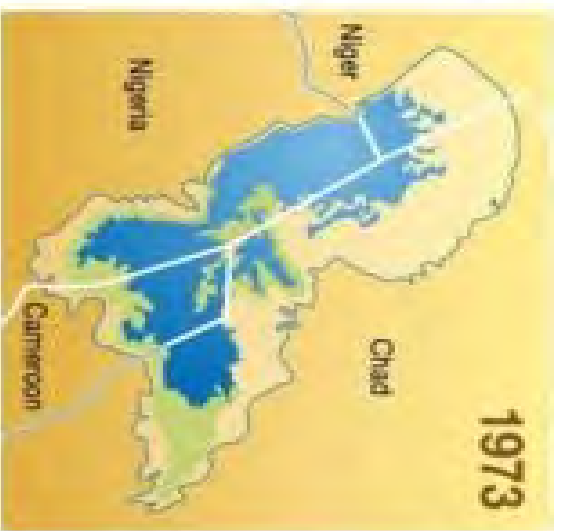
Countries ranked by share of their population in the LECZ				
	Country	Rank <sup>1</sup>	Population in LECZ	% of Pop in LECZ
1	Bahamas	172	266,580	88%
2	Suriname	168	317,683	76%
3	Netherlands	58	11,716,861	74%
4	Vietnam	13	43,050,593	55%
5	Guyana	155	415,456	55%
6	Bangladesh	8	62,524,048	46%
7	Belize	177	91,268	40%
8	Djibouti	158	248,394	39%
9	Gambia	148	510,159	39%
10	Egypt	16	25,655,481	38%



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



Human Health and –Climate Change,  
Climate change is already happening ,  
warming is small compared to what  
we will see in the next decades.

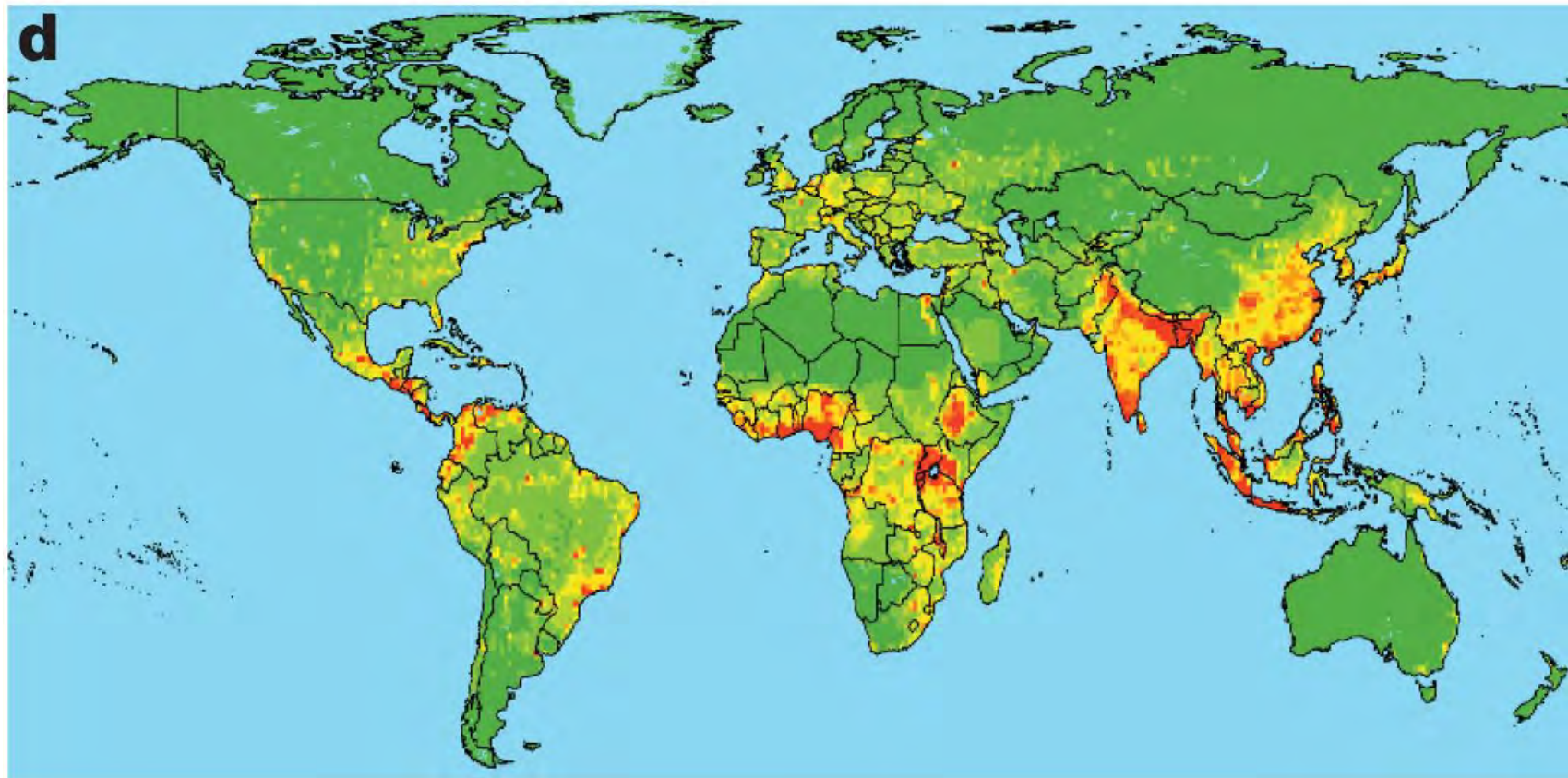


-  Water
-  Former shoreline
-  Vegetation

This collection of maps has been sourced from a series of satellite images provided by NASA's Goddard Space Flight Center.

<http://www.gfc.nasa.gov/gfc/earthvision/landuse/chad.htm>

# Relative risk of a vector-borne emerging infectious disease outbreak



Source: Jones *et al.* 2008. Global Trends in EIDs.  
*Nature*, 451(21 Feb)

