



**Adaptation
to
Climate Change
in Latin America and the
Caribbean**

**Activities, lessons learned and
recommendations for further
work**

IPCC : Summary for Policymakers 2007

- **Warming of the climate system is unequivocal**
- **The cause is very likely man-made and would continue for centuries**
- **Water shortages, heat waves, storms and floods are likely to be the result of global warming caused by human actions**

IPCC Fourth assessment report predictions:

For the next two decades a warming of about 0.2 C per decade is projected (for a range of IPCC Special report on Emission scenarios)

The best estimate for the low scenario is 1.8C and the best estimate for the high scenario is 4C (temperature change at 2090-99 relative to 1980-99)

Increase in temperature

- 0.6 C:
- 0.6 C:
- 1.0 C:
- 1.6 C:
- 2-3 C:
- 4 C:

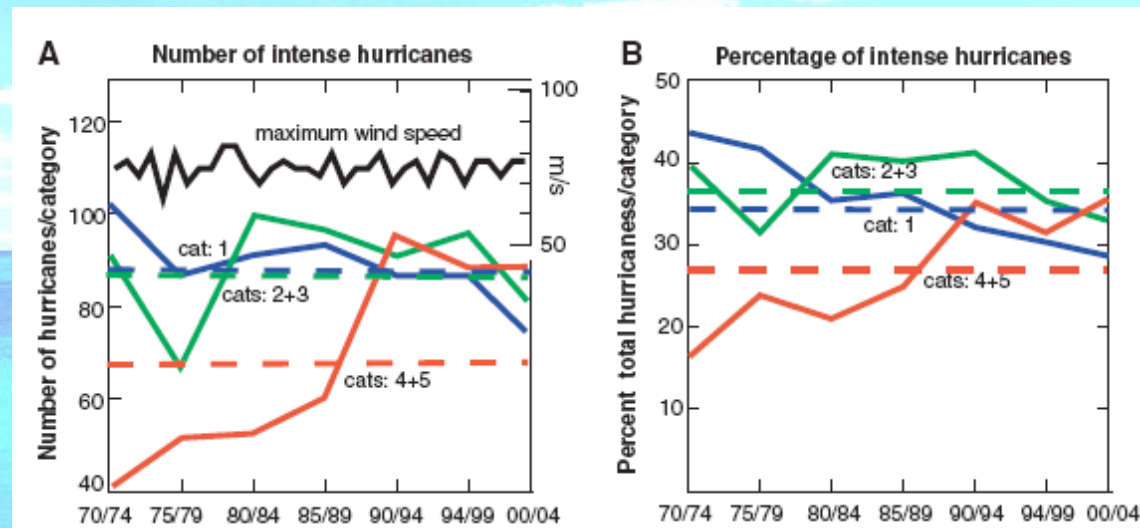
Expected consequences

Wholesale Coral Bleaching
West Antarctic starts to melt
Rapid retreat of tropical glaciers in the Andes
Onset of Greenland melting and rise of sea level
Loss of density of Amazon rainforest
Possible collapse of Gulf current

Summary of current impacts for the Caribbean

There are already many signs of the impacts of global warming in the Caribbean and worldwide...

- Catastrophic loss of Corals affect fisheries and tourism in Caribbean basin
- Sea level increase affects coastal aquifers and ecosystems
- Hurricane intensification threatens coastal populations and infrastructure



Examples of economic impact from climate change in the region by 2050

- **Combined impact of sea level rise, loss of fisheries and tourism calculated to equal 5-30% of GDP in the Caribbean**
- **Water supply to cities will be affected (Quito may see water supply costs increase by 30%, La Paz, Lima, Bogotá also to be affected by diminished supplies caused by climate change)**
- **Power generation will be more expensive as it shifts from hydro to thermal**
- **Health costs will be affected by increased exposure to tropical diseases**
- **The cost of hurricane impact has increased by two orders of magnitude in the Caribbean basin in the last 20 years and hurricane intensity is expected to continue increasing**
- **Loss of biodiversity and ecosystem integrity: priceless!**
- **Bank is currently assisting in estimating CC impact cost**

