

# An orientation on Climate Change

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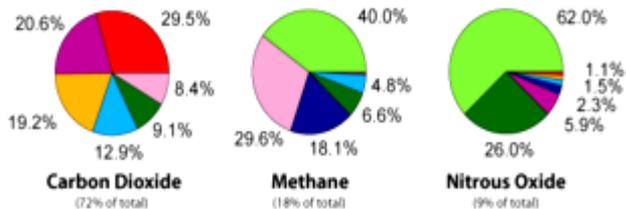
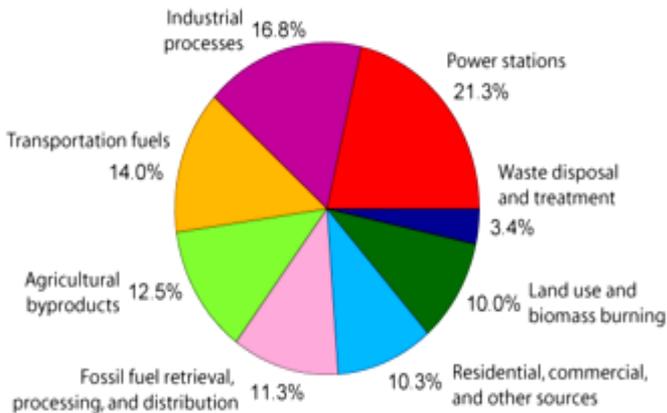
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# What is Climate Change ?

- Climate Change, sometimes referred to as Global Warming, is the change in the climate of the Earth.
- It is the **variation** in the Earth's global climate or in regional climates over time. It describes changes in the variability or average state of the atmosphere over time scales ranging from decades to millions of years
- In recent usage, especially in the context of environmental policy, the term "climate change" often refers to changes in modern climate, which according to the IPCC (Intergovernmental Panel on Climate Change) are very likely to have been caused by human action
- Current studies indicate that very likely the human activities increased the atmospheric concentrations of some 'greenhouse gases' intensifying the natural 'greenhouse effect', causing global warming