# HEAT WAVE - EUROPE



**> 70,000**  
**deaths over**  
**11 days**

**Heat Index Summer 2003**

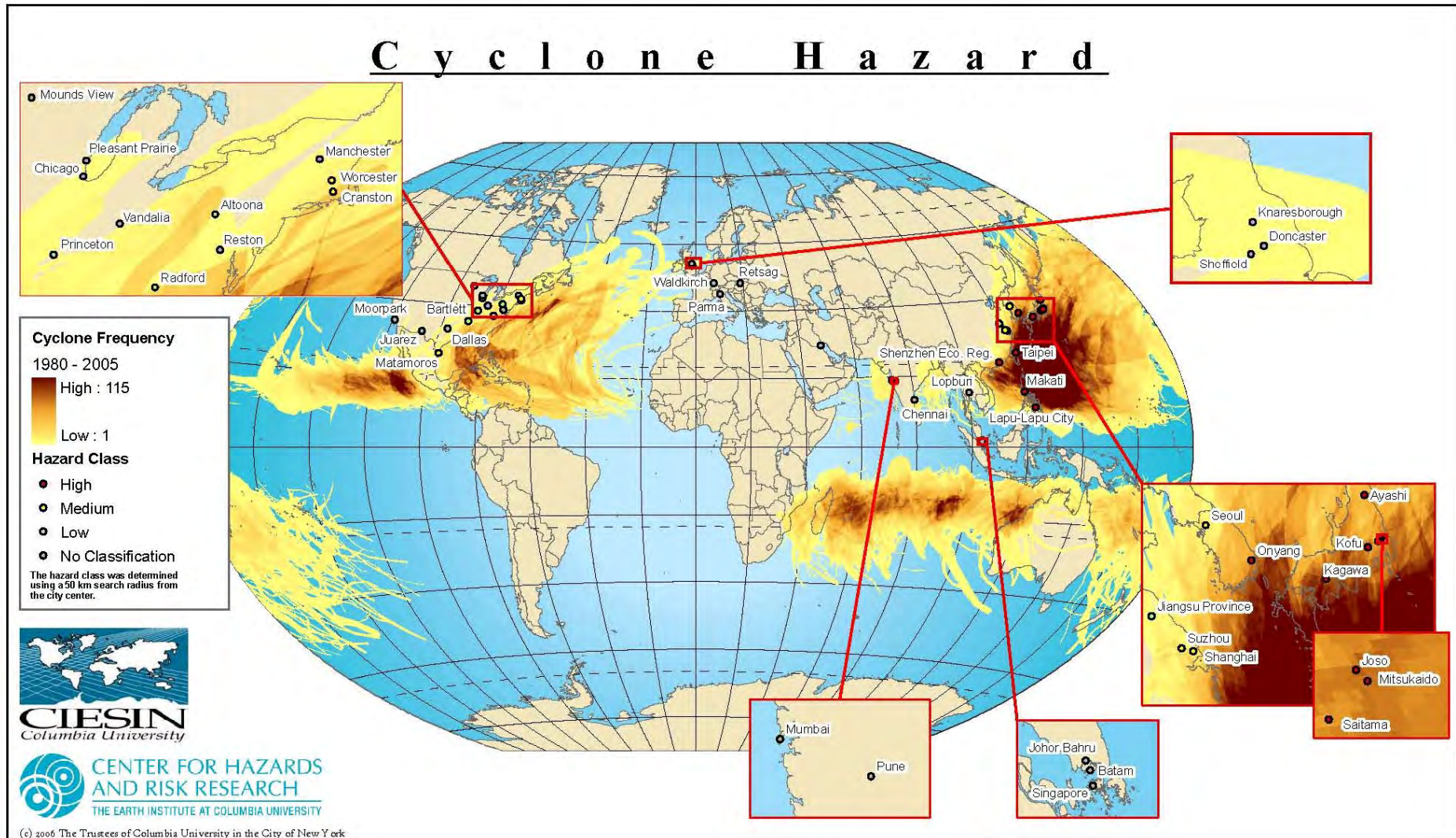
# Hurricane Katrina

August 29, 2005

Photo: NOAA



# Exposure to Current Climate



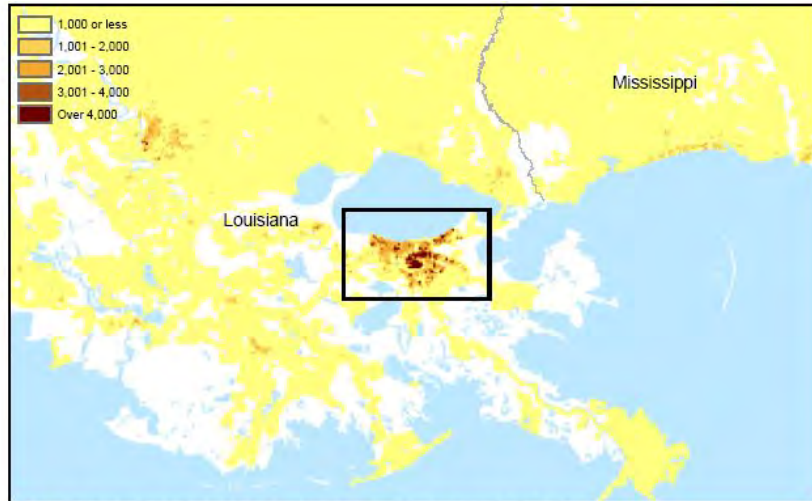
Source: Dilley, M., R.S Chen, U. Deichmann, A. Lerner-Lam and M. Arnold (2005), *Natural Disaster Hotspots: A Global Risk Analysis*, World Bank, Washington DC.