Three lines of action:

**1. Institutional strengthening
seeking to empower the region to play an
active and influential role in the
international climate agenda.**

2. Carbon finance

**Maximize the value and synergies of carbon
revenues by tightening the linkage
between these resources and local
environmental and social priorities**

3. Adaptation

**Priority number one in Latin America;
Large costs imposed on global community by
emission of GHGs.**

**Irreversible impacts and losses of environmental
services require immediate action;**

**Implement activities in key sectors that can
illustrate the costs and benefits of adaptation
as a springboard to unavoidable large scale
adaptation efforts.**

**CC impacts fall most heavily on those least able
to respond, and often on those that
contributed very little to its causes.**

(GEF – SCCF)

Knowledge management

- **Agreements with leading scientific institutions (data and analysis focused on Latin America)**
 - Meteorological Research Institute (Japan)
 - National Center for Atmospheric Research (USA)
 - Pool of glaciology institutes (Insbruck, IRD, MIT)
 - Japanese Space Agency
 - NOAA (USA)
- **Earth Simulator:**
 - Runs 550 ppm and 650 ppm stabilization
 - **Architecture:**
 - 40 Teraflops!!!!!!!!!!
 - Joint ocean-atmosphere model.
 - 20 x 20 km grid resolution
 - Future 5 x 5 km grid resolution
 - developed jointly by the Center for Climate System Research (CCSR) of the University of Tokyo and the Japanese National Institute for Environmental Sciences (NIES).

Knowledge management

- **Cooperation with MRI on the Earth Simulator:**
 - training in Japan to enable efficient use of ES data
 - technical assistance to interpret results
 - cooperation for dissemination of results in scientific literature
 - data storage
 - scientific exchange
 - feedback to ES for better future simulation at regional level
 - participation in meetings of the Subsidiary Body for Scientific and Technical Advice (SBSTA) and IPCC.
 - ES results made available for specific coastal areas in 3 countries of the Caribbean covering marshlands, inland wetlands, coral reefs, and areas of tourist and fishery activities

Carbon finance at the World Bank

- **Seven funds: E\$1,3 billion (European and Japanese)**
- **In Latin America:**
 - 35 projects under preparation
 - 24 projects under supervision (ERPAS)
 - Renewable energy (solar, eolic, geothermal)
 - Waste management (landfill gas, wastewater treatment)
 - Transport
 - Carbon sinks (reforestation, avoided deforestation, ecosystem recovery)
 - Others (industrial gases)

Financing adaptation at the World Bank

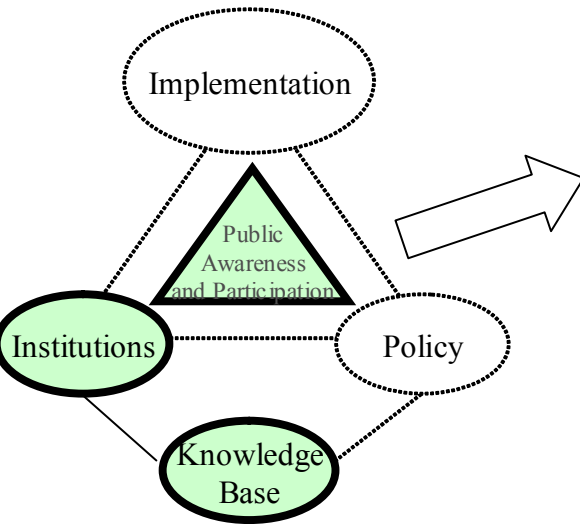
- **GEF**
 - **General trust fund (Climate Change Focal Area)**
 - **Strategic priority on adaptation (US\$50 million)**
 - **Special Climate Change Fund (~US\$70 million in pledges)**
- **Japanese Climate Change initiatives grant (US\$10 million/year)**

What is being done at the World Bank in the region?

