
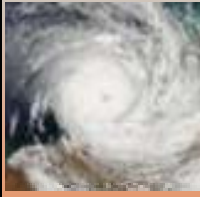



 **Climate Change and International Security-
the way forward** 

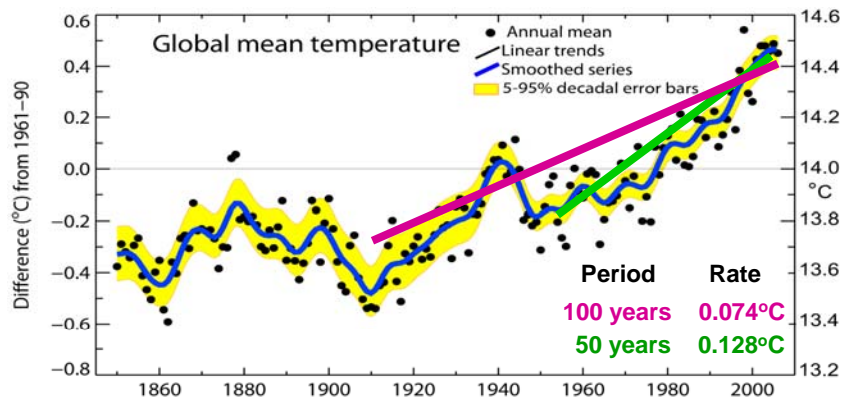
 **R. K. Pachauri**
Chairman, IPCC
Director-General, TERI 

 **Freiburg**
6th November 2008 

Warming of the climate system is unequivocal

I. Observed changes in climate

Changes in global average surface temperature



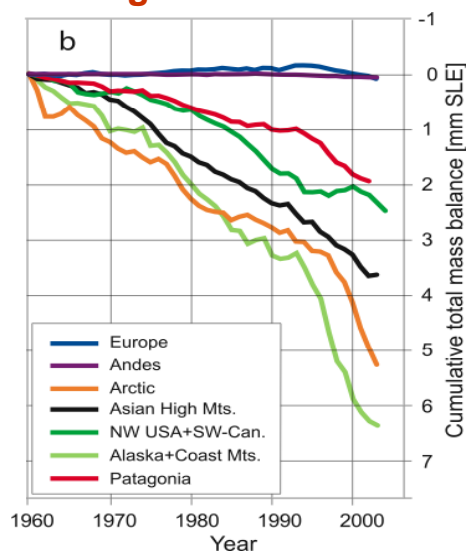
Eleven of the last twelve years rank among the twelve warmest years in the instrumental record of global surface temperature

II. Observed changes in climate

Cumulative balance of glacier mass

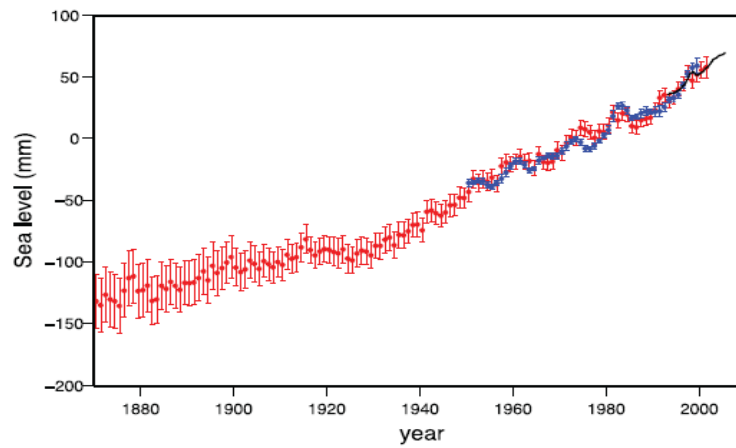
Water supplies stored in glaciers are projected to decline in the course of the century

