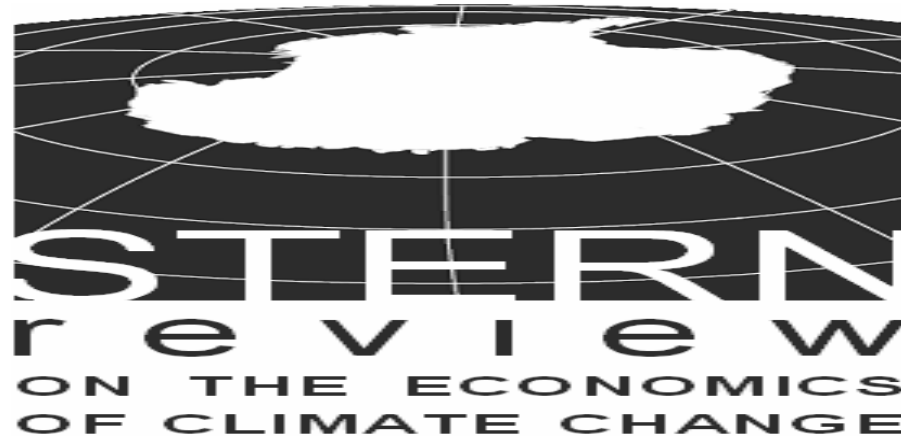


Responding to the Challenge of Climate Change



Sir Nicholas Stern,

Head of the UK Government Economic Service

April 25th, 2006

***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

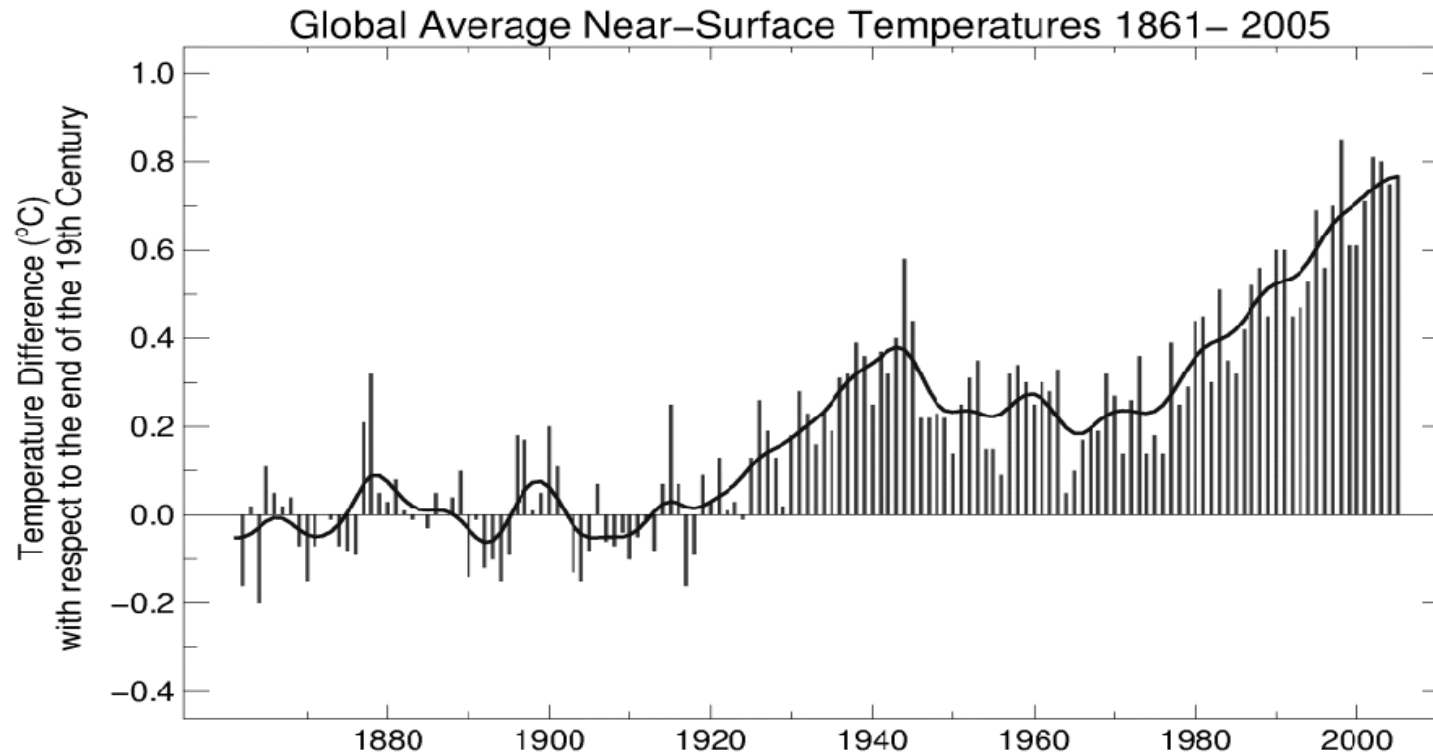
Part 3: The global challenge of mitigation – building an international response to climate change