- **Mitigation efforts through the Kyoto Protocol**
- **Adaptation efforts through GEF and other sources of funding**

CPACC

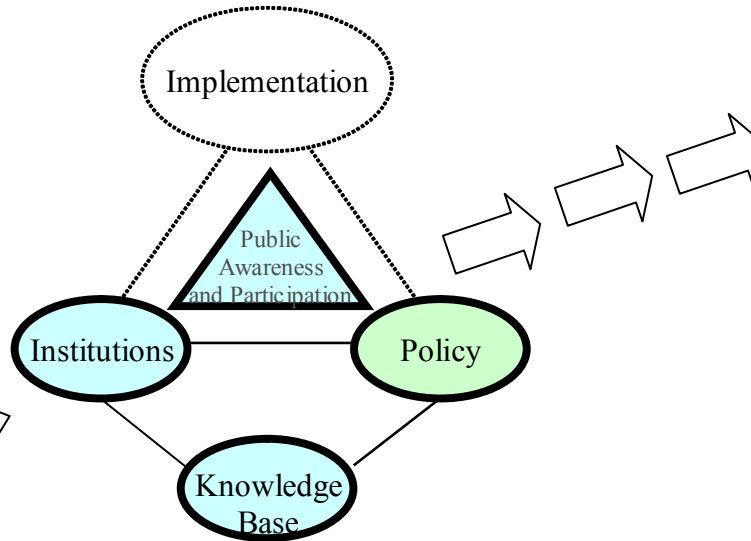
**Building awareness
and strengthening
knowledge base**



- **Building Awareness.**
- **Building monitoring and analysis capability**
- **Building planning capacity in institutions**

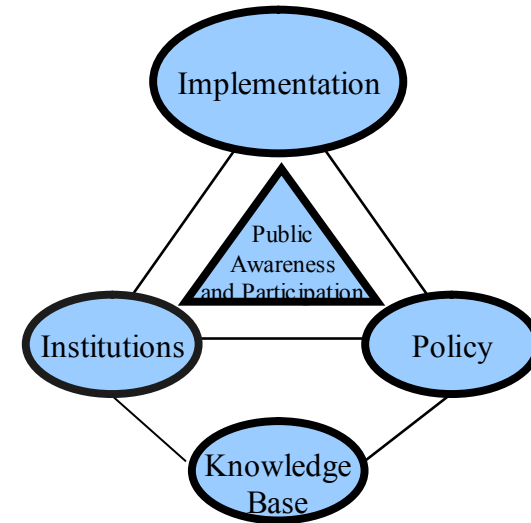
MACC

**Creating an enabling
environment for
adaptation**



- **Developing national policy framework for adaptation.**
- **Mainstreaming climate change issues into key sector activities.**
- **Preparation of pilot adaptation projects.**
- **Further strengthening of awareness and participation.**
- **Further strengthening of knowledge base**

Adaptation



- **Policy framework for adaptation in place**
- **Projects being implemented.**
- **Awareness and participation high.**
- **Monitoring, analysis and planning integrated throughout all national and sectoral planning.**

Caribbean Community Climate Change Center

- **Regional center of excellence in capacity building, technical assistance, as well as support mechanism to Caricom countries**
- **Designed to be:**
 - **An advisory body on climate change policy and a source of scientific and technical information on climate change and its potential impacts on the region.**
 - **A coordinating body for climate change adaptation and mitigation activities, enhancing institutional effectiveness and maximizing synergies and cross-sectoral linkages**
 - **A resource mobilization institution for regional and national activities in the field of climate change.**
 - **Creation mandated in 2001, inaugurated in 2005, implementing agency for SPACC, and soon for MACC**

Implementing adaptation measures in coastal zones of Dominica, Saint Lucia and St. Vincent & the Grenadines (GEF - SPA-US\$7 m)

- The objective is to support efforts to implement specific (integrated) pilot adaptation measures addressing primarily, the impacts of climate change on their natural resource base, focused on biodiversity and land degradation along coastal and near-coastal areas.**

Adaptation options:

- **Adaptation to changes in water supply and to CC impacts on coastal ecosystems in the Islands of Bequia and Union (St. Vincent & the Grenadines)**
- **Strengthened critical coastal infrastructure in the Castries area (St. Lucia).**
- **Morne Trois Pitons National Park Integrated Ecosystem Management (Dominica).**
- **Approved: Sept 6, 2006**