Decreases in glaciers have contributed to sea level rise

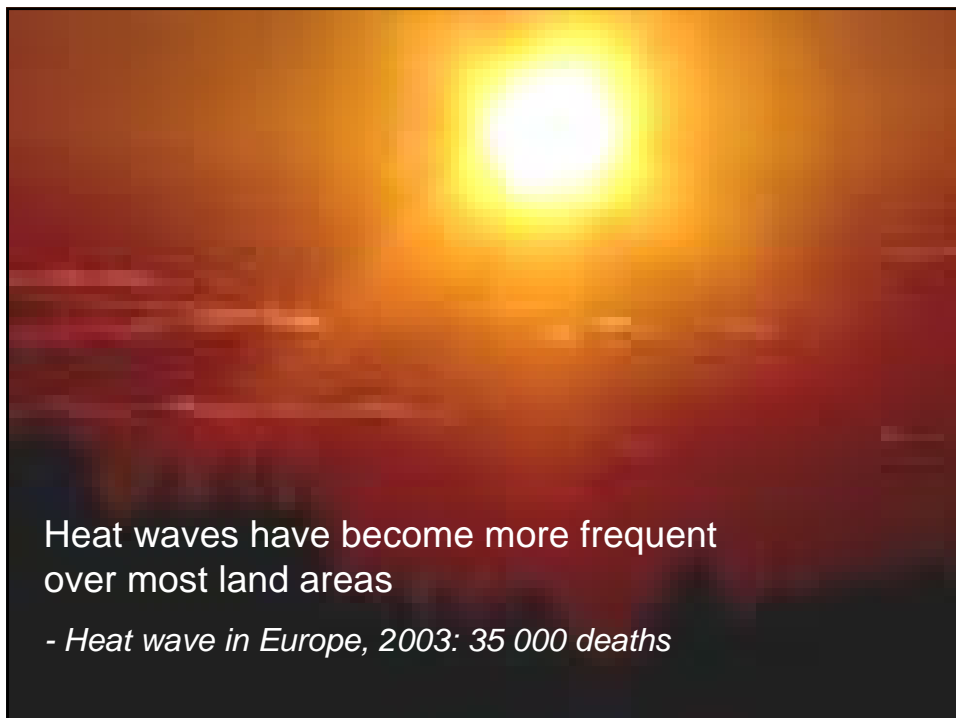


III. Observed changes in climate

Changes in global average sea level



Global average sea level has risen since 1961 at an average rate of 1.8mm/yr and since 1993 at 3.1mm/yr





The proportion of tropical cyclones reaching higher intensity have increased over the past 3 decades
- *Cyclone Nargis in Myanmar, 2008:*
100 000 estimated deaths

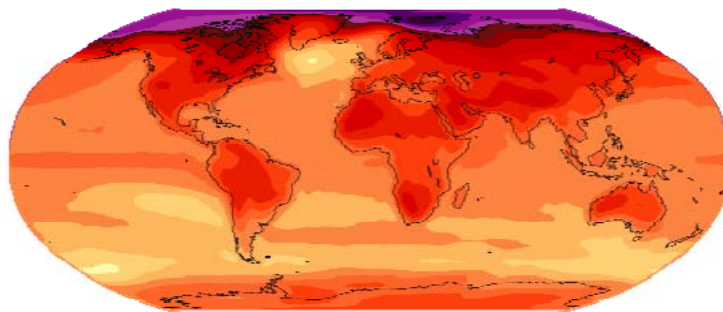


More intense and longer droughts have been observed over wider areas since the 1970s
- *About 25% of Africa's population currently experience high water stress*

Expected trends and impacts of climate change

Projections and impacts

**Projected surface temperature changes
(2090-2099 relative to 1980-1999)**



0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 (°C)

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

Examples of impacts associated with global average temperature change relative to 1980 -

	0	1	1999	3	4	5°
WATER	Increased water availability in moist tropics and high latitudes					
	Decreasing water availability and increasing drought in mid-latitudes and semi-arid low latitudes					
	Hundreds of millions of people exposed to increased water stress					
ECO-SYSTEMS	Increased coral bleaching		Most corals bleached		Widespread coral mortality	
	Terrestrial biosphere tends towards a net carbon source as: 15% 40% of ecosystems affected					
	Increasing species range shifts and wildfire risk					
	Ecosystem changes due to weakening of the meridional overturning circulation					
FOOD	Complex, localised negative impacts on small holders, subsistence farmers and fishers					
	Tendencies for cereal productivity to decrease in low latitudes			Productivity of all cereals decreases in low latitudes		
	Tendencies for some cereal productivity to increase at mid- to high latitudes			Cereal productivity to decrease in some regions		
COASTS	Increased damage from floods and storms					
	About 30% of global coastal wetlands lost					
HEALTH	Millions more people experience coastal flooding each year					
	Increasing burden from malnutrition, diarrhoeal, cardio-respiratory, infectious diseases					
	Increased morbidity and mortality from heat waves, floods, droughts					
	Changed distribution of some disease vectors					

Projections and impacts

Climate change could lead to some abrupt or irreversible impacts:



20-30% of species are likely to be at risk of **extinction** if increases in warming exceed 1.5-2.5°C



