



WMO



UNEP

# Key findings from the IPCC Fourth Assessment Report



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# 'Climate change is unequivocal'

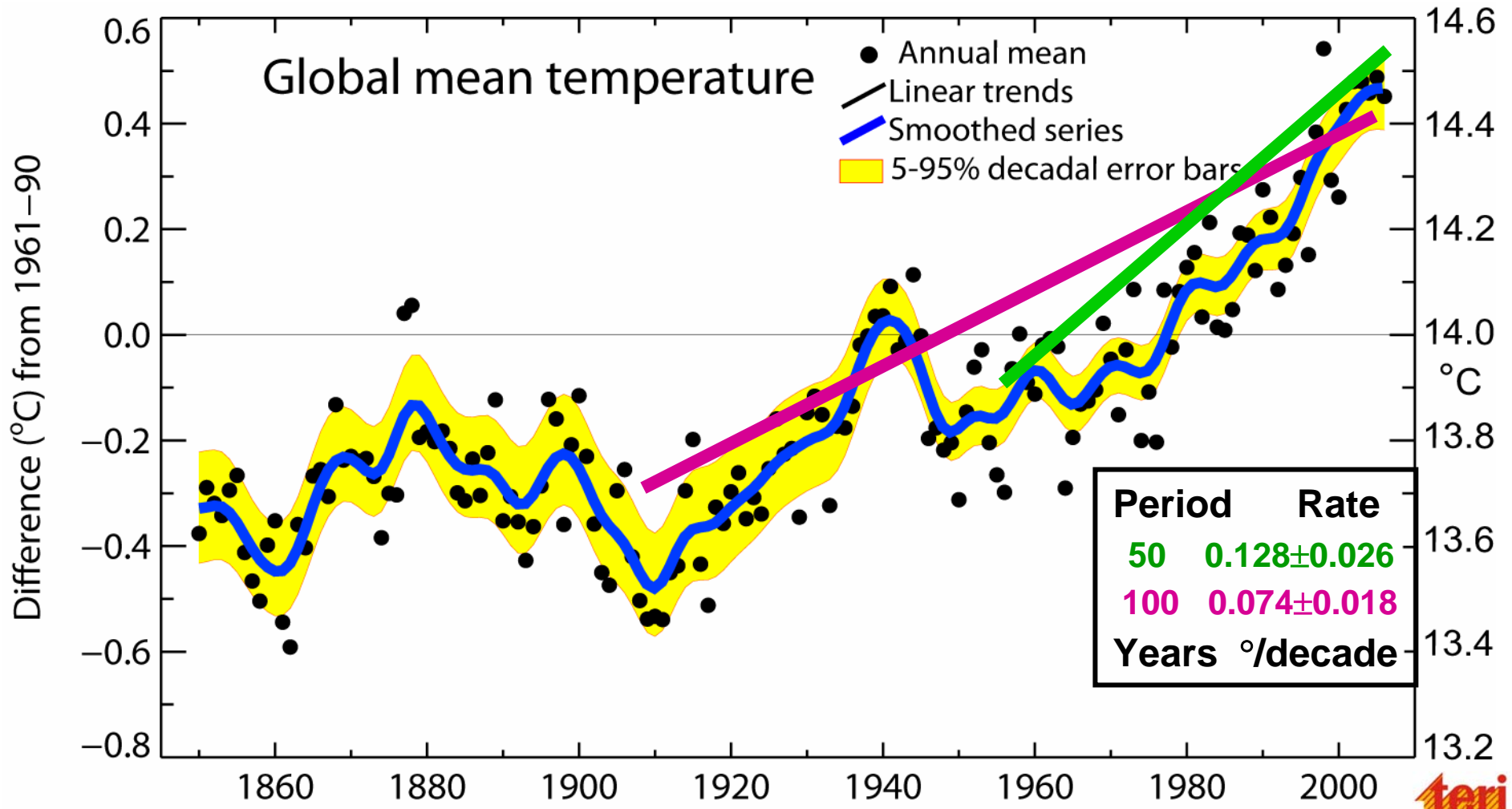
## Paleoclimatic perspective



- ❖ Last time the polar regions were significantly warmer than present for an extended period (about 125,000 years ago), reductions in polar ice volume led to **4 to 6 m of sea level rise**
- ❖ Warmth of the last half century is unusual in at least the previous **1,300 years**

