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Disaster risk management and climate change adaptation in the CARICOM and wider Caribbean region

Strategy and action plan



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Boats on rocky beach. Courtesy of Patrick McConney, Centre for Resource Management and Environmental Studies (CERMES), Barbados.

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Contents

ABBREVIATIONS AND ACRONYMS	iv
SUMMARY	v
1. INTRODUCTION	1
2. DELIVERING TRANSFORMATIONAL CHANGE	3
3. VISION	5
4. POLICY CONTEXT AND PRIORITIES	7
5. APPROACH AND LINKS TO STRATEGY ELEMENTS	13
5.1 Strategic element 1: Mainstream climate change adaptation strategies into sustainable development/agendas of CARICOM Member States	14
5.2 Strategic element 2: Promote the implementation of specific adaptation measures to address key vulnerabilities in the region	15
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	15
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	16
5.5 Strategic element 5: Promote actions to derive social, economic and environmental benefits from the prudent management of standing forests in CARICOM countries	16
6. STRATEGY AND ACTION PLAN	17
Annex 1 LILIENDAAL DECLARATION ON CLIMATE CHANGE AND DEVELOPMENT	27

ABBREVIATIONS AND ACRONYMS

CARICOM	Caribbean Community
CCA	Climate change adaptation
CCCFP	Caribbean Community Common Fisheries Policy
CCCCC	Caribbean Community Climate Change Centre
CDEMA	Caribbean Disaster and Emergency Management Agency
CDERA	Caribbean Disaster and Emergency Response Agency
CDM	Comprehensive disaster management
CERMES	Centre for Resource Management and Environmental Studies
Code	Code of Conduct for Responsible Fisheries
CRFM	Caribbean Regional Fisheries Mechanism
DRM	Disaster risk management
EAA	Ecosystem approach to aquaculture
EAF	Ecosystem approach to fisheries
GHG	Greenhouse gas
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
REDD+	Reducing Emissions from Deforestation and Forest Degradation (UN programme)
SES	social-ecological system
SGD	St George's Declaration
SSF	small-scale fishery
UNFCCC	United Nations Framework Convention on Climate Change
UWI	University of the West Indies
WECAFC	Western Central Atlantic Fishery Commission

SUMMARY

This report is the second of four outputs in an initiative of the Caribbean Regional Fisheries Mechanism (CRFM) and FAO on “Climate change adaptation and disaster risk management in fisheries and aquaculture in the CARICOM and wider Caribbean region”. The aim is to develop a strategy and action plan for integrating disaster risk management (DRM), climate change adaptation (CCA) and fisheries and aquaculture, with a focus on small-scale fisheries (SSF) and small-scale aquaculture.

This strategy and action plan are built upon, and integrate with, core policy documents. The regional policy context is primarily the “Regional Framework for Achieving Development Resilient to Climate Change” (the Regional Framework) that articulates the strategy of the Caribbean Community (CARICOM) 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 2011–21” and incorporates several global and 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 approaches of CARICOM and the Organization of Eastern Caribbean States (OECS) to climate change that integrate DRM. Inclusion of, or collaboration with, non-CARICOM Caribbean countries in the IP also needs to be considered. The Caribbean Disaster and Emergency Management Agency (CDEMA) Enhanced Comprehensive Disaster Management (CDM) Framework for 2007–2012 is another core document that emphasizes the need to focus on community-level adaptation and management (in Outcome 4). 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 2012–13 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), 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 Caribbean Community Climate Change Centre (CCCCC) Regional Framework contains 5 strategy elements and 20 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 incorporate 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 draw on the above-mentioned documents, elaborate on the concept of transformation and develop 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.

McConney, P., Charlery, J., Pena, M., Phillips, T., Van Anrooy, R., Poulain, F., Bahri, T. 2015.
Disaster risk management and climate change adaptation in the CARICOM and wider Caribbean region – Strategy and action plan. Rome. 29 pp.

1. INTRODUCTION

This strategy and action plan are 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 the strategy of the Caribbean Community (CARICOM) on climate change¹. 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 2011–21” and incorporates several global and regional instruments concerning climate change and variability². Fisheries and aquaculture initiatives in the CARICOM region should be integrated into the IP and take into account the response of CARICOM (including the Organization of Eastern Caribbean States [OECS]) 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 climate change adaptation (CCA) and disaster risk management (DRM) in fisheries and aquaculture in future sessions, and in its 2012–13 work plan included the preparation of a strategy, action plan and programme proposal, 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 (the Code)³ and the still evolving Caribbean Community Common Fisheries Policy (CCCFP)⁴. Both of these are connected to a web of international, regional and subregional 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).

