ECS

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# State of the Marine Environment and Associated Economies in the OECS Sub-region (OECS SOMEE)

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Technical Report No. 02

CATALYZING IMPLEMENTATION OF THE STRATEGIC ACTION PROGRAMME FOR THE CARIBBEAN AND NORTH BRAZIL SHELF LME'S

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# EXECUTIVE SUMMARY

The implementation of the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME+) Strategic Action Plan (SAP) throughout the Wider Caribbean Region (WCR), including the Organisation of Eastern Caribbean States (OECS), has as part of its mandate, the development of an integrated reporting mechanism on the State of the Marine Environment and Associated Economies (SOMEE). In this regard, the OECS through this consultancy – Preparation of Inputs to CLME+ State of the Marine Environment and associated Economies (SOMEE) Report and the Implementation of the CLME+ Strategic Action – has developed an OECS SOMEE for its Member States utilizing the Driver (D) - Pressure (P) - State (S) - Impact (I) - Response (R) (DPSIR) Analytical Framework to describe the status of coastal and marine habitats and fish stocks, effects of marine pollution and other drivers and pressures such as climate change, and matters relating to socio-economics, management processes and principles, international commitments, and governance.

The OECS Sub-Region encompasses twelve (12) protocol, associate and observer member countries of the Lesser Antilles, six (6) of which are independent states (Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines), three (3) overseas British territories (Anguilla, Montserrat and the British Virgin Islands) and three (3) overseas French territories (Guadeloupe, Martinique and St. Martin). Collectively, these Small Island Developing States (SIDS) represent approximately 6,000 $km^2$ of land area and 546,420 $km^2$ of marine space, and whilst the associated resources are critical to human well-being through the provision of products and ecosystem services, they are at significant risk of overexploitation due to development. The following provides a synopsis of the SOMEE for the OECS Sub-Region:

**State**

- The WCR including the Eastern Caribbean and the OECS countries therein, is considered one of the top five biodiversity hotspots in the world: There are over 495 species of fish, 200 species of birds, 50 species of coral, 12 species of whales and 4 species of turtles in the Eastern Caribbean. According to the International Union for Conservation of Nature (IUCN), 22% of the 206 marine species that have been evaluated, are listed as threatened.
- There is approximately 1,935 $km^2$ of coral reef area, 5,966 ha of mangroves and 575 $km^2$ of seagrass meadows contained within the OECS Sub-Region. In the face of significant declines in coverage throughout the region, these highly productive and inextricably linked ecosystems provide valuable goods and services including critical habitats for marine fish and invertebrates, nearshore environment support and protection, nutrient cycling and carbon sequestration.
- Overfishing and habitat destruction have reduced fish stocks in reefs and nearshore fisheries, causing a greater dependency on pelagic fisheries. In the Caribbean Region, nearly 60% of fisheries are commercially exploited.

**Impacts**

- The World Bank estimates the value of the ocean economy in the Caribbean at US $407 billion (as of 2012). This estimate comprises the total value of economic activity in the region, including the value of some non-market ecosystem services such as coastal protection and blue carbon.
- Tourism within the Caribbean is a major contributor to the economic growth of island economies as a source of employment, income and foreign exchange. The OECS countries are highly dependent on tourism as exhibited by an estimated tourism value of US $5.8 billion in 2018 (total contribution of travel and tourism to GDP). Cruise tourism is also growing rapidly in the WCR, accounting for approximately 35% of the global market.
- The fisheries resources of particular importance to the OECS include the spiny lobster, queen conch, reef fish and pelagics and larger offshore pelagics (yellowfin tuna, skipjack tuna etc., and capture production and export value amounted to 137,529 tonnes and US $7.2 million, respectively in 2017. Local consumption in 2016 has been estimated at 231 kg/capita/year and the sector employed approximately 47,000 in 2015/2016.
- Shipping in the Caribbean represents approximately 76% of the economy, and Port Throughput in the OECS region totalled 495,191 twenty-foot equivalent units (TEUs) in 2015. There are 33 ports, 59 marinas and 3,111 berths within the Member States.
- The majority of OECS countries have set renewable energy targets and marine renewable energy project, and Anguilla, Antigua and Barbuda, Guadeloupe and Martinique are in preliminary phases of conducting assessments.

