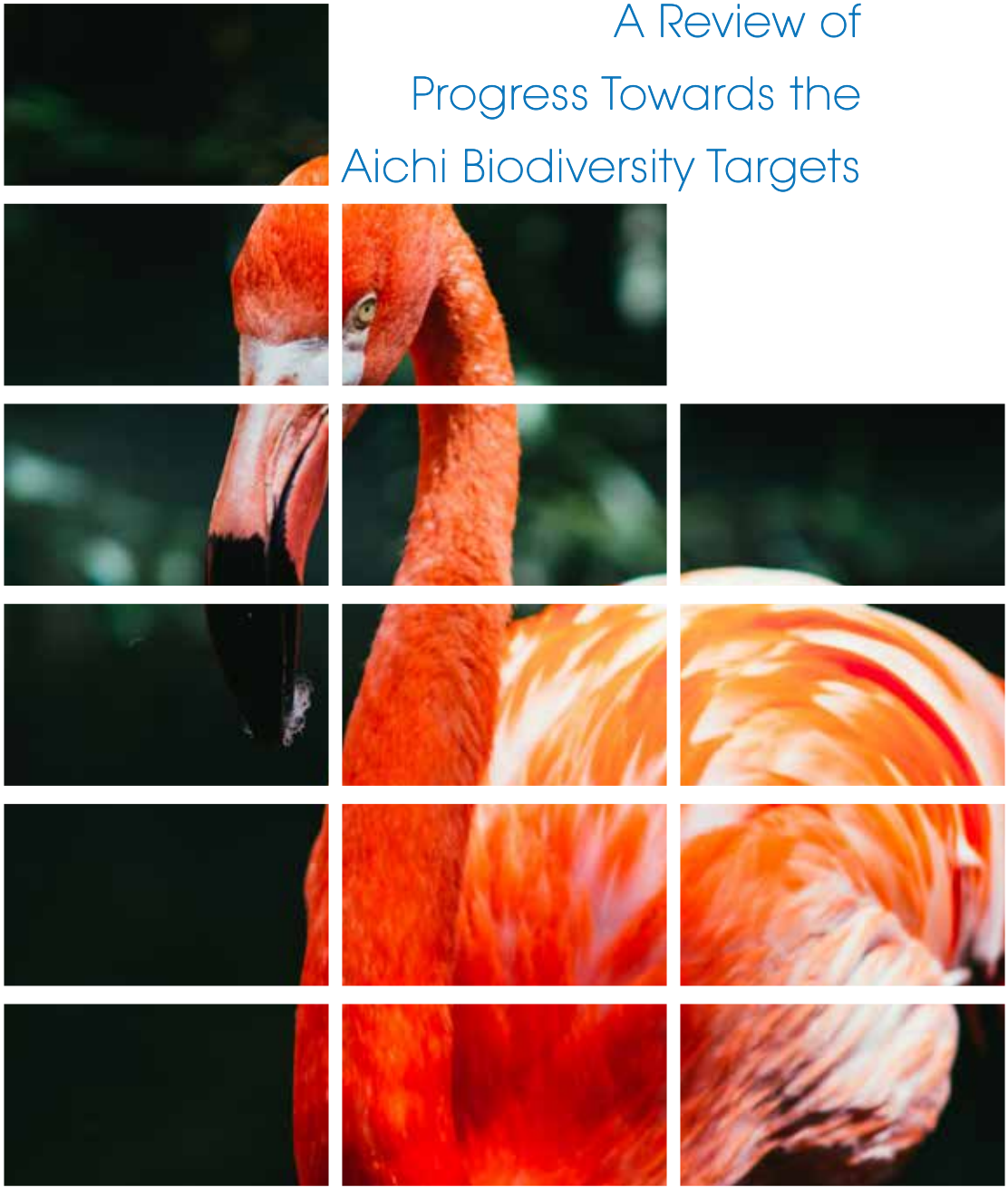
THE STATE OF BIODIVERSITY IN THE CARIBBEAN COMMUNITY

A Review of Progress Towards the Aichi Biodiversity Targets



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The Aichi Biodiversity Target icons are used with permission of the Secretariat of the Convention on Biological Diversity.

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Acronyms and Abbreviations

ABS	Access and Benefit Sharing
ASC	Aquaculture Stewardship Council
BIOPAMA	Biodiversity and Protected Areas Management Programme
C-CAM	Caribbean Coastal Area Management Foundation
CaMPAM	Caribbean Marine Protected Areas Management
CANARI	Caribbean Natural Resources Institute
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Community
Cartagena Convention	Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region
CBD	Convention on Biological Diversity
CBF	Caribbean Biodiversity Fund
CCI	Caribbean Challenge Initiative
CEPA	Communication, Education, Participation, and Awareness
CEPF	Critical Ecosystem Partnership Fund
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
CLME+	Caribbean Large Marine Ecosystem Plus project
CMS	Convention on the Conservation of Migratory Species of Wild Animals
COTED	Caribbean Community Council for Trade and Economic Development
CRFM	Caribbean Regional Fisheries Mechanism
EAG	Antigua and Barbuda Environmental Awareness Group
UN ECLAC	United Nations Economic Commission for Latin America and the Caribbean
ECMMAN	Eastern Caribbean Marine Managed Areas Network
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FLEGT	Forest Law Enforcement, Governance and Trade
GBO	Global Biodiversity Outlook

GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information System
IAS	Invasive Alien Species
ICRI	International Coral Reef Initiative
INDC	Intended Nationally Determined Contribution
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	International Union for Conservation of Nature
IWEco	Integrating Water, Land and Ecosystems Management in Caribbean SIDS
KAP	Knowledge, Attitudes, and Practices
LAC	Latin America and the Caribbean
LBS Protocol	Protocol Concerning Pollution from Land-Based Sources and Activities (LBS Protocol) to the Cartagena Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region
LCDS	Low Carbon Development Strategy
MEA	Multilateral Environmental Agreement
NBSAP	National Biodiversity Strategy and Action Plan
NEAP	National Environmental Action Plan
NEPA	National Environment and Planning Agency of Jamaica
NGO	Non-governmental organization
NR	National Report to the Convention on Biological Diversity
OECS	Organisation of Eastern Caribbean States
OPAAL	OECS Protected Areas and Associated Livelihoods
PBPA	Portland Bight Protected Area
SAMOA Pathway	Small Island Developing States Accelerated Modalities of Action Pathway
SBB	Suriname Foundation for Forest Management and Production Control (Stichting voor Bosbeheer en Bostoezicht)
SCBD	Secretariat of the Convention on Biological Diversity

SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
SPAW Protocol	Protocol Concerning Specially Protected Areas and Wildlife in the Wider Caribbean Region to the Cartagena Convention
UNDP	United Nations Development Programme
UNEP CAR/RCU	UNEP Caribbean Regional Coordinating Unit for the Caribbean Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UWI	University of the West Indies
VPA	Voluntary Partnership Agreement
WAMM	Watershed Area Management Mechanism

Foreword

The State of Biodiversity in the Caribbean Community: A Review of Progress towards the Aichi Biodiversity Targets

We often overlook the connection between biodiversity and some of the critical sectors of our economy such as agriculture, tourism, fisheries and forestry. It is important to note, however, that natural ecosystems provide the people of our Caribbean Community with essential services such as food and nutrition, medicine, recreation, fuel, storm protection, and climate resilience.

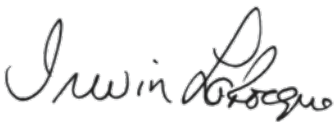
It means this Assessment Report on The State of Biodiversity in the Caribbean Community, the first such report by the Community, is both timely and valuable.

The Report highlights achievements, good practices, success stories and lessons learnt that can be shared, as examples, among the countries in the Region, and with countries outside the Region. It also recognizes that we face challenges, including of resources and capacity, but also as a result of the impacts of climate change and the increased frequency of severe weather events.

The Report presents recommendations for addressing these challenges and for mainstreaming biodiversity as a key element of the Region's sustainable development. The recommendations are in keeping with the commitment expressed in the CARICOM Strategic Plan towards *"good environmental management and protection of the Region's natural assets across all sectors of development"*.

All of the independent countries of the Caribbean Community are Party to the Convention on Biological Diversity and are committed to action to achieve the objectives of the global Strategic Plan for Biodiversity 2011-2020.

In commending this Report, I wish to acknowledge the contributions of our donor partners under the African, Caribbean Pacific Group of Countries-Multilateral Environmental Agreements (ACP-MEAs) Programme, the European Union (EU), the ACP Secretariat and the UN Environment Programme (UNEP).



Irwin LaRocque
Secretary-General
Caribbean Community (CARICOM)

Preface

"We are the first generation with the insight of the new global risks facing humanity, that people and societies are the biggest drivers of global change... We can no longer exclude the possibility that our collective actions will trigger tipping points, risking abrupt and irreversible consequences for human communities and ecological systems." **(Nobel laureates in The Stockholm Memorandum, 2011).**

Ecosystems providing critical support to the development and well-being of the Caribbean Community's citizens, a very diverse population of 20 million people living in one of the world's biodiversity hotspots, are seriously threatened by the effects of habitat destruction, pollution, invasive alien species and climate variability. It is in this scenario that we welcome "The State of Biodiversity in the Caribbean Community", with its assessment of progress towards each of the Convention on Biological Diversity's 20 Aichi Biodiversity Targets, as a basis for the development of common strategies building on each member's priorities and needs.

In the last quarter of 2017, it is clear that the Caribbean faces an unprecedented challenge in rebuilding and restoring large parts of its infrastructure and ecosystems after so many devastating weather events. It has also become clear that reducing the risk of future disasters, and building resilience against such impacts, can only be achieved through ecosystem-based solutions. Building on this assessment, the development of a sub-regional biodiversity strategy can provide an important mechanism to leverage support for CARICOM countries as they strive to implement the Convention's Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets. While small island developing States in the region remain a special case for sustainable development in view of their unique and particular vulnerabilities, the challenges affecting them, and the solutions available to address these challenges, are of critical importance to all countries in Latin America and Caribbean.

The publication provides key information given the relative lack of baseline data and related time-bound objectively quantifiable targets for the sub-region, and is of particular value given the dependence on natural resources for livelihoods and well-being, and thus exposure to disruption and environmental disasters, of communities in many SIDS and developing countries in the region. The Secretariat of the Convention on Biological Diversity and UN Environment stand behind the CARICOM Secretariat and its partners in the regional ACP MEA initiative, and we hope that this assessment provides a basis for actions to protect biodiversity as it underpins the sustainable development of the Caribbean region.

Cristiana Paşca Palmer, PhD – *Executive Secretary, Convention on Biological Diversity*
Elizabeth Mrema – *Director, Law Division, United Nations Environment Programme*

Introduction

The fifteen (15) countries comprising the Caribbean Community (CARICOM) are endowed with a rich and globally unique biodiversity. This biodiversity is under severe and increasing threat. The Caribbean islands have been identified as one of the world's top biodiversity hotspots, a hotspot being an area characterised by both a high level of regionally unique species and a severe degree of habitat loss and vulnerability to extinctions. Of CARICOM's continental countries, all of Belize is included in the Mesoamerica biodiversity hotspot, and Guyana and Suriname are located in the Guiana Shield, an eco-region of global ecological and cultural significance.

The societies and economies of CARICOM have long been heavily dependent on a relatively narrow range of natural resources, whether in agriculture, fisheries, forestry, or the tourism sector. The rapid growth of populations and economic activity in the past several decades has substantially impacted the Region's biodiversity (Critical Ecosystem Partnership Fund (CEPF), 2010) The main threats to the biodiversity of CARICOM countries include habitat destruction and fragmentation due to increasing urbanisation, conversion of lands for tourism and commercial development, and the expansion of agriculture. Invasive species, pollution, and overexploitation of living resources are also significant concerns. The challenges to biodiversity in the Small Island Developing States (SIDS) and low-lying coastal countries of CARICOM continue to be exacerbated by the effects—such as ocean warming and acidification, increased severity of drought, and increased frequency and intensity of hurricanes—of climate change.

Conservation and sustainable management of biodiversity is often hampered by competing goals of economic growth and national development, which are often perceived as being at odds with environmental protection and preservation. Additionally, the developing countries of CARICOM face a range of institutional challenges, including a lack of awareness of the values of biodiversity, weak environmental legislation, shifting jurisdiction of environmental portfolios, overlaps and/or gaps in jurisdiction, limited technical information, inadequate human and technical capacity, and insufficient funding for biodiversity.

National, regional and international policy responses and frameworks for biodiversity management in CARICOM countries continue to evolve. The Revised Treaty of Chaguaramas Establishing the Caribbean Community including the CARICOM Single Market and Economy contains several articles relevant to the conservation, management and sustainable use of biodiversity, including articles on agriculture, forest management, fisheries management, sustainable tourism, natural resources management, and environmental protection. For the countries comprising the Organisation of Eastern Caribbean States (OECS), the St. George's Declaration of

Principles for Environmental Sustainability in the OECS outlines key goals and principles, including optimal and equitable contribution of natural resources to socio-economic and cultural development and the protection of plant and animal species and ecosystems.

In the international policy arena, CARICOM countries are committed to the implementation of the 2030 Agenda for Sustainable Development, and the achievement of the Sustainable Development Goals (SDGs). Goals 14, on life below water, and 15, on life on land, are the most evidently linked to sustainable biodiversity management, but several other SDGs, such as Goal 6 on water and sanitation, Goal 12 on sustainable consumption and production, and Goal 13 on climate action also involve targets that are of relevance to the management, conservation and sustainable use of ecosystems and biological diversity (UNEP, 2106a).

International commitments to the sustainable development of SIDS are of particular relevance to the countries of CARICOM. The 2014 SIDS Accelerated Modalities of Action Pathway (SAMOA Pathway), along with its predecessors, the Barbados Programme of Action for the Sustainable Development of Small Island Developing States and the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of SIDS, all contain sections in their texts that explicitly reference coastal and marine resources, freshwater resources and biodiversity resources. The SAMOA Pathway also includes statements on access and benefit-sharing, halting and reversing deforestation and forest degradation, the threat of invasive alien species, and calls for conservation and sustainable use of biodiversity and its components, and for the protection and conservation of ecosystems, species and genetic diversity.

CARICOM countries are also Parties to a variety of regional and international multilateral environmental agreements (MEAs) with a focus on biodiversity (see Table 1), including *inter alia*, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on the Conservation of Migratory Species of Wild Animals (CMS), the Ramsar Convention on Wetlands, the Convention concerning the Protection of World Cultural and Natural Heritage, and the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (the Cartagena Convention) and its two (2) related Protocols. All independent CARICOM member countries are Parties to the Convention on Biological Diversity (CBD) and, as such, are committed to implementation of the Strategic Plan for Biodiversity (2011-2020).

The Tenth Meeting of the Conference of the Parties to the CBD, held in 2010, adopted, *via* decision X/2, a revised and updated Strategic Plan for Biodiversity, including the Aichi Biodiversity Targets, for the period 2011-2020. This plan provides an overarching framework for biodiversity management, not only for the biodiversity-related conventions, but for the entire United Nations system and all other partners engaged in biodiversity management and policy development.

The Strategic Plan consists of an overarching vision, five (5) strategic goals, and twenty (20) targets, commonly referred to as the Aichi Targets.

	CBD	CITES	CMS	Ramsar Convention	SPAW Protocol	World Heritage Convention
Antigua and Barbuda	●	●	●	●		●
The Bahamas	●	●		●	●	●
Barbados	●	●		●	●	●
Belize	●	●		●	●	●
Dominica	●	●				●
Grenada	●	●		●	●	●
Guyana	●	●			●	●
Haiti	●	●				●
Jamaica	●	●		●		●
Montserrat			●[1]			
St. Kitts and Nevis	●	●				●
Saint Lucia	●	●		●	●	●
St. Vincent and the Grenadines	●	●			●	●
Suriname	●	●		●		●
Trinidad and Tobago	●	●		●	●	●

The vision of the Strategic Plan is that "by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people."

The five (5) strategic goals contained in the Strategic Plan are to:

- ❑ Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society;
- ❑ Reduce the direct pressures on biodiversity and promote sustainable use;
- ❑ Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity;
- ❑ Enhance the benefits to all from biodiversity and ecosystem services;

1 The United Kingdom has extended the application of CMS to include Montserrat, as a United Kingdom Overseas Territory.

- Enhance implementation through participatory planning, knowledge management and capacity-building.

Parties also agreed to translate this overarching international framework into revised and updated national biodiversity strategies and action plans (NBSAPs), and to prepare and submit fifth national reports, due by 31 March 2014, focused on the implementation of the 2011-2020 Strategic Plan and progress achieved towards the Aichi Biodiversity Targets.

In 2014, the fourth edition of the Global Biodiversity Outlook (GBO-4) was launched. The GBO is a periodic report summarising the latest data on the status and trends of biodiversity, and drawing conclusions relevant to the further implementation of the CBD. GBO-4 provided a mid-term assessment of progress towards the implementation of the Strategic Plan for Biodiversity 2011-2020 (Secretariat of the Convention on Biological Diversity (SCBD), 2014). GBO-4 drew on a wide range of sources of information, including Parties' national reports, NBSAPs, Parties' assessment of progress towards the Aichi Targets, and reports from Parties and in the scientific literature on the status and trends of biodiversity.

Overall, the GBO-4 concluded that although there has been significant progress towards meeting some components of the majority of the Aichi biodiversity targets, in most cases this progress will be insufficient to achieve the targets set for 2020. Pressures on biodiversity continue to increase, and the status of biodiversity continues to decline. Additional action is required to keep the Strategic Plan for Biodiversity 2011-2020 on course.

In 2016, a detailed assessment of the status and trends of biodiversity specific to the Latin America and Caribbean (LAC) region was published (United Nations Environment Programme (UNEP), 2016c). This assessment found that overall progress towards the achievement of the Aichi Targets in the LAC region is similar to the global picture. A range of important actions have been taken to respond to some of the pressures on biodiversity, and there are a few target areas in which positive trends are observed. However, the trend across many targets shows countries reporting that they lack information to assess progress, or that they are not currently on track to meet specific targets.

