

Improving the Outlook for Caribbean Coral Reefs

A Regional Plan of Action 2014 – 2019





The Australia Caribbean Coral Reef Collaboration brings together coral reef managers and policymakers from different sides of the planet to share expertise and knowledge, to explore new ideas and to initiate joint projects that can help improve the outlook for Caribbean coral reefs in the face of climate change.

The Australia Caribbean Coral Reef Collaboration 2012 – 2014 was supported by the Australian Government through the Department of Foreign Affairs and Trade (DFAT) Australian Aid program. Implementation of the program was led by Australia's Great Barrier Reef Marine Park Authority (GBRMPA) in partnership with the Caribbean Community Climate Change Centre (CCCC) under the auspices of the Caribbean Community Secretariat (CARICOM).

Further information about the work of the Australia Caribbean Coral Reef Collaboration can be found at www.climateandreefs.org

Published by Great Barrier Reef Marine Park Authority, Townsville, Australia on behalf of the Australia Caribbean Coral Reef Collaboration

Copyright © Commonwealth of Australia 2014

Reproduction of this publication for educational or other non-commercial purposes is authorised without prior written permission from the copyright holder provided the source is fully acknowledged. Reproduction of this publication for resale or other commercial purposes is prohibited without prior written permission of the copyright holder.

Improving the outlook for Caribbean coral reefs: a regional plan of action 2014-2019 / Australia Caribbean Coral Reef Collaboration.

ISBN 978 1 922126 39 9 (eBook)

1. Coral reefs and islands -- Caribbean Area.
Coral reefs and islands -- Economic aspects.
2. Coral reef ecology -- Caribbean Area.
3. Climatic changes -- Environmental aspects.
4. Australia Caribbean Coral Reef Collaboration.

577.789365

Please cite this publication as:

Australia Caribbean Coral Reef Collaboration 2014, Improving the outlook for Caribbean coral reefs: A Regional Plan of Action 2014-2019, Great Barrier Reef Marine Park Authority, Townsville.

Available from:

Caribbean Community Climate Change Centre

2nd Floor, Lawrence Nicholas Building

Ring Road, P.O. Box 563

Belmopan, Belize, Central America

Phone: +(501) 822-1094 or +(501) 822-1104

Fax: +(501) 822-1365

Email: info@caribbeanclimate.bz

Available online at www.climateandreefs.org and www.caribbeanclimate.bz

Coordinating editor: Paul Marshall (paul.marshall00@gmail.com)

Editors: Paul Marshall, Anna Dowd, Nellie Catzim, Keith Nichols

Production: Anna Dowd, Tali Dunnage-Burke

Photography credited as follows:

All photography provided by Paul Marshall, excepting:

Jeff Maynard - Cover (Diver); Page 11 (Fisher); Page 16 (Man)

Peter McGinnity - Page 18 (Fishers)

Nellie Catzim - Page 20 (Reef Guardians)

Hazel Oxenford - Page 22 (Marine Rangers)

This is a climate neutral publication. All greenhouse gases generated in the production have been offset by funding clean energy projects. Visit www.climatefriendly.com for further information.



Improving the Outlook for Caribbean Coral Reefs

A Regional Plan of Action 2014 - 2019

Understanding and addressing the climate change risks for coral reefs - including the communities and economies that depend on them - is critical to the region's goal of achieving development resilient to climate change.

Climate Change and the Caribbean:
A Regional Framework for Achieving Development Resilient to Climate Change (2009-2015) CARICOM

Contents

Foreword	5
Executive Summary	6
Introduction.....	7
Guiding action: Goals, objectives & strategies.....	7
GOAL 1. Improve the health and resilience of Caribbean coral reefs.....	7
GOAL 2. Strengthen adaptive capacity of communities	7
GOAL 3. Build foundations for national and regional action	7
GOAL 4. Advocate globally for stronger action on climate change	7
Implementing the Regional Plan of Action.....	7
Appendices	7

Foreword

Coral reefs are central to the health of the Caribbean Sea and to the well-being of Caribbean societies. Addressing the risks to these systems is a key element of the CARICOM response to climate change. This Coral Reef Plan of Action identifies the priority challenges for sustaining the benefits from coral reefs under a changing climate. It forms an essential pillar in our collective efforts to achieve the goals of the Liliendaal Declaration, the Regional Framework for Achieving Development Resilient to Climate Change issued by CARICOM Regional Heads of Government in 2009, and the associated Implementation Plan endorsed in 2012.

Our natural resources represent the foundation on which our economies are grounded and on which our sustainable future is poised. We all recognise that our own activities continue to undermine the integrity of these vital natural resources. The resilience of our reefs is threatened by overfishing, dredging, sewage, oil and bilge water, increased run-off from agricultural and construction activities, and coastal development, just to name a few. The serious and alarming decline in the health of our reefs not only results in tremendous loss of biodiversity but also puts at risk the substantial revenues gained from the environmental benefits that they provide.

Tourism remains one of our most important of sectors given its contribution to economic growth. Fishing is another important activity throughout the region, and in many CARICOM nations it underpins the social and economic well-being of local communities. Our diverse coral reefs are vital to the sustainability of these sectors, and the worrying fate of coral reefs threatens the viability and prosperity of the Caribbean.

We are convinced that every effort must be made to eliminate the human-induced stresses on our natural systems. Our greatest challenge is to find a formula that affords reefs the best opportunities for survival at the same time sustaining and restoring essential ecosystem services in the face of a changing climate. The region does not possess all the resources required to address this challenge and it is for this reason that we must embrace every opportunity to help our reefs survive.

The assistance provided under the umbrella of the Australia Caribbean Coral Reef Collaboration in developing this Plan and related activities is a valued complement to the range of other initiatives aiming to build the resilience of Caribbean coral reefs.

However, a plan is just a collection of words unless it is funded and implemented. We hope that this plan is just the first step toward a coordinated program of action that will improve the outlook for our marine ecosystems. The call for support could not be more clearly articulated and it is our collective responsibility to ensure that it goes the whole way towards achieving its stated objectives.

We are very pleased to be a part of this collaborative initiative and pledge the fullest support of our organizations for the serious work that lies ahead.