¹ Caribbean Community Climate Change Centre. 2009. *Climate change and the Caribbean: a regional framework for achieving development resilient to climate change (2009–2015)*. Belmopan.

² Caribbean Community Climate Change Centre. 2012. *Delivering transformational change 2011–21: implementing the CARICOM regional framework for achieving development resilient to climate change*. Belmopan.

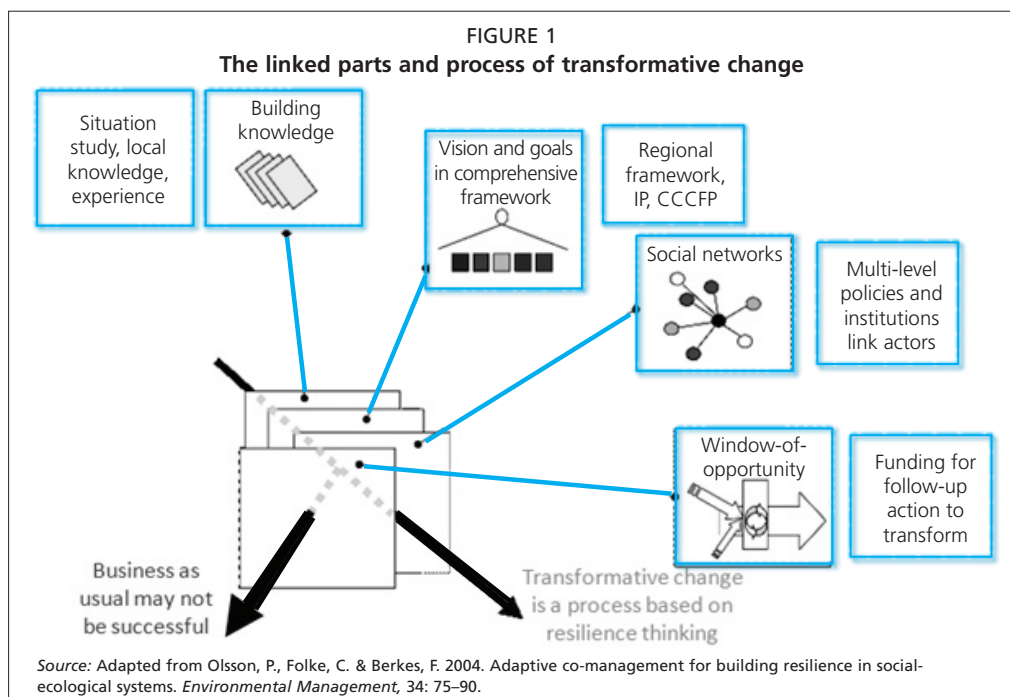
³ FAO. 2011. *Code of Conduct for Responsible Fisheries*. Special edition. Rome. 91 pp. (Includes a CD-ROM). (also available at www.fao.org/docrep/013/i1900e/i1900e00.htm).

⁴ www.caricom-fisheries.com/PublicationsandDocuments

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.

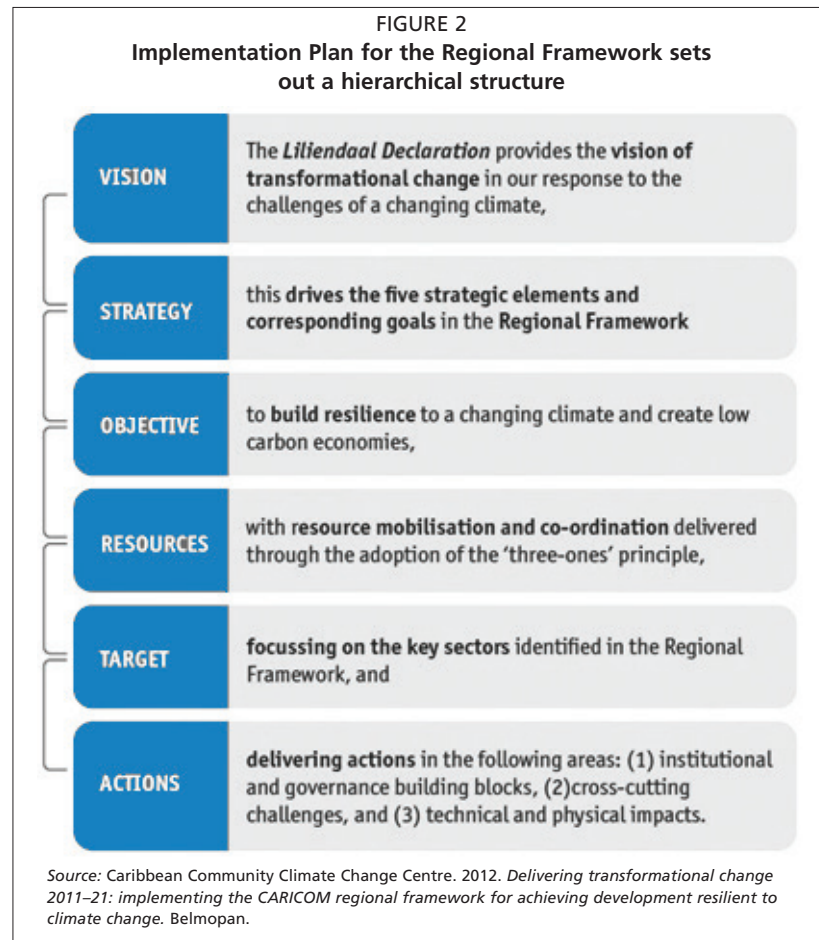
Authors have described how transformation involves coordinating information and activities, building knowledge and understanding of the social-ecological system (SES) dynamics, providing leadership in the form of visions and goals, using social networks, and seizing a window of opportunity to transform⁵. Figure 1 shows how the elements of the regional plan fit alongside the process that they describe.