This assessment of biodiversity status and trends for CARICOM has been prepared taking into account the particular circumstances of CARICOM as a SIDS region, with biodiversity conditions, vulnerabilities and pressures that are distinct from those experienced by our continental neighbours in Latin America. It also takes into account that, given the small size of CARICOM countries relative to the countries of Latin America, some of the specifics of the status and trends in biodiversity in the Caribbean may be eclipsed in the overall LAC big picture.

At the time of publication of GBO-4, the majority of CARICOM countries had not yet completed their fifth national reports (5NRs). This report therefore allows for inclusion on information from reports completed and submitted since the preparation of GBO-4 and the LAC biodiversity assessment.

This assessment is intended to provide information on CARICOM countries' action to achieve the Aichi Biodiversity Targets and the goals of the Strategic Plan

for Biodiversity 2011-2020. It highlights trends, patterns and commonalities in biodiversity status, pressures and impact across CARICOM, and it shines a light on the range of responses that are being taken at the national and regional levels to help the countries of CARICOM achieve the shared vision and goals of the Strategic Plan for Biodiversity 2011-2020.

This report draws on information from 5NRs, NBSAPs, key informant interviews, documents, scientific articles, websites and grey literature to assess the status of biodiversity in its broadest sense. Social, economic and political contexts are referred to where relevant to assist the reader in framing biodiversity threats and opportunities. Ongoing initiatives of donors, non-governmental organisations (NGOs) and governments, demonstrating actions currently being undertaken, are referred to. Finally, recommendations are made for actions to address the threats and pressures identified and to enhance the Community's progress towards the Aichi Targets.

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Target 1

By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Addressing the direct and underlying drivers of biodiversity loss will ultimately require behavioural change by individuals, organisations and governments. Understanding, awareness and appreciation of the diverse values of biodiversity, underpin the willingness of individuals to make the necessary changes and actions and to create the "political will" for governments to act. (SCBD, 2013)

Meeting this target requires not only that people are aware of what biodiversity is, but also that they are aware of its multiple values and of actions they can take to contribute to its conservation and sustainable use. At present, the range of values of biodiversity—environmental, cultural, economic and intrinsic—is not well understood (SCBD, 2013). As a result its economic, social and environmental importance is often overlooked in policy, planning and decision-making. Increased awareness of biodiversity values should give rise to actions that can be taken to conserve and sustainably use biodiversity, starting from the individual and community level, extending through economic sectors and reaching the top levels of government and private sector decision-making. Awareness of biodiversity values will greatly support the achievement of other Aichi Targets, in particular Targets 2, 4, 6, 7 and 8.

Target 1 is one of the most extensively adopted targets in CARICOM member countries. All countries for which 5NRs are available, report that multiple actions have been taken at the national level to support achievement of the target. Haiti's 5NR highlights that there is a legal requirement under Article 74 of the Framework Decree on Environmental Management for the State to carry out and support information and sensitisation programmes for the protection of the environment.

Generally, action towards the Aichi Target 1 involves the development of a variety of Communication, Education, Participation, and Awareness (CEPA) initiatives and materials for a variety of audiences, including people who may not perceive themselves as directly involved with the use of biodiversity in their everyday lives. Initiatives reported across the Region range from those that address biodiversity in its widest context (what it is, its value) to those that are targeted at raising awareness of particular species, ecosystems or protected areas.

Communication tools and methods are diverse and include print and electronic media advertisements, expositions and fairs, production of films, celebratory activities surrounding environmental days, special release postage stamps, printing of posters and flyers, production of novelty items such as refrigerator magnets and the use of social media.

In addition to CEPA activities undertaken by government, often as part of public sector or donor-funded projects, biodiversity awareness and advocacy activities are also

implemented by national and regional NGOs.

The inclusion of environmental and biodiversity-related issues in the formal curricula of educational institutions also contributes towards increased understanding of biodiversity and its values. Several universities across the Region offer undergraduate and graduate programmes in disciplines such as environmental sciences, natural resources management, marine sciences, forestry and ecology.

The development of ecotourism and community-based tourism in CARICOM countries has also provided opportunities to raise awareness about the value of species and ecosystems. Examples include mangrove tours in Guyana, wetlands tours in Jamaica, and turtle watching in Trinidad and Tobago. The development of the Caribbean Birding Trail is an awareness-raising ecotourism initiative that spans several countries of the Region.

Despite the substantial efforts that are being made to build awareness and understanding of the value of nature and biodiversity in the Caribbean, a major challenge to tracking progress towards Aichi Target 1 has been the lack of relevant and appropriate indicators and quantitative data to measure environmental awareness. CARICOM countries have attempted to address this challenge by including relevant indicators and monitoring provisions in their updated NBSAPs. Sample indicators include:

- the number of CEPA initiatives and activities implemented;
- trends in community-based conservation initiatives;
- the extent to which biodiversity educational curricula in schools have been developed; and
- trends in awareness, attitudes and public engagement in support of biological diversity and ecosystem service.

Caribbean Birding Trail

Knowledge, Attitudes, and Practices (KAP) studies, such as have been undertaken for other topics such as climate change, have been identified as useful tools in this regard. KAP studies would help both to evaluate the impacts of CEPA efforts, and to provide insight into how to improve public education and awareness strategies.

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Target 2

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Integrating and reflecting the contribution of biodiversity, and the ecosystem services it provides, in relevant strategies, policies, programmes, and reporting systems is an important element in ensuring that the diverse values of biodiversity and the opportunities derived from its conservation and sustainable use are recognized and reflected in decision-making. (SCBD, 2013)

This Target is closely related to, but distinct from, Target 1. Whereas Target 1 speaks to an overall awareness and understanding about biodiversity, Target 2 calls for the value of the services provided by biodiversity to be integrated into policy-making, accounting and development planning. This involves recognition of the many ways in which biodiversity supports major economic sectors (including tourism, agriculture, fisheries, forestry), livelihoods and human health and well-being.

The multiple values (economic, social, cultural, intrinsic) of biodiversity are not widely reflected in national accounting or factored into decision-making of many governments. The development imperative and poverty levels in many Caribbean countries often force biodiversity consideration into a secondary place. Progress in mainstreaming biodiversity into national strategies, policies, programmes, and reporting is important for balanced decision-making and national accounting.

Several countries in CARICOM have formulated national development plans, strategies or reports that include environmental priorities and considerations. For instance, the *Draft National Strategic Plan of Barbados 2005-2025* calls for the integration of environmental considerations into all aspects of national development, and sets out a strategy whereby "the integrity of natural features, wildlife habitats, significant flora and fauna, and important landscape and seascape features and protected areas are maintained during the process of development" (Government of Barbados, 2005, p. 65). In 2012, a 30-year review of development in Belize emphasised that "the management of Belize's natural

Box 2.1: Building capacity for biodiversity mainstreaming in CARICOM

Under the EU-funded Project for Capacity-Building Related to Multilateral Environmental Agreements in African, Caribbean and Pacific Countries (the ACP-MEAs project), the CARICOM Secretariat, in cooperation with UN Environment, the CAR/RCU, and the International Institute for Sustainable Development, has developed a training module, *Achieving National and Sectoral Development Priorities: the use of integrated environmental assessment tools for improved MEA implementation*. The module has been used across the Region to build capacity for the mainstreaming of biodiversity and biodiversity MEAs into national development policies. It is also used to help countries integrate the Sustainable Development Goals (SDGs) into their NBSAPs.

resources including its natural habitats, waterways, and archaeological sites is a key feature of sustainability and a societal responsibility with government charged as the steward" (Metzgen, 2012, pp 3-4). Jamaica's national development plan, *Vision 2030*, makes specific reference to the critical value of ecosystem services for sustainable development (Planning Institute of Jamaica, 2009).

CARICOM countries are also making efforts to integrate biodiversity values into physical development and land use planning processes. In this regard, two main approaches, not mutually exclusive, are used. One is to require biodiversity and ecosystems assessments as part of the environmental impact assessment and development approval process; this approach is practised in, for example, Jamaica and St. Kitts and Nevis. The other approach, used in Antigua and Barbuda, Dominica, and Suriname, is for area and national land use plans and physical development plans to include measures for minimising, halting, and reversing damage to natural ecosystems and habitats.

A third sphere of action in CARICOM is that of natural resources and ecosystems services valuations. Several countries - Belize, Grenada, Jamaica, and Saint Lucia are examples - are building national capacity for natural resources valuation, ecosystems services valuation, and natural capital accounting. In the *St. Vincent and the Grenadines National Economic and Social Development Plan 2013-2025*, the development and use of economic assessment and accounting of natural resources is considered an important strategic intervention for the conservation of that country's natural resources. (Government of St. Vincent and the Grenadines, 2013).

Country action on valuation and natural capital accounting has been complemented by regional and international enabling activities and capacity-building. Organisations and initiatives that have been active in this area include the CARICOM Secretariat, the SCBD, the initiative on The Economics of Ecosystems and Biodiversity, and the World Resources Institute.

Although a range of actions and initiatives are underway in the Region to address Aichi Target 2, the impact of these actions is difficult to assess. CARICOM countries continue to grapple with the challenges of balancing poverty alleviation and economic growth with biodiversity conservation. However, growing interest in ecosystems valuation and natural capital accounting suggests that countries are increasingly seeking to respond to this challenge using structured approaches for sound decision-making.

Box 2.2: Ecosystems services in Jamaica's National Development Plan

"Ecosystems such as forests, mangroves and coral reefs, provide essential services such as flood control, recharging ground water, and waste assimilation which underpin economic development and sustain human health. Jamaica's main industries, including agriculture, tourism, manufacturing, and mining and quarrying, rely heavily on the country's rich natural resource base…. Vision 2030 Jamaica focuses on the effective management of the country's natural resources to ensure the continued provision of essential environmental services."

(Planning Institute of Jamaica, 2009, p. 30)

Box 2.3: Ecosystems services valuation in Montserrat

"The Centre Hills, the largest intact forest area remaining on Montserrat, was found to provide a number of important environmental goods and services to the people of the island. An economic valuation study of this forest was conducted to increase the understanding of the economic importance of the forest and further the case for conservation of the area. First, a choice experiment was conducted on the Montserrat population to estimate monetary values for the aesthetic, species conservation and recreational services provided by the forest. On average, each household was willing to pay $80 per year for the control of invasive species. Second, the Total Economic Value (TEV) was calculated to indicate the relative importance of the ecosystem services from the Centre Hills forest, which produced a tentative estimate of around $1.4 million per year. The tourism value comprised 32 percent of the TEV, and, because the Centre Hills are the only source of drinking water on Montserrat, more than 30 percent of the TEV of the areas was due to water services. Species abundance (18 percent) and forest products for domestic consumption (15 percent) were also highly valued ecosystem services on Montserrat."

(CEPF, 2010, p. 36)

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Target 3

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimise or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socioeconomic conditions.

Substantial and widespread changes to subsidies and other incentives that are harmful to biodiversity are required to ensure sustainability. Ending or reforming harmful incentives is a critical and necessary step that would also generate net socioeconomic benefits. (SCBD, 2013)

This target has implications for both harmful and positive incentives on biodiversity. Measures deployed under this target should be sensitive to current conditions in each country; action related to this target would not require developing countries to remove subsidies that are necessary for poverty reduction (SCBD, 2013).

Both the GBO-4 and the report on *The State of Biodiversity in Latin America and the Caribbean* indicate that progress towards achievement of this target has been limited. This situation is reflected in the countries of CARICOM as well, with only a few countries identifying Aichi Target 3 as a national priority and reporting direct action towards its achievement.

The issue of reforming incentives schemes and mechanisms to be more favourable to the environment has been addressed by some countries as part of their efforts to move towards Green Economies. Over the period 2014 to 2016, Green Economy Scoping Studies were published for the countries of Barbados, Jamaica, and Saint Lucia (Moore et al., 2014; UNEP, 2016c; UNEP, 2016d). The studies recognised the value of using positive economic and fiscal incentives as a means of promoting sustainable use of resources, and provided several specific recommendations in this regard. However, it was noted that the use of such incentives would require corresponding attention to revenue generation in order to finance the incentives, and that current macroeconomic policy contexts constrain the provision of incentives to encourage "greening". The studies also recommended

Box 3.1: Green fiscal policies and incentives in Barbados

"Barbados has a long tradition of providing fiscal incentives to support various environmental and economic goals… There are already measures in place that allow for tax rebates on capital investments of up to 150 per cent on environmentally friendly investments. It may be necessary to expand the definition such that services and other forms of support come within the ambit of the tax breaks. …Alongside, more innovative ways need to be developed to provide incentives for actions that improve the environment, such as expanding the definition under current income tax legislation to include activities or actions that would qualify for favourable taxation treatment. For example, replanting of hedgerows that limit run-off and soil loss would qualify."

(Moore et al., 2014, pp. 170-171)

that consideration be given to the removal of environmentally negative incentives and subsidies, with a first step being a review of all government incentive policies to determine whether those policies are supporting development or activity that is harmful to the environment.

Examples of positive incentives designed specifically to promote biodiversity conservation and sustainable use can be found in the region. Jamaica's Forestry Department offers property tax remissions to private land owners to declare their lands as a Forest Reserve or Forest Management Area for a stipulated period or indefinitely. Similarly Saint Lucia's Forest, Soil and Water Conservation Act makes provision for providing property tax remission to land owners for the declaration of private lands as protected forests. At the international level, Guyana is a participant in the REDD+ programme, which incentivises developing countries to conserve and sustainably manage their forests as a contributor to climate change mitigation.

However, it appears that less attention has been focussed on eliminating systems of incentives that are harmful to biodiversity. An essential step in this regard would be to identify and evaluate existing systems of subsidies and incentives. Such an evaluation in Belize (Government of Belize, 2014) revealed that the current political climate promotes land clearance for agriculture through reduced land taxes for productive lands, and subsidised fuel and pesticides. Most large scale clearance for agriculture is currently associated with large commercial farms, the sugar cane farming industry, and clearance for cattle farming. Increased sugar cane prices and the newly opened market for cattle are leading to increased forest clearance and extensive farming and intensification leading to degraded soils. Similar assessments in other CARICOM countries are likely to shed light on how government subsidies or policies intended to stimulate sectoral growth and productivity may be creating unfavourable conditions for biodiversity.

Since most incentive and subsidy mechanisms do not fall under the direct control of the departments or ministries responsible for biodiversity management, progress on Target 3 requires building awareness (see Targets 1 and 2) and strengthening cooperation amongst the ministries responsible for economic affairs and sectoral development. Consultation and partnership with the private sector will also be necessary. However, progress towards this target will likely continue to be limited by the constrained fiscal conditions prevalent in the Region.

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Target 4

By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

The unsustainable use or overexploitation of resources is one of the main threats to biodiversity. Currently, many individuals, businesses and countries are making efforts to substantially reduce their use of fossil fuels, with a view to mitigating climate change. Similar efforts are needed to ensure that the use of other natural resources is within sustainable limits. (SCBD, 2013)

Target 4 focuses on achieving sustainable production and consumption over the long term. Guidance on this Target explains that it is not expected that sustainable production and consumption will be achieved by 2020, but meaningful steps should have been taken and measures put in place to achieve sustainable production and consumption (SCBD, 2013).

Information about progress towards Target 4 in CARICOM is limited. Few CARICOM countries included this target as a priority in their NBSAPs and most 5NRs reported low levels of progress towards this Target, with Belize, Guyana, Jamaica, and Saint Lucia being exceptions.

Some countries reported on sectoral initiatives towards sustainable production and consumption. These include promotion of organic agriculture, implementation and enforcement of closed seasons and quotas for the harvesting of living marine resources, development of policies for responsible tourism, and establishment of timber legality assurance schemes.

Private sector enterprises in CARICOM countries participate in international environmental and sustainability certification programmes such as those operated by FairTrade International, the Aquaculture Stewardship Council, the Rainforest Alliance, and Green Globe. In Belize, national certification standards for shrimp farming and the production of sugar cane, bananas and citrus are being developed. In Haiti eco-labelling for organic coffee and cacao, e.g. Haitian Blue, is gaining traction.

Although only a handful of countries have prioritised Target 4 for action and reporting, it is worth noting the close linkages between this target and Targets 6, which relates to fisheries management, and 7, which addresses agriculture, aquaculture and forestry. It is likely that actions and achievements in respect of those targets will also contribute to progress under Target 4.

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Target 5

By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Habitat loss, including degradation and fragmentation, is the most important cause of biodiversity loss globally. Natural habitats in most parts of the world continue to decline in extent and integrity, although there has been significant progress to reduce this trend in some regions and habitats. Reducing the rate of habitat loss, and eventually halting it, is essential to protect biodiversity and to maintain the ecosystem services vital to human wellbeing. (SCBD, 2013)

The countries of CARICOM are located in what is recognised as one of the world's great centres of endemic biodiversity, including a wide variety of habitats and ecosystems. Most of the countries of the regions are also located in biodiversity hotspots, that is, biogeographic regions that hold high numbers of unique species and which are currently at risk as a result of human activity. The valuable habitats of the Region are under threat as a result of rapid population growth, increasing urbanisation, and the expansion of agriculture, tourism and commercial development (CEPF, 2010).

Loss and fragmentation of these habitats will not only result in the loss of a wealth of globally unique species of fauna and flora, but will also compromise the vital ecosystems services—water supply, flood control, storm protection, climate mitigation, provision of food and medicines—associated with these habitats.

Note that this target relates to all natural habitats, including forests. However, for the purposes of this report, this section will focus principally on forests, including mangroves.

The degree of forest cover in CARICOM countries varies widely, from 3.5% in Haiti to over 95% in Suriname (FAO, 2015a). The assessment of the State of Biodiversity in Latin America and the Caribbean indicates that forest cover in Latin America and the Caribbean has decreased by 6% over the period 2001 to 2013 (UNEP, 2016b). The overall pattern in the insular Caribbean, however, appears to be contrary to this trend: the FAO reports a net increase in forest area in the Caribbean islands, mainly as a result of the abandonment of sugarcane plantations and other agricultural land (FAO, 2015b). Reforestation activities, such as those undertaken in Barbados, Jamaica and Saint Lucia, also contribute to an increase in forest cover.