Partial **loss of ice sheets** on polar land could imply metres of sea level rise

Climate Change, Adaptation and Mitigation

Key adaptation strategies

Developing **knowledge** on impacts and vulnerabilities

Integrating adaptation in wider policies

Improving **disaster preparedness** and management

Improving **health care** systems

Promoting **good governance** including responsible decision making and communities empowerment

✘ Poverty is the largest barrier to developing the capacity to cope and adapt

Adaptation is necessary to address impacts resulting from the warming which is already unavoidable due to past emissions

But **adaptation alone cannot cope** with all the projected impacts of climate change

- ➡ **Need for a mix of strategies including adaptation and mitigation**

Characteristics of stabilisation scenarios

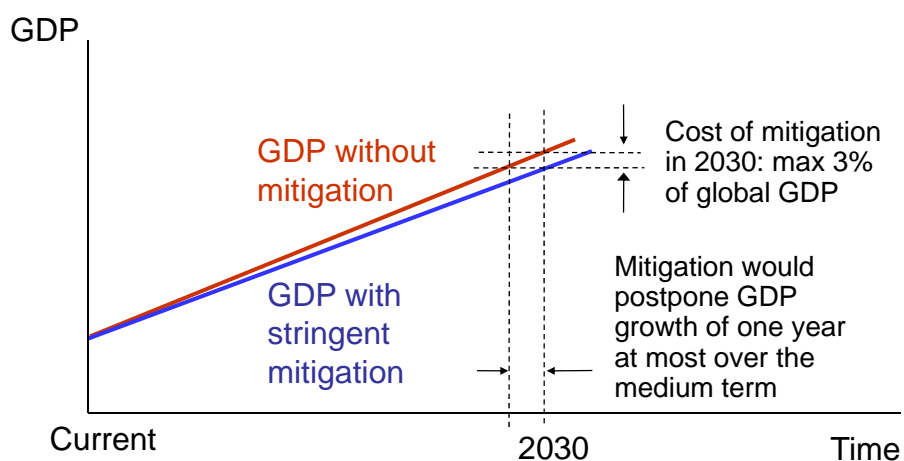
Stabilization level (ppm CO ₂ -eq)	Global mean temp. increase (°C)	Year CO ₂ needs to peak	Global sea level rise above pre-industrial from thermal expansion (m)
445 – 490	2.0 – 2.4	2000 – 2015	0.4 – 1.4
490 – 535	2.4 – 2.8	2000 – 2020	0.5 – 1.7
535 – 590	2.8 – 3.2	2010 – 2030	0.6 – 1.9
590 – 710	3.2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

Estimated global costs in 2030

Stabilisation levels (ppm CO ₂ -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

Impacts of mitigation on GDP growth



Schematic graph

Co-benefits of mitigation

- ✓ **Health** co-benefits from reduced air pollution
- ✓ Increased **energy security**
- ✓ More rural **employment**
- ✓ Increased **agricultural production** and reduced pressure on **natural ecosystems**
- **Co-benefits provide the opportunity for no-regrets policies and reduce mitigation costs**

Security Implications of Climate Change

Factors influencing vulnerability to climate change

- Dependence on climate-sensitive resources
- Vitality of local communities
- Integrity of key infrastructure
- Preparedness and planning
- Sophistication of the public health system
- Exposure to conflict

Food Supply

Agricultural productivity at low latitudes likely to suffer severe losses because of:



- high temperature
- drought
- flood conditions
- soil degradation

Possible yield reduction of:



- 50% by 2020 in some African countries
- 30% by 2050 in Central and South Asia
- 30% by 2080 in Latin America

Water availability

Water availability will be affected for consumption, agriculture and energy generation due to:



- Changes in precipitation patterns
- Increasing salinity of groundwater
- Glaciers melting decreasing river flows

People exposed to increased water stress by 2020:



- 120 million to 1.2 billion in Asia
- 75 to 250 million in Africa
- 12 to 81 million in Latin America

Human Health

Increases in **malnutrition** and consequent disorders

Increased burden of **diarrhoeal disease**

Exacerbation of abundance and/or toxicity of **cholera**

Increased **deaths, disease and injury** due to heat waves, floods, storms, fires and droughts

Increased frequency of **cardio-respiratory diseases**

Vulnerability of poor regions

The poor have **limited adaptive capacities** and are more dependent on **climate-sensitive resources**

In developing countries, vulnerability is often exacerbated by **existing stresses**

- ➔ **Climate change will act as a 'threat multiplier', especially in developing countries**