# 'Climate change is unequivocal'

## Evolution of global mean temperature

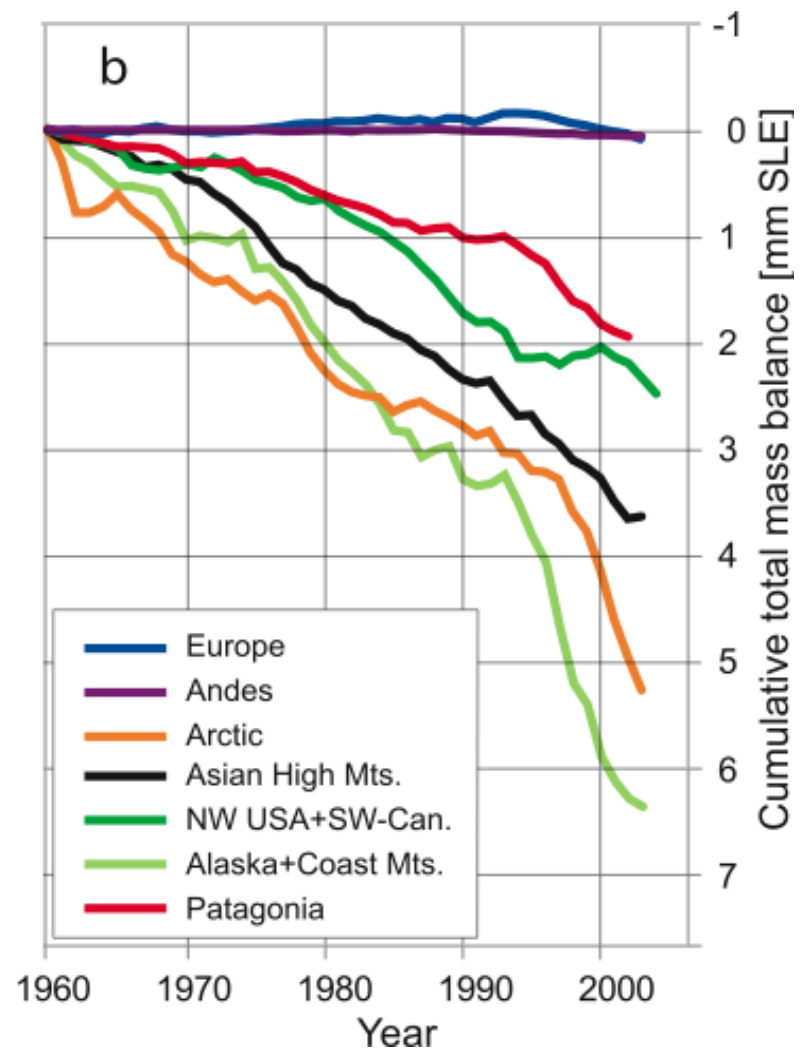


# 'Climate change is unequivocal'

## Cumulative balance of glacier mass

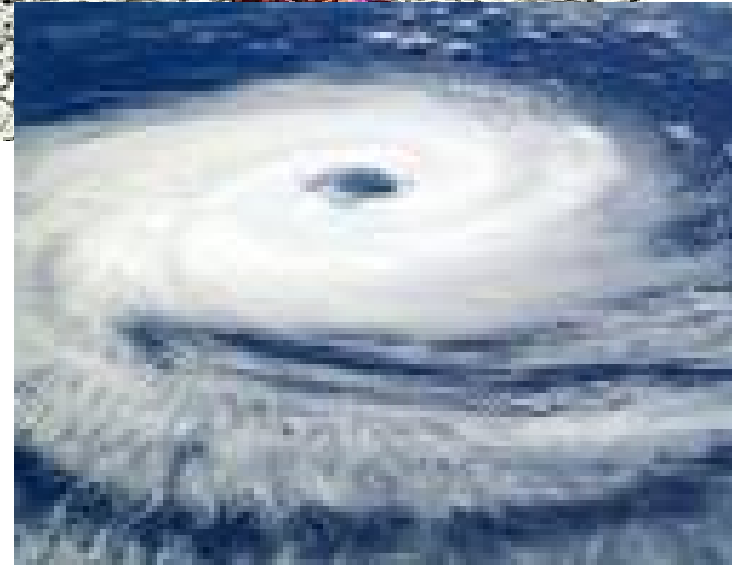
During the 20th century, glaciers and ice caps have experienced **widespread mass losses**