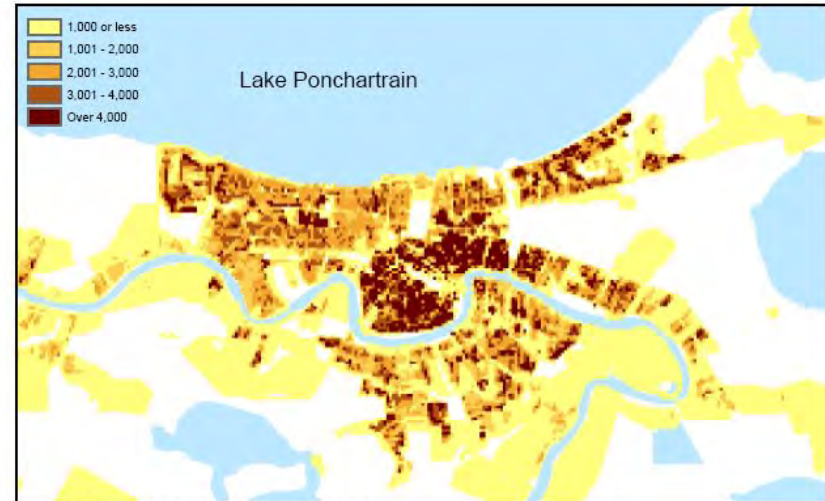


Source: Getty Images/Marko Georgiev

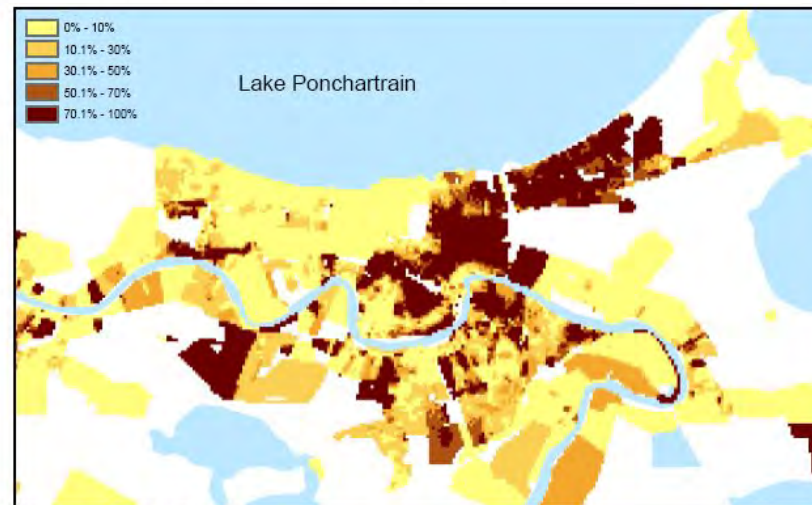
# New Orleans Demographics



Population density per square km with area of detail

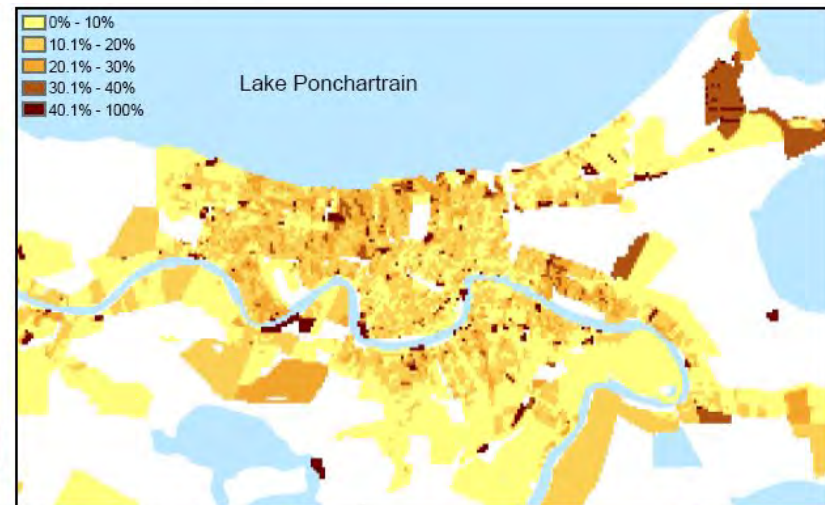


Population density per square km



Percentage of Blacks

0 5 10 20 Kilometers

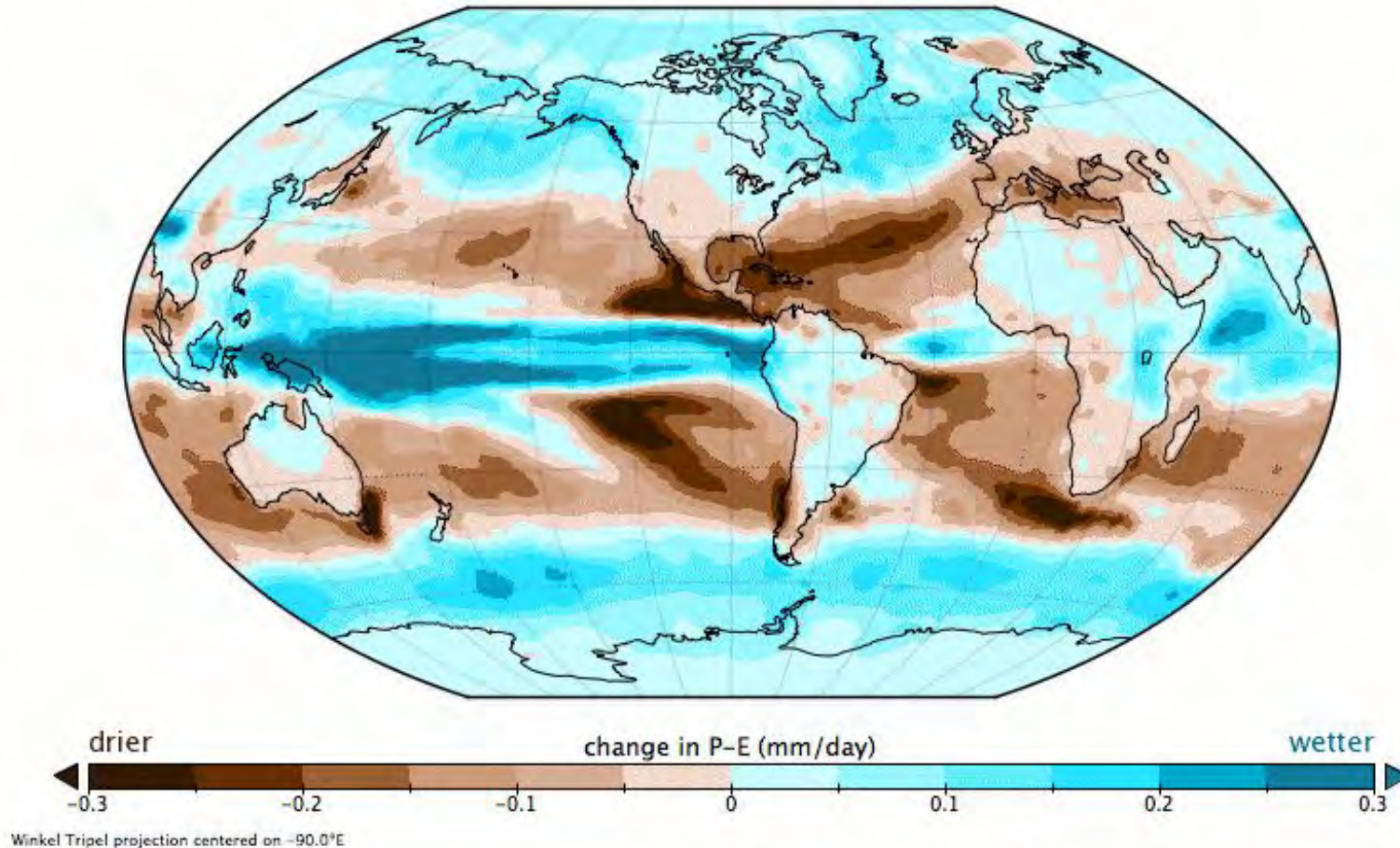


Percentage age 65 and older

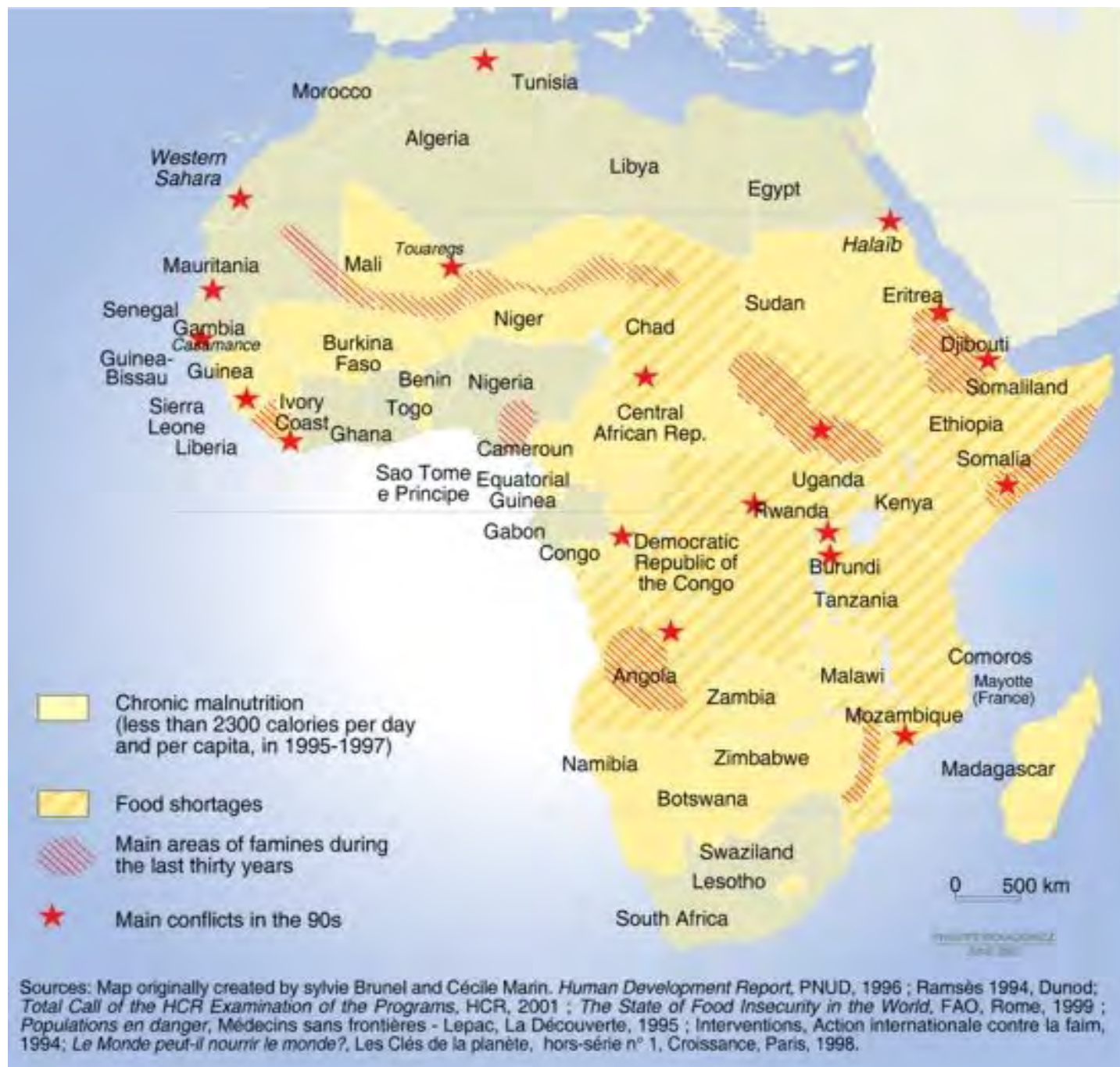


# Climate Change: Projections (2)

Change in P-E (2021-2040 minus 1950-2000)



- 1) wet areas getting wetter
- 2) dry areas getting drier
- 3) subtropical dry zones expanding poleward



Government's interests do not coincide with those harmed by the emission of greenhouse gases\*

In general, the U.S. Government represents the interest of **its citizens only**, not the interests of others!



Who represents these people ?

\*responsible for climate change

# If Climate Change Is An Ethical Issue, So What?

- People, nations, organizations have **obligations, duties, responsibilities**, not just interests.
- **Excuses** for not taking action are **not justifiable** such as:
  - is not in my national interest,
  - solution will not maximize global preference utility,
  - Solution will be costly

# What are the major ethical issues?

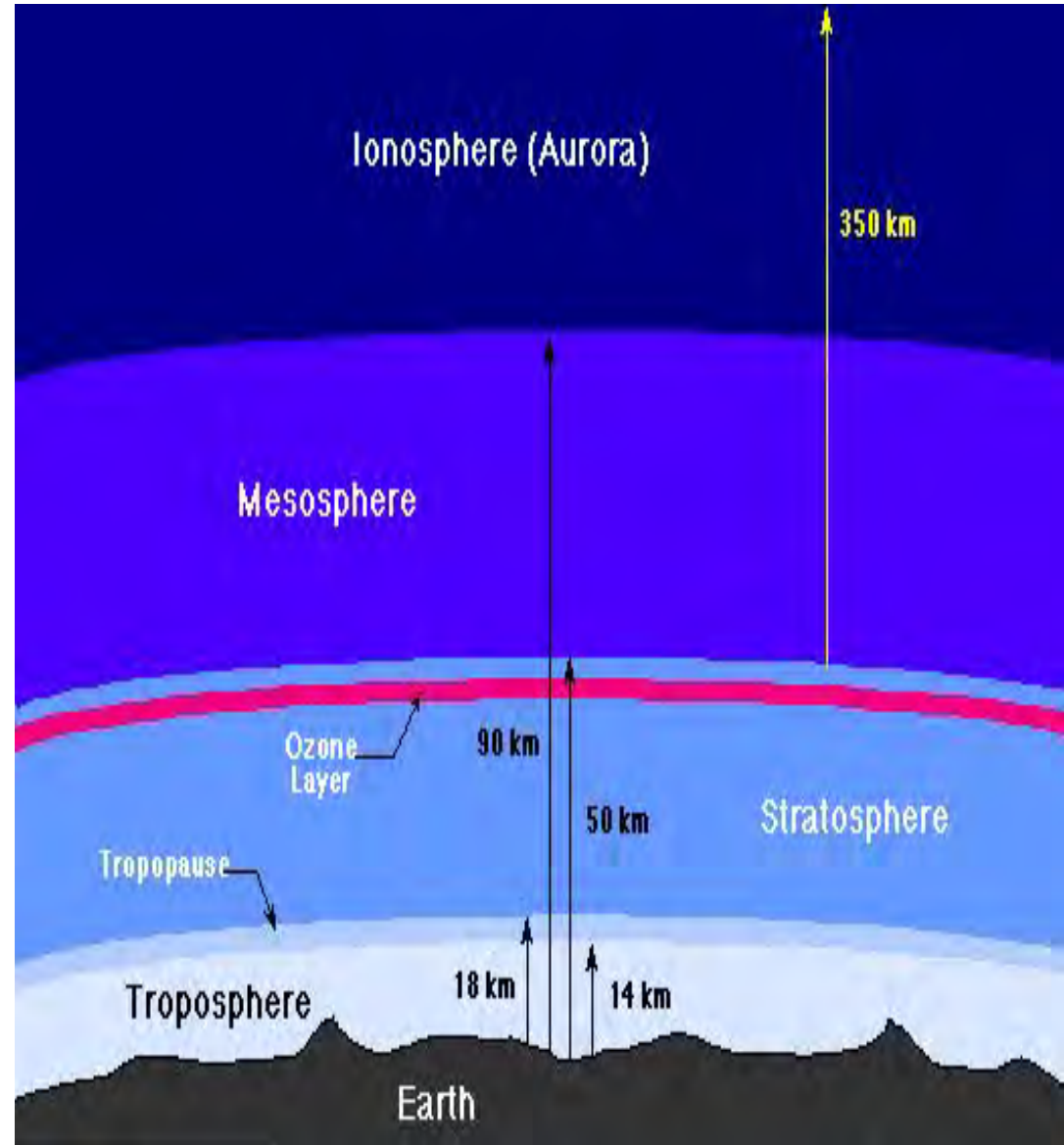
## Issues

- Greenhouse gas (GHG) atmospheric stabilization level
- Equitable allocation
- Who will pay for damages?
- Scientific uncertainty
- Cost to national economies
- Can nations wait until others reduce emissions
- Can nations wait for new cheaper technologies
- Fair processes and procedure
- Human rights violations
- Ethical Issues In trading
- Solutions
  - Biofuels
  - Carbon capture and storage
  - Nuclear