Mr. Milton Haughton
Executive Director
Caribbean Regional
Fisheries Mechanism Secretariat



Dr. Kenrick Leslie
Executive Director
Caribbean Community Climate
Change Centre

Executive Summary

A key element of the Caribbean region's vulnerability to climate change is the threat to coral reef ecosystems. Regional Heads of Government throughout the Caribbean have recognized the important role that coral reefs play in national economies and their crucial contribution to sustainable development. Accordingly, governments, regional leaders and coastal communities have begun to take measures to address the region's vulnerability and build resilience to climate change.

The Coral Reef Plan of Action provides a roadmap for navigating the challenges of sustainably managing coral reefs to protect biological diversity while sustaining provision of goods and services that these ecosystems provide to the people of the Caribbean.

The plan presents a set of objectives for improving the outlook for Caribbean reefs by 2018. These are the result of regional consultations that identified the priority needs expressed by regional leaders, stakeholders, officials and experts who together have accumulated the experience required for tackling the issues faced in the sustainable management of Caribbean coral reefs. The objectives are grouped under four goals:

1. Improve the health and resilience of Caribbean coral reefs
2. Strengthen adaptive capacity of communities
3. Build foundations for national and regional action
4. Advocate globally for stronger action on climate change

Investment in achieving the goals and objectives in this plan will be further guided through development of an associated implementation plan, and a program of monitoring, evaluation and reporting. With the support of the Caribbean Community Climate Change Centre, the Caribbean Regional Fisheries Mechanism will lead implementation of this plan to ensure it has the best chance of building the resilience of coral reefs to the impacts of climate variability and change in the Caribbean region.

This Coral Reef Plan of Action is aligned with relevant initiatives, sub-regional strategies and plans targeted at Caribbean coral reefs. These include the Caribbean Regional Fisheries Mechanism's Climate Change Adaptation and Disaster Risk Management Strategy and Action Plan, the 2012 Report Card for the Mesoamerican Reef, and the Strategic Action Programme for the Sustainable Management of the Shared Living Marine Resources of the Caribbean Large Marine Ecosystems and Adjacent Regions (CLME+SAP).

The Plan supports the vision articulated in the *Liliendaal Declaration* and contributes to strategic elements and goals elaborated in the *Regional Framework for Achieving Development Resilient to Climate Change* (Regional Framework) and its associated *Implementation Plan* (see Appendix 1). Through an integrated approach across these strategic initiatives, the Coral Reef Plan of Action will help build regional coordination and national commitment, motivate actions and stimulate much-needed support and investment from the international community in a coordinated effort to improve the outlook for Caribbean coral reefs.



Introduction



Coral reefs and adjacent coastlines are at the heart of Caribbean history, and remain the lifeblood of modern life in the region. They provide benefits to the region valued at over US\$3.1 to 4.6 billion annually¹, along with shoreline protection, habitat for healthy fisheries and natural infrastructure that supports the economically vital tourism sector. They are also internationally significant, representing unique biodiversity totalling approximately 10 per cent of the world's reef area².

However, Caribbean coral reefs are also under unprecedented pressure. Key coral species have declined dramatically, most reefs are overfished, one third are under threat from coastal development and 20 per cent are stressed by watershed-based pollution. In combination, more than 75 per cent of Caribbean reefs are affected by local threats¹. Unfortunately, the situation is likely to deteriorate further with the accelerating effects of climate change. Coral bleaching and disease outbreaks are becoming more prevalent as the world's oceans warm, leading to predictions that the combination of local pressures and climate-related threats will see 90 per cent of Caribbean reefs at risk by 2030².

With an estimated 60 per cent of the Caribbean's population living within 1.5km of the shoreline³, and significant numbers of visitors targeting beach resorts and coral reef experiences for their vacation, climate change and climate variability are key issues for the Caribbean. Regional leaders have expressed grave concerns that efforts to promote sustainable development and achieve Millennium Development Goals are failing; in particular, the vulnerability of coral reefs and associated environments puts at risk the range of economic, social and biodiversity benefits that they provide.

¹ Reefs at Risk in the Caribbean. World Resources Institute 2004.

² Reefs at Risk Revisited. World Resources Institute 2011.

³ Summary of DFID's work in the Caribbean 2011-2015. UK Department for International Development 2012

Coral reefs – harbingers of change

Understanding climate change threats and their interaction with local pressures is fundamental to our ability to sustainably manage coral reefs into the future. Increasing human populations and growing prosperity are adding new stresses and undermining the ability of reefs to tolerate environmental disturbances. Many of the threats from human activities have local sources, such as overfishing, coastal and cay development, cruise ship tourism, invasive species and terrestrial run-off (sediments and agrochemicals).

Global climate change and ocean acidification are adding to this cocktail of local stresses. Together, the cumulative stress affecting reefs add up to an unprecedented threat to reef ecosystems and the natural capital they provide to Caribbean societies.

At the heart of the vulnerability of coral reefs to these global changes is the sensitivity of corals to small increases in sea temperature. Corals have evolved under conditions of very stable temperature, and most are not well equipped to deal with temperatures outside their normal range. The most dramatic effect of rising sea temperatures is coral bleaching.

As global warming is increasing the amount of heat stored in the oceans, the occurrence of stressful temperatures has increased in frequency and severity. Already, this has caused serious damage to coral reefs all around the world, including the Caribbean. The corals of the Caribbean have also been severely impacted by disease outbreaks, which appear to be more prevalent after coral bleaching events and in locations exposed to local human pressures such as pollution⁴. These stresses, in combination with local stresses and disease in sea urchins, have driven a sustained, region-wide decline in health of Caribbean coral reefs over the last several decades⁵.



Increasing emissions of greenhouse gases into the atmosphere also has other implications for coral reefs. Ocean acidification, resulting from increased transfer of CO₂ from the atmosphere into sea water, is having a less visible, although potentially more worrying, effect on corals. As the pH of seawater decreases (becomes more acidic), corals struggle to build the limestone skeleton that provides the physical foundations of coral reef ecosystems.

The vulnerability of reefs leads to projections of further serious decline under a changing climate. While business as usual leads to a very dim outlook for Caribbean coral reefs, there is much that can be done at the local, national and regional scale to reduce pressures and restore the natural resilience of these dynamic ecosystems.

Building the capacity of Caribbean coral reef managers, local communities and other stakeholders to tackle issues at all scales is essential to the future of Caribbean reefs and the economic and social wellbeing that they support. The need to address these risks highlights the urgent need to fund and coordinate efforts that can improve reef resilience, strengthen the adaptive capacity of reef-dependent communities, build the foundations for regional action and advocate for stronger action on climate change.

