

# Responding to the Challenge of Climate Change



**Sir Nicholas Stern,**

***Head of the UK Government Economic Service***

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***Speaking in personal capacity: views expressed are  
not necessarily those of the UK government***



# Introduction

- Climate change is a serious & urgent issue
- Africa is already feeling the damaging effects of greater climate variability & change - adaptation is inevitable & essential
- Developing countries have much to lose from inaction
- But, with international action, mitigation can be combined with growth
- Technology & economic instruments are crucial
- The Stern Review on the economics of climate change, based in the UK Treasury – launched after Gleneagles G8 Summit in 2005.
- Publish ahead of the Mexico ministerial meeting of the Gleneagles Dialogue in October and the COP 12 in Nairobi

# Structure of the Argument

Part 1: The science and impacts of climate change

Part 2: The implications of climate change for development – the role of adaptation

Part 3: The global challenge of mitigation – building an international response to climate change

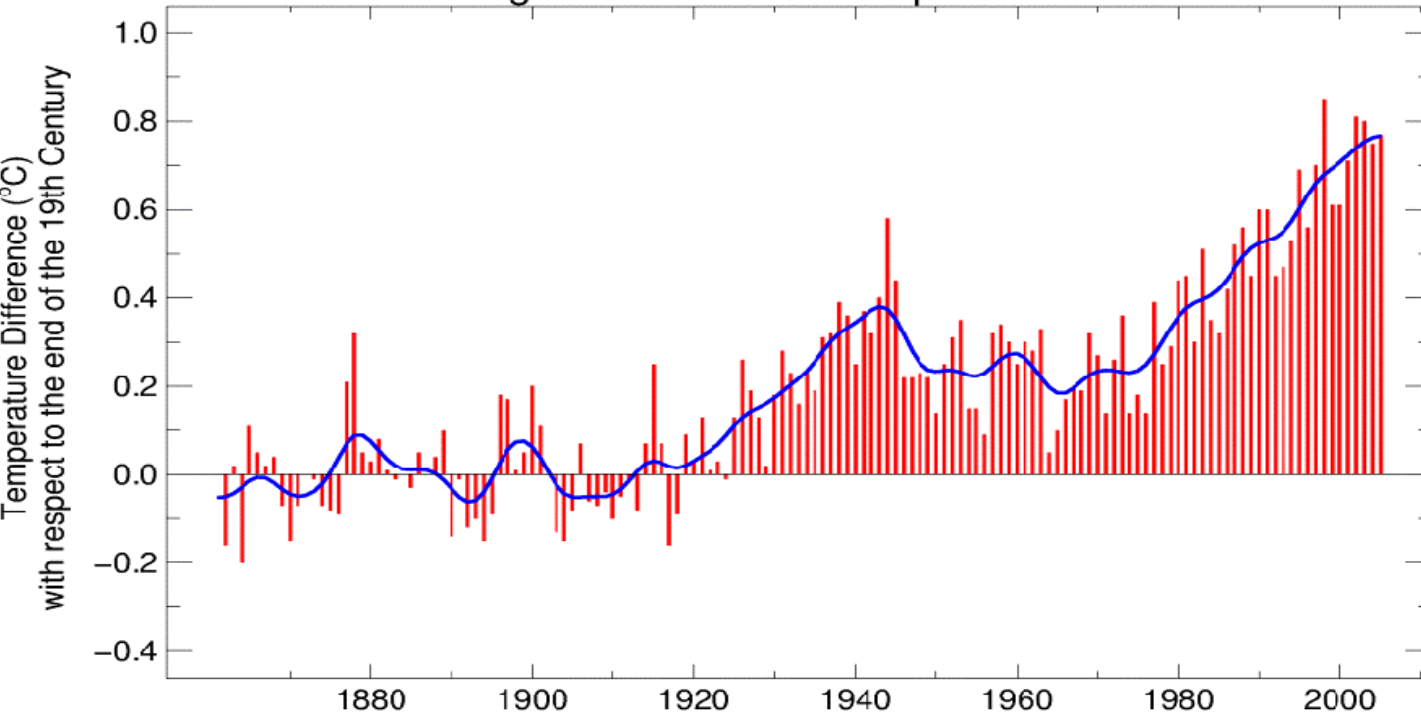
**Part 1:**  
**The Science and Impacts of  
Climate Change**