The continental countries of CARICOM are experiencing a net total decrease in forest cover. The FAO reports Suriname's deforestation rate as being 3.9%, with the majority of forest loss being caused by human activities (FAO, 2015a). Projections in Belize suggest that if current trends of land use, land policy and government subsidy continue, forest cover will fall from 61% in 2012 to 50% in approximately 29 years (Government of Belize, 2014). Proposed responses to reduce the loss of forests include review and rationalisation of national forest policies, and expansion of the

Box 5.1: Grenada's Forests

"Forests in Grenada are dominated by secondary forest, with only pockets of climax forest. A combination of anthropogenic pressures and natural disasters threaten the existing forest cover, including clearances for agriculture and development of the tourism sector housing, infrastructure and other commercial activities. Hurricanes, forest fires and invasive alien species are all threats to the forests and the biodiversity they contain. In 2004, hurricane Ivan had a severe impact on forest communities in Grenada. Weak public education and inadequate legislation, enforcement and monitoring have resulted in unsustainable extraction of species from the forests. A substantial proportion of Grenada's population depend on its forests for their livelihoods, and despite these pressures, forests in Grenada are currently in a recovery phase. Replanting of mangrove forests in particular has achieved over 50 per cent restoration of mangrove ecosystems."

(Government of Grenada, 2014, cited in UNEP, 2016c, p. 50)

Box 5.2: Loss of Mangroves in Antigua and Barbuda

"Mangrove extent in Antigua dropped sharply in the decade to 2000, as a result of anthropogenic pressure on the coastline, particularly from development linked to the tourism sector. Since 2000, substantial efforts have been made to restore mangroves, resulting from increased awareness of their importance in supporting the local fishing industry, as well as understanding of other intrinsic values of mangroves. However, these attempts have been hindered by the island's exposure to frequent hurricanes and storms, which have been compounding the losses. The fifth national report to the CBD reports that mangrove cover increased between 2000 and 2004, and again between 2005 and 2010, but that a sharp loss between 2004 and 2005 resulted in 2010 levels being only slightly higher than cover in 2000. Every year between 2006 and 2012 saw at least one hurricane or tropical storm affect the island."

(Environmental Division, Government of Antigua & Barbuda 2014, cited in UNEP, 2016b, p. 50)

area of forest designated for management and conservation. The designation of biological corridors, as described in Haiti's 5NR, may be a useful response to prevent fragmentation.

Around 12% of the world's mangrove forests are found in the Caribbean (Spalding et al., 2010, cited in UNEP, 2016b). The FAO reports an overall increase in mangrove forest area in the Caribbean over the period 2000 to 2015, due to natural increase and an improvement in estimates of mangrove cover (FAO, 2015b). However, it has been reported that mangrove forests in the Caribbean are receding due to rising sea levels (FAO, 2014), and that rates of mangrove loss in the Caribbean are among the highest in the world (Polidoro et al., 2010, cited in UNEP 2016b). These conflicting assessments demonstrate the difficulty of accurately assessing trends in mangrove forest cover in the Region.

Mangrove replanting and restoration projects, on varying scales, have been undertaken in many CARICOM countries, and evidence suggests that in some countries, such as Belize and Jamaica, this has led to an increase in mangrove cover (UNEP, 2016b).

The information available suggests that there may be an overall positive trend in forest and mangrove cover in the insular countries of CARICOM, but that forest

cover in the continental member countries is decreasing. However, information from different sources paints different, sometimes conflicting, pictures. More reliable and consistent data are needed to confidently assess the Region's progress towards this target.

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Target 6

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Overexploitation is a severe pressure on marine ecosystems globally, and has led to the loss of biodiversity and ecosystem structure. Harvests of global marine capture fisheries have been reduced from the unsustainable levels of a decade and more ago. However, overfishing still occurs in many areas, and fisheries could contribute more to the global economy and food security with more universal commitment to sustainable management policies. This target should be regarded as a step towards ensuring that all marine resources are harvested sustainably. (SCBD, 2013)

Aichi Target 6 relates to all wild stocks of fish, aquatic invertebrates and aquatic plants, whether marine or freshwater. It does not include fish, molluscs, crustaceans and aquatic plants cultivated and harvested under aquaculture; these are considered under Aichi Target 7.

In the Caribbean, the fisheries sector plays an important role in income generation for persons employed in the sector, as well as for national economies through exports of fish and marine products. The sector also contributes to, employment, food security the welfare of coastal communities. Data from the year 2015 indicates that the contribution of the fisheries sector to national gross domestic product (GDP) ranges from 0.05% in Trinidad and Tobago to 5.3% in Suriname (CARICOM Secretariat, 2016). The percentage of the labour force employed in fisheries is estimated to range from 2% in Trinidad and Tobago to 22% in Grenada and St. Kitts and Nevis (Masters, 2014).

Most CARICOM countries, in particular the small island developing states of the region, have relatively large exclusive economic zones in comparison to their land area. This is especially the case for archipelagic countries. These geographical parameters have implications for the management ability of these island states with respect to marine fisheries, and in particular the control of illegal, unregulated and unreported (IUU) fishing.

The largest marine capture fish producers in CARICOM are the continental countries of Guyana and Suriname. Several countries of the Region, such as Belize, Guyana, Haiti, Jamaica and Suriname, also have inland and freshwater fisheries, with commercial, artisanal and/or subsistence harvesting. Figure 6.1 shows the increase in annual marine capture fish production in CARICOM countries over the period 2001 to 2012. Marine capture fish production in 2012 was 17% greater than in 2001. Several countries—Barbados, Dominica, Saint Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago—showed reductions in fish production over the 11 year period. The largest increases were seen in Suriname and Haiti, where fish capture

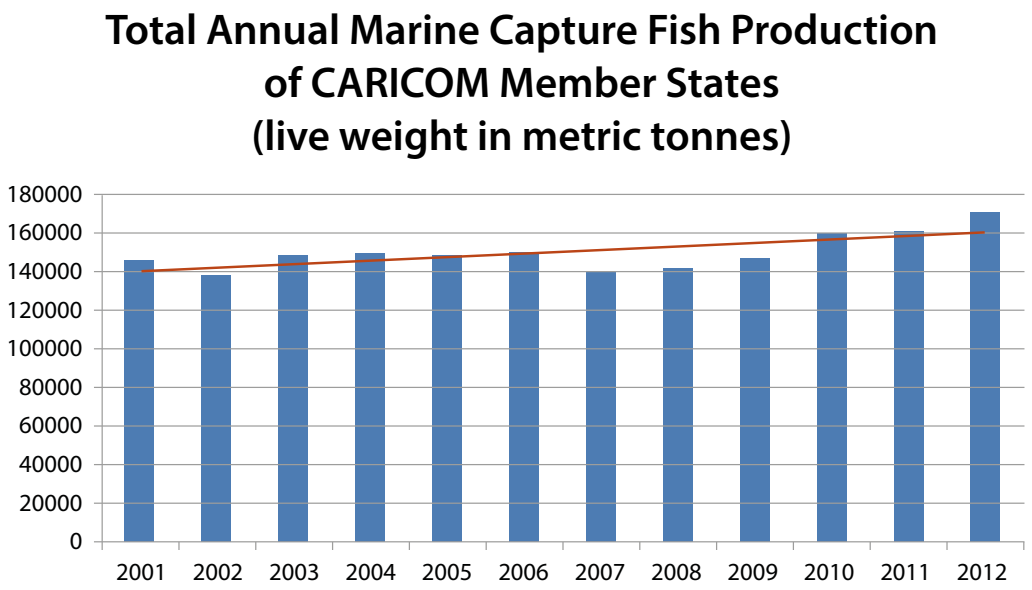

Figure 6.1: Total annual marine capture fish production (live weight in metric tonnes of CARICOM member countries for the period 2001-2012 (Source: Masters, 2014)

increased by 10,487 metric tonnes and 9,050 metric tonnes respectively. Haiti, in its 5NR, has recorded concern about the low likelihood of achieving of Aichi Target 6 due to overfishing, weak systematic control and monitoring, and the poor condition of fisheries ecosystems, particularly coral reefs.

National actions towards the achievement of Aichi Target 6 have included the amendment and updating of fisheries and marine resources legislation and regulations, for example, in Antigua and Barbuda, Jamaica, and St. Kitts and Nevis. Action has been taken to restrict or prohibit unsustainable harvesting methods: Belize, for instance, has enacted a nationwide ban on trawling. Some countries have also enacted species-specific protections, such as full protection of marine turles in The Bahamas, Barbados, Belize, Jamaica, and Trinidad and Tobago, the ban on commercial shark fishing in The Bahamas, and bans on the capture and sale of parrotfish, blue tang and surgeon fish in Belize (Masters, 2014). Suriname's Atlantic seabob shrimp fishery has been certified to Marine Stewardship Council (MSC) standards, as a result of substantial multi-stakeholder efforts to ensure the fishery's sustainability (MSC, n.d.). The designation of protected fisheries zones, such as the Special Fishery Conservation Areas that have been declared in Jamaica, will also support progress towards sustainable fisheries management.

At the regional level, the principal institution with responsibility for fisheries management in CARICOM is the Caribbean Regional Fisheries Mechanism (CRFM), which functions to "promote and facilitate the responsible utilisation of the Region's fisheries and other aquatic resources for the economic and social benefits of the current and future population of the Region" (CARICOM Secretariat, 2017).

The work of the CRFM has resulted in the development and adoption of the

Caribbean Community Common Fisheries Policy, a binding regional treaty focussed on the conservation, management and sustainable use of fisheries and related ecosystems. The main objectives of the Policy are supportive of Aichi Target 6. The CRFM also supports the improvement of fisheries data and information systems to guide sustainable fisheries management planning and decision-making.

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The CRFM has also been a driving force behind the development and adoption of the Castries (Saint Lucia) Declaration on IUU fishing in 2010 (CRFM, 2010). IUU fishing is one of the biggest threats to marine biodiversity and sustainable fisheries (FAO, 2015c). The Castries Declaration reaffirms the need to implement the principles and rules of international law to protect, conserve, manage and use the fisheries and other living marine resources and their ecosystems in a sustainable manner.

It should be noted that research suggests that recent declines in fish density in the Caribbean do not have overfishing as their sole primary cause (Paddack et al., 2009). While fishing is a factor (Stallings, 2009), a major contributor to fish population decline is habitat degradation, and specifically coral reef loss (Paddack et al., 2009). Achievement of Aichi Target 6 is therefore closely linked to the achievement of Aichi Target 10, as well as to Targets 8, 11, and 15.

Box 6.1: Combatting illegal, unregulated and unreported fishing in CARICOM

"In 2010 the Ministerial Council of the CRFM adopted the Castries (Saint Lucia) Declaration on illegal, unreported and unregulated fishing in 2010. The Castries Declaration urges the CRFM members to implement multiple international instruments in their legislation, such as the Code of Conduct on Responsible Fisheries, and to become party to the United Nations Convention on the Law of the Sea (UNCLOS), the United Nations Fish Stocks Agreement (UNFSA), and the FAO Compliance Agreement if they have not done so already."

"In October 2015, the Honourable Eugene Alastair Hamilton, Minister for Agriculture of Saint Kitts and Nevis, signed a National Plan of Action (NPOA) on behalf of his government, to deter and eliminate Illegal Unreported and Unregulated (IUU) Fishing. The signing of the NPOA-IUU demonstrates the country's commitment to the objectives outlined in the International Plan of Action. It also underscores the proactive approach of the country in combatting and deterring IUU fishing, whilst maintaining the sustainability of the global fisheries resources. Other CARICOM countries that have signed an NPOA-IUU and are actively fighting IUU fishing are Antigua and Barbuda and Belize."

(FAO, 2015c, pp. 3 and 4)

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Target 7

By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

The increasing demand for food, fibre and fuel will lead to increasing losses of biodiversity and ecosystem services if issues related to sustainable management are not addressed. On the other hand, sustainable management not only contributes to biodiversity conservation but can also deliver benefits to production systems in terms of services such as soil fertility, erosion control, enhanced pollination and reduced pest outbreaks, as well as contributing to the well-being and sustainable livelihoods of local communities engaged in the management of local natural resources. (SCBD, 2013)

The small size of most CARICOM member countries, together with their special biogeographic conditions and land tenure systems, limit the area available for agriculture, aquaculture, forestry, urban settlement and commercial and infrastructural development. As a result, one of the major long-term land management issues facing CARICOM countries is the degradation of land and habitats as a result of high demand for and pressure on a limited resource base. Sustainable management to achieve Target 7 requires integrating biodiversity considerations into decision-making and strategic planning in these three (3) sectors.

It should be noted that while some agriculture, aquaculture and forestry practices can be a significant cause of biodiversity loss, the variety and variability of animals, plants, and micro-organisms associated with productive landscapes are also an important component of biodiversity.

Agriculture

The CARICOM Agricultural Policy includes several principles, goals and objectives that are of relevance to Aichi Target 7, including recognition of the importance of sustainable natural resource use and adequate environmental conservation. The Policy also advocates the adoption of environmentally friendly and sustainable production methods and approaches, and the integration of Good Agricultural Practices.

Several regional organisations including the Caribbean Agricultural Research and Development Institute (CARDI), the Caribbean Agricultural Health and Food Safety Agency, the Inter-American Institute for Cooperation on Agriculture, and the FAO have been working in the Caribbean to build capacity for sustainable agricultural management.

These efforts to improve the sustainable management of agriculture are taking place in the context of a declining agricultural sector in much of the Region. Currently, the contribution of agriculture to GDP in CARICOM countries varies from less than 1% in Trinidad and Tobago to over 15% in Guyana, and the percentage of land in agricultural use ranges from less than 1% in Suriname to over 65% in Haiti (United Nations Economic Commission for Latin

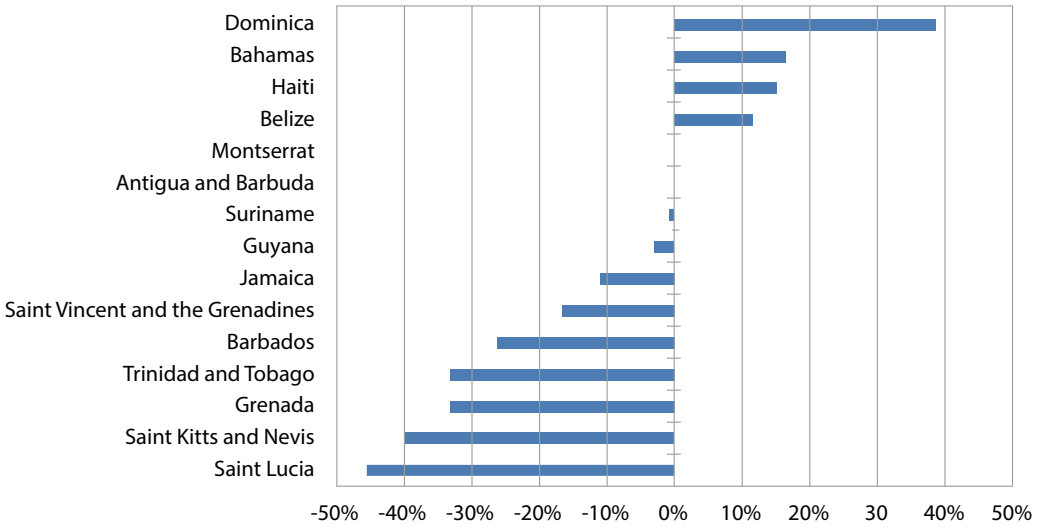

Figure 7.1: Percentage change in agricultural land area in CARICOM member countries over the period 1994-2014 (Source: UN ECLAC 2017)

America and the Caribbean (ECLAC), 2017). Over the 20 year period from 1994 to 2014, the area of land in agricultural use has declined in the majority of CARICOM countries (Figure 7.1)

In some cases this change reflects the decline of a principal agricultural crop such as bananas in Saint Lucia or sugarcane in St. Kitts and Nevis. In other cases, such as Grenada, it is mainly the result of growth in settlements and infrastructure areas.

The change from agriculture to other land uses may have some beneficial effects on biodiversity, for example through reduced use of agrochemicals or an associated increase in forest cover. However, there is also the potential for negative impacts on biodiversity, such as a decrease in agricultural biodiversity, and degradation and fragmentation of ecosystems as a result of infrastructure development.

Saint Kitts and Nevis has reported (Government of St. Kitts and Nevis, 2014) that as a result of the cessation of sugarcane cultivation, vegetative succession (from sugarcane to guinea grass and shrubbery) in previous agricultural lands has resulted in an increase in grass fires, causing the retreat of the forest line, habitat loss and disturbance for arboreal species, and adverse impacts on soil organisms.

Changes in the area of agricultural land provide important information, from both environmental and economic perspectives, about member countries endowment of agricultural resources (CARICOM Secretariat, 2003). The St. Kitts and Nevis example highlights the importance not only of sustainably managing areas in agricultural use, but also of giving careful consideration to the management of previous agricultural land that has become fallow, and managing the transition from agricultural to other land uses.

Aquaculture

The practice of aquaculture in most of the member countries of CARICOM is negligible, being limited to micro or small scale production (Figure 7.2).

