The Guidance Tool:

A Manual for Mainstreaming Climate Change Adaptation into the CDM Country Work Programme

CDEMA
The Caribbean Disaster Emergency Management Agency

financed by
Austrian Development Cooperation

The Caribbean Disaster Emergency Management Agency (CDEMA) is the Caribbean Community (CARICOM) organisation responsible for the harmonisation of work associated with disaster management. CDEMA has adopted several methodologies to plan and deliver Comprehensive Disaster Management (CDM) at the national level. Specifically, the Comprehensive Disaster Management Framework has been employed to rationalise all phases of the disaster management cycle, taking into account all peoples and sectors. This results based framework has been adopted as a planning tool to document the results required to achieve CDM. At the national level the work of CDM implementation is being programmatically-driven by a strategic plan which is the Country CDM Work Programme.

The Country Work Programme organizes CDM implementation at the national level around the CDM Framework and facilitates key stakeholder and sector contribution. This national CDM road map aims to reduce loss and vulnerability due to hazard events over a three to five year implementation period.

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Preface

Globally, the cost of disasters has increased seven-fold since the 1960s[1]. This is because more people and more valuable infrastructure have been located in vulnerable locations. In the near to mid-term, the vulnerability of societies around the world and the cost of disaster-related damage will increase. Caribbean states must develop integrated approaches to manage disaster risk and avoid national disaster risk management capacities being over-whelmed. The socio-economic consequences of extreme climatic events in the Caribbean can be devastating. Floods and hurricanes have caused major damage and loss to lives, livelihoods, human well being and GDP. Global climate change (GCC) is the most serious threat to development facing CARICOM States. The Intergovernmental Panel on Climate Change (IPCC) predicts that GCC will cause sea levels to rise, an increase in the frequency and intensity of hurricanes, disruptions in rainfall and reduced fresh-water availability.

CDEMA as the broker of the Enhanced Comprehensive Disaster Management (CDM) Programme Framework, a roadmap for building resilience to hazards within CDEMA Participating States in collaboration with regional institutions and development partners, is strengthening, national and community level capacity for mitigation, management and coordinated response to natural and technological hazards and the effects of climate change in each of its eighteen Participating States.

The development of country work programmes by the CDEMA Participating States serves as an important tool for the implementation of CDM at the national level as well as a mechanism for effective monitoring, reporting and evaluation of the overall CDM strategy and larger global Hyogo Framework for Action. CDEMA is therefore providing the necessary tools to its Participating States to ensure the incorporation of climate change adaptation through up-scaled and enhanced disaster risk management programming to cope with the impacts of climate change, and to ensure that regional and national sustainable development goals are achieved. The results-based nature of the CDM country work programme provides not only the entry points for mainstreaming climate change adaptation, but also ensures that the adaptation options that are mainstreamed are defined in results-based language, thus providing some degree of rigour for focused and action oriented adaptation measures.

The Mainstreaming Climate Change into Disaster Risk Management for the Caribbean Region Project, funded by the Austrian Development Agency, and executed by CDEMA, in collaboration with the Caribbean Community Climate Change Centre (CCCCC), and the Working Group on Climate Change and Disaster Management have developed the Guidance Tool for Mainstreaming Climate Change Adaptation into the CDM Country Work Programme (G Tool) to help CDEMA Participating States (PS) incorporate climate change adaptation (CCA) into national Disaster Risk Management (DRM) plans and strategies. This process is known as mainstreaming climate change adaptation into

[1] Freeman K.P, M. Keen, and S. Dessai. (2003). Dealing with Increased Risk of National Disasters: Challenges and Options. IMF Working Paper WP/03/197. Fiscal Affairs Department. 36pp.

disaster risk reduction or **CCA2DRR** describes a process of considering the implications of climate risks for all aspects of national development and adjusting development processes and disaster and climate change measures to address these risks.

The G Tool presents a practical and participatory process of mainstreaming climate change adaptation measures into the CDM country work programme. It promotes planned adaptation that takes advantage of current national needs to respond to current and anticipated climate threats. It also takes advantage of opportunities provided by current institutional modalities to secure short- and medium-term adaptation success, while maintaining a long-term adaptation perspective. The G Tool process includes the following key steps:

1. Scoping, stakeholder identification, and problem identification.
2. Review and assimilation of technical and socio-economic background information relevant to the identification and mainstreaming of adaptation options.
3. Analysis of factors affecting the mainstreaming of disaster risk reduction and climate change adaptation (using SWOT Analysis).
4. Preparation for a multi-stakeholder workshop (by participants and workshop facilitators).
5. Scenario development and the identification of climate change impacts, adaptation options and mainstreaming entry-points (prior to and during the workshop).
6. Implementation of workshop outputs (after the workshop).

We are pleased to offer the Guidance Tool for Mainstreaming Climate Change Adaptation into the CDM country work programme (G Tool) for use by disaster management professionals and practitioners. May it provide the necessary operational link at the national level between the region's disaster management and climate change adaptation initiatives. May it be an important resource tool for results based climate change national CDM planning and programming in the face of a changing climate.

Acknowledgements

The Caribbean Disaster Emergency Management Agency (CDEMA) is deeply grateful to the consulting team of Mr. Leslie Walling, Ms. Nicole A. Brown and Dr. David Smith who led the process in developing the Guidance Tool for Mainstreaming Climate Change Adaptation into the Comprehensive Disaster Management (CDM) Country Work Programme (G Tool).

The G Tool has benefited from the insights and professional guidance of the Climate Change and Disaster Management Working Group (CCDM-WG) led by the University of the West Indies, Centre for Resource Management and Environmental Studies (CERMES).

CDEMA also acknowledges the input of the Virgin Islands' Department of Disaster Management for the piloting of the G Tool, particularly facilitating the inputs from Virgin Islands' national agencies and organisations in the field testing of the participatory scenario development workshop process that is part of the G Tool and identifying ways in which both this process and the G Tool manual could be improved to ensure maximum utility to the intended end users.

The technical support and informative comments provided by the CDEMA and the programme and management staff of the Mainstreaming Climate Change into Disaster Risk Management for the Caribbean Region project is also acknowledged.

The Caribbean Disaster Emergency Management Agency (CDEMA) also expresses its appreciation to the Austrian Development Agency for the financial support provided for the production of the Guidance Tool for Mainstreaming Climate Change Adaptation into the CDM Country Work Programme (G Tool).

ACRONYMS

CARICOM	Caribbean Community
CCA	Climate Change Adaptation
CCA2DRR	Mainstreaming Climate Change Adaptation into Disaster Risk Reduction
CCCCC	Caribbean Community Climate Change Centre
CCDM	Mainstreaming Climate Change into Disaster Risk Management for the Caribbean Region Project
CCDRRE	Climate Change, Disaster Risk Reduction and Environment Sub-Committee
CDB	Caribbean Development Bank
CDM	Comprehensive Disaster Management
CDEMA	Caribbean Disaster Emergency Management Agency
CDERA	Caribbean Disaster Emergency Response Agency
CDM	Comprehensive Disaster Management
DFID	UK Department for International Development
DRR	Disaster Risk Reductions
DRM	Disaster Risk Management
GCC	Global Climate Change
GCM	General Circulation Model
GHG	Green House Gas
GWP	Global Water Partnership
HFA	Hyogo Framework for Action
IP or IP-RFADR	Implementation Plan for the CARICOM Regional Framework for Achieving Development Resilient to Climate Change
IPCC	Intergovernmental Panel on Climate Change
ISDR	United Nations International Strategy for Disaster Reduction

MACC	Mainstreaming Adaptation to Climate Change
NDC	National Disaster Coordinator
NDO	National Disaster Office
NWPM	National Work Programme Meeting
OT	Overseas Territory
PCDPP	Pan-Caribbean Disaster Preparedness Project
PS	Participating State(s)
PSD	Participatory Scenario Development
RBM	Results Based Management
RBP	Results Based Planning
SLR	Sea Level Rise
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VCA	Vulnerability and Capacity Assessment
VI	Virgin Islands
WG	Working Group

Executive Summary

Background

Globally, the cost of disasters has increased seven-fold since the 1960s.[2] This is because more people and more valuable infrastructure are located in vulnerable locations. In the short to medium-term, the vulnerability of societies around the world and the cost of disaster-related damage will increase; Caribbean states must therefore develop integrated approaches to manage disaster risk and avoid national disaster risk management capacities being over-whelmed.

The socio-economic consequences of extreme climatic events in the Caribbean can be devastating. Floods and hurricanes have caused major damage and loss of lives, livelihoods, human well being and GDP. Global climate change (GCC) is the most serious threat to development facing CARICOM States. The Intergovernmental Panel on Climate Change (IPCC) predicts that GCC will cause sea levels to rise, increase the frequency and intensity of hurricanes, disruptions in rainfall and reduce fresh-water availability.

A preliminary review of the country work programmes of CDEMA Participating States reveals a gap in the area of climate change adaptation. This has significant implications for both disaster risk and national development. Therefore, DRM must be scaled up and enhanced to cope with the impacts of climate change, if regional and national sustainable development goals are to be achieved.

Objectives

This manual outlines the use of the Guidance Tool for Mainstreaming Climate Change Adaptation into the Comprehensive Disaster Management (CDM) Country Work Programme (G Tool) as a method to integrate climate change considerations into disaster risk reduction initiatives. It is intended primarily for use by disaster management professionals and has been developed to help CDEMA Participating States (PS) incorporate climate change adaptation into the CDM country work programme . This process is known as mainstreaming climate change adaptation into disaster risk reduction or **CCA2DRR**.

Mainstreaming climate change adaptation describes a process of considering the implications of climate risks for all aspects of national development and adjusting development processes and disaster and climate change measures to address these risks.

The process of mainstreaming climate change adaptation measures is practical and participatory in nature. This manual provides guidance for practitioners on the implementation of this participatory mainstreaming process.

The goals of the G Tool manual are to:

1. Provide practitioners and stakeholders with a common understanding of climate variability and climate change.

2. Introduce practitioners and stakeholders to the idea and language of DRM and adaptation to climatic hazards of natural and anthropogenic origin.

[2] Freeman K.P, M. Keen, and S. Dessai. (2003). Dealing with Increased Risk of National Disasters: Challenges and Options. IMF Working Paper WP/03/197. Fiscal Affairs Department. 36pp.

3. Provide guidance on how to mainstream climate change adaptation into the comprehensive disaster management (CDM) country work programme.

The manual:

(i) Explains what you are going to do.

(ii) Tells you how to do it.

(iii) Tells you how you will know you have done it.

The G Tool suggests indicators that measure the extent and level of effectiveness of the mainstreaming exercise.

The G Tool Process

The G Tool promotes planned adaptation that takes advantage of current national needs to respond to current and anticipated climate threats. It also takes advantage of opportunities provided by current institutional modalities to secure short and medium-term adaptation success, while maintaining a long-term adaptation perspective. The process includes the following key steps:

1. Scoping, stakeholder identification, and problem identification.

2. Reviewing and assimilating technical and socio-economic background information relevant for identifying and mainstreaming adaptation options.

3. Analysing factors affecting the mainstreaming of disaster risk reduction and climate change adaptation (using SWOT Analysis).

4. Preparing for a multi-stakeholder workshop (both participants and facilitators).

5. Developing scenarios and identifying climate change impacts, adaptation options and mainstreaming entry-points (prior to and during the workshop).

6. Implementing workshop outputs (after the workshop).

The G Tool manual includes a process to identify stakeholders and assess their interest in climate change adaptation to develop a common awareness and understanding of the language, concepts, and definitions of climate change and disaster management.

This is followed by an analysis of factors that affect disaster risk reduction and climate change examining Strengths, Weaknesses, Opportunities and Threats (SWOT). The SWOT analysis entails:

1. A literature review and production of a draft SWOT matrix.

2. An online conference between the facilitators, CDEMA and the Government for feedback and verification of facts.

3. Indications of missing sources, experiences, capacity, and documents by host Government.

4. Real life examples and feedback based on recent events.

5. Refinement of the SWOT matrix in light of feedback.

6. Presentation of the revised draft matrix at the G Tool workshop.

Participatory Scenario Development

The Participatory Scenario Development (PSD) process follows and aims to stimulate engagement among stakeholders and provide a mechanism for generating better planning, policy, and decision support for the fledgling **CCA2DRR** process. Scenarios are reasonable descriptions of how the future may look, using recognisable signals and information from the present about how current trends will progress[3]. In the context of the **CCA2DRR** process, scenarios are used to identify a range of possible adaptation options as well as the policies or types (and levels) of investment needed to facilitate mainstreaming.[4] A participatory scenario development process engages stakeholders in the development and exploration of plausible sectoral/economic futures, enables stakeholders to examine possible disaster and climate change options and to consider the implications of the associated risks to projected national development. A key feature of the G Tool process is a multi-sectoral workshop for analysing and prioritising issues for action. The workshop should be attended by a wide range of interest groups and individuals involved in DRR activities who will be affected by increased climate risk. It includes the following steps:

Step 1: Identifying a vision
Participants develop a vision for the future of the Participating State in the context of long-term, national development goals as articulated in national development frameworks. Workshop participants work in small groups to develop a future vision; the common elements of the groups' visions are combined to develop a shared vision that informs subsequent workshop activities.

Step 2: Establishing socio-economic and climatic conditions
This session features two presentations that establish boundary conditions. The first focuses on socio-economic projections for the Participating State's future that might challenge the vision. Climate change is taking place alongside other development challenges and these ought to be taken into account when developing responses to increased climate risk. The second presentation focuses on climate change trends and projections that are relevant to the Caribbean in general and the Participating State in particular. It explores the linkages between adapting to climate change and reducing disaster risk.

Step 3: Ascertaining climate change impacts
Participants will identify the main climate change trends affecting their country, the direct and indirect impacts of each trend; and the groups or sectors vulnerable to each impact. They will examine the sector vulnerabilities identified and classify them by likely temporal occurrence: short-term, medium-term and long term.

Step 4: Identifying adaptation options
This session will include a presentation on the convergence between climate change and

[3] UNEP, 2002 cited in ESSA Technologies Ltd and IISD Technologies Ltd and IISD. (2010). Economics of Adaptation to Climate Change. Participatory Scenario Development (PSD) Approaches for Pro-Poor Adaptation: Capacity Development Manual. The World Bank Discussion Paper Number 19, December 2010. Washington, D.C.: The World Bank 78 pp.
[4] ESSA Technologies Ltd and IISD. (2010).

disaster risk reduction, focusing on win-win strategies that can "enhance the reduction of climate-related losses, lead to the more efficient use of resources, and increase the effectiveness and sustainability of both approaches."[5] Participants will identify adaptation options and results for the sector vulnerabilities identified in Step 3. This activity will be done in small groups and then consensus will be achieved in plenary.

Step 5: Identifying adaptation entry points and climate smart results

For the purpose of the CCA2DRR exercise a mainstreaming "entry point" is considered to be an opportunity or interface with elements in a strategic or planning framework through which a climate change adaptation intervention can be incorporated into an institution's operational plan. Participants map adaptation options to the Participating State's work programme to identify entry points for the prioritised adaptation actions. Where the adaptation result falls outside the scope of the country work programme other pathways and entry points will be identified to address them.

***Step 6:* Mainstreaming Adaptation Actions into the Operational/ Activity Level of the CDM country work programme – a Climate Smart CDM country work programme**

Participants incorporate identified adaptation options/activities into the high-level (outcomes and outputs) and operational/ activity level of the CDM country work programme; and identify and mainstream the climate change adaptation options/ activities necessary to support the delivery of CDM country work programme outputs and outcomes.

Step 7: Agreeing on the way forward

Participants will work in plenary to arrive at a shared agreement on the way forward for finalising the climate smart country work programme.

While the onus will be on the national disaster organisation to work through the rest of the G Tool, it will likely wish to continue to engage sector stakeholders as it does so.

At the end of the workshop, participants will have a shared understanding of climate change and its impacts on the Participating State, including how it will affect existing development challenges and vulnerabilities and how climate change adaptation can reduce current vulnerability and future risk; they will have identified existing and alternative adaptation options for the Participating State and gaps in current capacities. They will have also prioritised these options into adaptation entry points and pathways that build on current actions and frameworks for disaster risk reduction, discussed synergies and trade-offs between investments in these options and developed a draft climate smart CDM work programme.

Following the workshop, it is hoped that participants will be better able to reduce the risks posed by climate change and refine the draft climate smart CDM work programme.

[5] ProAct Network. (2008), Climate Change Adaptation and Disaster Risk Reduction Policy Paper. Nyon, Switzerland: ProAct Network Secretariat. 5pp.

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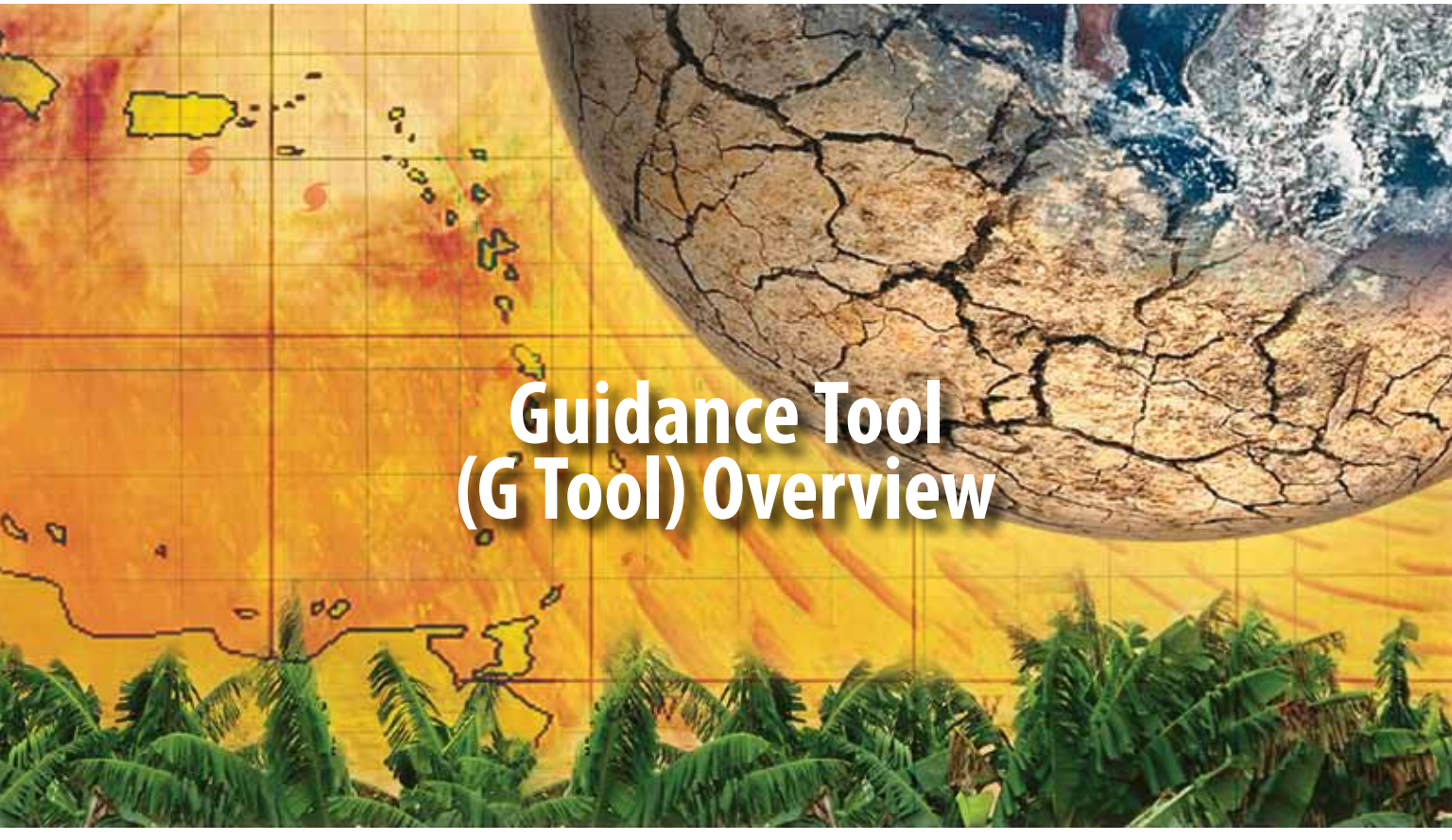

Guidance Tool (G Tool) Overview

CHAPTER 1. Getting Started

1.1 Why is a Guidance Tool Needed?

The global cost of disaster related damage has increased by 400% in the last 30 years.[6] This is because the development process has placed more people and more valuable infrastructure in harm's way, i.e. in vulnerable locations. In the short to medium term, developmental and economic trends are expected to increase the vulnerability of societies around the world and the cost of disaster-related damage is projected to increase. In order to avoid national disaster risk management capacities being over-whelmed, Caribbean states must develop integrated approaches for managing disaster risk.

Global climate change is the most serious threat to sustainable development facing CARICOM States. The Intergovernmental Panel on Climate Change predicts that GCC will result in more hostile regional climate risks and rising sea levels. The limited adaptive capacity of the CARICOM small-island and low-lying states, in addition to rising sea levels, an escalation in the frequency and intensity of tropical storms and hurricanes and disruptions in rainfall and fresh-water supply threaten the very existence of CARICOM countries.[7] It is on this tenet, and as reflected in the Enhanced Comprehensive Disaster Management (CDM) Strategy and Framework 2007-2012, that "business as usual" Disaster Risk Management must be up-scaled and enhanced to cope with the impacts of Climate Change.

Human induced climate change is an evolving reality that the Caribbean must begin to address if we are to avoid both disaster risk management and societal capacities being overwhelmed. The social and economic cost of natural disasters to the states of the Caribbean has been measured in multiples of gross domestic product. Reports indicate that the costs of global climate change impacts will exceed those that have been caused by natural disasters in the past. Climate change will add new dimensions to the vulnerabilities of CDEMA Participating States (PS) making climate-smart development an imperative if CDEMA PS are to become more resilient. Climate smart approaches to DRM encourage the use of longer timeframes for strategic and operational planning. This will allow CDEMA PS to address changes in the character of disaster risks and the uncertainties caused by climate change. Climate smart development (Box 1) will enhance adaptive capacity and address poverty and vulnerability and their structural causes.[8,9]

A preliminary review of the work programmes of CDEMA PS reflects a gap in the area of

[6] Freeman K.P, M. Keen, and S. Dessai. (2003). Dealing with Increased Risk of National Disasters: Challenges and Options. IMF Working Paper WP/03/197. Fiscal Affairs Department. 36pp.
[7] Sourced from the document, Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009-2015), Caribbean Community Climate Change Centre (CCCCC) July 2009.
[8] Apparusu Suman K. (2011). Climate Smart Adaptive Social Protection Implementation Framework: Background and Concept Exposition. Disaster, Risk and Vulnerability Conference 2011. School of Environmental Sciences, Mahatma Gandhi University, India in association with the Applied Geoinformatics for Society and Environment, Germany. March 12–14, 2011. Pgs. 208-213.
[9] Mitchell, T., Van Aalst, M., Silva Villanueva, P. (2010). Assessing Progress on Integrating Disaster Risk Reduction and Climate Change Adaptation in Development Processes, Strengthening Climate Resilience Discussion Paper 2, Institute of Development Studies.

Guidance Tool (G Tool) Overview

climate change adaptation. This has significant implications for DRM and national development. The incorporation of climate change into the country work programmes is therefore a strategic necessity and an identified indicator of CDM success.

BOX 1: Climate Smart Development

Climate Smart development attempts to make communities more resilient to the effects of a changing climate.

Prominent features:

- Periodic assessment and incorporation of risks, climate uncertainties into plans, policies and programmes.
- Involvement of diverse stakeholders and keeping them informed in transparent communication loops at all times for effective learning, reflection and innovation.
- Promotion of social, economic, environmental and political justice and climate smart development.

Key principles:

- Addressing the disaster risk related uncertainties,
- Enhancing adaptive capacity, and
- Tackling poverty and vulnerability and structural causes.

Source: Apparusu Suman K. (2011). Climate Smart Adaptive Social Protection Implementation Framework: Background and Concept Exposition. Disaster, Risk and Vulnerability Conference 2011

Although this situation may be viewed as a deficiency in national disaster risk management arrangements, it must also be recognised as an opportunity. Initiatives to enhance disaster, prevention, preparedness and mitigation, provide an opportunity to lay the groundwork, or initiate the implementation of climate change adaptation interventions. This means that CDEMA PS can begin to address national climate change adaptation needs without incurring the cost of establishing new institutions and without having to wait on the promulgation of new legislation, polices, or programmes. The cost of some climate change adaptation interventions will be an incremental increase in existing operational costs, rather than an investment in a completely new operational mechanism for implementing climate change adaptation initiatives. DRR can be viewed as the first line of defence in adapting to climate change.

In response to this lack of climate change adaptation readiness, CDEMA has put resources into the development of a practical tool to provide guidance for the development of climate smart country work programmes. The Guidance Tool for Mainstreaming Climate Change Adaptation into the Comprehensive Disaster Management Country Work Programme (G Tool) is an output of the "Mainstreaming Climate Change into Disaster Risk Management for the Caribbean Region (CCDM) Project" funded by the Austrian Development Agency (ADA).

The G Tool outlines a process for ensuring that disaster risk management plans and strategies of national disaster organisations are able to meet the challenges that will be posed by

climate change. The CDEMA PS are not optimally adapted to current climatic conditions and extreme events; more work needs to be done in the areas of disaster prevention, preparedness and mitigation to cope with both the existing situation and projected future conditions.

1.2 The Regional Context

The CARICOM's collective efforts to respond to, and recover from natural disasters began more than 20 years ago with the Pan-Caribbean Disaster Preparedness Project (PCDPP, 1981-1991), evolving into the Caribbean Disaster Emergency Response Agency (CDERA, 1991 – 2009) and the Caribbean Disaster Emergency Management Agency (CDEMA 2009 to present).

The transition from CDERA to CDEMA was an acknowledgement of the need to address all phases of the DRM cycle, expanding the focus from response and recovery to include the remaining phases: prevention, mitigation, and preparedness. The adoption of the Enhanced CDM Strategy and Framework 2007-2012 has provided CDEMA PS with a blueprint for DRM and reduction. Country work programmes are an important tool for the implementation of the Enhanced CDM Strategy and Framework 2007-2012 at the national level.

CARICOM's initial collective response to GCC took the form of three successive climate change adaptation planning projects, each building on the achievements of the other. The project-driven approach to promoting the region's climate change adaptation agenda paved the way for the establishment of the Caribbean Community Climate Change Centre (CCCCC or "5Cs") in Belize in 2005. The CCCCC provided the foundation and leadership for a more substantial, strategic and programmatic approach to advancing CARICOM's climate change resilience plan. The region's position was articulated in the 2009 Liliendaal Declaration on Climate Change and Development (See section 4).

The guiding framework for action Climate Change and the Caribbean: a Regional Framework for Achieving Development Resilient to Climate Change (2009-2015) was produced in 2009 by the CCCCC[10] and its Implementation Plan (IP) was produced in 2011. These documents references disaster risk several times and indicates that a Natural Hazard Risk Management Fund should be established to finance disaster risk management in the context of climate change, though they acknowledge that many actions can be accomplished through mainstreaming.

Enough is now known about the likely increases in risk due to GCC to merit incorporating climate change adaptation into CDM frameworks. The common theme in both CDM and adaptation to climate change is the management of hazard risk. Mainstreaming is an important way to achieve risk reduction especially where funds are scarce. Even if large sums of money were available, mainstreaming would not solve all problems; however, it remains an important strategy.

The G Tool will initiate and guide a series of national, participatory, multi-sectoral, constituency-building, mainstreaming workshops that

[10] http://dms.Caribbeanclimate.bz/php/cdcfullmeta.php?id=9486search=CARICOM

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will mobilise direct action that will contribute to the achievement of IP Strategic Elements 1, 2, 4, and 5, creating an operational linkage between the regional CDM and climate change adaptation interventions.

1.3 Overview of the G Tool

The G Tool is a manual. It describes the participatory process for mainstreaming climate change adaptation into CDM country work programmes and provides information and guidance to help practitioners conduct their own national CCA2DRR participatory consultations.

The G Tool has been developed to help CDEMA PS incorporate climate change adaptation measures into the CDM country work programme. This process of incorporating climate change adaptation measures into DRM, policies, strategies, planning, management, and operations, is known as mainstreaming climate change adaptation into disaster risk reduction or "**CCA2DRR**".

In order to be effective, the **CCA2DRR** process must be participatory and involve all relevant (including affected) parties or stakeholders. This principle is already central to the culture and practice of the CDEMA CDM process.

Given the diversity of the stakeholder community that will be required to participate in the **CCA2DRR** process, the G Tool addresses the need for ensuring a common understanding of climate change adaptation, DRM, and the issues related to effective mainstreaming.

The G Tool manual provides:

- An orientation on climate, climate change, disaster risk and adaptation,
- A method for undertaking the mainstreaming process,
- Practical tools for stakeholder identification, impact identification and adaptation mainstreaming,
- Caribbean climate hazard case studies,
- Reference information on useful documents, manuals, and guidelines, and,
- Prepared presentations.

The presentation materials from the pilot mainstreaming workshop have been incorporated into the appendices of the manual to facilitate the replication of the G Tool process in other CDEMA PS.

1.4 The Guidance Tool– Objectives

The objective of this manual is to help users to successfully undertake the **CCA2DRR** mainstreaming exercise, which may take the form of

The Goals of the G Tool manual are:

1. To provide stakeholders with a comprehensive, common understanding of climate variability and climate change.
2. To introduce stakeholders to the ideas and language of natural disasters and adaptation to the natural hazards.
3. To provide detailed guidance on how to mainstream climate change adaptation into the CDM country work programme .

a workshop(s) or a series of stakeholder consultations.

The G Tool:

- Guides stakeholders through the process of mainstreaming climate change into DRM planning. More specifically, it helps stakeholders involved in the national DRM effort to mainstream climate change adaptation in the Comprehensive Disaster Management country work programme;
- Helps stakeholders to establish an operational link between climate change adaptation and DRM;
- Provides guidance on the understanding and interpretation of climate change information for decision making on climate change adaptation mainstreaming approaches and priorities;
- Provides orientation to language and concepts of climate change, adaptation planning, disaster risk reduction and mainstreaming;
- Provides access to climate change information through the review of current climate change projections for the region and the discussion of vulnerability and adaptation case studies;
- Introduces users to a range of climate change adaptation options from a variety of sources, including local knowledge agriculture, environmental restoration, and infrastructure development;
- Assists in the analysis of the disaster risk management-enabling institutional and planning and policy environments into which climate change adaptation is to be mainstreamed;
- Offers an open and transparent planning and decision making process that can be repeated, built upon and replicated;
- Utilises a flexible process that is adaptable and scalable to national and institutional circumstances;
- Assists national disaster offices with planning and managing the process of mainstreaming DRM into the national CDM framework;
- Identifies results in the amendment of a national disaster management country work programme incorporating climate change adaptation measures for the mitigation of selected climatic hazards.

The G Tool has limitations that include, but are not limited to the following:

- The G Tool has been applied and tested in only one CDEMA PS: the Virgin Islands. Since national circumstances will differ, this version of the G Tool may require modifications when applied in the other settings.
- The G Tool does not include a component dedicated to the identification of barriers to climate change adaptation mainstreaming. However, the G Tool process helps stakeholders to identify, and understand potential barriers to the effective and efficient mainstreaming of

climate change adaptation interventions into the CDM country work programme. This is a subsidiary output of the broad PSD process.

1.5 Who Should Use the Guidance?

Ideally the guide should be used by the government ministry and/or agency with primary responsibility for national disaster risk management.

1.6 How Should the Guidance Tool be Used?

The G Tool manual is organised in four sections:

(i) Guidence Tool (G-Tool) Overview: provides an overview of the document and its purpose.

- Chapter 1 – Getting Started

(ii) The Mainstreaming Process and Steps describes the mainstreaming process and outlines the steps to be taken.

- Chapter 2 – Tools in the Mainstreaming Process.
- Chapter 3 – Participatory Scenario Development: Workshop Process and Development of the Climate Smart CDM country work programme .
- Chapter 4 – Outputs and Linkages: The way forward.

(iii) Climate Change and Disaster Management in the Caribbean-Background Material provides useful background information about climate change and disaster management.

- Chapter 5 – Climate Change and Disasters.
- Chapter 6 – Anatomy of a Disaster: Managing Disaster Risk.
- Chapter 7 – Impact of Climate Change on Development in the Caribbean.
- Chapter 8 – Mainstreaming Climate Change Adaptation into DRM planning.

(iv) Additional Reading, Glossary and Workshop Tools includes a list of additional resources that can be accessed online, a glossary, and templates tools, to assist in the delivery of the Participatory Scenario Development workshop.

Anyone wishing to organise or facilitate a **CCA2DRR** workshop using the G Tool process should read all sections 1 - 3 thoroughly.

Section 1 should be reviewed by all readers to gain a clear understanding of what the G Tool offers, as well as its limitations. Sections 2 and 3 can be read in the order preferred by the reader. For example, Section 3 might be read first by a reader wishing to become familiar with the subject matter of climate risk, climate change and adaptation mainstreaming, before reading about planning and implementing a **CCA2DRR** workshop using the G Tool process.

Section 2 provides a detailed description of the participatory process through which the mainstreaming of climate change adaptation into the CDM country work programme will be achieved. The language is simple and non-technical. This section should be read carefully if you intend to lead or participate in the staging of a **CCA2DRR** workshop or consultation.

Section 3 provides a basic introduction to the language and concepts of climate change, hazards, disaster risk, adaptation, and main-

streaming. The information provided in Section 3 supports the delivery of the workshop sessions described in Chapter 3 and **Tool 1.**

This section should be read by anyone wishing to gain a basic understanding of climate change and issues related to adaptation and the mainstreaming process. It should be read with particular care if you intend to organise or facilitate a **CCA2DRR** workshop or consultation, or assist in the preparation of workshop presentations.

The G Tool should be used as an information source and guide to:

- Identify and select stakeholders to participate in the **CCA2DRR** mainstreaming process (Chapter 2).
- Organise and coordinate the mainstreaming process (Chapters 2 and 3, and Appendices).
- Orient stakeholders to the issues, concepts, language, aims and objectives of the **CCA2DRR** process (Chapters 5, 6, 7 and 8),
- Facilitate active participation by stakeholders in a structured **CCA2DRR** process (Chapters 3 and 4), and
- Produce a draft climate smart CDM country work programme (Chapters 3 and 4).

1.6.1 Team Building: Stakeholder Identification and Analysis

The G Tool includes a process to identify stakeholders and assess their interest in, or stake, in a climate change adaptation agenda (Chapter 2). This will help ensure that all of the actors who need to be engaged in mainstreaming discussions are able to participate.

1.6.2 How and Where to Mainstream: Analysing the Institution and the DRM Strategy

A "Strengths, Weaknesses, Opportunities, Threats" (SWOT) analysis will be used to identify enabling factors in the host country's DM environment, i.e. the lead DM institution, the national disaster office, national disaster strategies and work plans (Chapter 2).

The SWOT analysis will provide an initial view of mainstreaming entry points and pathways.

The SWOT analysis was chosen because it is based on a simple, easily understood, and intuitive, method of analysis which has been proven to be an effective management and decision making tool.

1.6.3 Orientation and Definitions: The Language of Disasters and Climate Change

There will be a great deal of diversity in the backgrounds, experiences, expertise and knowledge of the individuals and organisations that will participate in the **CCA2DRR** process (Chapters 5, 6, 7 and 8).

It will be critical to ensure that a common language is used for the mainstreaming process and that there is a common understanding (not agreement) of the ideas, concepts, and issues related to DRM, climate change and climate change adaptation planning. To this end a series of presentations on climate, climate change, climatic disasters and adaptation are included in the Participatory Scenario Development workshop (**Tool 4**).

The presentations are designed to help stakeholders gain a clearer understanding of how climate variability and change affect CDEMA PS and its possible future impacts.

Guidance Tool (G Tool) Overview

The presentations seek to stimulate thought and discussion on how plausible climate change events could affect the performance of policies, programmes, projects and development initiatives for strategically important social and economic sectors and conversely the impact of these policies, programmes, projects and development initiatives on vulnerability to natural hazards.