# The Science of Climate Change

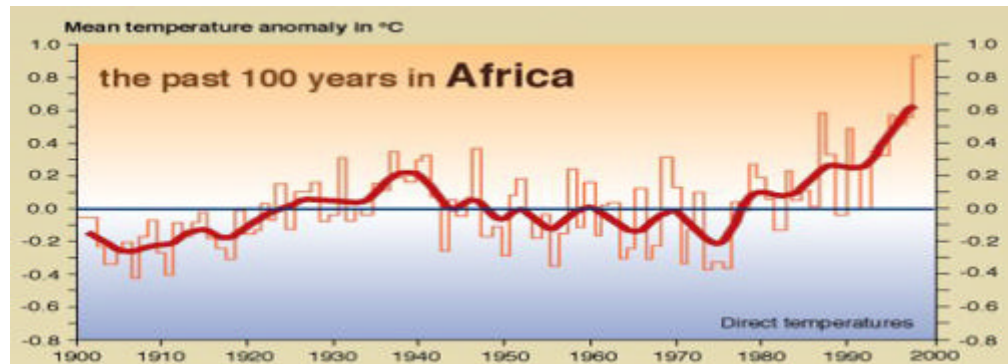
- The basic science of climate change was established in the 19<sup>th</sup> Century & has moved a long way in recent years
- Climate change caused by greenhouse gas emissions
  - Main sources are from burning fossil fuels, but also agriculture & deforestation
- GHG emissions & concentrations have increased sharply since 1950
  - already led to a temperature rise of 0.7 degrees.
  - already committed to a further 1 degree of warming
- Concentrations in the atmosphere now 425ppm CO<sub>2</sub> equivalent, rising at least 2ppm each year
  - We are heading for *at least* 550ppm by mid-century, leading to a global average temperature increase of at least 2 degrees – Hadley Centre predict it will be in the range of 2.4 to 5.4 degrees
  - Potential ‘positive feedbacks’ & still more serious risks
  - Possible that temperature increases could reach 5-6 degrees or higher by the end of the century – higher than in human experience.