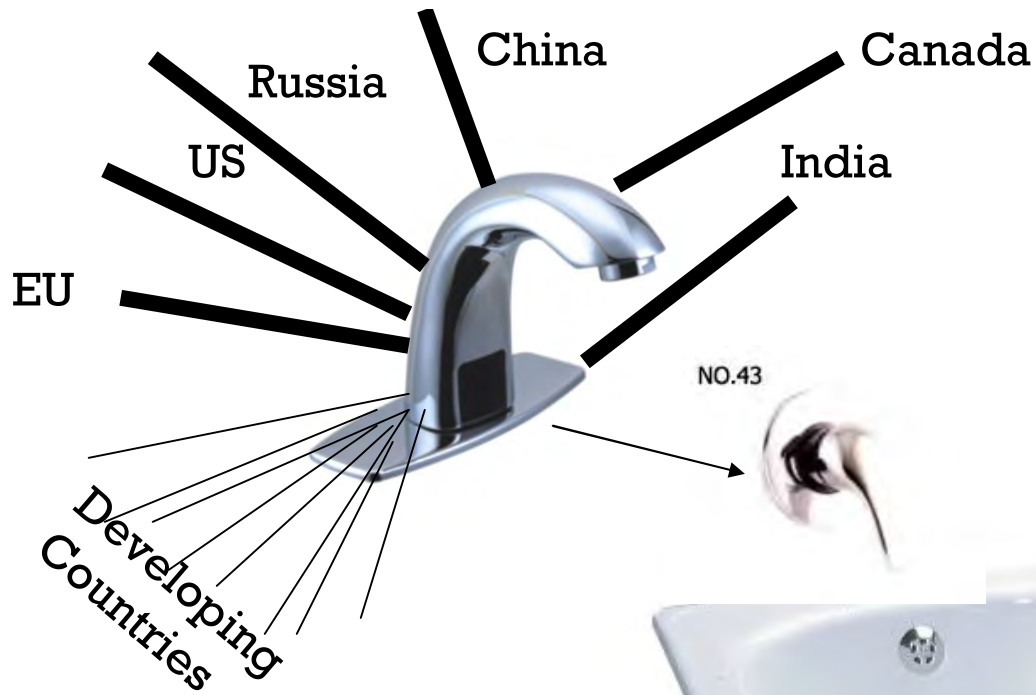


# Greenhouse Gas Stabilization Issue

- Will determine who lives or dies and what nations survive?
- Lots of uncertainty
- Need a global approach based upon national targets







Can't solve the climate change problem by slowing the rate of water down

A treaty is REQUIRED to control this!

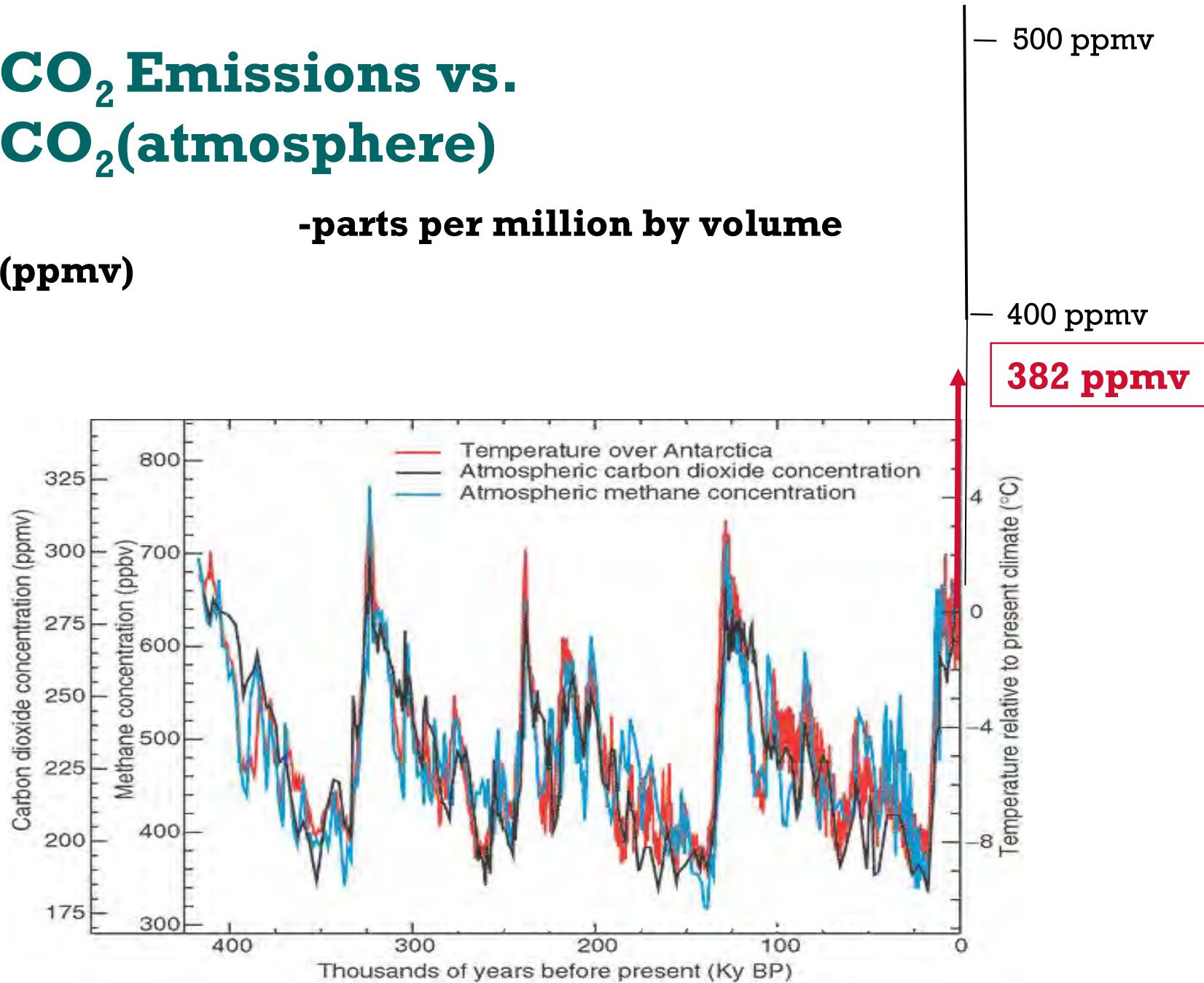
Bathtub will continue to overflow unless water is kept below this line