Consistent with the concepts of resilience, we appreciate that there will be uncertainty. Transformative change sets out to alter the fundamental state of an SES; the exact changes that 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 countries of the Caribbean Regional Fisheries Mechanism (CRFM) with this process.

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

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) via a network of sectors, each with actors, policies and institutions. These notions fit well with ecosystem approaches.



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 a progressive outlook or culture. 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,⁶ green and blue economy initiatives,⁷ blue carbon trading⁸ and many more. The United Nations Framework Convention on Climate Change (UNFCCC), the International Strategy for Disaster Reduction (ISDR), the Code 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. The Caribbean Disaster and Emergency Response Agency (CDERA) reminds us that even at the subregional level there is policy guidance for DRM and CCA⁹. The OECS St George's Declaration of Principles for Environmental Sustainability (SGD¹⁰) covers these in two principles:

- 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"; and
- 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. The Caribbean Disaster and Emergency Management Agency (CDEMA) is working towards the overall goal of "regional sustainable development enhanced through comprehensive disaster management". The 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.

⁶ Government of Guyana. 2010. *Transforming Guyana's economy while combating climate change*. Office of the President, Republic of Guyana.

⁷ UNEP, FAO, IMO, UNDP, IUCN, World Fish Center & GRIDArendal. 2012. *Green economy in a blue world*.

⁸ Linacre, N., Kossoy, A. & Ambrosi, P. 2011. *State and trends of the carbon market 2011*. Washington, DC, World Bank.

⁹ Caribbean Disaster Emergency Response Agency. 2007. *CDM strategy and programme framework 2007–2012*. Bridgetown.

¹⁰ OECS Secretariat. 2006. *St George's declaration of principles for environmental sustainability in the OECS (revised 2006)*. Castries.

4. POLICY CONTEXT AND PRIORITIES

The Regional Framework of the Caribbean Community Climate Change Centre (CCCCC) contains 5 strategy elements and 20 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 Comprehensive Disaster Management (CDM) Framework for 2007–2012 (a new strategy is being prepared) is general in content but also contains relevant components (Table 1). In the CCCFP, the content is entirely related to fisheries and aquaculture, but mention of CCA and DRM is limited (Table 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 constrains what may be set out as an action plan for fisheries and aquaculture. Therefore, the action plan and programme proposal are not restricted to merely an elaboration of these frameworks and agreement. Entirely new ground can be covered if necessary.

TABLE 1
Enhanced CDM Framework 2007–2012

GOAL			
Regional sustainable development enhanced through comprehensive disaster management (CDM)			
PURPOSE			
"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."			
OUTCOME 1 Enhanced institutional support for CDM programme implementation at national and regional levels.	OUTCOME 2 An effective mechanism and programme for management of CDM knowledge has been established.	OUTCOME 3 Disaster risk management (DRM) has been mainstreamed at national levels and incorporated into key sectors of national economies (including health, tourism, agriculture and nutrition).	OUTCOME 4 Enhanced community resilience in CDERA States/territories to mitigate and respond to the adverse effects of climate change and disasters.
OUTPUTS 1.1 National disaster organizations are strengthened for supporting CDM implementation and a CDM programme is developed for implementation at the national level. 1.2 CDERA coordinating unit is strengthened and restructured for effectively supporting the adoption of CDM in member countries.	OUTPUTS 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 and/or strengthened.	OUTPUTS 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 DRM. 3.2 DRM capacity enhanced for lead sector agencies, national and regional insurance entities, and financial institutions.	OUTPUTS 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.