1.6.4 Identification and Review of Response Options and Best Practices

Stakeholders are introduced to adaptation practices used to reduce the impact of extreme climatic events generated by both current climatic conditions (climate variability) and anticipated climate change (Chapter 6). Case studies from the region are used to ensure that concepts and practices are presented in familiar contexts - political, social, economic, environmental, geographic, institutional, and enabling (Chapter 7).

The G Tool provides participants with an appreciation of the variety of approaches that can be taken to reduce the disaster risks generated by climate change. Note is made of dedicated climate change adaptation approaches, non-climate specific development practices that reduce climate risk, and disaster risk reduction practices with climate change adaptation applications (Chapter 6).

	Internal	External
Positive	Strengths	Opportunities
Negative	Weaknesses	Threats

1.6.5 Mainstreaming: Participatory Scenario Development

Once the stakeholders have become familiar with the language, concepts, and definitions of climate, climate change, disaster management, and adaptation, they are asked to consider how climate change adaptation can be incorporated into the national CDM work programming framework, i.e. the country work programme.

The rationale for mainstreaming is introduced with reference to the aims, objectives and proposed actions of the Hyogo Framework for Action, the Enhanced Comprehensive Disaster Management (CDM) Strategy and Programme Framework 2007-2012 and the Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009-2015).[11,12]

The relationship between these frameworks and the country work programme is described with reference to the national priorities and plans for DRR and climate change adaptation.

A range of approaches for mainstreaming climate change adaptation into the national disaster risk management framework will be discussed, including the use of risk management approaches to integrate climate change into the physical planning.[13]

Participants will be introduced to the need to prioritise and sequence adaptation options for mainstreaming these approaches into adaptation entry points and pathways.

[11] CDEMA. (2010). Mapping the Enhanced Comprehensive Disaster Management Programme Framework to the Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change. Bridgetown: CDEMA 3 pp.

[12] CDEMA. (2010). The Regional Programme and Plan Of Action for Climate Change Adaptation and Disaster Risk Reduction for the Mainstreaming Climate Change into Disaster Risk Management for the Caribbean Region (CCDM) Project. Bridgetown: CDEMA 38 pp.

[13] CARICOM. (2003). Caribbean Risk Management Guidelines for Climate Change Adaptation Decision Making. Georgetown: CARICOM 86 pp.

A sample of potential interfaces and entry points for mainstreaming climate change into country work programmes will be presented with reference to the strategic elements and goals proposed in the Regional Framework for Achieving Development Resilient to Climate Change (Chapter 4).[14]

1.6.6 How Does the Manual Relate to the Participatory Workshop Process?

In order to reduce the risks posed by climate change induced natural hazards two things must be done: the appropriate climate change adaptation measures must be identified and the climate change adaptation measures must be implemented. The climate change adaptation measures represent the "what" and the mainstreaming process that will lead to the implementation of the climate change adaptation measures represents the "how".

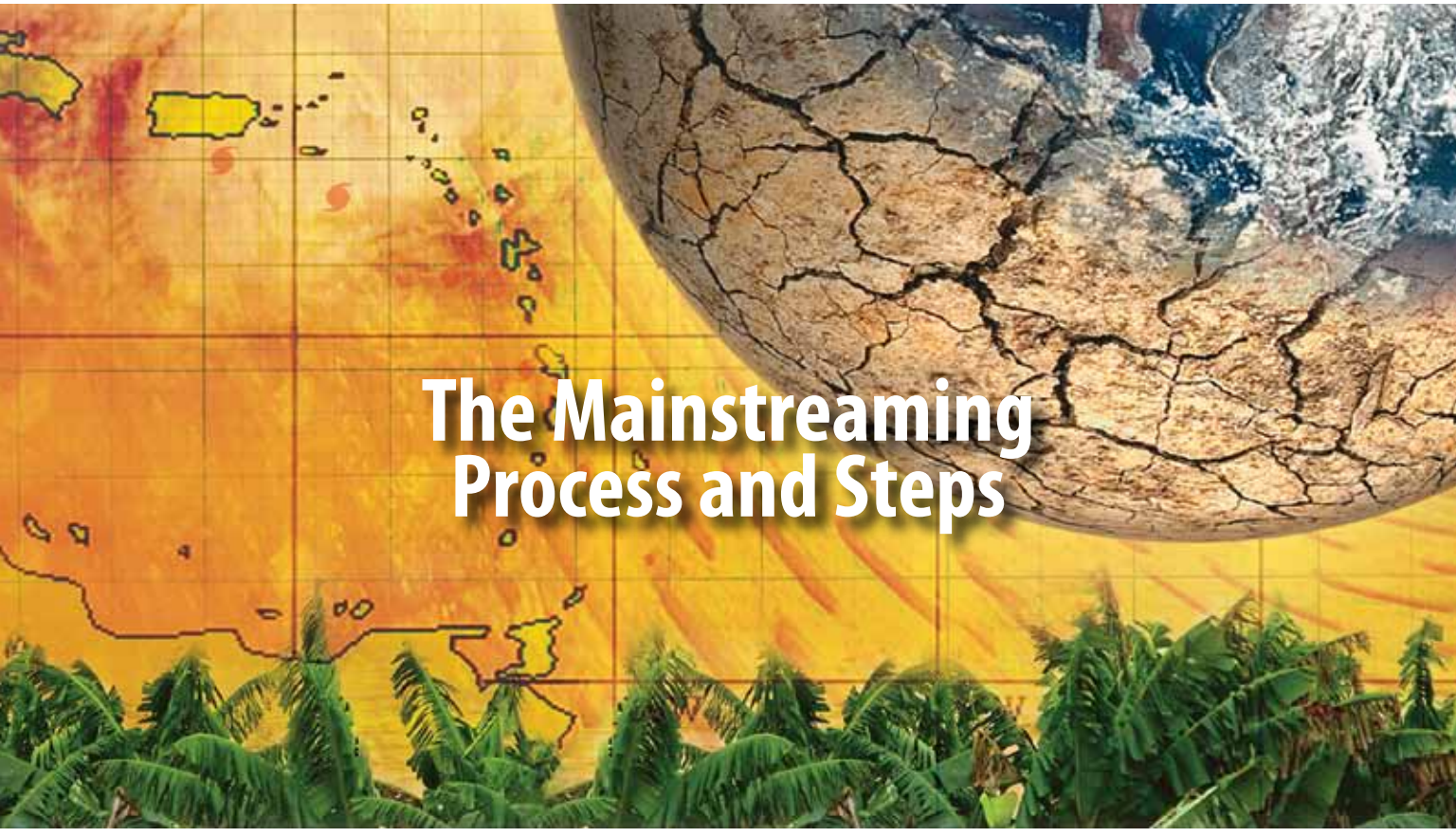
The G Tool has incorporated the general approaches used to identify climate change adaptation interventions.[15] The approaches have been combined and tailored to the G Tool process to ensure that the identification and prioritisation of appropriate climate change adaptation interventions, the "what", will lead to the formulation of an appropriate mainstreaming strategy for the development of a "climate smart" CDM work programme by the host country, the "how".

The steps in the process of identifying and mainstreaming climate change adaptation interventions are captured in the small group activities of the participatory workshop process. Table 1 shows the chapters in the G Tool manual that correspond to and support each of the small group activity sessions.

[14] CCCCC. (2009). The Regional Strategy for Achieving Development Resilient to Climate Change (2009-2015). Belize: CCCCC 30pp.
[15] UNDP. (2010). A Toolkit for Designing Climate Change Adaptation Initiatives. New York: UNDP. 58pp.

Table 1: Relationship between G Tool Workshop Sessions and the Chapters of the G Tool Manual

The G-Tool Participatory Mainstreaming Process (preparation, workshop and follow-up)	G-Tool STEPS	Description of Mainstreaming Steps in G Tool Manual (Section)	Supporting Background Chapters in G Tool Manual (Chapters)	Comments
1. Pre-workshop Preparation a) Stakeholder analysis b) SWOT analysis		3.2	2	• Process should be initiated at least 60 days before the scheduled G Tool Workshop to provide time for thoughtful review, partnership building and consultations.
2. Visioning SWG 1 – Tool 3	STEP 1	3.3.2.1	Tool 3	• Develop plausible ideal or desired description of status and conditions of selected sectors of critical developmental importance.
3. Identification of Boundary Conditions for Development c) Tool 4	STEP 2	3.3.2.2	5, 6, 7, 8 and Tool4	• Assess development trends of key economic and social sectors to 2020 or 2030. • Assess general or specific patterns of projected climate change, and define plausible climate futures for the Caribbean and your country. • Assess current level of exposure and vulnerability to current climate hazards.
4. Identification of Climate Impacts: SWG 2 – Tool 5	STEP 3	3.3.2.3	5 and 6 Tool 5	
5. Identification of Existing and Potential Adaptation Options: SWG 3 – Tool 6	STEP 4	3.3.2.4	6 and 7 Tool 6	• Conduct vulnerability and capacity assessment (VCA) studies. • Identify optimal adaptation options (win-win, low-regrets, no-regrets, Anticipatory, reactive) and climate-smart development options. • Review VCA and DRR case-studies from SIDS and low-lying coast states: • Adapt and adopt climate change adaptation and DRR methods, tools, approaches
6. Identify Barriers and Entry Points: SWG 4 – Tool 7	STEP 5	3.3.2.5	8 Tool 7	The national CDM Strategy and Work Programme provides the opportunities for mainstreaming climate change adaptation into existing CDM programmatic, operational, and practice frameworks. Existing policies and practices may inhibit the uptake or incorporation of climate change adaptation initiatives. It is important that these opportunities and barriers be identified early in the climate change adaptation formulation process to enhance mainstreaming efficiency and reduce wasted effort
7. Mainstream CCA into national CDM Strategy and Work Programme: Development of Climate-smart CWP SWG 5 - Tool 8	STEP 6	3.3.2.6	4 and 7 Tool 8	Having identified mainstreaming entry points in the CDM Strategy and Work Programme, the results-based language of the CDM outcomes, outputs and activities must be modified to incorporate the climate change adaptation options identified in Step 4 of the G Tool process.
8. The Way Forward – Planning the Post-Workshop Review and finalisation of the Climate-smart CWP - Tool 9	STEP 7	3.3.2.7	CDEMA/NDO consultations Tool 9	Development of mainstreaming timeline for: review and approval of climate-smart CDM Strategy and Work Programme, resource allocation, allocation of implementation responsibilities within NDO, and implementation.



The Mainstreaming Process and Steps

CHAPTER 2. Tools in the Mainstreaming Process

2.1 Background

It is important to understand who ought to be a part of the process and analyse the enabling environment for DRR mainstreaming. The purpose of this chapter is to introduce readers to the stakeholder identification and SWOT analysis processes in support of mainstreaming.

In this chapter the reader will also be introduced to the concepts and definitions associated with the process of mainstreaming. Terms such as mainstreaming, "entry point" and "pathways" will be discussed, along with their application in mainstreaming climate change adaptation into the country work programme.

2.2 Learning Objectives

By the end of the chapter the reader will be able to:

- Understand, explain and demonstrate terms such as "mainstreaming" and "entry point".
- Describe basic analytical tools for identifying mainstreaming opportunities and entry points.
- Understand the significance of the process of stakeholder identification to a successful climate change adaptation mainstreaming process.
- Explain the stakeholder identification process and its application in a national setting.

2.3 What is "Mainstreaming"?

Mainstreaming climate change adaptation is a process of considering the implications of climate risks for all aspects of national development and adjusting development processes, and the disaster/climate change preparedness, avoidance, mitigation, response, and recovery, measures to address these risks. The evidence for the negative impact of natural disasters on development in the Caribbean is clear and unambiguous. Mainstreaming climate change adaptation is the recognition of the need to address the evolving character of climate risk in the Caribbean to ensure that development programmes and policies are not at odds with existing and future climate risks.

2.3.1 The Advantages of the Mainstreaming Process

There are a number of advantages to be gained from the mainstreaming process as an alternative to developing a stand-alone climate change adaptation programme. [16]

- Mainstreaming is seen as a more sustainable, effective and efficient use of resources than designing and managing separate climate policies.
- Mainstreaming enhances the performance and development contribution of each sector and government ministry. Risk reduction should be viewed as an integral

[16] Kleine et al. (2007). Portfolio Screening to Support the Mainstreaming of Adaptation to Climate Change into Development Assistance. Climatic Change 84: 23-44.

part of development, regardless of sector or portfolio responsibilities, and not as an end in itself. DRR and climate change adaptation can and should be incorporated into all planning and policy frameworks.

- Mainstreaming can help identify win-win opportunities for adaptation. Although adapting to climate change represents a new challenge, overlaps do exist between "business-as-usual" development strategies and adaptation. In some cases, activities undertaken to achieve development objectives can automatically lead to adaptation benefits.

- Mainstreaming can help to avoid investment in maladaptive development by enhancing awareness of climate change threats and issues at the planning and policy levels.

This suggests that mainstreaming can be an efficient, effective, comparatively inexpensive, strategy for initiating a national climate change adaptation process.

2.3.2 Identifying Entry Points and Pathways

For the purpose of the **CCA2DRR** exercise a mainstreaming "entry point" is an opportunity for interface with elements in a strategic or planning framework through which a climate change adaptation intervention can be incorporated into an institution's operational planning.

The identification of "entry points" serves a number of purposes:

- It establishes a policy relevant point or points of focus for discussion, planning and decision-making.

- It establishes that the proposed mainstreaming dialogue and process will be a practical, applied exercise, intended to produce tangible and utilizable outputs.

- It encourages dialogue on climate risk management and adaptation to climate change.

- Establishes and demonstrates the strong links that exist between national priorities, disaster risk management and climate change adaptation.

At the higher, policy and planning level, good entry points for adaptation are related to economically and strategically important thematic areas such as, tourism, food security, disaster risk management, water resources and availability, agriculture, and environmental resource management.

For the purpose of the development and implementation of the G Tool the high-level thematic and policy entry point has been established as comprehensive disaster management. The objective of the mainstreaming initiative and hence the G Tool is to incorporate climate change adaptation into the country CDM work programme.

The exercise of identifying "entry points" therefore involves the identification of the, policy or operational interfaces; gaps in CDM policy,

planning or operational procedures, DRR or climate change adaptation needs or priorities that provide the opportunity or rationale for incorporating climate change adaptation initiatives into the country work programme planning framework.

2.4 The Stakeholder Process

In order to determine who should participate in the mainstreaming activity, it is helpful to go through a stakeholder process to ensure that all of the people who need to be engaged in mainstreaming discussions are aware of the process to be undertaken and given the opportunity to participate.

While NDOs will be very aware of the stakeholders that are part of their DRR operational framework, there are additional actors that would be both appropriate and desirable stakeholders in a **CCA2DRR** process. Resistance to mainstreaming could result from excluding stakeholders or insufficient prior consultation. The success of a **CCA2DRR** process could also be jeopardised by climate change adaptation measures that may bring about or contribute to existing conflicts of interest between different stakeholder groups.

The stakeholder process entails two steps:

- Stakeholder Identification to ascertain which organisations, sectors and groups are directly or indirectly involved in DRR and who could be affected by a **CCA2DRR** process or who could affect the outcomes of a **CCA2DRR** process.
- Stakeholder Analysis to understand disaster risk and climate vulnerability of each group.

2.4.1 Stakeholder Identification

The first step in the identification process is to generate an exhaustive list of organisations, institutions and groups. This can be done through a brainstorming process; the more people who participate in the brainstorming process, the more extensive the resulting list. The brainstorming session should be guided by the following questions:

- Which organisations are currently involved in DRR, either through the country work programme or through the national disaster management response and mitigation framework or structure?
- Which institutions and individuals (including national climate specialists) are currently involved in national climate change adaptation activities (policy and programmes)?
- Which groups and sectors are particularly vulnerable to climate change and might therefore have an interest in increasing resilience?
- Which groups/sectors could be most affected (both positively and negatively) by possible adaptation interventions?
- Which strategically important economic sectors might be particularly vulnerable to climate change?

- Which are the vulnerable groups that will be most affected by climate change?

2.4.2 Stakeholder Analysis

Once a list of stakeholders has been generated, it will be important to understand how each of the groups identified is vulnerable to natural disasters and climate events and how they have addressed vulnerabilities, if at all. This can be achieved by having each of the stakeholder groups complete the matrix below (Table 2). This can be done through a series of pre-workshop meetings with representatives of the stakeholder group. The blank matrix should be made available to each participating agency or group in advance of the meeting to facilitate preparation.

Information on current vulnerabilities and adaptation or coping mechanisms provides information on existing levels of awareness, preparedness and resilience; it can also provide insight into potential climate change vulnerabilities when reviewed in the context of climate change projections for that country or region.

Table 2: Stakeholder Analysis Matrix

Sector/ Group/ Physical location	Vulnerabilities to natural disasters	Main extreme climatic events and how they are dealt with	Main/ anticipated vulnerabilities to CC

The absence of a stakeholder's response to the query on "Main/anticipated vulnerabilities to CC", or an inadequate response, is important information in its own right, as it indicates to the NDO the climate change adaptation areas that will have to be addressed in the future, in terms of capacity development, awareness and/ or adaptation planning.

2.5 SWOT Analysis – Assessing the Enabling Environment

A "Strengths, Weaknesses, Opportunities, Threats" (SWOT) analysis is used to capture and verify the findings on the institutional environment that influences the DRM process of the host country and national disaster office.

What is a SWOT Analysis?

A SWOT analysis is a simple process in which the various factors of the organisation and its enabling environment pertinent to DRR and climate change adaptation are assessed and categorised. Each factor is characterised as positive or negative, and then as internal or external.

- Positive Internal factors are Strengths.
- Negative Internal factors are Weaknesses.
- Positive External factors are Opportunities.
- Negative External factors are Threats.

The categorised factors are then placed in a table (Table 3). It is often useful to simply brainstorm all factors at first with a group of stakeholders and place the suggestions on a board (flip chart)

and then characterise them rather than trying to fill out the matrix immediately. This is because it is often very easy to focus on weaknesses or to over emphasise strengths. Further, the table should not simply be based on opinions, but rather, whenever possible, on verifiable facts or reference documentation.

Statements should be as precise as possible. Often a large number of statements are generated; once the matrix has been completed it is useful to rank the factors in each quadrant in order of importance.

Once the table has been completed and prioritised, the climate change adaptation mainstreaming process will involve identifying adaptation interventions that build on the strengths identified; taking advantage of opportunities as well as addressing weaknesses and developing strategies to adapt to threats.

In most cases the SWOT analysis will be one of the first interactions with a community group or an agency. It is usually carried out in a group setting between a consultant or facilitator and the agency or community. Carrying out a face-to-face SWOT analysis, although desirable, may not always be feasible because of travel costs, time and scheduling considerations. It is possible that the initial meetings can take place "online" using Voice Over Internet Protocol (VOIP) technologies such as Skype©, Google Talk©, or proprietary Internet teleconferencing technology.

The G Tool project has explored and tested the use of online-meeting in the G Tool process. The obvious and immediate benefit has been to reduce the need for travel and associated costs, while simplifying coordination with professionals in the PS.

The longer-term advantages will result from the flexibility that this technology will introduce, mindful of the fact that the iterative G Tool process will be replicated in some or all of the remaining CDEMA PS in the coming years. Access to "Go To meeting" online-conferencing technology, Skype, video conferencing or VOIP facilities will enable CDEMA to facilitate SWOT consultations between national stakeholders, facilitators, consultants, and CDEMA project officers with minimal cost and inconvenience. This means that this type of interaction and analysis will be more likely to occur, enhancing the feasibility and effectiveness of the G Tool process.

The SWOT process entails:

1. Literature review and production of a draft SWOT matrix.
2. Video conference between the consultants, CDEMA and the national stakeholders for feedback and fact checking.
3. Indications of missing sources, experiences, capacity, and documents by host national stakeholders.
4. Real life examples and feedback based on recent events.
5. Refinement of the SWOT matrix in light of feedback.
6. Presentation of the revised draft matrix at the G Tool workshop.

Table 3: Excerpts from the SWOT Analysis of the Virgin Islands (un-prioritised)

	Factors	Entry points and strategy
Strengths	• Strong feeling that a major hurricane (Cat. IV) could be withstood.[17] • Government manifesto raises Climate Change as an issue and well-written policy documents exist. • A Climate Change policy is being drafted. • Strong leadership in DDM. • Vulnerability Analysis undertaken. • Work on Climate Change is creditable, especially given the short time over which it has occurred: a Climate Change committee has been named which engages non-government stakeholders, private sector and NGOs and an officer has been assigned to the issue. • Mitigation measures and CC adaptation measures are starting to be included in plans for coastal development and are included in the draft CC policy. Some findings have been incorporated in the hazard vulnerability process. • Existing met stations are working and provide data. • Airport has a current emergency plan and national Security Council reviews risk factors for lifelines regularly.	• Focus on flooding and storm surge rather than wind hazards. • Climate Change Policy should ensure that there are clear links to DRM both conceptually and to allow institutional linkages to DDM and to agencies involved in physical planning, building regulation, construction of infrastructure, lifelines and housing. Further it should look at livelihoods and economic activity to ensure resilience to climate change. The policy should address vulnerability as indicated in the Vulnerability Analysis. • Take the opportunity to review existing policy documentation for gaps. • Build on the work of the CC committee and the pilot project in Cane Garden Bay. • Create legislation or regulations to ensure that mitigation and adaptation measures are included in coastal development plans and the permitting system.
Weaknesses	• Low investment/funding from within VI: domestic revenue does not support CC and DRM activities as much as needed, potential of Carbon levies has not been fully exploited, levels of investment or funding from Private sector could be increased. • Economic activities and the majority of the infrastructure are in the coastal zone. • Ability to calculate risk due to multiple hazards or CC effect on existing hazards needs to be increased: collection of met. data (rainfall intensity for flooding) and correlation with events/ damage[18] needs to be improved, some historical rainfall data missing, few data on climate change effects. • Building code is incomplete but will be analysed and improved with disaster considerations addressed. • Unclear if vital infrastructure risk analysis includes increased storm surge or effects of Sea level rise on airport runways.	• Push building code improvements to completion. • Seek funds to improve capture and ability to manage meteorological data. • Include climate change risk in DDM annual report (as an annex if necessary).
Opportunities	• Overseas territory, non-self governing so routine expenses may be met and access to expertise from UK. • CDEMA provides access to expertise and assists in response and risk reduction. • Proximity to USVI and Puerto Rico assists in response and data availability. • Hilly in many places; some higher elevation areas to avoid storm surge cf. Grand and Little Cayman. • Healthy ecosystems in some places.	• Work with counterparts in USVI on CC on data sharing and acquisition, (University of the VI a potential partner?). • Develop a funding plan to be included as part of the CC policy.
Threats	• Low levels of access to external funding (outside the UK and from the UK) are a concern since many Overseas Territories do not get adequate levels of funding from the UK. The EU and other donors assume that the UK will provide adequate funding and refer OTs to the UK for money.	• Form alliances with other Overseas Territories and link with other islands for joint funding wherever possible.

[17]Based on the experience with Earl, a category four Hurricane which passed within 40km of Anegada.
[18]Is the level of damage correlated to the hazard? Are changes in drainage etc correlated to reduction in damage?

The Mainstreaming Process and Steps

During the piloting exercise the consultant reviewed literature provided by CDEMA, including policy documents, legislation, strategic plans and other material, including situation reports (SITREPS), where available. A draft SWOT matrix was developed based on available documentation. At this stage, what was missing was an assessment of actual implementation experiences, distinct from policy frameworks, standard operating procedures, and other documents.

To fill this gap, the draft matrix was sent to the NDO a few days before the online conference. The conference was based around a discussion of the matrix to give the stakeholders a chance to criticize and correct it and an opportunity to look at actions on the ground and implementation experience.

This provided an opportunity to refer to specific actions and other verifiable benchmarks and indicators that could improve the analysis enhancing the exercise. Following this, the SWOT matrix was modified in line with comments provided by the disaster management agency and its partners (Table 3). The modified matrix forms a part of the input into the **CCA2DRR** workshop's Participatory Scenario Development (PSD) process (see Chapter 3).

The online conference should not last more than two hours. The first hour is used to look at the draft matrix and invite feedback in a structured way and ask for further references that should be considered as part of the analysis. The second hour is used to look at the experiences of recent events and attempt to identify positive and negative experiences and areas where changes would be needed. To make the exercise a success, the government and particularly the national disaster organisation would be required to:

1. Evaluate the draft SWOT matrix.

    a. Indicate agreements and disagreements with the analysis.

    b. Provide any missing information and sources.

2. Answer questions on implementation; indicate how things worked on the ground at the last major events. (In the case of the VI, this drew on the experiences of floods in 2010 and Cyclones Earl and Otto). The exercise should be to remember the experiences and categorise them into:

    a. What went well.

    b. What did not go well.

3. Indicate areas where changes may be necessary.

    a. Specify sources of verification.

    b. Indicate whether there are reports, SITREPS or other documentation that can be used to support opinions expressed (Fig. 1).

At the workshop, the matrix will be presented and critiqued by the participants (Table 3). Then, the factors in the matrix will be prioritised so that each quadrant has a ranking of factors. This will allow further guidance on the next steps.

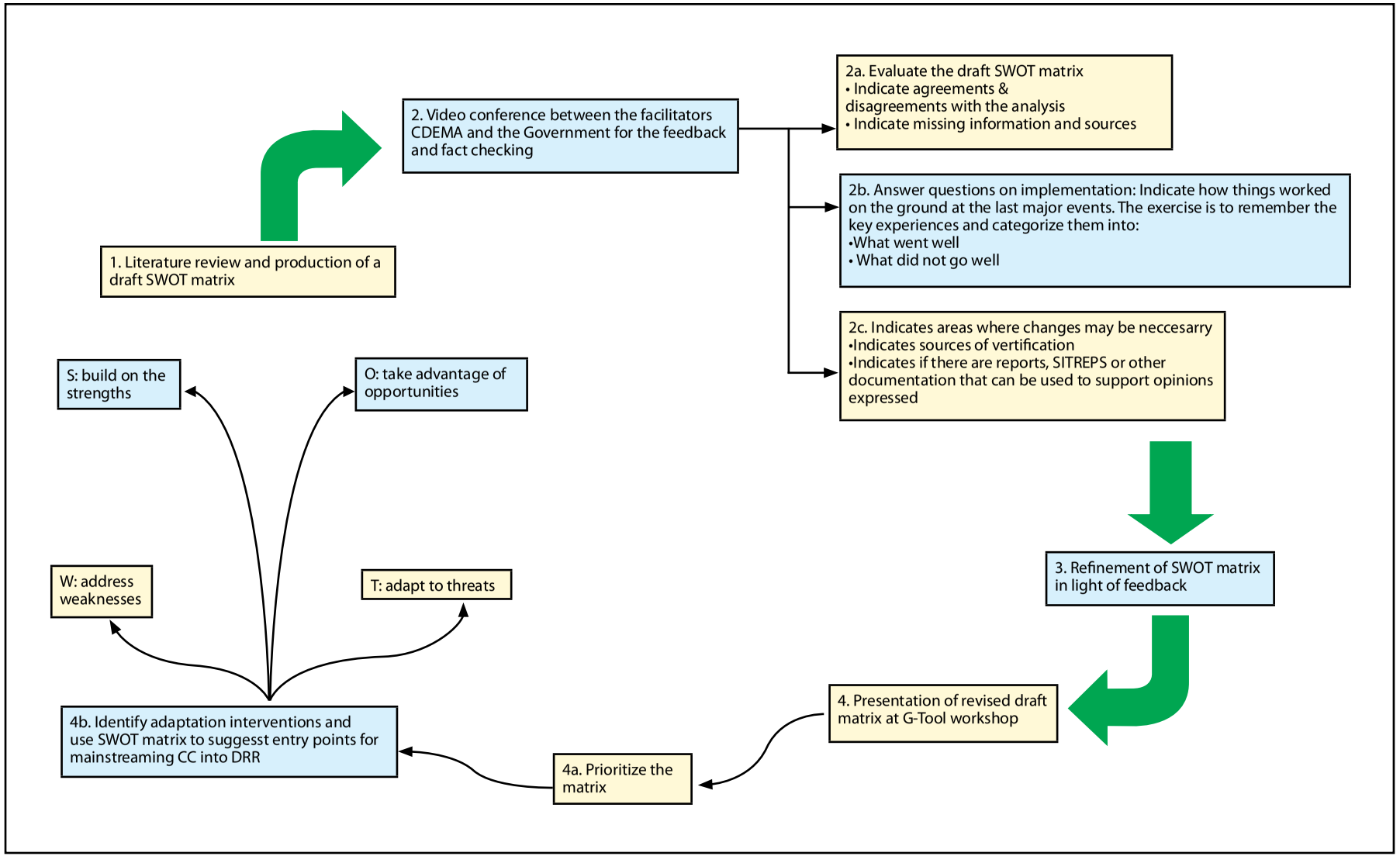


Figure 1: Key Actions in the SWOT process.

CHAPTER 3. Participatory Scenario Development: Workshop Process

3.1 Background

This step involves a participatory scenario workshop that is designed to stimulate engagement among stakeholders and generate better planning, policy, and decision support for the **CCA2DRR** process. The participatory scenario development process is the engine that drives the G Tool process.

The workshop is based on a methodology developed by the World Bank under its Economics of Adaptation to Climate Change Study.[19] However, it has been adapted for use by NDOs in the Caribbean that have developed country work programmes under the CDEMA CDM process.

The workshop is participatory and iterative and sessions build on each other to take participants to the stage of developing inputs for an amended country work programme. These inputs will serve as the basis for further refinement by the NDO towards preparing a final climate smart country work programme, as set out in Chapter 4.

The main output of the workshop is therefore a draft climate smart Country Work Programme.

At the heart of the workshop is a visioning process whereby participants develop a consensual vision for the socio-economic development of the PS. They assess how climate change impacts could affect the realisation of this vision and identify what is needed in order to realise this vision, in the face of climate variability and other climate impacts.

3.1.1 Understanding Scenarios

Scenarios are reasonable descriptions of how the future might look, using recognisable signals and information from the present about how current trends will progress.[20] In the context of the **CCA2DRR** process, scenarios are used to identify a range of possible adaptation options as well as the policies or types (and levels) of investment needed to facilitate mainstreaming[21]. A participatory scenario development process engages stakeholders in the development and exploration of plausible futures in a participatory way.

The process will enable stakeholders to examine plausible disaster and climate change futures in order to consider the implications of disaster and climate change risk on national development and the various stakeholder portfolios. Stakeholders will consider the need for climate change adaptation, the nature of required climate change adaptation interventions, and the assumptions and uncertainties associated with these considerations.

3.1.2 Backcasting

This process uses a "***backcasting***" approach, in which a development vision for the future is articulated and on which likely impacts of climate

[19] ESSA Technologies Ltd and IISD. (2010).
[20] UNEP. (2002). cited in ESSA Technologies Ltd and IISD. (2010).
[21] ESSA Technologies Ltd and IISD. (2010).

change and climate variability are superimposed as boundary conditions. In backcasting a successful outcome is imagined in the future, followed by the question: "what do we need to do today to reach that successful outcome?" (www.naturalstep.org) Fig. 2

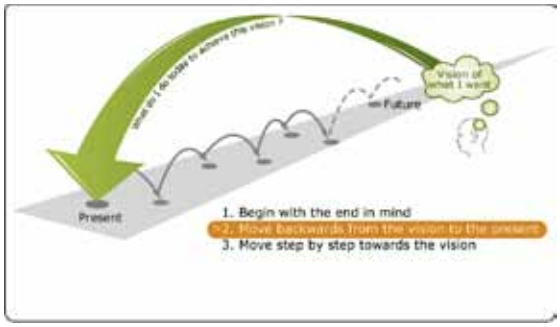


Figure 2.Backcasting.
Source: www.naturalstep.org

Backcasting is different from forecasting because it works in a context of discovery, rather than justification and when working with social issues, carries the principle of purposefulness, rather than causality.[22]

Backcasting is not merely based on the extrapolation of the present into the future. Rather it involves the extrapolation of desired or inevitable futures back into the present.[23] Participatory backcasting contributes to stakeholder learning and allows the articulation of futures shaped by a range of stakeholders.

3.2 Preparing for the Workshop

The workshop, like the entire G Tool process, is based on a multi-sectoral approach to analysing and prioritising issues for action. With this in mind, the workshop is intended to target not only representatives of the NDO that are directly involved in the delivery of the country work programme, it is intended to engage representatives from sectors that are important to the country's socio-economic development and that could play a role in identifying needed adaptation options that are relevant to their sector and that could play a role in implementing adaptation options.

3.2.1. Identifying participants

Having completed the stakeholder process (Section 2.4), it should be clear which agencies and groups need to be engaged in the workshop and the resulting mainstreaming activities.

It is likely that the workshop will engage representatives of agencies with responsibility for key economic and social sectors, including the following:

- Disaster Risk Management
- Meteorology
- Tourism
- Agriculture
- Fisheries
- Environment
- Forestry
- Gender Equity/Women's Affairs
- Youth Development
- Statistics

[22] Dreborg. (1996). cited in Cuginoti, A. (2008). Strategies for Sustainability using Participatory Backcasting from Principles. Draft of March 30th. 9pp. http://augustocuginotti.com/files/2008/03/participatory-backcasting-from-principles1.pdf
[23]Quist J, and P. Vergragt. (2006). Past and Future of Backcasting: The Shift to Stakeholder Participation and a Proposal for a Methodological Framework, Futures 38(9): 1027-1045: 1032. www.sciencedirect.com/science/journal/00163287

- Land Use Planning/Planning Approvals
- Finance
- Civil Society/Non-Governmental Organisations
- Architect/Civil Engineering community representation
- Private Sector Organisations/Chamber of Commerce representation
- Fire and Emergency Services
- Media (television, radio, press)
- Education
- Trade Unions
- The differently-abled

Participants should ideally be high level officers with responsibility for setting or influencing policy, planning and operational agendas in their organisations.

3.2.2 Useful background information for the workshop

Participants can prepare for the workshop by familiarising themselves with the following:

- The country's national development plan or strategy.
- Their sector's medium to long-term framework.
- The NDO's country work programme.

It is not anticipated that all participants will have in-depth knowledge of climate change; the workshop therefore makes accommodation for this.

3.3 The Workshop

The workshop has been developed for delivery over a three-day period. It is intended to be delivered by an experienced facilitator. A generic workshop agenda is included at **Tool 1**.

3.3.1 Workshop Objectives

The workshop aims to:

- Build a shared framework of understanding about climate change and its impacts on the Participating State, including how climate change will affect existing development challenges and vulnerabilities and how climate change adaptation can affect current vulnerability and future risk.
- Identify existing and alternative adaptation options for the Participating State and gaps in current capacities.
- Prioritise and sequence these options into adaptation entry points and pathways that build on current actions and frameworks for disaster risk reduction, and discuss synergies and trade-offs between investments in these options.
- Develop a Draft Climate Change Adaptation mainstreamed (climate smart) CDM work programme.

3.3.2 Approach

The workshop process is shown in Figure 3 and involves the following six steps:

- Step 1: Visioning.
- Step 2: Establishing socio-economic and climate boundary conditions for the Participating State.