4 Riegl, B., A. Bruckner, S. L. Coles, P. Renaud, and R. E. Dodge. 2009. "Coral Reefs: Threats and Conservation in an Era of Global Change." *Annals of the New York Academy of Sciences* 1162: 136–186.

5 Gardner, T. A., I. M. Cote, J. A. Gill, A. Grant, and A. R. Watkinson. 2003. "Long-Term Region-Wide Declines in Caribbean Corals." *Science* 301: 958–960.

Understanding and addressing the climate change risks for coral reefs – including the communities and economies that depend on them – is critical to the region’s goal of achieving development resilient to climate change (CARICOM’s Regional Framework for Achieving Development Resilient to Climate Change 2009-2015). Regional leaders recognize that coral reefs are a key component of the natural capital essential for sustainable development in the Caribbean, and there is now wide acknowledgement that coral reefs are facing a crisis.

Fortunately, there is also a strong basis for optimism: much can be done to improve the outlook for Caribbean reefs. There is abundant evidence that reducing local pressures can help restore the natural resilience of coral reefs and improve their ability to cope with climate change. Reducing nutrient pollution (from fertilizers and sewage) assists corals in surviving warmer temperatures and prevents overgrowth of corals by seaweeds. Reducing damage to mangrove and seagrass beds through the preservation of healthy, pristine areas helps reefs become more resilient by stabilizing sediments and supporting fish populations important for reef maintenance.

Protecting populations of key fish species can reduce disease risk and help reefs recover after extreme climate events like storms. In addition, implementing measures that ensure coastal development is sustainable will minimize losses to near shore reefs that are important to local communities.

In the face of climate change and climate variability, efforts on the local, national and regional scales to strengthen the resilience of coral reefs have never been more important for the people of the Caribbean.

There is much to lose if we fail to improve the resilience of Caribbean coral reefs. Further degradation of the region's reefs could cost US \$95-140 million per year in losses to coral reef-associated fisheries, US\$100-300 million per year through declines in dive tourism, and US\$140-420 million per year as a result of reduced shoreline protection services¹. Although largely un-quantified, the downstream economic costs of social impacts (food security, cultural identity etc.) of reef degradation further increase the case for urgent action. Efforts to minimize the losses to ecosystem services provided by reefs are expected to have high returns on

Regional Strength

This Coral Reef Plan of Action builds on or contributes to other regional and sub-regional initiatives, including the Caribbean Regional Fisheries Mechanism’s Climate Change Adaptation: the Disaster Risk Management Strategy and Action Plan; the 2012 Report Card for the Mesoamerican Reef; and the Strategic Action Programme for the Sustainable Management of the Shared Living Marine Resources of the Caribbean Large Marine Ecosystems (CLME+SAP).

The Plan’s implementation will draw on experiences gained from initiatives such as C-Fish, funded by the UK Department for International Development (DFID) and implemented through CARIBSAVE.

The Coral Reef Plan of Action also complements the vision and activities of the Caribbean Challenge Initiative (CCI). Launched in 2008, the CCI is the first conservation initiative embraced by governments across the region.

Participating CCI countries and territories have committed to conserving at least 20 per cent of their near shore marine and coastal environments in national marine protected areas systems by 2020, as well as creating National Conservation Trust Funds, endowed by new sustainable finance mechanisms (such as tourism fees), dedicated to solely to funding park management.

Implementing priority strategies under the Coral Reef Plan of Action will help build the capacity and institutional support for countries participating in the CCI.

investment for the social stability and economic future of the region.

Improving the Outlook for Caribbean Coral Reefs – A Regional Plan of Action 2014-2019 (Coral Reef Plan of Action) is a roadmap for navigating the challenges of managing coral reefs in a changing climate. It provides the mechanism for guiding investment and coordinating action at the regional scale. It also sets the stage for an implementation plan that details specific activities, timing, funding and responsibilities needed to achieve the objectives and goals outlined within the Plan.

The Coral Reef Plan of Action was initiated in response to calls for CARICOM nations to ‘incorporate climate change as part of their national development planning processes while building a sound understanding of climate change science, and strengthening their participation in international environmental negotiations on climate change and related subjects’ (Regional Framework for Achieving Development Resilient to Climate Change 2009-2015). The goals and objectives in this Plan were developed through a series of workshops and consultations with coral reef managers, scientific experts, and officials from CARICOM Member States (Appendix 3: Contributors).

Improving the outlook for coral reefs is in the mutual interest of all nations of the Caribbean, and a rallying point for local, national and international efforts aimed at delivering sustainable development resilient to climate change. Concerted action supported by coordinated assistance from the international community is essential for securing the best possible future for coral reefs, and the millions of people who depend on them. This Coral Reef Plan of Action aims to tap into the great energy and momentum within the Region to reduce the pressures on coral reefs and improve the outlook for both the Caribbean Sea and Caribbean societies.

The next section presents the goals and objectives to guide action. A vision for implementation of the Plan is presented in the final section.

Guiding action: Goals, objectives & strategies



The Coral Reef Plan of Action is presented as sixteen (16) objectives grouped under four high-level goals for improving the outlook for Caribbean coral reefs by 2018. Actionable strategies provide guidance for achieving each objective. The objectives and strategies derive from priority requirements and recommendations identified by Caribbean leaders, officials and experts through a series of regional scoping workshops, meetings and reviews during 2012-2013.

Through these goals and objectives the Plan will address Strategic Elements of CARICOM's Regional Framework for Achieving Development Resilient to Climate Change and its associated Implementation Plan (summarised in Appendix 1). Appendix 2 presents a table that maps the contributions of the Coral Reef Plan of Action against relevant Strategic Elements of the Regional Framework.

The four high-level goals that structure the Plan are:

- Improve the health and resilience of Caribbean coral reefs
- Strengthen adaptive capacity of communities
- Build foundations for national and regional action
- Advocate globally for stronger action on climate change



GOAL 1. Improve the health and resilience of Caribbean coral reefs

The resilience of coral reefs is fundamental to their ability to recover from damaging events. With the acceleration of climate change, disturbances such as hurricanes and coral bleaching events are predicted to occur with increasing severity and frequency, making resilience even more important. However, most Caribbean reefs are also exposed to chronic local stresses that make them more vulnerable to disturbance. Local pressures such as overfishing, watershed-based pollution and coastal development are undermining the ability of coral reefs to sustain ecosystem services in a changing climate.