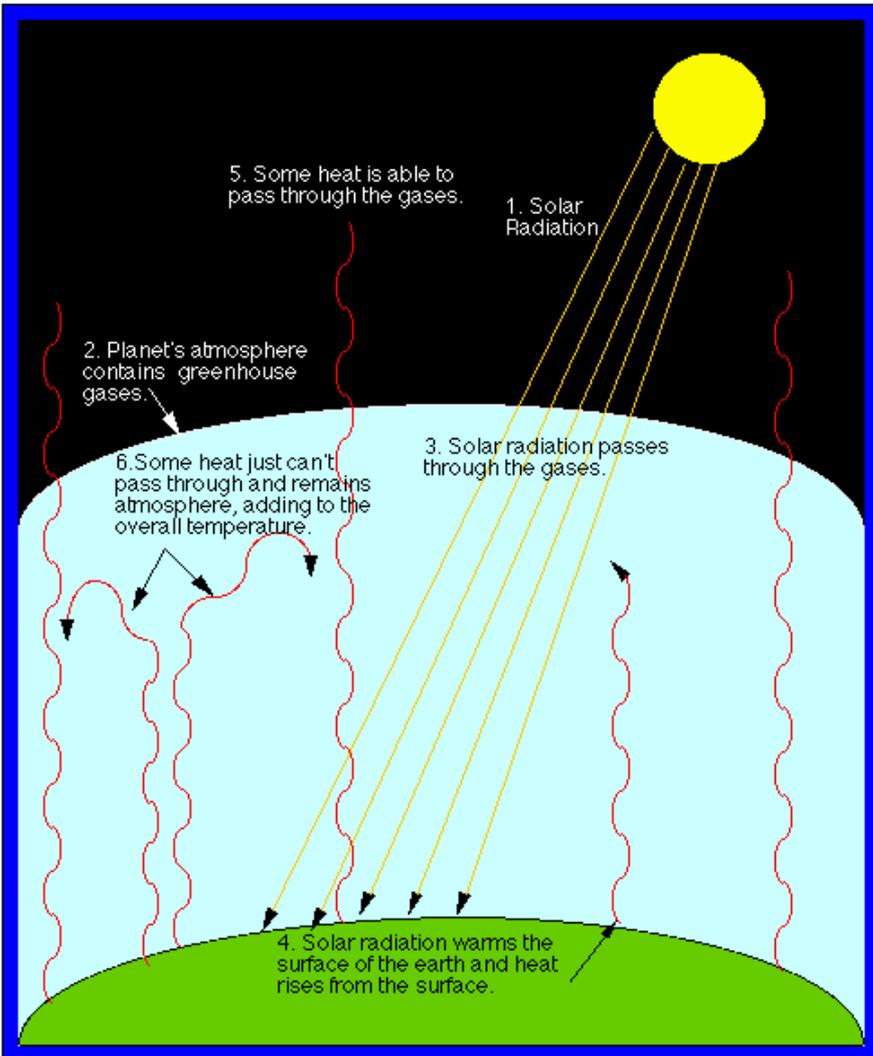
# Greenhouse Gases

**Annual Greenhouse Gas Emissions by Sector**



- On Earth, the most important greenhouse gases are
  - Carbon dioxide (CO<sub>2</sub>), which causes 9–26%
  - Methane (CH<sub>4</sub>), which causes 4–9%
  - Ozone, which causes 3–7%
  - Some other naturally occurring gases contribute very small fractions of the greenhouse effect; one of these, nitrous oxide (N<sub>2</sub>O), is increasing in concentration owing to human activity such as agriculture.
- The atmospheric concentrations of CO<sub>2</sub> and CH<sub>4</sub> have increased by 31% and 149% respectively above pre-industrial levels since 1750
- The present atmospheric concentration of CO<sub>2</sub> has already crossed **400** parts per million (ppm) by volume while the upper safety limit for atmospheric CO<sub>2</sub> is 350 ppm. Atmospheric CO<sub>2</sub> levels have stayed higher than 350 ppm since early 1988.

