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# **CLIMATE CHANGE ADAPTATION AND DISASTER RISK MANAGEMENT IN FISHERIES AND AQUACULTURE IN THE CARICOM REGION**

## **Volume 2 — Regional Strategy and Action Plan**



# **CRFM Technical & Advisory Document - Number 2013 / 8**

## **CLIMATE CHANGE ADAPTATION AND DISASTER RISK MANAGEMENT IN FISHERIES AND AQUACULTURE IN THE CARICOM REGION:**

### **Volume 2 – Regional Strategy and Action Plan**

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### **Volume 2 – Regional Strategy and Action Plan**

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## SUMMARY

This report is the second of four outputs in this initiative of CRFM and FAO on ‘Climate change adaptation and disaster risk management in fisheries and aquaculture in the CARICOM region’. The aim is to develop a strategy and action plan for integrating DRM, CCA and fisheries and aquaculture, with a focus on small-scale fisheries (SSF) and small-scale aquaculture.

This strategy and action plan is built upon, and integrates into, core policy documents. The regional policy context is primarily the ‘Regional Framework for Achieving Development Resilient to Climate Change’ (the Regional Framework) that articulates CARICOM’s strategy on climate change. CARICOM Heads of Government endorsed the Regional Framework at their July 2009 meeting in Guyana and issued the Liliendaal Declaration which sets out key climate change related interests and aims of CARICOM Member States. Based on the Liliendaal Declaration is the Implementation Plan (IP) for the Regional Framework. It is entitled ‘Delivering transformational change 2011 - 2021’ and incorporated several global to regional instruments concerning climate change and variability. See volume 1 for references and a comprehensive list of recommended further reading

Fisheries and aquaculture initiatives in the CARICOM region should be integrated into the IP and take into account the CARICOM and OECS approaches to climate change that integrate DRM. Inclusion of, or collaboration with, non-CARICOM Caribbean countries in the IP also needs to be considered. The CDEMA Enhanced CDM Framework for 2007-2012 is another core document that emphasises in Outcome 4 the need to focus on community level adaptation and management. The fourteenth session of the Western Central Atlantic Fishery Commission (WECAFC), held in Panama in February 2012, agreed to address CCA and DRM in fisheries and aquaculture in future sessions and, in its 2012 - 2013 Work Plan, included the preparation of a strategy, action plan and programme proposal on these, to be supported by FAO. Several policy instruments need to be taken into account specifically for ecosystem approaches to fisheries and aquaculture. These include the Code of Conduct for Responsible Fisheries (FAO 1995) and the Caribbean Community Common Fisheries Policy (CCCFP) and the OECS St George’s Declaration of Principles for Environmental Sustainability (SGD). These documents contribute to a vision such as: *regional society and economy that is resilient to a changing climate and enhanced through comprehensive disaster management and sustainable use of aquatic resources.*

The CCCCC Regional Framework contains five strategy elements and twenty goals or similar statements. Some are more relevant to fisheries and aquaculture, using an ecosystem approach, than others. Several aspects are developed in the IP, mainly under the heading of coastal and marine matters. This strategy and action plan incorporates fisheries and aquaculture more prominently into the IP as requested by the CRFM in order to strengthen the existing linkages to mutual advantage.

The strategy and action plan draws on the above-mentioned documents, elaborates on the concept of transformation and develops content to which the proposed programme for the region can be linked (see Volume 3). This volume sets out strategic actions “to strengthen regional and national cooperation and develop capacity in addressing climate change impacts and disasters in the fisheries and aquaculture sector”. It draws upon key regional policy instruments on fisheries, aquaculture, climate change and disasters. Ultimately it will be important for there to be linkages between the enhanced IP and critical fisheries and aquaculture policy at the regional and national levels. A protocol to the CCCFP that sets out these relationships could be a logical next step in this process.

## ABBREVIATIONS AND ACRONYMS

ACP	African, Caribbean and Pacific Group of States
ASSC / TMAC	Agriculture Sub-Sector Committee / Technical Management Advisory Committee
CANARI	Caribbean Natural Resources Institute
CARICOM	Caribbean Community
CBO	Community-Based Organization
CCA	Climate Change Adaptation
CCCFP	Caribbean Community Common Fisheries Policy
CCCCC	Caribbean Community Climate Change Centre
CCRF	Code of Conduct for Responsible Fisheries
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CDEMA	Caribbean Disaster and Emergency Management Agency
CDERA	Caribbean Disaster and Emergency Response Agency
CDM	Comprehensive Disaster Management
CEHI	Caribbean Environmental Health Institute
CERMES	Centre for Resource Management and Environmental Studies
CLME	Caribbean Large Marine Ecosystem (Project)
CRFM	Caribbean Regional Fisheries Mechanism
DRM	Disaster Risk Management
EAA	Ecosystem Approach to Aquaculture
EAF	Ecosystem approach to fisheries
EBM	Ecosystem based management
FAO	Food and Agriculture Organization of the UN
FMM	FAO Multi-donor Mechanism
GEF	Global Environment Facility
IP	Implementation Plan
IPCC	Intergovernmental Panel on Climate Change
ISDR	International Strategy for Disaster Reduction
NGO	Non-governmental Organization
OECS	Organization of Eastern Caribbean States
SES	Social-ecological system
SGD	St. George's Declaration
TNC	The Nature Conservancy
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
UWI	University of the West Indies
WECAFC	Western Central Atlantic Fishery Commission

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## 1 INTRODUCTION

This strategy and action plan is intended to assist interested parties “to strengthen regional and national cooperation and develop capacity in addressing climate change impacts and disasters in the fisheries and aquaculture sector”. The regional policy context is primarily the ‘Regional Framework for Achieving Development Resilient to Climate Change’ (the Regional Framework) which articulates CARICOM’s strategy on climate change<sup>1</sup>. CARICOM Heads of Government endorsed the Regional Framework at their July 2009 meeting in Guyana and issued the Liliendaal Declaration which sets out key climate change related interests and aims of CARICOM Member States. Based on the Liliendaal Declaration (Annex 1) is the Implementation Plan (IP) for the Regional Framework. It is entitled ‘Delivering transformational change 2011 - 2021’ and incorporated several global to regional instruments concerning climate change and variability<sup>2</sup>. Fisheries and aquaculture initiatives in the CARICOM region should be integrated into the IP and take into account the CARICOM (including OECS) response to climate change in other sectors. The fourteenth session of the Western Central Atlantic Fishery Commission (WECAFC), held in Panama in February 2012, agreed to address CCA and DRM in fisheries and aquaculture in future sessions, and in its 2012 - 2013 Work Plan, included the preparation of a strategy, action plan and programme proposal on these, to be supported by FAO.

Several policy instruments also need to be taken into account specifically for ecosystem approaches to fisheries and aquaculture. These include the Code of Conduct for Responsible Fisheries (CCRF<sup>3</sup>) and the still evolving Caribbean Community Common Fisheries Policy (CCCFP<sup>4</sup>). Both of these are connected to a web of international, regional and sub-regional instruments that all provide a strong policy foundation upon which to build the current strategy and action plan. This document bridges the space between what is (the assessment study) and what will be (programme proposal) by strategically framing desired action. We turn directly to this task, drawing on the above-mentioned documents, and elaborating on the concept of transformation, before addressing the action plan to which the proposed programme for the region is linked (see Volume 3).

## 2 DELIVERING TRANSFORMATIONAL CHANGE

The IP bears the powerful title “Delivering transformational change”. This can be further enhanced by packaging the notion in a conceptual framework often used for resilience (see Volume 1). In this section we briefly introduce one practical perspective on the concept of transformation and show how it can be applied to the challenges of CCA and DRM that we need to tackle, especially in terms of governance changes.

Authors have described how transformation involves coordinating information and activities, building knowledge and understanding of social-ecological system (SES) dynamics, providing leadership in the form of visions and goals, and using social networks along with seizing a window of opportunity

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<sup>1</sup>CCCC. 2009. Climate Change and the Caribbean: A Regional Framework for Achieving Development Resilient to Climate Change (2009 - 2015). Caribbean Community Climate Change Centre, Belmopan, Belize

<sup>2</sup>CCCC. 2012. Delivering transformational change 2011 - 2021: Implementing the CARICOM `Regional Framework for Achieving Development Resilient to Climate Change. Caribbean Community Climate Change Centre, Belmopan, Belize

<sup>3</sup><http://www.fao.org/docrep/005/v9878e/v9878e00.HTM>

<sup>4</sup><http://www.caricom-fisheries.com/PublicationsandDocuments>

to transform<sup>5</sup>. We show in Figure 2.1 how the elements of the regional plan fit alongside the process that they describe.