As reefs decline, people lose opportunities for earning their livelihood and often suffer declines in social wellbeing. Although many of the challenges associated with climate change and variability are daunting, there is much that can be done locally to reduce vulnerability. The intent of this goal is to identify key actions that can be taken by coral reef managers in collaboration with managers of watersheds, coastal zones and fisheries, as well as local communities to improve the resilience of coral reef ecosystems.

Objective 1.1 Support and expand Marine Protected Area (MPA) networks

This objective focuses on improving the effectiveness of marine protected areas (MPAs) through the support and expansion of existing MPA networks. There are 617 MPAs covering an area of 15,332km² - approximately 30 per cent of the Caribbean region's reefs; however, only 6 per cent by area (460km²) have been rated as fully effective⁶. The aim is to promote greater collaboration in planning and implementing management measures through strategies including:

- a) Establish agreements for sharing responsibilities and benefits across nations
- b) Identify and pursue public-private partnerships to strengthen MPA networks
- c) Promote south-south⁷ collaboration, exchange and internships
- d) Conduct regional marine spatial planning



⁶ Reefs at Risk in the Caribbean. World Resources Institute 2004.

⁷ South-south collaboration is a term historically used by policymakers and academics to describe the exchange of resources, technology, and knowledge between developing countries.

Objective 1.2 Strengthen existing Marine Protected Areas (MPAs)

This objective focuses on improving the effectiveness of Marine Protected Areas (MPAs) through targeted management interventions. It highlights the need for capacity building initiatives for marine resource managers, improved enforcement activities, increased financing, comprehensive planning and stronger partnerships among multi-sectoral users of the coastal zone and management agencies. It also promotes an increase in the area under full protection - from less than 1 per cent to at least 10 per cent. These strategies include:

- a) Enhance local management capacity
- b) Identify and pursue sustainable financing options
- c) Undertake policy reform to improve management of MPAs
- d) Develop and implement compliance and enforcement measures
- e) Improve management plan development by giving particular attention to zonation and allowable development activities within MPAs
- f) Identify and pursue public-private partnerships to enhance MPA management
- g) Expand no-take zones where possible

Objective 1.3 Respond to climate change risks

This objective aims to ensure that the risks associated with climate change are well understood by resource managers and resource users, and to make tools and approaches available for planning and adaptation strategies. It seeks to address the need to identify, monitor and mitigate the key local stressors for reefs. Proposed strategies include:

- a) Identify climate change vulnerabilities and incorporate these into planning and management
- b) Implement ecosystem-based adaptation measures
- c) Develop and implement adaptation planning tools (including user's guides)
- d) Develop regional guidelines and best practices for developers
- e) Identify, publish and maintain a register of research priorities
- f) Implement and institutionalize regional coral reef research
- g) Enhance data collection, analysis and application
- h) Raise awareness among policy and decision makers, resource managers, and resource users on the risks associated with climate change

Objective 1.4 Ensure extractive and non-extractive uses are sustainable

This objective aims to help ensure that both extractive and non-extractive uses, such as fishing and tourism, are not having significant effects on reef resilience. It seeks to provide long-term sustainability of the coral reef system and by so doing ensure healthy fish stocks for consumption and livelihood opportunities. Strategies include:

- a) Develop legislative and regulatory framework that promotes sustainable extractive and non-extractive use of marine resources



- b) Develop, enhance and implement compliance & enforcement measures
- c) Promote sustainable fishing practices
- d) Develop fish stock rehabilitation strategies and programmes
- e) Establish and implement spatial area management
- f) Ensure tourism policies and plans conform to principles of sustainable use through established or enhanced inter-agency cooperation
- g) Enhance public awareness and sensitization of sustainable extractive uses
- h) Conduct valuation of resources and communicate results to policy makers, decision makers and stakeholders

Objective 1.5 Reduce land-based pollution

This objective aims to accelerate progress toward reducing local pressures associated with pollution entering reef areas from watersheds, sewage and point source pollutants through a range of strategies. These include:

- a) Develop a legislative and regulatory framework to promote and improve integrated land and coastal area management
- b) Establish or enhance inter-agency cooperation
- c) Define and implement integration across watersheds and marine areas (Ridge-to-Reef approaches)
- d) Employ sustainable land use practices
- e) Institute compliance & enforcement measures
- f) Monitor & evaluate compliance and enforcement measures
- g) Establish mechanisms for public-private collaboration
- h) Enhance public awareness and sensitization of land based pollution

Objective 1.6 Protect coastal integrity

This objective aims to reduce local pressures associated with coastal development, maintain associated coastal ecosystems and minimize impacts on coral reefs through strategies that include:

- a) Develop legislative and regulatory framework to promote/improve management of the marine and coastal areas
- b) Develop and implement integrated coastal zone management plans
- c) Regulate coastal development to minimize ecosystem impacts
- d) Strengthen and deploy enforcement measures
- e) Enhance public awareness and sensitization on the negative impacts of unsustainable land use practices on coastal resources



Objective 1.7 Manage risks from invasive species

This objective provides strategies for accelerating progress toward addressing the impacts of existing invasive species and mitigating potential pressures associated with the introduction of new invasive species. These



include:

- a) Develop policy and legislation to support integrated management of invasive species and mitigation of new introductions
- b) Develop mitigation strategies for reducing and/or preventing invasive species introduction (e.g., ballast water controls, aquaculture species and aquarium trade restrictions)
- c) Develop control strategies and techniques for rapid deployment in response to invasions
- d) Establish or enhance regional programs and response teams

Objective 1.8 Enhance public awareness and stakeholder participation and compliance

Public support is important to affect response to climate change risks. Therefore this objective outlines strategies for increasing public awareness and stakeholder participation in improving coral reef resilience through awareness raising, the development and promotion of sustainable practices and guidelines, incentive programs and supporting policy frameworks. These include:

- a) Develop and implement public awareness campaigns on climate change risks
- b) Develop and implement communication strategies focusing on policy and decision makers, resource users and private sector
- c) Develop policy to support incentive programs
- d) Develop sustainable practices guidelines and compliance requirements
- e) Develop incentives for compliance
- f) Recognise and reward existing best practices



GOAL 2. Strengthen adaptive capacity of communities

Effective action to improve the resilience of Caribbean reefs will significantly improve their odds of adapting to the impacts from climate change and climate variability. However, even under the most optimistic scenarios there will be an increasing deficit between the demand for ecosystem goods and services and the ability of coral reefs to supply them. Unless the communities and economies that depend on coral reefs can adapt to these changes, they are likely to place increasingly unsustainable pressures on the ecosystem.