# Greenhouse Effect

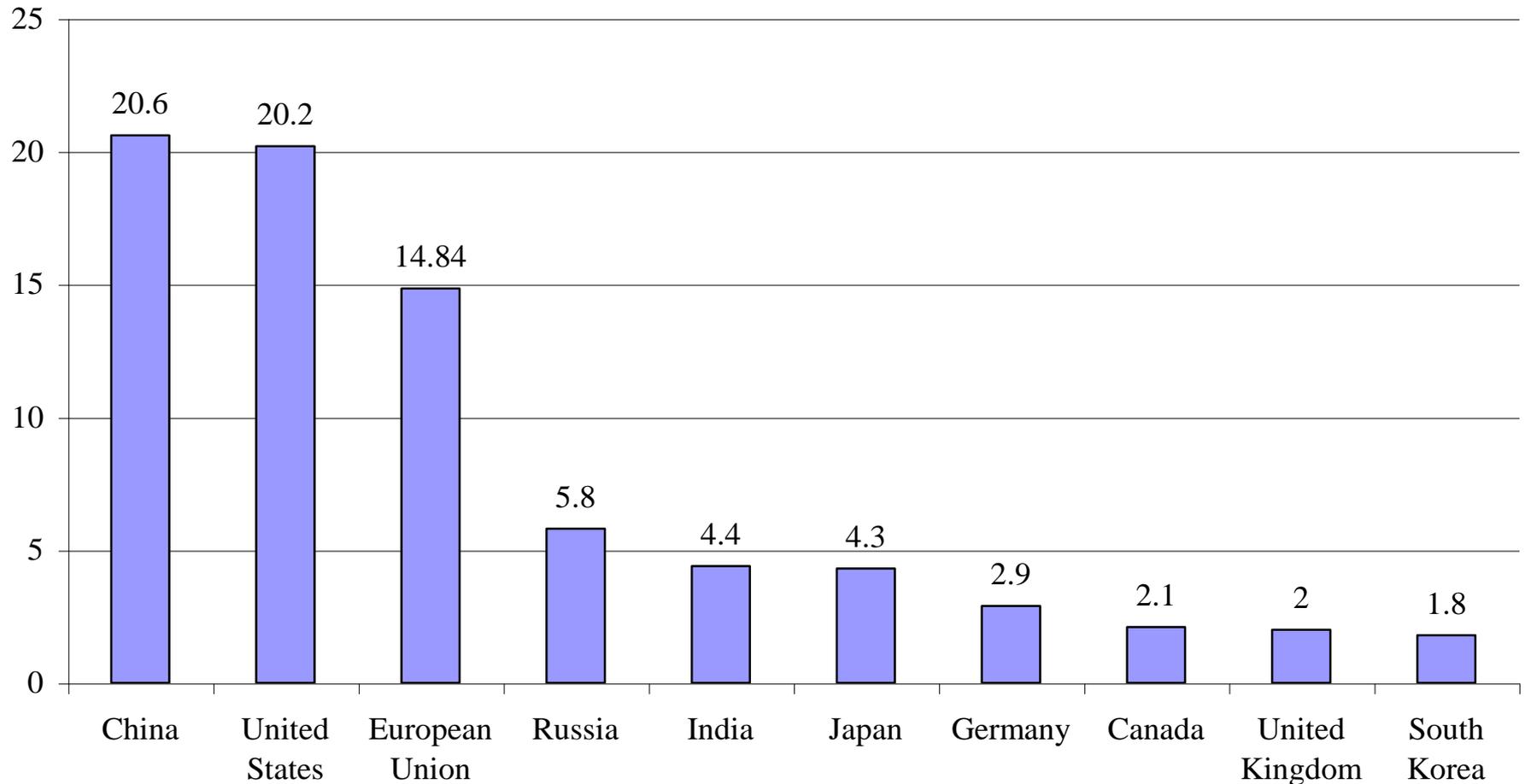


- The greenhouse effect was discovered by Joseph Fourier in 1824 and was first investigated quantitatively by Svante Arrhenius in 1896
- It is the process by which absorption and emission of infrared radiation by atmospheric gases warms a planet's atmosphere and surface
- Naturally occurring greenhouse gases have a mean warming effect of about 33 °C (59 °F), without which Earth would be uninhabitable. However, human activity has increased the atmospheric concentrations of some greenhouse gases resulting in the phenomenon of global warming

# What is the IPCC?

- The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP).
- The role of the IPCC is to assess the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation
- The global body does not carry out any research of its own
- Its assessments are mainly on peer reviewed and published scientific/technical literature

## Top Ten Carbon Emitters (2006): Percent of World (India is not in the Same League as China)



# Carbon Emissions Per Capita

## CO<sub>2</sub> emissions (t CO<sub>2</sub> per capita)

2004 ●  
1990 ○

United States  
20.6  
19.3

Canada  
20.0  
15.0

Russian Federation  
10.6  
13.4 (1992)