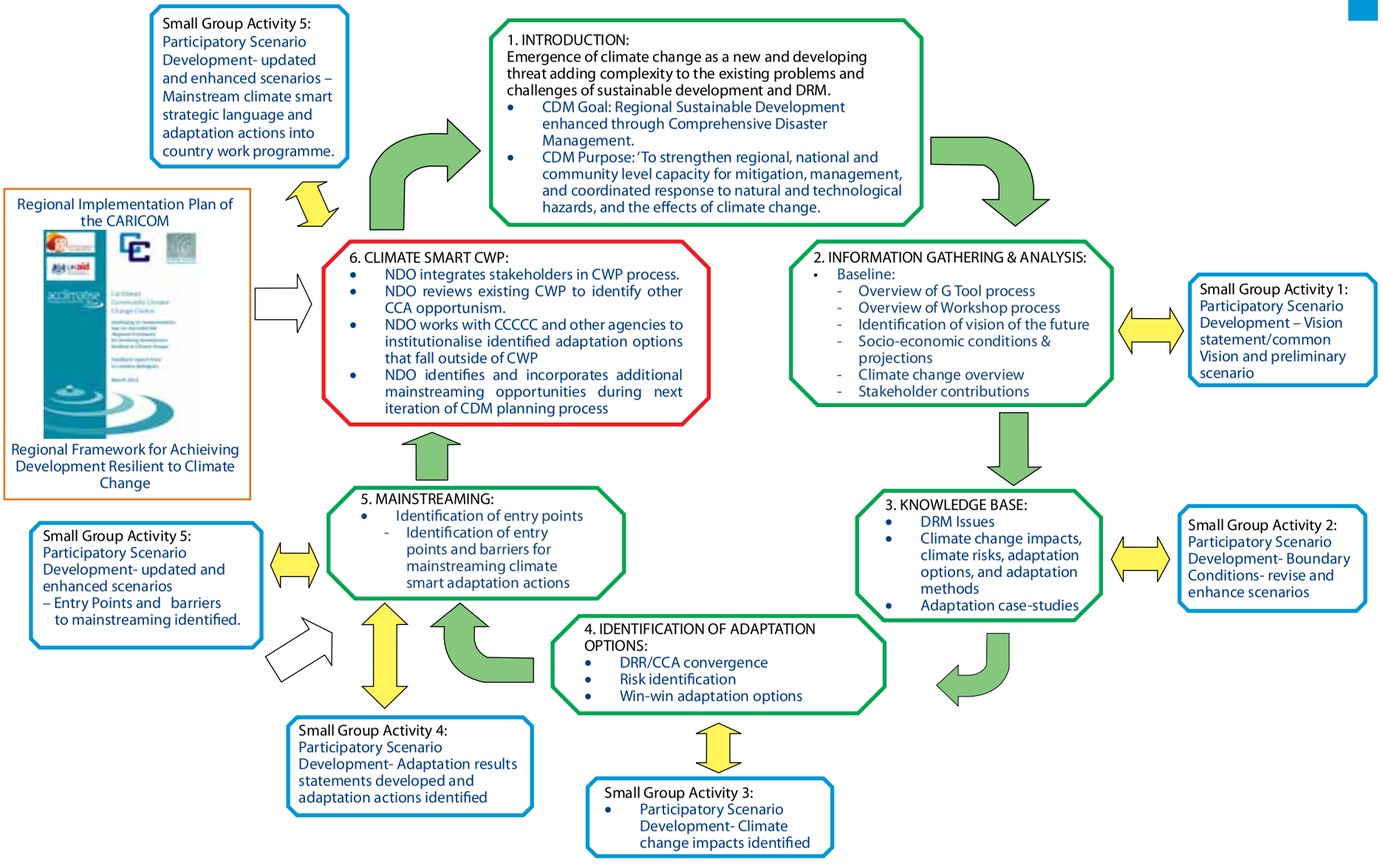


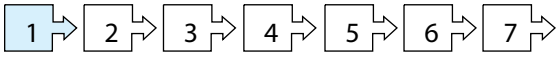
Figure 3: G-Tool Climate Change Adaptation Mainstreaming Workshop Process (**CCA2DRR**).

- Step 3: Identifying climate change impacts.
- Step 4: Determining adaptation options.
- Step 5: Identifying adaptation entry points and pathways in the national CDM country work programme.
- Step 6: Mainstreaming CCA interventions into the national CDM country work programme and development of a draft climate smart CDM country work programme.
- Step 7: Agreement on the way forward in order to finalise a climate smart CDM country work programme.

The workshop includes a number of presentations designed to provide background information and set the context for the PSD process; however, the emphasis is on desktop small group activities that participants work through from a sector perspective.

Instructions for the small group activities are provided in the appendices and a recording sheet has been prepared for small group activities 1 to 3. These recording sheets provide useful templates for the activities. Each group should be given one set of recording sheets, which they will complete over the course of the workshop and turn in to the facilitator at the end of the activity.

3.3.2.1 Step 1: Identifying a vision for the future



Learning objective: By the end of this session, participants will:

- Have a common vision for the future of their country.

Method: Workshop participants work in small groups to develop a future vision; the common elements of the visions are combined in order to develop a consensual vision that will inform subsequent workshop activities.

Participants will develop a vision for the future of the PS considering long-term, national development goals as articulated in national development frameworks (e.g. National Integrated Development Strategy, VI; National Strategic Plan of Barbados 2005 – 2025; Vision 2030, Jamaica; etc.).

The vision that participants develop is intended to be a tool for the workshop; it is not intended to replace or be integrated into a national vision document. Divide the workshop participants into sectoral groups (see flagged note below). The instructions for this group activity and recording sheet are provided in **Tool 2**.

Participants will have 50 minutes to develop their sector visions.

After participants present their sector visions in plenary, the facilitator should lead the group in an exercise to identify the common elements across the visions and to develop a consensual vision.

This facilitated discussion should take 1 hour.

Workshop organisers and the facilitator(s) should review the list of confirmed participants in advance of the workshop to determine the sector groups that participants could work in, e.g. natural resource management/environ-

ment; health; education; tourism; agriculture, etc. Depending on the number of sector representatives, it may be necessary to combine sectors and work in related thematic areas. For example, health, education, gender, and disability focussed groups could be combined under a social development/services banner.

The pre-selected groupings should be confirmed by the participants at the start of the activity and modifications made, if the group so dictates. It is important for people to be comfortable with their designation and to feel some sort of affinity with their group members. Participants will work from this designated sector or thematic perspective throughout the workshop.

Participants should prepare for this workshop session by reviewing their country's national development plan in advance of the workshop and their CDM country work programme .

3.3.2.2 Step 2: Establishing socio-economic and climatic boundary conditions for the Participating State

1 → 2 → 3 → 4 → 5 → 6 → 7

Learning objectives: By the end of this session, participants will:

- Understand the socio-economic conditions that could limit future development goals, objectives and visions;
- Understand how climate change and climate variability could limit future development goals, objectives and visions;
- Understand the linkage between climate change/climate variability and disaster risk reduction and implications for the vulnerability.

Method: This session features four presentations that establish the boundary conditions and provide an overview of climate change.

The first focuses on socio-economic projections for the PS's future that might challenge the vision. Climate change is taking place alongside other development challenges and these ought to be understood and taken into account when developing responses to increased climate risk. This presentation could be made by a senior representative of the national planning agency.

The second presentation focuses on disaster risk management issues and challenges in the PS. This presentation should be made by a representative of the NDO.

The third presentation focuses on climate change, trends and projections that are relevant to the Caribbean in general and the PS in particular. It will also explore the linkages between climate change and disasters, and climate change adaptation and disaster risk reduction. A climate change expert can present this topic.

The video "Islands on the Edge", produced by the Buccoo Reef Trust in Tobago, is a recommended tool for this session; it provides a concise and comprehensive overview of climate change, its causes and impacts on the region. The presenter could supplement the 22 minute video with a 10 minute presentation on PS-specific impacts.

"Islands on the Edge" is available for download from YouTube in two parts:

(http://www.youtube.com/watch?v=k2Z-t5U-NpA) and(http://www.youtube.com/watch?v=_XDpdMftd10&feature=related)

The fourth presentation focuses on the PS's climate change strategy and adaptation plan. It should give participants an idea of what actions have been taken to date, as well as challenges and opportunities. This presentation is best made by the National Climate Change Focal Point or a national climate change expert. Sample presentations are imcluded at **Tool 3**.

This session will take approximately 1 hour and 50 minutes. Presenters should be asked to prepare 15-minute presentations, with the exception of the climate change overview presenter, who should be asked to prepare a 10-minute presentation on PS-specific climate issues to supplement the video. The presenter should review the video as part of her/his preparation.

The facilitator should reserve 30 minutes for discussion and feedback. As part of the discussion, the facilitator should review the consensual vision and sector visions that were prepared and ask participants if the information provided has any implications for their visions. This should be captured on a sheet of flip chart paper by each group and appended to respective statements.

3.3.2.3 Step 3: Identifying climate change impacts

1 → 2 → **3** → 4 → 5 → 6 → 7

Learning objectives: By the end of this session, participants will be able to:

- Identify the main climate change trends affecting their country, the direct and indirect impacts of each trend; and the groups or sectors that will be vulnerable to each impact/set of impacts.

Method: Participants will use pre-prepared cards to develop impact chains.

Participants will examine the sector vulnerabilities identified and rank them by likely temporal impact occurrence: short-term, medium-term, and long term.

Information for the impact cards (changing climate parameter, direct and indirect impacts, and socio-economic effect) is provided in **Tool 4a**.

The instructions for this group activity and the recording sheet are provided in **Tool 4b and Tool 4c.**

Participants will have 1 hour to prepare their impact chains and 30 minutes to report back to the group.

The facilitator and climate change expert, if still available, should review the chains for completeness.

The facilitator or workshop organiser will have to prepare the impact cards in advance. Prepare a set of cards for each group. Use a different shape for each card category (see Fig. 4). Print two cards per letter-sized sheet of paper and cut in two. See **Tool 4a .**

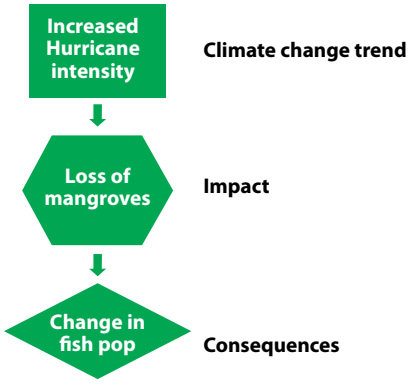
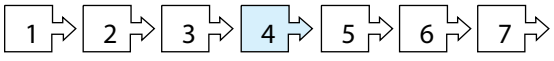


Figure 4: The Shape of the Trend, Impact, and Consequences, Impact Cards and their Relationship.

3.3.2.4 Step 4: Identifying adaptation options and adaptation result statements



Learning objectives: By the end of this session, participants will be able to:

- Articulate adaptation results for the sector vulnerabilities identified in Step 3.
- Identify new and existing adaptation options/ activities for the sector vulnerabilities identified in Step 3.

This session includes a presentation of up to 20 minutes on the convergence between climate change and disaster risk reduction, focusing on win-win strategies that can "…enhance the reduction of climate-related losses, lead to the more efficient use of resources, and increase the effectiveness and sustainability of both approaches."[24] Participants will work in their sector groups to identify desired adaptation results and options for their sector. In identifying the results and option, participants should refer to their sector vision and the consensual vision for guidance.

The climate trends and impacts identified in Step 3 are the starting point for this activity. For each impact, participants should articulate an adaptation result statement, a corresponding adaptation action or set of actions, indicate if it is new or existing and share how the existing options can be improved.

Participants have 1 hour and 10 minutes to work in their groups and 30 minutes for reporting back in plenary.

The instructions for this group activity and the recording sheet are provided in **Tool 5a** and **Tool 5b**.

All participants may not be familiar with results based planning. The facilitator should review 'result statements' with the group in plenary to ensure that all participants understand what is required of them before they go off into their sector groups.

3.3.2.5 Step 5: Identifying adaptation entry

[24] ProAct Network. (2008), Climate Change Adaptation and Disaster Risk Reduction Policy Paper. Nyon, Switzerland: ProAct Network Secretariat: 2. 5pp.

points and climate smart results of the CDM country work programme

1 2 3 4 5 6 7

Learning objectives: By the end of this session participants will be able to:

- Identify pathways and entry points for adaptation results in the CDM country work programme.
- Articulate new/ revised climate smart outputs and outcomes of the CDM country work programme based on the adaptation results in Step 4.
- Identify other sector pathways and entry points for priority adaptation results from Step 4 that fall outside the scope of the country work programme.

Method: Participants will continue to work in their sector groups. The starting point for this activity is the set of the adaptation result statements developed in Step 4.

Participants will map each adaptation result statement to the country work programme, working at the level of the overall Programming Framework (outcomes and outputs) only. The steps in this mapping process are specified in the decision-tree flow diagram in **Tool 6a**.

Where the adaptation result statement does not map to a specific output but is consistent with an outcome, participants will develop a new output statement for the relevant outcome.

Where the adaptation result falls outside the scope of the country work programme participants should identify the sector or ministry strategy that it best corresponds to and craft a suggested outcome statement.

Participants have 2 hours and 15 minutes to work in their groups and 30 minutes for reporting back to plenary.

The instructions for this group activity, which include a decision-tree schematic, are provided in **Tool 6a**.

Examples of entry points identified in the country work programme are shown in **Appendices 6b and 6c**.

The outcome of this exercise is a set of climate smart outcome and output statements that correspond to, and will replace, the DRM statements at the selected entry points in the country work programme (**Tool 6d**).

At this point in the process there must be correspondence with the climate change adaptation goals of the **Implementation Plan** for the "Regional Framework for Achieving Development Resilient to Climate Change" , i.e. entry points in the regional climate change adaptation work plan and strategic framework (see section 4.3 and **Tool 6d**).

The outputs from this exercise are recorded by the small working group in the recording sheet at **Tool 6e**.

Participants should prepare for this workshop session by reviewing their country work programme in advance of the workshop. They should be guided to pay particular attention to the page of the PS's CDM Framework that sets out the goal, purpose, outcomes and outputs.

3.3.2.6 Step 6: Mainstreaming Adaptation Actions into the Operational/ Activity Level of the CDM country work programme – a Climate Smart CDM country work programme

1 → 2 → 3 → 4 → 5 → 6 → 7

Learning objectives:

- To incorporate identified adaptation options/activities into the high-level (outcomes and outputs) and operational/ activity level of the CDM country work programme .
- To identify and mainstream the climate change adaptation options/ activities necessary to support the delivery of CDM country work programme outputs and outcomes.

Method: Participants will continue to work in their sector groups. The starting point for this activity will be the development of climate smart CDM Strategy (outcomes and outputs) based on the climate smart outcome and output statements developed in Step 5.

The sector groups will re-convene to continue the climate change adaptation mainstreaming process, starting with the mainstreamed outcome and output levels completed in Step 5, to the operational/ activities level of work programme activities.

The climate smart outcome and output statements developed in Step 5 will replace the DRM outcome and output language at the corresponding entry points.

Once the high-level mainstreaming exercise has been completed each sector group will be assigned the responsibility of mainstreaming climate change adaptation actions into one or more areas of the CDM country work programme .

Each sector group will review and, if necessary, expand on the range of climate change adaptation options/activities from Step 4 that are relevant to the area that they have been assigned. The objective will be to identify those climate change adaptation options/activities that are sufficient and necessary to deliver the climate change adaptation results identified in Step 5 at the output and outcome levels.

Once this exercise has been completed, the sector groups will then review the assigned areas of the CDM work programme with the objective of identifying:

(a) Existing CDM work programme DRM activities that can be incrementally modified to incorporate the climate change adaptation options/ activities; and

(b) The appropriate sections of the CDM work programme where, climate change adaptation activities that cannot be incorporated into existing DRM activities can be introduced as, new, dedicated climate change adaptation actions.

The climate change adaptation activities must then be mainstreamed throughout the entire results-based framework. In this way the climate change adaptation interventions identified and

elaborated in the national **CCA2DRR** workshop are reflected at the operational level of the CDM country wok programme as resourced climate change adaptation activities.

All participants may not be familiar with results based planning. The facilitator should review RBP principles and the 'results chain' with the group in plenary to ensure that all participants understand what is required of them before they go off into their sector groups.

High level mainstreaming: Participants have four hours to work in their sector groups on mainstreaming climate change adaptation results statements into the outcomes and outputs of the country work programme, and 60 minutes for reporting back to plenary.

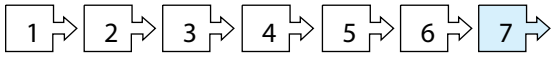
Activities level mainstreaming: Participants have four hours to work in their sector groups on mainstreaming climate change adaptation results statements - into the activities of the country work programme, and 60 minutes for reporting back to plenary.

Participants should prepare for this workshop session by reviewing their country CDM work programme in advance of the workshop. Participants should also review their national documents, or those from other Caribbean countries, that identify adaptation measures. These will include, but not be limited to national communications reports[25] and national climate change adaptation strategies (e.g. ***The Virgin Islands Climate Change Green Paper – A Snapshot*** (http://www.bvidef.org/main/media/Green%20Paper%28web%29.pdf) and the full version of ***The Virgin Islands Climate Change Green Paper*** which can be downloaded at the URL: (http://www.bvidef.org/main/media/The%20Virgin%20Islands%20Climate%20Change%20Green%20Paper%28web%29.pdf).The output of this activity is a draft "climate smart" CDM country work programme . The draft climate smart CDM country work programme will have to be reviewed by the NDO to confirm the feasibility of the mainstreamed climate change adaptation interventions.

Once the mainstreamed work plans have been reviewed and approved, they must be appropriately resourced (assignment of unit and/or staff responsibility, allocation of financial resources) and scheduled.

This process should involve, and be supported by, the stakeholder constituency that participated in the **CCA2DRR** process. Stakeholder input may come at the point in the process where the plans for making the specific climate change adaptation interventions operational have been developed and reviewed.

3.3.2.7 Step 7: Agreement on the way forward in order to finalise the climate smart country work programme



Learning objectives: By the end of this session, participants will:

- Have an agreed plan of action for completing the process after the workshop.

Method: Participants will work in plenary to arrive at a shared agreement on the way forward

[25] National Communications Reports: http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php

for finalising the climate smart country work programme.

Climate change adaptation actions will fall into two broad categories; those that can be addressed through existing mechanisms, or new, easily achievable modalities with existing resources ("low hanging fruit") and those that will require dedicated modalities and significant resource inputs.

In the case of the latter, the NDOs and the appropriate government agencies will need to establish dialogue with the Caribbean Disaster Emergency Management Agency and the Caribbean Community Climate Change Centre (CCCCC) to identify opportunities and modalities under the ***Implementation Plan*** for the ***"Regional Framework for Achieving Development Resilient to Climate Change"*** or other climate change adaptation frameworks (see Section 4.3).

In the case of the former, once the work plans have been approved, arrangements will have to be made to ensure that the initiatives are resourced and scheduled.

This process should involve, and be supported by, the stakeholder constituency that participated in the **CCA2DRR** process. Stakeholder input may come at the point in the process where the plans for making the specific climate change adaptation interventions operational have been developed and reviewed. It should address:

- Evaluation (feasibility);
- Resourcing; and
- Implementation.

While the onus will be on the NDO to finalise the climate smart work programme, it will likely wish to continue to engage with sector stakeholders as it does so. This session should be used to identify ways in which this mutually acceptable engagement could take place to develop an indicative time line to finalise the climate smart work programme.

The post workshop process should begin with a review of the draft climate smart CDM country work programme by the NDO to assess whether the proposed climate change adaptation initiatives can be implemented with existing resources and capacity or whether substantial new resourcing and institutional arrangements will have to be developed.

Consideration should be given to reviewing the draft climate smart CDM country work programme to verify that a comprehensive mainstreaming has taken place at all levels of the work programme. Any necessary refinement of the climate smart work programme should be undertaken at this stage.

The next step would consider the means by which the climate change adaptation interventions will be undertaken (authority, responsibility, staff assignments, supervision, monitoring and evaluation) and resourced (funding and budget approval), and the development of an implementation strategy and plan. The implementation strategy and plan are important measures for ensuring that the mainstreaming process does not loose momentum. The commitment to the **CCA2DRR** workshop is short-term and manageable. Substantial commitment

and planning will be required to ensure that the NDO team is able to spearhead and carry the responsibility for ensuring the formal adoption and implementation of the final climate smart CDM country work programme .

If possible, this exercise should be undertaken with the assistance of the partners and stakeholders from other organisations that participated in the **CCA2DRR** workshop. Since the partners and stakeholders will be familiar with the subject matter, CDM country work programme , mainstreaming methods, and national DRM and GCC circumstances, this process can be initiated and completed with less of an investment in preparation, orientation and coordination than was required for the original **CCA2DRR** G Tool workshop.

Consideration can be given to incorporating the follow-up **CCA2DRR** exercise into national stakeholder consultation workshops or CDM Harmonisation and Implementation Programme (HIP) workshops and consultations.

The session should be used to identify and prioritise the actions and strategies that will be used to ensure that the mainstreaming process is completed, timelines developed, partners and champions identified along with, the nature and sources of the resources required.

This session should last no longer than 2 hours and 30 minutes.

3.3.2.8 Evaluation and closing

The facilitator should use the final session of the workshop to review the experience. A sample workshop evaluation form is provided at **Tool 8**.

This session should last 30 minutes.

CHAPTER 4. Outputs and Linkages: The way forward

The Participatory Scenario Development (PSD) workshop generates the main output of the G Tool process: the draft climate smart country CDM work programme. Additional outcomes include a stakeholder constituency that shares a common knowledge and understanding of climate change adaptation and disaster risk reduction definitions, and concepts as they relate to current and projected national socio-economic circumstances and natural hazard threats. The stakeholder constituency will have developed a common understanding and familiarity with the G Tool process and the subsequent steps required to transform the CDM country work programme into a climate smart CDM country work programme for guiding DRM operations.

The stakeholder constituency represents an opportunity. Stakeholders who have participated in the G Tool process may offer the opportunity of an effective, aware, and knowledgeable, interface with the NDO. Where NDOs may be considering establishing or appointing DRM Liaison Officers in government agencies, ministries, statutory organisations and private sector organisations, stakeholders who have participated in the G Tool process may be suited to serve the Liaison Officer function or could play a role in supporting the designated offer within their organisation. The G Tool process increases the options and opportunities for **CCA2DRR** as well as provides linkages with the Regional Implementation Plan for the CARICOM "Regional Framework for Achieving Development Resilient to Climate Change" (www.caribbean-climate.bz/).

4.1 The CDM Link: The National CDM Programme Strategy and Framework

For illustrative **purposes** aspects of the Virgin Islands CDM country work programme are referred to in this section. This approach has been taken in order to provide an example of the specific relationship between DRM programming and national sustainable development objectives and the broader development agenda.

The purpose of the Virgin Islands Comprehensive Disaster Management Framework is to "Reduce human suffering and economic losses from natural and man-made hazard impacts". Natural hazard impacts and economic losses have increased four-fold in the last 20-years as a result of population and development growth into vulnerable areas. This trend is expected to continue. Global climate change trends were detected during the last century, and are expected to continue with the accompanying development of related impacts. Even if greenhouse gas emissions were stopped completely, with immediate effect, the inertia due to the presence of elevated greenhouse gas concentrations in the atmosphere would cause climate changes and associated impacts to manifest themselves for centuries to come. In order to achieve its purpose, the Virgin Islands Comprehensive Disaster Management Framework cannot promote business as usual because the business of disaster risk management is slowly and inexorably changing.

The **Goal** of the Virgin Islands Comprehensive Disaster Management Framework is to ensure that disaster management plans are fully integrated in the development and management

cycle of projects, and fully institutionalised within the Government structure. Mainstreaming disaster risk management into all aspects of a country's development planning process is not business as usual. However, the goal as stated only addresses part of the growing threat posed by natural and human induced hazards as climate change adaptation must be incorporated into the national CDM framework, strategy and operations. Like CDM, it must be mainstreamed into every aspect of a country's development planning process. Failure to upscale national CDM strategies and work programmes to adapt to, and reduce the negative impacts of, climate change will set the stage for the changing character of climate, climatic extremes, and hydro-meteorological disasters to eventually overwhelm national DRM capacity. This in turn will set the stage for gains in sustainable economic development to be undermined or reversed.

The results-based nature of the CDM country work programme provides not only the entry points for mainstreaming climate change adaptation, but also ensures that the adaptation options that are mainstreamed are defined in results-based language. This is important as it ensures that some degree of rigor is brought to bear on the formulation and wording of proposed climate change adaptation interventions so that they are focused and action oriented.

The CDM Harmonisation and Implementation Programme (CDM HIP) is already providing effective support to CDEMA Participating States in the area of capacity building, and more specifically, enhancing capacity for the results based national CDM planning and programming. The CDM HIP is a natural vehicle or conduit for continuing the **CCA2DRR** process among the CDEMA Participating States. Missions that provide training and technical assistance in national CDM programme development could be incrementally modified to support and facilitate the **CCA2DRR** process.

4.2 The CCA Link: The Regional Climate Change Strategic Framework for Achieving Development Resilient to Climate Change

It is important that the NDO and the wider stakeholder constituency keep in mind the broad relationship between the Enhanced CDM Strategy and Frameworks 2007 to 2012, the CDM country work programme developed by the NDO, the G Tool process and the ***CARICOM 'Regional Framework for Achieving Development Resilient to Climate Change'*** (Fig. 5).

This perspective is important because the G Tool process serves to establish an operational linkage at the national level between the region's CDM initiatives coordinated by CDEMA and the region's climate change adaptation initiatives coordinated by the Caribbean Community Climate Change Centre (CCCCC).

The Regional Framework for Achieving Development Resilient to Climate Change was endorsed by the Conference of Heads of Governments of the Caribbean Community (CARICOM) in 2009. The CARICOM Heads of Government also mandated the CCCCC to embark on a process to develop a comprehensive regional plan for the implementation of that strategy.

The CCCCC guided the development of the Plan through a process of consultation, involving national governments, regional institutions, the private sector, civil societies and international donor agencies. ***The Implementation Plan for***

the Regional Framework for Achieving Development Resilient to Climate Change (IP-RFADR, or IP) was submitted to the CARICOM Council for Trade and Economic Development (COTED) for endorsement at their Joint Meeting at the end of 29 August 2011 – 2 September 2011.

The IP defines the region's strategic approach for coping with climate change and is intended to:

1. Be a one-stop roadmap supporting the region's efforts in its Low Carbon Development (LCD) and climate change resilience initiatives.

2. Be a living document subject to revision as necessary to meet the needs of individual Member States.

3. Provide the basis for developing a set of 'bankable projects', a request from the Heads of Governments, for funding under the various funding mechanism of the UNFCCC.

The G Tool is intended to lead to the development of climate smart CDM country work programme s in CDEMA PS applying the tool. The climate smart CDM work programmes will define "what" is to be done in terms of climate change adaptation interventions within national strategic frameworks for disaster risk management.

The IP provides a complementing and supporting framework for making operational the proposed climate change adaptation initiatives, and in particular the more ambitious, climate change specific, adaptation measures. The CDEMA PS may find that the more accessible and easily implemented climate change adaptation opportunities are readily identified in the G Tool process and mainstreamed into national CDM strategies and frameworks. However, the G Tool may also identify critically needed climate change adaptation interventions that:

- Cannot be readily integrated into, or accommodated by, an existing national CDM strategy and framework.

- Are more appropriately mainstreamed into the strategic frameworks of government ministries and agencies, or private sector entities, that for various reasons are not configured to manage projected climate hazards, or to screen, design, and implement, and monitor sectoral climate change adaptation initiatives.

- Will require substantial financial investments that cannot be mobilised, or absorbed by the traditional institutional or sectoral budget frameworks.

The ability of national governments, sectoral interests, and private sector entities to develop the resilience necessary to cope with the anticipated adverse impacts (and positive opportunities) of global climate changes involves a two-pronged approach to climate change adaptation. This includes:

- An early commitment and implementation of the more accessible, more easily justified, climate change adaptation opportunities (low-cost, no-cost, win-win adaptation options).

- A transformational change in the approaches used to enhance resilience to,

reduce, and manage climate-related risks, and the identification and accessing of resources for climate change adaptation.

The IP will assist CARICOM Member States to address the range of strategic approaches taken to climate change adaptation, through its Strategic Elements:

1. Mainstreaming climate change adaptation strategies into the sustainable development agendas of CARICOM states.
2. Promoting the implementation of specific adaptation measures to address key vulnerabilities in the region.
3. Promoting actions to reduce greenhouse gas emissions through fossil fuel reduction and conservation, and switching to renewable and cleaner energy sources.
4. Encouraging action to reduce the vulnerability of natural and human systems in CARICOM countries to the impacts of a changing climate.
5. Promoting action to derive social, economic, and environmental benefits through the prudent management of standing forests in CARICOM countries.

The G Tool will initiate a series of national, participatory, multi-sectoral, constituency-building, processes that mobilise direct action on IP Strategic Elements 1, 2, 4, and 5, linking the regional CDM and climate change adaptation interventions. It will require substantial financial investments that cannot be mobilised, or absorbed by the traditional institutional or sectoral budget frameworks.

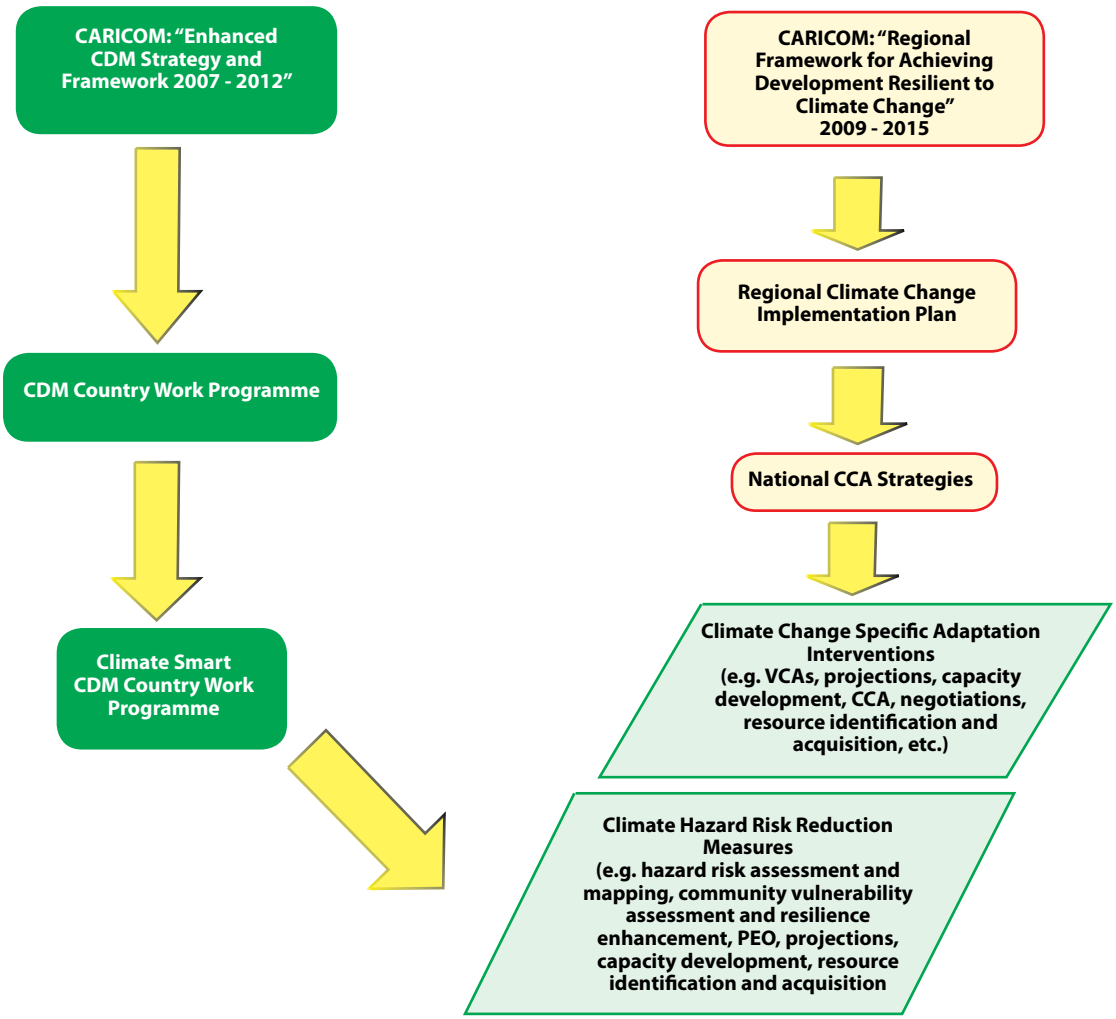
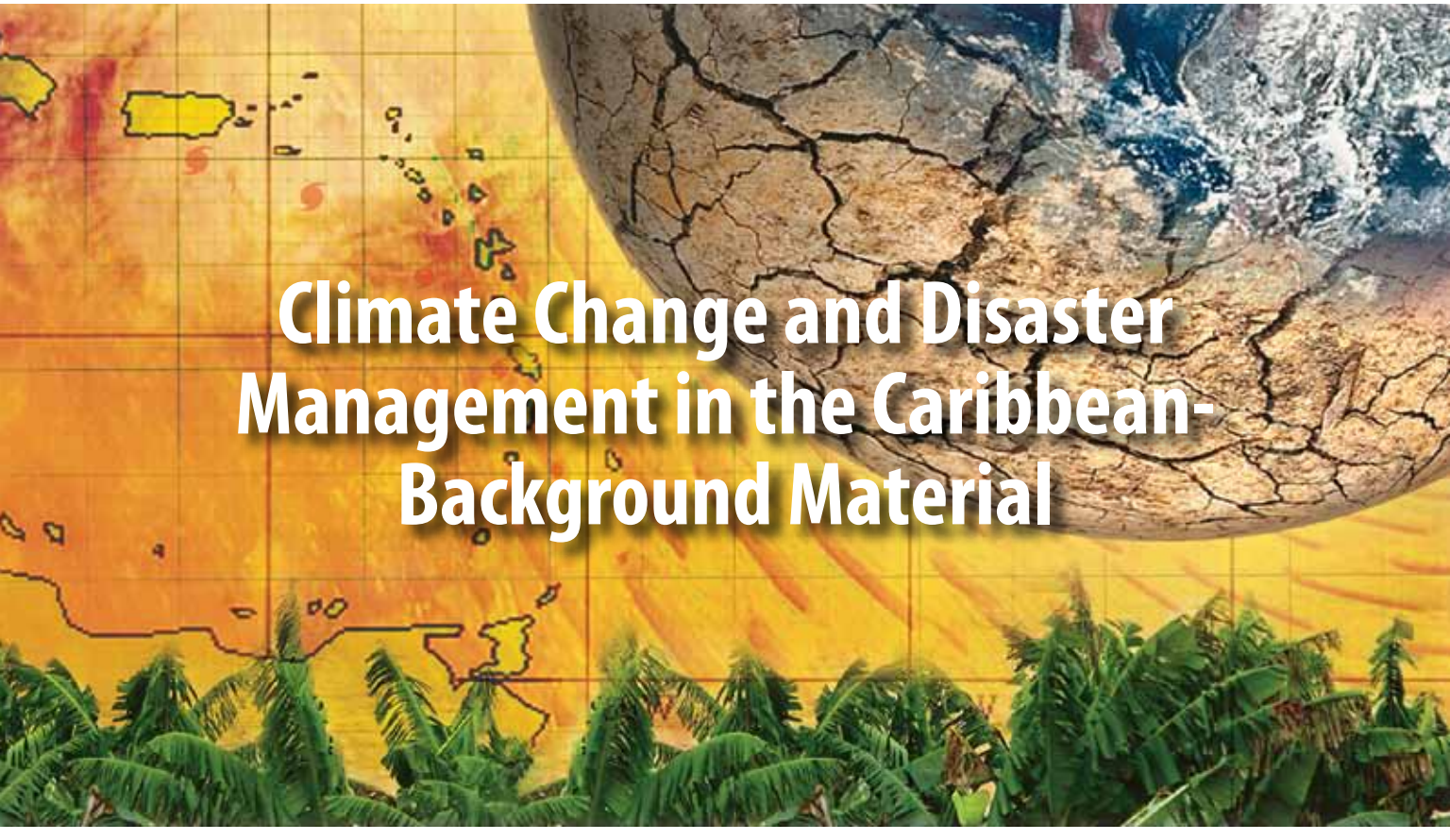


Figure 5: A schematic showing the Functional Relationship between the G Tool and the Implementation Plan for the Regional Framework for Achieving Development Resilient to Climate Change.



Climate Change and Disaster Management in the Caribbean- Background Material

CHAPTER 5. Climate Change and Disasters

The information on weather, climate and climate change and general guidance provided in this chapter supports the delivery of the workshop session "Establishment of Socio-Economic and Climate Boundary Conditions and the presentation "Understanding Climate Change –Introductory Overview" (**Tool 3**).

5.1 Background

This chapter introduces the concepts of weather, climate change, climate variability, and natural disaster risk. It goes on to introduce the concepts of disaster risk.

In order for the climate change adaptation mainstreaming process to be effective it must involve a wide range of stakeholders. The purpose of stakeholder diversity in the mainstreaming process is to ensure that the widest possible scope of expertise, experience, perspective, responsibility and opinion is brought to bear on the decision making process for mainstreaming climate change adaptation into the national disaster risk management planning process.