New data show that losses from the ice sheets have very likely contributed to **sea level rise** over 1993 to 2003



# 'Climate change is unequivocal'

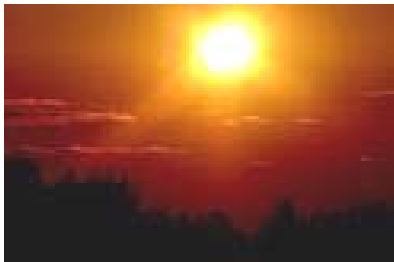
## Observed impacts



# 'Climate change is unequivocal'

## Observed impacts in India

### ❖ Change in temperature



- 0.68°C increase per century
- Warming more pronounced in post monsoon and winter

### ❖ Change in precipitation

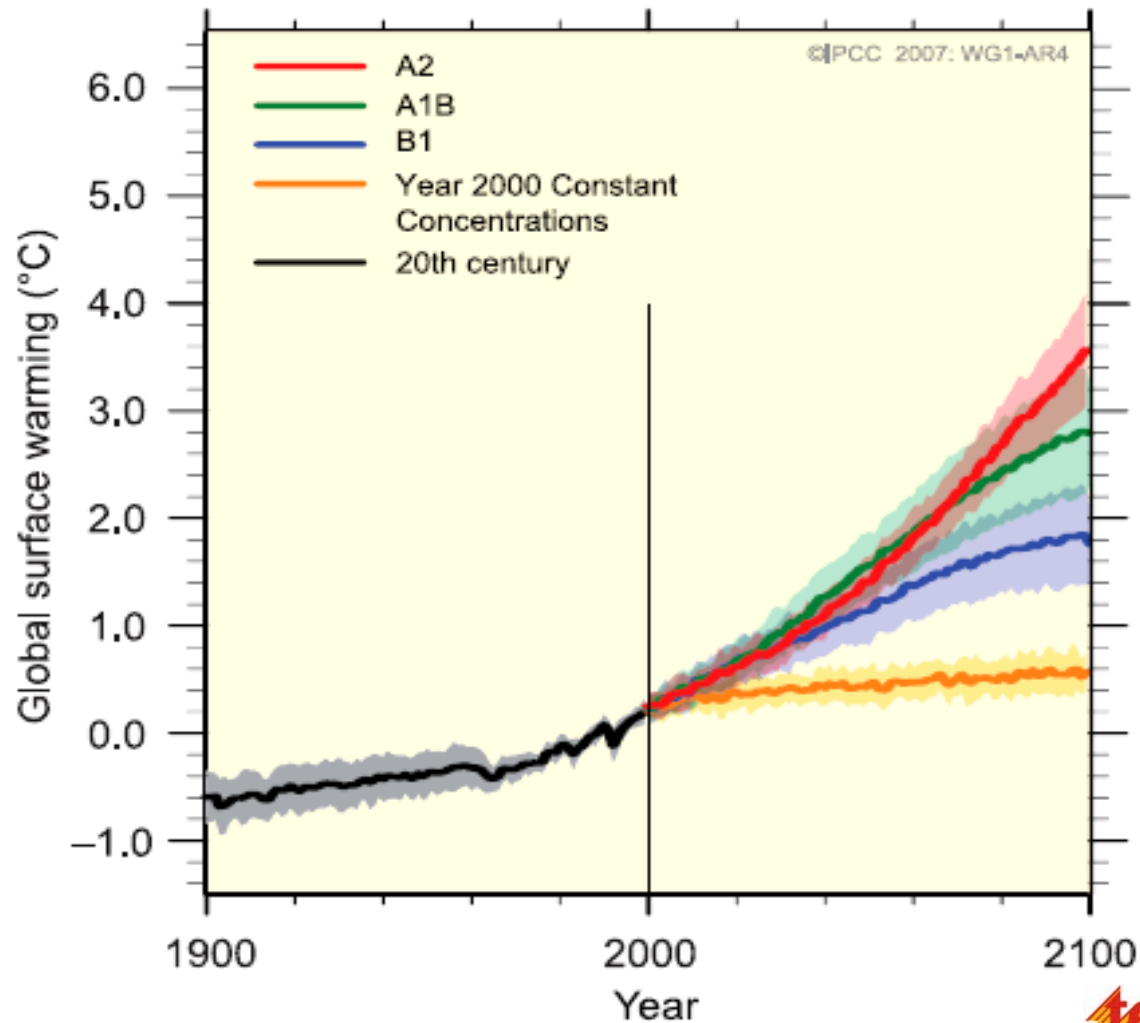


- Increase in extreme rains in north-west during monsoon
- Lower number of rainy days along east coast

# Expected trends and impacts

## Assessed ranges for surface warming

Continued emissions would lead to further warming of **1.8°C to 4°C** over the 21<sup>st</sup> century



# Expected trends and impacts

## Characteristics of stabilization scenarios

Stabilization level (ppm CO <sub>2</sub> -eq)	Global mean temp. increase (°C)	Year CO <sub>2</sub> needs to peak	Global sea level rise above pre-industrial from thermal expansion (m)
445 – 490	2.0 – 2.4	2000 – 2015	0.4 – 1.4
490 – 535	2.4 – 2.8	2000 – 2020	0.5 – 1.7
535 – 590	2.8 – 3.2	2010 – 2030	0.6 – 1.9
590 – 710	3.2 – 4.0	2020 – 2060	0.6 – 2.4

Large impacts can be expected due to our past emissions