United Kingdom  
9.8  
10.0

France  
6.0  
6.4

China  
3.8  
2.1

Egypt 2.3 1.5

Brazil 1.8 1.4

Viet Nam 1.2 0.3

India 1.2 0.8

Nigeria 0.9 0.5

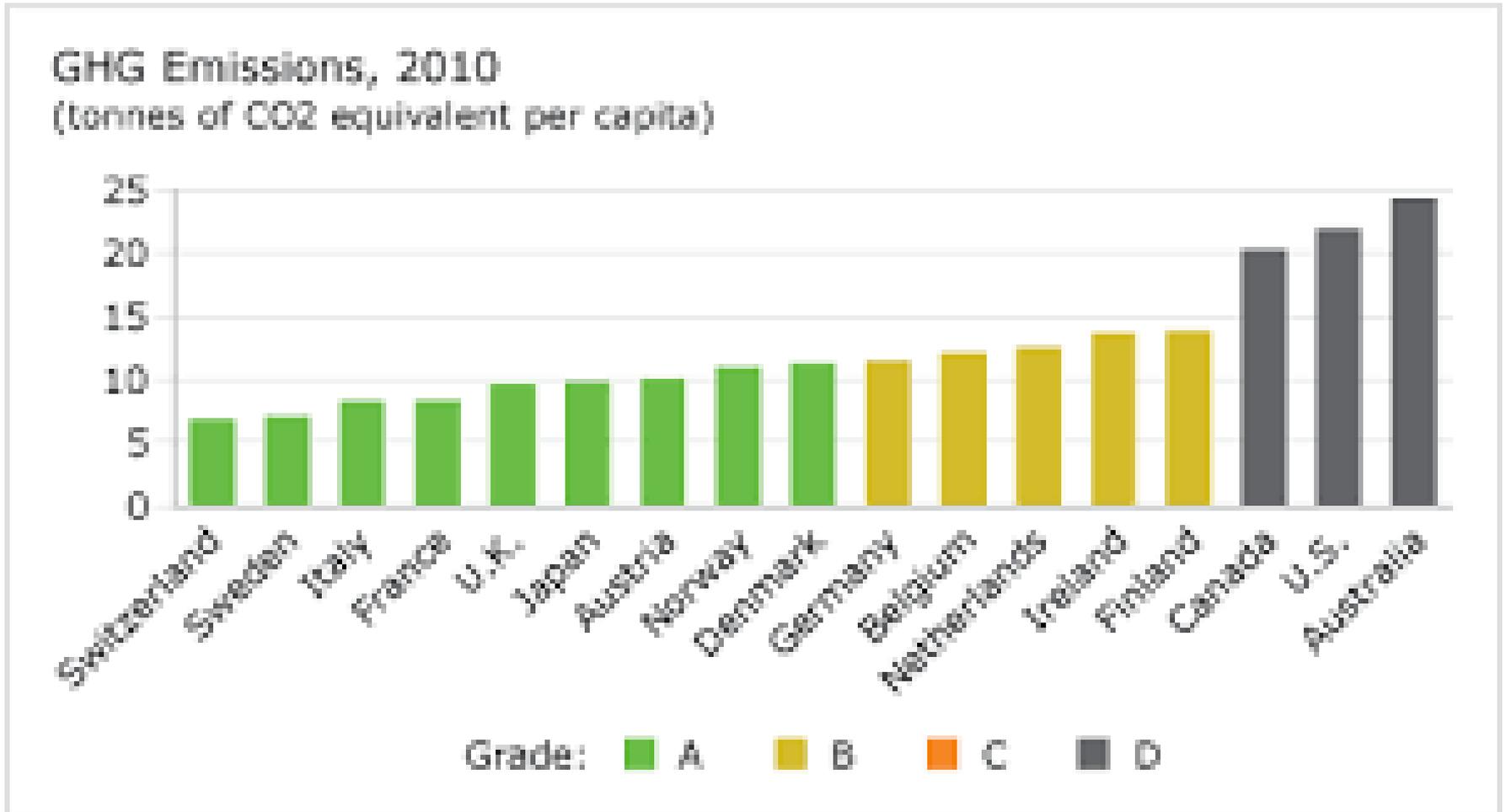
Bangladesh 0.3 0.1

Tanzania 0.1 0.1

Ethiopia 0.1 0.1

Source: CDIAC 2007.

# Carbon emission per capita



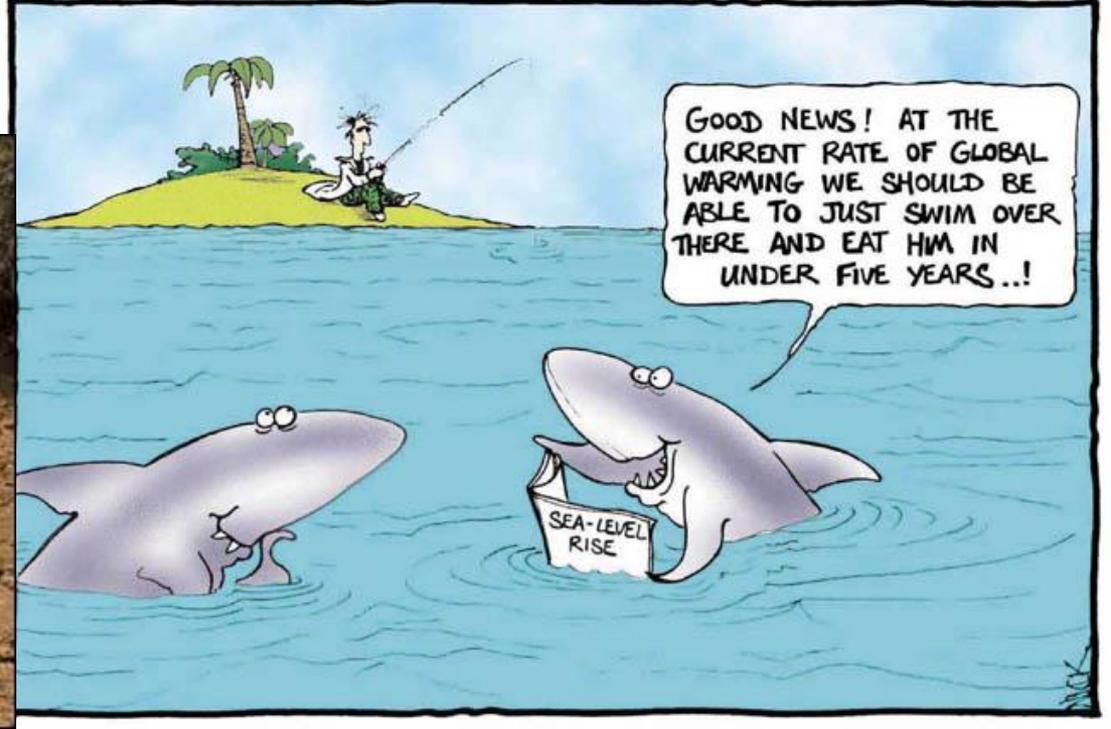
Source: [www.ubc.ca](http://www.ubc.ca)

# Impacts





"YOU DON'T SUPPOSE HE'D BE IMPRESSED WE VOTED FOR AL GORE?"