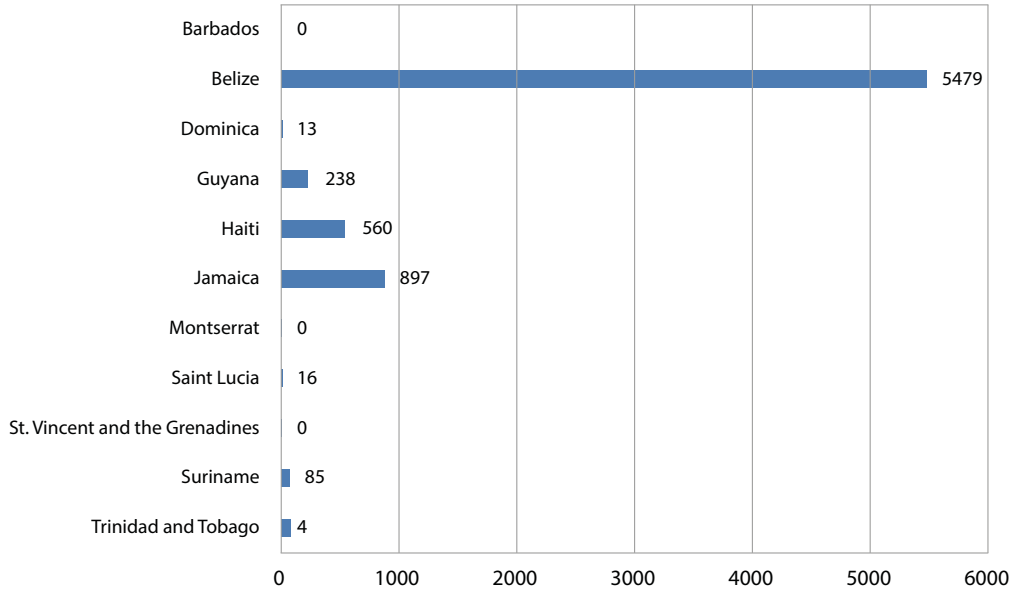

Figure 7.2: Average annual aquaculture production (metric tonnes) in CARICOM member countries for the period 2011-2012 (N.B.:countries for which data was not available are not included in the chart) (Source: Masters, 2014)

Aquaculture activities, where they occur, take place in marine waters, in coastal areas in brackish waters, and in inland ecosystems, including rivers and constructed ponds. Species cultivated include fish, molluscs, crustaceans and plants. There appears to be an interest in expanding aquaculture production, with aquaculture research projects carried out in The Bahamas, Guyana and St. Kitts and Nevis. On the other hand, in Jamaica, historically one of the region's leading aquaculture producers, the sector has been on the decline (Masters, 2014).

In Belize, the shrimp farming industry has taken the initiative to introduce certification under the Aquaculture Stewardship Council (ASC) (UNEP, 2016b). To receive ASC certification farms must demonstrate that their operations are both socially and environmentally responsible, and that they actively work to minimise their impacts on the surrounding natural resources (ASC, n.d.). Belize was the first country in the world to introduce ASC shrimp farm certification and so far, eight farming operations in Belize have been ASC certified. As CARICOM's largest aquaculture producer, Belize has the potential to establish itself as a benchmark for sustainable aquaculture in the Region.

Forestry

The commercial forestry sector in most CARICOM countries is small to non-existent. Information from the FAO (Figure 7.3) identifies five CARICOM countries with forest areas specifically designated for production.

FAO data also indicates that total wood removals in most CARICOM countries decreased over the period 1990 to 2011, Haiti and Suriname being notable exceptions to this trend (FAO, 2015a). It should be noted, however, that most of the forest production statistics presented for CARICOM countries in the 2015 Global

Country	% of forest area designated for production		
	1990	2005	2015
Guyana	100	99	87
Haiti	34	50	60
Jamaica	3	2	2
Suriname	2	13	13
Trinidad and Tobago	32	33	NA

Figure 7.3: Percentage of forest area designated for production in five CARICOM countries [Source: FAO, 2015b]

Forest Resources Assessment are estimates based on desk studies, rather than derived from national statistics. Guyana and Suriname, which have significant forestry sectors, both maintain official production statistics showing an overall trend of increase in the volume of timber production over the period 2004 to 2013 (Guyana Forestry Commission, n.d.; Suriname Foundation for Forest Management and Production Control, 2013).

Timber certification can be an important tool for sustainable forest management. As of March 2017, 931,542 hectares of forest, in three CARICOM countries, have received Forest Stewardship Council (FSC) forest management certification (Figure 7.4). The FSC has also issued 14 Chain of Custody certificates in the CARICOM region (Figure 7.5).

The establishment and implementation of the European Union Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan may also have a positive impact on sustainable forest management in the Region. Guyana is currently negotiating a voluntary partnership agreement (VPA) with the EU, in order to improve access to European timber markets (European Forest Institute, 2014; Guyana Forestry Commission, 2016) . Under a FLEGT VPA, Guyana would develop national timber licensing and legality assurance systems, and only licensed imports from Guyana would be accepted into the EU.

Country	Total certified area (ha)	Number of certificates
Belize	197,122	2
Guyana	371,680	1
Suriname	362,740	4

Figure 7.4: FSC-certified Area and Number of Certificates in CARICOM (Source: FSC, 2017

Country	Number of certificates
The Bahamas	1
Belize	2
Guyana	4
St. Vincent and the Grenadines	1
Suriname	6

Figure 7.5: Number of FSC Chain of Custody certificates in CARICOM countries (Source: FSC, 2017

Suriname has already established a national timber licensing and verification system, which has the potential to be strengthened and adapted for FLEGT VPA purposes.

Overall, available information indicates that action is being taken to improve the sustainability of the agriculture, aquaculture and forestry sectors in CARICOM. In countries where aquaculture and forestry are significant production and export sectors, certification schemes such as those operated by the ASC and FSC are useful indicators for monitoring the adoption of sustainable management practices. The development and use of a suite of sustainability criteria for agriculture in the Region would be a valuable monitoring and evaluation tool in respect of Aichi Target 7.

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Box 7.1: Sustainable Forestry Management in Suriname

In Suriname, the Foundation for Forest Management and Production Control (Stichting voor Bosbeheer en Bostoezicht, SBB) has developed a sophisticated system to ensure sustainable forestry management. The SBB uses LogPro, a log tracking database, and a geographical information system (GIS) to guide planning and mapping for timber licences.

Timber harvesting occurs only in the forest belt, by licensed concession holders, and is carefully monitored to ensure optimal harvesting within designated compartments. Prior to the start of logging, site boundaries are surveyed using a global positioning system, and inventoried commercial trees are selected for logging. After felling, the timber operator must prepare a register of the logs with tag numbers, species and size. All logs are uniquely labelled and can be determined, in an audit of the timber register by the SBB, as legally or illegally harvested.

The GIS and LogPro databases make it possible to monitor logging and determine exactly how much timber is produced in a given area. When the maximum allowable cap of 25 cubic metres per hectare is approached, the area will be closed for logging so that it can recover for the next cutting cycle.

The SBB has determined that the maximum harvesting limit for sustainable, safe limits of extraction is 1.5 million cubic metres per year. As of 2013, the amount of timber harvested was less than 400,000 cubic metres.

(SBB, 2012; SBB personal communication, 2013)

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Target 8

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Nearly all Parties indicated in their fourth national reports that pollution was posing a threat to biodiversity. In particular nutrient loading, primarily of nitrogen and phosphorus, is a major and increasing cause of biodiversity loss and ecosystem dysfunction, especially in wetland, coastal and dryland areas. (SCBD, 2013)

Given the geographical characteristics, size and terrain of CARICOM countries, a major concern in respect of the effects of pollution on biodiversity relates to impacts on coastal, marine and freshwater aquatic ecosystems.

The main point sources of land-based pollution to the Caribbean Sea have been identified by the UNEP Caribbean Regional Coordinating Unit for the Caribbean Environment Programme (UNEP CAR/RCU), which also serves as the Secretariat to the Cartagena Convention, as being (UNEP CAR/RCU, n.d.):

- Domestic sewage
- Solid waste
- Poor agricultural practices
- Oil refineries
- Sugar factories and distilleries
- Food processing
- Beverage manufacturing
- Pulp and paper manufacturing
- Chemical industries.

Of these, the single largest point source category of pollution was domestic sewage (UNEP CAR/RCU, 2001). More recent studies have shown that the vast majority of wastewater entering the Caribbean Sea remains untreated or only partially treated and only 17% of households in the Wider Caribbean are connected to acceptable collections and treatment systems (UNEP CAR/RCU, n.d.; Global Environment Facility Caribbean Regional Fund for Wastewater Management, 2017).

Marine-based sources of pollution, including ballast water, oil spills, pollution from offshore oil exploration and extraction, wastewater from cruise ships and other vessel, and marine litter, are also a cause for concern (UNEP CAR/RCU, n.d), particularly given the high maritime traffic in the semi-enclosed Caribbean Sea (UNEP, 2016b).

Several multi-country regional initiatives have been undertaken to address land-based sources of pollution in the Wider Caribbean. These include regional projects funded by the Global Environment Facility (GEF) and implemented by various UN agencies and regional organisations, such as: Integrating Water, Land and Ecosystem Management in Caribbean SIDS (IWEco – 2006 to 2011); Integrating Watersheds and Coastal Area Management (IWCAM – 2006 to 2012), Reducing Pesticides Run-off to the Caribbean Sea (REPCAR – 2007 to 2011)); the Caribbean Regional Fund for Wastewater Management (CReW – 2011 to 2017; and Catalysing Implementation of the Strategic Action Programme for the Sustainable Management of Shared Living Marine Resources in the Caribbean Large

Marine Ecosystem+ Region (UNDP/GEF CLME+ – 2015 to 2020). There have also been other projects supported by bilateral assistance, such as the German-funded Caribbean Aqua Terrestrial Solutions initiative.

These regional initiatives support countries in meeting their national obligations to the Protocol Concerning Pollution from Land-Based Sources and Activities (LBS Protocol) to the Cartagena Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region. The LBS Protocol is a regional multilateral environmental agreement that seeks to protect the marine environment and human health from land-based point and non-point sources of marine pollution. The Protocol includes regional effluent limitations for domestic wastewater (sewage), which is the major land-based point source or marine pollution in the Region. It also requires specific plans to address agro-chemical run-off, which is the leading nonpoint source of land-based marine pollution. The LBS Protocol establishes specific schedules for implementation and sets the stage for the development and adoption of future annexes to address other priority sources and activities of pollution (UNEP CAR/RCU, 2017). Eight (8) CARICOM countries (Antigua and Barbuda, The Bahamas, Belize, Grenada, Guyana, Jamaica, Saint Lucia and Trinidad and Tobago) have ratified the LBS Protocol. The LBS Protocol has catalysed the development of three regional partnerships or nodes for nutrients, marine litter and wastewater in support of the UN Environment Global Programme of Action for the prevention of pollution from land-based sources and activities. A regional action plan for reducing and preventing marine litter has also been developed and endorsed by Contracting Parties to the Cartagena Convention.

Actions being taken in countries at the national level include establishment and strengthening of legislation, policies and infrastructure for water and wastewater management, development and implementation of water quality monitoring programmes including strengthening laboratory capacity. Despite these efforts, it is difficult to assess progress towards Target 8 in the region. A major constraint is the unavailability of reliable time series of data on the sources, locations, volumes and concentrations of pollutants. Without sound trend data, it is not possible to evaluate improvements or deteriorations in pollution levels. The recent efforts under the UNDP/GEF CLME+ and the Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States (GEF-IWEco) projects to support the development of a State of Convention Area Report for the Caribbean Sea on pollution, along with further development of regional platforms for nutrients, wastewater and marine litter are expected to begin to address this deficiency.

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Target 9

By 2020, invasive alien species and pathways are identified and prioritised, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Invasive alien species are one of the main direct drivers of biodiversity loss at the global level. In some ecosystems, such as many island ecosystems, invasive alien species are the leading cause of biodiversity decline. Invasive alien species primarily affect biodiversity by preying on native species or competing with them for resources. In addition to their environmental impacts, invasive alien species can pose a threat to food security, human health and economic development. Increasing travel, trade, and tourism have facilitated the movement of species beyond natural bio-geographical barriers by creating new pathways for their introduction. With increasing globalisation, the occurrence of invasive alien species is likely to increase unless additional measures are taken. (SCBD, 2013)

This Target focuses on two (2) types of actions, the control or eradication of invasive alien species (IAS) and the management of their introduction pathways. It is important to note that any organism can become invasive; the phenomenon is not limited by taxonomic group and can occur in all types of ecosystems. Potential introduction pathways include shipping (introduction via ballast water or ship hulls), agricultural (plant or pest introductions), escape of species from captive facilities such as nature parks, aquaria or aquaculture operations, and movement of animals in the exotic pet trade. The Caribbean, as a major transshipment zone and tourism destination comprised mainly of small islands, is particularly vulnerable to the introduction of IAS. The Critical Ecosystems Partnership Fund has rated invasive species as "the greatest threat to the native biodiversity of the Caribbean Islands Hotspot" (CEPF, 2010, p. 52).

Information identifying invasive alien species that pose a threat to biodiversity is available from the 5NRs and NBSAPs of nine CARICOM countries (see Annex 1). Priority species include marine, terrestrial, and freshwater flora and fauna. Several countries included agriculture diseases and their associated vectors, such as black sigatoka disease (caused by the fungus *Mycosphaerella fijiensis*) and lethal yellowing (spread by the planthopper *Haplaxius crudus*).

In additional to these national lists, the Caribbean Invasive Alien Species Network (CIASNET) maintains a regional database on invasive alien species in the wider Caribbean (CIASNET, 2012).

The most commonly identified invasive alien species of concern is the lionfish (*Pterois volitans* and *Pterois miles*). Lionfish reproduce rapidly, are voracious hunters, and lack natural predators in the Caribbean Sea. The proliferation of lionfish across the Caribbean has led to declines in the abundance and diversity of native reef fish, which has impacts on the tourism and fisheries sectors, as well as on the health of coral reef ecosystems.

Box 9.1: Eradicating invasive alien species from Antigua and Barbuda's offshore islands

The Government of Antigua and Barbuda is in the process of removing goats and invasive rats from its most rugged and remote offshore island to allow endangered wildlife and their habitats to recover. Redonda is home to a unique array of plants and animals, including at least five critically endangered endemic species of reptiles, such as the Redonda ground dragon (Ameiva atrata). The uninhabited and seldom visited island is also formally recognised as an Important Bird Area, supporting globally-significant numbers of seabirds.

However, the island's plant and animal populations are disappearing fast thanks in large part to its population of over 5,000 aggressive black rats (an invasive alien species) which prey heavily on the island's wildlife. Together with the herd of long-horned goats that was brought to Redonda by humans more than a century ago, these mammals have transformed this once-forested island into a moonscape. So few plants survive that even the goats now face starvation.

One of the first steps has been to capture and move the remaining goats to Antigua, where they will be cared for by the Department of Agriculture. Rats are then eradicated using a rodenticide bait that has previously been used to restore more than 20 other Caribbean islands without harming native wildlife. The Redonda Restoration Programme has been formed by the Antigua & Barbuda Government and EAG in collaboration with partners from the UK (Fauna & Flora International, British Mountaineering Council), USA (Island Conservation) and New Zealand (Wildlife Management International Ltd).

Antigua and Barbuda has a wealth of experience and success under the ongoing Offshore Islands Conservation Programme which has, since 1995, removed rats and other invasive pests from 15 islets closer to Antigua. This has saved the Antiguan racer – once the world's rarest known snake – from extinction, and enabled an incredible recovery of other native animals and plants. Many tens of thousands of residents and tourists now visit and enjoy Antigua's pest-free islands every year.

(Flora and Fauna International, 2016)

The rapid emergence of lionfish as a threat to the marine and coastal biodiversity of the Caribbean had led to forceful responses from agencies such as the CRFM (Mohammed, 2016), the International Coral Reef Initiative (ICRI) (n.d.), and the Regional Activity Centre for the SPAW Protocol (SPAW-RAC) (n.d.*a*). At the national level, actions to address the threat have included promoting human consumption of lionfish, training divers to safely harvest lionfish, and hosting lionfish derby events. At the Centre for Marine Sciences of the Mona Campus of the University of the West Indies (UWI), research carried out to contribute to lionfish control and management has included studies of lionfish prey preferences and development of passive capture mechanisms (UWI Centre for Marine Sciences, 2017).

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The research at the Centre for Marine Sciences was a component of a larger GEF

project on Mitigating the Threat of Invasive Alien Species in the Insular Caribbean Under this project, a Strategy and Action Plan for Invasive Alien Species in the Caribbean Region was developed (Centre for Agriculture and Biosciences International, 2011). This strategy complements national strategies and action plans such as those in The Bahamas, Jamaica, and Saint Lucia.

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An emerging invasive alien species threat in the region is the periodic occurrence of massive blooms of Sargassum seaweed. The deposit and decomposition of large volumes of the Sargassum algae in coastal areas and on beaches across the Caribbean has had severe impacts on the fisheries and tourism sectors. There remains a need for research on the ecological impacts of these large scale algal occurrences. Responses at the national level have included national projects to clear the coast of Sargassum, such as the Coastal Sanitisation and Protection of the Great South Coast project in Haiti. Regional initiatives have included the publication of Sargassum resource guide by the Caribbean Hotel and Tourism Association Caribbean Alliance for Sustainable Tourism (n.d.) and research undertaken by the UWI Centre for Resource Management and Environmental Studies.

Substantial efforts have been made by a variety of agencies and organisations at the national and regional levels in the Caribbean to monitor and respond to the threats of invasive alien species. Improved monitoring of invasive species populations and introduction pathways is necessary to inform better assessment of regional progress towards Aichi Target 9.

Box 9.2: Protecting the islands of the Bahamas from invasive alien species

International NGO Island Conservation worked closely with The Bahamas National Trust, under a grant supported by the CEPF and CANARI (in its role as the Regional Implementation Team for CEPF's investments in the region), to build local capacity to manage and eradicate invasive species on Booby Cay, a small island in the Bahamas. The project developed a feasibility assessment for the removal of black rats, established a biosecurity plan, and conducted awareness raising activity about the threats posed by invasive species (mainly black rats) and the importance of protecting Booby Cay as a key biodiversity area. Island Conservation and The Bahamas National Trust successfully engaged the local community of Mayaguana and the Bahamian government in their efforts and as a result Booby Cay was officially designated as a National Park in August 2015.

(courtesy of CANARI)

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Target 10

By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimised, so as to maintain their integrity and functioning.

Urgently reducing anthropogenic pressures on those ecosystems affected by climate change or ocean acidification will give them greater opportunities to adapt. Where multiple drivers are combining to weaken ecosystems, aggressive action to reduce those pressures most amenable to rapid intervention should be prioritised. (SCBD, 2013)

This target relates to the sound management of vulnerable ecosystems under threat from climate change and ocean acidification, with a specific focus on coral reefs.