Atmosphere (like a bathtub) has a fixed volume

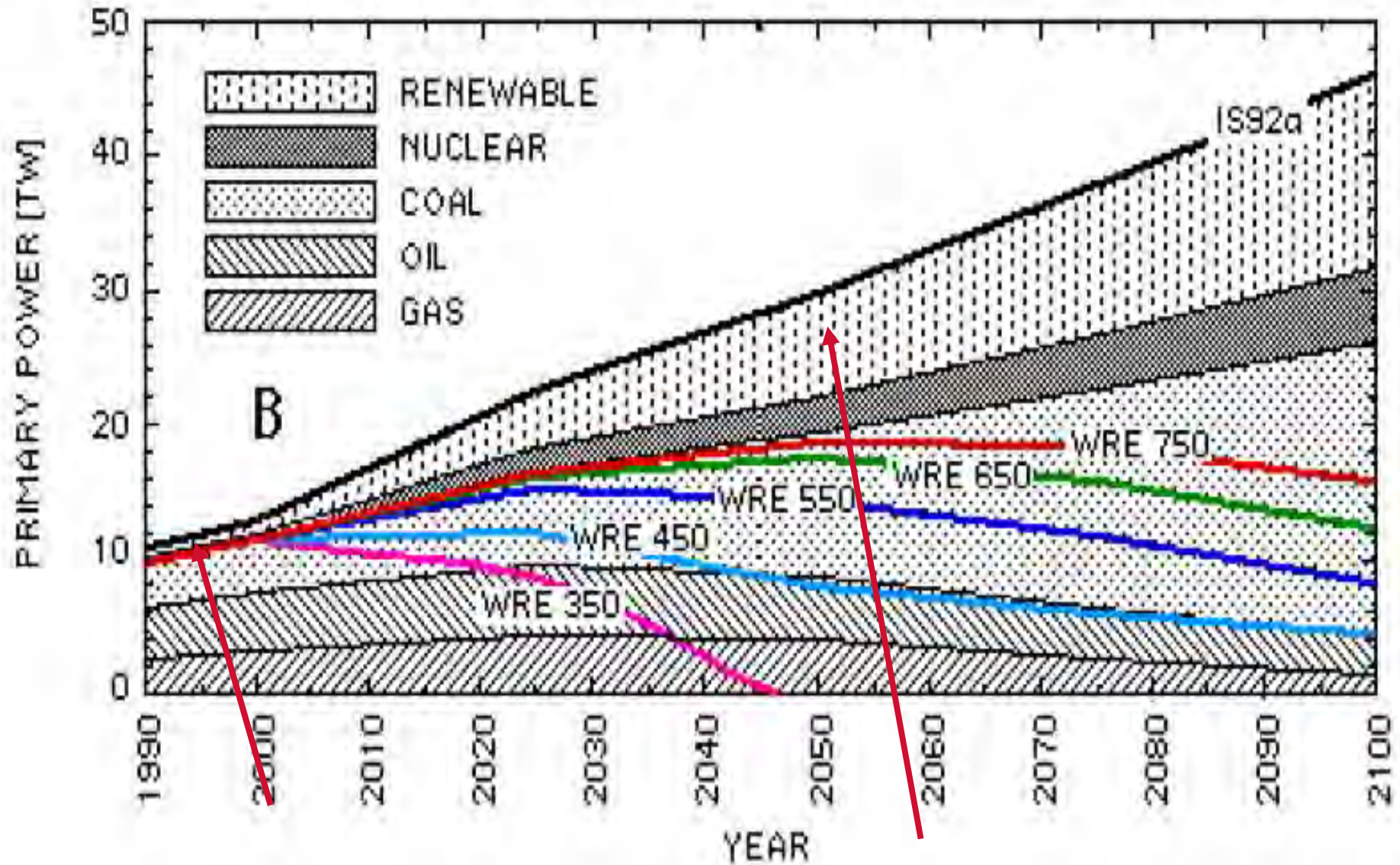


# CO<sub>2</sub> Emissions vs. CO<sub>2</sub>(atmosphere)

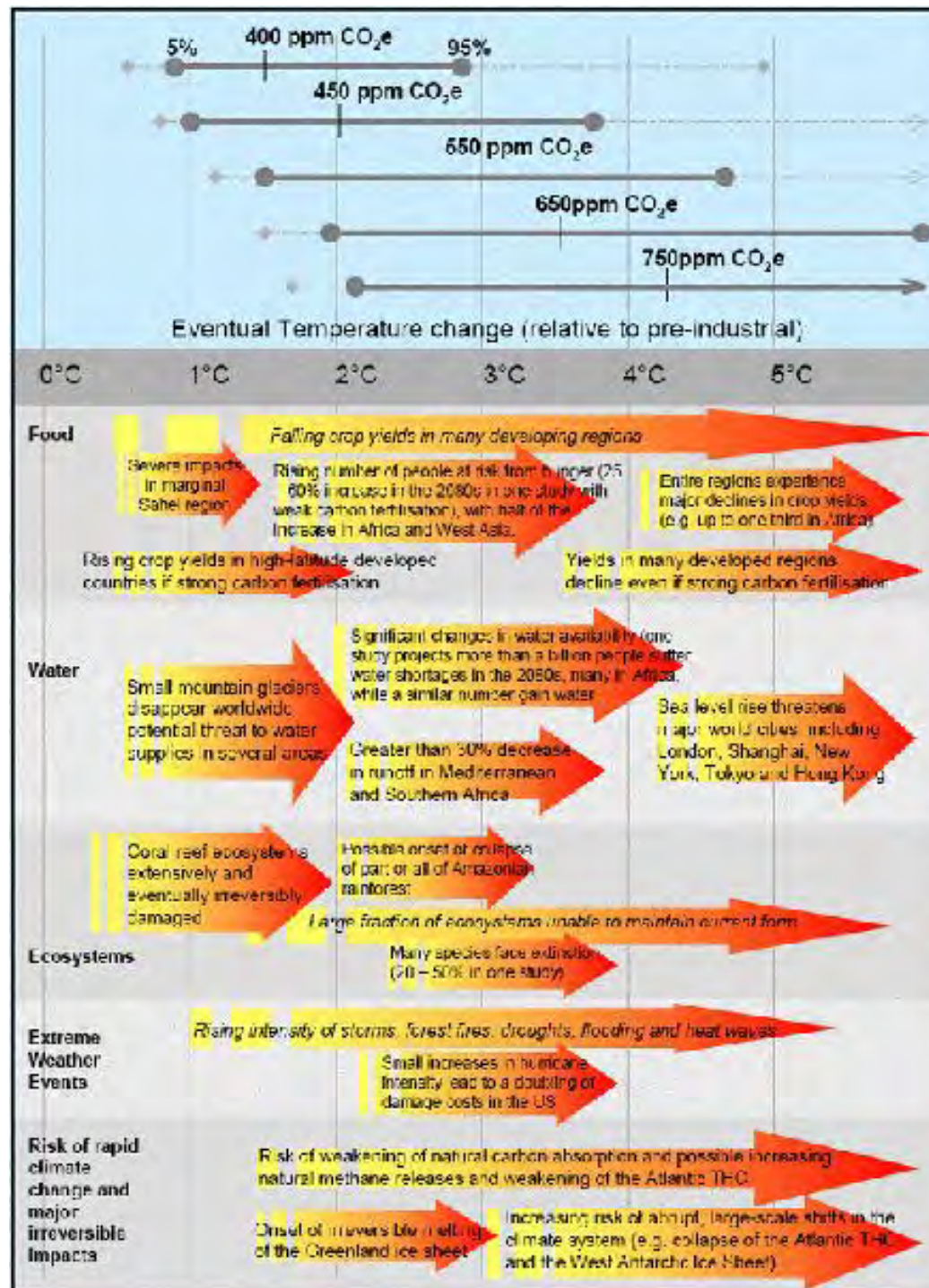
-parts per million by volume  
(ppmv)