# Expected trends and impacts

## Vulnerability of poor regions



- ❖ Aggravation of **malnutrition, water stress and health** problems in Africa, Asia and Latin America
  
- ❖ Vulnerability exacerbated by **existing stresses**:
  - Endemic poverty
  - Limited access to capital
  - Ecosystem degradation
  - Disasters and conflicts
  - Failure of government system to respond effectively

# Expected trends and impacts

## Impacts on natural ecosystems



- ❖ Climate change will reduce **biodiversity** and perturb functioning of most ecosystems
- ❖ 20-30% of plant and animal species at **risk of extinction** if increases in global average temperature exceed 1.5-2.5°C
- ❖ **Some ecosystems** are highly vulnerable:
  - Coral reefs, marine shell organisms
  - Tundra, boreal forests, mountain, Mediterranean regions

# Expected trends and impacts

## Coastal settlements most at risk



# Expected trends and impacts

## Expected impacts in India

### ❖ Losses in agricultural productivity

- Wheat yields could decrease by 5-10% per one-degree rise in temperature



### ❖ Decrease in freshwater availability

- Gross per capita water availability will decline from 1820 m<sup>3</sup>/yr in 2001 to 1140 m<sup>3</sup>/yr in 2050



- ❖ **Endemic morbidity and mortality** due to heat stress, floods, diarrhoeal disease and cholera