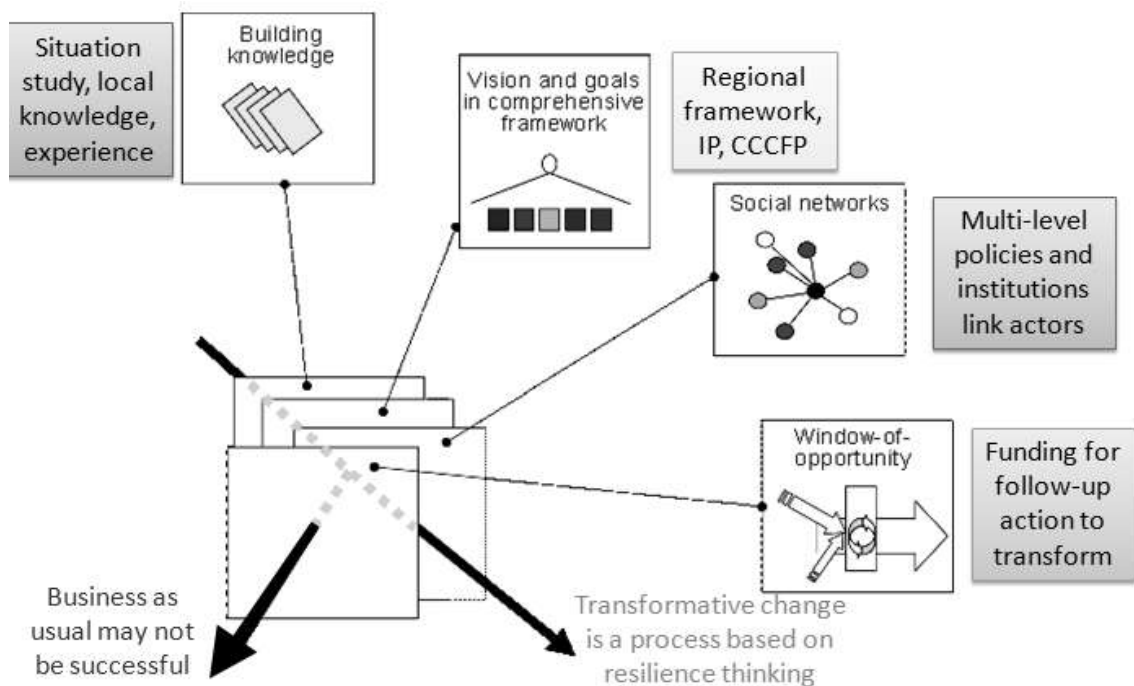


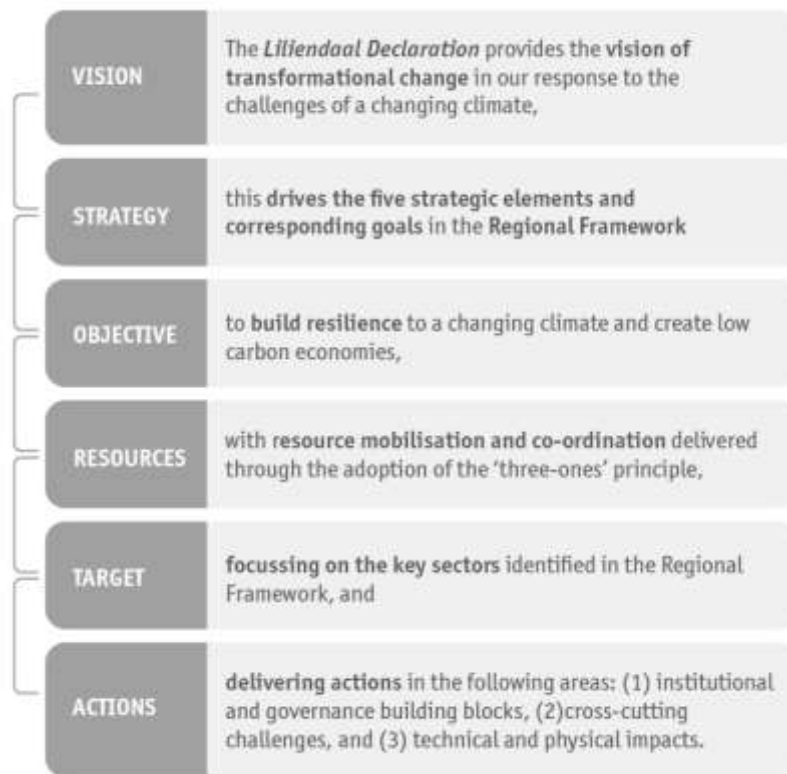
Figure 2.1 The linked parts and process of transformative change  
(Adapted from Olsson et al 2004)

Consistent with the concepts of resilience we appreciate that there will be uncertainty. Transformative change sets out to alter the fundamental state of a social-ecological system, but exactly what changes take place depends on a number of factors, not all of which are under the control of the change agent. Navigating the course calls for guidance through constantly monitoring and evaluating progress. The following paragraphs show how we can match a strategy for the CRFM countries with this process.

The current initiative builds on our knowledge of CCA and DRM in relation to fisheries and aquaculture. We have not yet tapped the wealth of local knowledge and experience in these areas. Even as we continue to build knowledge, the Regional Framework and IP hierarchically set out components of the change required from vision to action (Figure 2.2) via a network of sectors, each with actors, policies and institutions. These notions fit well with ecosystem approaches.

<sup>5</sup>Olsson, P., C. Folke and F. Berkes. 2004. Adaptive co-management for building resilience in social-ecological systems. *Environmental Management* 34: 75 - 90.





**Figure 2.2 Implementation Plan for the Regional Framework sets out a hierarchical structure**  
(Source: CCCCC 2012)

The window of opportunity typically concerns the development of adaptive capacity to a level at which change becomes much more feasible. Many factors feed into capacity-building such as human, physical and financial resources along with skills and an outlook or culture that is progressive. The proposed programme contributes to capacity development, as do several other ongoing initiatives, in order to reduce vulnerability. We need to see the vision through the window of opportunity.

### 3 VISION

Several texts provide ingredients for an appropriate vision, and the list continues to expand rapidly. Recent additions include ideas on low carbon economies<sup>6</sup>, green and blue economy initiatives<sup>7</sup>, blue carbon trading<sup>8</sup> and many more. UNFCCC, ISDR, CCRF and several other global level instruments are referred to in current regional policy guidance, whether the statements are called visions, goals, aims, overarching purposes or other similar high-level terms. CDERA (2007) reminds us that even at the sub-regional level there is policy guidance for DRM and CCA<sup>9</sup>. The OECS St George's Declaration of Principles for Environmental Sustainability (SGD<sup>10</sup>) covers these in two principles:

<sup>6</sup>Government of Guyana. 2010. Transforming Guyana's economy while combating climate change. Office of the President, Republic of Guyana

<sup>7</sup>UNEP, FAO, IMO, UNDP, IUCN, World Fish Center, GRIDArendal. 2012. Green Economy in a Blue World.

<sup>8</sup>Linacre, N., A. Kossoy and P. Ambrosi. 2011. State and trends of the carbon market 2011. World Bank, Washington, DC.

<sup>9</sup>CDERA. 2007. CDM Strategy and Programme Framework 2007 - 2012. Caribbean Disaster Emergency Response Agency, Barbados

<sup>10</sup>OECS Secretariat. 2006. St. George's Declaration of Principles for Environmental Sustainability in the OECS (Revised 2006). OECS Secretariat, Castries

- Principle #8: “Preparation for Climate Change” whereby “Governments will enact laws, create organizations and institutions and provide money to assist people and communities to adapt to the impact of climate change”
- Principle # 9: “Integrated Disaster Management” whereby “Governments will integrate disaster management initiatives with environmental priorities to help the peoples of the region in their preparation for and management of the impacts of natural and man-made disasters”

We can work with what already exists, noting areas of complementarity, rather than create an entirely new vision just for CCA and DRM in fisheries and aquaculture. The vision that drives the Regional Framework is the achievement of a “regional society and economy that is resilient to a changing climate” as amplified by the Liliendaal Declaration. CDEMA is working towards the overall goal of “regional sustainable development enhanced through comprehensive disaster management”. CRFM is guided in part by the CCCFP vision of “effective cooperation and collaboration among Participating Parties in the conservation, management and sustainable utilisation of the fisheries resources and related ecosystems in the Caribbean region in order to secure the maximum benefits from those resources for the Caribbean peoples and for the Caribbean region as a whole”. These compatible statements can form a linked vision such as: *regional society and economy that is resilient to a changing climate and enhanced through comprehensive disaster management and sustainable use of aquatic resources*. This is incorporated into the draft strategy and action plan in Annex 2.

#### **4 POLICY CONTEXT AND PRIORITIES**

The CCCCC Regional Framework contains five strategy elements and twenty goals or similar statements. Some are more relevant to fisheries and aquaculture, using an ecosystem approach, than others. Several aspects are developed in the IP, mainly under the heading of coastal and marine matters. The CDEMA Enhanced CDM Framework for 2007-2012 (a new strategy is being prepared) is general but also contains relevant components (Table 4.1). In the CCCFP, the content is entirely related to fisheries and aquaculture, but mention of CCA and DRM is limited (Table 4.2). The Regional Framework and Enhanced CDM Framework are fairly similar in structure. Both also set out various principles to guide implementation that relate mainly to promoting good governance. However, the structure of the CCCFP is completely different. It is a regional agreement comprising articles with statements of intent, but a work programme has not yet been developed for it. Although the three documents are not directly comparable they can be analysed for areas of commonality. The highest priority for attention is where shared coverage is greatest, but this does not exclude critical areas arising for other reasons. None of the documents constrain what may be set out as an action plan for fisheries and aquaculture. Therefore action plan and programme proposal is not restricted to merely an elaboration of these frameworks and agreement. Entirely new ground can be covered if necessary.