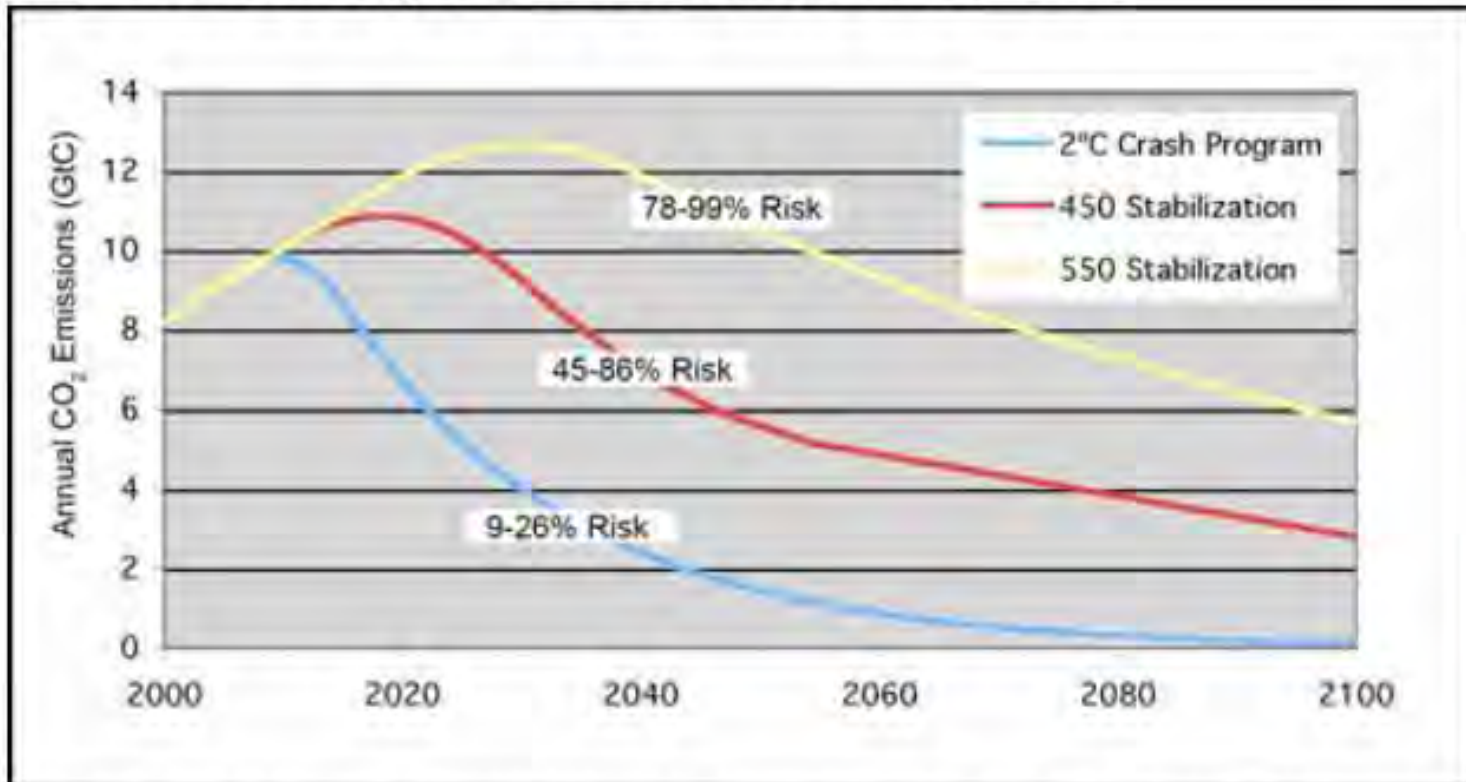
# Total Primary Power vs. Year



**1990: 12 TW 2050: 28 TW**

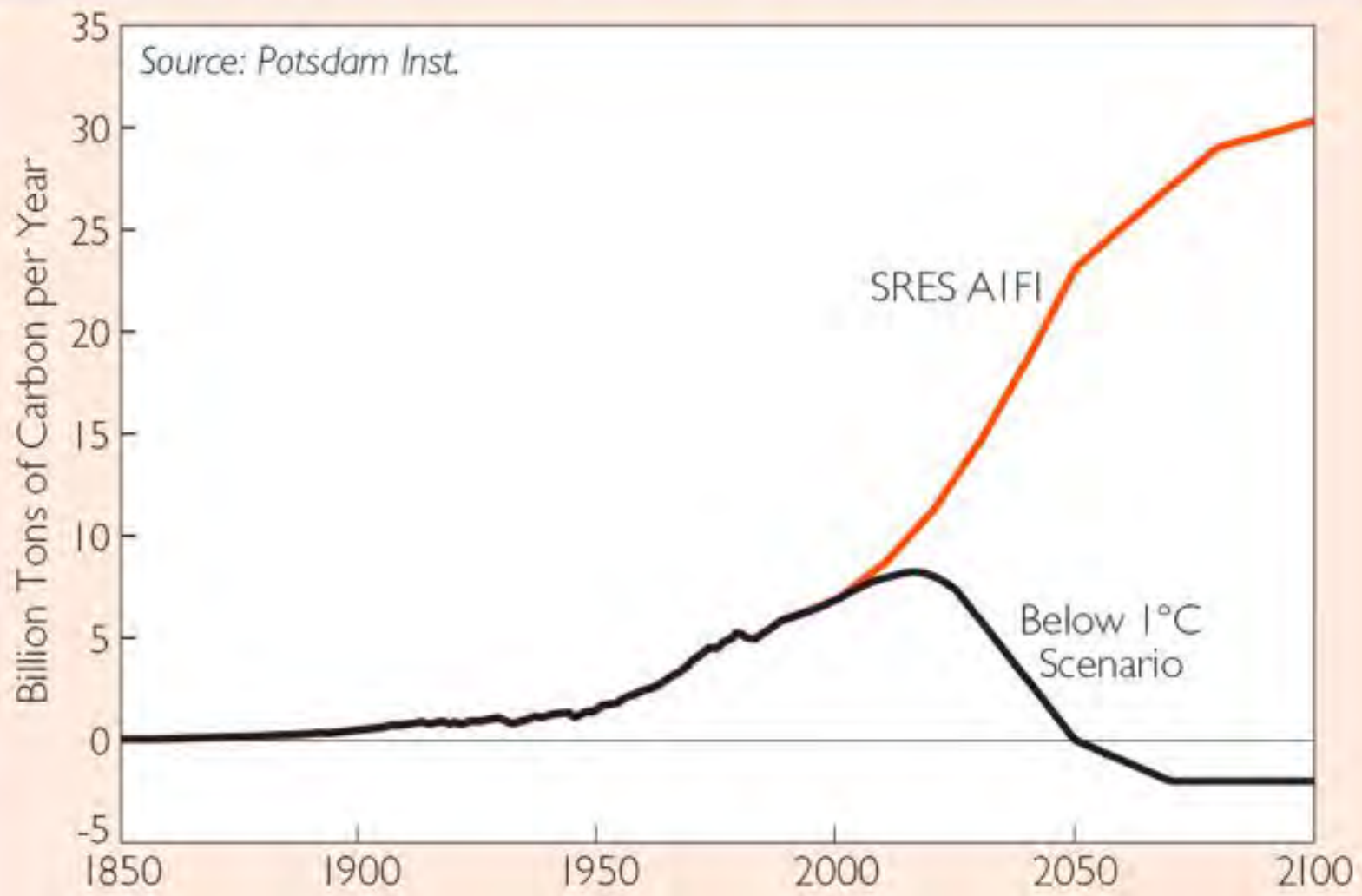


## The 2°C Crash Program, its Alternatives and its Odds

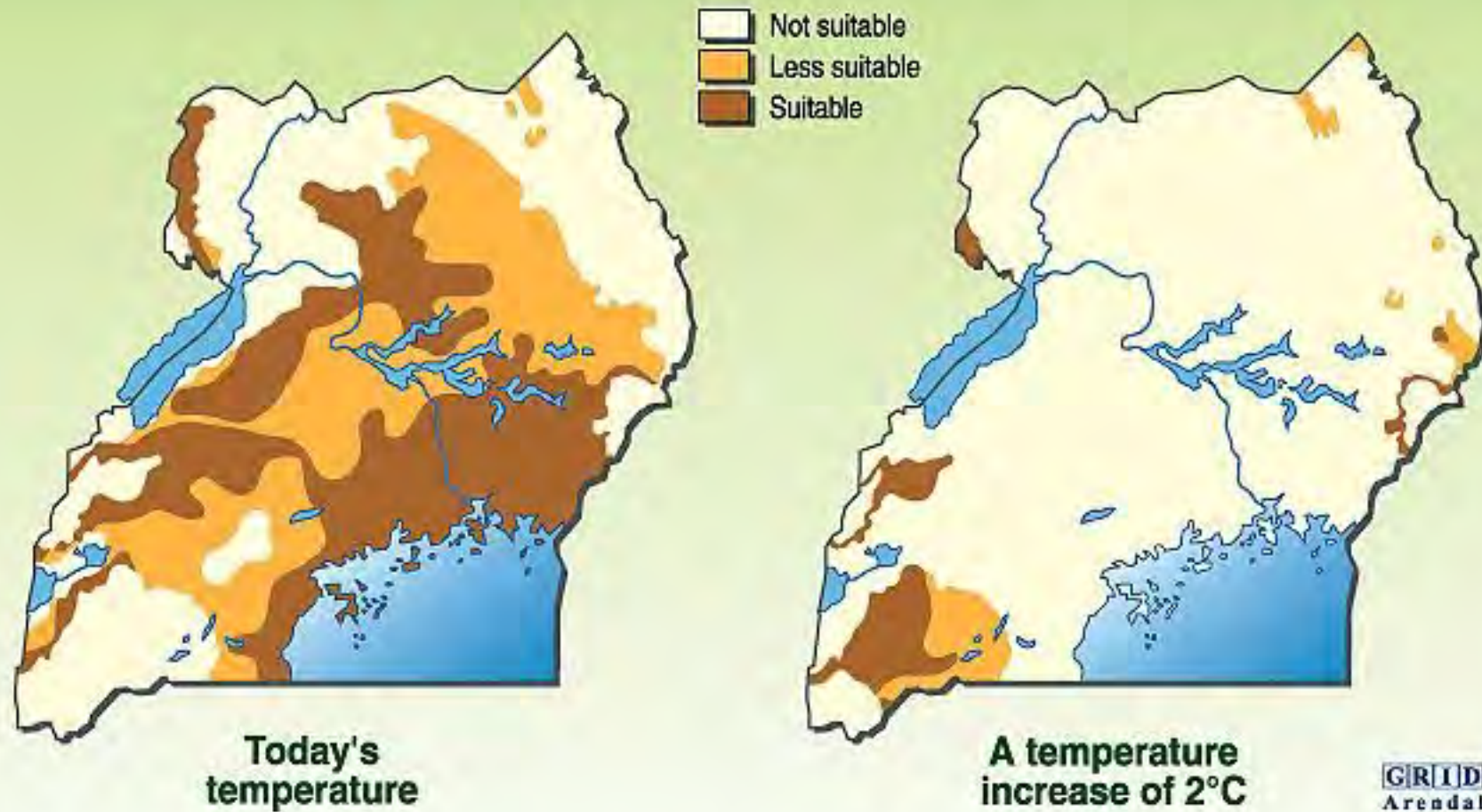


Emissions pathways for three scenarios – a “2°C Crash Program” and typical pathways for 450 ppm or 550 ppm CO<sub>2</sub> stabilization – along with the risk of exceeding the 2°C threshold (as calculated by Baer and Mastrandrea 2006).

**Figure 2-1. CO<sub>2</sub> Emissions from Fossil Fuels through 2100, IPCC SRES (High) Scenario and the Below 1 Degree Celsius Scenario**



## Impact of temperature rise on robusta coffee in Uganda



Source: Otto Simonett, Potential impacts of global warming, GRID-Geneva, case studies on climatic change, Geneva, 1989.

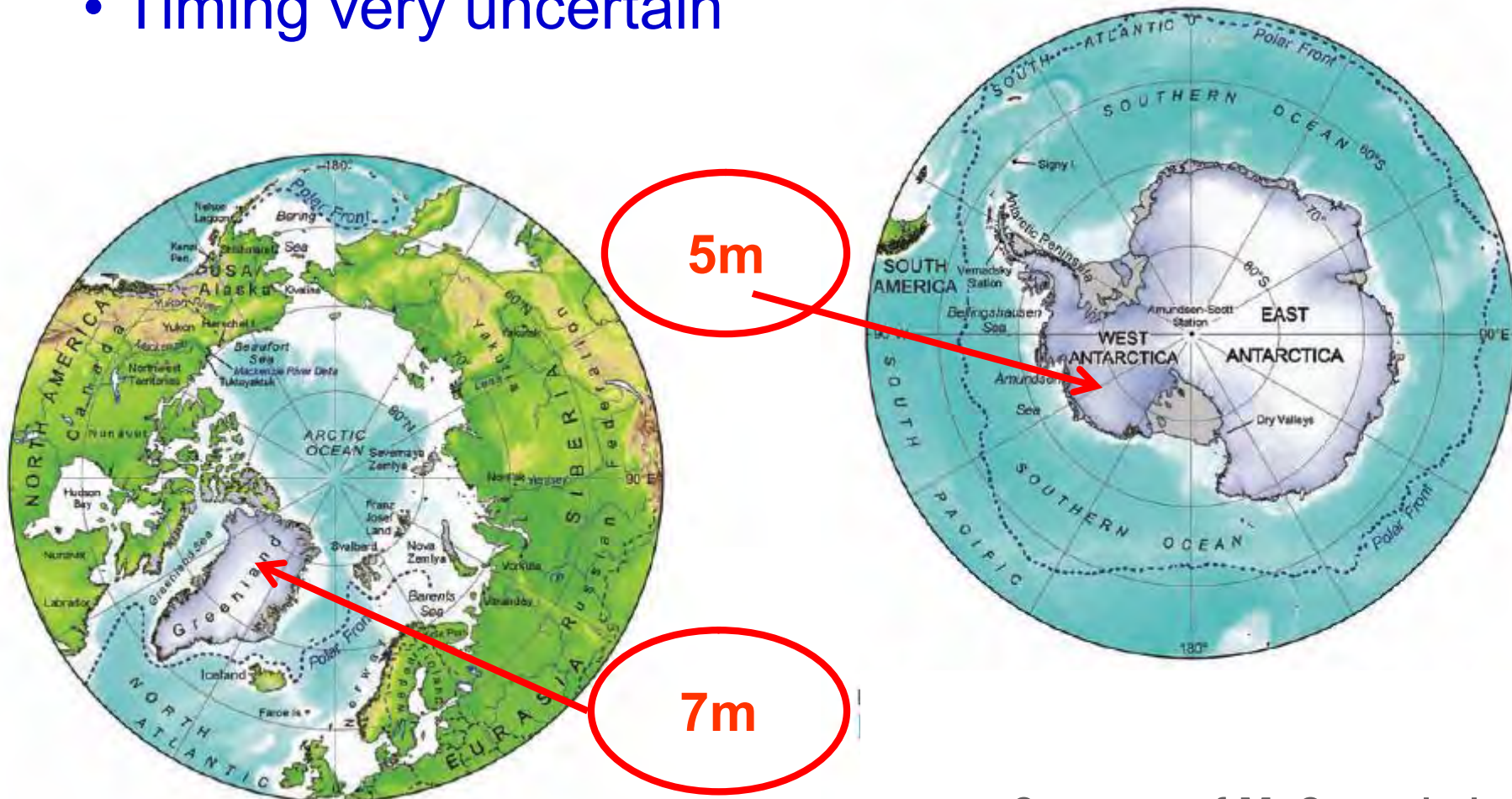
# Climate Change Consequences

- Spreading drought, floods, stronger hurricanes, coastal erosion, wetland loss, shift in fresh water availability (e.g. Atlanta's water supply threatened)
- Sea level rise will lead to forced migrations of millions in U.S. (e.g. Florida) & other countries
- The IPCC states: Climate change-related exposures are likely to affect the health status of millions of people, including:
  - Death/disease/injury from heat waves, floods, storms, fires & droughts
  - Cardio-respiratory diseases due to higher concentrations of ground level ozone related to climate change