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

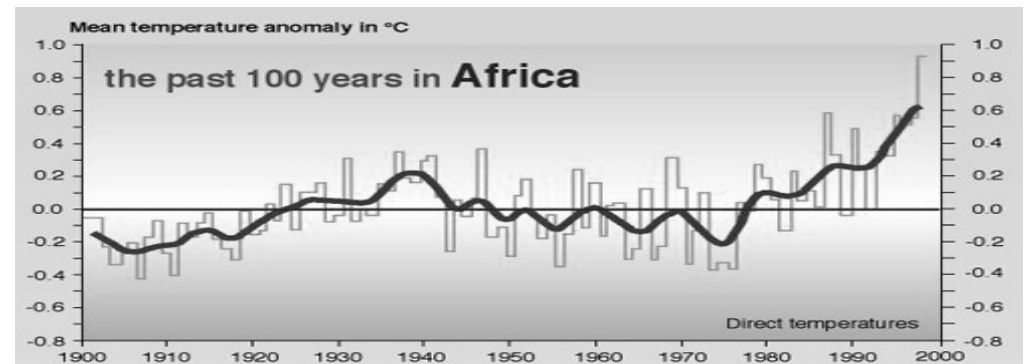
The Science of Climate Change

- The basic science of climate change was established in the 19th 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 CO₂ 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.