Through desperation, even people who care greatly for coral reefs may be forced to 'catch the last fish' if they have not been able to anticipate and prepare for changing conditions. In contrast, communities and economies that are well equipped to adapt to change can be active contributors to efforts that ensure coral reefs continue to underpin social wellbeing, local livelihoods and regional development.

The intent of this goal is to direct investments aimed at sustainable regional development toward the human face of the coral reef crisis.

Objective 2.1 Raise awareness of vulnerability of resources

This objective focuses on raising awareness within coastal communities about the vulnerability of coral reefs to a changing climate. Building on the premise that an understanding of the problem is fundamental to effective engagement and local ownership of 'solutions', this objective aims to inform and educate those who depend heavily on coral reefs through strategies including:

- a) Continuing to develop and implement vulnerability assessments
- b) Initiate, strengthen and implement education and outreach programmes
- c) Develop, implement and evaluate community-based adaptation planning tools and programs

Objective 2.2 Increase livelihood options

This objective supports programs and activities that help resource users to generate alternative and/or complementary income thereby reducing pressure on vulnerable reef resources. These include:

- a) Identify tools and approaches for integrating social resilience and ecological resilience
- b) Understand communities' resource dependency and links to vulnerability
- c) Establish community-based approaches to identifying livelihood options
- d) Identify and secure funding to support community based alternative livelihood programs

- e) Identify and deploy on-the-ground and visible initiatives that contribute to enhancement of livelihoods in and around MPAs

Objective 2.3 Enhance community participation and local stewardship

This objective is designed to help coral reef managers and reef-dependent people work together for a shared vision for coral reefs. It is aimed at facilitating ownership and more meaningful involvement by local communities in local actions to protect their reefs. Strategies to achieve this objective include:

- a) Support education and outreach activities
- b) Establish systems for the reward of good or sustainable practices
- c) Build capacities of local communities to meaningfully participate in monitoring and management programs
- d) Enhance local stewardship through development of rights-based policies and regulations (schemes or frameworks)
- e) Identify and pursue public-private partnerships that encourage stewardship
- f) Identify community advocates and document anecdotal and indigenous information
- g) Establish data management systems to capture anecdotal and indigenous information



GOAL 3. Build foundations for national and regional action

Throughout the Caribbean region, there are numerous efforts aimed at improving the health of coral reefs and supporting the livelihoods of coastal communities. However, there is an urgent need to build and strengthen the institutions, initiatives and financing mechanisms that can leverage these initiatives to deliver outcomes of regional significance.

The intent of this goal is to build at a national level the institutional and political foundations necessary for coral reef managers, reef-dependent communities and economies to improve the outlook for coral reefs on a regional scale.

Objective 3.1 Engage policy makers and business leaders

This objective focuses on broadening the constituency for coral reef protection. Policymakers and business leaders have a major stake in the future of coral reefs and need to be part of the solution; therefore it is important for them to be well informed and have a good understanding of the risks associated with climate change and to recognize the importance of mainstreaming climate change into their decision making. Strategies to achieve this objective include:

- a) Generate and utilize opportunities to sensitize and engage politicians and policymakers across portfolios
- b) Generate and utilize opportunities to sensitize and engage business leaders across sectors
- c) Incorporate mechanisms or frameworks for public-private partnerships into agreed national and regional strategies and policies

Objective 3.2 Integrate coral reefs into national development strategies

This objective is targeted at increasing the recognition of the importance of coral reefs to broader development goals by integrating issues associated with the future of coral reefs into regional planning and development agenda. Strategies to achieve this objective include:

- a) Integrate coral reef resilience into existing and future national policy agendas
- b) Develop mechanisms for providing technical input relating to coral reefs into the elaboration of national development strategies

Objective 3.3 Inform and engage the public

This objective focuses on informing the broader community of the value that coral reefs provide (economic and environmental), and engaging them in coral reef protection. Strategies to achieve this objective include:

- a) Establish and sustain regional awareness campaigns focusing on coral reef resilience using the most applicable and effective forms of media
- b) Produce and distribute resources for educators
- c) Integrate coral reef and climate change into national schools curricula
- d) Establish collaboration among educational institutions at national and regional levels on marine/coral reef issues
- e) Establish and facilitate a regional network of national education institutions



Objective 3.4 Enhance regional ocean governance

This objective outlines actions that can address the challenges of managing an ecosystem that spans political/sovereign boundaries and jurisdictions. It aims to strengthen existing mechanisms and if necessary identify new mechanisms for improved governance. Strategies to achieve this objective include:

- a) Strengthen regional institutional coordination and cooperation arrangements
- b) Establish and/or enhance scientific research, data quality, collection and management capacity of regional, sub-regional and national governance arrangements
- c) Establish and/or strengthen regional harmonisation of regulations that impact coral reef management and resilience
- d) Investigate the need for, and establish if necessary, a regional coordinating body for coral reef management

Objective 3.5 Build and enhance regional knowledge hubs

This objective provides a blueprint for improved regional coordination and delivery of knowledge to underpin planning and actions for improving the outlook for Caribbean reefs. Strategies to achieve this objective include:

- a) Support capacity of regional knowledge institutions
- b) Enhance existing knowledge portals and if necessary, develop new portals to fill specific gaps
- c) Implement strategies to increase uptake of knowledge
- d) Support research & monitoring activities
- e) Enhance integration of social & ecological considerations into regional and national action plans
- f) Enhance regional networking on coral reefs (between national agencies of Member States) and facilitate opportunities for regional networking

Objective 3.6 Demonstrate regional commitment to climate change

This objective is targeted at fostering and showcasing regional actions to demonstrate that the Caribbean region takes mitigation seriously and is doing its part to reduce emissions as a contribution to the larger global effort.