# Strong Global Warming Observed

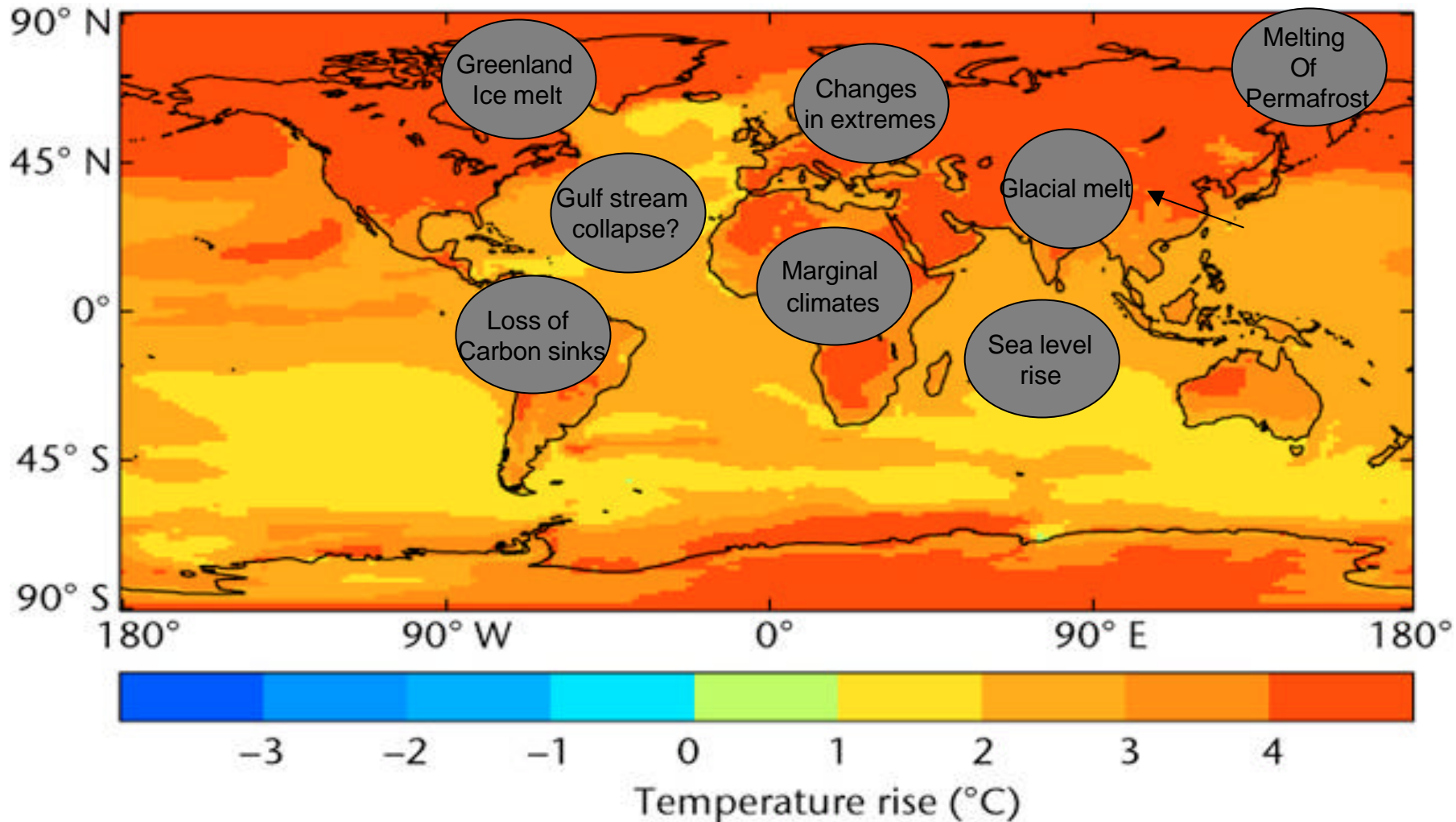
Global Average Near-Surface Temperatures 1861– 2005



Hadley Centre for Climate Prediction and Research  
Based on Folland et al (2000) and Jones and Moberg (2003)



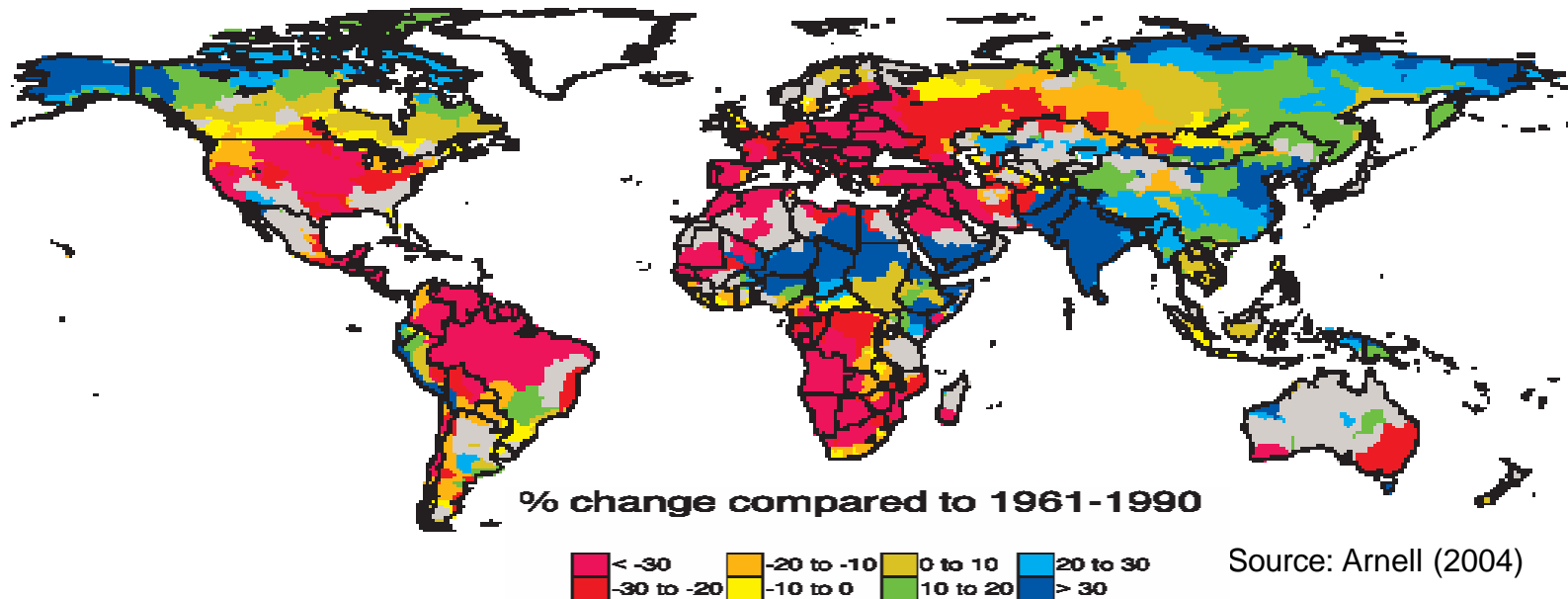
# Impacts of Climate Change: *the sting is in the tail...* possible severe climate change scenarios