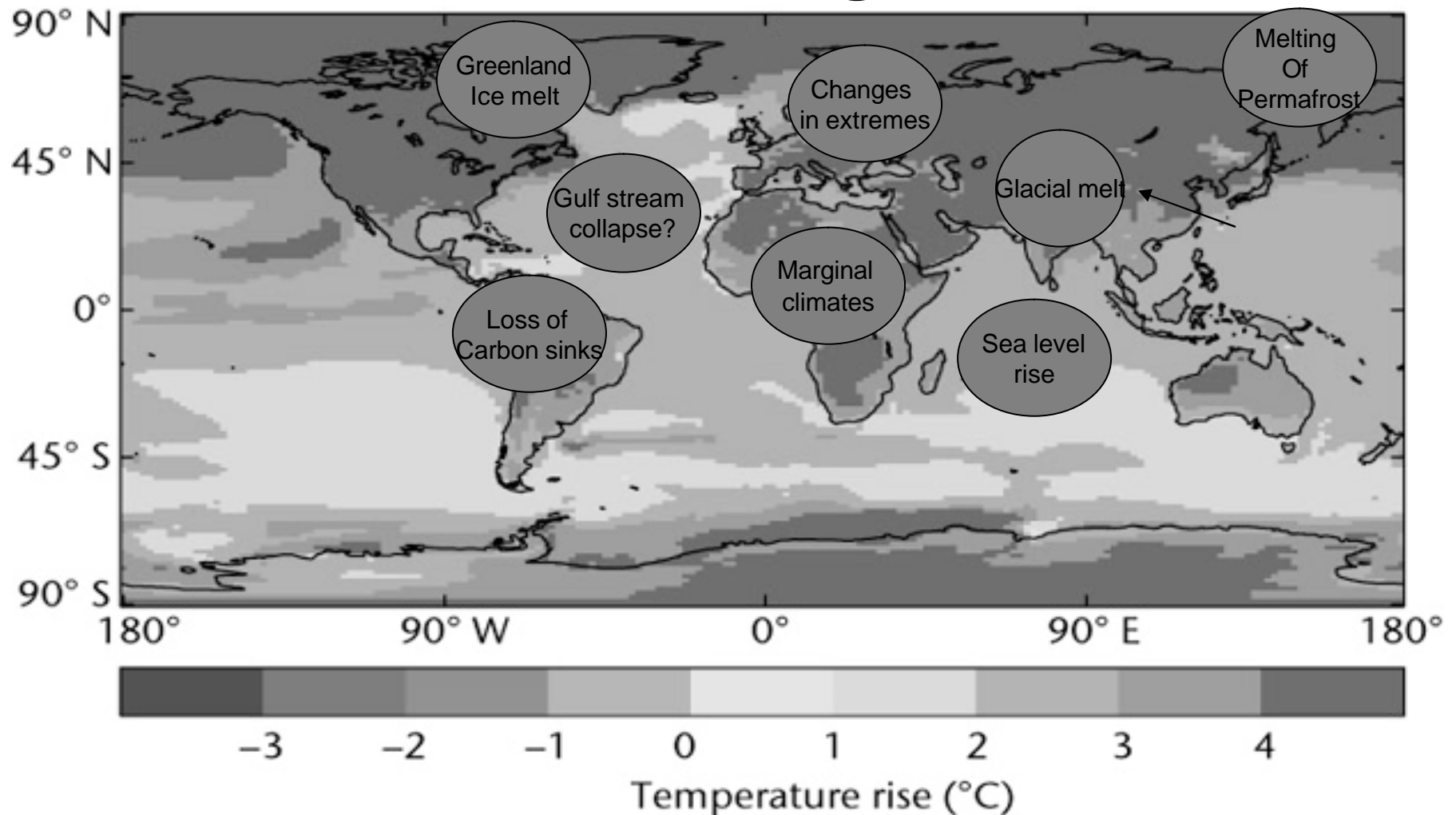
Strong Global Warming Observed



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



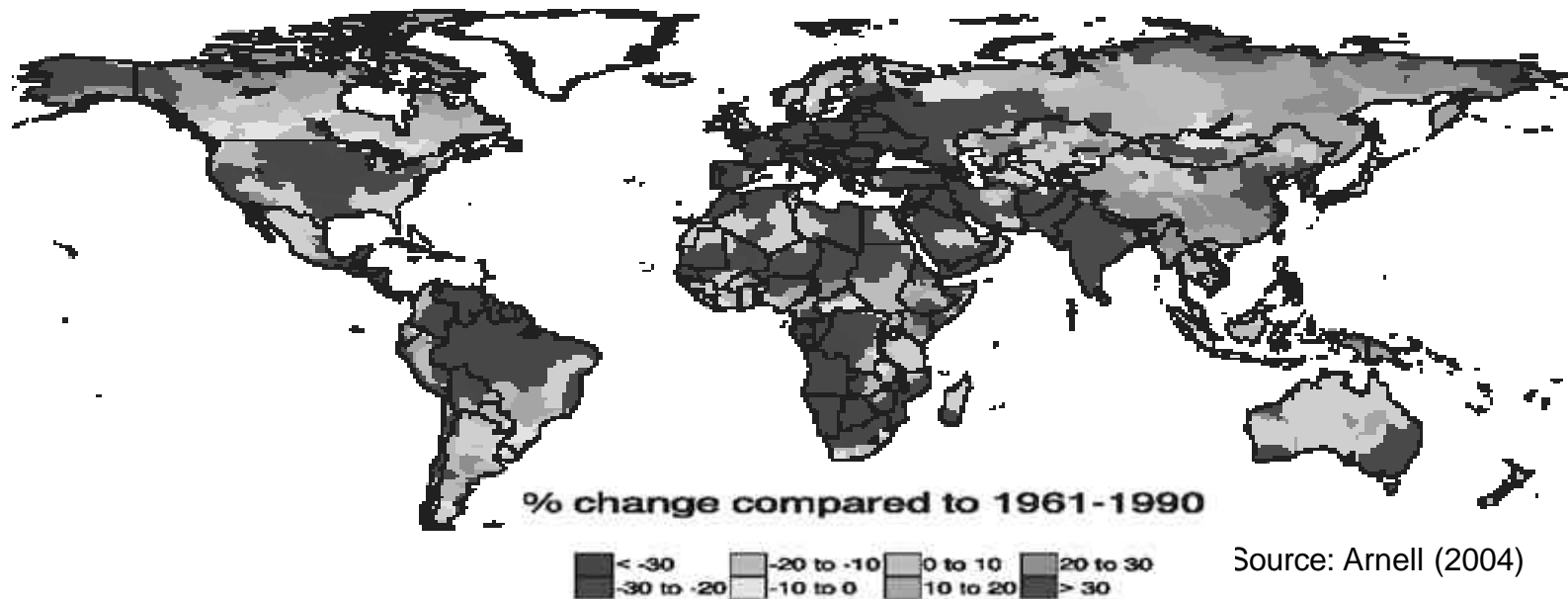
Impacts of Climate Change: *the sting is in the tail...* possible severe climate change scenarios