(continued)

<p>OUTPUTS</p> <p>1.3 Governments of participating States/territories support CDM and have integrated CDM into national policies and strategies.</p> <p>1.4 Donor programming integrates CDM into related environmental, climate change and disaster management programming in the region.</p> <p>1.5 Improved coordination at national and regional levels for disaster management.</p> <p>1.6 System for CDM monitoring, evaluation and reporting being built.</p>	<p>OUTPUTS</p> <p>2.3 Improved understanding and community-based knowledge sharing on priority hazards.</p> <p>2.4 Existing educational and training materials for comprehensive disaster management are standardized in the region.</p> <p>2.5 A strategy and curriculum for building a culture of safety is established in the region.</p>	<p>OUTPUTS</p> <p>3.3 Hazard information and DRM is integrated into sectoral policies, laws, development planning and operations, and decision-making in tourism, health, agriculture and nutrition, planning and infrastructure.</p> <p>3.4 Prevention, mitigation, preparedness, response, recovery and rehabilitation procedures developed and implemented in tourism, health, agriculture and nutrition, planning and infrastructure.</p>	<p>OUTPUTS</p> <p>4.3 Communities more aware and knowledgeable on disaster management and related procedures including safer building techniques.</p> <p>4.4 Standardized holistic and gender-sensitive community methodologies for natural and anthropogenic hazard identification and mapping, vulnerability and risk assessments, and recovery and rehabilitation procedures developed and applied in selected communities.</p> <p>4.5 Early warning systems for disaster risk reduction enhanced at the community and national levels.</p>
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Source: Caribbean Disaster Emergency Response Agency. 2007. *CDM strategy and programme framework 2007–2012*. Bridgetown.

TABLE 2

Content of the Caribbean Community Common Fisheries Policy highlighting CCA and DRM aspects

Section of CCCFP	Summary of content
Preamble	Refers to the instruments and country commitments that give context.
Definitions	Sets out meanings of aquaculture, ecosystem approach to fisheries (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 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".

Section of CCCFP	Summary of content
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 organizations	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 on in the action plan. Table 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 3
Fit of fisheries and aquaculture into the Regional Framework taking into account CDM and CCCFP

Strategy elements	Goals	Priority for fisheries, aquaculture
1. Mainstream CCA 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) ¹¹ by furthering institutional capacity, strengthening the knowledge base and deepening awareness and participation.	Assess the vulnerability and risks associated with a changing climate.	High priority for watersheds, coasts, nearshore and open-sea ecosystems.
	Reduce vulnerability to a changing climate.	High priority, especially from a livelihoods perspective that integrates many features and should be of concern to all.
	Effectively access and utilize resources to reduce vulnerability to a changing climate.	High priority, as resource mobilization is key, including making better use of existing resources through networking.
	Build a society that is more informed about and resilient to a changing climate.	High priority because awareness and information runs through all of the instruments prominently.
	Build the CCCCC's capacity to support the implementation of the strategy.	Low priority given the several other initiatives contributing to this goal.
	Reduce the region's carbon footprint through the promotion of energy efficiency measures.	<i>Medium</i> priority because small-scale fisheries and all but highly intensive aquaculture are fairly efficient.

¹¹ Caribbean Planning for Adaptation to Climate Change; Adaptation to Climate Change in the Caribbean; Mainstreaming Adaptation to Climate Change; Special Pilot Adaptation to Climate Change.

Strategy elements	Goals	Priority for fisheries, aquaculture
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, when combined, represent the largest threats to the well-being of the CARICOM countries.	Promote the adoption of measures and disseminate information that would make water supply systems resilient to climate-induced damage.	Medium priority for aquaculture at small-to medium-scales because many other factors also come into play.
	Promote the implementation of measures to reduce climate impacts on coastal and marine infrastructure.	High priority for coastal settlements ancillary services (e.g. boatyards), post-harvest facilities and access to the coast and nearshore generally.
	Promote the adoption of measures and dissemination of information that would adapt tourism activities to climate impacts.	Medium priority because, although there are many actual or potential interactions between aquaculture, tourism and fisheries, the links tend to be indirect unless physical.
	Promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate-induced damage.	High priority because it encompasses both habitat degradation and biodiversity conservation, but also applies to most freshwater aquaculture systems except closed systems.
	Promote the adoption of sound practices and measures to prevent and/or reduce climate-induced health impacts in the community.	Medium priority because, 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 bioaccumulation may be a hazard.
3. Promote actions to reduce greenhouse gas emissions through fossil fuel reduction and conservation, and switching to renewable and cleaner energy sources.	Promote the use of renewable energy resources.	Medium priority as for carbon footprint; energy sector innovations are likely to be applied or adapted.
	Support the assessment of wind potential to supply electric power in CARICOM countries.	Medium priority for aquaculture on shore, but low for fisheries except if offshore wind farms are introduced.
	Support the development of innovative financing mechanisms for the deployment of solar water heaters (SWHs).	Low priority for water heaters, but medium for solar technology that can be applied to both fisheries and aquaculture for economics and safety.
	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.
	Assess the economic viability and 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.	All strategic actions (not goals): Revise building codes to include restricting construction in areas susceptible to coastal flooding, landslides or tidal surges.	High priority given that most labour and physical infrastructure for fishing and coastal aquaculture is located in coastal settlements.
	Develop new standards for road construction to ensure adequate surface drainage.	Low priority because roads that serve fisheries and aquaculture are often part of public service infrastructure.
	Implement integrated land-use planning.	High 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, and to ensure safe systems for the treatment of wastewater and other forms of waste so as to reduce public health risks.	Medium to high (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.	High priority because awareness and information runs through all goals.
	Develop new legal tools that make for a more responsive insurance industry.	High priority for both fisheries and aquaculture where insurance is scarce and capital costs increasing.