**Table 4.1 Enhanced CDM Framework 2007 - 2012**  
(Source CDERA 2007)

<b>GOAL</b>			
Regional Sustainable Development enhanced through Comprehensive Disaster Management			
<b>PURPOSE</b>			
‘To strengthen regional, national and community level capacity for mitigation, management, and coordinated response to natural and technological hazards, and the effects of climate change.			
<b>OUTCOME 1</b>	<b>OUTCOME 2</b>	<b>OUTCOME 3</b>	<b>OUTCOME 4</b>
Enhanced institutional support for CDM Program implementation at national and regional levels	An effective mechanism and program for management of comprehensive disaster management knowledge has been established	Disaster Risk Management has been mainstreamed at national levels and incorporated into key sectors of national economies (including health, tourism, agri culture and nutrition)	Enhanced community resilience in CDERA states/ territories to mitigate and respond to the adverse effects of climate change and disasters
<b>OUTPUTS</b>	<b>OUTPUTS</b>	<b>OUTPUTS</b>	<b>OUTPUTS</b>
1.1 National Disaster Organizations are strengthened for supporting CDM implementation and a CDM program is developed for implementation at the national level 1.2 CDERA CU is strengthened and restructured for effectively supporting the adoption of CDM in member countries 1.3 Governments of participating states/ territories support CDM and have integrated CDM into national policies and strategies 1.4 Donor programming integrates CDM in to related environmental, climate change and disaster management programming in the region. 1.5 Improved coordination at national and regional levels for disaster management 1.6 System for CDM monitoring, evaluation	2.1 Establishment of a Regional Disaster Risk Reduction Network to include a Disaster Risk Reduction Centre and other centres of excellence for knowledge acquisition sharing and management in the region 2.2 Infrastructure for fact- based policy and decision making is established /strengthened 2.3 Improved understanding and /community-based knowledge sharing on priority hazards 2.4 Existing educational and training materials for Comprehensive Disaster Management are standardized in the region. 2.5 A Strategy and curriculum for building a culture of safety is established in the region	3.1 CDM is recognized as the roadmap for building resilience and decision- makers in the public and private sectors understand and take action on Disaster Risk Management 3.2 Disaster Risk Management capacity enhanced for lead sector agencies, national and regional insurance entities, and financial institutions 3.3 Hazard information and Disaster Risk Management is integrated into sectoral policies, laws, development planning and operations, and decision- making in tourism, health, agriculture and nutrition, planning and infrastructure 3.4 Prevention, Mitigation, Preparedness, Response, Recovery and Rehabilitation Procedures developed and Implemented in	4.1 Preparedness, response and mitigation capacity (technical and managerial) is enhanced among public, private and civil sector entities for local level management and response 4.2 Improved coordination and collaboration between community disaster organizations and other research/data partners including climate change entities for undertaking comprehensive disaster management 4.3 Communities more aware and knowledgeable on disaster management and related procedures including safer building techniques 4.4 Standardized holistic and gender-sensitive community methodologies for natural and anthropogenic hazard

and reporting being built		tourism, health, agriculture and nutrition, planning and infrastructure	identification and mapping, vulnerability and risk assessments, and recovery and rehabilitation procedures developed and applied in selected communities. 4.5 Early Warning Systems for disaster risk reduction enhanced at the community and national levels
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**Table 4.2 Content of the Caribbean Community Common Fisheries Policy highlighting CCA and DRM aspects (Extracted from CARICOM 2010)**

<b>Section of CCCFP</b>	<b>Summary of content</b>
Preamble	Refers to the instruments and country commitments that give context
Definitions	Sets out meanings of aquaculture, EAF, fisheries resources and others
Establishment of the CCCFP	The Agreement establishes the Caribbean Community Common Fisheries Policy
Participation	Who can be party to the agreement, extending beyond CARICOM
Vision, Goal and Objectives	Vision (see text above) and goal statements, plus nine objectives including: “integrate environmental, coastal and marine management considerations into fisheries policy so as to safeguard fisheries and associated ecosystems from anthropogenic threats and to mitigate the impacts of climate change and natural disasters”
Fundamental Principles	Six principles including: “application of internationally-recognised standards and approaches, in particular the precautionary approach to fisheries management and the ecosystem approach to fisheries management”
Scope	“The Agreement shall apply to: the development and management of fisheries and aquaculture; the conservation, sustainable development and management of fisheries resources and related ecosystems; the production, processing, marketing and trading of fishery and aquaculture products; and to the welfare of fishers”.
General Undertakings on Implementation	Participating Parties are reminded of their obligations to implement the agreement, including establishing a Competent Agency
Role of the Competent Agency	Comprehensive but general list applicable to most regional fisheries bodies and with no specific mention of CCA and DRM
Access to Fisheries Resources	Minimal provisions for access agreements with encouragement for parties to collaborate, but with the possibility of developing protocols
Fisheries Sector Development	“to promote and adopt measures to enhance the development of the fisheries and aquaculture sectors and to improve the welfare and socio-economic conditions of fishers and fishing communities”
Statistics and Research	Cooperation to “collect and compile fisheries catch and fishing effort, registration and licensing data as well as biological, ecological, economic, social, aquaculture and any other relevant data” and research
Conservation and Management of Fisheries Resources	Persuasion to “formulate, adopt, implement and revise conservation and management measures and, where appropriate, fisheries management and development plans on the basis of the best available

Section of CCCFP	Summary of content
	information, including traditional knowledge“
Registration and Licensing	To “take into account the status of available fisheries resources and existing fishing capacity when registering and licensing fishing vessels, fishers and other operators in the fisheries and aquaculture sector”
Inspection, Enforcement and Sanctions	Mainly concerns monitoring, control and surveillance (MCS) and illegal, unreported and unregulated (IUU) fishing
Confidentiality and Intellectual Property Rights	Addresses intellectual property rights in data, documents and products developed by the various parties
Dissemination of Information	Speaks mainly to efforts to “disseminate relevant information to stakeholders to enable them to be familiar with regional and international developments in fisheries and thereby facilitate informed decision-making and widespread acceptance of and participation in this Agreement”
Public Awareness	Includes establishing “research and education programmes to raise awareness of the impact of global warming, climate change, sea level rise and other environmental changes on the fisheries sector”
Marketing and Trade of Fisheries Resources	Largely about “national or common policies, measures and standards”
Links with International Organisations	To “facilitate the development of strategic alliances and partnerships with relevant agencies created by multilateral environmental agreements as well as regional fisheries management organisations and arrangements and other relevant national, regional and international agencies and organisations, whether governmental or non-governmental”
Protocols	Parties “undertake to prepare Protocols relating to” many aspects of fisheries and aquaculture”, but CCA and DRM are not mentioned
Reporting, Review and Development	Concerns very general provisions for monitoring and evaluation with a review five years after the Agreement comes into force
Amendments, Dispute Settlement, Depositary, Signature, Accession, Entry into Force, Withdrawal	Final sections that are primarily legal requirements of the agreement

In keeping with the CRFM preference for the matters of CCA and DRM in fisheries and aquaculture to be closely linked to the Regional Framework and IP we examine the strategic elements and goals of the former to determine the fit of these matters and to comment on areas for the action plan (and hence programme proposal) to address from now to 2021. Areas of highest priority or benefit will be focused upon in the action plan. Table 4.3 communicates, in summary fashion, the level of priority suggested, also taking into account the CDM and CCCFP contents. For ease of reference the assigned priorities are also format coded: normal text for low, *italic* for medium and **bold** for high priority.