# The Impacts of Climate Change on Physical Systems

- Expect major impacts on our physical environment from climate change:
  - Rising average & peak temperatures
- Most of the impacts are mediated through water:
  - Widespread water stress
  - Increased frequency & severity of droughts & floods
  - Changes to rainfall, including to the monsoon
  - Retreat of glaciers with impacts on major rivers
  - Rising sea levels could displace millions from the coast
    - Gambia: 1 metre sea level rise predicted to result in complete submergence of Banjul with land loss costs totalling \$217 million (Gambia, 2003)

# Climate Impacts on Water Sector: Supply



- Warming will lead to major changes in water availability across the globe by the 2050s, based on IPCC Scenario A1
- Water resources will be under increased pressure as climate change reduces supply through rising temperatures & changing precipitation & raises demand through greater need for irrigation.

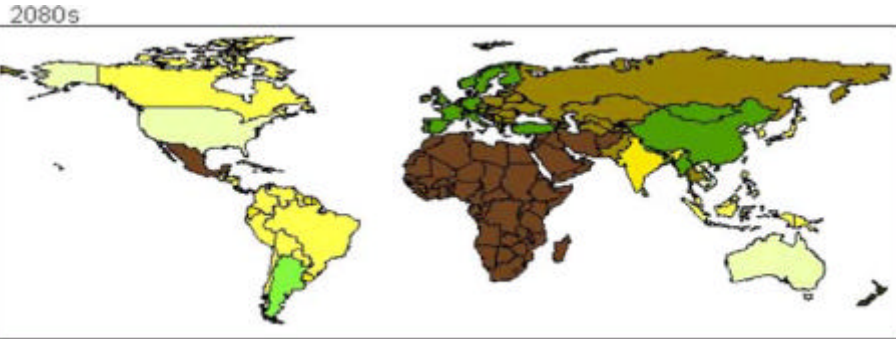
# Socio-Economic Impacts of Climate Change

- Increased water & food insecurity
- Threatened human settlements & livelihoods
- Adverse impacts on health & on education
- Negative impacts on economic growth, including via agriculture & damaged infrastructure
- Destroyed biodiversity & damaged ecosystems
- Poor countries particularly will be badly hit but impacts will affect everyone, including population movement & conflict

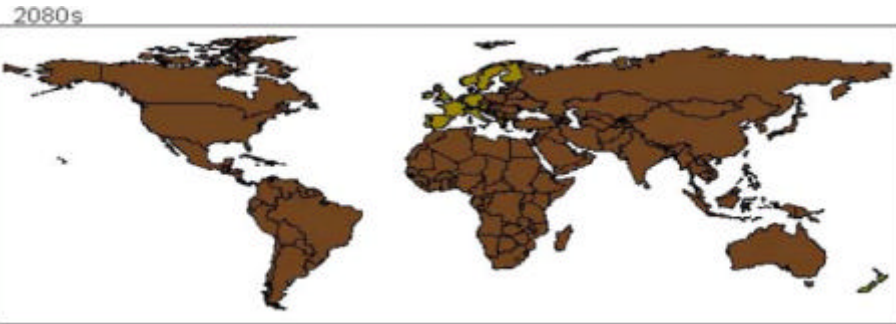
# Climate Impacts on Agriculture & Food Security