Strategy elements	Goals	Priority for fisheries, aquaculture
5. Promote actions to derive social, economic and environmental benefits from the prudent management of standing forests in CARICOM countries.	Promote the adoption of best practices for sustainable forest management.	Medium priority from an ecosystem approach that considers watershed impacts on habitat degradation.
	Engage in negotiations with international partners to mobilize resources for the protection of standing forests.	Low priority except in areas used for aquaculture and concerned with the coastal impacts from watersheds.
	Undertake research aimed at improving current methodologies for estimating carbon sequestration rates in tropical forests.	Low priority because very indirect link to fisheries and aquaculture matters.

Source: Based on: Caribbean Community Climate Change Centre. 2012. *Delivering transformational change 2011–21: implementing the CARICOM regional framework for achieving development resilient to climate change*. Belmopan.

Our analysis highlights several areas of high priority that focus mainly on knowledge mobilization, 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 its 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 the national and local levels across sets of countries in the programme proposal, achieving the vertical and lateral integration that all 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 IP¹². The database of initiatives in the region suggests that much is happening, 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 plan focus most on the zone of convergence, while not ignoring geological hazards. Technological hazards, such as those caused by radioactivity, chemical spills and other human actions 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 mobilizing limited resources, policy-setting and decision-making, and monitoring”. It is described in Chapter 2 of the IP thus:

1. **One coordinating mechanism to manage the process** (note, in the IP, we recommend that there be a regional coordinating mechanism and separate national coordinating mechanisms in each country).
2. **One plan that provides the framework for coordinated action by all partners** (note “one plan” means one agreed set of shared and common goals and objectives that can be contained within various individual documents).
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 monitoring and evaluation measures).

The second principle strongly encourages interested parties to build upon the existing content of the IP, customizing 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;

¹² www.caribbeanclimate.bz/projects/planning-for-climate-compatible-development-in-the-caribbean.html

- 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 a preliminary indication as to the level (or levels) at which action should take place;
- set out strategic actions to be easily used to construct a programme proposal.

The strategy and action plan follow 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, time frame, estimated cost and links to existing actions. We omit those columns that 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 are organized 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 lack of evenness among elements is not problematic once the issues are addressed. The subsections 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 paid 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. However, this 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 or 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 the ecosystem approach to fisheries (EAF) or ecosystem approach to aquaculture (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 area, along with the shore-based post-harvest operations in fisheries. Applications to fishing vessels and harvest operations are likely to be fewer although fuel consumption and costs are major issues. These areas fit well within the region’s green economy thrust and are likely to receive attention as resources are mobilized 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 greenhouse gas (GHG) emitters in comparison with 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 the SES and is compatible with livelihood perspectives in order to focus more on the local individual, household and community levels.

Owing to its 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. The opportunity exists 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 SESs. 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 that 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 affect 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 EAFs and EAAs. 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 between 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 essential for effective and timely resilience building to the hazard risks associated with a changing climate.
- Investing in building resilience to a changing climate is an investment in sustainable development.
- Investing in proactively building resilience 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 organizations must be an integral part of building resilience 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>Goal 1: assess the vulnerability and risks associated with a changing climate Objective: manage the adverse effects of climate change on coastal and marine resources Outcomes:</p> <ul style="list-style-type: none"> • coral reef research programme institutionalized and providing data to guide scientific research by 2021; • increased output of peer-reviewed and published research for contribution to teaching of climate science and to Intergovernmental Panel on Climate Change (IPCC) use. 	High	priority