**Drivers and Pressures**

- Nearly 80% of marine pollution in the Caribbean results from direct or indirect discharge of solids and liquid waste, which is as a result of runoff from land-based sources such as rivers, outfalls, waterways, agricultural runoff, and infrastructure. Furthermore, approximately 60% of coral reefs in the OECS Sub-Region have been categorized at medium to high levels of threat due to sedimentation and pollution from land-based sources. Marine sources of

pollution is also a growing problem given the large number of ships that traverse the regional waters.

- Coral ecosystem diseases are rapidly emerging and spreading throughout the Caribbean, highlighting the need for enhance response measures in order to improve resilience and recovery. The Stony Coral Tissue Loss Disease (SCTLD) for example, is currently significantly affecting many coral reef areas throughout the WCR and may impact the OECS countries.
- Invasive species such as the lionfish and sargassum have been added pressures on the coastal and marine environment of OECS countries competing for food and space, which in-turn, lead to a reduction in overall ecosystem health.
- OECS Member States are particularly vulnerable to climate change and coastal and marine habitats are exposed to increases in the intensity of extreme weather events, sea surface temperature and sea levels. For the Sub-Region, the estimated cost of climate change inaction (based on 2004 GDP) is projected to be over US $3 billion in 2100.

**Responses**

- OECS Governance Frameworks including: the Revised Treaty of Basseterre Establishing the Organisation of Eastern Caribbean States Economic Union (RTB); the principal Organs of the Organisation (RTB Art. 7); the St. George's Declaration of Principles of Environmental Sustainability enshrined in Article 24 of the Economic Union Protocol (ECEU) currently being revised and is contemplated for designation as SGD 2040; policy frameworks and technical and coordinating mechanisms mandated/endorsed by the principal Organs for example the OECS Ocean Governance Team (OGT) and the Eastern Caribbean Regional Ocean Policy (ECROP) and Strategic Action Plan; and, National Ocean Policies and Strategic Action Plans and National Ocean Governance Committees established by the OECS Member States.
- Marine Protected Areas (MPAs) are a common management tool applied to geographically defined coastal and marine areas and their resources, and there are approximately 169 MPAs occupying roughly 140,420 $km^2$ in the OECS Sub-Region.
- A majority of OECS Member countries have National Climate Change Policies and related adaptation plans that refer to the marine environment. All Independent States have submitted their Nationally Determined Contributions to the United Nations Framework Convention on Climate Change (UNFCCC).
- The proximity of countries in the Eastern Caribbean and a long history of cooperation makes the OECS Commission an ideal fit for coordinating the management of ocean resources given its transboundary characteristics. In that regard, the OECS Ocean Governance Team was established in January 2012, and the Eastern Caribbean Regional Ocean Policy was approved at the Fifty-Seventh Meeting of the OECS Authority in June 2013. In that context, the OECS Ocean Governance Team, supported by National Ocean Governance Committees in the respective Member States have been tasked with the responsibility of facilitating a robust governance structure for achieving the policy goals outlined in the Revised Eastern Caribbean Regional Ocean Policy document.
- Only two of the participating countries have clearly articulated Integrated Coastal Zone Management Plans (ICZMP). However, despite initiatives to address coastal management initiatives through existing physical development plans and physical development legislation, there is need for the articulation of coastal marine spatial plans. As part of the CROP five national Coastal Master Plans and Marine Spatial Planning will be prepared, including one regional coastal marine spatial plan.
- The OECS Regional Green-Blue Economy Strategy and Action Plan mandated by the Seventh Meeting of the OECS Council of Ministers for Environmental Sustainability, (COMES-7), Martinique, May 15-17, 2019, to be presented to COMES-8 for consideration and endorsement in May 2020, would provide a more structured framework for implementation of a holistic, sustainable economic development plan in the short, medium and long-term.
- A Revised St. George's Declaration of Principles of Environmental Sustainability in the OECS to reflect the current international development architecture and Member States context and priorities including reporting requirements, preparation of which was endorsed by COMES-7.
- The planned adoption and integration of guiding principles in the revised Eastern Caribbean ECROP 2019, into all OECS policy documents on environmental sustainability based on requirements in the United Nations Convention on the Law of the Sea (UNCLOS) and other international and regional agreements including the Revised Treaty of Basseterre Establishing the Organisation of Eastern Caribbean States Economic Union St. George's Declaration, that have been updated to reflect current requirements and terminology associated with emerging agreements. The guiding principles which should apply to all policies, plans, regulations, decisions and actions affecting access to and use of the marine environment are also included within each NOP delivered under the CROP.

