

# **Vulnerability and Adaptation to Climate Change in Small Island Developing States**

## **BACKGROUND**

Dr. Graham Sem  
Sustainable Environment Management Limited  
53 Warwick Avenue, Westmere  
Auckland, New Zealand  
E-mail: [gsem@xtra.c.nz](mailto:gsem@xtra.c.nz)

*UNFCCC Expert Meeting on Adaptation for Small Island Developing States (SIDS): Part  
II Pacific and Indian Ocean SIDS, Rarotonga, Cook Islands, February 26-28, 2007*

# Outline

- **Introduction and Context (1)**
- **Data, Methods and Tools for V&A Assessments (2)**
- **Key Vulnerabilities (3)**
- **Adaptation to Climate Change (4)**
- **Risk Management, Risk Reduction and Insurance (5)**
- **Cooperation and Opportunities for Adaptation (6)**
- **Conclusion and Issues for further Consideration (7)**



# Introduction and Context (1)

- Decision 1/CP.10: requested the secretariat to organize three regional workshops and **an expert meeting for SIDS**, reflecting **issues of priority identified by that group**, in order to **facilitate information exchange and integrated assessments to assist identifying specific adaptation needs and concerns.**
- Main purpose is to stimulate discussion on priorities and issues for further consideration
- Exchange of information and experiences of different practices within SIDS

# Introduction and Context (1)

- 51 States and Territories spread over the Pacific, Indian and Atlantic Oceans and Caribbean Sea
- Climate is predominantly influenced by ocean-atmosphere interactions - Tropical cyclones, hurricanes (storm surges, inundation, erosion)
- 1950-2004: average costs of damage per cyclone is \$US75.7 million (2004 value) and in the Caribbean damage cost was over US\$2.2 billion in only four countries – Bahamas, Grenada, Jamaica and Dominican Republic. In the Pacific Islands Region, estimated cost of damage in the last decade is over US\$2.8billion



# Introduction and Context (1)

- Dominant climate regimes in the Pacific influenced by trade winds, Hadley-Walker Circulation system, movement of ITCZ, SPCZ, and ENSO
- Caribbean climate is influenced by North Atlantic Subtropical High (NAH) – dry winters and wet summers
- Indian Ocean climate influenced by Asian Monsoon system

# Introduction and Context (1)

- SIDS characterized by small populations, limited resources, remoteness, susceptibility to natural disasters, highly dependent on international trade and vulnerability to global events, and lack of economies of scale
- SIDS contribute less than one percent of global emissions of GHGs
- SIDS already experience adverse effects of climate change – sea-level rise; tropical cyclones/hurricanes, droughts, increasing sea surface temperatures, coral bleaching
- Sustainable development challenges – water resources, agriculture, coastal infrastructure and activities, human health, tourism, fisheries, biodiversity
- Livelihood, resilience and adaptive capacity is low



# Data, Method and Tools for Assessment of Impacts, Vulnerability and Adaptation (2)

- Data Needs and Observations – South Pacific Sea Level and Climate Monitoring Project (1992-), and Caribbean Planning for Adaptation to Climate Change (1997-2000).
- National Meteorological and Hydrological Services (NMHS) are responsible agencies for climate observations
- Many networks not working efficiently due to: limited assigned satellite window for data transmission, low frequency of recordings; delays in maintenance and replacement, incorrect calibration of equipment, accessibility to products and services is limited.

## Data, Methods and Tools (2)

### Participation in Global Climate Observing Systems

- - GCOS – 10 regional workshops between 2000-2006:  
Regional Action Plans to respond to needs
- Pacific Islands Global Climate Observing System (PI-GCOS)  
– addressing capacity-building needs, GUAN, GSN, climate prediction and improved telecommunication and data rescue
- Regional Action Plan for Central America and the Caribbean  
– many elements being implemented through MACC project and upgrades of GUAN and GSN networks, data rescue, assessment of surface and groundwater monitoring networks.