# Impact of CC on People and Resources

## **Fresh water**

- Drought-affected areas around the world to increase
- Dry regions to get drier, and wet regions to get wetter
- Increased frequency of heavy precipitation to cause flood risk
- Water supplies stored in glaciers and snow cover to decline

## **Food**

- Crop productivity to decrease in seasonally dry and tropical regions
- Increase in frequency of droughts and floods to affect local crop production
- Aquaculture and fisheries to be affected adversely

## **Coastal System**

- Coasts will be exposed to increasing risks such as coastal erosion due to sea-level rise
- More coastal areas are projected to be flooded every year due to sea-level rise by 2080s and will lead to large scale migration

## **Health**

- Increased deaths, disease and injury due to heat waves, floods, storms, fires and droughts.
- Increased malnutrition and consequent disorders, with negative implications for child growth and development

# Who is most affected by climate change...?

- Poor people living at coasts, floodplains, low-lying river deltas, mountains, drylands and the arctic.
- Particularly women, young children, elderly, ill and people with disabilities.
- Smallholder farmers, agricultural workers and traditional fisherfolks. Poor people in drought-prone areas with poor infrastructure and market distribution systems



# How to deal with CC?

- Mitigation
  - Reduce the sources of emissions and enhance the sinks of greenhouse gases
- Adaptation
  - Building systems and capacities to reduce the vulnerability of people and countries to respond to the impacts of climate change

# Adaptation

- Adaptation refers to *“adjustments in ecological, social or economic systems in response to actual or expected stimuli and their effects or impacts. This term refers to **changes in processes, practices and structures** to moderate potential damages or to benefit from opportunities associated with climate change”*
- Adaptation involves adjustments to **decrease the vulnerability** of communities, regions, and nations to climate variability and change and in **promoting sustainable development** (IPCC 2001).
- Adaptation will be necessary **to address impacts** resulting from the warming **which is already unavoidable** due to past emissions (IPCC, 2007).