**Table 4.3 Fit of fisheries and aquaculture into the Regional Framework taking into account CDM and CCCFP  
(Based on CCCCC 2012)**

<b>Strategy elements</b>	<b>Goals</b>	<b>Priority for fisheries, aquaculture</b>
1. Mainstream climate change adaptation strategies into the sustainable development agendas of the CARICOM Member States. The CCCCC will adopt a learning-by-doing approach to capacity building and build on the progress achieved in past projects (CPACC, ACCC, MACC and SPACC) by furthering institutional capacity, strengthening the knowledge base, and deepening awareness and participation	1. Assess the vulnerability and risks associated with a changing climate	<b>High</b> priority for watersheds, coasts, nearshore and open sea ecosystems
	2. Reduce vulnerability to a changing climate	<b>High</b> priority, especially from a livelihoods perspective that integrates many features and should be of concern to all
	3. Effectively access and utilise resources to reduce vulnerability to a changing climate	<b>High</b> priority, as resource mobilisation is key, including making better use of existing resources through networking
	4. Build a society that is more informed about and resilient to a changing climate	<b>High</b> priority since awareness and information runs through all of the instruments prominently
	5. Build the Caribbean Community Climate Change Centre's capacity to support the implementation of the strategy	Low priority given the several other initiatives contributing to this goal
	6. Reduce the region's carbon footprint through the promotion of energy efficiency measures	<i>Medium</i> priority since small-scale fisheries and all but highly intensive aquaculture are fairly efficient
2. Promote the implementation of specific adaptation measures to address key vulnerabilities in the region. This element of the strategy seeks to strengthen the climate resilience of the most vulnerable sectors by supporting the dissemination of successful adaptation measures, some of which are already being implemented in the region. Specifically, the strategy seeks to address the impacts of climate change on: (a) water supply; (b) coastal and marine ecosystems; (c) tourism; (d) coastal infrastructure; and (e) health, which combined represent the largest threats to the well-being of the CARICOM countries.	1. Promote the adoption of measures and disseminate information that would make water supply systems resilient to climate-induced damage	<i>Medium</i> priority for aquaculture at small to medium scales since many other factors also come into play
	2. Promote the implementation of measures to reduce climate impacts on coastal and marine infrastructure	<b>High</b> priority for coastal settlements ancillary services (e.g. boatyards), postharvest facilities and access to the coast and nearshore generally
	3. Promote the adoption of measures and dissemination of information that would adapt tourism activities to climate impacts	<i>Medium</i> priority since although there are many actual or potential interactions between aquaculture, tourism and fisheries the links tend to be indirect unless physical
	4. Promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate-induced damage	<b>High</b> priority as encompasses both habitat degradation and biodiversity conservation, but also applies to most freshwater aquaculture systems except closed systems
	5. Promote the adoption of sound practices and measures to prevent and/or reduce climate-induced health impacts in the community	<i>Medium</i> priority since, despite the importance of health to all, the links to fisheries and aquaculture tend to be indirect except for some toxins such as ciguatera. Agrochemical bio-accumulation may be a hazard
3. Promote actions to reduce greenhouse gas emissions	1. Promote the use of renewable energy resources	<i>Medium</i> priority as for carbon footprint; energy sector innovations

Strategy elements	Goals	Priority for fisheries, aquaculture
through fossil fuel reduction and conservation, and switching to renewable and cleaner energy sources		are likely to be applied or adapted
	2. Support the assessment of wind potential to supply electric power in CARICOM countries	<i>Medium</i> priority for aquaculture on shore, but low for fisheries except if offshore wind farms are introduced
	3. Support the development of innovative financing mechanisms for the deployment of solar water heaters (SWHs)	Low priority for water heaters, but <i>medium</i> for solar technology which can be applied to both fisheries and aquaculture for economics, safety
	4. Assess the feasibility of converting waste to energy in CARICOM countries	Low priority for energy production but fish waste by-products fit into green/blue economy initiatives
	5. Assess the economic viability of environmental impact of shore-based Ocean Thermal Energy Conversion (OTEC) Plants	Low priority at this time, but OTEC has previously been proposed in association with aquaculture and fisheries enhancement if successful
4. Promote actions to reduce the vulnerability of natural and human systems in CARICOM countries to the impacts of a changing climate	<i>All strategic actions (not goals)</i> -Revise building codes, to include restricting construction in areas susceptible to coastal flooding, landslides, or tidal surges;	<b>High</b> priority given that most labour for fishing and coastal aquaculture is located in coastal settlements as well as the physical infrastructure
	- Develop new standards for road construction to ensure adequate surface drainage;	Low priority since roads that serve fisheries and aquaculture are often part of public service infrastructure
	- Implement integrated land-use planning;	<b>High</b> priority for aquaculture and fisheries to better integrate rights of access and improve management
	- Enact national standards for sanitation, both to reduce the required volume of water, as well as to ensure safe systems for the treatment of wastewater and other forms of waste so as to reduce public health risks;	<i>Medium</i> to <b>high</b> (marketing and trade related) priority specifically for fisheries and aquaculture given that high socio-economic importance of sanitation generally will spill over to benefit these sectors/stakeholders
	- Develop and test crop varieties that are more tolerant to adverse weather conditions such as droughts, high winds, and floods;	Low priority except in areas where pond and flooded field aquaculture can be practiced, but may be of higher importance where resistant varieties are being engineered
	- Implement public education and awareness programs;	<b>High</b> priority since awareness and information runs through all goals
	- Develop new legal tools that make for a more responsive insurance industry	<b>High</b> priority for both fisheries and aquaculture where insurance is scarce and capital costs increasing
5. Promote actions to derive social, economic, and environmental benefits from the prudent management of standing forests in	1. Promote the adoption of best practices for sustainable forest management	<i>Medium</i> priority from an ecosystem approach that considers watershed impacts on habitat degradation
	2. Engage in negotiations with international partners to	Low priority except in areas used for aquaculture and concerning the

Strategy elements	Goals	Priority for fisheries, aquaculture
CARICOM countries.	mobilise resources for the protection of standing forests	coastal impacts from watersheds
	3. Undertake research aimed at improving current methodologies for estimating carbon sequestration rates in tropical forests	Low priority as very indirect link to fisheries and aquaculture matters

Our analysis highlights several areas of high priority that focus mainly on knowledge mobilisation, physical infrastructure, technology, integrated planning and legal-institutional arrangements. The items of medium and low priority are mainly those addressed in other sectors or in society generally that fisheries and aquaculture can reasonably expect to benefit from without any special effort. There are also a few cases where priority is low given limited geographic, technological or other relevance.

## 5 APPROACH AND LINKS TO STRATEGY ELEMENTS

It is feasible and desirable to apply the Regional Framework to fisheries and aquaculture. Based on the Framework’s strategic elements and high priority goals we can now examine the IP, Enhanced CDM Framework and CCCFP again, along with other (primarily regional level) documents, to identify goal-oriented outcomes and strategic actions. These actions, or a selection of them to be determined by CRFM countries, will form the basis of the programme proposal for the period 2013 - 2021 that is set out in the third volume. While the strategic actions at this point will be fairly general to serve the regional interest, some will be taken to national and local levels across sets of countries in the programme proposal, achieving the vertical and lateral integration that all of the key documents aim for while creating opportunities for learning networks, replication and scaling up. The starting point for this step is the existing IP which has political endorsement. Readers are encouraged to carefully review the IP<sup>11</sup>. The database of initiatives in the region suggests that a lot is going on, but while disaster management, biodiversity, health, water resources, agriculture and education are prominent, forestry and fisheries are less so and aquaculture is not specifically identified.

Although CCA and DRM are converging, as noted in the assessment report, the fact remains that not all disasters are climate-related. The strategy and action focus most on the zone of convergence while not ignoring geological hazards. Technological hazards, such as due to radioactivity, chemical spills and other man-made sources are not fully addressed. These will need to be included at a later stage.

The ‘three ones’ principle or approach in the IP is said to have been successful at providing “a model for mobilising limited resources, policy-setting and decision-making, and monitoring”. It is described in Chapter 2 of the IP thus:

1. **One co-ordinating mechanism to manage the process** (Note in the Implementation Plan we recommend that there is a regional co-ordinating mechanism and separate national co-ordinating mechanisms in each country).
2. **One plan that provides the framework for co-ordinated action by all partners.** (Note ‘One Plan’ means one agreed set of shared and common goals and objectives which can be contained within various individual documents).

<sup>11</sup><http://www.caribbeanclimate.bz/projects/planning-for-climate-compatible-development-in-the-caribbean.html>



3. **One monitoring and evaluation framework to measure progress, transparency and value for money.** (Each country to define its own targets, defined by risk assessments and national priorities, and M&E measures).

The second principle strongly encourages interested parties to build upon the existing content of the IP, customising it to their specific needs which are expected to be dynamic, but contributing to the one plan integrity and coherence at the same time. In elaborating strategic actions for fisheries and aquaculture in the context of CCA and DRM and consistent with the IP we should therefore try to:

- Take the current content of the IP (mainly its Annex 1) as a starting point
- Strengthen the current content concerning fisheries and aquaculture
- Add new fisheries and aquaculture content where critical areas are lacking
- Ensure that both CCA and DRM are adequately addressed in all content
- Look for links with other sectors consistent with an ecosystem approach
- Provide preliminary indication as to what level(s) action should take place at
- Set out strategic actions to be easily used to construct a programme proposal

The strategy and action plan follows the guidance above. Most of it is extracted from the IP, then edited and reformatted to suit the task at hand. The IP table contains columns on country or location, lead agency / collaborators, timeframe, estimated cost and link to existing actions. We omit these columns which have many blank cells in the original table. For aquaculture and fisheries these fields are best filled in after there is agreement on the strategic actions and perhaps best located in the programme proposal which can subsequently be linked back to the IP.

The strategy and action plan is organised around the strategic elements, as is the IP. We present what is already in the IP and suggest improvements and / or additions. Some elements have much more aquatic content than others. This unevenness amongst elements is not problematic once the issues are addressed. The sub-sections of the elements set out the strategic actions relevant to fisheries and aquaculture from CCA and DRM perspectives that are already in the IP and some proposed additional strategic actions.