Globally, Target 10, with its 2015 deadline, has not been met (UNEP, 2016b). This is consistent with the circumstances in the CARICOM Region where coral reefs have declined in area by over 50% since 1970 (Jackson et al., 2014). Over 75 per cent of Caribbean reefs are considered to be under threat, and over 30 per cent are categorised as highly, or very highly, threatened (UNEP, 2016b).

The report *Status and Trends of Caribbean Coral Reefs: 1970 – 2012* (Jackson et al., 2014) is the most comprehensive assessment to date of coral reefs in the region. The assessment found that average coral cover for the wider Caribbean in 2012 is 16.8%, down from the 34.8% average observed in 1970.

The main drivers of this decline were identified as high human population density (both of residents and of tourists); overfishing of herbivores, particularly parrotfish; coastal pollution; ocean warming; and invasive alien species (Jackson et al., 2014). These drivers point to the inter-related nature of the Aichi Targets: action on targets 6, 8, 9 and 11 in the Caribbean could also contribute to the goal under Target 10 of reducing anthropogenic pressures on coral reefs.

While coral disease has also had a significant adverse impact on Caribbean coral reefs (Mumby et al., 2014), and Caribbean species of coral appear to be especially vulnerable to the impact of introduced diseases, disease was considered to be a symptom of human disturbance, rather than a direct driver of coral reef change (Jackson et al., 2014).

Coral bleaching as a result of ocean warming has been found to cause mass localised coral mortality in the Caribbean (Jackson et al., 2014; Mumby et al., 2014). The severity of coral bleaching events in the Region has been increasing since 1995, and it is expected that even greater rises in sea temperature in the future will have correspondingly grave impacts on the health of Caribbean reefs. Historical data on ocean acidification is currently insufficient to comprehensively assess the impact to date of decreased pH on Caribbean reefs, but both ocean acidification and climate change loom large as threats to the future health of Caribbean corals (Jackson et al., 2014; UNEP CAR/RCU, 2015). Potential impacts on corals include reduced growth

and reproduction rates, reduced rates of reef building, and increased bioerosion and dissolution of reef frameworks (Mumby et al., 2014). For coral reefs in the Caribbean which are already experiencing severe stress as a result of pollution and overfishing, the impacts of climate change and ocean acidification may be especially severe (Mumby et al., 2014).

In 2016 the Climate Resilient Eastern Caribbean Marine Managed Areas Network

Figure 10.1: Raising awareness about marine ecosystems - Clovis cartoon in The Jamaica Observer of July 25, 2016.

Box 10.1: Parrotfish conservation for coral reef health

The International Coral Reef Initiative, at its 28th General Meeting, held in Belize City in 2013, recognising that overfishing of herbivores, particularly parrotfish, has been among the major drivers of reef decline in the Caribbean, adopted a Recommendation which "urges Nations and multi-lateral groupings of the wider Caribbean to:

Adopt conservation and fisheries management strategies that lead to the restoration of parrotfish populations and so restore the balance between algae and coral that characterises healthy coral reefs;

Maximise the effect of those management strategies by incorporating necessary resources for outreach, compliance, enforcement and the examination of alternative livelihoods for those that may be affected by restrictions on the take of parrotfish;

Consider listing the parrotfish in the Annexes of the SPAW Protocol (Annex II or III) in addition to highlighting the issue of reef herbivory in relevant Caribbean fisheries fora;

Engage with indigenous and local communities and other stakeholders to communicate the benefits of such strategies for coral reef ecosystems, the replenishment of fisheries stocks and communities' economy."

(Jackson et al., 2014; ICRI, 2013)

(ECMMAN) project, implemented by The Nature Conservancy and funded by the German Government, produced Coral Reef Report Cards for six CARICOM countries. The Report Cards were prepared using the Reef Health Index developed by the Healthy Reefs Initiative, which takes into account four (4) key coral reef indicators: coral cover, fleshy macroalgae, herbivorous fish, and commercial fish.

Overall reef health, averaged over the six countries included in the assessment, was assessed as poor. Average coral cover was measured at 17%, based on data from 277 sites, and this coverage was assessed as fair, the middle ranking on a scale from critical to very good. The individual reef health indices for the countries participating in the assessment are presented in Figure 10.2 below.

It should be noted that there are significant differences in the coral reef area reported in ECMANN Coral Reef Report Cards and the reef area reported for the corresponding countries in Jackson et al. (2014). These discrepancies again highlight the need for more consistent and reliable longitudinal data to inform policy making on biodiversity conservation and management in the Caribbean.

Jackson et al. (2014) made four major recommendations to improve the resilience and wellbeing of Caribbean coral reefs:

- Adopt conservation and fisheries management strategies with the objective of restoring parrotfish populations;
- Improve the monitoring of Caribbean reefs and the use of the resulting data to inform adaptive management;
- Foster information exchange and sharing of experiences and best practices;
- Develop and implement legislative and regulatory frameworks to systematically address the threats to coral reefs, especially those posed by fisheries, tourism and coastal development.

	Antigua and Barbuda	Dominica	Grenada	Saint Lucia	St. Kitts and Nevis	St. Vincent and the Grenadines
Reef Health Index (1 – 5)	2.3	2.8	2.5	2.8	2.3	2.8
Coral Cover	Poor	Good	Good	Good	Fair	Good
Fleshy Macroalgae	Poor	Good	Poor	Poor	Critical	Poor
Herbivorous Fish	Fair	Poor	Poor	Fair	Fair	Fair
Commercial Fish	Poor	Critical	Poor	Poor	Poor	Poor

Figure 10.2: Reef Health Index and its contributing factors for six Eastern Caribbean Countries [Source: The Nature Conservancy, 2016]

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Target 11

By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

Well-governed and effectively managed protected areas are a proven method for safeguarding both habitats and populations of species and for delivering important ecosystem services. Particular emphasis is needed to protect critical ecosystems such as tropical coral reefs, sea-grass beds, deepwater cold coral reefs, seamounts, tropical forests, peat lands, freshwater ecosystems and coastal wetlands (SCBD, 2013)

Efforts to meet Aichi Target 11 should take into account all of the five main elements of the target: protected area coverage, management effectiveness, equitability, representativeness, and connectivity. Protected areas systems should include areas high in species richness, threatened species, endemic species and areas which are important for the continued provision of ecosystem services.

Figure 11.1 below is derived from information in the World Database on Protected Areas (WDPA), and provides an overview of reported protected area coverage in CARICOM member countries. Belize, Dominica, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago are recorded as having over 17% of terrestrial area protected, therefore meeting and exceeding the goal for terrestrial protected area coverage under Aichi Target 11. However, according to the 2014 UN List of Protected Areas (Deguignet et al., 2014), only Jamaica and Belize have officially designated all their reported sites as protected areas; for all other countries the listing includes sites whose protection status, as of 2014, was only proposed. Belize is therefore the only CARICOM country to have conclusively met the goal for protected area coverage in terrestrial areas and inland waters. The data also suggests that Belize and Jamaica are the only two (2) countries in CARICOM with any significant marine protected area coverage.

There are a number of important caveats regarding the information in the WDPA and the 2014 UN List of Protected Areas. In some cases the data provided are incomplete or dated, or do not include the requisite spatial information (Deguignet et al., 2014), such as the size of all reported protected areas. As a result, for several countries, the information in the database may be a misrepresentation, and probably an under-representation, of the actual size and scale of actual protected area networks.

It is also worth noting that the WDPA and UN List of Protected Areas only include sites that meet the International Union for Conservation of Nature (IUCN) definition of a protected area, i.e. *"a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values"*

	Number of Terrestrial Protected Areas	Terrestrial Protected Area Coverage	Number of Marine Protected Areas	Marine Protected Area Coverage
Antigua and Barbuda	8	5%	8	1%
The Bahamas	42	13%	16	0%
Barbados	8	0%	1	0%
Belize	101	37%	15	7%
Dominica	8	22%	2	0%
Grenada	35	2%	13	0%
Guyana	4	9%	1	0%
Haiti	8	0%	0	0%
Jamaica	128	16%	13	5%
Montserrat	18	0%	11	0%
St. Kitts and Nevis	19	3%	2	1%
Saint Lucia	27	17%	15	0%
St. Vincent and the Grenadines	46	22%	8	1%
Suriname	15	15%	7	2%
Trinidad and Tobago	43	32%	1	1%

Figure 11.1: Type, Number and % area in km² protected by various categories of protected areas (Source: World Database on Protected Areas)

(Deguignet et al., 2014, p. 9). Conservation areas that do not meet this definition, for example Marine Management Areas that have been established primarily for sustainable resource use rather than conservation, are not included. In setting national targets and indicators for, and measuring progress towards, Aichi Target 11, countries should include explicit national protected area definitions, along with clear descriptions of the conservation and management objectives that apply to different types of protected areas.

Several countries in the Region have been taking action to improve their national protected areas systems. These actions include the designation of new protected areas, and the development of protected areas system management plans, or the update and strengthening of such plans where they already exist. This work has been facilitated by national and multilateral projects such as the Protected Areas Resource Conservation project in Jamaica and the OECS Protected Areas and Associated Livelihoods (OPAAL) project in Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, and St. Vincent and the Grenadines. A trend has also been observed of the consolidation of administrative and institutional arrangements for protected areas management, including the development of comprehensive protected areas legislation and the creation of agencies with

specific responsibility for protected areas management (Nichols, 2004).

© Natalie Boodram

A significant multi-country undertaking with respect to marine protected areas in the Caribbean is the Caribbean Challenge Initiative (CCI), which seeks "to effectively conserve and manage at least 20 percent of the marine and coastal environment by 2020" (CCI, 2016). Six (6) CARICOM countries have committed to this "20 by 20" goal, and are working to finalise their national CCI plans, as well as a regional CCI action plan.

The SPAW Protocol to the Cartagena Convention provides for the establishment of a network of protected areas of particular importance to the Wider Caribbean area. So far, three (3) CARICOM countries have listed protected areas under the Protocol. Belize has listed the Hol Chan Marine Reserve, the Glover's Reef Marine Reserve, and the Port Honduras Marine Reserve; Grenada has listed the Molinière - Beauséjour Marine Protected Area; St. Vincent and the Grenadines has listed the Tobago Cays Marine Park (SPAW-RAC, n.d.b). The goals of the SPAW protocol are supported by the Caribbean Marine Protected Areas Management (CaMPAM) Network, a regional partnership building capacity for the successful management of marine protected areas (CaMPAM, 2010).

The designation of natural or mixed heritage sites under the World Heritage Convention also provides a basis for the protection and conservation of marine and terrestrial biodiversity. Five (5) such sites have been designated in the countries of CARICOM: the Belize Barrier Reef Reserve System, the Morne Trois Pitons National Park in Dominica, the Blue and John Crow Mountains of Jamaica, Saint Lucia's Pitons Management Area, and the Central Suriname Nature Reserve.

The Biodiversity and Protected Areas Management Programme (BIOPAMA) initiative in African, Caribbean and Pacific Countries is contributing significantly to protected areas development and management in the Caribbean. The BIOPAMA programme seeks, *inter alia*, to "make the best available science and knowledge available for building capacity to improve policies and better decision-making on biodiversity conservation, [and] protected areas management" (BIOPAMA, n.d.). Actions under the Caribbean component of BIOPAMA have included:

- The establishment of Regional Observatories to serve as information hubs for biodiversity and PAs management; which in the Caribbean is the Caribbean Protected Areas Gateway (*http://caribbean-rris.biopama.org*/) hosted by the UWI, with the Centre for Resource Management and Environmental Studies as the operational base;
- The operationalisation of the Caribbean

Box 11.1: The creation of Haiti's first municipal protected area

Community members in the southeastern border town of Anse-à-Pitres, Haiti, worked with the International Iguana Foundation, Grupo Jaragua (a Dominican non-governmental organisation) and the municipal government to take steps in establishing the country's first Municipal Protected Area to legally protect 3,000 hectares of dry forest where a small sub-population of the critically endangered Ricord's Iguana *(Cyclura ricordii)* can be found. Endemic to Hispaniola, with only four known sub-populations throughout the Dominican Republic and Haiti, the Ricord's Iguana has been threatened by hunting and nest-poaching, not to mention habitat degradation from deforestation for charcoal production and livestock grazing. The participatory process that led to the creation of the new municipal wildlife habitat named Parc Cacique Henri, is one that can be replicated in other areas in Haiti. During 2012-2015, the International Iguana Foundation implemented a project supported by the CEPF and CANARI (in its role as the Regional Implementation Team for CEPF's investments in the region) their work in Anse-à-Pitres and make the municipal reserve a reality. The project:

- built capacity of young conservationists from the local community in habitat surveillance, species monitoring and habitat restoration;
- conducted wide stakeholder outreach and awareness raising of the importance of biodiversity conservation with landowners, local community groups and non-governmental organisations, charcoal producers, local authorities, herdsmen, women's groups, farmers, fisherfolk, students and teachers;
- developed a management plan for the protected area to provide a framework for development of conservation programmes; and
- documented the feasibility and recommended procedures for declaring a municipal reserve in Haïti, providing a model that can be replicated in other parts of the country.

The legal document declaring the protected area, called an arrêté communal, was signed by the Mayor of Anse-à-Pitres in July 2014. The last step in officially declaring the protected area requires publication in the national gazette, *Le Moniteur*. In the meantime, the municipality of Anse-à-Pitres and their partners continue to work towards conservation and sustainable development of this critical ecosystem in Haiti.

(courtesy of CANARI)

Protected Areas Gateway, providing ecological, socio-economic and governance information to improve decision making by bridging the science-policy gap;

- Building capacity for collection and management of biodiversity and protected areas-related data and information; and
- Support for improved protected areas management at the national level, e.g. to The Bahamas in the review and application of IUCN Management Categories and to Saint Lucia in developing a plan for the implementation of the Systems Plan for Protected Areas.

BIOPAMA has also contributed to the preparation and update of protected areas country reports for all CARICOM member countries except Montserrat. These reports notably include assessments of the quality of data available for each country. Under BIOPAMA action will be taken to address data gaps and deficiencies that constrain accurate assessment of progress towards the achievement of Aichi Target 11 in CARICOM.

It is important to note that available data on protected area size and coverage does not allow for assessment of other aspects of Aichi Target 11, i.e. whether sites are being

Box 11.2: Participatory protected areas management in Guyana

Guyana has given considerable attention to issues of equitable and participatory management of protected areas. The Government of Guyana has declared more than 4,045 km^2 of land as the Konashen Community-Owned Conservation Area (COCA), to be managed by the indigenous Wai Wai people, who were given formal title to the land. The Wai Wais have applied for the Konashen COCA, which comprises approximately 3% of Guyana's terrestrial area, to be formally incorporated Guyana's National Protected Areas System, and the Protected Areas Commission is working to achieve this. Guyana's Amerindian communities have also played a key role in the development and operations of the Iwokrama International Centre for Rain Forest Conservation and Development, and play an active role in the monitoring and management of the associated 371,000 hectare protected area managed by the Centre.

(Government of Guyana, 2014)

managed effectively and equitably, and whether they are ecologically representative and well-connected. These factors must be taken into account in efforts to expand and improve protected area networks in the Region.

Protected area policies and management plans should consider the need for protected areas, both terrestrial and marine, to:

- include areas of particular importance for biodiversity and ecosystem services, such as areas high in species richness or threatened species, threatened biomes, areas with particularly important habitats, and areas, including sites of cultural significance, that are important for the continued provision of ecosystem services;
- be ecologically representative, i.e. containing adequate samples of the full range of existing ecosystems and ecological processes within the country;
- be effectively and equitably managed, with measures in place to ensure ecological integrity, the protection of species, habitats and ecosystem processes, and the full participation of indigenous and local communities, such that costs and benefits of the areas are fairly shared; and
- be well-connected to the wider landscape or seascape using corridors and ecological networks to allow connectivity, adaptation to climate change, and the application of the ecosystem approach. (CBD, 2013)

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Target 12

By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Though some extinctions are the result of natural processes, human action have greatly increased current extinction rates. Reducing the threat of human-induced extinction requires action to address the direct and indirect drivers of change … and can be long-term processes. However, imminent extinctions of known threatened species can in many cases be prevented by protecting important habitats (such as Alliance for Zero Extinction sites) or by addressing the specific direct causes of the decline of these species (such as overexploitation, invasive alien species, pollution and disease). (SCBD, 2013)

The CEPF (2010) has described the biodiversity of the Caribbean, and specifically the islands of the Caribbean, as being at serious risk of species extinction, due to high levels of endemism and speciation, the restricted range of many endemic species, and high levels of threat to species and habitats. The island members of CARICOM are home to over 350 globally threatened species, including 93 species that are critically endangered.

CARICOM member countries have in large part identified nationally threatened species and taken steps to assess and monitor their status, devise protection strategies and implement conservation programmes. Table A.2 in Annex 1 lists species mentioned in 5NRs and NBSAPs as being threatened and endangered, but is not a comprehensive list of threatened species in CARICOM countries. More detailed information can be found in national legislation and regulations and the IUCN Red List.

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The increase in populations of several endemic species, such as the Antigua Racer snake, Sisserou, Saint Lucia Parrot, and St. Vincent Parrot, are evidence of successful conservation efforts in the countries to which those species are native. Some countries have prepared conservations action plans for certain priority species, such as the Grenada Dove, the Saint Lucia iguana, and crocodiles, hutia and iguanas in Jamaica. Sea turtles are among the most commonly mentioned threatened and endangered species in 5NRs and NBSAPs, and most countries have national Sea Turtle Recovery and Action Plans, developed with

Box 14.1: Watershed Area Management in Jamaica

In 2011 the Jamaica National Environment and Planning Agency (NEPA) implemented the Watershed Area Management Mechanism (WAMM), in Black River, St. Elizabeth. The WAMM was initially developed under the Global Environmental Facility (GEF) funded project *Integrating Watershed and Coastal Areas Management* and was previously implemented by NEPA in Drivers River, Portland. The WAMM provides watershed stakeholders, government agencies, NGOs, funding agencies and ordinary citizens with a simple, practical and flexible method of achieving sustainable watershed management.