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 the University of the West Indies (UWI) Centre for Marine Sciences and national agencies.	Coastal zone and marine	Regional National
Implement and institutionalize regional coral reef research programmes at the Centre for Marine Sciences of the UWI (CMS) and Centre for Resource Management and Environmental Studies (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
Environmental Research Institute (ERI) University of Belize to be provided with 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, flying fish, groupers, snappers) and the social and economic impacts (food security, employment, income, etc.) based on different climate scenarios (temperature, salinity, pH, etc.) to facilitate planning, decision-making and disaster risk management (DRM).	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, seagrass beds, mangrove systems, to document location, state of health and contribution to economic development.	Coastal zone and marine	Regional National
Formulate, adopt, implement and review 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 freshwater species to diversify industry, reduce pressures on the living marine resources and build coastal community resilience.	Coastal zone and marine	Regional National
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 organizations 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 Caribbean Regional Fisheries Mechanism (CRFM) and related institutions to coordinate, monitor and support the mainstreaming of climate consideration and disaster risk reduction 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 postdoctoral programmes. More models will be investigated and utilized that are relevant to the region and that can provide resolution down to 10 km ² grids. International cooperation with technical partners will continue.	Multisector	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 programme under the leadership of the Caribbean Institute of Meteorology and Hydrology (CIMH) will be in place. Technical coordination and leadership will be the responsibility of the CIMH, National Oceanic and Atmospheric Administration, and the Department of Survey and Land Information of UWI (DSL) of the UWI.	Multi sector	Regional
Goal 1: assess the vulnerability and risks associated with a changing climate (continued) Objective: reduce greenhouse gas (GHG) emissions through the promotion and use of renewable and alternative energy sources Outcomes: (none stated)	High	priority
Develop and/or implement new research and teaching areas in alternative energy, waste management, resource economics and geographic information systems / remote sensing.	Coastal zone and marine Energy	Regional

Action	Sector or area	Activity level
Goal 2: reduce vulnerability to a changing climate Objective: limit the effects of climate change on agriculture and food security Outcomes: <ul style="list-style-type: none"> adequate food supplies being produced to meet the region's food and nutrition needs by 2021 	High	priority
Prepare and implement agriculture sector adaptation strategies for selected countries, learning from the Guyana experience.	Agriculture	Regional National
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 integrated water resources management strategies in all countries.	Water	National
Establish water resources management agencies where necessary and provide additional support where agencies exist.	Water	National
Goal 3: effectively access and utilize resources to reduce vulnerability to a changing climate Objective: use of forests to support sustainable development while reducing GHG emissions Outcomes: <ul style="list-style-type: none"> common negotiating position on forest issues at the United Nations Framework Convention on Climate Change (UNFCCC) 	High	priority
Information sharing and coordination between countries at the Conference of the Parties serving as the Meeting of the Parties (COP/MOP) on Comprehensive Disaster Management (CDM), REDD+ and other forest-related initiatives.	Forestry	National
Training and capacity building in REDD+ negotiations, CDM project development, preparation of nationally appropriate mitigation actions and development of national low-carbon strategies.	Capacity building	Regional National
Coordinated and common negotiation strategy at UNFCCC.	Multisector	Regional National
Goal 4: promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate-induced damage Objective: (none stated) Outcomes: (none stated)	High	priority
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).	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 DRM issues).	Coastal and marine	Regional National
Incorporate climate change and the principles of sustainable land management 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
Goal 5: build the Caribbean Community Climate Change Centre's capacity to support the implementation of the strategy Objective: realize the objectives set out in the agreement establishing the CCCCC Outcomes: <ul style="list-style-type: none"> climate change mitigation and adaptation responses in the region are coordinated in an efficient and transparent manner 	Low	priority
No action clearly related to fisheries or aquaculture.		
Goal 6: reduce the region's carbon footprint through the promotion of energy efficiency measures Objective: (none stated) Outcomes: (none stated)	Medium	priority

Action	Sector or area	Activity level
Develop and implement climate change and DRM awareness/education/information programme (including relevant fora, websites, databases, publications, toolkits, guidelines) targeted to key tourism sector, subsectors and stakeholders (public/private sector organizations, civil society/NGOs, 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>Goal 1: mainstream DRM into fisheries and aquaculture at multiple levels 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 Outcomes:</p> <ul style="list-style-type: none"> • CCA and DRM integrated into sustainable fisheries and aquaculture at all points in the fish chain rather than added as an afterthought; • changed mindset and behaviour among diverse stakeholders to adequately understand and address risks from a variety of sources and be proactive. 	High	priority
More closely link poverty reduction to multisector 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 for 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 fishery body, to advocate the inclusion of fisheries and aquaculture into DRM and CCA through CARICOM's regional and national mechanisms.	Fisheries and aquaculture	Multilevel
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 ecosystem-based management 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>Goal 1: promote the adoption of measures and disseminate information that would make water supply systems resilient to climate-induced damage Objective: manage the adverse effects of climate change on water resources Outcomes:</p> <ul style="list-style-type: none"> • integrated water resources management policies and strategies in place for prudent management of water resources; • appropriate distribution and storage infrastructure in place to satisfy water quality and demand across all sectors; • measures are in place to facilitate installation of resilient infrastructure to cope with extreme events (floods and droughts.) 	Medium	priority