In the sections below we provide a brief analysis of the existing and proposed additional strategic actions, linked to various guiding documents. Readers are reminded of the rating of relevance assigned in the previous section. Our main focus is on goals rated to be of high or medium priority. This does not preclude attention to low priority goals if CRFM countries so decide.

### **5.1 Strategic element 1: Mainstream climate change adaptation strategies into sustainable development / agendas of CARICOM Member States**

This element contains the most coastal zone and marine content. Actions cover both CCA and DRM. The actions under this element are very comprehensive save for the limited attention to aquaculture. In many cases the objectives and outcomes can be made more specific to fisheries and aquaculture and relate more to the several global and regional instruments that guide these areas. This, however, is a matter of fine tuning that can be done at the programme or project level within the existing frame. It would be more prudent to leave the existing wording and make the necessary finer scale interpretation as required upon implementation than to re-draft most of these actions prior to the scheduled review of the entire IP based on what has or has not worked to been taken up for implementation. For these reasons, only a few additional strategic actions are proposed to fill the most obvious gaps.

Focusing on fisheries and aquaculture, some additional strategic actions are proposed. These additional actions fill in some of the gaps revealed by the situation assessment (Volume 1) and flagged in particular by Outcome 3 of the Enhanced CDM Framework. Although mainstreaming CCA and DRM into fisheries and aquaculture is made easier by ecosystem approaches, most of the CRFM countries are still a long way from comprehensively introducing EAF or EAA as customary practice.

The focus of the additional actions is to forge new connections that offer benefits to most fisheries and aquaculture stakeholders through attention to CCA and DRM. They also serve as entry points for addressing recognized deficiencies in the IP such as inadequate attention to gender mainstreaming. A key feature of successful mainstreaming is to ensure that the benefits outweigh the costs of attending to the additional variables and uncertainties that arise by widening the scope of the core topic area or sector. In fisheries, even more than aquaculture, mainstreaming CCA and DRM internalizes many of the uncertainties known to be problematic and allows them to be addressed in a more systematic way.

## **5.2 Strategic element 2: Promote the implementation of specific adaptation measures to address key vulnerabilities in the region**

This element also contains much coastal zone and marine content. Actions cover CCA and DRM, and there are several cross-sectoral linkages such as with water resources management, tourism and health that can be packaged in the EAF.

Specific adaptation measures for fisheries and aquaculture can quickly generate an unnecessarily long and detailed list of strategic actions unless sets of ideas are grouped together. The actions under this element perform credibly in terms of packaging the key ideas. Aquaculture has to be read into the broad actions under water resources management for example, but this may be advantageous in places where there would be little attention to aquaculture on its own, but much attention to water resources.

Focusing on fisheries and aquaculture, some additional strategic actions are proposed. This strategic element addresses key vulnerabilities. Determining what is ‘key’ at any time depends on many dynamic factors and is ultimately, in a region such as CARICOM, a matter for negotiation. In these additional actions we highlight current pressing issues such as poverty, information exchange and the development of capacity through multilevel networking. We also pay more attention to social institutions for learning in keeping with the emphasis on resilience.

## **5.3 Strategic element 3: Promote actions to reduce greenhouse gas emissions through fossil fuel reduction and conservation, and switching to renewable and cleaner energy sources**

This element is of medium to low priority primarily because advances in the areas of concern are likely to be made first in other sectors of industry before being applied, if at all, to fisheries and aquaculture.

Aquaculture is likely to be a beneficiary of advancement in this subject area along with the shore-based postharvest operations in fisheries. Applications to fishing vessels and harvest operations are likely to be fewer although fuel consumption and cost is a major issue. These areas fit well within the green economy thrust in the region and are likely to receive attention as resources are mobilised for this. Aspects of appropriate marine technology need to be highlighted in order for them to benefit.

Focusing on fisheries and aquaculture, some additional strategic actions are proposed. For a topic such as energy it would be unreasonable to expect fisheries and aquaculture to feature prominently given their presumed insignificance as energy consumers or GHG emitters in comparison to several other economic sectors in the CARICOM region. However, especially in the context of green economy initiatives, it is important to establish that fisheries and aquaculture are relevant as end users of new technology even if not the prime motivation for its development. These additional actions attempt to bring in some of the main areas in which fisheries and aquaculture can benefit.

#### **5.4 Strategic element 4: Promote actions to reduce the vulnerability of natural and human systems in CARICOM Member States to the impacts of a changing climate**

This element overlaps considerably with element 2. However, one may argue that it more explicitly recognizes SES and is compatible with livelihood perspectives in order to focus more on the local individual, household and community levels.

Due to the overlap with element 2 this element is relatively poorly populated. However, much of what applies to agriculture also applies to fisheries and aquaculture. This is aided by the three areas often being housed within the same ministry of government. Advantage can be taken to focus on the local level as stated in the introduction and to insert goals and objectives derived from several fisheries and aquaculture instruments.

Focusing on fisheries and aquaculture, some additional strategic actions are proposed. The additional actions for this element emphasize building capacity to reduce vulnerability in the aquatic social-ecological systems. Here, vulnerability also applies to SSF communities, the poor and otherwise disadvantaged in terms of food security. Areas and actors that are key to food security must be protected. The potential for overlap with actions under other elements is extremely high. We concentrate on establishing networks in the proposed actions.

#### **5.5 Strategic element 5: Promote actions to derive social, economic and environmental benefits from the prudent management of standing forests in CARICOM countries**

This element is least relevant to fisheries and aquaculture except for fairly specific circumstances. Areas of mangrove forest are relevant to both aquaculture and fisheries. Economic valuation of mangroves can be useful for policy making and planning from an ecosystem services perspective on alternative uses or non-use. Forest management in upland watersheds can impact the coast and water supply for aquaculture. These aspects of forestry are largely covered under previous elements of the strategy but may bear repeating.

Focusing on fisheries and aquaculture, some additional strategic actions are proposed. Forests, whether in the coastal zone or upland watershed, are of concern in ecosystem approaches to fisheries and aquaculture. The actions suggested here concentrate on the value of forests in providing ecosystem services.

## 6 STRATEGY AND ACTION PLAN

### Vision

A regional society and economy that is resilient to a changing climate and enhanced through comprehensive disaster management and sustainable use of aquatic resources.

### Guide points

- An integrated approach is important in minimizing the use and costs of limited technical, administrative, and financial resources; in reducing any potential conflicts in policy development; and in promoting coordination among all stakeholder groups in hazard risk reduction;
- Effective and sustained involvement of civil society;
- Stakeholder involvement and participation must be effectively coordinated so as to minimize duplication of effort and conflict, and ensure efficient use of resources and the creation of positive synergies;
- An effective institutional, administrative, and legislative environment is a *sine qua non* to effective and timely resilience-building to the hazard risks associated with a changing climate;
- Investing in resilience-building to a changing climate is investing in sustainable development;
- Investing in proactive resilience-building to a changing climate can significantly limit the immediate losses and future cost of recovery from climate events;
- An enabling environment for the adoption of appropriate technologies and practices is necessary to ensure that national, regional, and international commitments with respect to the causes and effects of a changing climate are fulfilled;
- Effective collaboration with other regional and international state actors and organisations must be an integral part of resilience-building to a changing climate;
- Reducing the singular and cumulative impacts of natural disasters can alleviate development challenges;
- Access to information and transparency in planning and implementation

(taken from the regional framework p.22)

**Strategic element 1: Mainstream climate change adaptation strategies into sustainable development / agendas of CARICOM Member States**

### Existing

Action	Sector or Area	Activity Level
<p><i>Goal 1: Assess the vulnerability and risks associated with a changing climate</i></p> <p><i>Objective: Manage the adverse effects of climate change on coastal and marine resources</i></p> <p><i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Coral reef research programme institutionalized and providing data to guide scientific research by 2021</i></li> <li>• <i>Increased output of peer reviewed and published research for contribution to teaching of climate science and to IPCC use</i></li> </ul>		<b>High priority</b>