The WAMM's components include *Engaging the Community* from the onset to ensure maximum participation; *a "Bottom Up" Governance Approach*; *Reconnaissance of Resources* to gain baseline data on available/potential natural resources; *Establishing Indicators for Assessment and Evaluation* to evaluate progress towards goals; *Watershed Management Capacity Building* for community members; *Environmental Monitoring, Mitigation and Evaluation* to assess the status and trends of the watershed's social and natural resources; *Capacity Building to Access External Funds for Community Projects* to enable access to funding from agencies; *Developing Sustainable Livelihoods* that do not undermine the natural resources; *Capturing Lessons Learnt* by collecting validating, consolidating and documenting experiences, developments, and risks of project implementation; and *Broadcasting the Experience* to share success stories and lessons learnt with others.

The strength of the WAMM lies in its ability to effectively address challenges which can be mitigated through state agencies and communities pooling their resources to bring about needed rehabilitation of watersheds. The aim of NEPA is to implement the WAMM in all 26 Watershed Management Units in Jamaica.

(Kirkland, 2010; NEPA, 2011)

the support of the Wider Caribbean Sea Turtle Network to achieve the objectives of the SPAW Protocol.

The SPAW Protocol to the Cartagena Convention requires Parties to take measures to protect, preserve and manage in a sustainable way threatened or endangered species of fauna and flora, and to adopt co-operative measures to ensure the protection and recovery of endangered and threatened species of flora and fauna listed in Annexes I, II and III of the Protocol.

Annex I includes threatened or endangered plant species for which any form of destruction or disruption (picking, gathering, uprooting, cutting, possession, trade, etc) must be banned in order to guarantee their protection and if need be their recovery.

Annex II lists threatened or endangered animal species for which, again, any form of destruction or disruption (capture, possession, killing, trade, etc) must be banned for their protection and recovery.

Annex III includes a list of animal and plant species for which special measures must be taken to ensure their protection and recovery whilst authorising and regulating the use of these species.

There are 53 species listed in Annex I of the Protocol, 117 named species as well as all species of *Sirenia* and *Cetacea* listed in Annex II; and 42 species of flora and 31 named species of fauna and 5 coral groups listed in Annex III. Under the Protocol, in addition to the previously mentioned Sea Turtle Recovery and Action Plans, regional management plans have been prepared for

marine mammals generally (UNEP, 2008), and the West Indian Manatee in particular (UNEP, 2010).

Non-governmental organisations also play a vital role in the conservation of threatened species. Clear examples of this may be seen in the work of the Antigua and Barbuda Environmental Awareness Group (EAG).

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The EAG, with technical and financial support from several international organisations, has been instrumental in the recovery of the Antigua Racer and has also implemented projects aimed at conservation of the West Indian Whistling Duck and the White-Crowned Pigeon.

Species conservation action in the countries of CARICOM has included species reintroduction (as in the case of the Saint Lucia Whiptail), captive breeding programmes (as in the case of the Mountain Chicken and the Jamaica Iguana), action to remove invasive predators (such as mongooses and rats which were threats to populations of the Antigua Racer) and the development and implementation of legislation to prevent hunting, capture and trading of threatened species (as in the case of the Sisserou and St. Vincent Parrots), supported by public awareness and education programmes.

Despite some success stories, the rich species diversity of the Caribbean continues to be threatened by anthropogenic pressures, habitat loss and degradation, climate change, and natural disasters. Populations of many of the Caribbean's threatened species continue to decline, and overall it seems unlikely that Target 12 will be met in the Caribbean region by the 2020 deadline.

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Target 13

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimising genetic erosion and safeguarding their genetic diversity.

The genetic diversity of cultivated plants and farmed or domesticated animals and of wild relatives is in decline as is the genetic diversity of other socio-economically and culturally valuable species. The genetic diversity which remains needs to be maintained and strategies need to be developed and implemented to minimise the current erosion of genetic diversity, particularly as it offers options for increasing the resilience of agricultural systems and for adaptation to changing conditions (including the escalating impacts of climate change). (SCBD, 2013)

Historically, Caribbean countries have cultivated a variety of crops, such as bananas, cacao, coffee, rice, spices and sugar cane. There is also a history in the Caribbean of development of new varieties and breeds of crops and livestock, often with the intent of enhancing disease resistance or adaptation to climatic and other environmental conditions. Caribbean crop and livestock varieties such as the Trinidad Moruga Scorpion pepper and the Barbados Black Belly Sheep are recognised internationally for their distinctive qualities and genetic traits.

However, the maintenance of agricultural genetic diversity was generally not identified as a leading priority in most of the 5NRs and NBSAPs reviewed. Despite this, the reports did indicate that some actions are being taken by countries to maintain genetic diversity of cultivated plants and farmed and domesticated animals.

Genebanks and seedbanks have been established in several countries, including Guyana, Jamaica, Suriname and Saint Lucia. Jamaica's national genebank maintains species of plants of economic, medicinal and cultural importance, as well as endemic plants. Suriname's seedbank supports the use of original vegetable plants, and measures are being taken to minimise cross-breeding and in-breeding. Saint Lucia has identified the establishment of germplasm banks in agriculture as one of a national bright spot in the implementation of the CBD. In Belize, indigenous peoples are working to maintain culturally important varieties of corn and beans through the collection and storage of seed stock, along with the use of forest buffer zones.

At the regional level, CARDI includes in its programmes of work activities to characterise sweet potato varieties found in various countries, and to stabilise indigenous hot pepper varieties of interest to specific countries. CARDI maintains a germplasm collection in Barbados, for many of the indigenous hot pepper landraces from CARICOM Member States. Also in Barbados, the West Indies Central Sugar Cane Breeding Station, houses some 2500 accessions of sugar cane, 60 lines of cotton, and root crops such as sweet potato, cassava and yam. The Cocoa Research Centre at the University of the West Indies

St. Augustine Campus is custodian of the International Cocoa Genebank, a field genebank considered to be one of the world's most diverse collections of cacao geneplasm.

The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture (FAO, 2010), to which six (6) CARICOM countries submitted national reports, identifies some of the challenges to the conservation of agricultural crop diversity in the Region. These include:

- the lack of programmes to systematically inventory, characterise, evaluate and document plant genetic resources for food and agriculture;
- the increased use of and preference for imported varieties and hybrids;
- insufficient seed production to maintain local landraces;
- insufficient incentive for farmers to maintain collections of varieties not in commercial use;
- inadequate public awareness about the importance of conserving local varieties and landraces; and
- fragmentation of agricultural lands and increasing urbanisation.

Participation in the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) could provide CARICOM countries with opportunities to access funding and capacity-building support for the management of agrobiodiversity, and corresponding enhancements in food security and climate change resilient agriculture. As of April 2017, four CARICOM countries—Guyana, Jamaica, Saint Lucia, and Trinidad and Tobago—were parties to the ITPGRFA.

Given the low priority generally accorded to this target by countries in the Community, along with the general overall decline in the agricultural sector as discussed under Target 7, the goal of maintaining the genetic diversity of cultivated plants, farmed and domesticated animals and wild relatives, and other socio-economically and culturally valuable species is unlikely to be achieved by the target date of 2020.

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Target 14

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

All ecosystems provide goods and services. However, some ecosystems are particularly important for human wellbeing because of the services they provide. Ecosystems which provide services related to the provision of food, fibre, medicines and fresh water, pollination of crops, filtration of pollutants, and protection from natural disasters are among those ecosystem services provided by biodiversity which are essential for human wellbeing. (SCBD, 2013)

This target contains three main components: a specific focus on ecosystems that provide essential services, such as food, water, crop pollination, and protection from natural disasters; the restoration and protection of such ecosystems; and taking into account the needs of groups of people who are especially and directly reliant on these ecosystems for their daily needs and wellbeing, and who are most likely to be affected by ecosystem degradation and loss.

In most CARICOM countries that identified action in respect of this target, the main ecosystem service of concern was the provision of fresh water. This is in keeping with the declaration emerging from the 8th High Level Ministerial Forum of Water Ministers in the Caribbean, held in 2012. The declaration recognised the importance of ensuring long-term water security as a driver for economic and social development, and the urgent need to address water scarcity in the Caribbean region (Global Water Partnership-Caribbean & Caribbean Water and Wastewater Association, 2012). Availability of fresh water in the region has been a matter of concern for several decades (Cashman, 2013) and many of the insular countries of CARICOM are experiencing water stress and scarcity (World Resources Institute, 2013; Global Water Partnership, 2014; UNEP, 2014). In 2014, six CARICOM countries—Antigua and Barbuda, Barbados, Haiti, St. Kitts and Nevis, Saint Lucia, and St. Vincent and the Grenadines—were assessed as being water stressed, with Barbados being the country in the region with the least water per capita (UNEP, 2016b). Climate change is likely to increase the levels of water stress and scarcity faced by CARICOM member countries.

The protection and restoration of ecosystems that provide fresh water services have therefore been important aspects of action in CARICOM towards achievements of Target 14.

Actions have included the enactment of relevant legislation, implementation of participatory water and watershed management, and measures to protect important watersheds, catchments and wetlands. Jamaica has developed an innovative community-based Water Quality First Responders Programme, which involves communities in safeguarding, monitoring and rehabilitating watershed ecosystems.

Box 14.1: Watershed Area Management in Jamaica

In 2011 the Jamaica National Environment and Planning Agency (NEPA) implemented the Watershed Area Management Mechanism (WAMM), in Black River, St. Elizabeth. The WAMM was initially developed under the Global Environmental Facility (GEF) funded project *Integrating Watershed and Coastal Areas Management* and was previously implemented by NEPA in Drivers River, Portland. The WAMM provides watershed stakeholders, government agencies, NGOs, funding agencies and ordinary citizens with a simple, practical and flexible method of achieving sustainable watershed management.

The WAMM's components include *Engaging the Community* from the onset to ensure maximum participation; *a "Bottom Up" Governance Approach*; *Reconnaissance of Resources* to gain baseline data on available/potential natural resources; *Establishing Indicators for Assessment and Evaluation* to evaluate progress towards goals; *Watershed Management Capacity Building* for community members; *Environmental Monitoring, Mitigation and Evaluation* to assess the status and trends of the watershed's social and natural resources; *Capacity Building to Access External Funds for Community Projects* to enable access to funding from agencies; *Developing Sustainable Livelihoods* that do not undermine the natural resources; *Capturing Lessons Learnt* by collecting validating, consolidating and documenting experiences, developments, and risks of project implementation; and *Broadcasting the Experience* to share success stories and lessons learnt with others.

The strength of the WAMM lies in its ability to effectively address challenges which can be mitigated through state agencies and communities pooling their resources to bring about needed rehabilitation of watersheds. The aim of NEPA is to implement the WAMM in all 26 Watershed Management Units in Jamaica.

(Kirkland, 2010; NEPA, 2011)

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In Belize, a systematic rationalisation of the National Protected Areas System was carried out to assess protected areas across Belize for their ecosystem services, and produced recommendations for protected area realignments where these would improve priority ecosystem coverage.

Belize has also given some consideration to the regulation functions of ecosystems, in particular to such ecosystems, wetlands and mangroves that provide flood protection and coastal defence services.

CARICOM countries also took actions aimed at protecting and restoring ecosystems that support community livelihoods. These actions tended to focus on forests (Jamaica and Saint Lucia) and coastal and marine ecosystems (Belize, Jamaica, Saint Lucia and Suriname).

Guyana was unique in its strong focus on ecosystems that provide fundamental support services, e.g. services related to nutrient cycling and soil formation, with the main priority for action being the promotion of soil health within the managed ecosystem of cultivated agricultural lands.

At the regional level, attention is being given to the sustainable management of

the shared Caribbean Sea ecosystem. The UNDP/GEF CLME+ project and the Eastern Caribbean Regional Ocean Policy are examples of important initiatives aimed at ensuring the sustainable management, conservation and use of the Caribbean marine ecosystem and the essential services it provides.

Box 14.2: Eastern Caribbean Regional Ocean Policy

The Eastern Caribbean Regional Ocean Policy was approved by the OECS Authority in 2014, pursuant to Article 4.2 of the *Revised Treaty of Basseterre Establishing the Organisation of Eastern Caribbean States Economic Union*, which provides for co-ordination, harmonisation and undertaking of joint actions and policies. The Policy sets a vision for a

> *Healthy and richly biodiverse Eastern Caribbean marine environment, sustainably managed in an integrated way to promote socio-economic development and support the livelihoods and aspirations of current and future generations.*

Among its guiding principles, the Policy recognizes that

> *The value of the resources provided by the oceans must be recognized and opportunities for their economic development optimised to meet society's needs and promote the wellbeing of coastal communities.*

And that

> *The integrity of marine ecosystems must be maintained and, where appropriate, rehabilitated, with a desired end of maintaining or recovering natural levels of biological diversity and ecosystem services.*
>
> *(OECS, 2013)*

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Target 15

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Deforestation, wetland drainage and other types of habitat change and degradation lead to the emission of carbon dioxide, methane and other greenhouse gases. The reversal of these processes, through ecosystem restoration, represents an immense opportunity for both biodiversity restoration and carbon sequestration. In fact, in many countries, degraded landscapes, represent a huge wasted resource. Restored landscapes and seascapes can improve resilience including adaptive capacity of ecosystems and societies, and can contribute to climate change adaptation and generate additional benefits for people, in particular indigenous and local communities and the rural poor. The conservation, restoration and sustainable management of forests, soils (especially peatlands), freshwater and coastal wetlands and other ecosystems are proven, cost-effective, safe and immediately-available means to sequester carbon dioxide and prevent the loss of other greenhouse gases. (SCBD, 2013)

Carbon stocks in the context of Aichi Target 15 refer to the carbon stored in biomass—for example, in tropical forests, mangroves and seagrass beds—and in soils. Ecosystems degradation tends to lead to the release of these carbon stocks from storage, thus contributing to climate change. Ecosystem restoration, on the other hand, can increase carbon sequestration (UNEP, 2016). Under this target, countries should aim to conserve ecosystems that are important for carbon sequestration, and to restore degraded ecosystems so as to increase their resilience and sequestration potential.

Because forests are a major carbon sink, this target is closely linked to Targets 5 and 11 on reducing forest loss and sustainable management of areas under forestry. The progress made in relation to those Targets (e.g. the increase in forest cover in some CARICOM countries) also contributes towards the achievement of Target 15.

Belize, Guyana and Suriname are participants in the international mechanism, developed under the United Nations Framework Convention on Climate Change (UNFCCC), for reducing emissions from deforestation and forest degradation, fostering conservation and sustainable management of forests, and enhancement of forest carbon stocks (REDD+). REDD+ offers developing countries incentives to reduce emissions by reducing deforestation and forest degradation, and to take action to sustainably manage forests and enhance forest carbon stocks. Countries are also incentivised to invest in low-carbon paths to sustainable development.

Guyana has been implementing a national low carbon development strategy (LCDS) that provides for the country's forest to be protected and maintained in an effort to reduce global carbon emissions. It is estimated that through its LCDS Guyana can avoid cumulative forest-based

Box 15.1: Managing protected areas for climate change adaptation in Jamaica

The Caribbean Coastal Area Management Foundation (C-CAM), a Jamaican NGO, has, with the participation of a wide group of government agencies, land owners, land managers, and community members, developed sub-area management plans for two key biodiversity areas within the Portland Bight Protected Area (PBPA)—Hellshire Hills (14,700 hectares) and Portland Ridge and Bight (43,000 hectares). C-CAM's mission is to promote the sustainable development of the PBPA where they have worked for almost twenty years. The plans include a climate change risk assessment and adaptation strategy. These are the first such plans in Jamaica to include climate change for protected area management planning. This work took place under a grant supported by the CEPF and CANARI (in its role as the Regional Implementation Team for CEPF's investments in the Region).

(courtesy of CANARI)

emissions of 1.5 gigatons of carbon dioxide equivalent (inclusive of other greenhouse gases) by 2020 (Government of Guyana, 2010). Dominica has formulated a Low Carbon Climate-Resilient Development Strategy which indicates an intention to protect carbon sinks and to access opportunities through international or regional agreements for forest-based carbon sequestration (Government of Dominica, 2012). It is projected that with sound management practices, Dominica's forests will continue to sequester 100 Ggs of national GHG emissions on an annual basis during the period 2020 to 2030 (Government of Dominica, 2015).

In statements of Intended Nationally Determined Contributions (INDCs) prepared for the UNFCCC, several CARICOM countries have indicated an intention to develop GHG sinks though reforestation, afforestation reduced deforestation and reduced forest degradation. St. Vincent and the Grenadines' 5NR indicates an intention to conduct baseline studies on carbon sequestration by various ecosystems (forest, marine and coastal). Subsequent to establishing baseline, changes to the ecosystems will be monitored and data on corresponding changes in carbon sequestration capacity will be used to facilitate reporting on contributions to climate change mitigation.

Guyana's National Mangrove Management Action Plan aims to respond to and mitigate climate change through protection, rehabilitation and wise use of the country's mangrove ecosystems. The Guyana Mangrove Restoration Project has achieved notable success in the restoration of degraded mangroves along Guyana's coasts. Grenada also has ongoing mangrove replanting activities as well as inland forest restoration. In Jamaica, reforestation activities led by the Forestry Department have focused on re-establishing degraded sites with an emphasis on carbon stock conservation and enhancement.

The CARICOM Regional Framework for Achieving Development Resilient to Climate Change (CARICOM Climate Change Centre, 2009) recognises the important role that standing forests play in carbon sequestration and other ecological services. The Framework therefore seeks to promote the adoption of best practices for sustainable forest management, to mobilise resources for the protection of standing forests, and to undertake research to improve estimates of carbon sequestration rates in tropical forests.

Overall, some of the clearest statements of the intentions and activities of CARICOM countries in regard to Aichi Target 15 may be found in policy documents and strategies relating to climate change adaptation and mitigation, and in countries' statements of INDCs under the UNFCCC.

However, it is recognised that further work is needed to better quantify the carbon sink capability and value of member countries' forests and other ecosystems. There is also a need to identify and assess the extent of degraded ecosystems, to determine what the 15% goal means in terms of ecosystem area to be restored. Better data will inform and motivate more vigorous action towards Target 15, and will also improve countries' abilities to monitor progress in this regard. In taking action towards Aichi Target 15, it should be kept in mind that, where possible, avoiding degradation through conservation is preferable to, and more cost-effective than restoration of an ecosystem after it has been degraded or disturbed (SCBD, 2013).