Because of this diversity, the first step in the climate change adaptation mainstreaming process is to develop a common awareness and understanding among participating stakeholders of the language, concepts, and definitions that describe and define climate change and disaster hazard phenomena.

The stakeholders participating in the mainstreaming workshop should be introduced to the concepts of climate change, climate variability, and natural disasters. A basic presentation should be given on the causes and effects of climate change, and natural disasters. Teaching examples should be drawn from the Caribbean to allow new concepts to be introduced in familiar socio-economic contexts and geographic settings. Case studies on disasters caused by extreme weather events and climate change vulnerability should be presented and explained to reinforce the concepts and definitions.

The presentations will introduce the concepts of exposure, vulnerability, hazard, disaster and risk and highlight the nature of their inter-relationships. The significance of their interrelationships will be discussed in the context of disaster risk management and reduction.

5.2 Learning Objective

By the end of this chapter, readers will be able to:

- Explain the difference between terms such as weather and climate.
- Describe climate change, its causes and its main effects.
- Describe how climate change is affecting the Caribbean, their country and community (including key sectors such as health, agriculture, fisheries, water, environmental management etc).
- Explain what a changing climate means for disaster risk reduction.

Box 2: Workshop Presentation – An Introduction to Climate Change

The participants should be introduced to the fundamental concepts and definitions related to weather, climate variability, disaster risk, and climate change with the aid of presentation material developed from published and unpublished reviews, guidance documents, and teaching materials. The presentation will provide the context in which climate change adaptation and mainstreaming can be understood.

5.3 Weather and Climate: Ideas and Definitions

Weather

Weather describes that actual state of the atmosphere at a specific location and time. Wherever we are in the world, weather is described in terms of certain factors, temperature, wind speed, precipitation, and cloud cover. Additional factors used to describe weather, include air pressure and moisture (humidity).

Because weather is location and time specific it changes from day to day and from season to season.

Climate

Every aspect of how humans live on the planet Earth is affected by climate. The types of homes that we live in, the clothes that we wear, the foods that we grow and eat, the plants and animals that grow around us even how we gain access to and use water. Climate plays such an important and extensive role in our everyday lives that, ironically, like the air that we breathe, we tend to forget about it.

When we think of climate we tend to think of the long term pattern of weather conditions typical to a particular geographic region. We talk about the "tropical" climate of the Caribbean; the "temperate" climate of southern Europe. Climate is defined by the weather average over in a particular geographic region over protracted periods of time (at least 30 years).

The climate describes the characteristic range of weather factors that are to be experienced in a particular geographic location in terms of temperature, precipitation, wind, cloud cover, humidity, and air pressure. These factors will display particular patterns in their variation from month-to-month over the space of a year. These variations are called seasons. Historically the month-to-month variations in any geographic region in temperature, precipitation, wind, cloud cover, humidity, and air pressure (the seasons) have been relatively predictable. There might be departures from the seasonal pattern for a period of a few years, but these departures from normal climatic-pattern tend to be short lived in comparison to 30-year time-frame used to define the climatic conditions.

There is a saying that is used to help make the distinction between climate and weather:

"Climate is what you expect (e.g. dry spell in February); weather is what you get (a very wet February)." [26]

[26] MACC. (2005).Climate Change Handbook for Caribbean Journalists.Caribbean Community Climate Change Centre, Belmopan, Belize. Pgs. 72. http://200.32.211.67/M-Files/openfile.aspx?objtype=0&docid=2723.

The main idea that you should keep in mind about "climate" is that historically the climate in any particular region has been predictable. There may have been variations from year to year, but on average, over the long-term (30 or more years) the ranges over which the climatic factors varied during the year, were predictable.

This is how farmers know when to plant certain crops. This is why vacation holidays tend to be taken at a particular time of the year and weddings tend to be held in June.

Climate in the Caribbean

CDEMA PS have tropical climates. They are located between the equator and the Tropic of Cancer (at approximately 23.4378° N). The CDEMA PS generally are distributed between latitudes 11 and 18 degrees north. Suriname on the South American continent is the most southerly PS, while the archipelago of The Bahamas is the most northerly.

The climate of the Caribbean region is generally characterised by dry winters and wet summers, with:

- A cool-dry winter/hot-wet summer climate regime.
- Two wet seasons each year, with an early rainy season from May to June, followed by a brief dry period and then the peak rainy season later in the year.
- The peak rainy season in the second half of the year coincides with peak hurricane activity.

The size and continental location of the CDEMA PS of Belize,[27] Guyana, and Suriname introduce some variation to this model climate pattern (Box 3 and Box 4).

Box 3: Climate in Belize

Northern Belize has a subtropical climate with an annual rainfall of 1,500 mm (60 inches). Southward, the climate becomes increasingly tropical and annual rainfall increases to 3,800 mm (150 inches). The climate is characterised by marked wet and dry seasons separated by a cool transitional period. The rainy season begins in the south in the middle of May and arrives in the north in mid June. It continues through to November, but most locations experience a drier period in August. Some 60% of annual precipitation occurs during this season, produced primarily by tropical systems including tropical cyclones. The cool transition period occurs from November through February. Rainfall declines and approximately 12 cold fronts cross the country during this period. The true dry season is from February to April and is produced by strong anticyclones in the Atlantic that generate persistent stable south easterly airflow across the country.

[27] Belize First National Communication to the Conference of the Parties of the United Nations Framework Convention on Climate Change. (2002). Belize Ministry of Natural Resources, the Environment, Commerce and Industry. (2002).http://www.hydromet.gov.bz/CC_CDM/Climate%20Change/General%20Studies/Belize%20First%20National%20Communication.pdf.

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Box 4: Caribbean Climate

Most of the Caribbean possesses a cool-dry winter/hot-wet summer climate regime. The temperature pattern generally follows the motion of the sun, with some spatial variation across larger islands, as coastal areas exhibit warmer temperatures compared to the cooler (oftentimes mountainous) interiors of the islands. Sea breezes and the warm ocean temperatures of the Gulf and Caribbean Sea also help modulate temperatures year round.

Peak rainfall occurs in the latter half of the year for most Caribbean islands, coinciding with peak hurricane activity. In some islands there is bimodality to the rainfall pattern, with an early rainfall period (May/June), followed by a brief dry period and then the primary rainfall period.

By virtue of its location, the region is also prone to the influence of hurricanes that pass through the north tropical Atlantic.

On the seasonal time scale the Caribbean rainfall regime is conditioned by the large-scale features of the tropical north Atlantic. Rainfall received during the dry early months reflects the influence of North American frontal systems which trek through the northern Caribbean. In early spring the northward migration of the North Atlantic High yields lower surface pressures and weaker trades across the Caribbean. Not surprisingly, this marks the onset of the rainfall season. The appearance of warm ocean surface temperatures and lower vertical shears in the wind field (especially in September-October) also enhances convective potential and therefore helps determine the onset, duration and peak of the wet season. The presence of surface, mid and upper level troughs and the passage of easterly waves, tropical depressions, storms and hurricanes then give rise to the rainfall.

Source: Taylor, Chen, and Bailey (2009)

URL: http://200.32.211.67/M-Files/openfile.aspx?objtype=0&docid=270.

Box 5: Impact of Hurricane Ivan on Grenada

- Hurricane Ivan (2004) claimed 37 lives, impacted over 90% of housing stock, caused significant livelihood losses. Estimated total damage was in excess of 200% of Grenada's GDP.
- Country had not been hit in some 49 years, since Hurricane Janet in 1955.
- A 2005 assessment of Grenada's progress towards the UN Millennium Development Goals suggested the Hurricane had likely set back development by 10 years.
- In addition to physical damage Hurricane Ivan also debilitated governance structures and systems.
- There was significant damage recorded to key administrative infrastructure and trauma experienced by government personnel.
- Police, prison services, PM's office, national disaster office all were severely impacted.
- Damage estimated at US$300M.

Extreme weather events

The climate of a region describes the average or most probable range of weather-related factors (rain, cloudiness, wind, temperature, humidity etc.) that will be experienced at any given time of the year. However, the weather varies around these averages or "normal" conditions. Sometimes these variations can be large with significant direct and indirect results. It is when climatic conditions make major departures from the normal or expected trend, that populations are exposed to climatic hazards.

The Caribbean region is exposed to a number of extreme natural phenomena of geological, atmospheric, hydro-geologic, seismic and volcanic origin. Although hurricanes may be the most spectacular and devastating of the extreme climatic events, floods and the associated hydro-geological hazards (e.g. landslides, sediment floods) are the most frequent [28]

The socio-economic consequences of extreme climatic events in the Caribbean are on record as being devastating. Whether it is the hurricane season of 2004 and the impact of hurricane Ivan, the floods in Guyana of 2005, the social and economic consequences can be measured in lives, livelihoods, human well being, and GDP (Box 5).[29]

[28] Ahmad, R. (2007). Risk Management, Vulnerability and Natural Disasters in the Caribbean. A Report Prepared For The International Federation Of Red Cross. Pgs. 43.

[29] Chakalall, Y.S. and L. John Walling. (2009). Incorporating Business Continuity and Disaster Recovery (BC/DR) in Governance and Planning Systems of Caribbean SIDS. Presented at the 10th Annual SALISES Conference - Navigating Risks and Building Resilience in Small States. March 25-27, 2009 Cave Hill Campus, Barbados. http://www.cavehill.uwi.edu/salises/conferences/2009/10th AnnualConference_2009.htm.

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Climate Variability

Climate variability is the way that local climatic conditions vary from the average conditions used to describe the model situation (see Section 5.3).

The climate at any location is described by the behaviour of the climatic variables such as temperature and precipitation, wind speed and direction, humidity, and cloud-cover. The fluctuation in the values of these variables from their average state represents the phenomenon of climate variability. For example, the average maximum temperature in July in Georgetown, Guyana, might be of 32°C (89.6°F) and the average temperature, 24°C (75.2 °F) in the hottest month (July). However, each year, July's daily average maximum temperature will be less than or greater than the long-term average maximum and minimum values. The highest temperature ever recorded in the capital was 37.7°C (99.9°F) and the lowest 16.6°C (61.9 °F). This indicates the range over which temperatures will "vary" around the average values.

Although daily weather values will depart from the climatic mean, the climate is considered stable if the long-term average does not significantly change.

Climate Change

The Intergovernmental Panel on Climate Change (IPCC) defines climate change as:

"A change in climate over time, whether due to natural variability or as a result of human activity".

The earth's climate is driven by the energy radiated by the sun. The energy radiated by the sun as "light" heats the earth's surface. The warmed earth's surface radiates energy back into space (think of the heat that you "feel" being radiated from the dashboard of your car). The natural components of the atmospheric (water vapour, carbon dioxide, and other gases) trap some of the outgoing energy, retaining heat somewhat like the glass panels of a greenhouse. This is where the term "greenhouse gas" comes from.

Without this natural "greenhouse effect," temperatures would be much lower than they are now, and life as known today would not be possible (www.epa.gov). In fact, it has been said that without the natural green houses gases in the atmosphere, the earth would be at the same temperature as the moon (-18° C).

The emissions of greenhouse gases (GHGs) have increased greatly over the last two centuries, primarily as a result of industrial activities that released large quantities of carbon dioxide into the atmosphere. The main activities that have contributed to the increased concentration of greenhouse gasses in the atmosphere include the burning of large quantities of coal, oil, and gasoline, coal; the cutting of forests; and certain farming methods. During the last century changes in technology and industrial processes have led to the introduction of new greenhouse gases into the atmosphere.

If natural greenhouse gases at natural concentrations are a good heat trap or insulator, you can imagine that the increase in concentration of natural greenhouse gasses and the addition of new greenhouse gasses would result in more heat being trapped in the atmosphere. The increased concentration of GHGs has increased

the heat-trapping ability of the atmosphere, resulting in marked increases in global surface temperatures (over 0.5°C in the last century).

Since the earth's climate is driven by heat energy, the trapping of more heat in the atmosphere has begun to alter the earth's climate. Future changes in climate are expected as the average temperature of the atmosphere increases. This will result in changes in cloud and snow cover, rainfall patterns, wind circulation,patterns, ocean currents, storm and hurricane frequency and possibly storm intensity, and the distribution of plant and animal species.

Climate Change Definition

According to the United Nations Framework Convention on Climate Change (UNFCCC), the term climate change is used to describe a change in climate that is attributable directly or indirectly to human activity that alters atmospheric composition (UNFCCC, 2002). Another definition regards climate change as any systematic change in the long-term statistical characteristics of the climate elements (such as temperature, pressure, or wind) sustained over several decades or longer (see http://www.ilrdss.sws.uiuc.edu).

5.4 Climate Change Effects: What Will Change?

Using 1990 as the baseline, the IPCC estimates that the earth's average surface temperature will increase by between 1.1°C and 6.4°C by the end of this century. Global mean sea-levels are projected to rise from 18 cm to 59 cm during the same period.

In general terms, climate change will affect the Caribbean by producing a warmer, dryer region with more intense hurricanes, and possibly more variability in extreme events.[30]

The specific future climate conditions within the Caribbean will vary across the region. Taylor, Chen and Bailey (2009) summarised the projected future climate conditions in the Caribbean, in their review of the health effects of climate change in the Caribbean:

- During the 21st century, sea levels are likely to continue to rise on average around the small islands of the Caribbean Sea, but this increase in sea level is not projected to be geographically uniform.
- Summer rainfall in the Caribbean is very likely to decrease in the vicinity of the Greater Antilles, but changes elsewhere and in winter are uncertain.
- It is likely that there will be an increase in intense tropical cyclone activity. However, the tracks and global distribution of the tropical cyclones are uncertain. Projections indicate that tropical cyclones will become more intense, with higher peak wind-speeds and heavier rainfall.[31]

[30] Taylor, M. A., A.A. Chen, W. Bailey (2009). Review of Health Effects of Climate Variability and Climate Change in the Caribbean. Prepared in association with the Climate Studies Group, Mona, University of the West Indies and Caribbean Environment and Health Institute for: The Mainstreaming Adaptation to Climate Change Project of The Caribbean Community Climate Change Centre. Pgs. 85.

[31] OECD (2009). Integrating Climate Change Adaptation into Development Cooperation. Policy Guidance. OECD. France 2009.

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- All Caribbean islands are very likely to experience warming, although somewhat less than the global annual mean warming in all seasons.
- Short term variability in rainfall patterns will likely continue. The prevailing warmer conditions may make the convection associated with the short lived events more intense. Rainfall events will be shorter and the intensity of the rainfall will be greater.

The OECD[32] policy guide on integrating climate change adaptation into development cooperation provides specific examples of the types of impacts that climate change will have on Small Island Developing States:

- *"Subsistence and commercial agriculture will be adversely affected. Fisheries are also expected to be negatively affected.*
- *Many islands in the Caribbean are likely to experience increased water stress. Climate change will reduce freshwater availability and increase salinisation of freshwater resources.*
- *Sea-level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards, thus threatening vital infrastructure, settlements and facilities that support island communities.*
- *Deterioration in coastal conditions, for example through erosion of beaches and coral bleaching, is expected to affect local resources.*
- *By mid-century, climate change is expected to reduce water resources in many small islands (e.g. in the Caribbean and the Pacific) to the point where they become insufficient to meet demand during low-rainfall periods.*
- *Coral bleaching may become an annual or biannual event in the next 30 to 50 years or sooner."*

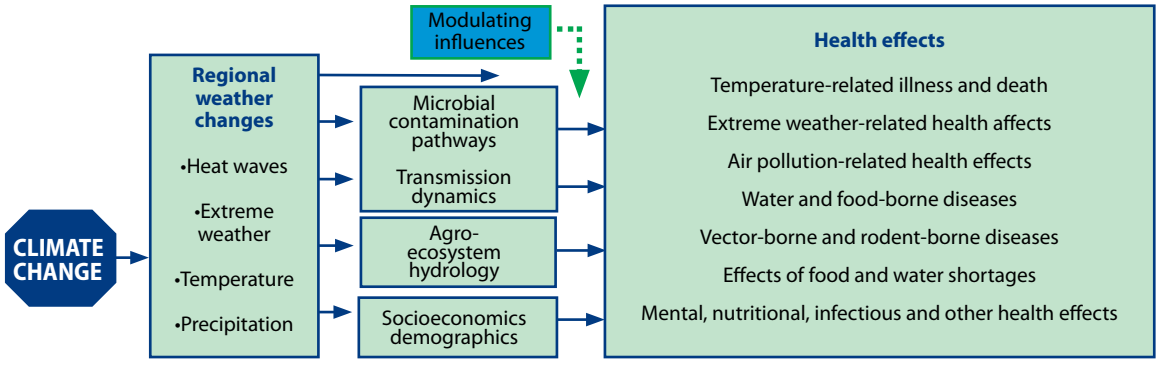


Figure 6: Potential Climate Change Induced Health Effects.
Source: Taylor, Chen, Bailey, 2009.

[32] OECD (2009). Integrating Climate Change Adaptation into Development Cooperation. Policy Guidance. OECD. France 2009.

5.5 How Climate Change is Affecting the Caribbean, Countries and Communities

In the Caribbean:

- Mean global temperatures increased by approximately 0.74° C over the course of the 20th Century.
- Global mean sea-levels are projected to increase by at least 18 cm and as much as 59 cm during the same period.

The UNEP report on Climate Change in the Caribbean and the Challenge of Adaptation[33] reports that an analysis of data from the late 1950s to 2000 has shown that:

- The number of very warm days and nights in the Caribbean is increasing dramatically and very cool days and nights are decreasing.
- The extreme inter-annual temperature range is decreasing.
- The Caribbean Sea has warmed by 1.5°C over the last century. The maximum number of consecutive dry days is decreasing and the number of heavy rainfall events is increasing.
- There is a trend towards an overall decrease in precipitation, with prolonged dry spells having occurred over the past few decades.

Climate change will affect both direct and indirect impacts on Caribbean populations. Direct impacts of climate change on health will result from changes in the intensity, frequency and location of extreme weather (Fig. 6) events such as heat waves, floods, droughts, hurricanes, and storm surges. These changes will, in turn, increase the level of exposure of Caribbean populations to these extreme weather events, with the accompanying health implications of sickness, injury, and death.

Indirect negative impacts of climate change on human health will result from the direct beneficial impacts of climate change on pathogens and disease carriers (vectors) such as rats (leptospirosis) and mosquitoes (dengue and malaria) and will have negative impacts on food productivity.

The direct and indirect impacts of climate change may, in turn, create conditions and circumstances that lead to an increase in the levels of mental stress and mental illness.

[33]UNEP (2008).Climate Change in the Caribbean and the Challenge of Adaptation. UNEP Regional Office for Latin America and the Caribbean, Panama City, Panama. Panama City, in October 2008

CHAPTER 6. The Anatomy of a Disaster: Managing Disaster Risk

The information on natural hazards, disaster risk reduction, climate change adaptation and the general guidance provided in this chapter supports the delivery of the workshop session "Identification of adaptation options" and the presentation "DRR, CCA and Convergence - win-win development strategies" (Box 6).

6.1 Background

This chapter introduces the reader to the language and concepts of disaster risk reduction and climate change adaptation. The information in this chapter will help the reader to understand how patterns of disaster risk evolve over time, and the implications for future approaches to disaster risk reduction.

6.2 Learning Objectives

By the end of the chapter the reader will be able to:

- Define, and explain the terms, hazard, disaster, exposure, sensitivity, vulnerability, resilience, adaptive capacity, and coping capacity.
- Describe how gender affects vulnerability and adaptive capacity.
- Describe a range of approaches to addressing disaster risk.
- Suggest disaster risk reduction options for floods, droughts, hurricanes, and landslides.
- Explain the different types of climate change adaptation response.
- Describe how the different types of climate change adaptation response might be integrated into disaster risk reduction initiatives.
- List similarities and differences between climate change and disaster risk reduction, and examine what is being done at the regional level to deal with climate change.
- Explain the concept of convergence and describe the benefits of adopting a coordinated approach to dealing with climate change adaptation and DRR (See Presentations at Tool 3).

6.3 Disaster Risk and Climate Change Concepts

Hazard

In the disaster risk reduction and climate change adaptation contexts, a hazard may be considered to be:

"A dangerous phenomenon, substance, or human activity or condition that may cause loss of life, injury or other health impacts, property

damage, loss of livelihoods and services, social and economic disruptions, or environmental damage".[34]

Hazards may be "slow onset" phenomena such as changes in rainfall patterns, sea-level rise, or changes in temperature patterns. "Fast onset" hazards include floods, droughts, storms, and hurricanes. Hazards are described by the likely frequency of occurrence of a specific event within a named time frame for different areas, determined from historical data or scientific analysis. An example would be the probability of a Category III hurricane happening within the next ten years in Barbados.

Box 6: Workshop Presentation – Disaster Risk Reduction, Climate Change Adaptation, Convergence, and Development Strategies

Specific natural disaster cases should be used to introduce concepts, definitions and risk reduction approaches, and elaborate on the relationships between, hazard, disaster, exposure, sensitivity, vulnerability, resilience, adaptive capacity, and coping capacity. The relationship between disaster risk reduction and climate change adaptation should be discussed in relation to the projected changes in climatic conditions and climate extremes.

Exposure

At the regional level a comparison of land area and the number of natural disasters experienced by the population shows that small island states tend to have the highest frequency of natural disasters. This was attributed to their location in areas prone to hurricanes and tropical cyclones.[35]

The Caribbean is located centrally in Hurricane Alley, the belt of warm water that stretches from the west cost of North Africa, to the east cost of Central America and the Gulf Coast of the United States. The countries of the Caribbean are exposed to hurricane hazards on an annual basis, although not all to the same degree.

At the national and local levels the same principle applies, exposure refers to the communities, property, people, property, infrastructure, households, livelihoods, infrastructure, or other elements present in the areas where natural hazards occur that are thereby subject to potential losses.

Vulnerability

Vulnerability refers to the social circumstance, economic, structural, physical, health, educational, political, and other factors that cause groups to be more susceptible to injury or distress that others when exposed to the same natural hazard. An important point to remember is that vulnerability is a characteristic of the

[34] UNISDR (2009) Terminology: Basic terms of disaster risk reduction.
[35] Rasmussen, T. (2004). Macroeconomic Implications of Natural Disasters in the Caribbean. IMF Working Paper WP/04/224. Pgs.24.

subject of interest, whether it is a person, family, community, structure, businesses, industry, or environmental resource. Vulnerability should be considered as being independent of exposure. Two buildings in the same location can have the same levels of exposure to the same natural hazard. If one building has been designed and constructed to incorporate features to withstand hurricane winds (e.g. block and steel construction, sound foundation structure, hurricane-straps, optimal roof angle and type) and the other has not, the latter will be more susceptible to wind damage and hence more vulnerable when exposed to storm or hurricane winds.

Houses in Guyana that incorporate the traditional design of building on stilts will be less vulnerable to flooding than those in the same location without stilts.

Risk

Disaster Risk is defined by the UNISDR as:

"The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period."

Populations are at risk from natural hazards because (i) there is a hazard that poses a threat to their wellbeing, (ii) the population is exposed to the hazard, and (iii) the population is vulnerable to the hazard. These terms will be defined in the coming sections of this chapter.

But it is important, first, to understand the relationship among these factors and how they contribute to risk.

Risk can be represented as a basic equation that combines the functions of hazard, exposure and vulnerability as follows.

Risk = Hazard x Exposure x Vulnerability

The equation says that an increase in one or more of the following factors will lead to an increase in hazard risk:

- **Exposure** (home located on the beach vs. home located inland on elevated ground),
- **Hazard** (increase in hurricane strength from category 1 to category 4; or three inches of flood water vs. three feet of flood water), and/or
- **Vulnerability** (two homes located close to the beach, one with the first floor raised on ten-foot above ground on concrete pillars the other on with the first floor at ground level).

Resilience

Resilience can be defined as:

"The ability of a community to resist, absorb, and recover from the effects of hazards in a timely and efficient manner, preserving or restoring its essential basic structures, functions and identity." [36]

[36] UNISDR. (2009).Terminology on Disaster Risk Reduction. http://unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf. UNISDR-20-2009-Geneva.

Box 7: Cayman Islands BC/DR Experience Snapshot (2004) – Hurricane Ivan Year.

- Main economic drivers: International financial services & tourism.
- Financial services sector responsible for 63% of Governments revenue.
- Estimated economic loss from Hurricane Ivan (2004) was US$2.4 billion (UN ECLAC).
- Real economic growth declined from 2% in 2003 to 0.9% in 2004.
- Recovery: By the end of 2005 GDP was at 6%.
- Cayman Islands Monetary Authority (CIMA) survey of banks reported 90% of respondents had business continuity plans at time of hurricane strike.
- Businesses with Business Continuity plans were able to resume some services almost immediately.
- Businesses without BC/DR plans were closed for longer periods.
- Rapid recovery attributable to recovery of financial services sector.
- Speed of recovery attributable to Government recognition of the importance of the financial services sector & prioritisation of assistance to facilitate its resumption.
- Unity of purpose by Government.
- Magnitude of the Ivan event identified a number of planning weaknesses which are being addressed.
- As a consequence of the Ivan experience an Economic Continuity sub-committee established under the national disaster and continuity planning framework in recognition of economic resilience in achieving immediate and long term national recovery.
- Role of committee to promote effective continuity practices and responses
- Cayman Islands Montary Authority (CIMA) developed:
    - Own BC/DR plans covering crisis assessment, response management, business recovery management, emergency management, staff wellbeing management and public relations management.
    - A Statement of Business Continuity Management for all licensed financial service sector businesses.
- Currently a greater appreciation for business continuity and crisis management plan maintenance & testing programmes in Cayman.

Source: Chakallal and Walling (2009) based on Bodden, P. N. (2006) & Stafford T. (2005)

A number of factors may influence the susceptibility or resilience of a community to natural hazards and disasters. This influence will be reflected in the degree of vulnerability of the community. In a study of the Cayman Islands, Grenada, Jamaica, and Haiti following Hurricane Ivan,[37] the most common factors that were observed to affect resilience were: social capital; the quality of housing and location of settlements; the living conditions of female-headed households; and the economic well-being of the population.

It has been shown that there is a negative relationship between income and the number of people affected by natural disasters, supporting the fact that the capacity of countries to avoid the human cost of disasters improves as income improves.[38]

Disaster

A disaster is defined as:

"A serious disruption of the function of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources".[39]

The physical impacts of Hurricane Ivan (2004) in Cayman, Grenada, and Jamaica were substantial and extensive (Boxes 7, 8, and 9). What was instructive was the affect that Ivan had on the governance systems required to respond to and recover from the hurricane, and the comparative differences that were observed among the islands.[40] Although all of the islands experienced an overwhelming event, the ability to recover was markedly different.

Gender

Gender can profoundly affect disasters. Gender refers to the social (rather than the biological) differences between male and female persons. Gender differences may be expressed in terms of income, living conditions, access to social services (such as education) as well as the roles played in child rearing, or coping with extreme events. In most societies these factors vary between men and women as well as between boys and girls.[41]

In the context of disaster risk reduction, gender differences may be expressed at different stages of the disaster equation. For example, female-headed households are larger and poorer than male-headed households; this makes them more vulnerable and affects their resilience. On the other hand men are more likely than women to take risks during an extreme event and thus more likely to experience injury. Females may tend not to be as vulnerable during an event (they may be in shelters), but may recover more slowly. Women and girls are more vulnerable.

[37] Kambon, A. (2007).Caribbean Small States, Vulnerability and Development. In Caribbean Development Review. Volume 1. UN ECLAC,LC/CAR/L.155. Pgs. 104-139.
[38] Rasmussen, T. (2004). Macroeconomic Implications of Natural Disasters in the Caribbean. IMF Working Paper WP/04/224. City and publisher needed 24 pp.
[39] UNISDR (2009). Terminology on Disaster Risk Reduction. http://unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf.
[40] Chakalall, Y.S. and L. Walling (2009). Incorporating Business Continuity and Disaster Recovery (BC/DR) in Governance and Planning Systems of Caribbean SIDS. UNDD. (2009). 10th Annual SALESIS Conference. Barbados, 2009.
[41] UNDP. (2009). Enhancing Gender Visibility in Disaster Risk Management and Climate Change in the Caribbean). http://www.undp.org.cu/crmi/genderstudy/index.asp

Box 8: Jamaica Business Continuity and Disaster Response (BC/DR) Experience Snapshot (2004) – Hurricane Ivan Year

- Impact: Hurricane Ivan claimed 31 lives, affected 370 000 persons, damaging 102,000 households and causing an estimated US$580M in damage.
- Economy: Planning Institute of Jamaica review of April-June 2005 quarter indicated that the economy remained flat due to the residual impact of Hurricane Ivan and drought conditions.
- GDP: Preliminary data revealed an estimated 0.1% decrease relative to April-June period in 2004. PIOJ forecasted GDP growth of 1.9% for July-September 2005.
- Recovery operations for localized impact events, e.g. floods were managed by the Office of Disaster Preparedness & Emergency Management (ODPEM).
- Due to the widespread effects of Hurricane Ivan an Office for National Reconstruction (ONR) was established.
- The ONR mandated to fully involve the entire Jamaican society in the rebuilding drive, working closely with the private sector, trade unions, corporate groups, Non - Governmental Organisations, churches and the entire civil society, so as to secure their full participation
- ONR established with A bi-partisan board headed by a recognized impartial technocrat, Ret. police commissioner, two businessmen, a banker, representatives from the political parties and other organisations.
- According to the US Government Accountability Office (GAO) review of USAID's disaster recovery and reconstruction efforts to Hurricane Ivan and summary of lessons learned; the establishment of a host government agency to coordinate the international response to a disaster is important.
- US GAO noted that USAID worked with the Governments of Jamaica and Grenada to establish independent coordination entities separate from those countries' ministries to facilitate the recovery process and to streamline work.
- US GAO noted that donors should take into account the time needed to establish these agencies when developing implementation schedules and setting time frames.

Source: Chakallal and Walling (2009). Based on (2005) News Release; Chaplin, K (2004); US Government, Accountability Office (2006); IADB/ECLAC (2007)

Box 9: Grenada Business Continuity and Disaster Response (BC/DR) Experience Snapshot (2004-2007) – Hurricane Ivan Year & Aftermath

Impact:

- *Hurricane Ivan (2004) claimed 37 lives, impacted over 90% of housing stock, caused significant livelihood losses. Estimated total damage was in excess of 200% of Grenada's GDP.*
- *A 2005 assessment of Grenada's progress towards the UN.*
- *Millennium Development Goals suggested the Hurricane had likely set back development by 10 years.*
- *Significant scale of damage recorded to key administrative infrastructure and trauma experienced by government personnel.*
- *Police, prison service, PM's office, national disaster office all were severely impacted.*
- *Damage estimated at US$300M.*
- The country had not been hit in some 49 years, since Hurricane Janet in 1955.
- US congress approved US$100M to be spent in one year.
- Other donor pledges stood at US$122M. There was still a notable financing gap.
- 77% of US congressionally approved resources were actually spent.
- Recognising the complexity of the reconstruction task and the fact that it could not fit within traditional Public Service rules of operation a reactive institutional model for reconstruction and development was proposed by the Government of Grenada in response to the crisis.
- An Agency for Reconstruction and Development (ARD) was proposed.
- Initially ARD model designed as an independent body outside Government reporting to Cabinet through a stakeholder council.
- ARD model assumed: leadership outside partisan politics, transparent governance, flexible internal structures, secure core funding, establishment of a Development/Recovery Fund, a mandate to coordinate internal and external country assistance and clear core strategic objectives.
- A reconstruction levy was imposed by the Government of the day with the intention of populating a Reconstruction Fund.
- Reconstruction fund established by Act of Parliament but ARD unable to secure finances from Fund or manage Fund.

Box 9 cont'd: Grenada Business Continuity and Disaster Response BC/DR Experience Snapshot (2004-2007) – Hurricane Ivan Year & Aftermath

- Stakeholder council ceased functioning after 1 or 2 meetings, ARD commenced reporting directly to PM's office, governance arrangements evolved to suit circumstances as Ministries began to reassert roles and there was some confusion of ARD's mandate and responsibilities.
- ARD's mission evolved rapidly, with changes to it its formal mandate given changing circumstances on the ground.
- Model changes included ARD role in facilitating, enabling, advising and coordinating Ministerial programmes in the absence of its own turnkey recovery programmes and due to unmet expectations in the context of securing large amounts of additional programme funding from Development partners.
- Lessons learned: recovery requires strong information base; existence of sound & complete sector policies; good mechanisms for horizontal cross-agency planning, budgeting & coordination; pre-designation of a national body for reconstruction, development & cross-agency coordination; clear reporting and accountability mechanisms; effective public communications; agility & flexibility in approach and realistic expectations.
- New Government of Grenada in November 2008 repealed the Reconstruction Levy.

Source: Chakallal and Walling (2009). Based on: US GAO (2006), Goss Gilroy Inc. (2007), UNDP (2007)

6.4 Adaptation to Climate Change

For the Caribbean, adaptation might be thought of as preparing for the unavoidable. The world has already been committed to global climate change. Irrespective of the effectiveness of mitigation measures there will be some degree of unavoidable climate change due to the quantity and persistence of GHGs in the atmosphere.

Adaptation measures will reduce the risks of negative climate change impacts through systematic efforts to analyse and manage the contributing factors to climate change hazard risk, including reduction in exposure and vulnerability of people, livelihoods and property, prudent management environmental resources, land use planning, and improved preparedness (Table 4).

Adaptation measures can be designed to reduce vulnerability to climate change or to develop capacities that will serve as the foundation for delivering adaptation interventions through enhanced:

- Organisational development
- Legislation
- Regulation
- Policy and technical guidance
- Research
- Data collection and monitoring
- Awareness raising

Climate change adaptation initiatives can be grouped according to, who is adapting, the stimulus or cause for adaptation action, or the timing of the adaptation action relative to the observed climate change threat or hazard. Adaptation initiatives can be described as:

- **Anticipatory:**
  - Adaptation that takes place before impacts of climate change are observed.
  - Also referred to as proactive adaptation.
- **Reactive Adaptation:**
  - Adaptation that takes place after the impacts of climate change have been observed.
- **Autonomous:**
  - Adaptation that does not constitute a conscious response to climate stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems.
  - Also referred to as spontaneous adaptation.
- **Planned Adaptation:**
  - The result of deliberate policy decisions, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state.
- **Private Adaptation:**
  - Adaptation that is initiated and implemented by individuals, households or private companies.
  - Adaptation that is usually in the actor's rational self-interest.

Table 4: Examples of Approaches to Reducing Hazard Risk

Hazard	Risk Factor	Approaches to reduce risk
General	**Exposure**	• Hazard mapping to indicate where the hazard is likely to occur should influence physical plans and be incorporated into EIAs[42] and SEAs. • Physical planning to reduce construction in exposed areas and create "no build" zones if necessary. • Economic planning to make provisions for likely damage and to reduce exposure. • Improve forest cover, maintain healthy coral reefs or plant mangroves and maintain ecosystem integrity. • Engineering solutions. • Evacuation and re-location.
	Vulnerability	• Building codes to ensure appropriate construction to withstand likely impacts from Hazard. • Insurance to cover major losses. • Improved land management. • Integrated watershed management. • Business continuity plan.
Floods	**Exposure** Houses located in flood-prone areas, e.g. flood plains, old watercourses or near rivers.	• Physical Planning to take flooding into account for new buildings. • Re-location if feasible. • Construction and maintenance of levees, dykes and sea walls, gullies and flood gates etc. • River training. • Reforestation of denuded slopes. • Management of watersheds.
	Flood risk increased due to increase in paved and impermeable surfaces e.g. driveways or roofs.	• Reduce impermeable surfaces (use green driveways and parking areas). • Increase size of drains to account for increased runoff.
	Vulnerability	• Build elevated ground floor on stilts or by raising the ground level to reduce flooding. • Build cellars that flood first.
Drought	**Exposure** Location in areas dependent on rainfall as a water source and subject to reduced rainfall.	• National Water management: storage (above and below ground) and harvesting, use of wells, desalination.

Source: http://unfccc.int/resource/docs/publications/impacts.pdf.

[42] EIA- Environmental Impact Assessment; SEA- Strategic Environmental Assessment.