- Potential changes in national cereal yields for the 2080s (compared with 1990) with CO2 effects (a) & without (b)

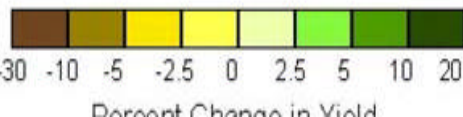
- Climate impact on Robusta coffee in Uganda



(a): with CO2 effects

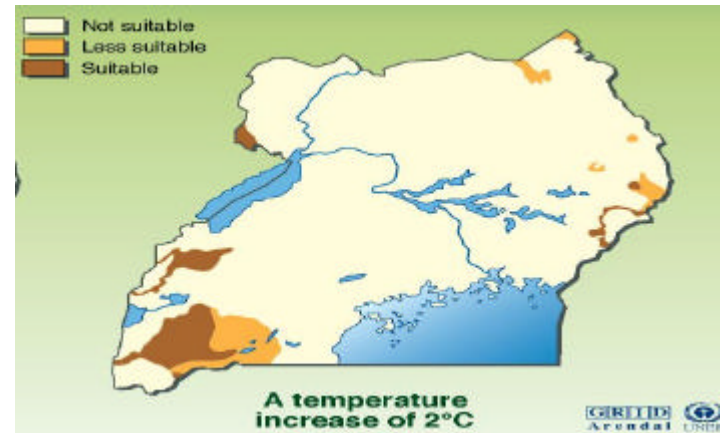
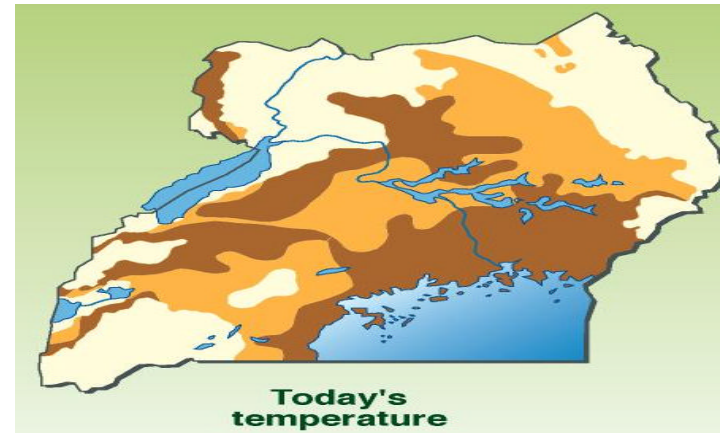


(b): without CO2 effects



Source: Parry *et al.* (2004)

IPCC A1F1 scenario



## **Part 2:**

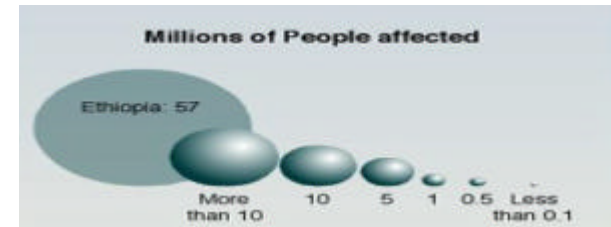
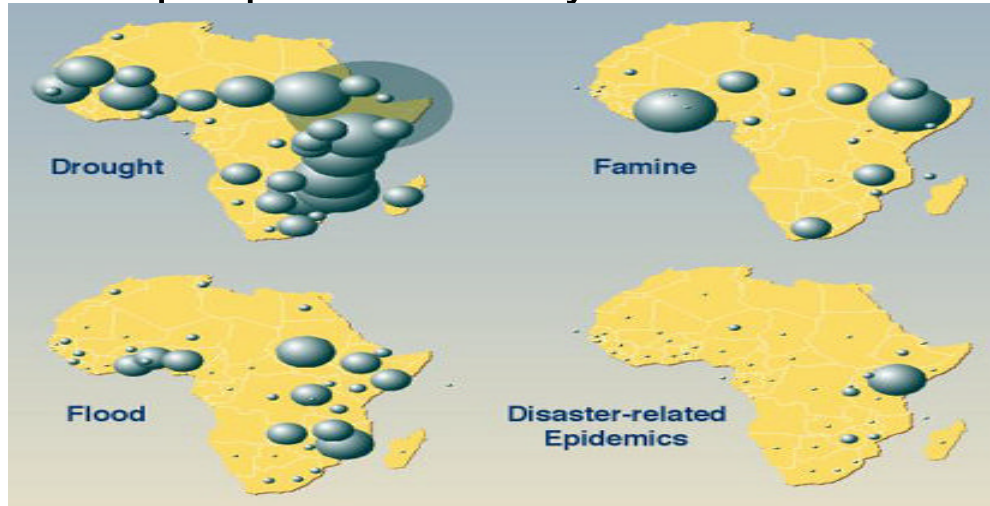
# **The implications of climate change for development – the role of adaptation**