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Target 16

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation is in force and operational, consistent with national legislation.

The Nagoya Protocol provides a transparent legal framework for the effective implementation of one of the three objectives of the CBD: the fair and equitable sharing of benefits arising out of the utilization of genetic resources. The Protocol covers genetic resources and traditional knowledge associated with genetic resources, as well as the benefits arising from their utilisation by setting out core obligations for its contracting Parties to take measures in relation to access, benefit-sharing and compliance. (SCBD, 2013)

Aichi Target 16 addresses both the entry into force of the Nagoya Protocol and the operationalisation of the Protocol consistent with national legislation.

Globally, the first aspect of this target has been achieved with the Protocol's entry into force in October 2014. At the time of publication of this assessment, two (2) CARICOM countries (Antigua and Barbuda and Guyana) are Party to the Nagoya Protocol. Grenada has signed the Protocol, but has not yet ratified it. Several countries are either in the process of assessing the implications of becoming Party to the Protocol, or have already signalled their intention to become Party to the Protocol.

The Bahamas is currently implementing a national GEF-funded project intended to create and apply enabling conditions for fair and equitable access and effective benefit-sharing. Eight (8) other CARICOM countries (Antigua and Barbuda, Barbados, Grenada, Guyana, Jamaica, St. Kitts and Nevis, Saint Lucia, and Trinidad and Tobago) are participating in a similar GEF project, *Advancing the Nagoya Protocol in Countries of the Caribbean*. The project aims to increase uptake of the Nagoya Protocol in the Region, to build capacity for effective implementation of access and benefit-sharing (ABS) systems, and to establish enabling regional and national policy environments for implementation of the Nagoya Protocol. The project is being implemented and executed by the UN Environment and the IUCN respectively.

Other key players in building capacity for ABS in CARICOM have been the CARICOM Secretariat, the ABS Capacity Development Initiative, and the Secretariat of the CBD. Since 2012 these organisations have provided guidance and support to the development of national ABS roadmaps, the development of a regional ABS roadmap, the drafting of legislation for implementation of the Nagoya Protocol, the formulation of ABS contracts and mutually agreed terms for benefit-sharing, and the assessment of existing ABS arrangements in CARICOM countries.

The member countries of CARICOM have, via the Council for Trade and Economic Development (COTED), requested the CARICOM Secretariat to play a key role in facilitating and coordinating ABS-related capacity development activities in the Region. In response to this request,

a CARICOM Framework for Capacity-Building and Development to Support Effective Action on ABS has been drafted.

With regard to the second aspect of Aichi Target 16, Antigua and Barbuda has enacted legislation on ABS and has also established a contract-based ABS system. Guyana has a comprehensive national ABS policy, which sets out the principles and details related to the utilization of genetic resources (Tvedt, 2016). Administrative arrangements for ABS in Guyana have also been established.

Other countries, such as Dominica, St. Kitts and Nevis, and Saint Lucia, have formulated draft ABS measures. It is expected that participation in national and regional ABS projects will result in finalisation and official adoption of these draft provisions.

It should be noted that at present several countries are regulating access to genetic resources *via* permit systems that have not been specifically designed for ABS purposes. The weaknesses of this approach have been highlighted (Tvedt, 2016) with the recommendation that countries move towards functional contractual approaches to granting access and requiring benefit-sharing.

Although the target of operationalisation of the Nagoya Protocol by 2015 has not been fully met in the countries of CARICOM, progress is being made, and it is anticipated that the Region will achieve considerable success in achieving the objective of Aichi Target 16 by the year 2020.

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Target 17

By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

National Biodiversity Strategies and Action Plans are the principal instruments for implementing the Convention at the national level. In order to fulfill the Strategic Plan by 2020 NBSAPs must be in place by 2015 at the latest as they are the main national mechanism through which the Strategic Plan will be implemented. Further, the target for 2015 implies that, not only are NBSAPs developed through a participatory approach, but that they are used as effective tools for mainstreaming biodiversity across government and society. (SCBD, 2013)

As of March 2017, eight (8) of the fourteen (14) CARICOM countries that are Party to the CBD in CARICOM have submitted a post-2010 NBSAP to the CBD Secretariat. Of these, seven incorporate and are aligned to the Strategic Plan for Biodiversity 2011-2020 and the 20 Aichi Targets. The exception is Suriname's National Biodiversity Action Plan, which was formulated on the basis of the directions outlined in the National Biodiversity Strategy, which was finalised 6 years earlier in 2007. Suriname's Plan nonetheless provides a basis for action toward the three (3) objectives of the CBD.

Haiti is the only Party in the Region that has never submitted an NBSAP to the CBD.

Some CARICOM countries have adopted or adapted all twenty (20) Aichi Targets as their national targets, some have identified a suite of priority targets, and others have defined a set of context-specific national targets that are related to some or all of the Aichi Targets. The table below shows which Aichi Targets are reflected in the NBSAPs prepared by CARICOM countries.

Although Suriname's National Biodiversity Action Plan is not explicitly aligned with the Aichi Targets, the objectives and sub-objectives identified in the plan can be linked with Aichi Targets 1, 2, 4, 6, 7, 11, 16, 18, 19 and 20.

Country	Date of Submission of post-2010 NBSAP
Antigua and Barbuda	January 5, 2015
Belize	November 30, 2016
Dominica	March 25, 2014
Grenada	September 23, 2016
Guyana	June 2, 2015
Jamaica	November 27, 2016
St. Kitts and Nevis	February 3, 2016
Suriname	March 13, 2013

Figure 17.1: Submission dates of CARICOM countries' post-2010 NBSAPs

Of the six (6) CBD Parties that have not yet submitted post-2010 NBSAPs, most are in the process of preparing their NBSAPs or have completed NBSAPs that are awaiting official approval and adoption as a policy instrument prior to their submission to the CBD.

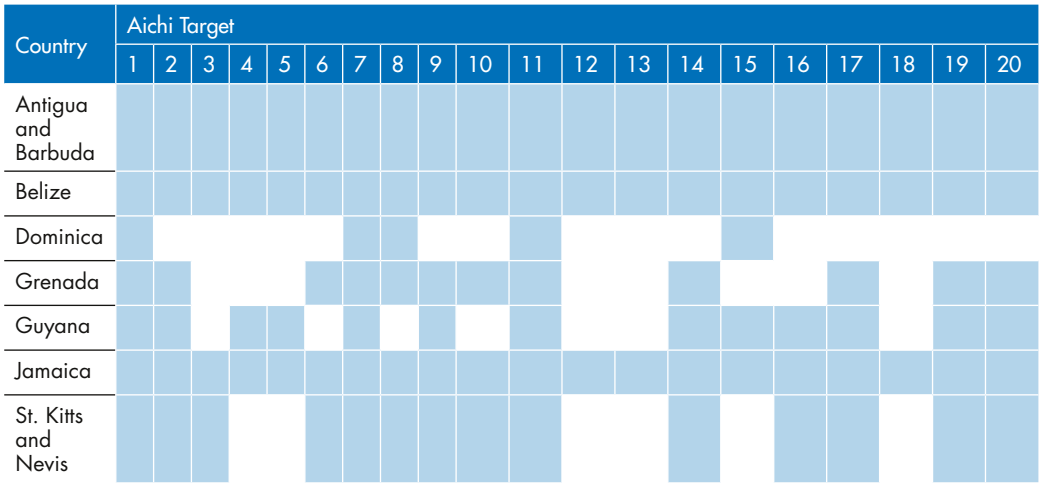

Figure 17.2: Aichi Targets reflected in the post-2010 NBSAPs submitted by CARICOM countries (Source: https://www.cbd.int/nbsap/targets/default.shtml)

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Target 18

By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

There is a close and traditional dependence of many indigenous and local communities on biological resources. Traditional knowledge can contribute to both the conservation and the sustainable use of biological diversity. This target aims to ensure that traditional knowledge is respected and reflected in the implementation of the Convention, subject to national legislation and relevant international obligations, with the effective participation of indigenous and local communities. (SCBD, 2013)

Several CARICOM countries are taking measures to integrate indigenous and local communities into the biodiversity co-management process. In Jamaica, the Forest Department has supported the establishment of Local Forest Management Committees to ensure that social and environmental safeguards are addressed and respected for the benefit of all. In Belize, management strategies are being developed that incorporate traditional knowledge and customary use of resources into policies for conservation, land use planning, and natural resource use. Saint Lucia reports that traditional uses of marine resources, such as the harvesting of pilot whales, conch, sea turtles, and sea urchins, are taken into account by the Fisheries Department in their resource management strategies. The participation of Guyana's indigenous communities in protected areas and ecosystems management has been highlighted under Target 11.

The Nagoya Protocol on Access and Benefit Sharing includes provisions related to the rights of indigenous and local communities in relation to genetic resources and

Box 18.1: Traditional and local knowledge in the Revised Treaty of Chaguaramas

Article 64 (6)
COTED shall co-operate with the Member States and competent organisations to devise means of protecting, developing and commercialising local knowledge about the value and use of the Region's biodiversity for the benefits of their populations, especially their indigenous peoples.

Article 66
COTED shall promote the protection of intellectual property rights within the Community by, *inter alia* … the identification and establishment, by the Member States of mechanism to ensure … the preservation of indigenous Caribbean culture; and the legal protection of the expressions of folklore, other traditional knowledge and national heritage, particularly of indigenous populations in the Community.

(CARICOM Secretariat, 2002)

associated traditional knowledge. Therefore actions taken by countries to achieve Target 16 may also contribute in some degree to progress on Target 18.

A key point to note in relation to Aichi Target 18 is that actions to achieve it are subject to both relevant international obligations and to national legislation. Provisions in national legislation and policy with respect to indigenous, local and traditional communities vary across the region. In order to assess progress under Target 18, therefore, more information is needed about the relevant national contexts, i.e. about indigenous and local communities, their traditional knowledge, innovations, practices and customary uses of biological resources, and applicable national policy contexts. Currently information is insufficient to determine whether the intent of Aichi Target 18 is being met in the countries of CARICOM.

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Target 19

By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

It is widely recognised that we are losing biodiversity at an unprecedented rate but there is relatively little information on the consequences of its loss. Much of the information we have is based on anecdotal evidence. Increased understanding of the consequences of biodiversity loss is essential to creating action for its conservation. (SCBD, 2013)

The report on the State of Biodiversity in Latin America and the Caribbean (UNEP, 2016b) reports favourable progress towards this target in the Latin American and Caribbean region, and makes special note of the establishment and development of global, regional and national initiatives and platforms for data collection and sharing.

In CARICOM, regional action to improve the production and sharing of environment, including biodiversity, statistics, commenced in 1999 with the launch of a capacity-building project jointly executed by the United Nations Statistics Division and the CARICOM Secretariat. At the time the project was initiated, only Belize and Jamaica were undertaking to produce national environment statistics. Subsequent to the launch of the project, ten (10) CARICOM member countries have produced compendia of environmental statistics and the CARICOM Secretariat has published three editions of The CARICOM Environment in Figures report, including information on forestry, land use and agriculture, coastal and marine resources, protected areas and threatened species. Jamaica and Belize remain among the member countries furthest advanced in relation to achievement of Target 19.

In Jamaica, the national clearing-house mechanism for the CBD serves as Jamaica's biodiversity information network. Research institutions, including the University of the West Indies, are involved in several biodiversity-related national Committees where research updates are shared. Memoranda of Understanding have been established between the National Environment and Planning Agency and various academic and research institutions such as the University of the West Indies, Institute of Jamaica, the Scientific Research Council and Northern Caribbean University, allowing for improvement in science-based policy-making on biodiversity matters.

Belize reports that there is increasing information available on the ecosystems and biodiversity of Belize, biodiversity values, ecosystem services and trends in the status and condition of biodiversity, particularly in protected areas. These advances are supported by the work of a number of national thematic working groups and networks, as well as by improvements to biodiversity and threat monitoring in protected areas. Also reported are significant advances in standardising marine data collection, under both the Fisheries Department monitoring programmes, and the Healthy Reef Initiative. The Forest Department is establishing a national Forest Inventory, with permanent sample plots

located throughout Belize. A National Biodiversity Monitoring Programme is currently being developed through the University of Belize Environmental Research Institute focusing on developing national biodiversity monitoring goals and targets. Information is being used to inform biodiversity management at both site and national levels.

In Antigua and Barbuda, the development and use of GIS-based tools such as the Environmental Information Management and Advisory System allow policymakers to identify areas rich in biodiversity value as part of the development planning process. Guyana has also undertaken to map important ecosystems and biodiversity areas and will be incorporating the information produced into national land use and protected areas planning.

The BIOPAMA programme, discussed under Target 11, is also contributing substantially to the achievement of Target 19, especially through the establishment of a Caribbean biodiversity observatory, and capacity-building for better data and knowledge management.

Despite the progress that has been made, lack of available information still inhibits progress towards the Aichi Targets. One of the challenges faced is the severely limited human and technical capacity for consistent data collection. There is also a need to strengthen inter-agency collaboration, including both government and non-governmental organisations, for more efficient data management and better information sharing.

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Target 20

By 2020, at the latest, the mobilisation of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilisation, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

Most countries indicated in their fourth national reports that limited capacity, both financial and human, was a major obstacle to the implementation of the Convention. The capacity which currently exists in countries needs to be safeguarded and increased from current levels, in line with the process laid out in the Strategy for Resource Mobilisation, in order to enable countries to meet the challenges of implementing the Strategic Plan for Biodiversity 2011-2020. The fulfilment of this target will have implications on the feasibility of achieving the other 19 targets contained in the Strategic Plan (SCBD, 2013)

Funding through projects or special funding arrangements contributes significantly to financing for biodiversity activities in the Caribbean Region. The GEF in particular has contributed substantially to assisting countries in implementing the Strategic Plan for Biodiversity. However, there is still a sizeable funding gap that is hampering progress towards the Aichi Targets, as well as slowing progress on implementation of countries NBSAPs.

National and regional responses to this challenge are being developed. A significant regional advance is the establishment of the Caribbean Biodiversity Fund (CBF). The Fund is intended to support achievement of the sustainable finance goals of the Caribbean Challenge Initiative, by providing "long-term and reliable funding to conserve and sustainably manage the marine and coastal resources and the environment in each participating country and territory" (CCI, 2016). The CBF is a regional endowment, the first of its kind in the Caribbean, that channels support to protected area trust funds in participating countries (CBF, 2015). Seven (7) CARICOM countries—Antigua and Barbuda, The Bahamas, Grenada, Jamaica, St. Kitts and Nevis, Saint Lucia and St. Vincent and the Grenadines—participate in the CBF, and are in the process of establishing and operationalising their national protected areas trust funds.

Outside of the CBF framework, several countries have established dedicated funding mechanisms to support work related to environmental sustainability and the management and conservation of biodiversity. These mechanisms include the Sustainable Island Resource Fund in Antigua and Barbuda, the Protected Areas Conservation Trust in Belize, the National Protected Areas Trust Fund in Guyana, the Suriname Conservation Foundation, and the Green Fund in Trinidad and Tobago. Sources of capital for these funds include debt for nature swaps, conservation fees, levies, and grants from international funding partners.

The connections between Target 20 and Target 2 on biodiversity values have

been recognised by CARICOM member countries. Improved information on the values of biodiversity and ecosystems can allow for better integration of those values into financial planning processes, including by establishing arrangements for payment for ecosystems services.

The development and implementation of national resource mobilisation plans would serve to improve progress towards achievement of Target 20. To this end, Belize is participating in the Biodiversity Finance Initiative (BIOFIN), which aims to build a sound business case for increased investment in the management of ecosystems and biodiversity (United Nations Development Programme (UNDP), 2016). For countries implementing BIOFIN, a series of assessments are undertaken to evaluate the biodiversity finance gap, determined in part by the cost to implement the country' NBSAP (UNDP, 2016). Based on the outcome of these assessments, comprehensive national resource mobilization strategies are formulated to address the finance gap (UNDP, 2016).

The majority of updated post-2010 NBSAPs submitted by CARICOM countries to the CBD Secretariat do not include estimates of the cost of implementation. Across the Region, it is essential to get a better picture of the amount of financing needed to support countries in implementing the Strategic Plan for Biodiversity 2011-2020 and meeting their national Aichi Target priorities. Clear definitions and quantification of biodiversity finance needs and gaps provide a sound basis for formulation and implementation of strategies to fill those gaps, as well as a baseline for measuring progress against this target.

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Recommendations

Caribbean biodiversity continues to exist in a complex situation. The biophysical context and development status of the countries of CARICOM, along with the existential threat posed by climate change, present challenging circumstances for a Region endowed with some of the world's outstanding unique and diverse ecosystems. Progress in implementation of the Strategic Plan for Biodiversity and achievement of the Aichi Targets has been varied. This section presents recommendations for action to generate positive changes to the state of biodiversity in the countries of CARICOM, up to and beyond 2020.

Improve availability, quality and use of data, including spatial data, especially for critical ecosystems and endangered species

Lack of dependable and comparable data and difficulties in accessing relevant information have been identified as constraints to effective biodiversity management in the Region. Inadequacies in data inhibit informed, science-based decision making and policy development, and prevent reliable assessment of progress towards the Aichi Targets. National data collection capacity and efforts need to be enhanced to address these deficiencies. Inter-institutional cooperation, at national, regional, and international levels, is needed to improve data availability and information sharing. Cross- or multi-sectoral approaches can serve to enhance the efficiency and effectiveness of data collection and information management. Regional and international organizations can contribute by supporting the coordination and compilation of data, and by producing information and reports to help strengthen the science-policy interface. The use of appropriate technological platforms and applications, such as the Caribbean Protected Areas Gateway, can improve access to and use of data.