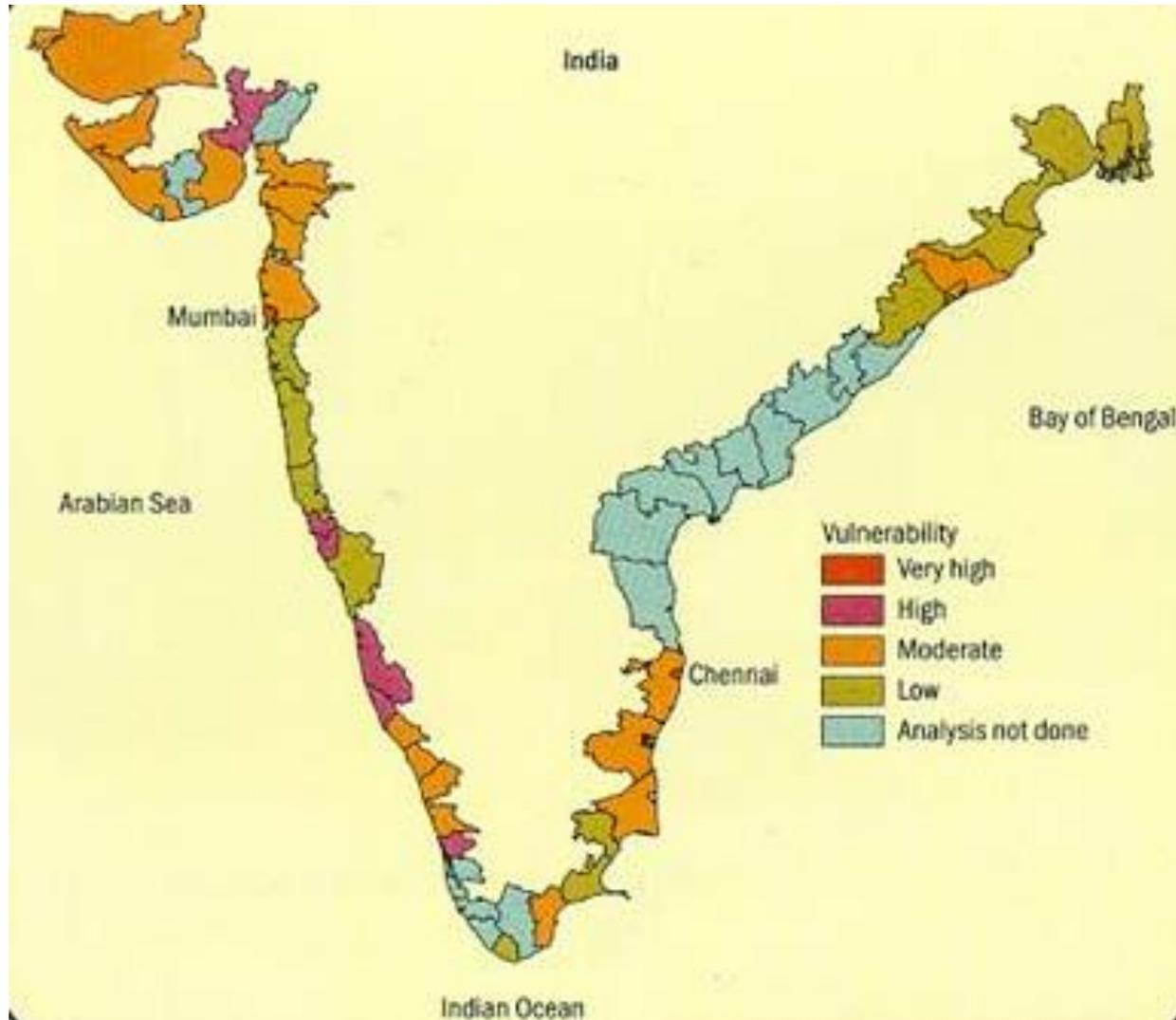
# Climate Change and India-1

- One of the most **disaster-prone** nations in the world
- Livelihoods of **two third Indians** come from climate-sensitive sectors such as farming, fisheries and forestry
- **Variable weather** patterns will affect agricultural output, food security, lead to water shortages and outbreaks of water and mosquito-borne diseases such as diarrhea and malaria.
- The average global temperature has increased by about **0.8°Celsius** and may rise up to 4.8 degrees Celsius during the 21<sup>st</sup> century.

# Climate Change and India-2

- Between 1870 and 2004, global average sea levels rose a total of 195 mm (7.7 in). In 2013, the IPCC projected that during the 21st century, sea level will rise another 26cm to 82cm. India is one of the most vulnerable with **7517 km long coastline**.
- **National Action Plan** on Climate Change (NAPCC) 2008, enumerates several policy measures the government intends to take for adaptation.
- NAPCC claims that Central government spending on adaptation exceeds **2.6 percent of GDP** as of 2006-07 and broadly identifies the focus areas which are a) crop improvement, b) drought proofing, c) forestry, d) water, e) coastal regions, f) health, g) risk financing, h) disaster management.

# Impacts of 1-m sea level rise



Source: TERI

TERI (1996)

# Vulnerable sectors

- Poverty Alleviation
- Health
- Risk Financing
- Land development
- Agriculture & Allied Services
- Forestry & Biodiversity
- Water Resources
- Disaster Management
- Coastal, Marine & Ocean Management

# Ministries/ Departments with Schemes/ Programmes on Adaptation

1. Department of Agriculture
2. Department of Animal Husbandry
3. Dairying and Fisheries
4. Department of Agricultural Research and Education
5. Department of Rural Development
6. Department of Land Resources
7. Department of Drinking Water and Supply
8. Department of Urban Development
9. Ministry of Housing and Urban Poverty alleviation
10. Department of Health and Family Welfare
11. Department of Health Research
12. Ministry of Water Resources
13. Ministry of Environment and Forest
14. Department of Food and Public Distribution
15. Ministry of Home Affairs
16. Ministry of Panchayati Raj
17. Ministry of Science and Technology
18. Department of Biotechnology
19. Department of Space
20. Ministry of Tribal Affairs
21. Ministry of Women and Child development
22. Ministry of Human Resources Development
23. Ministry of Social Justice and Empowerment

# NAPCC – 8 missions

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a Green India
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change

# International level progress so far

- National Adaptation Plan of Action (NAPA)
- Nairobi Work Plan
- National Adaptation Plans (NAPs)
- Adaptation committee
- Adaptation Fund (NABARD as NIE)
- 50% of Green Climate Fund for adaptation
- International Mechanism on Loss & Damage

Group work

# What and how do we assess when we face?

1. Changing rainfall pattern
2. Glacial melt
3. Sea level rise

Thank You