Table 4 cont'd: Examples of Approaches to Reducing Hazard Risk

Hazard	Risk Factor	Approaches to reduce risk
	Vulnerability	• Increase efficiency of water use: e.g. hydroponics on farms, or low-flush toilets or water-saving shower-heads in homes. • Use of storage tanks for buildings. • Harvesting rainwater from roofs and other surfaces. • Plant crop varieties that are able to withstand water stress.
Tropical Cyclones Wind, heavy rainfall, lightning, storm surge.	**Exposure** Coastal roads located in storm surge areas.	• Construction of dykes or sea walls. • Plan for future roads to be built beyond storm surge areas. Use of mangroves in suitable areas.
	Homes located in storm surge areas.	• Relocation, map hazard and integrate into planning to reduce number of homes built in hazard areas. • Evacuation.
	Vulnerability	• Develop and enforce building codes. • Use hurricane straps to increase resistance of roof to winds. • Insurance to cover major damage.
Landslides, debris flows & mudslides caused by heavy rainfall (not due to seismic activity).	**Exposure** Slope Erosion increased due to human activity such as deforestation, farming or poor road construction.	• Develop and implement a landslide plan[43]. • Reforest denuded slopes. • Management of watersheds. • Install Check Dams, Gabion baskets etc. • Slope stabilization: retaining walls, improve road construction techniques, set and maintain engineering standards for hillside roads and construction. • Evacuation.
	Vulnerability	• Terracing for hillside farms. • Contour cropping. • Agroforestry, intercropping with trees, pineapples etc. • Maintain higher levels of forest cover. • Use the Vetiver system to reduce soil loss. • Insurance.

[43] An example can be found at http://www.stlucia.gov.lc/nemp/plans/LandslidePlan.pdf

- **Public Adaptation:**
  - Adaptation that is initiated and implemented by governments at all levels.
  - Usually directed at collective needs.

Sound adaptation interventions are characterised by one or more of the following features:

- They start by addressing risks associated with current climate variability and extremes.
- They embody an understanding of current risks and impacts climate variability and extremes.
- They avoid decisions or actions that eliminate, or deprive decision makers, of adaptation options that might be needed in the future.
- They are based on adaptation processes that are SMART:
  - Specific
  - Measurable
  - Achievable
  - Results-oriented
  - Time-bound
- Recognise value of "low-regrets" and "win-win" adaptation options.
- Are participatory and inclusive.
- Understand uncertainties.
- They are conceived in the context of national sustainability and development objectives.

Win-Win adaptation measures produce both climate change adaptation and other (e.g. socio-economic or environmental) benefits. These types of adaptation measures can be introduced for non-climate change adaptation reasons, but deliver climate change adaptation benefits. Ecosystem restoration and environmental conservation initiatives can produce adaptation benefits by maintaining or restoring environmental services that reduce climate risk e.g. reforestation (soil stabilization and land slide mitigation, livelihoods sustainability, food security), wetland restoration (flood mitigation, water supply), coral reef conservation and mangrove conservation and restoration (coastal protection, livelihoods sustainability, food security).

No-regrets and low regrets adaptation options maximise the return on investment when certainty of the associated climate change risk is low.

No-regrets adaptation measures deliver net socio-economic benefits regardless of the climate change outcome. An example of this type of adaptation might be measures to reduce the loss of potable water in transmission due to leakage. In some Caribbean countries, transmission losses can be as high as 50%. A reduction in transmission losses would have socio-economic benefits whether or not climate change induced reductions in precipitation affect water availability.

Low-regrets adaptation measures are characterised by relatively low costs and relatively

large climate change adaptation benefits. The relatively low cost of win-win adaptation options makes them attractive for mainstreaming climate change adaptation e.g. restricting the type and extent of development in flood prone areas.

In addition to the reality that climate change cannot be avoided, there are a number of reasons for individuals, communities, enterprises, industries, originations, government agencies, and countries to consider and eventually commit to climate change adaptation. They include:

- Anticipatory and precautionary adaptation, which is more effective and less costly than forced, last minute, emergency adaptation and retrofitting.
- The reality that climate change may be more rapid and more pronounced than current estimates suggest. Unexpected events are possible.

See Table 5 for a list of adaptation measures in key vulnerable sectors.

6.5 Convergence

Convergence as shown in Figure 7 describes merging the two approaches of disaster risk reduction and climate change adaptation. It could be argued that the main difference in the approaches is that climate change adaptation is more long-term and disaster risk reduction is short to medium term. Despite this, many of the goals of the two approaches are similar. Both approaches use the risk equation and aim to reduce vulnerability or exposure. Although climate risk is anthropogenic, in the Caribbean little can be done to reduce the hazard. When integrating climate change adaptation into disaster risk reduction one should take note of the potential effects in terms of lives lost and those in terms of loss of livelihoods. An emergency response approach to an approaching cyclone could be to place persons into shelters. This will likely reduce lives lost. The risk management approach will look at facilitating human settlements in less vulnerable areas and improving access to better building methods which will likely reduce lives lost and reduce damage to livelihoods. Climate change adaptation will try to ensure that the better building methods take into account the likely increases in the wind and rain associated with cyclones in the future, rather than simply looking at past experience.

In pursuing this approach, climate risk should be calculated and taken into account in defining the hazard. For example in calculating setbacks from the sea or the size of drains, one should take into account not only the current levels of rainfall or storm surge, but also the likely increases due to climate change.

Several of the approaches being adopted to adapt to climate change are relevant to disaster risk reduction since they are proactive and involve scenario or event planning. The major difference in risk reduction for climate change is that climate risks are dynamic and increasing and predictions based on a past relatively stable state do not give a good estimation of future expectation.

[44] Mitchell, T. and M.van Aalst. (2008). Convergence of disaster risk reduction and climate change adaptation: A review for DFID, October 2008. http://www.preventionweb.net/files/7853_ConvergenceofDRRandCCA1.pdf.
[45] Venton, P. and S. La Trobe. (2008). Linking climate change adaptation and disaster risk reduction. Teddington, UK: Tearfund. http://www.tearfund.org/webdocs/Website/Campaigning/CCA_and_DRR_web.pdf.

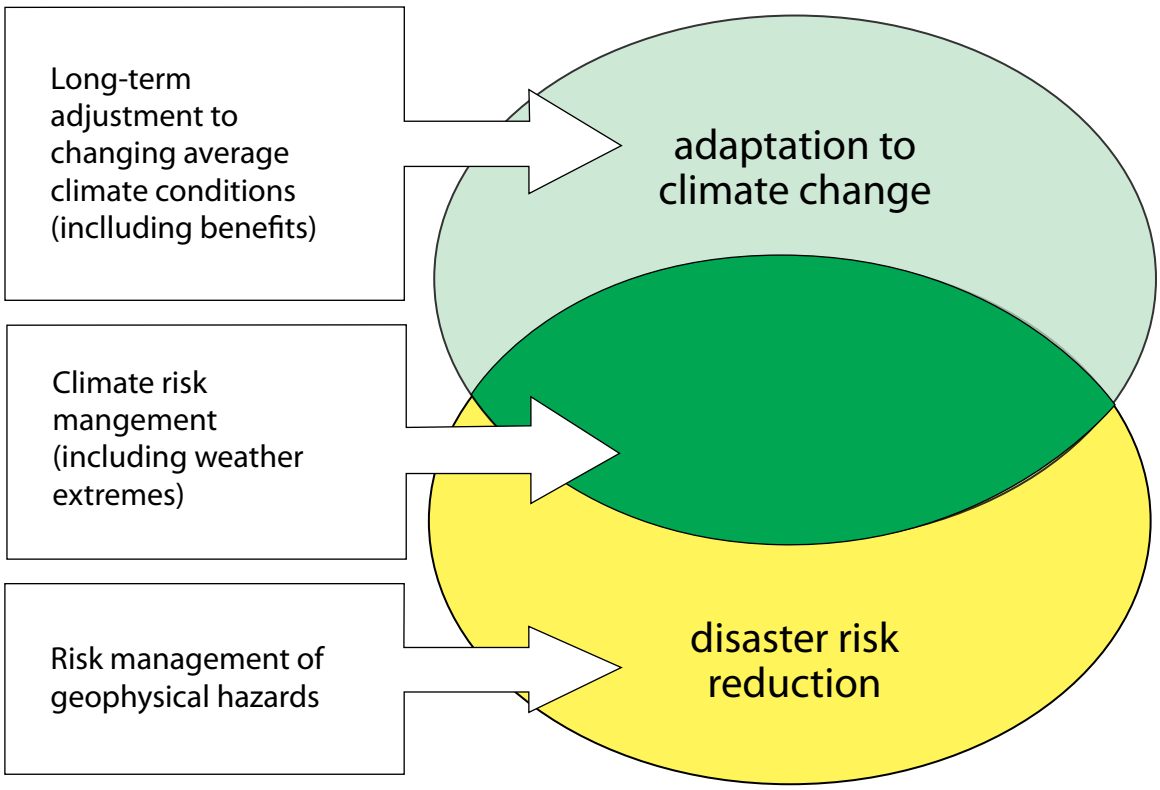


Figure 7 Schematic Demonstrating the Overlap in Management Focus between Climate Change Adaptation and Disaster Risk Reduction.[44 45]

Table 5: Adaptation Measures in Key Vulnerable Sectors Highlighted in National Communications of Developing Countires

Vulnerable sectors	Reactive adaptation	Anticipatory adapation
Water Resources	• Protection of groundwater resouces. • Improved management and maintenance of existing water supply. • Proctection of water catchment areas. • Improved water supply. • Groundwater and rainwater harvesting and desalination.	• Beter use of recyclied water. • Conservation of water catchment areas. • improved system of water management. • Water policy reform including pricing and irrigation policies. • Development of flood and controls and drought monitoring.
Agriculture and food security	• Erosion control. • Dam construction for irrigation. • Changes in fertilizer use and application. • Introduction of new crops. • Soil fertility maintenance. • Changes in planting and harvesting times. • Switch to different cultivars. • Educational and outreach programmes on conservation and management reform. • Improved housing and living conditions. • Improved emergency response.	• Development of tolerant/resistant crops (to drought, salt, insects/pests). • Research and development. • Soil-water management. • Diversification and intensification of food and plantation crops. • Policy measures, tax incentives/subsidies, free market. • Development of early warning systems.
Human health	• Public health management reform. • Improved housing and living conditions. • Improved emergency response.	• Development of early warning system. • Better and/or improved disease/vector surveillance and monitoring. • Improvement of environmental quality. • Changes in urban and housing design.
Terrestrial ecosystems	• Improvement of management systems including control of deforestation, reforestation and afforestation. • Promoting agroforestry to improve forest goods and services. • Development/improvement and national forest fire management plans. • Improvement of carbon storage in forests.	• Creation of parks/reserves, protected areas and biodiversity corridors. • Identification/development of species resistant to climate change. • Better assessment of the vulnerabilty of ecosystems. • Monitoring of species. • Development and maintenance of seed banks. • Including socioeconomic factors in management policy.
Coastal zones and marine ecosystems	• Protection of economic infrastructure. • Public awareness to enhance proctection of coastal and marine ecosystems. • Building sea walls and beaches reinforcement. • Proctection and conservation of coral reefs, mangroves, sea grass and littoral vegetation.	• Integrated coastal zone management. • Better coastal planning and zoning. • Development of legislation for coastal protection. • Research and monitoring of coast and coastal ecosystems.

Source: http://unfccc.int/resource/docs/publications/impacts.pdf.

CHAPTER 7. Impact of Climate Change on Development in the Caribbean

The information on sectoral climate change impacts, adaptation options and the general guidance provided in this chapter supports the delivery of the workshop sessions on the ***"Identification of a Vision for the Future"*** and the supporting "small group exercise" along with the workshop sessions on the ***"Identification of (Mainstreaming) Entry Points"*** (Tool 4).

7.1 Background

This chapter describes the nature and scope of the influence that climate change will have on aspects of national development.

7.2 Learning Objectives

By the end of the chapter the reader will be able to:

- Describe the main climate change impacts that are likely to affect each of the country's major economic sectors.
- Describe the main adaptation options available to each economic sector to reduce the negative impacts of climate change and protect development gains.

7.3 Climate Change Impacts

Climate change will affect both the average weather conditions and the extreme weather conditions in the Caribbean. The significance of the difference between the two types of change is that, while changes in average weather conditions are important, societies tend to be especially vulnerable to extreme conditions, such as floods, droughts, heat waves and cyclones.[46]

The impacts of climate change can be divided into two classes or types:

(i) The catastrophic effects of climate disasters or hazards such as hurricanes, droughts, and floods.

(ii) The chronic or ongoing new conditions such as increased sea level (sea level rise), higher temperatures, changes in rainfall patterns, changes in seasonal patterns, salt-water (saline) intrusion, falling water tables, or more frequent hurricanes.

Climate change impacts may also be classified as "slow-onset" and "rapid-onset" events. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change indicates the following likely impacts of climate change:

- Sea-level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards, thus threatening vital infrastructure, settlements and facilities that support the livelihood of island communities (very high confidence);

[46] OECD (2009). Integrating Climate Change Adaptation into Development Co-operation. Policy Guidance. Pgs. 193.

- Many **islands in the Caribbean** are likely to experience increased water stress as a result of climate change. Under all scenarios, **reduced rainfall in summer** is projected for the region, so that it is unlikely that demand would be met during low rainfall periods. Increased rainfall in winter is unlikely to compensate, due to lack of storage and high runoff during storms;
- It is very likely that subsistence and commercial agriculture on small islands will be adversely affected by climate change (high confidence);
- New studies confirm previous findings that the effects of climate change on tourism are likely to be direct and indirect, and largely negative (high confidence);
- There is growing concern that global climate change is likely to impact human health, mostly in adverse ways (medium confidence).

Possible effects on different economic sectors are indicated in the Table 6

7.4 What can we do about these impacts?

Caribbean states are small and have contributed, and will continue to contribute, very little to the production of the green house gasses that have given rise to anthropogenic climate change, than reduction in the production of green house gasses (mitigation). Adaptation would be any *"Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities"*.[47]

Adaptation measures have characteristics that distinguish the process from "coping" mechanisms which tend to be short-term, crisis motivated, survival strategies. Adaptation measures:

- Are oriented towards longer term livelihoods security,
- Are a continuous process in which results are sustained,
- Use resources efficiently and sustainably,
- Involve planning,
- Combine old and new strategies and knowledge,
- Focus on finding alternatives.[48]

The identification and implementation of adaptation measures can be challenging. Win-win, low-regrets, and no-regrets adaptation options may provide climate change adaptation options with low access barriers, particularly if the measure is closely linked to, or is mainstreamed into existing sectoral or ministerial strategic and operational frameworks e.g. tourism, water resources, agriculture, infrastructure development, or human settlement, to name a few.

An intuitive and accessible approach to the identification of the basic steps in planning and designing an adaptation initiative has been developed by the UNDP.[49] The approach has been

[47] IPCC. (2007). Climate Change 2007.Impacts, adaptation, and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Annex I.
[48] CARE (2009). http://www.careclimatechange.org/files/adaptation/CARE_VN_Mainstreaming_Handbook.pdf

Table 6: Possible Effects of Climate Change on Important Economic Sectors

Climate Change Effect	Economic Sector	Possible Impact
Sea Level Rise	Tourism	Erosion of beaches
		Increased flooding from the sea
		Seaside buildings and infrastructure damaged
		Permanent loss of beach in some places
		Change in marine species occurrence
	Civil Infrastructure / Housing	Damage to coastal roads
		Increased floods or damage to airport runways at low elevation or close to the shore
		Damage to seaport facilities (inc. cruise shipping)
	Water/ Agriculture	Saline intrusion of aquifers
		Degradation of agricultural land near the coast
	Other	Increase in area of wetlands
Increase in sea surface temperature (leading to an increased number of major Hurricanes with more rainfall associated with them)	Tourism	Potential reduction in demand for warm weather destinations
		Increased number of storm days
		Increased wind damage from hurricanes
		Increased flooding and storm surge from tropical cyclones
		Increased coral bleaching
	Civil Infrastructure / Housing	Increased number of storm days
		Increased wind damage from hurricanes
		Increased flooding from tropical cyclones
		Increased in damage from storm surge
	Water	Sedimentation of water supplies
	Agriculture	Crop loss, redistribution of commercial fishes, potential loss of fisheries
Increased summer drought	Tourism	Decreased water supply for guests
	Water	Water shortages
	Agriculture	Crop loss
Increased rainfall during hurricane season	Tourism	Increased number of wet days, leading to decrease in attractiveness of the destination
	Civil Infrastructure / Housing	Increased Floods and landslides
	Agriculture	Crop loss
Increase in daily temperatures	Tourism	Potential loss of tourists if the destination becomes too hot, loss of demand for warm weather destinations
	Civil Infrastructure / Housing	Potential increase in demand for cooling
	Agriculture	Changes in growing seasons, potential yield changes
	Health	Increase in vector-borne diseases (malaria, dengue), loss of productivity at work

Source: http://unfccc.int/resource/docs/publications/impacts.pdf.

adapted for the purpose of the G Tool process, to link the identification of appropriate climate change adaptation interventions, the "what", with a process for mainstreaming the climate change adaptation interventions, the "how". Broadly speaking the steps in the G Tool process are the following.

- **Define Problem:**
  - o Assess current level of exposure and vulnerability to current climate hazards.
  - o Assess general or specific patterns of projected climate change, and define plausible climate futures for the Caribbean and your country.
- **Identify Causes Of Projected Climate Hazards:**
  - o Identify/establish change trends for each climate factor (temperature, perception, storm intensity etc),
  - o Determine the climatic hazards that will result from changes in the climate factors
  - o Define the range of impacts that will result from the changes in each climate factor.
- **Establish The Responses That Will Reduce Climate Vulnerability, And Enhance Climate Resilience**
  - o Conduct vulnerability and capacity assessment (VCA) studies.
  - o Identify optimal adaptation options (win-win, low-regrets, no-regrets, Anticipatory, reactive) and climate-smart development options.
  - o Review VCA and DRR case-studies from SIDS and low-lying coast states.
  - o Adapt and adopt climate change adaptation and DRR methods, tools, approaches.
- **Identify Barriers And Entry Points:**

The identification of the appropriate adaptation interventions represents the "what" of climate hazard risk reduction. The mechanism through which climate change adaptation interventions will be implemented represents the "how".

Climate change is a developing and ongoing phenomenon. The measures required to address climate change risks (adaptation) will probably have to be of a similar nature; developing and ongoing. Climate change interventions will therefore need to have an institutional home to ensure/convey, legitimacy, adequate resources, accountability for implementation, and an operational framework within which flexible climate change adaptation implementation will be supported and facilitated. The incorporation of climate change adaptation measures into the development, policy, planning, and operational frameworks, is referred to as mainstreaming.

Existing development strategies and practices may provide opportunities for mainstreaming climate change adaptation into existing, programmatic, operational, and practice frameworks. Similarly, existing policies and practices may inhibit the uptake or incorporation of climate change adaptation initiatives. It is important that these opportunities and barriers

[49] UNDP, (2010). A Toolkit for Designing Climate Change Adaptation Initiatives. Environment and Energy Group/Environmental Finance Bureau of Development Policy. Pgs. 58. N.Y: UNDD

be identified early in the climate change adaptation formulation process to enhance mainstreaming efficiency and reduce wasted effort.

- **Formulate Mainstreaming Strategy:**

The approach to mainstreaming must be participatory, appropriate, systematic, accessible, replicable, adaptable, and amenable to monitoring and evaluation. The G Tool manual describes one approach to mainstreaming climate change adaptation into the national sustainable development process, and specifically the CDM country work programme

Sectoral vulnerability and capacity assessment (VCA) studies (below) represent a comprehensive approach to defining the problem and identifying and characterising the causes of projected climate threats, and identifying the appropriate climate change adaptation interventions to reduce or eliminate projected climate risk, the "what". The making the climate change adaptation interventions operational and sustainable requires mainstreaming, the "how". We will first look at two case studies to gain an insight into one type of approach for assessing vulnerability and identifying adaptation options.

The G Tool promotes planned adaptation that takes advantage of current national needs to respond to current and anticipated climate threats, and takes advantage of opportunities provided by current institutional modalities to secure short and medium term adaptation success, while maintaining long-term adaptation perspective.

7.5 Case Study 1: Tourism- The Virgin Islands Climate Assessment

A **climate assessment** was undertaken to quantify and describe in detail how key variables of The Virgin Islands' climate (rainfall, temperature, relative humidity, wind speed and comfort index) were projected to change to assess the potential local climate change impacts to tourism attractions, infrastructure and supporting sectors. The summary findings of the study were:

Coastal waters, coral reefs and sport fishing:

- **An increasing chance of sedimentation and, therefore, degradation of coastal waters** due to increased monthly average rainfall. By the 2011-2020 period average maximum temperatures to increase, by 1°C - 2°C.
- More **frequent mass coral bleaching** events by 2011-2020 due to increased temperatures will affect the scuba and snorkelling sector (-25% of the sector's 2005 revenue) and also likely cause important sport fish species to migrate north.

Beaches:

- Short-term climate change impacts to beaches due to more intense hurricanes and associated storm surges and a possible **long-term risk of 24%-94% losses in beach area** on Tortola under various sea level rise scenarios.

Food supply for the tourism sector:

- **Agricultural production falls** because of changes to rainfall patterns, soil degradation, pests and disease prevalence and direct crop damage.
- Climate change may affect ecosystem functions and services, and **reduce abundance of commercial fish species** which depend heavily on coral reefs and mangroves for food, shelter and nursery habitat.
- Climate change may reduce plankton populations that serve as an important base of the marine food web, and affect large scale fish migrations. These changes would have a significant impact on the local commercial and regional fish stocks that are important to tourism.

Comfort Level, Outdoor Activities and Special Events/Festivals:

- The region's tourism product is defined and underpinned by its climate. Tourism is therefore highly susceptible to changes in climatic patterns.
- Projected temperature increases of up to 3.1°C, increased relative humidity, decreased wind speed during the tourism season and an increased number of days classified as "uncomfortable" by the comfort index may affect perceptions of the quality of the VI tourism project and act as a deterrent to tourists.

Tourism Infrastructure and Energy:

- The number of **strong (category 4 and 5) hurricanes is projected to increase**. Assuming similar building standards to public buildings and shelters. Risk of significant structural damage to tourism properties as a result of an increase in the number of strong hurricanes.
- Damage estimates based on projected increase in the number of strong hurricanes ranges from 11% to 70% and 31% to 77% in category 4 and 5 hurricanes, respectively.
- **Increased risk of infrastructure damage** due to **storm surge** resulting from a combination of increasing sea level rise and a projected increase in number of strong hurricanes.
- **Increased demand and associated costs for cooling (e.g. air conditioning) and water** in the tourism sector. This will contribute to an increase in electricity consumption, from an electricity supply system that is itself vulnerable to the climate change impacts described.

7.6 Case Study 2: Water Resources

The Mainstreaming Adaptation to Climate Change Project (MACC) provided funding for pilot vulnerability and capacity country assessments in Jamaica focusing on the water sector. The Jamaica pilot project focused on assessing how climate change and sea level rise will im-

pact on coastal limestone areas. The study area selected was the limestone aquifer of the Clarendon and Vere Plains located along Jamaica's south coast.

The study area was characterised by:

- A shallow hinterland and a major estuary, which allows for the upstream (inland) movement of saline water.
- Economically important sugar cane production, and a bauxite processing factory.
- Number of small towns and other communities.

The aims of the study were to provide information on:

- How a predicted sea level rise of 0.5 m and 1 m, with climate change, might impact the quantity and quality of available water resources, if aquifer recharge was reduced and salt water intruded inland in the aquifer.
- Adaptation response strategies including policy interventions that would be required to minimize effect of climate change.

The study identified a number of potential impacts of climate change and sea level rise noting that, adaptation measures and programmes developed now would provide benefits to improve the current and near-term future status of the water resources and water sector within the project area (win-win adaptation).

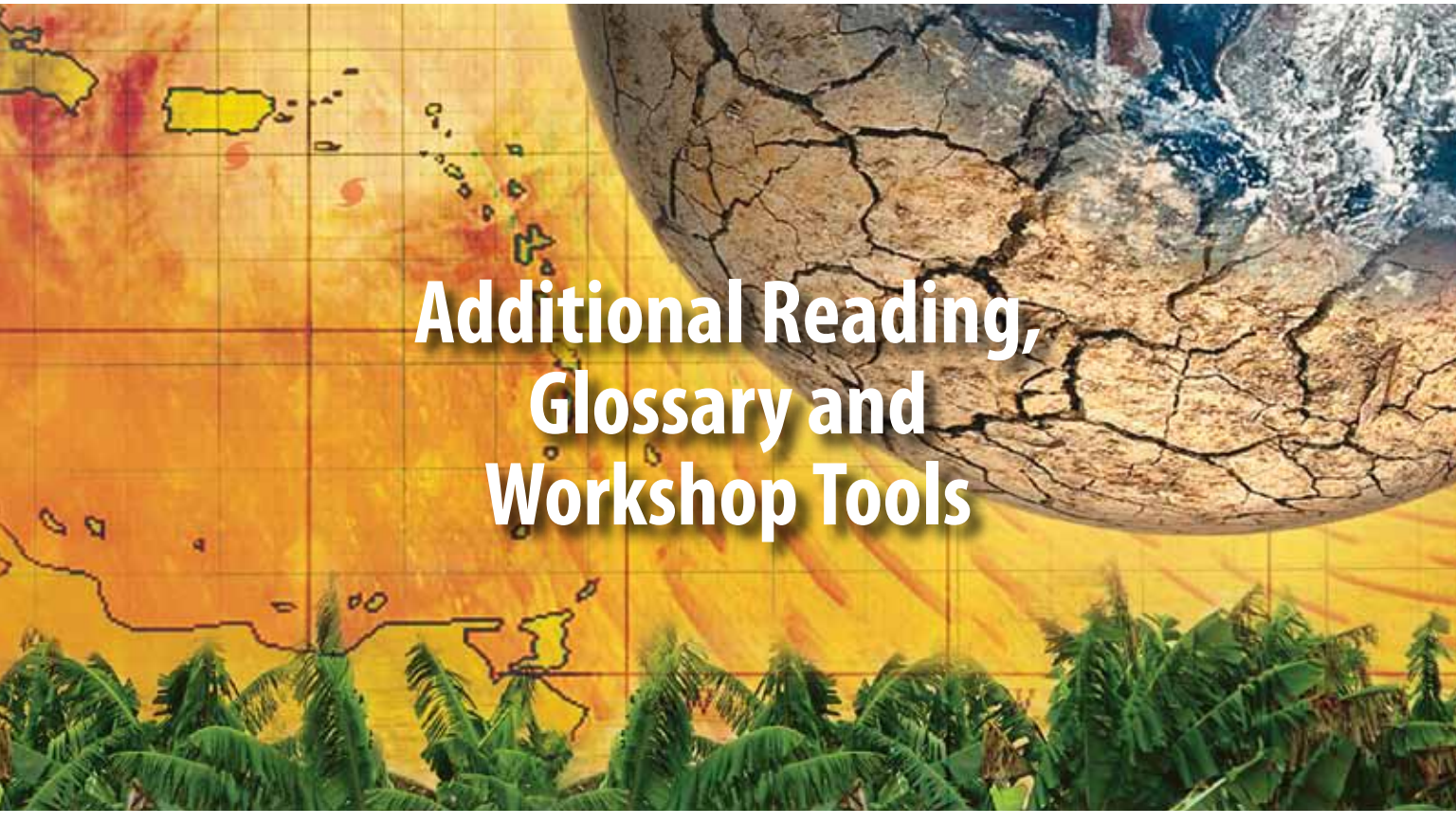
The adaptation interventions and options proposed as a result of the study included:

- Improved inter-agency co-operation in data sharing for the effective modelling and management of the resource.
- Avoid development and political decisions without technical or engineering guidance.
- Invest in water use efficiency: e.g. improved methods of irrigation.
- Encourage domestic rainwater harvesting.
- Research alternative cropping patterns: e.g. there are alternative cropping patterns of the existing varieties of sugar cane grown that can increase the conservation of soil and water.
- Research growing alternative varieties and crops.
- Adjust the price of water to encourage efficiency and manage water demands.
- Re-assess alternative surface water sources to replace groundwater.
- Rehabilitate the existing saline barrier on the Rio Minho at Alley to prevent salt water from moving upstream.
- Rehabilitate riverside wells as an alternative to using deeper wells drawing upon groundwater. Such wells would take advantage of riverbank infiltration to provide in-situ water quality treatment. Such wells have lower pumping costs, although they may require more maintenance.

- Improve connectivity of water supply system, including blending sources to offer more than one potential source of water to a particular water supply zone. This is important for water supply reliability, but allows blending of sources if under quality water from a particular source exceeds a water quality threshold and blending can address the problem.
- Strengthen institutional capacity: the loss of trained personnel and graduates to developed countries and economies is a significant issue in CARICOM. Retaining highly trained technical staff is important for the development and design of adaptation interventions and programmes. Retaining staff is not always directly related to salaries, but includes career development, training opportunities and perceived inequalities/unfairness in career prospects and promotion.

The study also noted that all the potential adaptation measures identified and others that would arise in the future would have to be considered within an integrated framework to effectively address the identified changes in water resources availability.

Since the identified adaptation measures had costs associated with them as well as benefits it was felt that there was a clear need for an environmental economics evaluation and methodologies such as cost-benefit analysis to assist with ranking and selecting these measures.



Additional Reading, Glossary and Workshop Tools

Additional Reading, Glossary and Workshop Tools

Additional Reading

The following documents can be accessed at the URL:

http://www.caribbeanclimate.bz/macc/macc.html.

- *Vulnerability and Capacity Assessments*

Jamaica Water Resources Authority, 2008: Vulnerability and capacity assessment: Southern Clarendon pilot project Jamaica. Final Report. Caribbean Community Climate Change Centre, Belmopan, Belize

Guyana Sugar Corporation, 2009: Vulnerability and Capacity Assessment: Impacts of Climate Change on Guyana`s Agriculture Sector. Final Report. Caribbean Community Climate Change Centre, Belmopan, Belize

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- *Health*

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- *National Adaptation Strategies*

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Glossary

Adaptation: The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

- **Low-regrets Adaptation:** Low-regret adaptation options are those where moderate levels of investment increase the capacity to cope with future climate risks. Typically, these involve over-specifying components in new construction or refurbishment projects. For instance, installing larger diameter drains at the time of construction or refurbishment is likely to be a relatively low-cost option compared to having to increase specification at a later date due to increases in rainfall intensity.[50]
- **No-regrets Adaptation:** Adaptation that would generate net social and/or economic benefits irrespective of whether or not anthropogenic climate change occurs.
- **A win-win** or, "no regrets" adaptation strategy, is one that provides net social benefits whether or not anthropogenic climate change becomes a major problem.

Alliance of Small Island States (AOSIS): A coalition of some 43 low-lying and small-island countries, most of which are members of the G-77, which are particularly vulnerable to the potential adverse consequences of climate change such as sea-level rise, coral bleaching, and increased frequency and intensity of tropical storms.

Carbon Dioxide (CO_2): CO_2 is a colourless, odourless, non-poisonous gas that is a normal part of the ambient air. Of the six greenhouse gases (GHGs) normally targeted, CO_2 contributes the most to human-induced global warming. Human activities such as fossil fuel combustion and deforestation have increased atmospheric concentrations of CO_2 since the industrial revolution.

Carbon Dioxide Equivalent (CO_2e): The emissions of a gas, by weight, multiplied by its "global warming potential."

Chlorofluorocarbons (CFCs): CFCs are synthetic industrial gases composed of chlorine, fluorine, and carbon. They have been used as refrigerants, aerosol propellants, cleaning solvents, and in the manufacture of plastic foam. There are no natural sources of CFCs. CFCs have an atmospheric lifetime of decades to centuries, and they have 100-year "global warming potentials" thousands of times that of CO_2, depending on the gas. In addition to being greenhouse gases (GHGs), CFCs also contribute to ozone depletion in the stratosphere and are controlled under the Montreal Protocol.

Climate: The long-term average weather of a region including typical weather patterns, the frequency and intensity of storms, cold spells, and heat waves. Climate is not the same as weather.

[50] World Bank Adaptation Guidance Notes: http://climatechange.worldbank.org/climatechange/content/adaptation-guidance-notes-key-words-and-definitions.

Climate Change: In UNFCCC usage, climate change refers to a change in climate that is attributable directly or indirectly to human activity that alters atmospheric composition. In IPCC usage, climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. Other references regard climate change as changes in long-term trends in the average climate, such as changes in average temperatures.

Climate Smart: The incorporation of actions that address climate change adaptation.

Climate Variability: Refers to changes in patterns, such as precipitation patterns, in the weather and climate.

Disaster: A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Disaster Risk: The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

Disaster Risk Reduction: The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Ecosystem: A community of organisms and its physical environment.

Ecosystem Services: The benefits that people and communities obtain from ecosystems.

Exposure: People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.

GDP: Gross Domestic Product, a measure of overall economic activity.

General Circulation Model (GCM): A computer model of the basic dynamics and physics of the components of the global climate system (including the atmosphere and oceans) and their interactions which can be used to simulate climate variability and change.

Global Warming: The progressive gradual rise of the Earth's average surface temperature thought to be caused in part by increased concentrations of greenhouse gases (GHGs) in the atmosphere.

Greenhouse Effect: The insulating effect of atmospheric greenhouse gases (e.g., water vapour, carbon dioxide, methane, etc.) that keeps the Earth's temperature about 15°C (60°F) warmer than it would be otherwise.

Greenhouse gases: Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds.

Hazard: A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Hydro-meteorological Hazard: Process or phenomenon of atmospheric, hydrological or oceanographic nature that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Intergovernmental Panel on Climate Change (IPCC): The IPCC was established in 1988 by the World Meteorological Organisation and the UN Environment Programme. The IPCC is responsible for providing the scientific and technical foundation for the United Nations Framework Convention on Climate Change (UNFCCC); primarily through the publication of periodic assessment reports (see "Second Assessment Report" and "Third Assessment Report").

Land-use Planning: The process undertaken by public authorities to identify, evaluate and decide on different options for the use of land, including consideration of long term economic, social and environmental objectives and the implications for different communities and interest groups, and the subsequent formulation and promulgation of plans that describe the permitted or acceptable uses.

Methane (CH_4): CH_4 is among the six greenhouse gases (GHGs) to be curbed under the Kyoto Protocol. Atmospheric CH_4 is produced by natural processes, but there are also substantial emissions from human activities such as landfills, livestock and livestock wastes, natural gas and petroleum systems, coalmines, rice fields, and wastewater treatment. CH_4 has a relatively short atmospheric lifetime of approximately 10 years, but its 100-year GWP is currently estimated to be approximately 23 times that of CO_2.

Natural Hazard: Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Nitrous Oxide (N_2O): N_2O is among the six greenhouse gases to be curbed under the Kyoto Protocol. N_2O is produced by natural processes, but there are also substantial emissions from human activities such as agriculture and fossil fuel combustion. The atmospheric lifetime of N_2O is approximately 100 years, and its 100-year GWP is currently estimated to be 296 times that of CO_2.

Per fluorocarbons (PFCs): PFCs are among the six types of greenhouse gases (GHGs) to be curbed under the Kyoto Protocol. PFCs are synthetic industrial gases generated as a by-product of aluminium smelting and uranium enrichment. They also are used as substitutes for CFCs in the manufacture of semiconductors. There are no natural sources of PFCs. PFCs have atmospheric lifetimes of thousands to tens of thousands of years and 100-year GWPs thousands of times that of CO2, depending on the gas.

Preparedness: The knowledge and capacities developed by governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

Prevention: The outright avoidance of adverse impacts of hazards and related disasters.

Residual Risk: The risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained.

Resilience: The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Retrofitting: Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards.

Risk: The combination of the probability of an event and its negative consequences.

Risk Assessment: A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

Risk Management: The systematic approach and practice of managing uncertainty to minimize potential harm and loss.

Risk Transfer: The process of formally or informally shifting the financial consequences of particular risks from one party to another whereby a household, community, enterprise or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.