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



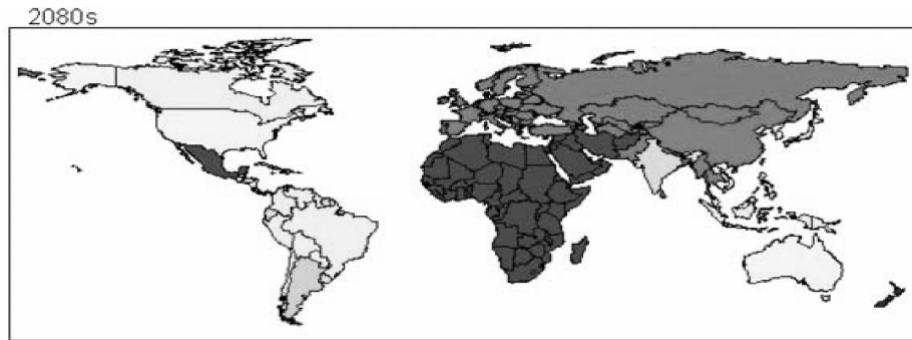
- Warming will lead to major changes in water availability across the globe by the 2050s, based on IPCC Scenario A1
- Water resources will be under increased pressure as climate change reduces supply through rising temperatures & changing precipitation & raises demand through greater need for irrigation.

Socio-Economic Impacts of Climate Change

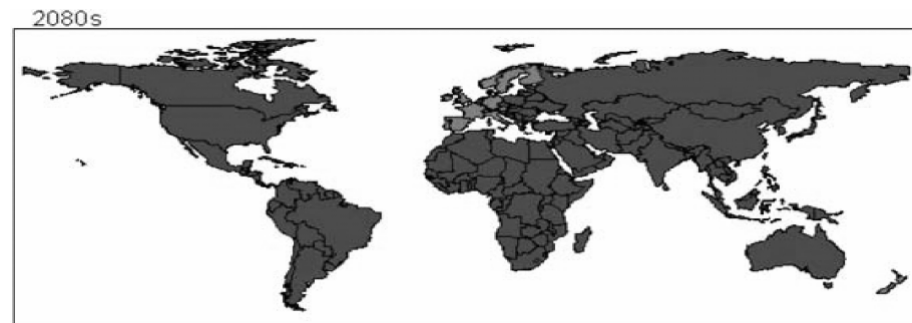
- Increased water & food insecurity
- Threatened human settlements & livelihoods
- Adverse impacts on health & on education
- Negative impacts on economic growth, including via agriculture & damaged infrastructure
- Destroyed biodiversity & damaged ecosystems
- Poor countries particularly will be badly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

Climate Impacts on Agriculture & Food Security

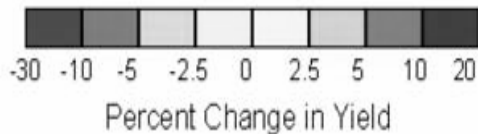
- Potential changes in national cereal yields for the 2080s (compared with 1990) with CO2 effects (a) & without (b)