# What do the Impacts of Climate Change mean for Development?

- Climate change impacts will affect everyone...But poor countries are already vulnerable to climate variability & have the least capacity to respond
- Climate change will severely damage progress on goals for development in the world's poorest regions
- Costs of climate change can be reduced through both adaptation & mitigation – but adaptation is the only way to cope with impacts of climate change over next few decades.
- Adaptive capacities need to be increased to sustain developmental activities in the face of climate change
- Multi-pronged approach to adaptation needed:
  - Reducing vulnerability through development & diversification
  - Investing directly to reduce vulnerability
  - Information
  - Financing adaptation

# Africa already Vulnerable to Impacts of Climate Variability

- Millions of people affected by natural disasters between 1971 - 2000



Source: The Office of US Foreign Disaster Assistance (OFDA). The Centre for Research on the Epidemiology of Disasters (CRED). International Disaster Database. [www.cred.be/emdat](http://www.cred.be/emdat), Universite Catholique de Louvain, Brussels

- Economic impacts of disasters e.g.
  - Mozambique: total measurable flood costs approx \$550 million or 12% GDP (2000)
  - Kenya: adverse health impacts of La Nina drought amounted to 6% GDP (1997-98)
- Climate instability & resulting scarcity of resources (water, food) contribute to population movement & conflict e.g.
  - SSA: 7 million people migrated in order to obtain relief food
  - Sudan's Northern Darfur State: 20 years of below average rainfall have contributed to migration & conflict over land & other scarce resources

# Adaptation: Reducing Vulnerability through Development & Diversification

- Poverty & existing stresses (e.g. high disease burden, conflict etc) limits ability to cope with & recover from climate shocks
- Progress on development goals helps reduce vulnerability to climate variability & change & build capacity to adapt; e.g. education & eradicating malaria
- Diversification is important to reduce vulnerability:
  - Livelihoods: Income diversity, rural-urban linkages
  - Agricultural: Crop & livestock diversity
- Importance of gender issues
- Contribution of development policy:
  - Link climate change & key policy areas e.g. health/education
  - Link climate change & responses to disasters
- *Thus do not separate climate change from development policy & action*

# Adaptation: Investing Directly to Reduce Vulnerability

- Effective adaptation requires investment to reduce specific climate risks:
  - *Natural Capital*: Protecting resilience of natural systems e.g. mangrove belts as storm breakers
  - *Physical Capital*: Making infrastructure more climate resilient e.g. building codes, land use zoning, river management, warning systems
  - *Technology transfer*: Supporting flows of knowledge, e.g. climate-resilient crop varieties & irrigation schemes.
- Combined effort of public & private sector, civil society & international community needed
- Improving disaster preparedness & disaster recovery
- Contribution of development policy
  - Risk screening for major infrastructure projects
  - Strengthening natural & man-made climate resilience
  - Funding to develop drought & flood resistant crops & transfer of technology