Storyline: The narrative on which climate scenarios are based. Storylines represent different demographic, social, economic, technological, as well as environmental developments. Each storyline is numbered to avoid interpretations that may reflect value judgment. The Intergovernmental Panel on Climate Change (IPCC) uses four storylines: A1, A2, B1, and B2. From these six scenarios, groups are developed, one each for A2, B1, and B2, and three for A1 (A1F-Fossil fuel intensive, A1B-Balanced – i.e. equal reliance on fossil fuels and non-fossil fuel; and A1T predominantly non-fossil fuel).

Structural and Non-structural Measures:

- **Structural measures:** Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard resistance and resilience in structures or systems.
- **Non-structural measures:** Any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education.

Sustainable Development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Vulnerability: The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

Liliendaal Declaration on Climate Change and Development

We, the Heads of State and Government of the Caribbean Community, at our Thirtieth Meeting of the Conference in Liliendaal, Guyana from 2–5 July 2009, affirm our commitment to the principles and objectives of the Caribbean Community as embodied in the Revised Treaty of Chaguaramas establishing the Caribbean Community including the CARICOM Single Market and Economy -

1. **Recalling** the objective, principles and commitments of the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol;

2. **Gravely concerned** that our efforts to promote sustainable development and to achieve the internationally agreed development goals including the Millennium Development Goals (MDGs) are under severe threat from the devastating effects of climate change and sea level rise which has led to increasingly frequent and intense extreme weather events, damage to bio diversity, coral bleaching, coastal erosion, changing precipitation patterns.

3. **Emphasising** that dangerous climate change is already occurring in all SIDS (Small Islands and Low-lying Coastal Developing States (SIDS) regions including the Caribbean and that many SIDS will cease to exist without urgent, ambitious and decisive action by the international community to reduce global greenhouse gas emissions significantly and to support SIDS in their efforts to adapt to the adverse impacts of climate change, including through the provision of increased levels of financial and technical resources.

4. **Very concerned** that the estimated total annual impact of potential climate change on all CARICOM countries is estimated at US$9.9 billion in the total Gross Domestic Product (GDP) in 2007 US$ prices or about 11.3% of the total annual GDP of all 20 CARICOM countries (Member States and Associate Member States) according to the World Bank estimates.

We Affirm:

1. **Our belief** that the global response to climate change should be undertaken on the basis of common but differentiated as well as historical responsibility and that it should not compromise the ability of SIDS to pursue Sustainable Development and the sharing of the cost of addressing climate change should be equitable and should not perpetuate poverty.

2. **Our continued commitment** to the work of the Intergovernmental Panel on Climate Change (IPCC) and call on all Parties to ensure that UNFCCC decisions are guided by that work;

3. **Our Endorsement** for the Caribbean Challenge in its efforts to protect the Region's Marine Resources and in its work towards fulfilling the UNFCCC ecosystem-based management and adaptation recommendations and implementing the Millennium

Development Goals related to reducing biodiversity loss;

4. **Support for** the coordinating role of the CARICOM Task Force for Climate Change and Development established by the Conference of Heads of State and Government and the implementing role of the Caribbean Community Climate Change Centre (CCCCC) and the roles of the CARICOM Secretariat, the Alliance of Small Island Developing States (AOSIS) chaired by the Government of Grenada and the CARICOM Representatives in the international climate change negotiations; and 5. The importance of a common Regional approach to address the threats and challenges of climate change and of the full and effective participation of the Region in the upcoming United Nations Climate Change Conference in Copenhagen, Denmark (COP15), the UN Secretary-General's Climate Change Summit in September 2009 and their preparatory processes.

We Declare:

1. **That all Parties to the UNFCCC should** work with an increased sense of urgency and purpose towards arriving at an ambitious and comprehensive agreement at the COP 15 in Copenhagen in 2009 which provides for: long-term stabilisation of atmospheric greenhouse gas concentrations at levels which will ensure that global average surface temperature increases will be limited to well below 1.5° C of pre-industrial levels; that global greenhouse gas emissions should peak by 2015; global CO2 reductions of at least 45 percent by 2020 and reducing greenhouse gas emissions by more than 95 per cent of 1990 CO2 levels by 2050;

2. Adaptation and capacity building must be prioritised and a formal and well financed framework established within and outside of the Convention, including the multi-window insurance facility, to address the immediate and urgent, as well as long term, adaptation needs of vulnerable countries, particularly the SIDS and the LDCs;

3. **The need** for financial support to SIDS to enhance their capacities to respond to the challenges brought on by climate change and to access the technologies that will be required to undertake needed mitigation actions and to adapt to the adverse impacts of climate change;

4. **Our full support** for the location of the Headquarters of the UNFCCC Adaptation Fund Board in Barbados;

5. **Support** for climate change negotiations to be fully cognisant of the requirement for improved land use management;

6. Our recognition of the value and potential of standing forest, including pristine rainforest, and our affirmation of its potential contribution to Reduced Emissions from Deforestation and Degradation (REDD). Forest conservation or avoided deforestation and sustainable management of forests are important mitigation tools against

climate change in a post 2012 Agreement. We also support the approach to harmonizing climate change mitigation and economic development as proposed by Guyana in its Low Carbon Development Strategy;

7. Strong determination to overcome technical, economic and policy barriers to facilitate the development, diffusion and deployment of appropriate and affordable low- and zero-emission technologies and renewable energy services; We also recognise the need for energy efficiency and conservation and the need for increased technical and financial support for the development of renewable energy in the Caribbean;

8. Our commitment to providing more effective preparedness for response to natural disasters through the development of better risk assessment and material coordination along with the streamlining of risk reduction initiatives. In pursing this task, we call on the Parties negotiating the new Climate Change Agreement to endorse the Alliance for Small Island Developing States (AOSIS) proposal on risk management and risk reduction strategies, including risk sharing and transfer mechanisms such as insurance;

9. Strong support for the streamlining of all climate change funding mechanisms including the Global Environment Facility to include the vulnerability index in their formulae in order to better facilitate SIDS' access to financial resources; and to explore mechanisms to support the Caribbean Community adaptation programmes;

10. Our commitment to ensuring that the Caribbean Community and its supporting institutions will play their full part in implementing our shared vision, goals and actions, working in strategic partnerships with others;

11. Our resolve to strengthen our educational institutions to provide training, education, research and development programmes in climate change and disaster risk management particularly in renewable and other forms of alternative energy, forestry, agriculture, tourism, health, coastal zone management and water resources management to increase the Region's capacity to build resilience and adapt to climate change; and

12. Our further resolve to institute a comprehensive programme of public awareness and education and hereby invite all, partners, organisations and stakeholders to play a full part in promoting a better understanding of climate change and its impacts and in addressing adaptation and mitigation.

4 July 2009

Tool 1: Workshop Agenda

(Insert Partner and Agency Logos Here)

Workshop on Mainstreaming Climate Change Adaptation into the National CDM Work Programme
Country, Date
Agenda

The objectives of the workshop are to:

- Build a shared framework of understanding about climate change and its impacts on the (insert country) including how Climate Change will affect existing development challenges and vulnerabilities and how Climate Change Adaptation can affect current vulnerability and future risk;
- Identify existing and alternative adaptation options for the (insert country)and gaps in current capacities; and
- Prioritise and sequence these options into adaptation entry points and actions that build on the current framework and actions for disaster risk reduction;
- Develop a draft climate smart (climate change adaptation mainstreamed) CDM country work programme.

Day 1		
8.00 – 8.30	**Registration**	
8.30 –9.30	**Introduction and Overview** • Welcome *Host NDO* *Caribbean Disaster and Emergency Management Agency (CDEMA)* 1. Overview of G Tool Process *Facilitator/Representative of the host NDO* 2. Overview of the workshop process and structure *Facilitator* • Introductions	Plenary
9.30 – 11.30	**Identification of a Vision for the Future (Step 1)** • Small group activity 1 *Facilitator*	Small group table top activity Plenary discussion
11.30 – 11.45	**BREAK**	

Day 1		
11.45 – 13.30	**Establishment of Socio-Economic and Climate Boundary Conditions (Step 2)** • Socio-economic projections for the PS (15 mins) *PS Presenter* • DRM issues and challenges in the PS (15 mins) *PS Presenter* • Understanding climate change: Introductory overview -Islands on the Edge Video (20 mins) -Supplementary presentation (10 mins) *Climate change expert* • National climate change strategy and actions (15 mins) • Discussion (30 mins)	Plenary
13.30 – 14.30	**LUNCH**	
14.30 – 16.00	**Climate Change Impacts on the [insert country] (Step 3)** • Small group activity 2 *Facilitator*	Small group table top activity Plenary
16.00 – 16.15	**Day 1 Wrap up** *Facilitator*	Plenary
Day 2		
08.30 – 10.30	**Identification of Adaptation Options (Step 4)** • DRR/CCA Convergence: win-win development strategies *Climate Change/DRR Expert* • Small group activity 3 • Report back and discussion	Plenary Small group table top activity Plenary
10.30 – 10.45	**BREAK**	
10.45 – 1.00	**Identification of Adaptation Entry Points (Pathways) in the CWP (Step 5)** *Facilitator* • Small group activity 4	Small group table top activity Plenary
13.00 – 14.00	**LUNCH**	
14.00 – 14.30	**Identification of Adaptation Entry Points (Pathways) in the Country Work Programme (Step 5 continued)** *Facilitator* Report back and discussion	Small group table top activity Plenary

Day 2		
14.30-15.30	**Small Group Presentations: Climate Smart Country Work programmes outcomes and outputs (**Step 5 continued**)**	
15.30-17.30	**Mainstreaming Climate Change Results-based Language into the National CDM Strategy** (Step 6) • Mainstreaming at the Strategic Level of CWP Outcomes and Outputs • Facilitator • Small group activity 5a	
Day 3		
8.30 - 10.00	**Small Group Presentations: Mainstreamed CWP Strategies (**Step 6 continued**)** • Facilitator	Plenary
10.00 -13.00	**Mainstreaming Climate Change Adaptation Actions into the CDM country work programme** (Step 6) • Facilitator • Small group activity 5b	
13.00 – 14.00	**LUNCH**	
14.00-16.00	**Small Group Presentations: Mainstreamed CWP Strategies** (Step 6 continued**)** • Facilitator	
16.00-14.00	• Wrap up and closing *NDO* *Caribbean Disaster Emergency Management Agency (CDEMA)*	Plenary

Tool 2a: Small Group Activity (Step 1)

Activity Instructions

Small Group Activity 1: Developing a Vision for the Future

Purpose: To develop a vision of the future for your sector in the year 2030.

You are creating a working document for the workshop. This information will be used throughout the workshop to help determine what adaptation options are desirable for the country. As we get information throughout the workshop, we will add to the vision.

Time: 50 minutes

Desired output: A representation of your future vision (this can be done with words, images, pictures or any combination thereof).

Process:

1. Assign the roles of group leader, note taker, and time keeper within the group.
   a. The group leader will ensure that the group moves through the exercise as outlined in these instructions.
   b. The note taker will be responsible for capturing information and completing the Recording Sheet.
   c. The time keeper will keep an eye on the time to ensure you complete the exercise within the allotted time.
2. Once roles have been assigned, take five minutes to sit in silence and imagine how you would like your sector to look in 2030. If all were going well in yout country, what would be the main features and characteristics of your sector?
3. At the end of five minutes come back together in your small group and brainstorm ideas. Capture everyone's ideas and contributions.

4. Use existing long-term development goals and strategies and targets to get started, but add to the vision based on what you know about current challenges and what you think the future would look like if they were resolved by 2030. Where would you like it to be? How would you like it to be described?

5. Who would be the main beneficiaries and stakeholders in this development future? What resource inputs are needed? What support elements (institutions, policy frameworks etc.) will be needed to ensure this development future can come into being?

6. Document the key characteristics of your future vision on the flip chart sheets provided. Use words, drawings, images, or any combination thereof! Include a Vision Statement (2 – 3 sentences).

7. Think big both in terms of your vision and the scale of how you document it – we will be using this for reference throughout and adding to it.

8. Be creative! Come up with a desirable yet plausible vision for the future!

9. You will have five minutes to present your vision in plenary.

Tool 2bB: Small Group Activity 1 (Step 1)

Recording Sheet

Small Group Activity 1: Developing a Vision for the Future
Group Number_____

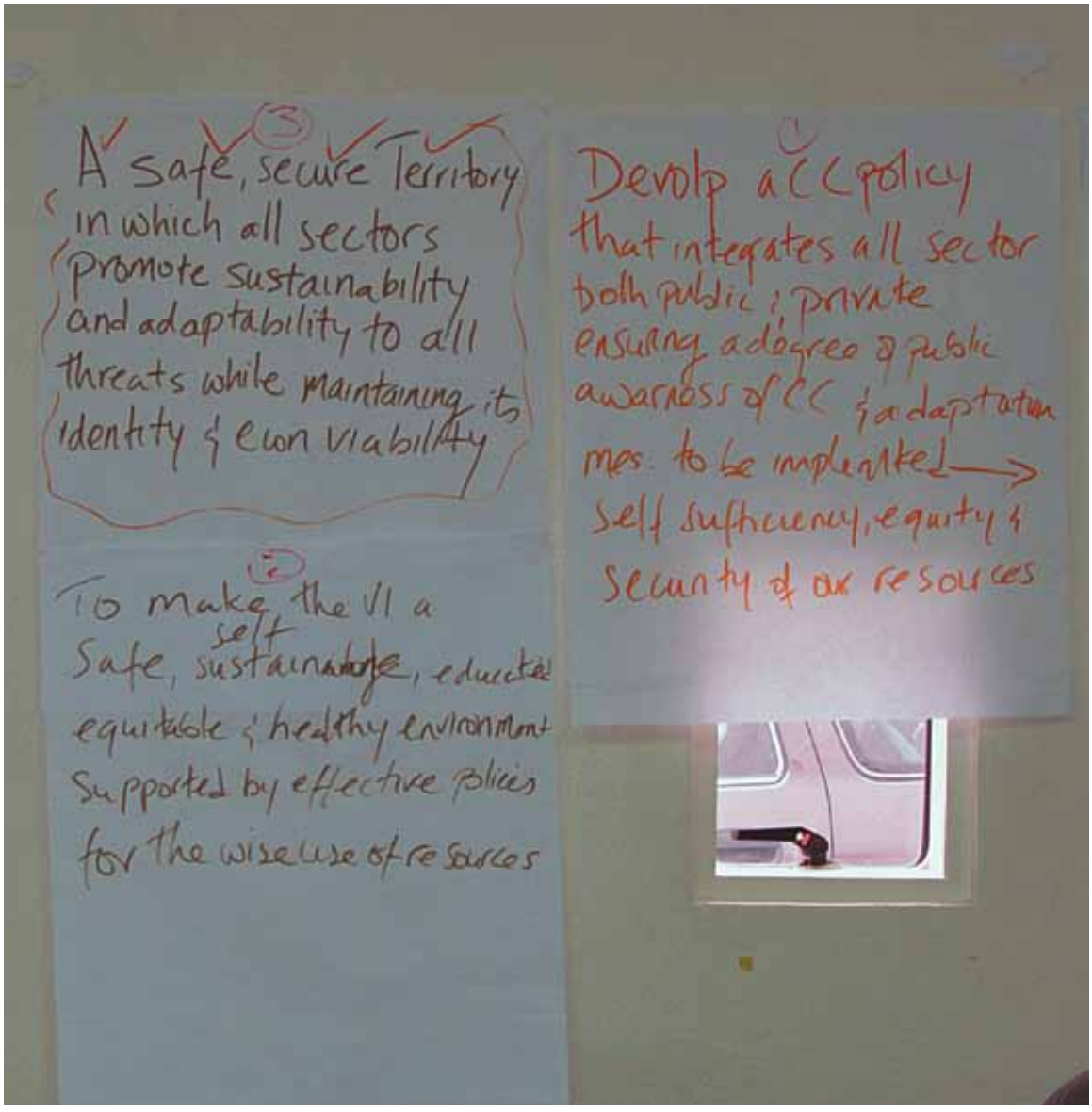
1. What are the key characteristics of a long-term vision for your group? How would your group describe a desirable yet plausible future for your sector for the year 2030?

2. Who would be the main beneficiaries and stakeholders in this development future? What resource inputs are needed? What support elements (institutions, policy frameworks etc.) will be needed to ensure this development future can come into being?

3. Vision Statement (2 – 3 sentences)

Tool 2c: Small Group Activity 1 (Step 1)

Examples of Vision Statements Developed by Small Working Groups



Tool 3a: Plenary Session (Step 2)

Boundary Conditions Presentations Guidelines

This session features presentations from knowledgeable, senior managers working in strategically important sectors. The purpose of the presentations is to identify the boundary conditions that may influence or constrain patterns of future development and hence the development visions being developed by the small working groups.

The first focuses should be on socio-economic projections for the PS's future that might challenge the vision. Climate change is taking place alongside other development challenges and these ought to be understood and taken into account when developing responses to increased climate risk. This presentation could be made by a senior representative of the national planning agency. The second presentation should focus on disaster risk management issues and challenges in the PS and ought to be made by a representative of the NDO. The third presentation focuses on climate change, trends and projections that are relevant to the Caribbean region in general and the PS in particular. The presentation will explore the linkages between climate change and disasters and Climate Change Adaptation and Disaster Risk Reduction. This presentation might be given by the national focal point, climate change focal point, or a professional with working experience in climate change adaptation planning and/or climate change mitigation.

The video "Islands on the Edge", produced by the Buccoo Reef Trust in Tobago, is a recommended tool for this session; it provides a concise and comprehensive overview of climate change, its causes and impacts on the region. The presenter could supplement the 22 minute video with a 10 minute presentation on PS -specific impacts.

"Islands on the Edge" is available for download from YouTube in two parts http://www.youtube.com/watch?v=k2Z-t5U-NpA and

http://www.youtube.com/watch?v=_XDpdMftd10&feature=related.

The fourth presentation should focus on the PS's climate change strategy and adaptation plan. It should give participants and idea of what actions have been taken to date, as well as challenges and opportunities. This presentation is ideally suited for the National Climate Change Focal Point or a national climate change expert.

After the presentations each small working group will revisit its development vision statement and determine whether any new information gathered from the expert presentations makes it necessary to amend any aspects of the vision statement.

Once each small working group has finalised its vision statement, the statements are reviewed in plenary. The critical common elements of the visions statements are listed and reformulated to produce a consensus vision statement.

Tool 3b: Plenary Session (Step 2)

Boundary Conditions Presentation Example, "Socio-economic Projections for the Virgin Islands"

Presented by Raymond Phillips, Director, Development Planning, Virgin Islands

The economy of the VI, like every other in the world has shown signs of weakness in this ongoing economic crisis. Many of the economic indicators have recorded negative growth and it is hard to predict when this trend will be reversed. The effects of this type of phenomena are seen first and foremost in the Government finances, since negative growth in economic indicators translates to stagnant or native growth in tax or other government revenues. The major social indicator is population growth.

Tourism

This represents one of the twin towers of the VI's economic development. Over 90% of tourist arrivals to the VI hail from the United States. This indicator showed significant positive growth until the economic crisis in 2008. In 2007, it was pretty close to the one million mark. In 2008, arrivals fell by a mere 1.5%, but are projected to fall by 15.3% by 2016 if this present economic situation persists.

Tourism Expenditure

This indicator is directly correlated to tourist arrivals. Statistics show that over 80% of employment in the VI is related in one way or another to tourism. This clearly indicates the influence tourism has to the VI's economic development. In 2007, tourism expenditure reached over US$450 million. Between 2007 and 2016, this is projected to decrease by some 32% to US$307million.

IBC

The registration of IBCs represents the second of the two twin towers of the VI economy. The indicator is not immune to the global economic downturn, but it is not as adversely affected as tourism. Whereby these registrations don't contribute much by way of direct employment when compared to tourism, they contribute much to government revenues. Though modestly, IBC registration continues to increase from year to year. In 2011, there were 67,667 new registrations and it is projected that these will increase by 7.4% to 72,643 by 2016.

GDP

This is the main indicator of the economic situation in the VI. All the other economic indicators inform the level of this indicator. Between 2008 and 2009, this indicator fell by an unprecedented and very significant 11.6%.

However by 2010, it rebounded somewhat to show a small 2.05% positive growth. There are no completed official projections for this indicator as yet, but if this economic situation persists, it is sure to record little or no growth going forward.

Trade

Over 90% of consumer and durable goods are imported from the United States. In 2006, over 236 million goods were imported and it is projected that this amount would reduce by 3% to reach US$229 million by 2009. Import duties were US$33 million in 2008 and fell by 12.2% to US$29 million in 2010. By June 2011, just over US$15 million in import duties were collected. This suggests that it would probably reach US$30 million by the end of the year.

No official projections have been done for trade, but the present trend suggests that if the present economic conditions continue, there will be little or no or even negative growth as it relates to trade imports.

Consumer Price Index (CPI)

Although there is some delay in the effects on prices, the CPI of the VI is directly linked to movement in prices in the United States. As was earlier stated, over 90% of consumer goods originate in the US. The VI has enjoyed relatively low rates of inflation over the years. In 2011, inflation stood at 2.37% and is projected to be at 3.02% in 2013. However, between 2011 and 2013, it is expected to fluctuate rather than show a linear trend.

Employment

The number of persons employed in the VI fell for the first time in 2009. In 2008, there were 19,098 persons employed. By 2009, this number fell by 2% to 18720 and by 2010, the number fell by another 1.3% to reach 18,473. There are no official projections for employment figures, but the trend suggests that if this economic situation continues, there will be little or no or negative growth in the number of persons employed.

Population

The Population for the VI has shown significant growth over the past decades, this growth is mainly due to immigration which is employment driven. The 2001 census recorded 23, 161 persons. Based on the trend in natural population increase and migration, it is projected to reach 29,537 in 2010 and 35, 867 in 2020. These represent a 27.5% increase for 2010 over 2001 and a 21.4% increase when comparing 2020 to 2010.