- Island Systems Management (ISM), a multidisciplinary, integrated approach using adaptive management to address conflict in resource use and provide necessary policy orientation to control the impacts of human intervention, developed by the OECS and adopted at the First Ministerial Meeting on the Implementation of the Barbados Programme of Action for the Sustainable Development of SIDS (BPOA), would be adopted as a foundational standardized guiding principle.

# INTRODUCTION

The marine and coastal environments of the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME+) is characterized by coral reefs, mangroves, seagrass beds, sandy and rocky shores and deep seabed, all of which provide incalculable opportunities for these small island coastal states to derive economic and social benefits from the use of these resources. These ocean resources also are, biodiversity rich, have high rates of national and regional endemism, and contains the greatest concentration of endemic marine species in the Western Hemisphere. They also account for key elements of the islands' economies in the areas of commercial fisheries, tourism and coastal infrastructure protection, as well as other benefits that directly impact the livelihood and welfare of stakeholders. Unfortunately, uncontrolled and unmanaged anthropogenic activities have led to marine pollution, habitat degradation, resource exploitation and an overall reduction in the resilience of these ecosystems to cope with climate change stressors and impacts. Continued or sustained loss of these ecological resources and their associated ecosystem services would therefore place a great strain on the economies of countries that have varying levels of dependency on these development sectors.

Current systems used to manage and plan coastal and marine development are often thought to be disconnected from the larger picture of harmonious resource use. Issues encountered include user conflicts, a sectoral and disjointed approach to management that is independent of what are perceived as the external interests of competing industries, ministerial jurisdictions, or resource users. This is further compounded by informational gaps on the impact of these activities on the marine and coastal resource base, deficiency in the availability of appropriate planning tools, and inadequate capacity and skill in management. Ideally, a cross-sectoral, collaborative and integrated planning practices of both the marine and coastal space must be inculcated among the array of institutions operating in the Caribbean.

Considering the above, the CLME+ has developed a 10-year Strategic Action Programme (CLME+ SAP) that outlines a comprehensive roadmap towards sustainable management of living marine resources through strengthened and consolidated regional cooperation. The Organisation of Eastern Caribbean States (OECS) has also taken action to address similar problems in the OECS region by adopting the Eastern Caribbean Regional Ocean Policy (ECROP) through a coordinated management approach to the use of ocean resources.

In response to the outcomes of the ECROP, a Grant Agreement for the Caribbean Region Oceanscape Project (CROP) was signed on October 14, 2017, between the International Bank for Reconstruction and Development, (the World Bank), acting as an Implementing Agency of the Global Environment Facility, and the OECS became effective on October 18, 2017, and will conclude December 31, 2021. The relating Grant is for the benefit of the five (5) participating Member State – Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines – responds to such demands for coastal and marine spatial plans to coordinate management across sectors and resources, and integrate environmental management directly with economic development. The CROP is designed to strengthen capacity for ocean governance, and coastal and marine geospatial planning in the participating countries. Outputs under the CROP will include, inter alia, an enhanced ECROP, National Ocean Policies and Strategies, National Coastal and Marine Spatial Plans, a regional Marine Spatial Planning framework, and readily available web-based ocean education materials and courses applicable to the region.

Under the 5-year "UNDP/GEF CLME+ Project" (2015-2020) which is helping to catalyse the implementation of the CLME+ SAP through a broad-based Global CLME+ Partnership called the CLME+SAP Interim Coordination Mechanism (CLME+ICM), is supporting effective implementation of the CLME+ SAP across the OECS and the Wider Caribbean Region through the ECROP and the CROP. This CLME+ SAP ICM partnership, which includes the OECS, has also, as part of its mandate the development of an integrated reporting mechanism on the "State of the Marine Environment and Associated Economies" (SOMEE) in the CLME+ region.