# Ice Sheets and Sea Level Rise

- Potential for catastrophic sea level rise
- Destabilization threshold 1-4 °C
- Timing very uncertain



Courtesy of M. Oppenheimer

# Greenhouse Gas Emissions

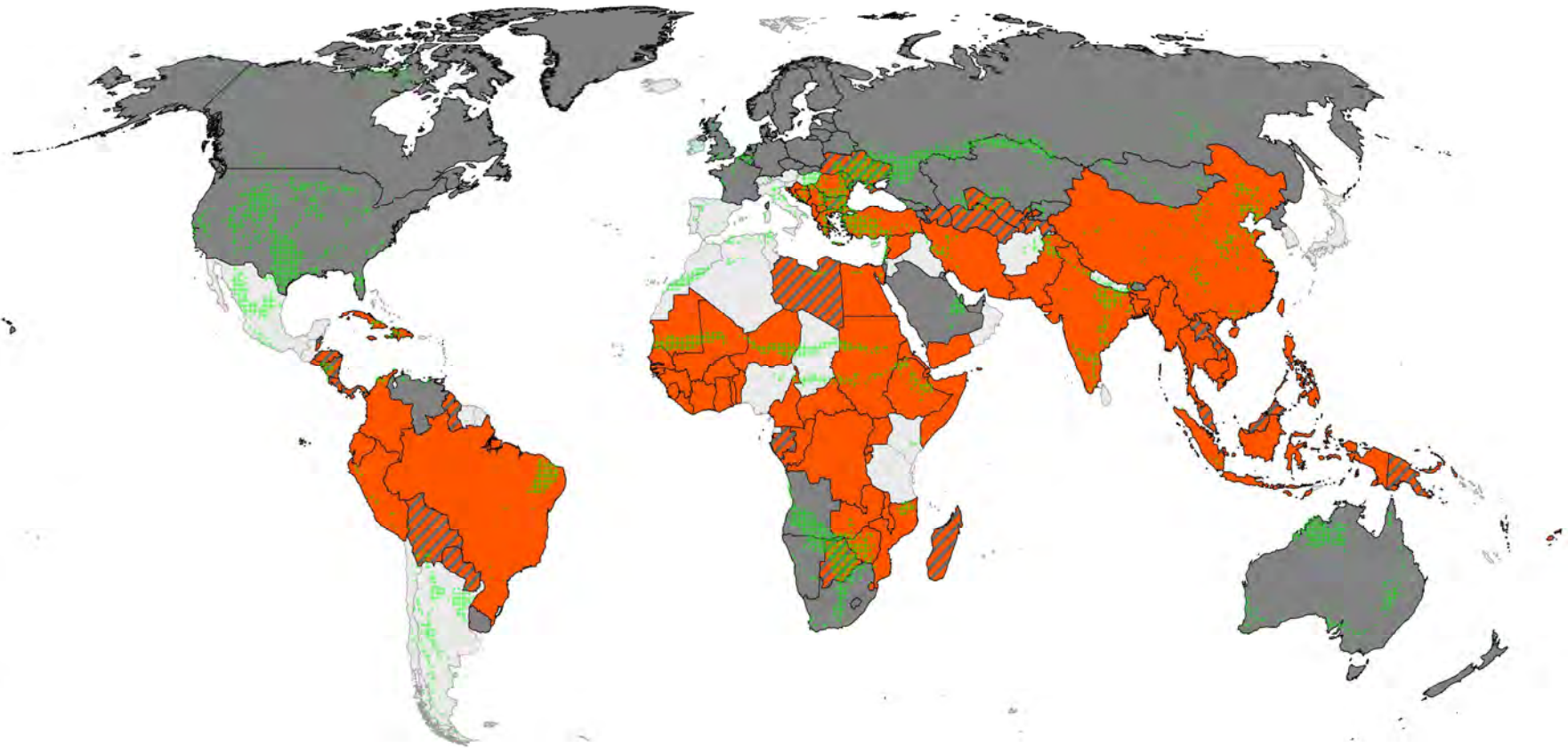
- An average American emits 20.4 tons of CO<sub>2</sub> per year
- For Industrial nations, it is 11 tons
- Worldwide, the average person emits 4 tons
- Our long-term target is 2 tons of CO<sub>2</sub> per year (just 10% of the current usage)

# Allocation question

- Who gets the 3 billion tons?
- Per capita
- Difference between survival tons and luxury tons