Climate Change Impact Chain Cards

(1) Climate Change Trend Cards

Sea Level Rise

Increases Sea Surface TEMPERATURE

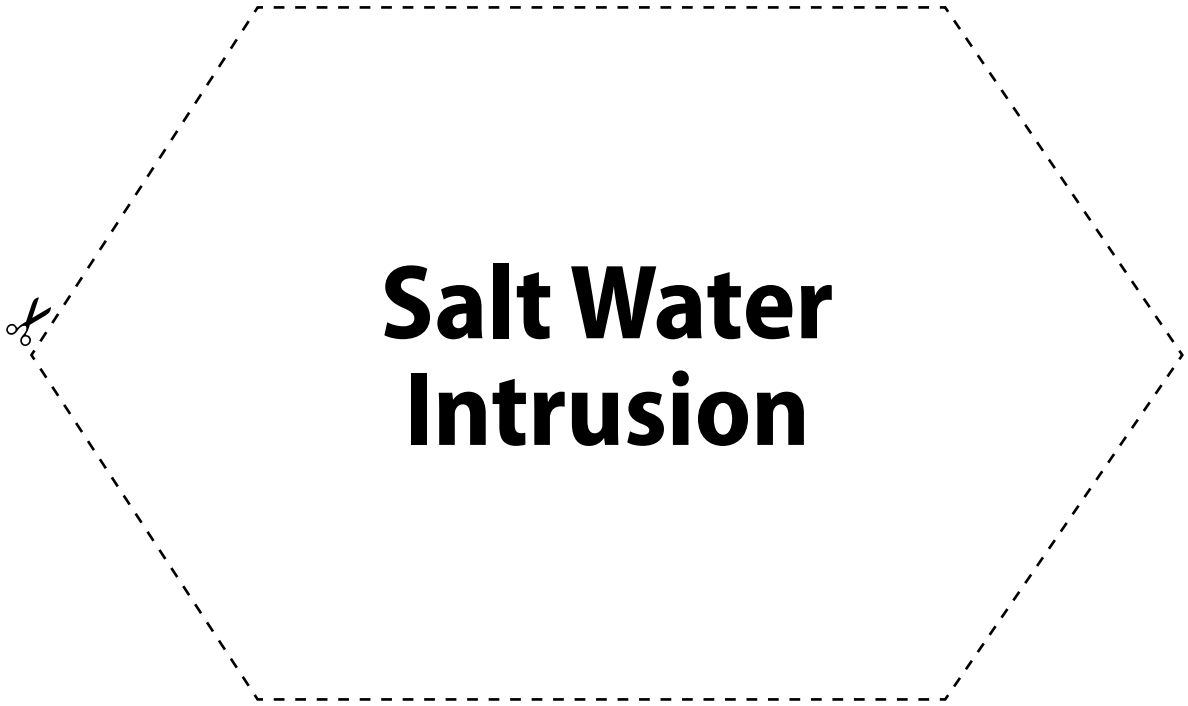
Increased Summer Drought

Increased Rainfall During Hurricane Season

Increased Hurricane Intensity

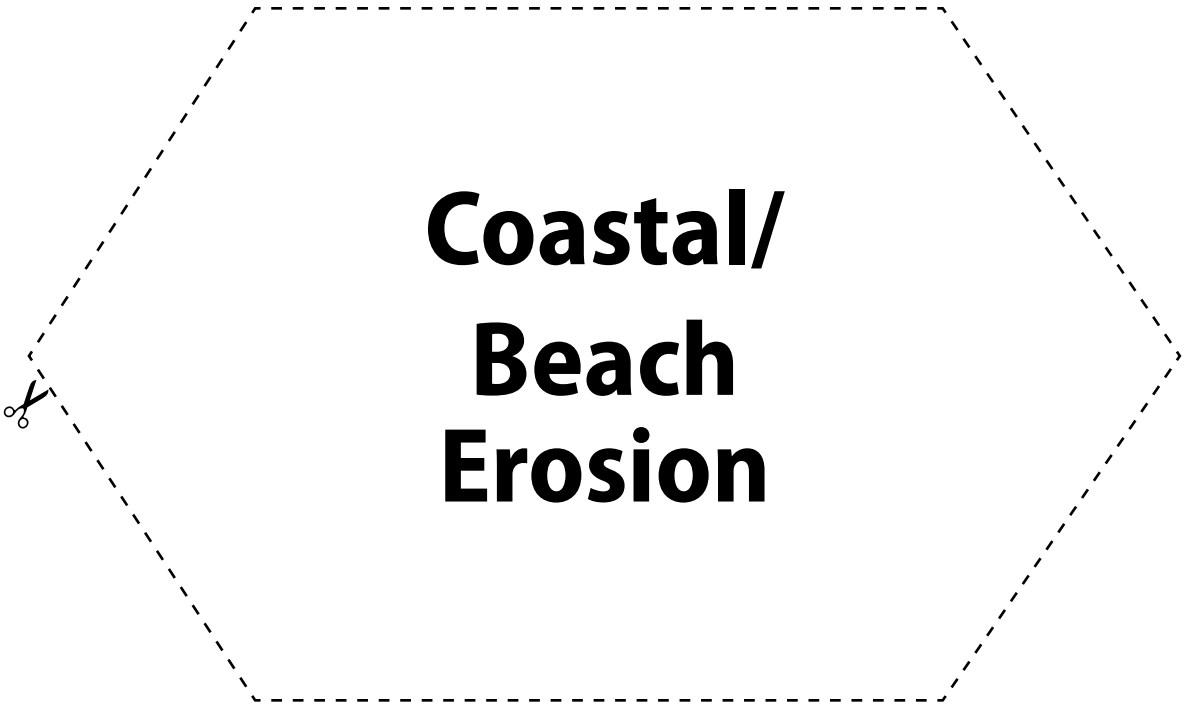
Increased Rainfall Intensity

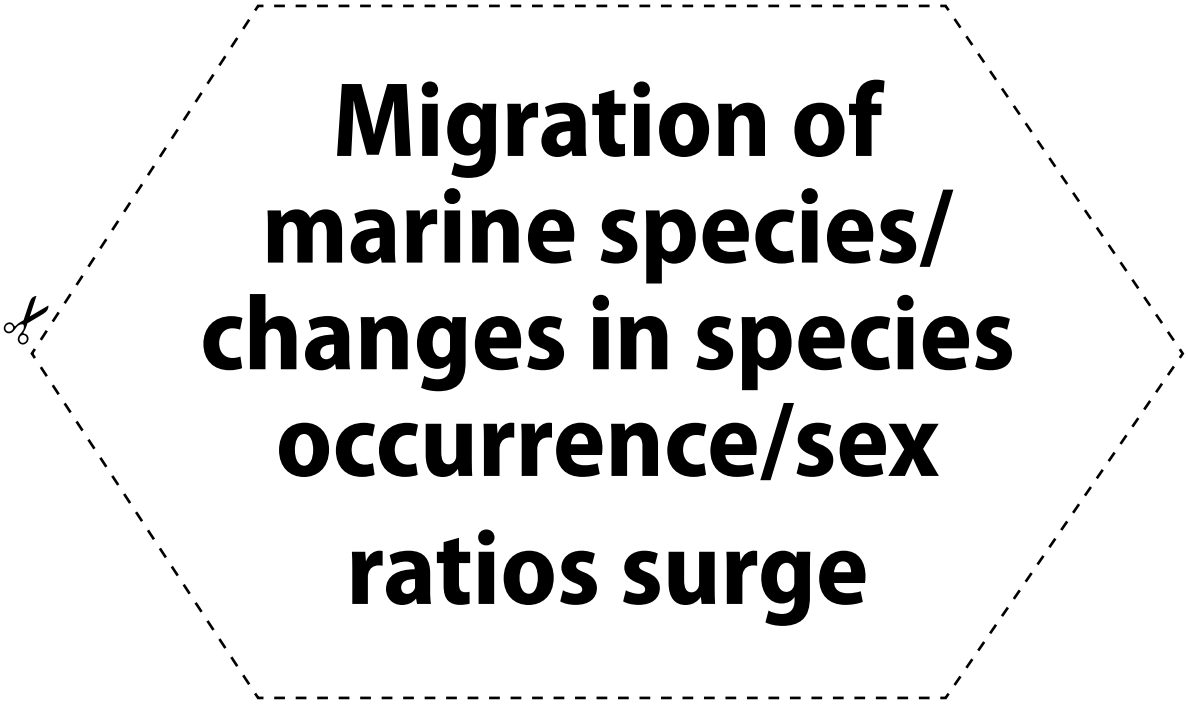
(2) Climate Change Impact Cards

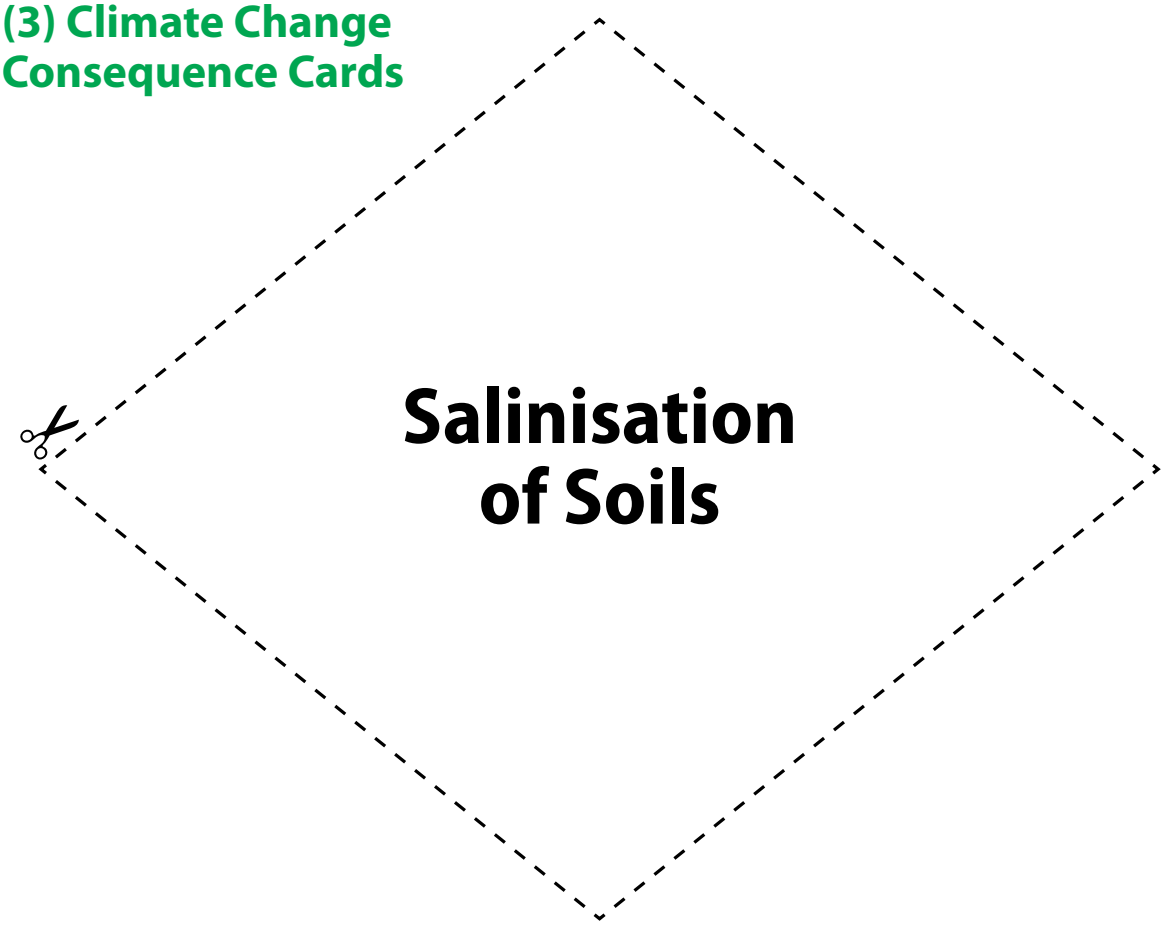


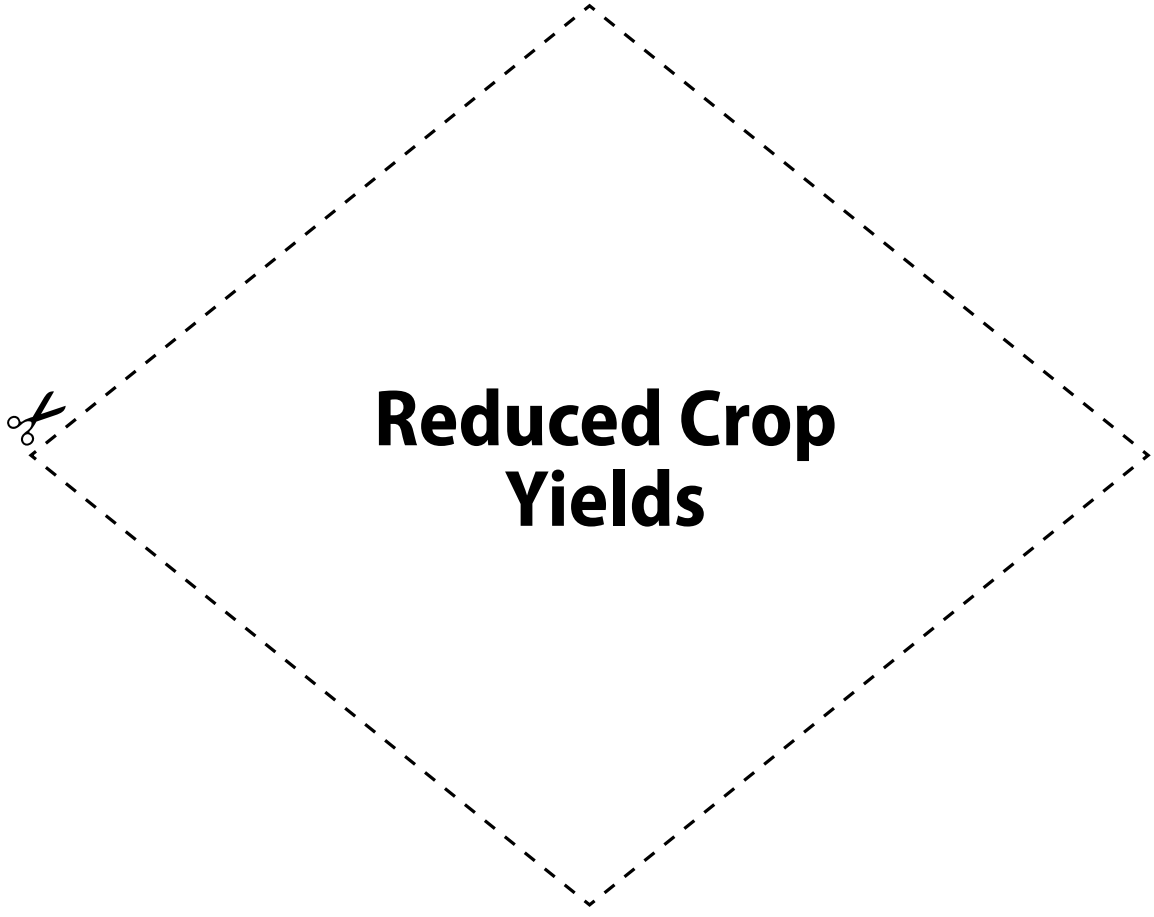

Wetland
Loss

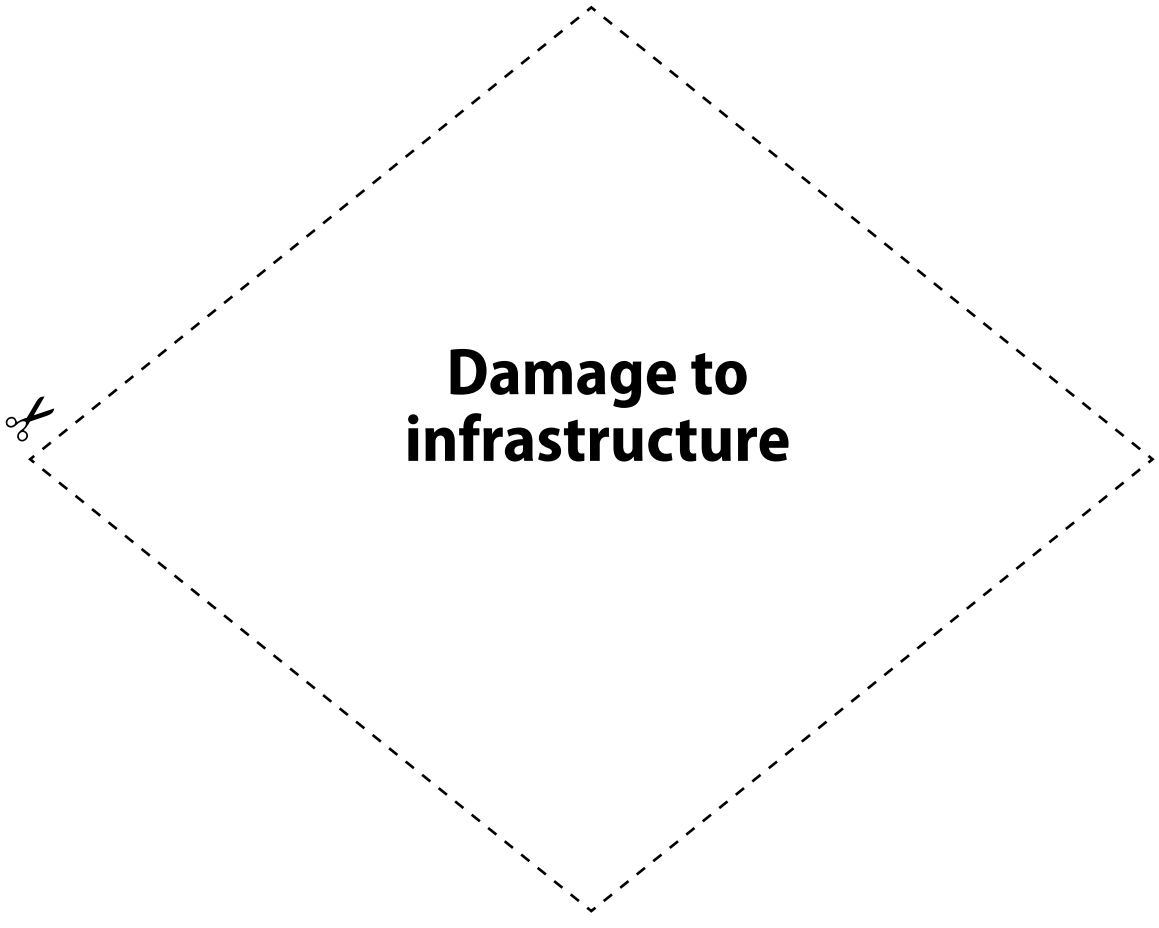

Flooding
and Storm
Surge

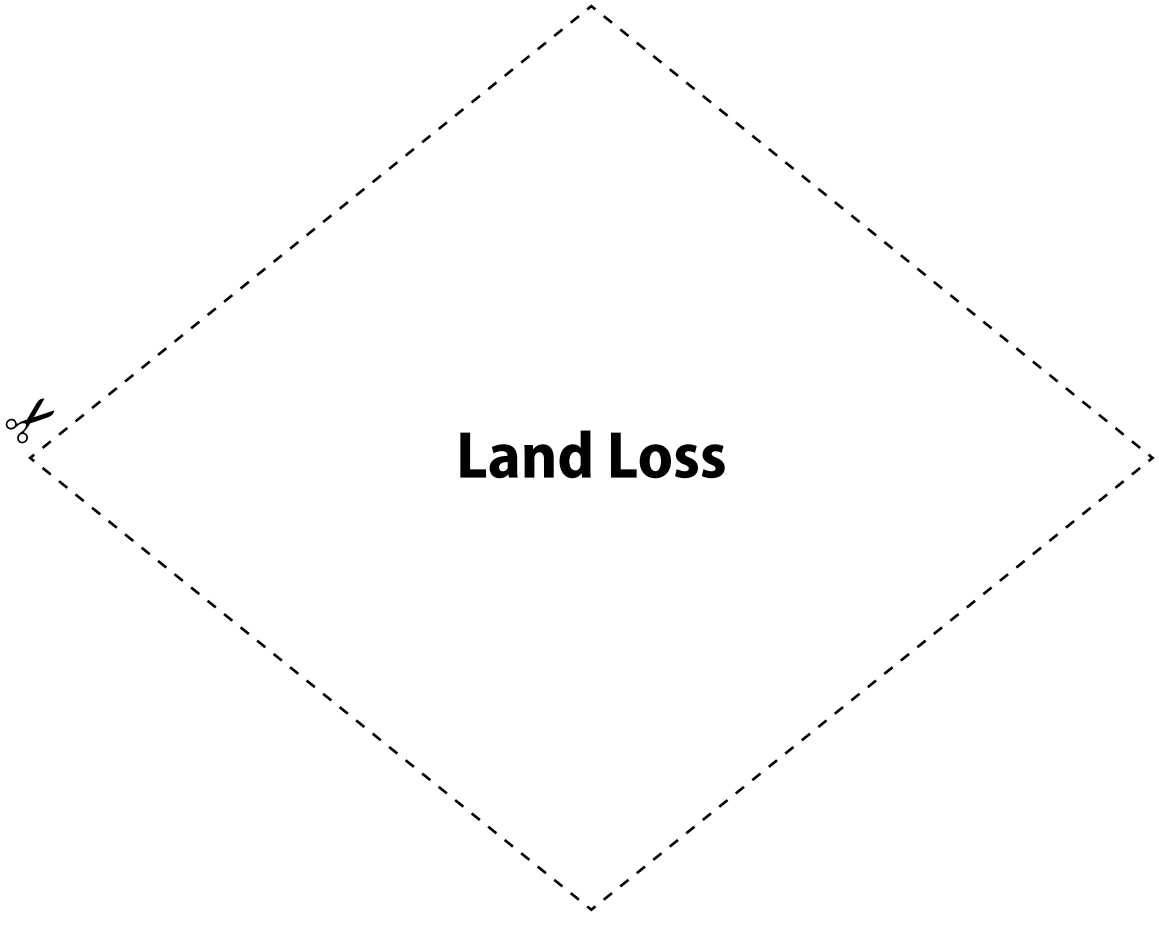

Coastal/
Beach
Erosion

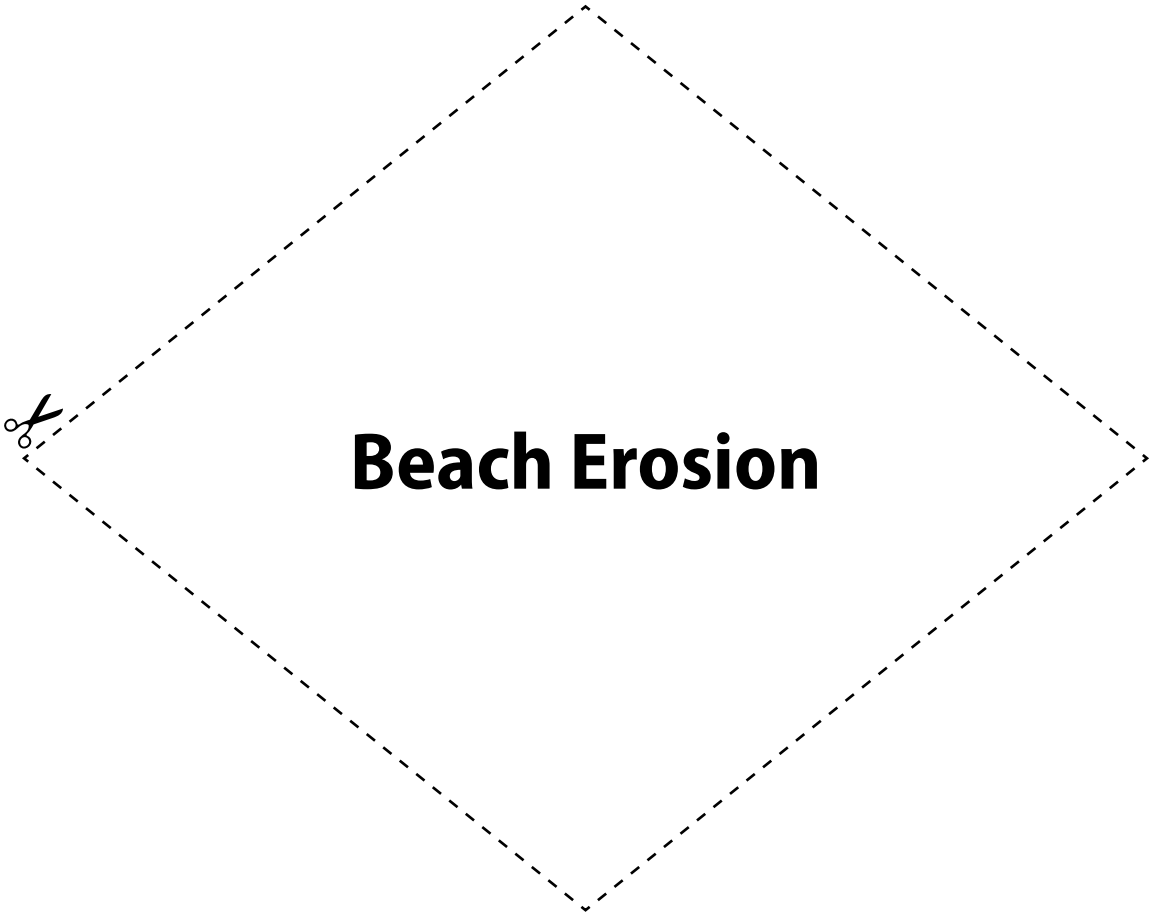

Migration of
marine species/
changes in species
occurrence/sex
ratios surge

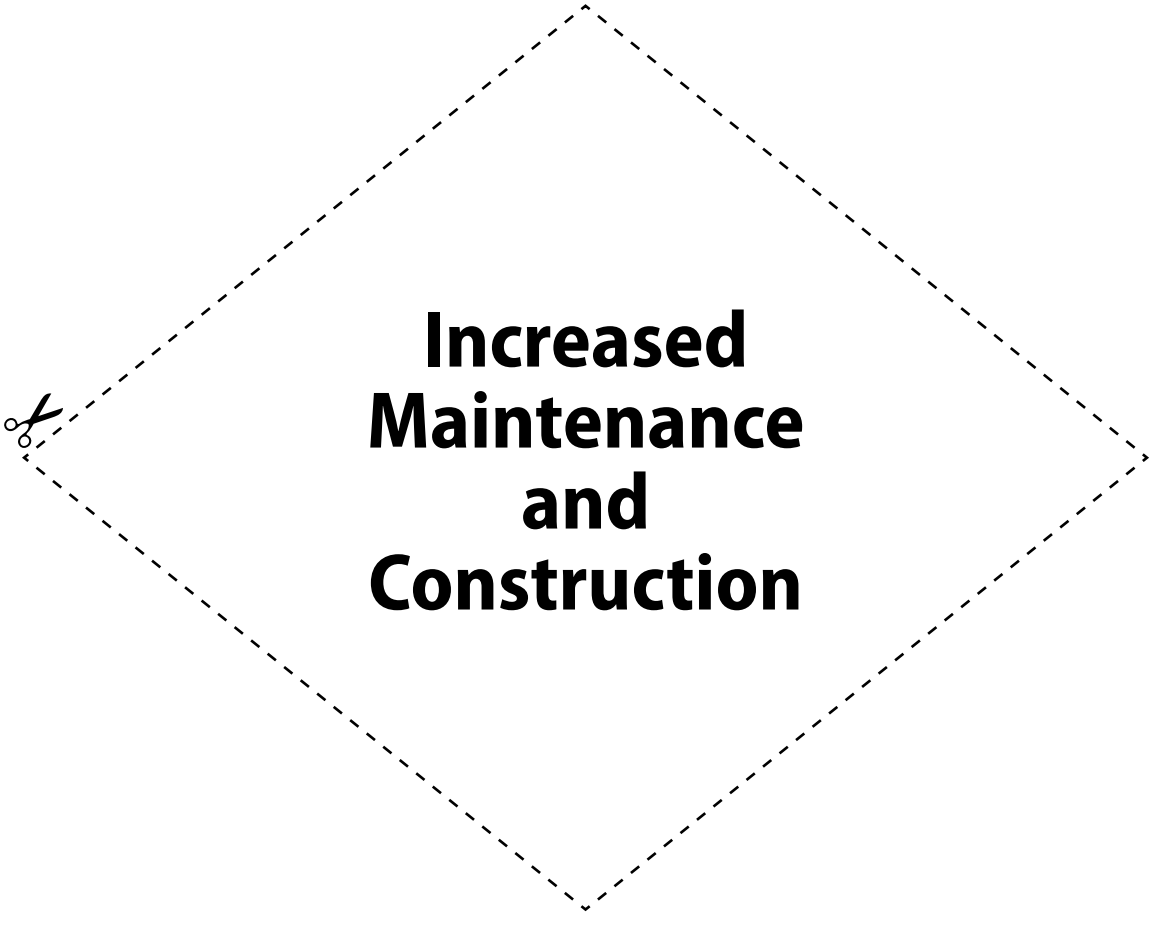

Salinisation
of Soils

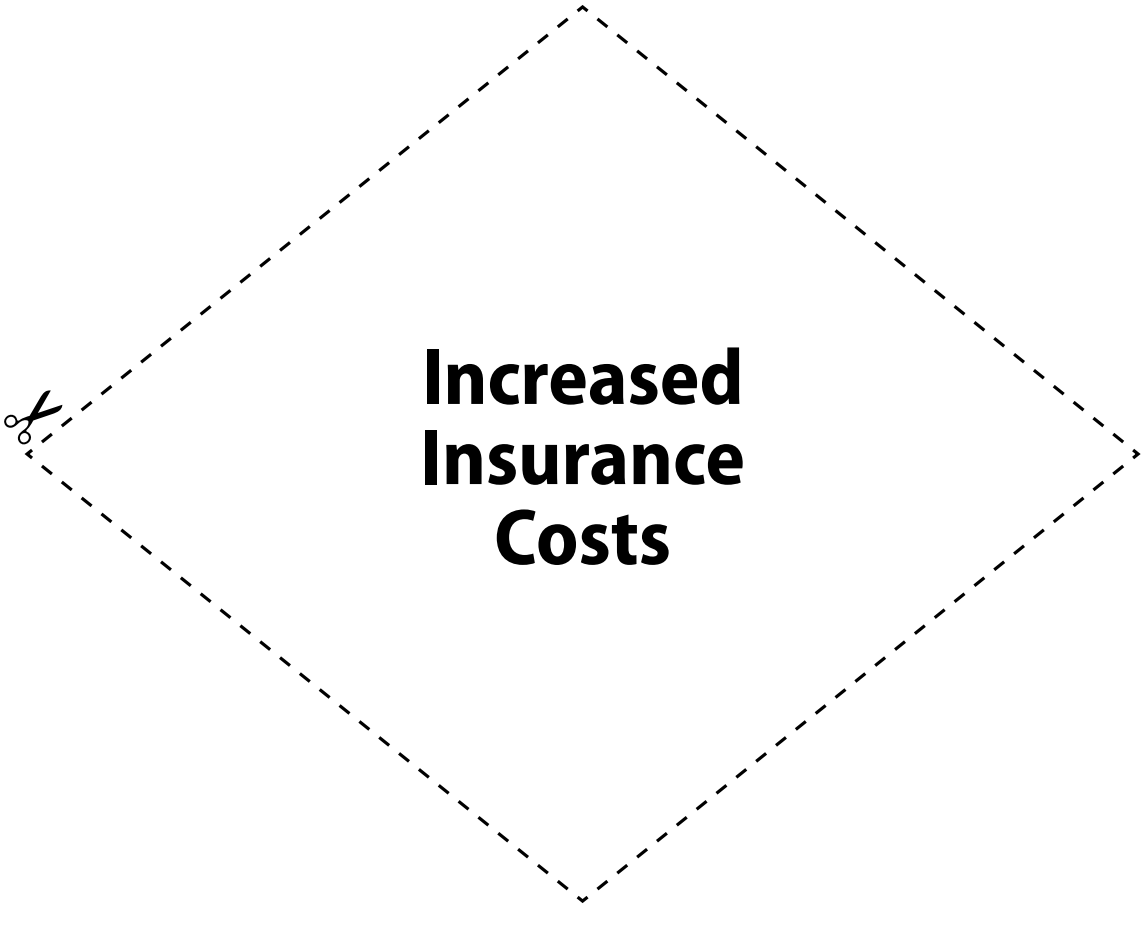

Reduced Crop
Yields

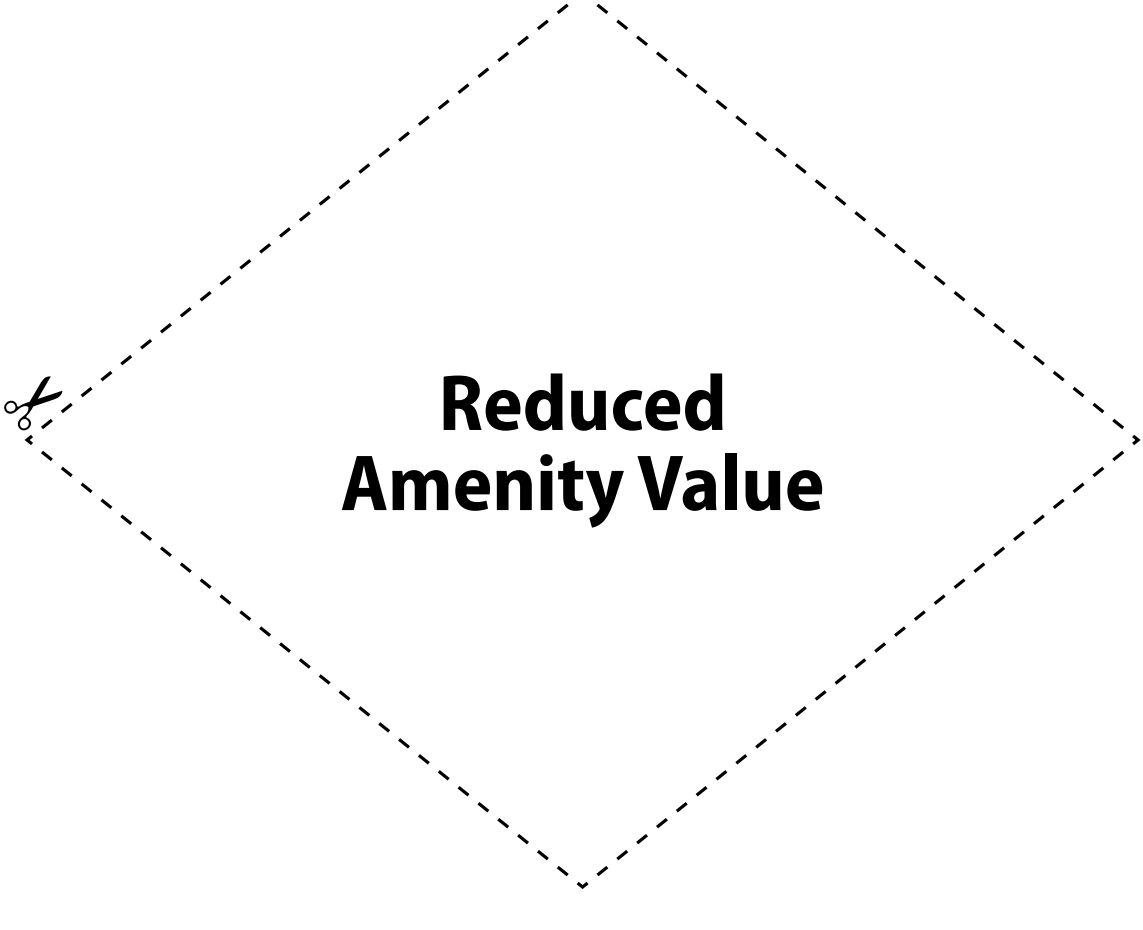

Damage to
infrastructure

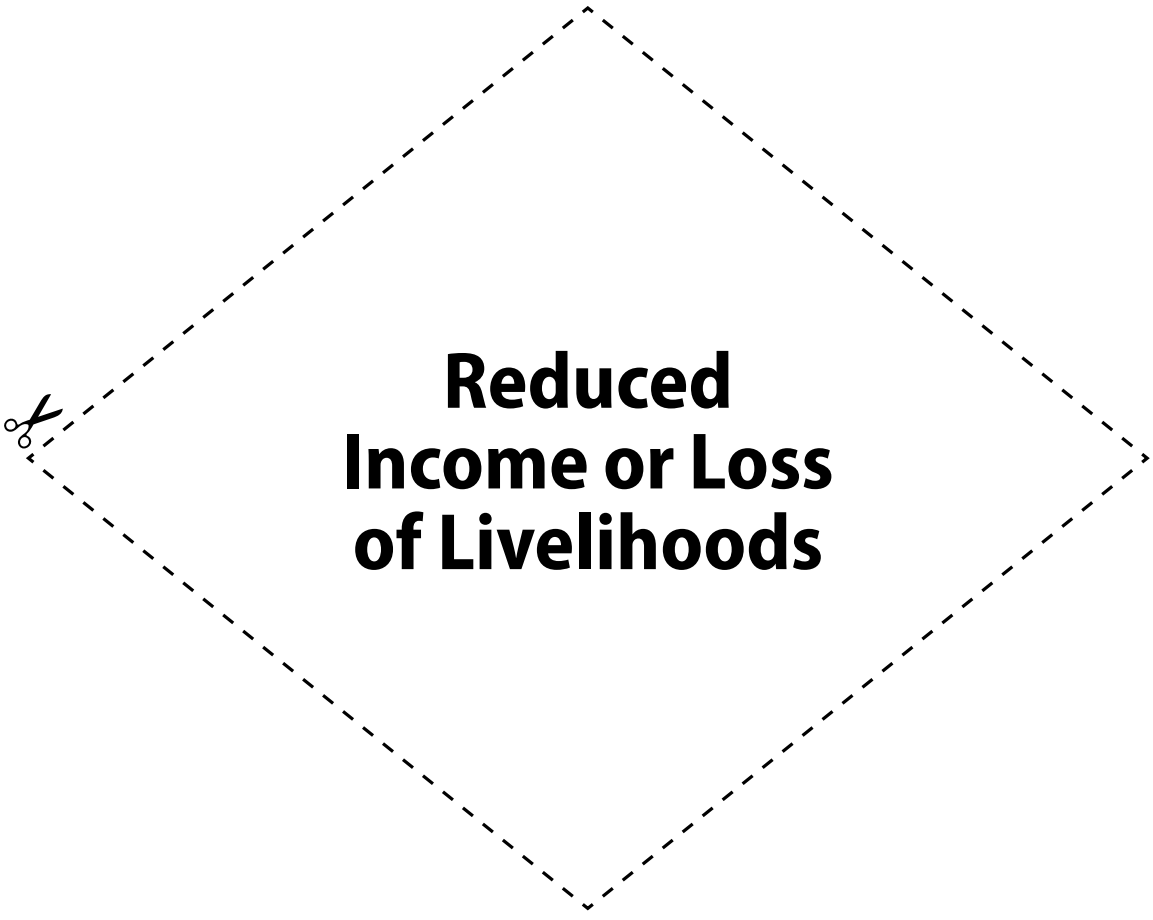

Land Loss


Beach Erosion


Increased
Maintenance
and
Construction


Increased
Insurance
Costs


Reduced
Amenity Value


Reduced
Income or Loss
of Livelihoods

Tool 4b: Small Group Activity 2 (Step 3)

Activity Instructions

Small Group Activity 2: Identification of Climate Change Impacts on the Participating State

Purpose: To identify the main climate change trends affecting your country, the direct and indirect impacts of each trend; and the social groups or sectors that will be vulnerable to each impact.

Time: 60 minutes

Desired output: Climate change impact chain showing direct and indirect bio-physical impacts, socio-economic effects and vulnerable sectors/populations.

Material needed: Impact cards, flip chart paper, glue or tape, markers, index cards

Process:

1. Assign the roles of group leader, note taker, and time keeper within the group.
   a. The group leader will ensure that the group moves through the exercise as outlined in these instructions.
   b. The note taker will be responsible for capturing information and completing the Recording Sheet.
   c. The time keeper will keep an eye on the time to ensure you complete the exercise within the allotted time.
2. Identify the main climate change trends from the previous session that will affect your country.
3. For each trend, identify the main direct and indirect impacts, socio-economic effects, and then go on to identify the sectors and social groups that will be vulnerable to each impact/set of impacts. Indicate why the sector or social group is vulnerable. Capture this information in an impact chain.
4. Use the trend and impact cards provided to help you develop impact chains. Use the blank index cards to fill in the vulnerable groups. Blank trend and impact cards have been provided

so that you can fill in any missing information. (Hint: the set of cards you have received is not complete!)

5. Affix your impact chains to the flip chart sheets provided.
6. Once you have all your chains, rank the impacts by:
   - National Significance - Score from1 (lowest) to 5 (highest)
   - Certainty - Score from1 (lowest) to 5 (highest)
   - Severity - Score from1 (lowest) to 5 (highest)
   - Urgency - Score from1 (lowest) to 5 (highest)
7. You will have five minutes to present your impact chains in plenary.

Step 3: Identification of climate change impacts

Climate change trend

Impact

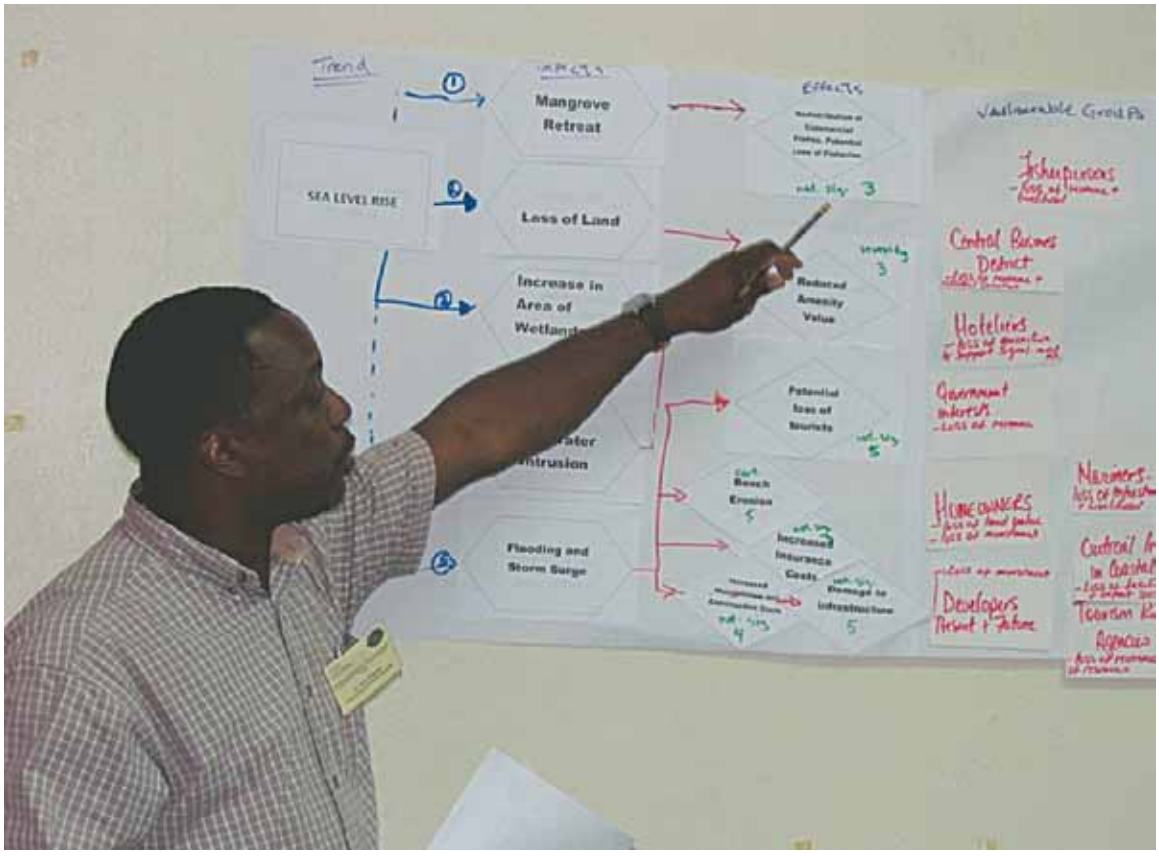
Consequences

"The potential disaster losses, in:

- Lives,
- Health status
- Livelihoods
- Assests(natural & built)
- Services(natural & built)

.....which could occur to a particular community or a society over some specified future time period."


CDEMA
The Caribbean Disaster
Emergency Management Agency


Trend
Mangrove
Retreat
SEA LEVEL RISE
Loss of Land
Increase in
Area of
Wetland
Flooding and
Storm Surge
Reduced
Amenity
Value
Potential
loss of
tourists
Beach
Erosion
Increased
Insurance
Costs
Damage to
infrastructure
Fishermen
Central Bureau
District
Hoteliers
Government
Developers

Tool 4c: Small Group Activity 2, (Step 3)

Recording Sheet

Small Group Activity 1: Developing a Vision for the Future

Group Number_____

CHANGING CLIMATIC PARAMETER (Trend)	DIRECT AND INDIRECT IMPACTS (Biophysical)	SOCIO ECONOMIC EFFECTS	VULNERABLE SECTOR(S)	VULNERABLE SOCIAL GROUP(S)
REASON WHY VULNERABLE	**NATIONAL SIGNIFICANCE** Score from1 (lowest) to 5 (highest)	**CERTAINTY** Score from1 (lowest) to 5 (highest)	**SEVERITY** Score from1 (lowest) to 5 (highest)	**URGENCY** Score from1 (lowest) to 5 (highest)

Tool 5a: Small Group Activity 3 (Step 4)

ACTIVITY INSTRUCTIONS

Small Group Activity 3: Identification of Adaptation Result Statements and Existing and Potential Adaptation Options for (Priority) Vulnerabilities

Purpose: To identify existing adaptation options/ activities for priority vulnerabilities and results statements.
Time: 1 hour 10 minutes

Desired output: A list of existing and potential adaptation options for the priority vulnerabilities

Material needed: Flip chart paper, markers

Process:

1. Assign the roles of group leader, note taker, and time keeper within the group.

   a. The group leader will ensure that the group moves through the exercise as outlined in these instructions.

   b. The note taker will be responsible for capturing information and completing the Recording Sheet.

   c. The time keeper will keep an eye on the time to ensure you complete the exercise within the allotted time.

2. Review the list of socio economic effects from day 1 (impact chains) and relate the relevant ones to your sector vision and determine how these effects pose potential risks for the viability of your sector future as visualised by the group.

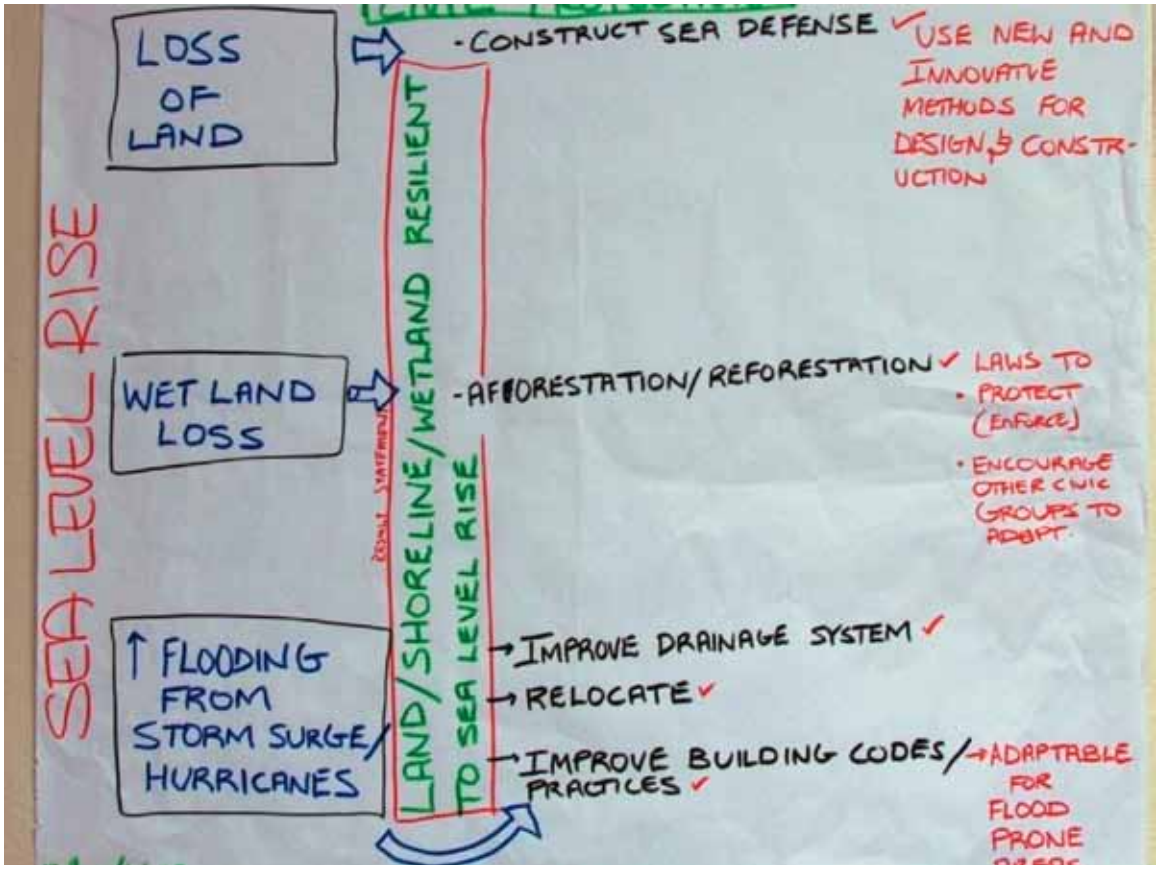
3. For each risk identified, develop an adaptation results statement. A results statement is a specific, measurable, attainable, realistic and time-bound (SMART) climate risk reduction outcome, e.g. Reduce beach erosion at major resorts by x per cent, by 2017.

4. What are some of the adaptation options/ activities that you are aware of that could help deliver the desired results?

5. Which adaptation options/ activities are currently underway and which are new proposals?

6. How can existing adaptation options/ activities be improved?

7. Please record your answers on the flip chart sheets provided. (If you wish, you may use the same format as the recording sheet.)