CARICOM countries should also seek to improve their submission of good quality nationally-derived data to global databases. In this regard, countries are encouraged to use the preparation and submission of the sixth national reports to the Convention on Biological Diversity as an opportunity to provide timely and thorough updates on progress towards the Aichi Biodiversity Targets. Sixth national reports should include, *inter alia*, information about measures taken to achieve relevant biodiversity targets, assessment of the effectiveness of these measures, objectively measured evaluations of progress towards the targets, a list of relevant indicators used, and description of how progress and effectiveness are monitored.2

Strengthen environmental regulatory and institutional frameworks, including mechanisms for compliance and enforcement

Effective management of biodiversity and other natural resources is dependent on the enactment and implementation of appropriate legislation and regulations at the domestic level. CARICOM countries have been undertaking to update and strengthen their environmental and legislative regimes, but there is still considerable scope for

2 Further information on the preparation of sixth national reports may be found on the CBD website at https://www.cbd.int/nr6/default.shtml.

improved and accelerated action in this regard. In addition to having appropriate legislation in place, institutional arrangements must support enforcement of the law to ensure compliance. This requires awareness-raising, capacity-building and improved collaboration and cooperation between environment and conservation officers, law enforcement and the judiciary. There is also scope for action at the regional and sub-regional levels to promote legislative harmonisation and consistency.

Increase resources available for biodiversity

In CARICOM countries, resource constraints and competing national priorities have tended to result in a shortage of consistent, predictable financing for biodiversity. In recent years, though, a number of new and innovated regional and national funding mechanisms are being established, and are promising new avenues for sustainable biodiversity finance in the Region. CARICOM countries should pay close attention to the emerging best practice in this area. However, the development of national and regional environmental funds should not preclude efforts towards inclusion and integration of biodiversity in national budgets. There is also significant potential for private sector and civil society investment in biodiversity and its associated ecosystems services. Countries that have not yet assessed and quantified national biodiversity expenditures are encouraged to do so, and resource mobilisation strategies should be developed to support implementation of NBSAPs.

Improve coordination and collaboration among government agencies

Lack of collaboration and cooperation among government departments and agencies has been identified as a significant obstacle to effective environmental and biodiversity management in CARICOM countries (Bizikova *et al.,* 2015). Poor coordination can lead to duplication of efforts, conflicting efforts, or a vacuum of policy and action. Countries should make an effort to institute and support multilevel coordination and cooperation between agencies and departments. Regional agencies can emphasise collaborative approaches by encouraging cross-sectoral participation in regional activities and meetings.

Enhance engagement and collaboration between governmental and non-governmental partners

As evidenced by many of the cases and examples documented in this report,civil society organisations, local communities, indigenous peoples, academia, and the private sector are making substantial contributions to delivering on the Aichi Targets in the countries of CARICOM. These contributions include roles in research, monitoring, development of plans and policies, public education and outreach, and concrete implementation and management actions on the ground.

Building on these achievements, efforts should be made to strengthen partnerships for broad-based multi-stakeholder governance, conservation, management, and sustainable use of biodiversity. Such partnerships enable all stakeholders to more advantageously leverage resources, to enhance the sense of ownership necessary for mainstreaming biodiversity, and to develop and enhance effective synergies for action and implementation. In keeping with Decision X/2 of the Conference of the Parties to the CBD, CARICOM

governments should seek to encourage "participation at all levels to foster the full and effective contributions of women, indigenous and local communities, civil-society organisations, the private sector and stakeholders from all other sectors in the full implementation of the objectives of the Convention and the Strategic Plan" (CBD, 2010, p. 2). In turn, non-governmental stakeholders should seek to align and integrate their work with Parties' NBSAPs.

Mainstream biodiversity across economic sectors and business

Given that major economic sectors, such as agriculture, fisheries, forestry, tourism, and extractive industry, rely and/or have significant impacts on biodiversity and associated ecosystems services, attention should be paid, at both national and regional levels, to mainstreaming integrating biodiversity values into decision-making, policy development and practice across sectors, and into strategies for sustainable development.

Tourism is a leading contributor to GDP in many CARICOM countries. Inadequately regulated and managed tourism activities can cause major pressures on and damage to ecosystems and their ability to provide services, including services necessary to attract tourists and tourism investment. Governments, private sector, industry associations, and tourists should strive to promote and practice sustainable tourism, optimising the benefits of biodiversity to tourism, and of tourism to biodiversity, while minimising the negative effects of tourism on biodiversity (SCBD, 2004), with special attention to impacts on vulnerable ecosystems and ecosystems that provide essential services.

For all economic sectors, mainstreaming efforts should seek to create and take advantage of opportunities to work in and with the private sector to integrate biodiversity considerations into business practices. Compared to other biodiversity-rich regions, there has been relatively little funding cooperation between biodiversity conservation interests and the private sector in the Caribbean (CEPF, 2010). There is therefore considerable potential for businesses in the Region to increase their investment in and contribution to the conservation of biodiversity and the sustainable use of its components and ecosystems services, in line with the recommendation in Decision XI/7 of the Conference of the Parties to the CBD (CBD, 2012).

Apply economic valuation and national accounting methods in a participatory manner and clearly communicate their findings

Countries in the Region are increasingly exploring means of integrating biodiversity values into national accounting and planning processes. Economic valuation and environmental/natural resource accounting are two (2) principal mechanisms by which this can be achieved. These tools can be used to raise awareness of the value of biodiversity and related ecosystems services, both generally and as it relates to specific economic sectors such as tourism, real estate, fisheries, etc. Green accounting and natural resource economics can be applied to a variety of policy questions, including evaluation of project and policy impacts, identification of opportunities for effective conservation and sustainable use, and design of mechanisms to finance biodiversity conservation and restoration (Waite et al., 2014). Future action in this area should address not only building

technical capacity to carry out economic valuation and environmental accounting, but also the creation of enabling conditions to support the use of these tools to inform policy and management decisions.

Strengthen capacity, including through intra-regional collaboration and South-South cooperation

Notwithstanding the important contribution of regional and international organisations to the provision of resources, training, and other capacity-building for agencies and organizations involved in biodiversity management and protection, capacity for biodiversity management and conservation varies significantly across the CARICOM Region. Capacity-building initiatives should be continued and enhanced, with a focus on areas identified by countries as being of national and regional priority. Cooperation between countries in the region through, for example, expert attachments, staff exchanges, sharing of solutions, data sharing, and technical assistance, should be explored as a means of building capacity. Keeping in mind that ecosystems, habitats and species in the Region cross geo-political boundaries, efforts toward intra-regional collaboration should seek to develop and strengthen partnerships with non-CARICOM countries and territories, including the European Union and its overseas countries and territories and the United Kingdom and its overseas territories, in the Caribbean. South-South cooperation with higher capacity countries in the wider LAC region, and with partners from other SIDS regions, would also be beneficial.

Adopt ecosystem-based adaptation approaches

Climate change poses an existential threat to the development of the CARICOM Region and its people, and has been recognised as one of the foremost drivers of biodiversity loss. While climate change can adversely affect biodiversity and related ecosystems services, healthy ecosystems are more resilient to climate changes and even have the potential to mitigate climate change and its impacts. CARICOM countries should continue to explore and implement ecosystem-based adaptation approaches to climate change. Through such approaches, the sustainable management, conservation and restoration of ecosystems such as forests, mangroves and reefs, can be incorporated into broader climate change adaptation strategies. Sustainable forestry practices, integrated water resources management, and conservation of agrobiodiversity are examples of ecosystem-based adaptation activities that can enhance the Region's climate resilience.

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Annex: Supplementary data

Table A.1: Invasive species of concern in select CARICOM member countries

Country	Species
Antigua & Barbuda	Giant African Snail (*Lissachatina fulica)* Lemongrass (*Cymbopogon* sp.) Lion Fish (*Pterois volitans)* Mongoose Black Rat (*Rattus rattus)* Brown Rat (*Rattus norvegicus)* Cuban Tree Frog (*Osteopilus septentrionalis)* Cuban Garden Snail (*Zachrysia* sp.) Cuban Laurel Thrip (*Gynaikothrips ficorum)* Varroa Mite (*Varroa destructor)* Red Palm Mite (*Raoiella indica)* West Indian Fruit fly Agave Weevil Hairy Crazy Ant (*Nylanderia fulva)* Avocado Lacebug (*Pseudacysta persea)* House Sparrow Scaly-breasted Munia (*Lonchura punctulata)* Eurasian Collared Dove (*Streptopelia decaocto)* Papaya Mealybug (*Paracoccus marginatus)* Pink Hibiscus Mealybug (*Maconellicoccus hirsutus)* Red Imported Fireant Lethal Yellowing spread by Plant Hopper Budrot of Palms Iguana tail (*Saururus cernuus)* Southern Cattail (*Typha domingensis)* Water Hyacinth (*Eichhornia crassipes)*
Belize	*Aedes aegypti* Citrus Greening (*Candidatus Liberibacter asiaticus)* Pink Hibiscus Mealybug (*Maconellicoccus hirsutus*) Asiatic house gecko Asiatic tokay gecko Black tiger prawns (*Penaeus monodon*) Pacific white Shrimp (*Litopenaeus vannamei*) Tilapia Armourerd catfish Central American river turtle Melaleuca Casuarina Water Hyacinth (*Eichhornia crassipes)*

Table A.1: Invasive species of concern in select CARICOM member countries

Country	Species
Dominica	Seagrass (*Halophila stipulacea*) Lionfish (*Pterois volitans)* Huanglongbing-HLB Citrus greening disease Citrus *Tristeza* virus disease Black sigatoka disease (*Mycophaerella fijiensis)* Cane toad (*Bufo marinus*)
Grenada	Lionfish (*Pterois volitans)*
Haiti	Necklace Tree (*Adenanthera pavonina*) Casuarina (*Casuarina equisetifolia*) Common Carp (*Cyprinus carpio*) Tilapia (*Oreochromis mossambicus*) Water Hyacinth (*Eichhornia crassipes*) Water Lettuce (Pistia stratiotes) *Leucaena leucocephala* Moringa (*Moringa olifera*) Calliandra (*Calliandra olyythyrysus*) Mongoose (*Herpestes auropunctatis*) Lionfish (*Pterois volitans*) Sargassum seaweed (*Sargassum natans* and *Sargassum fluuitans*) Dog (*Canis lupus familiaris*) Rat (*Rattus norvegicus*) Mosquito (*Aedes aegypti*)
Jamaica	Wild Ginger(*Alpinia allughas)* Bottle Brush (*Melaleuca quinquenervia)* Small Indian Mongoose (*Herpestes javanicus)* Feral Cats (*Felis catus)* Lionfish (*Pterois volitans)* White Tailed Deer (*Odocoileus virginianus)* Bamboo (*Bambusa vulgaris)*
St. Kitts & Nevis	Lionfish
St. Lucia	Feral Pigs Mongoose Opossum Lionfish(*Pterois volitans)*
St. Vincent & the Grenadines	Lionfish (*Pterois volitans)*
Suriname	Pink mealy bug (*Maconellicoccus hirsutus*) Carambola fruit fly (*acterocerus carambolae*) Caribbean Fruit Fly Black Tilapia (*Oreochromis mossambicus*)

Table A.2. Nationally threatened species as identified in 5NRs and NBSAPs of selected CARICOM countries

Country	Species	IUCN Red List Status
Antigua and Barbuda	Antigua Racer Snake (*Alsophis antiguae*)	CR↑
	Lesser Antillean Iguana (*Iguana delicatissima*)	EN↓
	Green Turtle (*Chelonia mydas*)	EN↓
	Hawksbill Turtle (*Eretmochelys imbricata*)	CR↓
	Leatherback Turtle (*Dermochelys coriacea*)	V↓
	Loggerhead Turtle (*Caretta caretta*)	V↓
Belize	Antillean Manatee (*Trichechus manatus ssp. Manatus*)	EN↓
	American Crocodile (*Crocodylus acutus*)	V↑
	Central American River Turtle (*Dermatemys mawii*)	CR↓
	Yellow-headed Amazon Parrot (*Amazona oratrix ssp. belizensis*)	EN↓
	Scarlet Macaw (Petén sub-species) (*Ara macao*)	LC↓
	Yucatán Black Howler Monkey (*Alouatta pigra*)	EN↓
	White-lipped Peccary (*Tayassu pecari*)	V↓
	Geoffroy's Spider Monkey (*Ateles geoffroyi*)	EN↓
	Green Turtle (Chelonia mydas)	EN↓
	Hawksbill Turtle (*Eretmochelys imbricata*)	CR↓
	Leatherback Turtle (*Dermochelys coriacea*)	V↓
	Loggerhead Turtle (*Caretta caretta*)	V↓
	Smalltooth Sawfish (*Pristis pectinate*)	CR↓
	Scalloped Hammerhead Shark (*Sphyrna lewini*)	EN
	Great Hammerhead Shark (*Sphyrna mokarran*)	EN↓
	Oceanic Whitetip Shark (*Carcharhinus longimanus*)	V↓
	Dusky Shark (*Carcharhinus obscurus*)	V↓
	Atlantic Goliath Grouper (*Epinephelus* itajara)	CR
	Nassau Grouper (*Epinephelus* striatus)	EN↓
	Rosewood (*Dalbergia stevensonii*)	—
	Cedar (*Cedrela*)	—
	Mahogany (*Swietenia macrophylla*)	V
Dominica	Mountain Chicken (*Leptodactylus fallax*)	CR↓
	Sisserou Parrot (*Amazona imperialis*)	EN↑

Table A.2. Nationally threatened species as identified in 5NRs and NBSAPs of selected CARICOM countries

Country	Species	IUCN Red List Status
Grenada	Staghorn Coral (*Acropora cervicornis*)	CR→
	Elkhorn Coral (*Acropora palmata*)	CR→
	Grenada Dove (*Leptotila wellsi*)	CR↓
	Grenada Hook-billed Kite (*Chondrohierax uncinatus mirus*)	—
	Grenada Frog (*Eleutherodactylus euphronides*)	EN↓
	White Mangrove (*Laguncularia racemose*)	LC↓
	Red Mangrove (*Rhizophora mangle*)	LC↓
	Black Mangrove (*Avicennia germinans*)	LC↓
	Silver-leaved Buttonwood Mangrove (*Conocarpus erectus*)	LC↓
Guyana	*Trichilia surumuensis*	EN
	Rosewood (*Aniba rosodora*)	EN
	Baboonwood (*Virola surinamensis*)	EN
	Giant Otter (*Pteronura brasiliensis*)	EN↓
	Sun Parakeet (*Aratinga solstitialis*)	EN↓
	Hoary-throated spinetails (*Synallaxis kollari*)	CR↓
	Red Siskin (*Spinus cucullatus*)	EN↓
	Green Turtle (*Chelonia mydas*)	EN↓
	Hawksbill Turtle (*Eretmochelys imbricata*)	CR↓
	Scalloped Hammerhead Shark (*Sphyrna lewini*)	EN
	Great Hammerhead Shark (*Sphyrna mokarran*)	EN↓
	Daggernose Shark (*Isogomphodon oxyrhynchus*)	CR↓
	Nassau Grouper (*Epinephelus striatus*)	EN↓
	Atlantic Bluefin Tuna (*Thunnus thynnus*)	EN↓
	Largetooth Sawfish (*Pristis pristis*)	CR↓
	Caribbean Electric Ray (*Narcine bancroftii*)	CR↓
	Sei Whale (*Balaenoptera borealis*)	EN
	Blue Whale (*Balaenoptera musculus*)	EN↑
	Fin Whale (*Balaenoptera physalus*)	EN

Table A.2. Nationally threatened species as identified in 5NRs and NBSAPs of selected CARICOM countries

Country	Species	IUCN Red List Status
Haiti	Buff-breasted sandpiper (*Calidris subruficollis*)	NT↓
	Long-nose Shrew (*Solenodon paradoxus*)	EN↓
	Ridgway's Hawk (*Buteo ridgwayi*)	CR↓
	Stygian Owl (*Asio stygius*)	LC↓
	Zagouti (*Plagiodontia aedium*)	EN↓
Jamaica	Jamaican Iguana (*Cyclura collei*)	CR
	American Crocodile (*Crocodylus acutus*)	V↑
	Mahogany (*Swietenia mahagoni*)	EN
	Bursera hollicki	EN
	Green Turtle (*Chelonia mydas*)	EN↓
	Hawksbill Turtle (*Eretmochelys imbricata*)	CR↓
	Loggerhead Turtle (*Caretta caretta*)	V↓
	Jamaica Hutia/Coney (*Geocapromys brownii*)	V↓
St. Kitts and Nevis	Mountain Chicken (*Leptodactylus fallax*)	CR↓
	Green Turtle (*Chelonia mydas*)	EN↓
	Hawksbill Turtle (*Eretmochelys imbricata*)	CR↓
	Leatherback Turtle (*Dermochelys coriacea*)	V↓
Saint Lucia	L'encens Tree (*Protium attenuatum*)	—
	White-breasted Thrasher (*Ramphocinclus brachyurus*)	EN↓
	Saint Lucia Iguana	
	Saint Lucia Parrot (*Amazona versicolor*)	V↑
	Saint Lucia Racer Snake (*Erythrolamprus ornatus*)	CR
	Saint Lucia Whiptail (*Cnemidophorus vanzoi*)	CR↑
	Leatherback Turtle (*Dermochelys coriacea*)	V↓
	Mauby Tree (*Colubrina elliptica*)	—
	Latanye Tree (*Coccothrinax barbadensis*)	—
	Fat Poke Plant (*Chrysobalanus icaco*)	—

Table A.2. Nationally threatened species as identified in 5NRs and NBSAPs of selected CARICOM countries

Country	Species	IUCN Red List Status
St. Vincent and the Grenadines	St. Vincent Parrot (*Amazona guildingii*)	V
	Lesser Antillean Tanager (*Tangara cucullata*)	LC→
	Grenada Flycatcher (*Myiarchus nugator*)	LC↓
	Rufous-throated solitaire (*Myadestes genibarbis*)	LC↓
	House Wren (*Troglodytes aedon musicus*)	LC↑
Suriname	Green Turtle (*Chelonia mydas*)	EN↓
	Hawksbill Turtle (*Eretmochelys imbricata*)	CR↓
	Leatherback Turtle (*Dermochelys coriacea*)	V↓
	Olive Ridley (*Lepidochelys olivacea*)	V↓

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