Strategies to achieve this objective include:

- a) Enhance capacities of regional and national institutions to develop and implement mitigation strategies targeted at reducing emissions
- b) Support demonstration activities on climate action linked to coral reefs
- c) Capture, document and share project successes and valuable lessons
- d) Support a regional network and community of practice relating to climate action for coral reefs and associated support ecosystems
- e) Facilitate opportunities for regional networking on coral reefs (between national agencies of member states)



Early successes

The Australia Caribbean Coral Reef Collaboration, funded by the Australian Government, has already initiated a suite of activities to address key priorities identified during the development of this Coral Reef Plan of Action. In conjunction with the Caribbean Community Climate Change Centre, the collaboration has initiated projects on marine biodiversity offsets, monitoring tools for coral reef managers, reef stewardship, outlook reporting and social resilience. These projects are demonstrating that cost-effective actions can be implemented, providing encouragement for further investment in regional action to address climate change challenges for coral reefs.



GOAL 4. Advocate globally for stronger action on climate change

Local and regional actions are crucial for building the resilience of coral reefs, but they are not enough. Global action is essential to address this most serious long-term threat to the Caribbean.

Climate change has been referred to as the greatest moral challenge of our generation – it is clearly not a problem with a simple solution. However, there is broad agreement among climate experts that there are feasible actions that can and must be taken urgently if we are to avoid the most costly and irreversible consequences of climate change.

The intent of this goal is to bolster efforts by the Caribbean region to articulate its vulnerability to climate change and argue for urgent and decisive action by the global community to reduce emissions of greenhouse gases.

Objective 4.1 Negotiate for global climate action

This objective focuses on the important role of Caribbean regional representatives at international meetings and policy fora, ensuring that they have adequate resources to present compelling cases for climate change action. Strategies to achieve this objective include:

- a) Leverage resources to support regional participation in international negotiations
- b) Promote Caribbean coral reefs as a key focal area for climate change action
- c) Activate a system for engagement of the Caribbean Community Climate Change Centre in United Nations Framework Convention on Climate Change (UNFCCC) negotiations on behalf of the region



Implementing the Regional Plan of Action



This Coral Reef Plan of Action provides CARICOM Member States with goals, objectives and strategies to improve the outlook of Caribbean coral reefs in the face of a changing climate. Developed with input from regional and national coral reef experts it can serve as an instrument to support on-going efforts and to promote innovative solutions to the many anthropogenic stresses impacting Caribbean coral reefs.

Critical to its uptake and implementation is the identification of a regional body with an existing mandate to oversee the implementation of the plan, and to monitor and evaluate its performance. The Caribbean Regional Fisheries Mechanism (CRFM) is appropriately identified as the legally instituted regional organization with such a mandate. As such, it is envisaged that the Caribbean Community Climate Change Centre and the CRFM will take a collaborative approach to securing the resources required for the implementation of the Plan.

The regional priorities identified within the Plan will however require national action. It is within this context that countries, governments and their partners will apply these strategies to guide coral reef resilience responses in the region and participate in regularly scheduled reviews to ensure relevance and focus.

At the global level, the Coral Reef Plan of Action is intended to assist donors identify regional priorities for investment, and increase the confidence that investments will support actions that are strategic, coordinated and efficient. In total, the plan aims to increase the funding and support to the region that is required to improve the outlook for coral reefs as a key contribution to achieving development resilient to climate change.

It is envisaged that an Implementation Plan will be developed to identify specific activities, timelines, funding, roles and responsibilities for achieving the objectives of this plan.

Regional Coordination

The Coral Reef Plan of Action is an important contribution to implementation of the Regional Framework for Achieving Development Resilient to Climate Change 2009-2015. Its goals and objectives directly support key goals under Strategic Elements 1 and 2 of the Regional Framework.



Strategic Element 1

Mainstream climate change adaptation strategies into the sustainable development agendas of the CARICOM member states

GOAL 1: Assess the vulnerability and risks associated with a changing climate.

GOAL 2: Reduce vulnerability to a changing climate.

GOAL 4: Build a society that is more informed about and resilient to a changing climate.

Strategic Element 2

Promote the implementation of specific adaptation measures to address key vulnerabilities in the region

GOAL 2: Promote the implementation of measures to reduce climate impacts on coastal and marine infrastructure.

GOAL 4: Promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate-induced damage.

The Caribbean Community Climate Change Centre

The Caribbean Community Climate Change Centre (CCCCC) is charged with the responsibility of coordinating the Regional Framework's Implementation Plan. The CCCCC was established by the CARICOM Heads of Government in July 2002 and operates as a CARICOM agency. The objectives of the CCCCC are to:



Caribbean Community
Climate Change Centre

- i. promote the protection of the earth's climate system with special emphasis on the Caribbean
- ii. enhance regional, institutional capabilities for the co-ordination of national responses to the adverse effects of climate change
- iii. provide comprehensive policy and technical support in the area of climate change and related issues and spearheading regional initiatives in those areas
- iv. promote education and public awareness on climate change issues, and
- v. facilitate regional consensus for negotiations related to the United Nations Framework Convention on Climate Change (UNFCCC).

The Centre is well integrated in international and regional networks and works with a variety of international and regional partners, government and sector organizations, research institutions and universities.

Appendices



Appendix 1. Summary of the strategic elements and goals of the Regional Framework for Achieving Development Resilient to Climate Change 2009-2015

Appendix 2. Linkages between the Coral Reef Regional Plan of Action and the Regional Framework for Achieving Development Resilient to Climate Change

Appendix 3. Contributors to the Development of the Regional Plan of Action

Appendix 1: Summary of the strategic elements and goals of the Regional Framework for Achieving Development Resilient to Climate Change 2009-2015