# The cost of mitigation

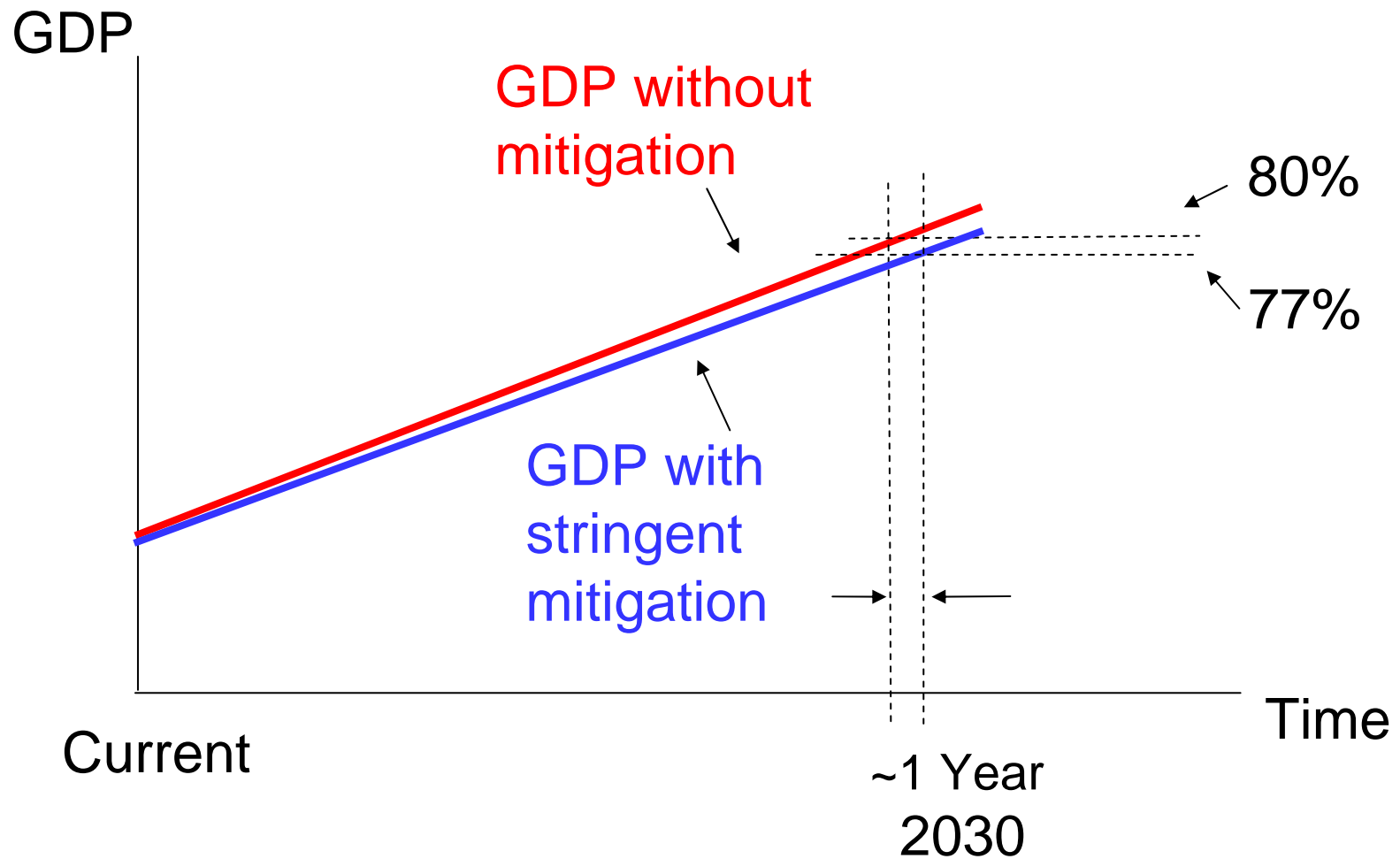
## Global costs in 2030 for least-cost trajectories

Stabilisation levels (ppm CO <sub>2</sub> -eq)	Range of GDP reduction (%)	Reduction of average annual GDP growth rates (percentage pts)
590 - 710	-0.6 – 1.2	< 0.06
535 - 590	0.2 – 2.5	< 0.1
445 - 535	< 3	< 0.12

Mitigation measures would induce 0.6% gain  
to 3% decrease of GDP in 2030

# The cost of mitigation

## Illustration of costs numbers



# Key solutions

The range of stabilization levels of GHGs can be achieved by the deployment of a portfolio of **technologies that are currently available** and those that are expected to be **commercialised in coming decades**