Combining adaptation and mitigation

- **Trinidad and Tobago: Nariva Wetland Restoration and Carbon Offset Project:**
- **Bio Carbon Fund: E\$2 m**
- **Objective: Cause carbon sequestration through reforestation and restoration of Nariva Wetlands ecosystem**
- **A restored coastal ecosystem:**
 - **Will promote carbon sink (compensated through Bio Carbon fund)**
 - **Will protect biodiversity (65 species of endemic birds)**
 - **Will provide buffer to storm surges for inland communities (adapting to stronger hurricanes)**

Colombia: Integrated National Adaptation Plan (US\$15 m-SPA)

- Complement specific pilot adaptation measures to meet the anticipated impacts from climate change focused on key priorities identified under the National Communications
 - High altitude moorlands (water regulation, carbon storage, hydro-energy)
 - Riparian belts, reforestation, habitat conservation
 - Insular areas
 - Rain harvesting, water demand management, protection and monitoring of a MPA
 - Increased exposure to Malaria and Dengue
 - Strengthen detection and prevention programs and infrastructure
 - Board approved April 11, 2006

Mexico: Gulf Coast Wetlands

Adaptation to climate change impacts on coastal wetlands in the Gulf of Mexico through improved water resource management – US\$ 28 m-SCCF (INE)

(Coastal areas subject to flooding with 0.25 m increase in sea level)

Objective: Reduce vulnerability to anticipated Impacts from CC on Mexico's water resources, with primary focus on coastal areas of Gulf of Mexico and associated basins. Protection of environmental and economic functions from CC related impacts:

- National climate impact on water budget assessment
- On gulf coast wetlands (address impacts from subsidence and salination):
 - Restoration of natural surface drainage
 - Rationalization of water use
 - Regeneration of soil cover



Other adaptation projects in the region:

- **Andean Moorlands: greater contribution to water regulation than tropical glaciers:**
Objective: Understand carbon and water cycles (CCIG)
 - **Compensate for loss of water regulation in Las Hermosas**
 - Soil cover recovery over 10000 ha
 - Widen riparian vegetation belt
 - Optimize water demand
 - **GEF Central Andes Regional Adaptation Project (Bolivia, Ecuador, Peru):**
 - **Objective: Implement key measures to address impacts from affected glacier regulated water flow on Human consumption, Agriculture, Energy, Ecosystems**
Components:
 - **Water supply for human consumption, agriculture and ecosystem integrity:**
 - Development of alternative sources
 - Demand management
 - Engineered storage
 - **Energy supply**
 - Diversification of supply
 - **Agriculture**
 - Alternative crops, advanced irrigation systems
- Scheduled for GEF approval by July 07*
- **Regional Andes: CCIG**
 - **Set up of monitoring network of field stations for priority glaciers (from environmental service perspective)**
 - **Remote sensing of tropical glaciers through ALOS (Advanced Land Observation System, Japan)**

Recommendations

- **Adaptation is about development, and should therefore be focused on integrating climate change risks and adaptation measures into development actions on the ground**
- **Thus, Mainstreaming of climate concerns into national and regional policies and development activities is essential**
- **Strengthen work on institutional development and technical assistance in climate change is required.**
- **Better understanding of regional climate trends and projected impacts is supported.**
- **Work on ecosystem restoration and climate change adaptation need to be made more complementary and mutually supportive**
- **Synergies between the mitigation work (with carbon revenues) and adaptation opportunities in the region are sought.**

Recommendations

- **Disaster mitigation and climate change require of a common approach that would benefit decision making today to address long term risk management.**
- **Adaptation, even through no regrets actions, will be expensive and will require considerable funding well beyond of what is available today through the GEF funds and other sources.**
- **A few regional priorities have to be carefully selected to cover a range of situations, where the probability of success is the highest.**
- **Economic assessment of CC impacts at a regional and sectoral level.**
- **CC Mitigation and Adaptation should be central to sustainable development agenda**