# Data, Method and Tools (2)

## Application of scenario-based and vulnerability-based methods

- Scenario-based approaches to V&A assessments in INC process using GCM projections from various modeling centres (e.g. Hadley Centre, Canadian Climate Change Centre, Geophysical and Fluid Dynamics Laboratory (GFDL), CSIRO, etc. – “top-down”)
- Problems of scale and utility which meant that many assessment focused on sensitivity analysis rather than integrated assessments
- Vulnerability-based – e.g. CPACC started to use “bottom-up” approaches to V&A assessments, Capacity-building for development of adaptation measures in the Pacific island countries project (CBDAMPIC) also used bottom-up approaches

# Data, Methods and Tools (2)

## Needs, requirements and training

- Lack of or limited baseline information constrains the understanding of impacts of climate change and their interlinkages, in-depth, national integrated assessments in SIDS
- CGE Hands-on training workshops were conducted on use of various assessment method/tools to enable NAI Parties to prepare their second national communications (e.g. MAGICC-SCENGEN, Dynamic Interactive Vulnerability Analysis (DIVA)).
- No training workshop held for SIDS by the CGE



# Key Vulnerabilities in SIDS (3)

- SSTs have increased by  $0.1^{\circ}\text{C}$  per decade in oceans where SIDS are located.
- Caribbean region – number of very cool days and nights is decreasing, extreme inter-annual temperature range is decreasing.
- Pacific region – annual number of hot days and warm nights is increasing, increasing trend in mean rainfall in NE of ITCZ. Increases in surface air temperatures have been greater in the Pacific than global rates of warming
- AOGCMS simulated well broad scale pattern of temperature and precipitation across SIDS regions, although rainfall amounts vary between models

# Key Vulnerabilities (3)

## Current and future impacts and vulnerabilities

- Agriculture and fisheries – effects from land loss, salinisation, sea-level rise and drought on subsistence and commercial agriculture. Fisheries contribute 10% to GDP in many SIDS, ENSO effects on Tuna fishery is significant for many SIDS
- Biodiversity – coral reef and mangroves suffer extensive damage from extreme climate events (i.e. cyclones and drought on coral reefs)
- Water resources – critical for SIDS as most rely on rainwater as primary source of freshwater (potable). Those who rely also on groundwater resources are also seriously affected due to lack of recharge during drought (ENSO)



# Key Vulnerabilities (3)

- Coastal Zones, Marine resources and settlements
  - almost all infrastructure and socio-economic activities and populations are located on or near coasts
  - Coastal erosion is a chronic problem exacerbated by extreme weather events
  - any rise in SL will mean significant and serious losses for SIDS economies, e.g. a 50cm rise would result in loss of up to 60% of beaches in some areas.
- Tourism sector – drought, sea-level rise, erosion, degradation of coral reefs, incidence of vector-borne and water-borne diseases would all affect tourism in SIDS

# Adaptation to Climate Change (4)

## Current experiences on community-based adaptation

- People and communities in SIDS have been resilient over many generations but this resiliency is serious being undermined by climate change and sea-level rise – use of traditional coping mechanisms/strategies
- Relocation of a community to a higher inland location in Vanuatu and Cuba, and placing of concrete blocks to hold down roof in Jamaica are two examples in response to effects of climate change, climate variability and extreme events



# Adaptation to Climate Change (3)

## Possible Adaptation Options

- Most adaptation initiatives have been part of enabling activities – national communications, national adaptation programmes of action in SIDS LDCs
- Possible measures relate to:
  - ✓ Biodiversity and land degradation
  - ✓ Infrastructure and settlement
  - ✓ Water resources
  - ✓ Capacity-building and training

# Adaptation to Climate Change (4)

## Adaptation policy processes and projects

- National adaptation programmes of action – SIDS LDCs (e.g. Samoa, Vanuatu, Kiribati, Solomon Islands, Union of Comoros)
- Programmes and Projects
  - ✓ Multi-country projects in the Pacific and the Caribbean (e.g. PICCAP, MACC)
  - ✓ Global projects that SIDS countries participate in, e.g. Samoa on Community-Based adaptation and Fiji on Human Health
- Numerous programmes and projects (refer to pages 21-23 of background document)



# Risk Management, Risk Reduction and Insurance (5)

- Many SIDS have Disaster Preparedness and Management policies and legislation, e.g. Pacific Island Governments - Emergency Management Cook islands.
- Formulation and implementation of risk reduction strategies is constrained by institutional reforms, i.e. reduction in government support and services
- *Ex-ante* measures in the form of insurance would be far more beneficial for the affected community and economy than *ex-post* mechanisms such as credit, government subsidies or private donations.
- *Ex-ante* approach offers the potential to influence the level of risk, through linking insurance prices and conditions with government policies on disaster mitigation, etc