Regional Vision: Building Regional Resilience to a Changing Climate				
Strategic Element 1: Mainstream Climate Change Adaptation Strategies into Sustainable Development/ Agendas of CARICOM Member States	Strategic Element 2: Promote the Implementation of Specific Adaptation Measures to address Key Vulnerabilities in the Region	Strategic Element 3: Promote Actions to Reduce Greenhouse Gas Emissions through Fossil Fuel Reduction and Conservation and Switching to Renewable and Cleaner Energy Sources	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	Strategic Element 5: Promote Actions to Derive Social, Economic and Environmental benefits from the Prudent Management of Standing Forests in CARICOM Countries
<p>Goal 1.1: Assess the vulnerability and risks associated with a changing climate</p> <p>Goal 1.2: Reduce vulnerability to a changing climate</p> <p>Goal 1.3: Effectively access and utilize resources to reduce vulnerability to a changing climate</p> <p>Goal 1.4: Build a society that is more informed about and resilient to a changing climate</p> <p>Goal 1.5: Build the Caribbean Community Climate Change Centre's Capacity to support the implementation of the Strategy</p> <p>Goal 1.6: Reduce the region's carbon footprint through the promotion of energy efficiency measures</p>	<p>Goal 2.1: Promote the adoption of measures and disseminate information that would make water supply systems resilient to climate induced damage</p> <p>Goal 2.2: Promote the implementation of measures to reduce climate impacts on coastal and marine infrastructure</p> <p>Goal 2.3: Promote the adoption of measures and disseminate information that adapt tourism activities to climate-induced impacts</p> <p>Goal 2.4: Promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate induced damage</p> <p>Goal 2.5: Promote the adoption of sound practices and measures to prevent and or reduce climate induced health impacts in the community</p>	<p>Goal 3.1: Promote the use of renewable energy resources</p> <p>Goal 3.2: Support the assessment of wind potential to supply electric power in CARICOM Countries</p> <p>Goal 3.3: Support the development of innovative financing mechanisms for the deployment of solar energy (water heaters, etc.)</p> <p>Goal 3.4: Assess the feasibility of converting waste to energy in CARICOM Countries</p> <p>Goal 3.5: Asses the economic viability and environmental impact of shore-based ocean thermal energy conversion (OTEC) Plants</p>	<p>In order to achieve the objectives of this element of the strategy, CARICOM Countries will have to take the following actions:</p> <p>Revise building codes to include restricting construction in areas susceptible to coastal flooding, landslides, or tidal surges</p> <p>Develop new standards for road construction to ensure adequate surface drainage</p> <p>Implement integrated land-use planning</p> <p>Enact national standards for sanitation, to reduce the required volume of water, to ensure safe systems for the treatment of wastewater and other forms of waste to reduce public health risks</p> <p>Develop and test crop varieties that are more tolerant to adverse weather conditions</p> <p>Implement public education and awareness programs</p> <p>Develop new legal tool that make for a more responsive insurance industry</p>	<p>Goal 5.1: Promote the adoption of best practices for sustainable Forest Management</p> <p>Goal 5.2: Engage in negotiations with international partners to mobilize resources for the protection of standing forests</p> <p>Goal 5.3: Undertake research aimed at improving the current methodologies for estimating carbon sequestration rates in tropical forests</p>

Appendix 2: Linkages between the Coral Reef Regional Plan of Action and the Regional Framework for Achieving Development Resilient to Climate Change

Regional Framework for Achieving Development Resilient to Climate Change Strategic Elements and Goals addressed by the Coral Reef Regional Plan of Action				
Strategic Element 1: Mainstream Climate Change Adaptation Strategies into Sustainable Development/ Agendas of CARICOM Member States			Strategic Element 2: Promote the Implementation of Specific Adaptation Measures to address Key Vulnerabilities in the Region	
Goal 1.1: Assess the vulnerability and risks associated with a changing climate	Goal 1.2: Reduce vulnerability to a changing climate	Goal 1.4: Build a society that is more informed about and resilient to a changing climate	Goal 2.2: Promote the implementation of measures to reduce climate impacts on coastal and marine infrastructure	Goal 2.4: Promote sound conservation practices in coastal and marine ecosystems to shelter these resources from climate induced damage



Goals of the Regional Plan of Action for Improving the Outlook for Caribbean Coral Reefs				
Goal 1: Improve Health and Resilience of Caribbean Reefs	Goal 1: Improve Health and Resilience of Caribbean Reefs		Goal 1: Improve Health and Resilience of Caribbean Reefs	Goal 1: Improve Health and Resilience of Caribbean Reefs
Goal 2: Strengthen Adaptive Capacity of Communities	Goal 2: Strengthen Adaptive Capacity of Communities	Goal 2: Strengthen Adaptive Capacity of Communities	Goal 2: Strengthen Adaptive Capacity of Communities	Goal 2: Strengthen Adaptive Capacity of Communities
Goal 3: Build Foundations for National and Regional Action	Goal 3: Build Foundations for National and Regional Action			
	Goal 4: Advocate for globally stronger action on Climate Change			

Appendix 3: Contributors to the Development of the Regional Plan of Action

Stakeholder/Partner	Name	Function
AusAID	Ms Aileen Croghan	Head of Post
AusAID	Ms Kiesha Farnum	Program manager
AusAID	Mr Matt Lapworth	Team leader
Australia Caribbean Coral Reef Collaboration	Ms Nellie Catzim	Local coordinator
Australia Caribbean Coral Reef Collaboration	Ms Anna Dowd	Program Coordinator
Australia Caribbean Coral Reef Collaboration	Dr Paul Marshall	Team Leader
Bahamas Department of Meteorology	Ms Shayvonne Bonamey	Representative
Bahamas National Trust	Mr Lindy Knowles	Representative
Barbados Coastal Zone Management Unit	Ms Angelique Braithwaite	Representative
Barbados Coastal Zone Management Unit	Mr Richard Suckoo	Representative
Belize Audubon Society	Mrs. Amanda Acosta	Executive Director
Belize Audubon Society	Ms. Dareece Chuc	Education Director
Belize Coastal Zone Management Institute and	Mr Vincent Gillett	Chief Executive Officer
Belize Fisheries Department	Ms Beverly Wade	Fisheries Administrator
Caribbean Community Climate Change Centre	Dr Mark Bynoe	Project Management and Development
Caribbean Community Climate Change Centre	Mr Dannel Cain	Representative
Caribbean Community Climate Change Centre	Mr. Earl Green	Partnerships
Caribbean Community Climate Change Centre	Mr Ottis Joslyn	Representative
Caribbean Community Climate Change Centre	Dr Kenrick Leslie	Executive Director
Caribbean Community Climate Change Centre	Ms Sharon Lindo	Representative