Tool 5b: Small Group Activity 3 (Step 4)

Recording Sheet

Small Group Activity 3: Identification of Adaptation Result Statements and Existing and Potential Adaptation Options for (Priority) Vulnerabilities

Group Number_____

CLIMATE CHANGE RISK (Hazard x Exposure x Vulnerability)		ADAPTATION RESULT STATEMENT	ADAPTATION OPTIONS/ ACTIVITIES	EXISTING (YES/NO)	NEW (YES/ NO)	HOW CAN EXISTING ADAPTATION OPTIONS/ ACTIVITIES BE IMPROVED?
CLIMATE TREND	IMPACT					

Tool 6a: Small Group Activity 4 (Step 5)

Activity Instructions

Small Group Activity 4: Identification of adaptation entry points and pathways in the country work programme and formulation of climate smart result statements.

Purpose:

- Identify pathways and entry points for adaptation results in the CDM country work programme.
- Articulate new/ revised climate smart outputs and outcomes of the CDM country work programme based on the adaptation results in Step 4.
- Note entry points for priority adaptation results from step 4 that fall outside the scope of the country work programme and if possible suggest sector entry points and pathways.

Time: Participants have 2 hours and 15 minutes to work in their groups and 30 minutes for reporting back to plenary.

Desired output: climate smart language to replace the language of the country work programme Outcome and Outputs selected as **CCA2DRR** entry points.

Material needed: cue cards, markers

Process: Participants will continue to work in their sector groups. The starting point for this activity is the set of the group adaptation result statements (GAR) developed in Step 4.

Participants will map each adaptation result statement to the country work programme, working at the level of the overall Programming Framework (outcomes and outputs) only using the process described in the decision tree flow-chart below.

1. Assign the roles of group leader, note taker, and time keeper within the group.

   a. The group leader will ensure that the group moves through the exercise as outlined in these instructions.

   b. The note taker will be responsible for capturing information and completing the Recording Sheet.

c. The time keeper will keep an eye on the time to ensure you complete the exercise within the allotted time.

2. One at a time, take the group adaptation results (GAR) statement developed at Step 4 and using the process described in the decision tree diagrammed (below) review the country work programme (Tool 6b) and identify country work programme Outcomes and Outputs whose language can be modified or made climate smart (entry points) to reflect the adaptation results statement(s) developed in Step 4, and support the associated adaptation options/actions (Tool 6c).

3. Revise the language at the country work programme outcome and/or output levels (Tool 6d) to provide high level strategic consistency and support for the climate change adaptation activities that will subsequently be mainstreamed into the country work Programmes activities.

4. Record the outputs of this exercise (climate smart language for country work programme) outcome and outputs in the recording sheet shown in Tool 6e.

Where the adaptation result statement does not map to a specific output but is consistent with an outcome, participants will develop a new output statement for the relevant outcome.

Where the adaptation result falls outside the scope of the country work programme participants should identify the sector or ministry strategy that it best corresponds to and craft a suggested outcome statement.

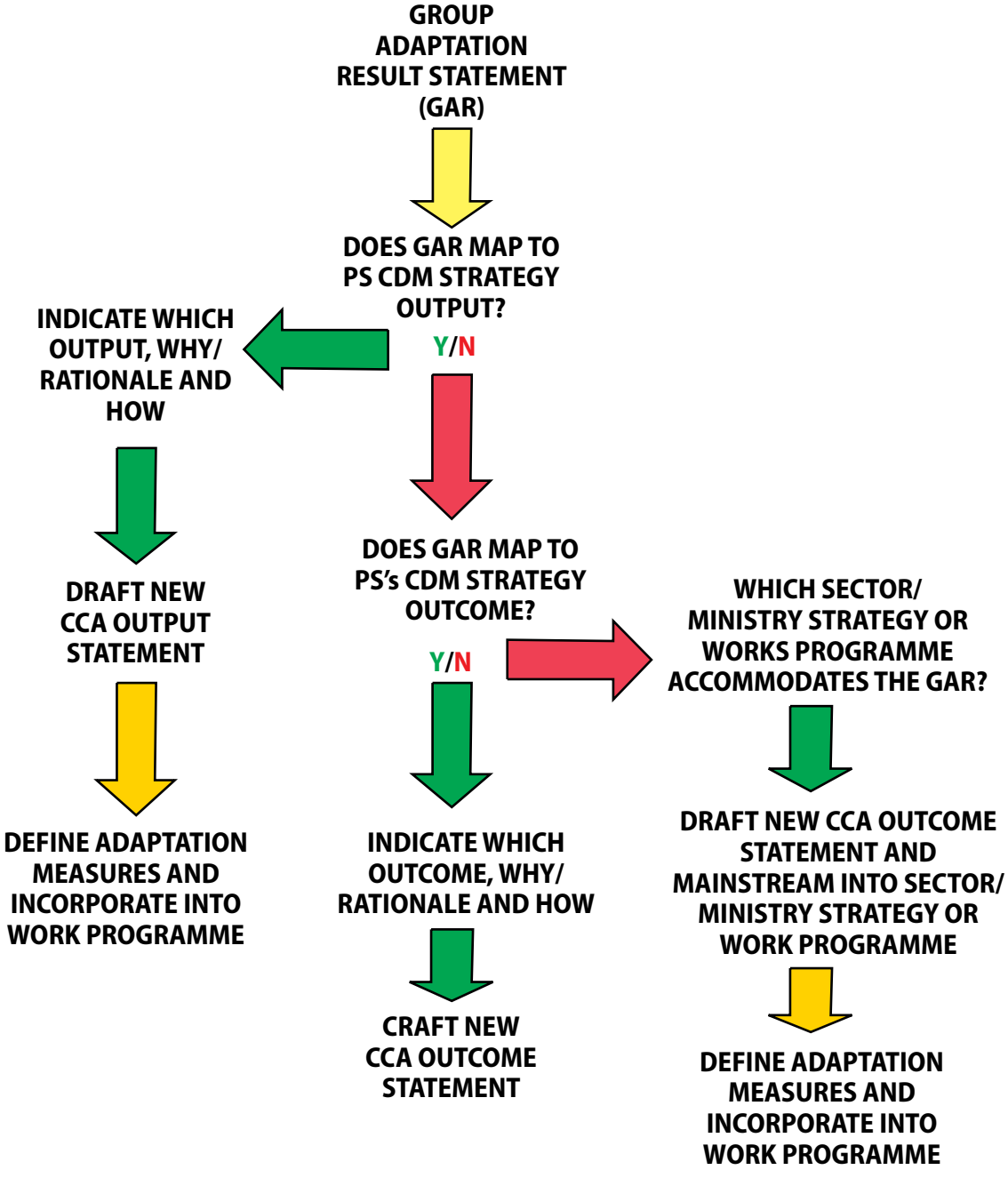


Figure 8: Flow Chart to Guide the Mainstreaming of Group (Climate Change) Adaptation Results (GAR) Statements into the Country Work Programme.

Tool 6b: Small Group Activity 4 (Step 5)

Country Work Programme

VI CDM Programming Framework

***Goal*: Disaster Management plans fully integrated in the development and management cycle of projects, fully institutionalized within an efficient Government structure, grounded in community support and sustained by Government support to make VI a regional model and centre of excellence for CDM**

***Purpose*: Reduce Human suffering and economic losses from natural man-made hazards' impacts**

Outcome 1: A population aware & educated about preparedness for & the impact of hazard/disaster

- 1.1 Enhanced availability of accurate/timely hazard/ disaster date/information for the population
- 1.2 Update accurate date and timely weather and seismic information available to the population
- 1.3 Media campaigns developed and implemented at all levels of society and governmentsand private sector
- 1.4 CDM preparedness, mitigation and response integrated into school curriculum
- 1.5 CDM Program at HLSCC expanded/funded delivered

OUTPUT

Outcome 2: Enhanced integration of CDM into & preparedness of all sectors of hazards/disasters

- 2.1 Disaster Emergency Plans (& sub-plans) developed/tested/ updated in all Government ministries, departments/ agencies & sectors
- 2.2 CCM Liaison Officer (focal points) established/ trained in all sectors and Government ministries, departments and agencies and the private sector
- 2.3 National Recovery Plan completed
- 2.4 Increase and enhanced private sector continuity/recovery planning and CDM awareness
- 2.5 CDM Strategy for the Tourism Sector developed
- 2.6 Financial Sector Disaster Recovery Policy Framework developed/ implemented
- 2.7 Disaster Emergency Plans developed/tested in all schools, daycares

OUTPUT

Outcome 3: Planning and development enhanced through disaster mitigation & improved integration of hazard/vulnerability data

- 3.1 Hazard mapping/ modelling completed for all hazards
- 3.2 Enhanced capacity for mapping/modelling
- 3.3 Enhanced awareness of planners, engineers and developers for hazard mitigation integration into building/development
- 3.4 HVAs conducted, integrated into EIAs and applied
- 3.5 Coat/benefit analyses for public and private sector completed/ disseminate
- 3.6 Risk reduction scheme for banking/insurance sector developed
- 3.7 Non-structure mitigation addressed (especially in the building sector

OUTPUT

Outcome 4: Reduced vulnerability/enhanced resilience of communities to mitigate/respond to hazards/ disaster

- 4.1 DRR measures implemented in vulnerable communities
- 4.2 Enhanced awareness of community members on hazard identification/ feasible mitigation
- 4.3 Enhanced capacity and coverage of CERT teams and volunteers
- 3.4 Enhanced evacuation planning and routes for vulnerable communities

OUTPUT

Outcome 5: VI emergency operations (response and relief) capacity enhanced

- 5.1 Enhanced relief distribution mechanism (&policies/plans/ guidelines) for emergency aid management
- 5.2 Clarified roles & responsibilities in disaster management plans/ emergency response
- 5.3 Enhanced capacity of first responders & emergency response actors (inclucing health)
- 5.4 New NEOC established Web-EOC capacity developed
- 5.5 Emergency systems able to alert the population and provide reliable communication during emergency/disasters
- 5.6 911 Emergency Response system developed/executed
- 5.7 Structurally sound emergency shelters with enhanced capacity to withstand hazard/disaster impact
- 5.8 Hazards documented and responded to
- 5.9 Met Office established

OUTPUT

Outcome 6 : CDM integrated into national policies/laws/strategies & DDM Activities

- 6.1 2009-2013 DDM CDM Strategy executed, monitored and reported on
- 6.2 Dm Legislation and policy reviewed and update
- 6.3 Strategic participation in national committees such as the NDMC, Planning Authority & Environmental Committee
- 6.4 Sustained active participation in CDEMA
- 6.5 State of Preparedness Reports &'Critical Infrastructure Protection Review completed

OUTPUT

Tool 6c: Small Group Activity 4 (Step 5):

Country Work Programme with Identified Outcome and Output Entry Points

VI CDM Programming Framework

***Goal*: Disaster Management plans fully integrated in the development and management cycle of projects, fully institutionalized within an efficient Government structure, grounded in community support and sustained by Government support to make VI a regional model and centre of excellence for CDM**

***Purpose*: Reduce Human suffering and economic losses from natural man-made hazards' impacts**

Outcome 1: A population aware & educated about preparedness for & the impact of hazard/disaster

- 1.1 Enhanced availability of accurate/timely hazard/ disaster date/information for the population
- 1.2 Update accurate date and timely weather and seismic information available to the population
- 1.3 Media campaigns developed and implemented at all levels of society and governmentsand private sector
- 1.4 CDM preparedness, mitigation and response integrated into school curriculum
- 1.5 CDM Program at HLSCC expanded/funded delivered

OUTPUT

Outcome 2: Enhanced integration of CDM into & preparedness of all sectors of hazards/disasters

- 2.1 Disaster Emergency Plans (& sub-plans) developed/tested/ updated in all Government ministries, departments/ agencies & sectors
- 2.2 CCM Liaison Officer (focal points) established/ trained in all sectors and Government ministries, departments and agencies and the private sector
- 2.3 National Recovery Plan completed
- 2.4 Increase and enhanced private sector continuity/recovery planning and CDM awareness
- 2.5 CDM Strategy for the Tourism Sector developed
- 2.6 Financial Sector Disaster Recovery Policy Framework developed/ implemented
- 2.7 Disaster Emergency Plans developed/tested in all schools, daycares

OUTPUT

Outcome 3: Planning and development enhanced through disaster mitigation and improved integration of hazard/vulnerability data

- 3.1 Hazard mapping/ modelling completed for all hazards
- 3.2 Enhanced capacity for mapping/modelling
- 3.3 Enhanced awareness of planners, engineers and developers for hazard mitigation integration into building/development
- 3.4 HVAs conducted, integrated into EIAs and applied
- 3.5 Coat/benefit analyses for public and private sector completed/ disseminate
- 3.6 Risk reduction scheme for banking/insurance sector developed
- 3.7 Non-structure mitigation addressed (especially in the building sector

OUTPUT

Outcome 4: Reduced vulnerability/enhanced resilience of communities to mitigate/respond to hazards/ disaster

- 4.1 DRR measures implemented in vulnerable communities
- 4.2 Enhanced awareness of community members on hazard identification/ feasible mitigation
- 4.3 Enhanced capacity and coverage of CERT teams and volunteers
- 3.4 Enhanced evacuation planning and routes for vulnerable communities

OUTPUT

Outcome 5: VI emergency operations (response and relief) capacity enhanced

- 5.1 Enhanced relief distribution mechanism (&policies/plans/ guidelines) for emergency aid management
- 5.2 Clarified roles & responsibilities in disaster management plans/ emergency response
- 5.3 Enhanced capacity of first responders & emergency response actors (inclucing health)
- 5.4 New NEOC established Web-EOC capacity developed
- 5.5 Emergency systems able to alert the population and provide reliable communication during emergency/disasters
- 5.6 911 Emergency Response system developed/executed
- 5.7 Structurally sound emergency shelters with enhanced capacity to withstand hazard/disaster impact
- 5.8 Hazards documented and responded to
- 5.9 Met Office established

OUTPUT

Outcome 6 : CDM integrated into national policies/laws/strategies & DDM Activities

- 6.1 2009-2013 DDM CDM Strategy executed, monitored and reported on
- 6.2 Dm Legislation and policy reviewed and update
- 6.3 Strategic participation in national committees such as the NDMC, Planning Authority & Environmental Committee
- 6.4 Sustained active participation in CDERA
- 6.5 State of Preparedness Reports &'Critical Infrastructure Protection Review completed

OUTPUT

Tool 6d: Small Group Activity 4 (Step 5):

Example of Alternative Climate Smart Wording for Country Work Programme Outcomes and Outputs, showing Entry Points and Strategic Linkages to the CDM and CC Frameworks for Planning and Development

ENTRY POINTS & STRATEGIC LINKAGES TO THE CDM AND IP CCA FRAMEWORKS		STEP 5: MAINSTREAM ADAPTATION ACTIONS VI OUTCOME 3, PLANNING & DEVELOPMENT		
OUTCOMES	**OUTPUTS**	**CLIMATE SMART OUTPUT STATEMENTS**	**PLANNING & DEVELOPMENT** **Results Statements**	**ADAPTATION ACTIVITY[51]**
Outcome 3: Planning and development enhanced through disaster mitigation and improved integration of hazard/ vulnerability data. ✓ **CDM Output 4.1 & 4.4** ✓ **IP CCA Goal 1.1, 1.2, 2.2 & 2.3 P**	**3.1** Hazard mapping/ modelling completed for all hazards.	**3.1** Hazard mapping completed for all hazards arising from climate variability and climate change.	• Proper engineering and construction procedures enhanced for risk reduction. • Impact of SLR and flooding on coastline reduced.	• Enhance local weather monitoring and modelling to. • Provide early flood warning systems. • Ensure "climate-proof" structures by improving construction standards. • Overhaul outdated building regulations, • Retrofit existing structures, and • Improve surveillance and enforcement of planning and building laws/regulations and approval conditions. • Increase minimum elevation requirement above the high water mark for reclamations. • Plan for future relocation of critical facilities at risk to sea level rise and stronger storm surges. • Where feasible, establish "no build areas" for critical facilities in highly vulnerable areas. • Educate developers about the increasing risk of building in low-lying coastal areas. • Develop best practice guidelines for developers to protect their properties from climate impacts.
	3.2 Enhanced capacity for mapping/ modelling.	**3.2** Enhanced capacity for mapping and modelling climate variability and climate change and associated impacts.	• Impact of SLR and flooding on coastline reduced.	
	3.3 Enhanced awareness of planners, engineers and developers for hazard mitigation integration into building/ development.	**3.3** Enhanced awareness of planners, engineers and developers for hazard mitigation integration, and climate change adaptation mainstreaming, into building/ development.	• Impact of SLR and flooding on coastline reduced. • Sea defences properly engineered and constructed for land protection. • Proper engineering and construction procedures enhanced for risk reduction.	
	3.5 Cost/benefit analyses for public and private sector completed/ disseminated.	**3.5** Cost/benefit analyses for public and private sector completed/ disseminate for adaptation to both climate variability and climate change.	• Amenity values and investments protected.	• Invest in "soft" measures (e.g. mangroves) to protect existing vulnerable roads, communities, and infrastructure. • Where feasible, in highly vulnerable areas, establish "no build areas" for settlements. • Increase setback and elevation requirements for coastal tourism infrastructure/facilities.
	3.7 Non-structural mitigation addressed (especially in the building sector).	**3.7** Non-structural climate variability mitigation and climate change adaptation addressed (especially in the building sector).	• Natural coastal defences in vulnerable areas enhanced.	• Invest in "soft" measures (e.g. mangroves) to protect existing vulnerable roads, communities, and infrastructure.

[51] Burnett-Pen, A. (2010).Virgin Islands Climate Change Green Paper. URL: http://www.bvidef.org/main/media/The%20Virgin%20Islands%20Climate%20Change%20Green%20Paper%28web%29.pdf

Tool 6d: Small Group Activity 4 (Step 5) - Cont'd

Example of Alternative Climate Smart Wording for Country Work Programme Outcomes and Outputs, showing Entry Points and Strategic Linkages to the CDM and CC Frameworks for Planning and Development

ENTRY POINTS & STRATEGIC LINKAGES TO THE CDM AND IP CCA FRAMEWORKS		STEP 5: MAINSTREAM ADAPTATION ACTIONS VI OUTCOME 3, PLANNING & DEVELOPMENT		
OUTCOMES	**OUTPUTS**	**CLIMATE SMART OUTPUT STATEMENTS**	**PLANNING & DEVELOPMENT Results Statements**	**ADAPTATION ACTIVITY[51]**
Outcome 4: Reduced vulnerability/ enhanced resilience, of communities to mitigate/ respond to hazards/ disasters. ✓ **CDM Output 4.3** ✓ **P IP CCA Goal 1.1, 1.2,1.3,1.4, 2.2& 2.3**	**4.1** DRR measures implemented in vulnerable communities.	**4.1** DRR and CCA measures implemented in vulnerable communities.	• Groundwater resources used in the potable water system secured and protected. • Natural resources available for community use enhanced and protected.	• Invest in the capture, basic treatment and reuse of storm water for specific purposes. • Plan for the expansion of desalination production capacity to meet projected water demand. • Explore possibility of using solar-powered desalination technology. • Reduce per capita demand for desalinated water. • Develop a sustainable freshwater, watershed and coastal waters management and pollution prevention plan. Conduct a water carrying capacity study. • Repair and expand public infrastructure for water capture, storage and delivery. • Continue and expand the leak detection programme for the water distribution system. • Work to eliminate water theft through illegal water connections. • Improve methods of household capture, storage and use of rainwater.
✓ **CDM Output 4.1, 4.2, 4.3, 4.4.** ✓ **IP CCA Goal 1.2, 1.3, 1.4, 2.2., 2.3,**	**4.2** Enhanced awareness of community members on hazard identification/ feasible mitigation 4.3.	**4.2** Enhanced awareness of community members on hazard identification/ feasible mitigation and CCA.		

Tool 6e: Small Group Activity 4:(Step 5)

Recording Sheet

Recording of identified adaptation entry points (CWP Entry Point) in the country work programme and formulation of climate smart result statements (new outcome/ output statement) from Step 4 Group Adaptation Result (GAR)

Group Adaptation Result (GAR) Statement 1:	
CWP Entry Point:	
New Outcome/ Output statement If none say none	
Rationale:	

Group Adaptation Result (GAR) Statement 2:	
CWP Entry Point:	
New Outcome/ Output statement If none say none	
Rationale:	

Group Adaptation Result (GAR) Statement 3:	
CWP Entry Point:	
New Outcome/ Output statement If none say none	
Rationale:	

Tool 6e: Small Group Activity 4:(Step 5) Cont'd

Recording Sheet

Recording of identified adaptation entry points (CWP Entry Point) in the country work programme and formulation of climate smart result statements (new outcome/ output statement) from Step 4 Group Adaptation Result (GAR)

Group Adaptation Result (GAR) Statement 4:	
CWP Entry Point:	
New Outcome/ Output statement If none say none	
Rationale:	

Group Adaptation Result (GAR) Statement 5:	
CWP Entry Point:	
New Outcome/ Output statement If none say none	
Rationale:	

Tool 7a: Small Group Activity 5 (Step 6)

Activity Instructions

Small Group Activity 5: Mainstreaming Climate Change Adaptation Actions into the National CDM Country Work Programme.

Purpose: Produce a climate smart CDM country work programme

Time:

a) High level mainstreaming: Participants have four hours to work in their sector groups on mainstreaming climate change adaptation results statements (GAR) into the Outcomes and Outputs of the country work programme, and 60 minutes for reporting back to plenary.

b) Activities level mainstreaming: Participants have four hours to work in their sector groups on mainstreaming climate change adaptation results statements (GAR) into the activities of the country work programme, and 60 minutes for reporting back to plenary.

Desired output: A climate smart country work programme.

Material needed: Flip chart paper, markers, and cue cards

Process: Participants will continue to work in their sector groups. The starting point for this activity is the set of the climate smart output and outcome statements developed to replace the DRM language of the selected country work programme entry points at the outcome and output level

1. Assign the roles of group leader, note taker, and time keeper within the group.

   a. The group leader will ensure that the group moves through the exercise as outlined in these instructions.

   b. The note taker will be responsible for capturing information and completing the Recording Sheet.

   c. The time keeper will keep an eye on the time to ensure you complete the exercise within the allotted time.

High level mainstreaming:

2. Each group will modify the DRM outcome and output language at the selected entry point in the country work programme with climate smart language (Tool 7b).

3. Each group will report its results in plenary (Tool 7c)

Activities level mainstreaming:

4. Each sector group will be assigned the responsibility of mainstreaming climate change adaptation actions into one or more areas of the CDM country work programme (Tool 7d).

5. Each sector group will review and, if necessary, expand on the range of climate change adaptation options/activities from Step 4 that are relevant to the area that they have been assigned. The objective will be to identify those climate change adaptation options/activities that are sufficient and necessary to deliver the climate change adaptation results identified in Step 5 at the output and outcome levels (Tool 6d).

6. Once this exercise has been completed the sector groups will then review the assigned areas of the CDM Work Programme with the objective of identifying:

   a) Existing CDM work programme DRM activities that can be incrementally modified to incorporate the climate change adaptation adaptation options/ activities:

   b) The appropriate sections of the CDM work programme where, climate change adaptation activities that can not be incorporated into existing DRM activities, can be introduced as, new, dedicated climate change adaptation actions.

7. Each group will reports its results in plenary.

Harmonisation

Each small working group will have produced a mainstreamed high level country work programme and one or more sections of the work (activities) programme into which climate change adaptation actions will have been mainstreamed. In order to produce one coherent climate smart work programme the contributions of the small working groups will have to be brought together, harmonised and rationalised. This process will:

- Ensure that the high level work programme elements (Outcomes and Outputs) reflect the consensus climate smart language and intent of the working groups.
- Adaptation activities are not duplicated in work programme areas.

The approach to be used to harmonise and rationalise the climate smart contributions of the small working groups will be similar to that used to develop a consensus vision statement.

For each outcome or output amended by more than one group, the amended, climate smart language will be reviewed and compared in plenary. The main climate smart elements of each amended outcome statement will be identified, highlighted, and listed. The listed elements of the statement will then be arranged to produce a consensus climate smart outcome statement.

Once this exercise is completed for each outcome statement, it will be repeated for each output statement that has been made climate smart by more than one small working group.

The areas of activity in the country work programme will be assigned to different small working groups so that as much of the work programme, if not all, can be mainstreamed during the workshop. An objective of the presentation of the mainstreamed work programme activities to plenary will be to note and flag adaptation activities that are duplicated in a number of work programme areas.

Once all of the activities-level mainstreaming presentations have been shared, it will be the job of plenary to rationalise and harmonise the proposed adaptation activities among the work programme areas.

Tool 7b (i) : Small Group Activity 5 (Step 6): Mainstreaming Climate Change Adaptation into Work Programme Outcome and Outputs.

Example of Updated Climate Smart Work Programme Outcomes and Outputs

Outcome 2: Enhanced integration of CDM and CCA into preparedness of all sectors for hazards/disasters.	Outcome 3: Planning and development enhanced through disaster mitigation, CCA& improved integration of hazard/vulnerability data and climate change projections.	Outcome 4: Reduced vulnerability/enhanced resilience of communities to mitigate/respond to hazards/ disasters caused by climate variability and climate change.
2.2 DRM/GCC Liaison Officers (Focal Points) trained and established in all sectors and government ministries, departments and agencies and the private sector.	3.1 Hazard mapping completed for all hazards arising from climate variability and climate change.	4.1 DRR and CCA measures implemented in vulnerable communities.
2.4 Increased and enhanced Private Sector continuity/ recovery planning, and CDM and CCA awareness.	3.2 Enhanced capacity for mapping and modelling climate variability and climate change and associated impacts.	4.2 Enhanced awareness of community members on hazard identification/ feasible mitigation and CCA.
	3.3 Enhanced awareness of planners, engineers and developers for hazard mitigation integration, and climate change adaptation mainstreaming, into building/ development.	
	3.5 Cost/benefit analyses for public and private sector completed/disseminate for adaptation to both climate variability and climate change.	
	3.7 Non-structural climate variability mitigation and climate change adaptation addressed (especially in the building sector).	

Tool 7b (ii): Small Group Activity 5 (Step 6): Mainstreaming Climate Change Adaptation into Work Programme Outcome and Outputs

Example of Mapping of Work Programme Outcomes and Outputs to Climate Smart Outcome 2 and associated, Climate Smart Outputs and Actions

Outcome 3: Planning and development enhanced through disaster mitigation and improved integration of hazard/vulnerabilty data.

Outcome 3: Planning and development enhanced through disaster mitigation, CCA& improved integration of hazard/vulnerability data and climate change projections.

Climate Smart Outcome

OUTPUTS

- 3.1 Hazard mapping/modeling completed for all hazards.
- 3.2 Enhanced capacity for mapping/modeling.
- 3.3 Enhanced awareness of planners, engineers and developers for hazard mitigation integration into building/develop.
- 3.4 HVAs conducted, integrated into EIAs and applied.
- 3.5 Cost/benefit analyses for public and private sector completeddisseminate.
- 3.6 Risk reduction scheme for banking/insurance sector developed.
- 3.7 Non-structural mitigation addressed (especially in the building sector).

Climate Smart Outputs

- 3.1 Hazard mapping completed for all hazards arising from climate variability and climate change.
- 3.2 Enhanced capacity for mapping and modelling climate variability and climate change and associated impacts.
- 3.3 Enhanced awareness of planners, engineers and developers for hazard mitigation integration, and climate change adaptation mainstreaming, into building/ development.
- 3.5 Cost/benefit analyses (CBA) for public and private sector completed/disseminate for adaptation to both climate variability and climate change.
- 3.7 Non-structural climate variability mitigation and climate change adaptation addressed (especially in the building sector).

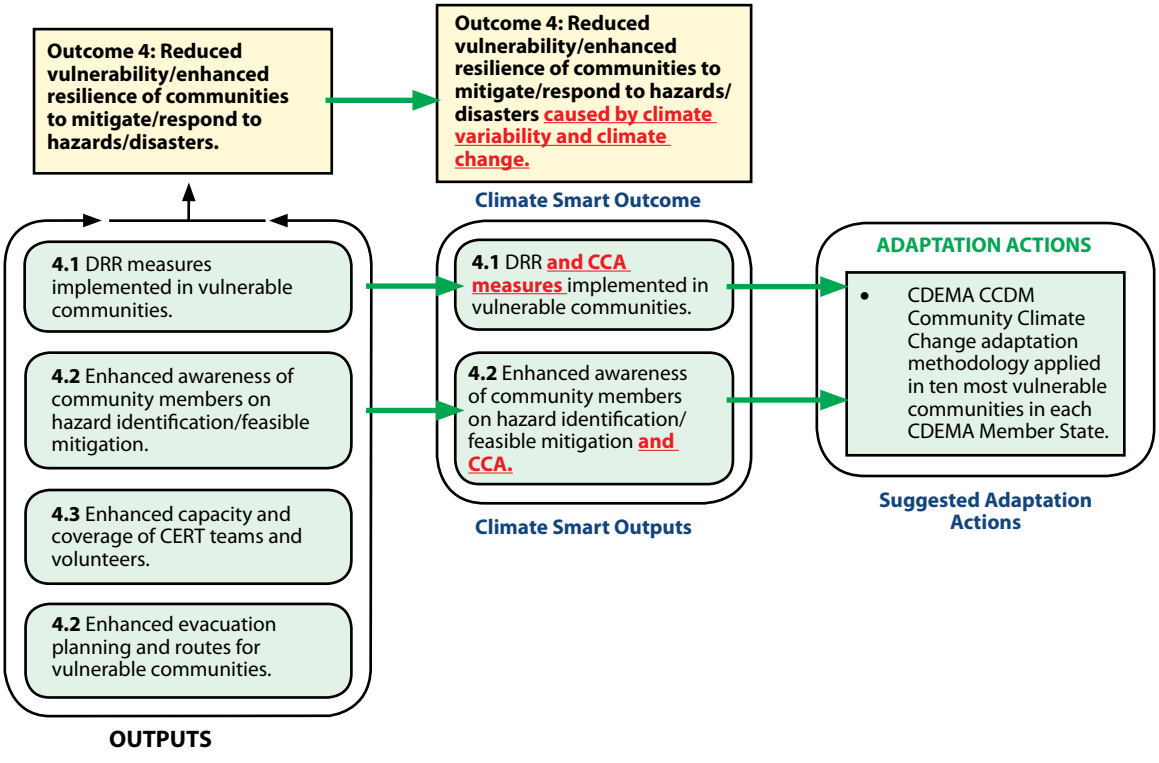
ADAPTATION ACTIONS

- Climate change projections developed for current and future (climate change induced) climate threats.
- Capacity for the development and/or interpretation of climate hazard maps and climate change models and projections collaboratively developed among the appropriate government agencies.
- Professional certification schemes in climate smart planning and construction procedures developed and implemented.
- NDOs and national GCC/ FP collaborate with CCCCC in the development of CBAs for priority high-cost adaptation options.
- NDOs and national GCC/ FP collaborate with CCCCC in the development of CBAs for priority high-cost adaptation options.

Suggested Adaptation Actions

Tool 7b (iii): Small Group Activity 5 (Step 6): Mainstreaming Climate Change Adaptation into Work Programme Outcome and Outputs

Example of Mapping of Work Programme Outcomes and Outputs to Climate Smart Outcome 3 and associated, Climate Smart Outputs and Actions



Tool 7c: Small Group Activity 5 (Step 6):

Examples of Country Work Programme Activities that can serve as Entry Points for the Mainstreaming of Climate Change Adaptation Activities

Property Protection Measures - Reduction of risk in development projects was achieved through analysis, mitigation, and incentive measures									
Risk reduction incentive scheme for insurance and Banking Sectors	Arrange meeting with Banks, Insurance, and Appraisal companies and stakeholders	I	Research existing Reduction incentive schemes for Insurance and Banking Sectors	I	Develop proposal for Risk Reduction Scheme for insurance and Banking Section/or Contract Consultant to Develop Proposal	Finalize Proposal for Incentive Scheme	Contract Consultant to implement scheme or implement scheme in coordination with Government agencies	1. In house or 2. Seek External Funding: 1. GFDRR, 2. OAS	Banks Insurance TCP, MOF, tRADE, DG, PWD, MCW, etc
		II	Contact Consultants/ Professionals with experience in this area	II	Distribute proposal to Institutions/Businesses for Review				
				III	Arrange Meetings with Affected/Interested Parties				
Cost Benefit Analysis for Disaster Mitigation Projects	No work	Research Training for Cost Benefit Analysis		I	Participate in Training for Cost Benefit Analysis	I Develop proposal for Mitigation Cost Benefit Analysis Model to be used in Public Sector Investment projects using probabilistic hazard maps and vulnerability determination of the built environment to natural hazard phenomena and annualized damage estimates and economic impacts from natural hazards	Implement cost benefit analysis model for public sector investments	1. In house or 2. Seek External Funding: 1. GFDRR, 2. OAS	Banks Insurance TCP, MOF, tRADE, DG, PWD, MCW, etc

Tool 8: Workshop Evaluation Form

Workshop on Mainstreaming Climate Change Adaptation into the Comprehensive Disaster Management (CDM) Country Work Programme

Workshop Evaluation Form

Please take a few moments to answer the questions below to help us refine the workshop.

	1= Strongly disagree	2= Disagree	3=Neither agree nor disagree	4= Agree	5= Strongly agree
Workshop Objectives					
1. I was well informed about the objectives of this workshop.					
2. This workshop lived up to my expectations.					
3. I feel the workshop met each of the following objectives:					
Build a shared framework of understanding about climate change and its impacts on your country including how climate change will affect existing development challenges and vulnerabilities and how climate change adaptation can affect current vulnerability and future risk;					
Identify existing and alternative adaptation options for your country and gaps in current capacities;					
Prioritise and sequence these options into adaptation entry points and actions that build on the current framework and actions for disaster risk reduction;					
Provide feedback for the improvement of the climate change mainstreaming guidance tool (G-Tool) and participatory scenario development process					
Workshop Content					
4. I had sufficient information in advance of the workshop to ensure my effective participation.					
5. The material covered was appropriate.					
6. Use the numbers 1 to 5 to rate how you feel about the complexity of the material covered: 1= Too complex ←→ 5= Perfect					
7. Use the numbers 1 – 5 to rate how you feel about the volume of material covered: 1= Too complex ←→ 5= Perfect					
8. The printed handouts were useful and relevant to their respective sessions.					
9. The Guidance Tool provides clear and practical guidance on incorporating climate change adaptation into the national CDM Work Programme and clarity on the roles of my organisation in implementation.					

Tool 8: Workshop Evaluation Form Cont'd

Workshop on Mainstreaming Climate Change Adaptation into the Comprehensive Disaster Management (CDM) Country Work Programme

Workshop Evaluation Form

Please take a few moments to answer the questions below to help us refine the workshop.

Workshop Process					
10. The workshop is a useful process for engaging stakeholders in a method to identify climate change adaptation pathways and actions for strengthening the national disaster management country work programme.					

11. What is least valuable about this workshop process?

_____

_____

_____

_____

12. What is most valuable about this workshop process?

_____

_____

_____

_____

13. How would you improve this workshop? (Check all that apply.)

___Provide better information before the workshop.

___Clarify the workshop objectives.

___Reduce the content covered in the workshop.

___Increase the content covered in the workshop.

___ Allot more time for the exchange of ideas and experiences.

___ Increase the number of small group activities.

___Reduce the number of small group activities.

___Improve workshop organisation.

___Slow down the pace of the workshop.

___Speed up the pace of the workshop.

___Allot more time for the workshop.

___Shorten the time for the workshop

14. Are there any other improvements to this workshop that would you recommend?

_____

_____

_____

_____

Tool 8: Workshop Evaluation Form Cont'd

Workshop on Mainstreaming Climate Change Adaptation into the Comprehensive Disaster Management (CDM) Country Work Programme

Workshop Evaluation Form

Please take a few moments to answer the questions below to help us refine the workshop.

15. Has the workshop given you new viewpoints and insights? (Check one)					
___To a great degree ___To a moderate degree ___Somewhat	___To a minimal degree ___Hardly at all				
Please rate each of the following:					
	Poor	Fair	Good	Very Good	Excellent
16. Venue and administrative arrangements					
Training room and equipment					
Refreshments					
Support and assistance provided by staff					
16. Facilitators' skills					
Maintained a dynamic and interesting atmosphere					
Presented topics clearly					
Allowed for sufficient discussion and encouraged participation					
Closed out discussions					

17. Do you have any suggestions for improving the G-Tool document?

18. Any other comments or feedback?

Thank you for taking the time to fill out this form. Please return it to a facilitator or workshop organizer.

CDEMA
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