The CLME+ SAP SOMEE is therefore seen as a monitoring mechanism that seeks to build on already available reporting efforts such as the CROP's Regional Ocean Policy Baseline Analysis Report, State of Convention Area Report on Pollution (SOCAR), required under the LBS Protocol, State of the Marine Habitat and State of Fisheries Report. This would be critical to inform the SOMEE and to produce a holistic view of the OECS region's attributes and vulnerabilities and influence integrated ocean governance where the region can sustainably use and secure the ocean's resources. In that regard this initiative is expected to include periodic production of a "static" report as well as the development of a more dynamic, web-based version report will include the description of environmental/marine habitat status, status of marine pollution, fish stocks and matters relating to socio-economics, management processes and principles, international commitments, and governance.

# METHODOLOGY/APPROACH

The methodology employed in the development of the SOMEE involved a combination of desk studies, interviews and field visits to assess the state of the marine environment in the OECS Member States, based on the criterion established under the CLME+ Project.

### DATA GATHERING

An extensive literature review was undertaken to obtain the necessary country information and data, focussing primarily on national and regional reports or reporting instruments. For example, the National Reports and National Biodiversity Action Plans to the Convention on Biological Diversity were extremely useful in providing information related to coastal and marine resources. Additionally, datasets provided by regional and international organisations were also instrumental, such as the United Nations (UN) Food and Agriculture Agency (FAO), Caribbean Regional Fisheries Mechanism (CRFM), The Nature Conservancy (Atlas of Ocean Wealth) and the UN Environment Programme World Conservation Monitoring Centre Protected Planet (UNEP-WCMCP, Protected Planet).

In order to supplement the desktop review, an integral part of the SOMEE exercise involved consultation with stakeholders in the respective Member States. Face-to-face interviews with key stakeholders in Antigua and Barbuda, Saint Lucia, Saint Vincent and the Grenadines, St. Kitts and Nevis, Montserrat and the British Virgin Islands. Stakeholders in the other Member States were contacted for information related to the SOMEE via telephone, Skype or Zoom. Appendix 1 contains a list of stakeholder engagements held throughout this assignment.

The consultations facilitated the acquisition of data and reports from various governmental entities in the respective countries and discussions with experts on qualitative and quantitative information related to the coastal and marine environment. This SOMEE assessment emphasized the gathering of qualitative data that has been identified as a major informational deficit. The findings and conclusions are therefore guided by sound evidence and analysis that is clearly documented.

### DPSIR FRAMEWORK

From a thematic perspective, the Driver (D) - Pressure (P) - State (S) - Impact (I) - Response (R) (DPSIR) Analytical Framework was adopted in the development of the SOMEE. This approach allowed for the assessment of the status of the marine environment with respect to the following parameters:

- Coastal and marine environment
- Marine pollution
- Fish stocks
- Related socio-economic indicators
- Management processes and principles
- Regional/International commitments
- Governance.

The SOMEE also addresses the drivers/root causes influencing the past, current and future state of the marine environment and associated economies, as well as the pressures/direct causes. Furthermore, it provides a description of the responses that have been, are being and/or will/should be taken to close the gap between the current and the desired environmental and socio-economic conditions. These include governance arrangements and processes, architecture and stress reduction measures including those related to climate change (Fig. 1).

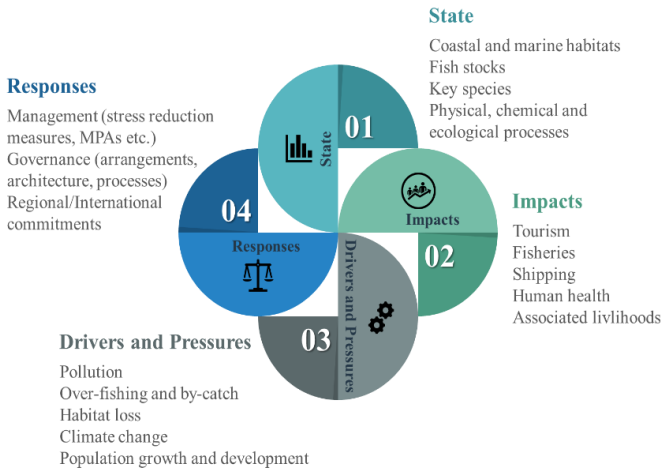



**Fig. 1 | DPSIR Framework.**

The SOMEE utilizes a “story telling approach” that builds on the DPSIR Framework to explore current, past and possible future conditions of marine habitats, biodiversity and fish stocks, what this means for human well-being and our economies, why current (or future) conditions may be different from what we desire and from the targets we set for ourselves as societies. The SOMEE will then continue to explore the reasons for these differences, as well as what has, is, and can be done to progressively close the gap between current conditions and our societal aspirations.