# Risk Management, Risk Reduction and Insurance (5)

## Risk Assessment

- Risk reduction measures such as cooperation between government, insurance industry, donors and civil society in sharing the burden when disasters strike is already happening in many SIDS
- Risk Assessment – e.g. Pacific Islands Disaster Risk Reduction and Disaster Management Framework 2006-2015 and Pacific Islands Framework for Action on climate Change 2006-2015
- Implementing a 3-year Caribbean Hazard Mitigation Capacity Building Programme (CHAMP) focusing on:
  - Increasing GIS and data collection resources
  - Hazard mapping
  - Sectoral assessment



# Risk Management, Risk Reduction and Insurance (5)

## Possible Options for Insurance and Risk Transfer

- Affordable insurance is a major concern for many SIDS. Rates of insurance is a function of mitigation measures, implementation of hazard plans, and forecasting and warning systems undertaken by communities, individuals, governments and other stakeholders.
- Risk management requires involvement and participation of all stakeholders (i.e. decision-makers, disaster risk managers, scientific community, civil society and local communities).
- Governments should integrate pre-planning, risk assessment, reconstruction and rehabilitation programmes based on disaster scenarios into their development plans, environmental policies, and poverty reduction strategies.
- Microfinance can provide valuable alternative to insurance for poor households and at community level. Community-based disaster prevention and risk management through mitigation programmes is essential.

# Risk Management, Risk Reduction and Insurance (5)

## Needs and Constraints

- Further work on improving early warning systems and forecasting, dissemination of information and decision-making is required in SIDS
- Involvement and collaboration of all stakeholders (governments, technical agencies, bilateral and multilateral organisations and the private sector (insurers and re-insurers) is critical for transfer of risk diversification of financial burden.
- Size of risk pool is very small, lack of availability of financial instruments and services of risk management, inadequate coverage and pay off.
- Most SIDS cannot afford fully domestic insurance. Other financial risk transfer mechanisms such as catastrophe bonds, weather derivatives and micro-insurance might provide flexibility to adapt to a SIDS country
- Partnerships between governments and financial institutions for promoting preparedness and mitigation could help with capacity-building, e.g. Catastrophe Risk Insurance Facility (CRIF).



# Risk Management, Risk Reduction and Insurance (5)

- Number of ways have been proposed for transferring risk from climate change:
  - a) Supporting public-private partnership;
  - b) Supporting Relief and Reconstruction – transferring risks of public infrastructure through private insurers or directly to capital markets through alternative risk transfer instruments;
  - c) Supporting micro insurers by supporting and transferring the risk of micro insurers by acting as re-insurers or assuming interest payments of catastrophe bonds.
  - d) Supporting data collection and analytical capacity-building
  - e) Supporting new risk hedging instruments – creating national level market incentives – i.e. tax reductions for purchasing catastrophe bonds at lower interest.

# Cooperation and Opportunities for Adaptation (6)

- Funding

- a) GEF Trust Fund e.g. Strategic Priority on Adaptation (SPA) supporting pilot and demonstration projects
- b) Special Climate Change Fund – programme on adaptation and technology transfer
- c) The Least Developed Countries Fund – preparation and implementation of NAPA
- d) The Adaptation Fund under the Kyoto Protocol – supporting vulnerable countries to adapt to adverse impacts of climate change
- e) Funding is also available through UNCCD and CBD



# Cooperation and Opportunities for Adaptation (6)

## Opportunities for Cooperation

- Many opportunities exist for cooperation through regional organisations, groups and networks (refer to pages 30-34 of background document)

# Conclusion and Issues for further Consideration (7)

- Awareness of CC impacts is high, need to adapt is immediate and mainstreaming of adaptation into policy is progressing.
- Many barriers to implementation of adaptation still exist. Some adaptation projects being developed and those in the pipeline also aim at removing these barriers.
- Many opportunities exist for cooperation and many SIDS have taken full advantage of these initiatives especially within their respective regions.



# Conclusion and Issues for further Consideration (7)

- To help shape discussions the workshop may consider the following:
  - a) How can completed project outcomes be disseminated effectively?
  - b) How can a balance between traditional strategies of coping and modern technologies in adapting to climate change be reached?
  - c) Is insurance most suitable mechanism for risk transfer? What else needs to be done for a successful insurance scheme?
  - d) How can future adaptation projects be coordinated?
  - e) How can climate change impact on migration flows between countries and regions?
  - f) How are the policies of other countries affect adaptation to climate change in SIDS?
  - g) How can existing networks and organisations be better used to improve cooperation on adaptation and increase adaptation activities?
  - h) How can outcomes from the IPCC AR4 be used to inform policy processes in SIDS?