# Key solutions

## Key technologies currently available

### Energy Supply



Efficiency; fuel switching; renewable (hydropower, solar, wind, geothermal and bioenergy); combined heat and power; nuclear power; early applications of CO2 capture and storage

### Transport



More fuel efficient vehicles; hybrid vehicles; biofuels; modal shifts from road transport to rail and public transport systems; cycling, walking; land-use planning

### Buildings



Efficient lighting; efficient appliances and airconditioning; improved insulation ; solar heating and cooling; alternatives for fluorinated gases in insulation and appliances

# Key solutions

## Policies and measures

- ❖ Appropriate incentives for **development of technologies**
- ❖ Effective **carbon price** signal
- ❖ Appropriate **energy infrastructure** investments
- ❖ Changes in **lifestyle and behavior**



# The role of education

## The role of education

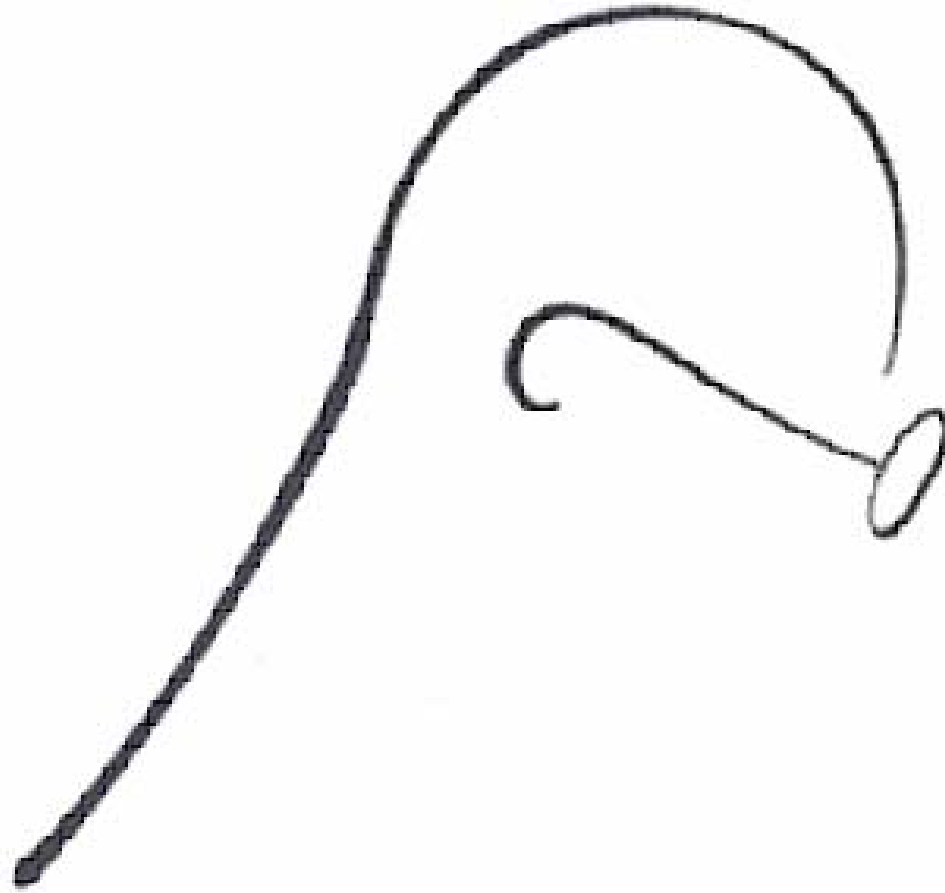
- ❖ Education and public awareness are essential complements to GHG mitigation policies across all sectors
  - Education can help **overcome barriers** to the acceptance of new practices
  - **Youth** are a powerful agent of change in the perspective of sustainable development



# The role of education

## TERI Education Campaign Project

- ❖ Launch by of an international education campaign on climate change in 2008
  - Education material based on IPCC AR4
  - Chains of schools exchanging on their ideas and experiences
  
- ❖ Need for partners worldwide
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**Be the change you want to see in the world**