Action	Sector or area	Activity level
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
Goal 2: promote the implementation of measures to reduce climate impacts on coastal and marine infrastructure Objective: manage the effects of climate change on coastal and marine area Outcomes: <ul style="list-style-type: none"> reduced vulnerability and increased resilience of coastal communities and infrastructure; reduced vulnerability and increased resilience of coastal and marine ecosystems; strengthen food security, availability and distribution infrastructure and mechanisms to meet the requirements during normal times and during disasters. 	High	priority
Mangrove reforestation in selected coastal areas of Jamaica, 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 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
Goal 3: promote the adoption of measures, and the dissemination of information, that adapt tourism activities to climate impacts Objective: reduced vulnerability and increased resilience of the tourism sector to the adverse impacts of climate change Outcomes: <ul style="list-style-type: none"> enhance the integration of the CCA and DRM strategies and response measures into the tourism sector; policy- and decision-makers are provided with research findings for planning and decision-making; appropriate adaptation and mitigation policies, strategies and plans implemented. 	Medium	priority
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
Goal 4: promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate-induced damage Objective: (none stated) Outcomes: (none stated)	High	priority
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
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).	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 DRM issues).	Coastal zone and marine	Not stated [Regional National]
Incorporate climate change and the principles of sustainable land management into coastal physical planning and development procedures.	Coastal zone and marine	Not stated [Regional National]

Action	Sector or area	Activity level
Ensure that tourism policies and plans conform to the principles of sustainable tourism.	Coastal zone and marine	Not stated [Regional National]
<p>Goal 5: promote the adoption of sound practices and measures to prevent and/or reduce climate-induced health impacts in the community</p> <p>Objective: limit the effects of climate change on human health</p> <p>Outcomes:</p> <ul style="list-style-type: none"> • measures are in place to prevent or reduce the incidence of diseases and health-related issues exacerbated by climate change; • Monitoring and early warning systems are in place to enable effective first response and management during and after events/episodes. 	Medium	priority
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 well-being and health.	Health	National

Additional

Action	Sector or area	Activity level
<p>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</p> <p>Objective: manage the adverse effects of climate change and disasters on fisheries and aquaculture</p> <p>Outcomes:</p> <ul style="list-style-type: none"> • policies and strategies in place for prudent public and private sector management of risks; • measures are in place to facilitate resilient social ecological systems to cope with extreme events. 	Medium	priority
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 to strengthen 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 dependence.	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>Goal 1: promote the use of renewable energy resources Objective: adopt energy efficiency and conservation methods Outcomes:</p> <ul style="list-style-type: none"> • policies and legislation in place to remove barriers and promote investment in renewable and alternative energy; • energy reduction target in place at the CARICOM level; • demand side power management institutionalized in the region. 	Medium	priority
No action clearly related to fisheries or aquaculture.		
<p>Goal 1: promote the use of renewable energy resources (continued) Objective: reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources Outcomes:</p> <ul style="list-style-type: none"> • renewable energy provides up to xx percent of energy supply in CARICOM countries as a group by 2021. 	Medium	priority
No action clearly related to fisheries or aquaculture.		
<p>Goal 2: support the assessment of wind potential to supply electric power in CARICOM countries Objective: reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources Outcomes: (none stated)</p>	Medium	priority
No action clearly related to fisheries or aquaculture.		
<p>Goal 3: support the development of innovative financing mechanisms for the deployment of solar energy (water heaters, etc.) Objective: reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources Outcomes: (none stated)</p>	Medium	priority
No action clearly related to fisheries or aquaculture.		
<p>Goal 4: assess the feasibility of converting waste to energy in CARICOM countries Objective: reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources Outcomes: (none stated)</p>	Low	priority
No action clearly related to fisheries or aquaculture.		
<p>Goal 5: assess the economic viability and environmental impact of shore-based ocean thermal energy conversion plants Objective: reduce GHG emissions through the promotion and use of renewable energy and alternative energy sources Outcomes: (none stated)</p>	Low	priority
No action clearly related to fisheries or aquaculture.		