Action	Sector or Area	Activity Level
Establish a functioning network of Coral Reef Early Warning Systems (CREWS) in selected countries. In addition to Jamaica stations, installations should include Belize, Barbados, Tobago and Saint Lucia	Coastal Zone and Marine	Regional
Monitoring in all countries with coral reef is institutionalized between UWI Centre for Marine Sciences and national agencies	Coastal Zone and Marine	Regional National
Implement and institutionalize regional coral reef research programmes at the CMS and CERMES	Coastal Zone and Marine	Regional
Continue research in coral nursery to identify species that are adaptive to warming sea temperatures and other parameters in selected countries	Coastal Zone and Marine	Regional National
CERMES to be provided with institutional support (building and equipment) to allow for expansion of teaching and research functions	Coastal Zone and Marine	Regional
ERI University of Belize to be provided institutional support (building and equipment) to allow for expansion of teaching and research functions	Coastal Zone and Marine	National
Research and development of models to forecast changes in distribution, abundance and production of commercially important fisheries (e.g. lobsters, conch, shrimp, ground fish, tunas, flyingfish, groupers, snappers etc.) and the social and economic impacts (food security, employment, income etc.) based on different climate scenarios (temp, salinity, pH, etc.) to facilitate planning, decision-making and disaster risk management	Coastal Zone and Marine	Regional National
Establish/strengthen systems to collect and compile fisheries catch and fishing effort data as well as biological, ecological, economic, social, aquaculture and any other relevant data to monitor performance of key commercial and other associated and dependent species in the ecosystem	Coastal Zone and Marine	Regional National
Mapping and valuation of coastal ecosystems and habitats, including coral reefs, sea-grass beds, mangrove systems, to document location, state of health and contribution to economic development	Coastal Zone and Marine	Regional National
Formulate, adopt, implement and revise conservation and management measures and, where appropriate, fisheries management and development plans on the basis of the best available information, including climate change, to achieve optimum sustainable use and long-term conservation of fisheries resources	Coastal Zone and Marine	Regional National
Revise and upgrade regional and national fisheries and marine resource management policies, legislation and regulations to incorporate and address ecosystem approach to fisheries, climate change and DRM considerations	Coastal Zone and Marine	Regional National
Conduct research to develop methodologies and systems for culture of indigenous marine and brackish water and fresh water species to diversify industry, reduce pressures on the living marine resources and build coastal community resilience	Coastal Zone and Marine	Regional National

Action	Sector or Area	Activity Level
Develop and implement programmes aimed at the protection and rehabilitation of degraded fisheries habitats and ecosystems, and the environment generally	Coastal Zone and Marine	Regional National
Strengthen the capability of fisherfolk organisations at the regional, national and local levels to enhance community participation in planning and implementing programmes to increase resilience to climate change.	Coastal Zone and Marine	Regional National
Development of human resource capacity of stakeholders in the fisheries sector to incorporate climate change consideration including DRM in fisheries development and management.	Coastal Zone and Marine	Regional National
Identify, and where possible develop, alternative livelihood opportunities for fisherfolk and other vulnerable groups in the coastal zone	Coastal Zone and Marine	Regional National
Strengthen institutional capability of the CRFM and related institutions to coordinate, monitor and support the mainstreaming of climate consideration and DRR in fisheries and marine resource management	Coastal Zone and Marine	Regional
Climate modelling: The partnership with Caribbean institutions will be strengthened and expanded to produce data at greater resolutions. Continued training and upgrading of Caribbean technical expertise will be facilitated through doctoral and post-doctoral programs. More models will be investigated and utilized that are relevant to the region and that can provide resolution down to 10 square kilometre grids. International cooperation with technical partners will continue.	Multi sector	Regional
Sea level rise: Additional monitors will be installed to strengthen the monitoring network. The Regional Archiving Centre will be further supported at the location in Belize. A routine and permanent maintenance program under the leadership of the CIMH will be in place. Technical coordination and leadership will be the responsibility of the CIMH, NOAA and the DSLI of the UWI.	Multi sector	Regional
<b>Goal 1: Assess the vulnerability and risks associated with a changing climate(continued)</b> <b>Objective: Reduce GHG emissions through the promotion and use of renewable and alternative energy sources</b> <b>Outcomes:</b> <b>(None stated)</b>	<b>High priority</b>	
Develop and / or implement new research and teaching areas in alternative energy, waste management, resource economics and GIS / remote sensing.	Coastal Zone and Marine Energy	Regional
<b>Goal 2:Reduce vulnerability to a changing climate</b> <b>Objective: Limit the effects of climate change on agriculture and food security</b> <b>Outcome:</b> <b>• Adequate food supplies being produced to meet the region’s food and nutrition needs by 2021</b>	<b>High priority</b>	
Prepare and implement agriculture sector adaptation strategies for selected countries, learning from the Guyana experience.	Agri-culture	Regional National

Action	Sector or Area	Activity Level
Vulnerability and capacity assessment of the impacts of climate change on water, agriculture, tourism, coastal and marine and forestry sectors for the years 2020 and 2050 in all CARICOM states.	Multi-sector	Regional National
Prepare water sector adaptation strategies for all CARICOM countries by 2017.	Water	Regional National
Implement water sector adaptation strategies for all CARICOM countries.	Water	National
Develop climate resilient IWRM strategies in all countries.	Water	National
Establish water resources management agencies where necessary and provide additional support where agencies exist.	Water	National
<b>Goal 3: Effectively access and utilize resources to reduce vulnerability to a changing climate</b> <b>Objective: Use of forests to support sustainable development while reducing GHG emissions</b> <b>Outcome:</b> <b>• Common negotiating position on forest issues at UNFCCC</b>		<b>High priority</b>
Information sharing and coordination between countries at COP MOP on CDM, REDD+ and other forest related initiatives.	Forestry	National
Training and capacity building in REDD+ negotiations, CDM project development, preparation of NAMAs and development of national low carbon strategies.	Capacity building	Regional National
Coordinated and common negotiation strategy at UNFCCC.	Multi-sector	Regional National
<b>Goal 4: Promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate-induced damage</b> <b>Objective: (None stated)</b> <b>Outcomes:</b> <b>(None stated)</b>		<b>High priority</b>
Protection, including reforestation, of mangrove swamps in selected coastal areas.	Coastal zone and marine areas	Regional National
Planning and Policy Development in place for the Coastal and Marine Areas (that includes Climate Change and Disaster Risk Reduction considerations).	Coastal zone and marine areas	Regional National
Improve governance arrangements by identifying and facilitating the empowerment and participation of the relevant interest groups (particularly vulnerable groups in coastal areas (e.g. fisherfolk, civil engineers, etc).	Coastal zone and marine areas	Regional National
Develop the legislative and regulatory framework to promote/improve management of the marine and coastal areas (include climate change and Disaster Risk management issues).	Coastal and Marine	Regional National
Incorporate Climate Change and the principles of Sustainable Land Management (SLM) into coastal physical planning and development procedures.	Coastal and Marine	Regional National
Ensure that tourism policies and plans conform to the principles of sustainable tourism.	Multi-sectoral	Regional National
<b>Goal 5: Build the Caribbean Community Climate Change Centre's capacity to support the implementation of the strategy</b> <b>Objective: Realize the objectives set out in the Agreement Establishing the CCCCC</b> <b>Outcome:</b>		<b>Low priority</b>

Action	Sector or Area	Activity Level
<ul style="list-style-type: none"> <li>• <i>Climate change mitigation and adaptation responses in the region are coordinated in an efficient and transparent manner</i></li> </ul>		
No action clearly related to fisheries or aquaculture		
<p><b>Goal 6: Reduce the region's carbon footprint through the promotion of energy efficiency measures</b>  <b>Objective: (None stated)</b>  <b>Outcomes: (None stated)</b></p>		<b>Medium priority</b>
Develop and implement climate change and DRM awareness / education / information programme (including relevant fora, websites, databases publications, toolkits, guidelines) targeted to key tourism-sector sub-sectors and stakeholders (public / private sector organizations, civil society / NGO, communities).	Tourism	Regional
Encourage public and private sector tourism stakeholders and civil society to apply a mix of technology and behavioural change to address the issue of climate change.	Tourism	Regional National

### Additional

Action	Sector or Area	Activity Level
<p><b>Goal 1: Mainstream DRM into fisheries and aquaculture at multiple levels</b>  <b>Objective: To fully recognize the interconnectedness of CCA and DRM, so as to integrate them fully into all fisheries and aquaculture policies and plans by 2015</b>  <b>Outcomes:</b></p> <ul style="list-style-type: none"> <li>• <i>CCA and DRM integrated into sustainable fisheries and aquaculture at all points in the fish chain rather than added as an afterthought</i></li> <li>• <i>Changed mindset and behaviour among diverse stakeholders to adequately understand and address risks from a variety of sources and be proactive</i></li> </ul>		<b>High priority</b>
More closely link poverty reduction to multi-sector development, EAF, EAA, DRM and CCA, based for example on the recent CRFM poverty assessment for the region	Fisheries and Aquaculture	Multilevel
Mainstream gender into fisheries and aquaculture DRM and CCA, noting that this is an area in which the IP admits weakness and can be tackled at both national and local levels, especially with civil society assistance	Fisheries and Aquaculture	Multilevel
Introduce the Hyogo Framework of Action within the fisheries and aquaculture sectors, and facilitate implementation of multilevel action via closer networking among fisheries, aquaculture and DRM practitioners	Fisheries and Aquaculture	Multilevel
Support the development of crisis prevention and management policies in the fisheries and aquaculture sectors at multiple levels by involving networks of national and local CCA and DRM experts with aquatic skills	Fisheries and Aquaculture	Multilevel
Improve the systems for expedient rebuilding and rehabilitation of the aquaculture, but especially fisheries sector, in the aftermath of natural disasters as key contributors to food security at local and national levels	Fisheries and Aquaculture	Multilevel
Strengthen the capacity of the CRFM, as a leading regional fisheries body (RFB), to advocate the inclusion of fisheries and aquaculture into DRM and CCA through CARICOM's regional and national mechanisms	Fisheries and Aquaculture	Multilevel