Migration and conflicts

Numbers of environmental refugees could increase as **extreme events** and **famines** become more frequent

Rising ethnic conflicts can be linked to competition over increasingly **scarce natural resources**

- ➔ **The impacts of climate change on the poorest communities could prove particularly unsettling for the whole world**



Increased Vulnerability of Coastal Areas



Need for enhanced cooperation

Poor regions will suffer the most from the impacts of climate change on marine environments and have limited adaptive capacity

- ➔ National policy making in developing countries remains a major challenge that can only be met with increased **North-South as well as South-South cooperation**



Rethinking of Global Spending Priorities required

Poverty is the largest barrier to adaptation to climate change



Total net Official Development Assistance from OECD countries was US\$**103.9 billion**, in 2006

Developed countries spent US\$**250 billion** in 2005 to support their own agriculture

Global military expenditure is about US\$**1.2 trillion** in 2006

Technology Transfer, investment in renewable technologies and rethinking of global spending priorities key to mainstreaming climate change policies

Towards a new system of governance

There is increasing recognition of a shift to a more **inclusive concept of governance**, including:

- The contributions and cooperation of various levels of government, the private sector and civil society
 - Mainstreaming, which requires that non-climate policies, programmes and individual actions take climate change mitigation and adaptation into consideration
- ➡ Mainstreaming of climate change issues and involvement of the relevant parties in the decision making process are **essential to achieve the desired goals**

IPCC

Present and Future Role

The IPCC

“The General Assembly [...] endorses action of the World Meteorological Organisation and the United Nations Environment Programme in jointly establishing an Intergovernmental Panel on Climate Change to provide **international coordinated scientific assessments** of the magnitude, timing and potential environmental and socio-economic impact of climate change and realistic response strategies [...].”

United Nations General Assembly
43rd session resolution, 6th December 1988

Strengths of the IPCC

- ✓ Mobilisation of thousands of multi-disciplinary experts worldwide
- ✓ Policy-relevant findings
- ✓ Widely used methodological reports
- ✓ Assessments relying on peer reviewed literature
- ✓ Review process involving experts and Governments
- ✓ Media attention and outreach activities

The assessments carried out by the IPCC have influenced global action on an unprecedented scale

1. First Assessment Report (1990) had a major impact in defining the content of the **UNFCCC**
2. The Second Assessment Report (1996) was largely influential in defining the provisions of the **Kyoto Protocol**
3. The Third Assessment Report (2001) focused attention on the **impacts** of climate change and the need for **adaptation**
4. The Fourth Assessment Report (2007) is creating a strong basis for a **post Kyoto Protocol** agreement

Guiding principles

The “**Principles governing IPCC work**” should continue to cut across the entire Panel and its activities

- To be reviewed every 5 years, including 2008

Changes in the IPCC should be in the nature of **refinements** to answer the needs of a changing world:

- ✓ New public perceptions and knowledge
- ✓ Greater interest in sustainable development
- ✓ Greater importance of economic aspects

Need for further research on the regional aspects of climate change

The IPCC should act as a **facilitator** and promote research on impacts of climate change in regions where data is missing

- Possible **workshop** with relevant entities to:
 - Set up a programme of action for focused research
 - Provide direction on the coverage of regional aspects in future IPCC reports

Future outputs of the IPCC

✓ 5th Assessment Report

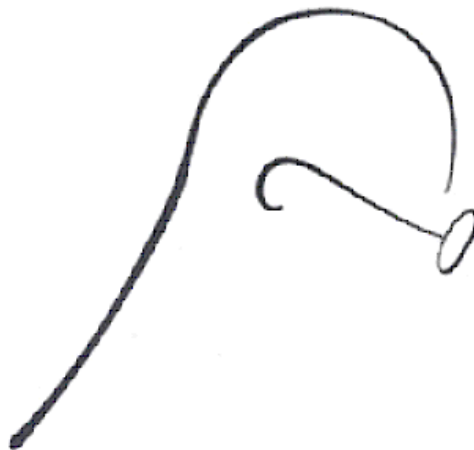
- To be finalised in 2014
- 3 Working Group Reports unchanged
- Revised set of scenarios based on possible evolutions of atmospheric GHG concentrations
- Planning of the Synthesis Report to start earlier in the assessment process

✓ Special Reports

- Renewable energy: 2010

✓ Technical Papers

} Framework for establishing topic priorities agreed during the 20th Session of the IPCC



Democracy must in essence therefore, mean the art and science of mobilizing the entire physical, economic and spiritual resources of all the various sections of the people in the service of the common good for all.