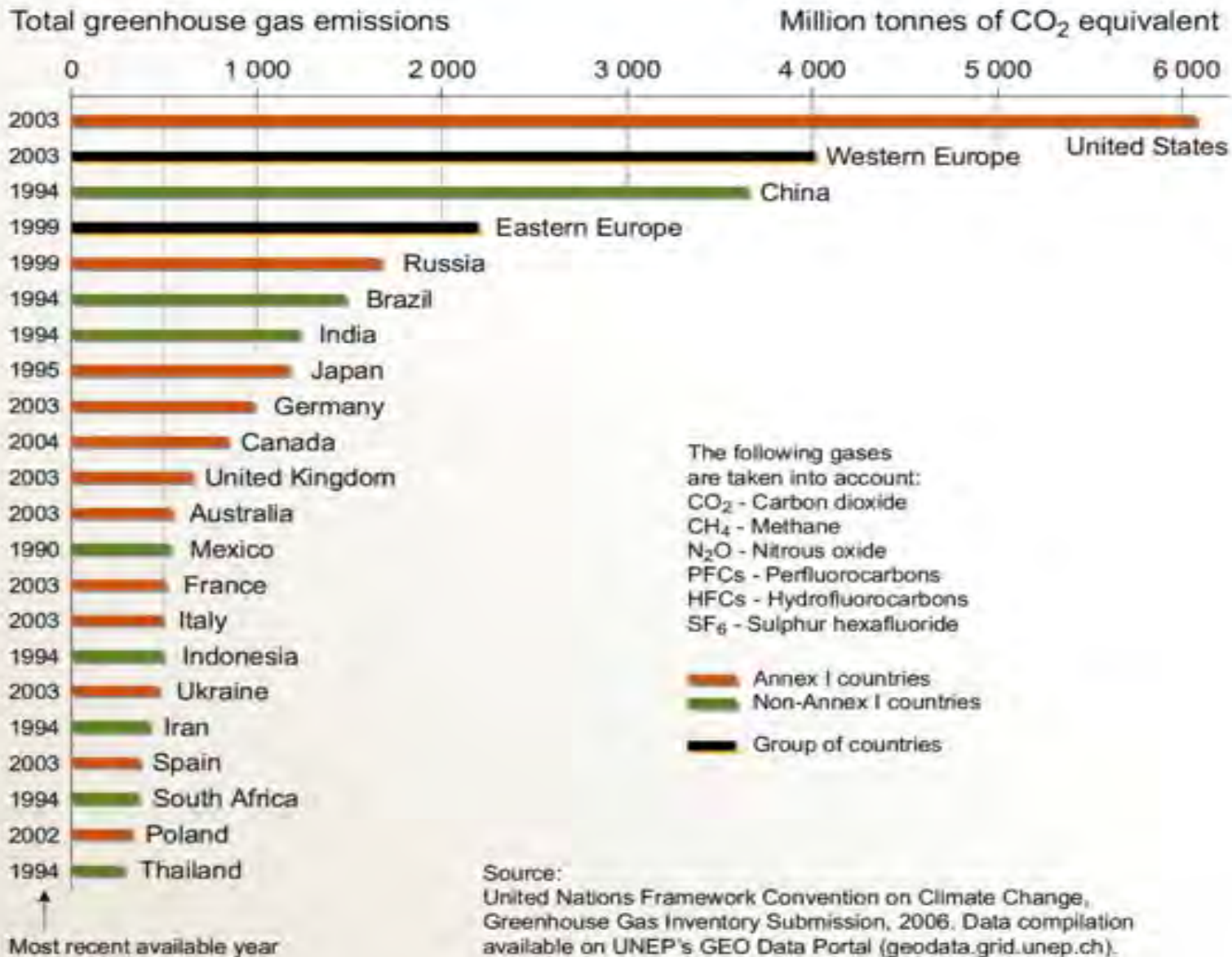
# The Moral Dilemma of Climate Change



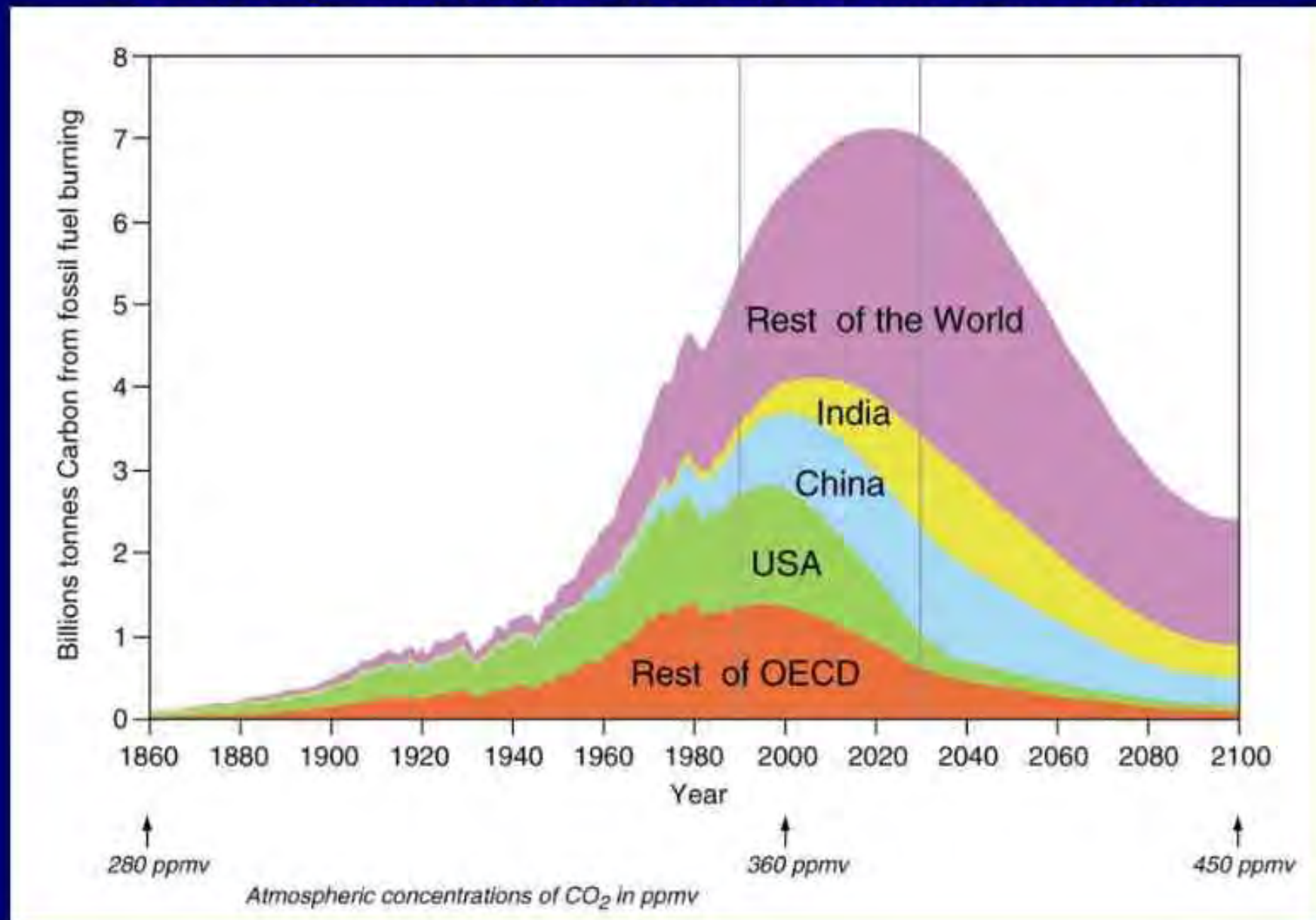
**Highest vulnerability towards climate change vs. largest CO<sub>2</sub> emissions (from fossil fuel combustion) and cement production, and including land use change, kg C per person and year from 1950 - 2003)**

- Largest per capita CO<sub>2</sub> emitters
- Highest social and / or agro-economic vulnerability
- ▨ Largest per capita CO<sub>2</sub> emitters, and highest social and / or agro-economic vulnerability
- Areas with highest ecological vulnerability

## Top 20 greenhouse gas emitters (including land use change and forestry)



# Carbon dioxide contraction for 450 ppmv and convergence by 2030 to globally equal per capita emissions rights



# UNITED STATES OF CLIMATE CHANGE

Greenhouse gas emissions from energy, national equivalents



Map is based on data calculated from US Department of Energy. Emissions are an average of the period from 2001 to 2003 and include energy use only and exclude carbon sinks. Emissions are considered "equivalent" if they are within 10 percent. In 2003, more than 3 billion people lived in the countries and continents named on this map; the US population was 291 million.

# Issue 3-Who will pay for damages?

- Polluter pays principle?
- Historical emissions?
- Questions of proof?





# Issue 4-Scientific Uncertainty

- Does the fact that there may be some uncertainty about climate change impacts raise ethical issues?
- Two ethical questions are raised:
  - Who should have the burden of proof?
  - And what quantity of proof should satisfy that burden of proof

# Cost As Justification for Non-action?

- Cost to one country alone ?
- Cost-benefit analysis?
  - Disaggregation of harms and benefits
  - Discounting future benefits
  - Everything is a commodity-nothing sacred
  - Health is more than income
  - Victims rights

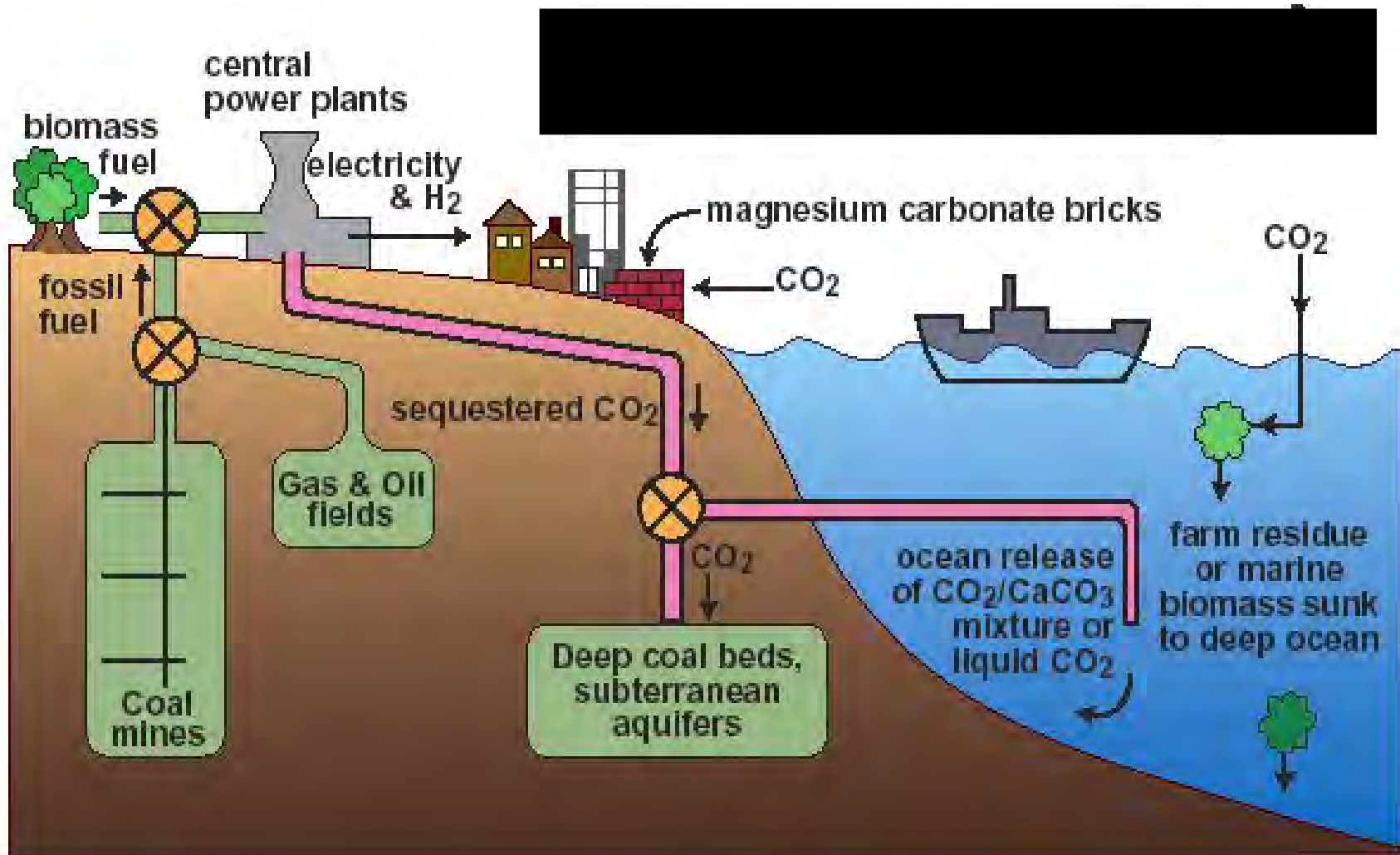


# Other climate change ethical issues

- ***A Nation Can Wait Until Others Act***
- ***A Nation Can Wait Until New Technologies are Invented***
- ***Ethics of Technological Solutions***
  - *nuclear, wind, biofuels,*
- ***Ethics of Geoengineering***
- ***Ethics of Trading***
- ***North-South tech transfer***



# Carbon Sequestration



# BioFuels

- Two major controversies with ethanol
  - The **amount of land needed** to grow the plants and the consequent effect on food and loss biodiversity of such use.
  - The **amount of energy used** in production of ethanol



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