Action	Sector or Area	Activity Level
Increase the capacities of fishers and coastal communities to deal with more extreme rough sea events by improving safety at sea, early warning systems and community-based or assisted rescue capability	Fisheries and Aquaculture	Multilevel
Increase the capacities of fishers and coastal communities to participate and engage in policy development processes that utilize EBM and other integrated approaches, either as individuals or community-based groups	Fisheries and Aquaculture	National
Strengthen the ability of coastal and rural communities to properly assess damage and loss following the impacts of an extreme weather event or slow onset events	Fisheries and Aquaculture	Regional National

**Strategic element 2: Promote the implementation of specific adaptation measures to address key vulnerabilities in the region**

**Existing**

Action	Sector or Area	Activity Level
<p><i>Goal 1: Promote the adoption of measures and disseminate information that would make water supply systems resilient to climate-induced damage</i></p> <p><i>Objective: Manage the adverse effects of climate change on water resources</i></p> <p><i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Integrated Water Resources Management policies and strategies in place for prudent management of water resources</i></li> <li>• <i>Appropriate distribution and storage infrastructure in place to satisfy water quality and demand across all sectors</i></li> <li>• <i>Measures are in place to facilitate installation of resilient infrastructure to cope with extreme events (floods &amp; droughts)</i></li> </ul>	Water	Medium priority
Assessment, quantification and mapping of surface water resources in CARICOM Member States.	Water	Regional National
Vulnerability and capacity assessment of the impacts of climate change on water in all countries.	Water	National
Assessment, quantification and evaluation of water demand and consumption patterns.	Water	National
Prepare water sector adaptation strategies for all CARICOM countries by 2015.	Water	Regional National
Implement water sector adaptation strategies for all CARICOM countries.	Water	National
<p><i>Goal 2: Promote the implementation of measures to reduce climate impacts on coastal and marine infrastructure</i></p> <p><i>Objective: Manage the effects of climate change on coastal and marine area</i></p> <p><i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Reduced vulnerability and increased resilience of coastal communities and infrastructure</i></li> <li>• <i>Reduced vulnerability and increased resilience of coastal and marine ecosystems</i></li> <li>• <i>Strengthen food security, availability and distribution infrastructure and mechanisms to meet the requirements during normal times and during disasters</i></li> </ul>	Water	High priority

Action	Sector or Area	Activity Level
Mangrove reforestation in selected coastal areas of Jamaica (GCCA), Guyana and Suriname.	Coastal Zone and Marine	National
Expansion of commercial fish processing and storage facilities and infrastructure (canneries) and value added products.	Coastal Zone and Marine	National
Planning and policy development for the coastal and marine areas (including EAF, EAA, CCA and DRM considerations).	Coastal Zone and Marine	Regional National
Improve governance arrangements by identifying and facilitating the empowerment and participation of the relevant interest groups (particularly vulnerable groups in coastal areas).	Coastal Zone and Marine	Regional National
Develop the legislative and regulatory framework to promote/improve management of the marine and coastal areas (include climate change and Disaster Risk Management issues).	Coastal Zone and Marine	Regional National
Incorporate Climate Change and the principles of Sustainable Land Management (SLM) into coastal physical planning and development procedures.	Coastal Zone and Marine	Regional National
Ensure that tourism policies and plans conform to the principles of sustainable tourism.	Coastal Zone and Marine	Regional National
<p><b>Goal 3: Promote the adoption of measures and the dissemination of information that adapt tourism activities to climate impacts</b>  <b>Objective: reduced vulnerability and increased resilience of the tourism sector to the adverse impacts of climate change.</b>  <b>Outcomes:</b>  <ul style="list-style-type: none"> <li>• Enhance the integration of the CCA and DRM strategies and response measures into the tourism sector</li> <li>• Policy and decision makers are provided with research findings for planning and decision making</li> <li>• Appropriate adaptation and mitigation policies, strategies and plans implemented</li> </ul> </p>		<b>Medium priority</b>
Assess the socio-economic impacts of climate change on tourism.	Tourism	Not stated
Develop / enhance tourism-related policies, strategies and plans to incorporate sustainable tourism principles and mainstream climate change adaptation and mitigation and DRM issues and recommendations.	Tourism	Not stated
Fiscal regime to encourage sustainable construction in less vulnerable coastal zones	Tourism	Not stated
<p><b>Goal 4: Promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate-induced damage</b>  <b>Objective: (None stated)</b>  <b>Outcomes: (None stated)</b></p>		<b>High priority</b>
CFRM to continue work in technical research priority areas and provide technical assistance to national governments.	Coastal Zone and Marine	Regional National
Protection, including reforestation, of mangrove swamps in selected coastal areas.	Coastal Zone and Marine	Regional National

Action	Sector or Area	Activity Level
Planning and Policy Development for the Coastal and Marine Areas (that includes EAF, EAA, CCA and DRM considerations).	Coastal Zone and Marine	Regional National
Improve governance arrangements by identifying and facilitating the empowerment of the relevant interest groups (vulnerable groups) in coastal areas (e.g. fisherfolk, civil engineers, etc).	Coastal Zone and Marine	Not stated [Regional National]
Develop the legislative and regulatory framework to promote management of the marine and coastal areas (include climate change and Disaster Risk Management Issues)	Coastal Zone and Marine	Not stated [Regional National]
Incorporate Climate Change and the principles of Sustainable Land Management (SLM) into coastal physical planning and development procedures.	Coastal Zone and Marine	Not stated [Regional National]
Ensure that tourism policies and plans conform to the principles of sustainable tourism.	Coastal Zone and Marine	Not stated [Regional National]
<b><i>Goal 5: Promote the adoption of sound practices and measures to prevent and/or reduce climate-induced health impacts in the community</i></b> <b><i>Objective: Limit the effects of climate change on human health</i></b> <b><i>Outcomes:</i></b> <ul style="list-style-type: none"> <li>• <i>Measures are in place to prevent or reduce the incidence of diseases and health related issues exacerbated by climate change.</i></li> <li>• <i>Monitoring and early warning systems are in place to enable effective first response and management during and after events/ episodes.</i></li> </ul>		<b>Medium priority</b>
Conduct research on linkages between climate and health, with emphasis on diseases and impacts.	Health	National
Sensitize stakeholders, including the general public and health professionals, to the role and threat of climate change in determining wellbeing and health.	Health	National

### Additional

Action	Sector or Area	Activity Level
<b><i>Goal 1: Promote the adoption of measures and disseminate information that would make fisheries and aquaculture resilient to climate-induced damage primarily through a sustainable livelihoods approach</i></b> <b><i>Objective: Manage the adverse effects of climate change and disasters on fisheries and aquaculture</i></b> <b><i>Outcomes:</i></b> <ul style="list-style-type: none"> <li>• <i>Policies and strategies in place for prudent public and private sector management of risks</i></li> <li>• <i>Measures are in place to facilitate resilient social ecological systems to cope with extreme events</i></li> </ul>		<b>Medium priority</b>

Action	Sector or Area	Activity Level
Build local and national capacities to undertake hazard identification and analysis, undertake risk assessments and compile risk mapping down to the local level to facilitate empowerment and strengthen subsidiarity	Fisheries and Aquaculture	Multilevel
Develop education and training for the entire DRM cycle, especially for climate-related disaster mitigation, and also strengthening local early warning and response capacities at multiple levels	Fisheries and Aquaculture	Multilevel
Develop stronger partnerships to mobilize resources for implementation of programmes and projects within the fisheries and aquaculture sectors via networked fisheries, aquaculture, CCA and DRM stakeholders	Fisheries and Aquaculture	Multilevel
Design rehabilitation, reconstruction and recovery activities to rebuild livelihoods that are more resilient than those existing before the disaster; avoid contributing to 'poverty traps' by increasing aid dependencies	Fisheries and Aquaculture	Multilevel
Document, analyse and understand local knowledge, existing strengths, coping strategies and community measures in disaster-prone coastal communities so as to build on and share lessons about their resilience	Fisheries and Aquaculture	Multilevel
Create channels through which local knowledge and culture can be included in policy and be used to inform implementation as part of any action plan	Fisheries and Aquaculture	Multilevel
Ensure that small-scale fisheries and aquaculture do not contribute to land or coastal degradation and exacerbate issues of climate change and disasters	Fisheries and Aquaculture	Multilevel
Develop innovative insurance products, including for income insurance where applicable, that can be tied to existing implementation capacity	Fisheries and Aquaculture	Multilevel
Plan strategically in disaster response for long-term rehabilitation and recovery bearing in mind the sustainability of livelihoods, management, and any changes to ecosystems that occurred as a result of the disaster	Fisheries and Aquaculture	Multilevel
Record and disseminate local knowledge and good practices through DRM/CCA action learning networks or other means of social learning	Fisheries and Aquaculture	Multilevel
Monitor and evaluate the implementation of (?) fisheries management plans in such a way as to be prepared to replace physical infrastructure, technology and practices with improvements should disaster recovery allow wholesale replacements	Fisheries and Aquaculture	Multilevel

**Strategic element 3: Promote actions to reduce greenhouse gas emissions through fossil fuel reduction and conservation, and switching to renewable and cleaner energy sources**