Additional

Action	Sector or area	Activity level
<p>Goal 1: in aquaculture and fisheries, promote the use of renewable energy resources and the conversion of waste into new by-products Objective: improve energy efficiency and conservation, and waste utilization consistent with global green economy initiatives Outcomes:</p> <ul style="list-style-type: none"> • policies and programmes in place to promote investment in affordable renewable and alternative energy advances; • energy demand in fisheries and aquaculture declines at all points along the value chain; • income to support livelihoods is generated from items that were waste. 	Medium	priority

Action	Sector or area	Activity level
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
Goal: (not stated, so revert to the language of the strategic element) Objective: limit the effects of climate change on agriculture and food security Outcomes: <ul style="list-style-type: none"> enhanced food security through adequate food supplies being produced to meet the region's food and nutrition needs by 2021; enhanced and secured livelihoods in the agriculture sector. 	High	priority
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 between individual countries, based on needs and local conditions.	Agriculture	Regional National
Regional and national emergency preparedness institutions to become an integral part of the CCA response strategy.	Agriculture Coastal zone	Regional National
Goal: (not stated, so revert to the language of the strategic element) Objective: limit the effects of climate change on agriculture and food security Outcomes: <ul style="list-style-type: none"> add value to agriculture production through processing. 	High	priority
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
Goal: (not stated, so revert to the language of the strategic element) Objective: limit the effects of climate change on fisheries and aquaculture contribution to food security Outcomes: <ul style="list-style-type: none"> enhanced food security through adequate food supplies being produced to meet the region's food and nutrition needs by 2021; enhanced and secured livelihoods in the fisheries and aquaculture sector. 	High	priority
Use network and institutional analysis as tools to establish institutional arrangements that easily span local, national and regional levels.	Fisheries and aquaculture	Multilevel
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	Multilevel
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	Multilevel
Ensure that, while strengthening coastal community-based organizations in DRM/CCA, they are sensitized to fisheries and aquaculture, preferably by linking them to site-based fisherfolk organizations.	Fisheries and aquaculture	Multilevel
Build public sector – private sector (social) partnerships at national level in CRFM countries to better mobilize resources, including knowledge.	Fisheries and aquaculture	Multilevel

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

Existing

Action	Sector or Area	Activity Level
<p>Goal 1: promote the adoption of best practices for sustainable forest management Objective: use of forests to support sustainable development while reducing GHG emissions Outcomes:</p> <ul style="list-style-type: none"> • policies and legislation are based on scientific assessments • protocols and manuals as part of management plans to guide operations within forests and protected areas; • value added to timber through production and processing of wood products in-country. 	Medium	Priority
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>Goal 2: engage in negotiations with international partners to mobilize resources for the protection of standing forests Objective: use of forests to support sustainable development while reducing GHG emissions Outcomes:</p> <ul style="list-style-type: none"> • common negotiating position on forest issues at UNFCCC; • significant resources mobilized to support national sustainable development initiatives. 	Low	Priority
No action clearly related to fisheries or aquaculture.		
<p>Goal 3: undertake research aimed at improving the current methodologies for estimating carbon sequestration rates in tropical forests Objective: use of forests to support sustainable development while reducing GHG emissions Outcomes:</p> <ul style="list-style-type: none"> • research programmes in place to support forest and protected areas management. 	Low	Priority
No action clearly related to fisheries or aquaculture.		

Additional

Action	Sector or Area	Activity Level
<p>Goal 1: promote sustainable forest policy and management that incorporates ecosystem approaches to fisheries and aquaculture Objective: use of forests to support sustainable development and maintain services from connected ecosystems Outcomes:</p> <ul style="list-style-type: none"> • improved policies and plans based on comprehensive resource valuation; • plans and practices in forested areas are guided by ecosystem approaches. 	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 aquaculture	Multilevel
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 aquaculture	Multilevel

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) 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 CO₂ reductions of at least 45 percent by 2020 and reducing greenhouse gas emissions by more than 95 percent 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 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".

4 July 2009

Issued at the conclusion of the 30th Meeting of the Conference of Heads of Government of the Caribbean Community, 2–5 July 2009, Georgetown, Guyana.

The Strategy and action plan are part of an initiative of the Caribbean Regional Fisheries Mechanism (CRFM) and the Food and Agriculture Organization of the United Nations (FAO) on climate change adaptation and disaster risk management in fisheries and aquaculture in the CARICOM and wider Caribbean region. The aim was to develop a strategy and action plan for integrating disaster risk management (DRM), climate change adaptation (CCA) and fisheries and aquaculture, with a focus on small-scale fisheries (SSF) and small-scale aquaculture. The strategy and action plan were reviewed and refined by 65 local, national and regional stakeholders during the regional workshop on the Formulation of a strategy, action plan and programme proposal on disaster risk management and climate change adaptation in fisheries and aquaculture in the CARICOM and Wider Caribbean Region, which was held in Kingston, Jamaica, from 10 to 12 December 2012. The Strategy and action plan were subsequently adopted by CRFM member states in 2013.