Stakeholder/Partner	Name	Function
Caribbean Community Climate Change Centre	Mr Keith Nichols	Program counterpart
Caribbean Community Climate Change Centre	Mr Ahnivar Peralta	Representative
Caribbean Community Climate Change Centre	Ms Diana Ruiz	Representative
Caribbean Community Climate Change Centre	Dr Ulrich Trotz	Deputy Executive Director
Caribbean Marine Protected Areas Management	Ms Emma Doyle	Coral Reef Coordinator
Caribbean Regional Fisheries Mechanism	Mr Milton Haughton	Executive Director
Caribbean Regional Fisheries Mechanism	Mr. Peter Murray	Program Manager, Fisheries
Caribbean Regional Fisheries Mechanism	Dr. Susan Singh-Renton	Deputy Executive Director
CARIBSAVE - C FISH	Mr Newton Eristhee	Program leader
CARIBSAVE	Mr Natalie Hutchinson	Representative
CARIBSAVE	Ms Diana Melville	Representative
CARICOM Secretariat	Mr Garfield Barnwell	Director, Sustainable Development
CARICOM Secretariat	Ms Karlene Russell	Business Development
Centre for Resource Management and	Prof Robin Mahon	Director
Department of Marine Resource & Fisheries,	Ms Ester Tobias	Representative
Department of Marine Resources, St Kitts & Nevis	Mr Lorinston Jenkins	Representative
Environment TOBAGO	Dr Bertrand Bhikarry	Representative
Fisheries Division, Ministry of Agriculture, Grenada	Mr Roland Baldeo	MPA Manager
Fisheries Division, Ministry of Agriculture, Grenada	Mr Coddington Jeffrey	Park Warden
Fisheries Division, Ministry of Agriculture, Grenada	Mr Cecil McQueen	Park Warden
Gulf and Caribbean Fisheries Institute (GCFI)	Ms Emma Doyle	Coral Reef Coordinator

Stakeholder/Partner	Name	Function
Healthy Reefs for Healthy People	Mr Roberto Pott	Representative
Healthy Reefs for Healthy People	Dr Melanie McField	Director
Institute of Marine Affairs, Trinidad & Tobago	Mr Jahson Alemu	Science coordinator
Le Phare Bleu Marina, Grenada	Mr Dieter Burkhalter	Owner
Meso-American Programme, OAK Foundation	Ms Imani Fairweather-	Director
Ministry for Sustainable Development, St Lucia	Dr James Fletcher	Minister
Ministry of Tourism, St Lucia	Mr Cuthbert Didier	Yachting Director
Ministry for Sustainable Development, St Lucia	Mr Sylvester Clauzel	Permanent Secretary
Researcher	Ms Lisa Carne	Marine Scientist
Seaweed Farming Project, Placencia Fishermen	Mr. Lowell Godfrey	Coordinator
Soufriere Marine Management Association, St	Ms Jeannine Antoine-Compton	Director
Soufriere Marine Management Association, St	Ms Nadia Cazaubon	Representative
Soufriere Marine Management Association, St	Mr Vaughn Charles	Chairman
Soufriere Marine Management Association, St	Ms Rita Harrison	Fisheries Extension Officer
Southern Environmental Association Belize (SEA	Ms Shalini Cawich	Protected Areas Program Director
Southern Environmental Association Belize (SEA	Ms Cecilia Guerrero	Outreach program officer
Southern Environmental Association Belize (SEA	Dr Annelise Hagan	Science coordinator
Southern Environmental Association Belize (SEA	Mr Justino Mendez	Outreach program director
St Lucia Adventure Divers	Mr Chester Nathoniell	Dive master
St. Georges University, Grenada	Mr Stephen Nimrod	Science coordinator
The Nature Conservancy	Ms Julie Robinson	Marine Specialist

Stakeholder/Partner	Name	Function
The Nature Conservancy	Ms Lynelle Williams	Climate Change Technical Associate
Toledo Institute for Development and Environment	Ms Celia Mahung	Executive Director
Trinidad Tobago National Marine Affairs Institute	Mr Jahson Alemu	Science coordinator
UNEP/GRID-Arendal	Ms Tina Kurvits	Senior Advisor Ecosystem Management
University of Belize	Dr Leandra Cho-Ricketts	Marine Science Director
University of West Indies, Cavehill	Dr Patrick McConney	Fisheries Governance
Wildlife Conservation Society	Ms Virginia Burns	Representative
Wildlife Conservation Society	Ms Janet Gibson	Belize Country Director
World Wildlife Fund, Mexico/MAR	Ms Nadia Bood	Representative

About the Partners



The Caribbean Regional Fisheries Mechanism (CRFM) was officially inaugurated on 27 March 2003. It is an inter-governmental organization with its mission being to “To promote and facilitate the responsible utilization of the region's fisheries and other aquatic resources for the economic and social benefits of the current and future population of the region”. The CRFM consist of three bodies – the Ministerial Council; the Caribbean Fisheries Forum; and the CRFM Secretariat.



Caribbean Community
Climate Change Centre

The Caribbean Community Climate Change Centre (CCCCC), officially established in July 2002 by the CARICOM Heads of Government, coordinates the region's response to climate change. The Centre is the key node for information on climate change issues and the region's response to managing and adapting to climate change.



The CARICOM Secretariat is the principal administrative organ of the Community and is headed by a Secretary General who is the Chief Executive Officer of the Community. Our mission is to contribute, in support of Member States, to the improvement of the quality of life of the People of the Community and the development of an innovative and productive society in partnership with institutions and groups working towards attaining a people-centred, sustainable and internationally competitive Community.



AusAID is Australia's aid program, implemented by the Department of Foreign Affairs and Trade. The Australian Government's aid program promotes Australia's national interests through contributing to economic growth and poverty reduction.



Australian Government
Great Barrier Reef
Marine Park Authority

The Great Barrier Reef Marine Park Authority (GBRMPA) is an Australian Government statutory authority that advises the Australian Government Minister for the Environment on the control, care and development of the Great Barrier Reef Marine Park. Our aim is to ensure the long-term protection, ecologically sustainable use, understanding and enjoyment of the Great Barrier Reef for all Australians and the international community, through the care and development of the Marine Park.



Further Information

Improving the Outlook for Caribbean Coral Reefs:
A Regional Plan of Action 2014 – 2019
is available from the web at www.climateandreefs.org
and at www.crfm.int

For further information about the
Australia Caribbean Coral Reef Collaboration
contact climateandreefs@gmail.com