**Existing**

Action	Sector or Area	Activity Level
<p><i>Goal 1: Promote the use of renewable energy resources</i></p> <p><i>Objective: Adopt energy efficiency and conservation methods.</i></p> <p><i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Policies and legislation in place to remove barriers and promote investment in renewable and alternative energy.</i></li> <li>• <i>Energy reduction target in place at the CARICOM level.</i></li> <li>• <i>Demand side power management institutionalized in the region.</i></li> </ul>	Medium	priority
No action clearly related to fisheries or aquaculture		

Action	Sector or Area	Activity Level
<p><b>Goal 1: Promote the use of renewable energy resources (continued)</b>  <b>Objective: Reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources.</b>  <b>Outcome:</b>  <ul style="list-style-type: none"> <li>• Renewable energy provides up to xx percent of energy supply in CARICOM countries as group by 2021.</li> </ul> </p>		Medium priority
No action clearly related to fisheries or aquaculture		
<p><b>Goal 2: Support the assessment of wind potential to supply electric power in CARICOM countries</b>  <b>Objective: Reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources.</b>  <b>Outcomes:</b>            (None stated)</p>		Medium priority
No action clearly related to fisheries or aquaculture		
<p><b>Goal 3: Support the development of innovative financing mechanisms for the deployment of solar energy (water heaters, etc)</b>  <b>Objective: Reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources.</b>  <b>Outcomes:</b>            (None stated)</p>		Medium priority
No action clearly related to fisheries or aquaculture		
<p><b>Goal 4: Assess the feasibility of converting waste to energy in CARICOM Countries</b>  <b>Objective: Reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources.</b>  <b>Outcomes:</b>            (None stated)</p>		Low priority
No action clearly related to fisheries or aquaculture		
<p><b>Goal 5: Assess the economic viability and environmental impact of shore-based Ocean Thermal Energy Conversion (OTEC) plants</b>  <b>Objective: Reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources.</b>  <b>Outcomes:</b>            (None stated)</p>		Low priority
No action clearly related to fisheries or aquaculture		

### Additional

Action	Sector or Area	Activity Level
<p><b>Goal 1: Promote in aquaculture and fisheries the use of renewable energy resources and the conversion of waste into new by-products</b>  <b>Objective: Improve energy efficiency and conservation, and waste utilization consistent with global green economy initiatives</b>  <b>Outcomes:</b>  <ul style="list-style-type: none"> <li>• Policies and programmes in place to promote investment in affordable renewable and alternative energy advances</li> <li>• Energy demand in fisheries and aquaculture declines at all points along the value chain</li> </ul> </p>		Medium priority

Action	Sector or Area	Activity Level
<ul style="list-style-type: none"> <li>• <i>Income to support livelihoods is generated from items that were waste</i></li> </ul>		
Increase research, development and investment funding for green technology such as supplemental wind and solar power for fishing vessels and processing plants, and vessel designs or powering to reduce fossil fuel consumption.	Fisheries and Aquaculture	Multilevel
Align aquaculture and onshore fish processing to take advantage of advances in agriculture and other industries including implementing energy audits, etc.	Fisheries and Aquaculture	Multilevel
Accelerate research into and development of biofuels and the use of more efficient and affordable outboard and inboard engines in fishing vessels	Fisheries and Aquaculture	Multilevel

**Strategic element 4: Promote actions to reduce the vulnerability of natural and human systems in CARICOM Member States to the impacts of a changing climate**

**Existing**

Action	Sector or Area	Activity Level
<p><i>Goal: (not stated, so revert to the language of the strategic element)</i>  <i>Objective: Limit the effects of climate change on agriculture and food security</i>  <i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Enhanced food security through adequate food supplies being produced to meet the region's food and nutrition needs by 2021</i></li> <li>• <i>Enhanced and secured livelihoods in the agriculture sector</i></li> </ul>		<b>High priority</b>
Expanded extension and support services for farmers.	Agriculture	National
Develop and institutionalize infrastructure and logistics to support post-harvest handling, transportation, distribution and marketing of food within and amongst individual countries, based on needs and local conditions.	Agriculture	Regional National
Regional and national emergency preparedness institutions to become an integral part of the climate change adaptation response strategy.	Agriculture Coastal Zone	Regional National
<p><i>Goal: (not stated, so revert to the language of the strategic element)</i>  <i>Objective: Limit the effects of climate change on agriculture and food security</i>  <i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Add value to agriculture production through processing</i></li> </ul>		<b>High priority</b>
Develop and implement policies and other measures to promote investment in the processing of agricultural products, to add value and variety to output for food and other uses.	Agriculture	National

## Additional

Action	Sector or Area	Activity Level
<p><i>Goal: (not stated, so revert to the language of the strategic element)</i>  <i>Objective: Limit the effects of climate change on fisheries and aquaculture contribution to food security (?)</i>  <i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Enhanced food security through adequate food supplies being produced to meet the region's food and nutrition needs by 2021</i></li> <li>• <i>Enhanced and secured livelihoods in the fisheries and aquaculture sector</i></li> </ul>		<b>High priority</b>
Use network and institutional analysis as tools to establish institutional arrangements that span from local to national to regional levels easily	Fisheries and Aquaculture	Multi-level
Adopt a livelihoods approach to fisheries and aquaculture policies and plans within CCA, and the design and implementation of disaster preparedness, response and recovery programmes	Fisheries and Aquaculture	Multi-level
Work with a range of agencies, including civil society, to implement systematic approaches to livelihood diversification for fishing and aquaculture communities to build resilience and reduce vulnerability	Fisheries and Aquaculture	Multi-level
Ensure that while strengthening coastal community based organizations (CBOs) in DRM/CCA they are sensitised to fisheries and aquaculture, preferably by linking them to site-based fisherfolk organisations	Fisheries and Aquaculture	Multilevel
Build public sector / private sector (social) partnerships at national level in CRFM countries to better mobilise resources including knowledge	Fisheries and Aquaculture	Multilevel

<p><b>Strategic element 5: Promote actions to derive social, economic and environmental benefits from the prudent management of standing forests in CARICOM countries</b></p>
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### Existing

Action	Sector or Area	Activity Level
<p><i>Goal 1: Promote the adoption of best practices for sustainable forest management</i>  <i>Objective: Use of forests to support sustainable development while reducing GHG emissions.</i>  <i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Policies and legislation are based on scientific assessments.</i></li> <li>• <i>Protocols and manuals as part of management plans to guide operations within forests and protected areas.</i></li> <li>• <i>Value added to timber through production and processing of wood products in-country.</i></li> </ul>		<b>Medium Priority</b>
Economic valuation of forest resources (timber and non-timber products and services) in selected countries.	Forestry	National
Enact legislation to support implementation of management plans.	Forestry	National
<p><i>Goal 2: Engage in negotiations with international partners to mobilise resources for the protection of standing forests</i>  <i>Objective: Use of forests to support sustainable development while reducing GHG emissions.</i>  <i>Outcomes:</i></p>		<b>Low Priority</b>

Action	Sector or Area	Activity Level
<ul style="list-style-type: none"> <li>• <i>Common negotiating position on forest issues at UNFCCC.</i></li> <li>• <i>Significant resources mobilized to support national sustainable development initiatives.</i></li> </ul>		
No action clearly related to fisheries or aquaculture		
<p><i>Goal 3: Undertake research aimed at improving the current methodologies for estimating carbon sequestration rates in tropical forests</i></p> <p><i>Objective: Use of forests to support sustainable development while reducing GHG emissions.</i></p> <p><i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Research programs in place to support forest and protected areas management.</i></li> </ul>		Low Priority
No action clearly related to fisheries or aquaculture		

#### Additional

Action	Sector or Area	Activity Level
<p><i>Goal 1: Promote sustainable forest policy and management that incorporates ecosystem approaches to fisheries and aquaculture</i></p> <p><i>Objective: Use of forests to support sustainable development and maintain services from connected ecosystems</i></p> <p><i>Outcomes:</i></p> <ul style="list-style-type: none"> <li>• <i>Improved policies and plans based on comprehensive resource valuation</i></li> <li>• <i>Plans and practices in forested areas are guided by ecosystem approaches</i></li> </ul>		Medium priority
Add to the cases of economic valuation of coastal forests such as mangrove for alternative uses including those related to fisheries and aquaculture; share lessons from the valuation studies in order to guide policy	Fisheries and Aqua-culture	Multi-level
Enhance the linkages between forest management in upland watersheds and coastal management, including aspects such as ensuring freshwater supplies and flows sufficient for both aquaculture and coastal ecosystems	Fisheries and Aqua-culture	Multi-level

## 7 ANNEX

### Annex 1: 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 biodiversity, 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 COP15 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 CO<sub>2</sub> reductions of at least 45 percent by 2020 and reducing greenhouse gas emissions by more than 95 percent of 1990 CO<sub>2</sub> 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 pursuing 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”.

*4July2009*

**Issued at the conclusion of the 30th Meeting of the Conference of Heads of Government of the Caribbean Community, 2 – 5 July2009, Georgetown, Guyana**