# Adaptation: Information

- Understanding how the climate is changing is essential for integrating climate risk into the development process & comprehending how & why adaptation is necessary
- We know very little about Africa's climate e.g. the density of weather watch stations in Africa is 8 times lower than the minimum level recommended by the World Meteorological Organisation, & reporting rates are the lowest in the world.
- Effective communication of climate data to stakeholders is essential e.g. policy-makers need to use climate information effectively in planning.
- Global Climate Observation System (GCOS) is a good starting point
- Contribution of development policy
  - International assistance is needed to improve availability of information about future climate scenarios (G8 commitment)

# Adaptation: Financing

- Least developed countries will be hit hardest & earliest by climate change
- Costs of adaptation will be relatively more for poorer societies & will be difficult in the face of uncertainty
- Developed countries – as the main source of existing changes - have a responsibility to assist these countries in adapting to climate change
- Sources of funding:
  - Global Environment Facility (GEF)
  - Adaptation Fund
  - Least Developed Countries Fund
  - Special Climate Change Fund
  - Energy Investment Framework
- Climate change further strengthens case for international action to fight poverty & promote development - essential to deliver on 2005 commitments on aid

# **Part 3: The global challenge of mitigation – building an international response to climate change**

# Building an International Response: Integrating the Economics with the Science

- The science tells us that climate change is
  - an international collective action problem
  - with long-term impacts
  - with uncertain implications & potential for major disruption to societies and economies
- Adaptation is essential but unlikely to be an adequate response given the magnitude of the risks
- To stabilise at or below 550 ppm, emissions must start to fall soon
- Emissions from large developing countries are growing rapidly – these countries will need to be part of the solution
- All countries see maintaining growth as crucial, particularly in the fight against poverty, hence must ask whether we can be green & grow

# Green Growth

- Developing countries can be green & grow but should look to developed countries to help with incremental costs of investing in clean energy sources & technology transfer, particularly carbon capture & storage (CCS) in India & China
- Energy investment choices can support national objectives for growth, energy security, efficiency, local environmental quality and climate change
- Energy supply & access a key issue for Africa:
  - *Renewables*: more economical than conventional generation for some off-grid applications
  - *Coal*: reality that it will feature in Africa's energy mix so need to look at opportunities to reduce carbon content e.g. CCS, energy efficiency
  - *Transport*: greater use of biofuels; opportunities to reduce carbon content of coal to liquid process through CCS
- Green growth possibilities illustrated by Brazil: switched from oil imports to production of ethanol from sugarcane, reducing import costs, dependence on oil & creating opportunities in rural areas

# Routes to Mitigation With Growth

- Maintaining growth whilst reducing GHG emissions from energy requires
  - Increased efficiency and strong innovation that in turn requires appropriate incentives & stable policy frameworks
  - Support to lower carbon development options in energy, transport, waste & urban planning
  - Action in line with investment cycles to help reduce transition costs
  - Improved access to technology e.g. carbon capture & storage
  - International funds to help meet incremental costs of lower carbon investment, estimated to be at least US\$40 billion per year in developing countries
- Clean development mechanism (CDM) currently the main channel, providing around €500 million per annum - a long way from generating the required flow of incremental capital
- Deep & liquid global carbon markets are needed, with EU ETS, Japanese business, US regional initiatives & World Bank EIF
- Scaling up market based mechanisms to support growth based on clean technology & energy efficiency will be a key challenge for future action on climate change

# Role of South Africa & Regional Action

- South Africa is responsible for the bulk of Africa's emissions: can and is showing leadership within Africa on tackling climate change:
  - Politically: Chair of the G77+ for Nairobi in November and hosting the informal ministerial dialogue in June
  - Demonstration: e.g. White Paper on Renewable Energy (2003), National Climate Change Conference and Kuyasa low-cost urban housing energy upgrade project
- Pan-African and regional co-operation will be essential for both adaptation and mitigation
  - NEPAD
  - African Development Bank
  - Africa Union
  - Economic Commission for Africa

# Questions for Discussion

- Adaptation:
  - What are the key investments & actions needed?
  - How to better prepare and respond to climatic disasters?
  - How to integrate with development policy & actions more broadly?
- Mitigation:
  - What are the options for clean energy in Africa?
  - How can these be promoted?
- Donor Support:
  - How can the international community help finance Africa's efforts to respond to climate change?
  - How can technologies & institutions be supported?