(a): with CO2 effects



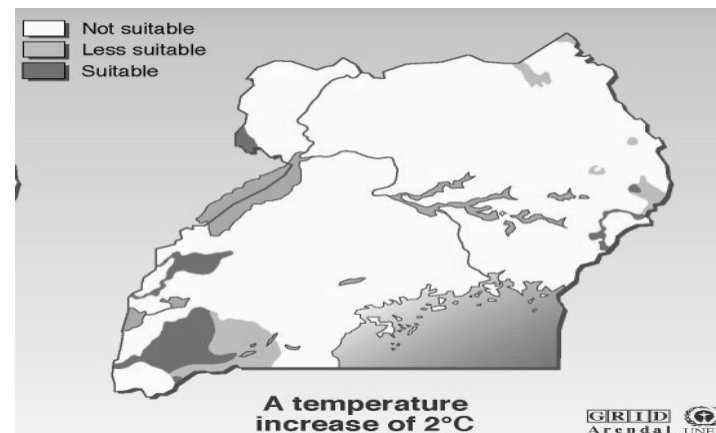
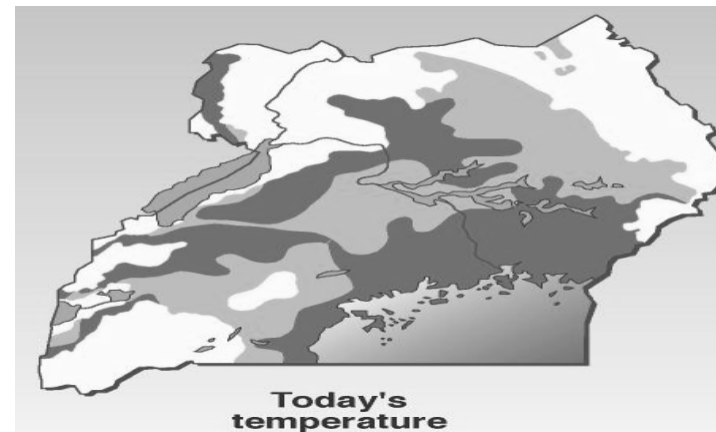
(b): without CO2 effects



Source: Parry *et al.* (2004)

IPCC A1F1 scenario

- Climate impact on Robusta coffee in Uganda



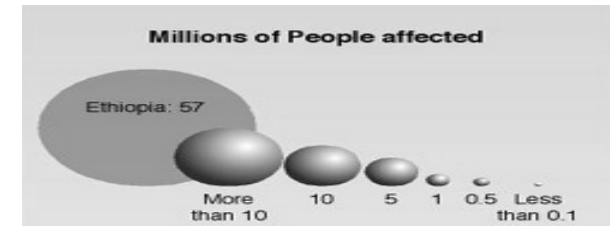
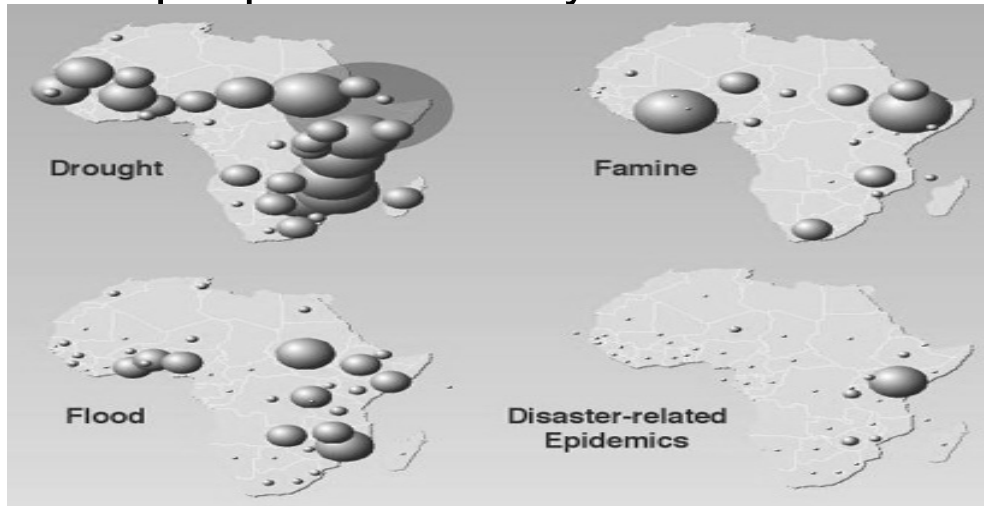
Part 2:
**The implications of climate
change for development –
the role of adaptation**

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, 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?