This document takes a distinctive regional approach which is intended to capture the outstanding performers as well as highlight those areas with the greatest challenges, ensuring that best practices are noted and opportunities for lesson learning are captured.

# THE OECS AND COUNTRY PROFILES

## THE ORGANISATION OF EASTERN CARIBBEAN STATES

The Organisation of Eastern Caribbean States is an International Inter-governmental Organisation that came into being on 18th June 1981, when seven (7) Eastern Caribbean countries signed the Treaty of Basseterre, agreeing to cooperate with each other and promote unity and solidarity among the Members. Guided by strategic objectives including regional integration, resilience, social equity, foreign policy and high performing organisation, the OECS works with its Member States towards enhancing economic growth, social inclusion and environmental protection within the Sub-Region. Various levels of support and research is facilitated by the OECS on several topics such as agriculture, biodiversity, sustainable development, climate change and ocean governance. Today, the OECS comprises twelve (12) member islands across the Eastern Caribbean (Fig. 2): seven (7) founding protocol members, four (4) associate members and one (1) non-member that has been granted observer status (OECS Commission, 2016).

| Protocol Members | Associate Members | Observer Status |
|---|---|---|
| • Antigua and Barbuda<br>• Dominica<br>• Grenada<br>• Montserrat<br>• St. Kitts and Nevis<br>• St. Lucia<br>• St. Vincent and the Grenadines | • Anguilla<br>• British Virgin Islands<br>• Martinique<br>• Guadeloupe | • St. Martin |

**Fig. 2 | Composition of the OECS.**
*Source: OECS Commission, 2016*

Recognising the importance of the Sub-Region's extensive marine space and the potential benefits and stressors associated with the utilization of living and non-living resources, the OECS' Eastern Caribbean Regional Ocean Policy (ECROP) and its Strategic Action Plan was unveiled. The document, which was unveiled in 2013, articulates some clear priorities for improving ocean governance in the Member countries, encourages the collaborative formulation of well-integrated governance frameworks capable of addressing marine user conflicts and protecting the fragile marine environments of Member States.

The ECROP document, which was approved by the OECS Authority, outlined Seven Policies and thirteen Goals to achieve the plan outlined in the SAP (OECS Commission, 2013a; Fig. 3). While most of the outputs were achieved and outcomes realized, the 2013 ECROP document had become out of sync with new realities given the commitments made by Member States as reflected in some very significant multilateral agreements such as the Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway (Apia, September 2014), the Paris Agreement (COP 21, Dec 2015), the CLME+ Strategic Action Plan (2015-2025), and most importantly, the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs), which sets out a global blueprint that recognizes that "ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests" (UNDESA, 2015).

The revised ECROP 2019, prepared as part of the Caribbean Regional Oceanscape Project (CROP), is an overarching policy that aims to promote and guide the future sustainable use and development of the region's marine resources, and includes the policy elements that was approved by the OECS Authority in 2013. In addition, given the new regional and global initiatives articulated the 2013 document, the 2019 policy document has been updated to reflect the alignment with those agreements, particularly the 17 SDGs, which have been endorsed by all the OECS Member Countries. Fig. 3 provides a summary of the principles shared by the two documents, and which are applied to all policies, plans, regulations, decisions and actions as it relates to access and use of the marine environment and its resources.

## COUNTRY PROFILES

For the purpose of this SOMEE Report, the OECS Sub-Region refers to the twelve (12) protocol, associate and observer member countries of the Lesser Antilles mentioned in Section 3.1, six (6) of which are independent states, three (3) overseas British territories and three (3) overseas French territories. Bordered by the Atlantic Ocean and Caribbean Sea, these partially volcanic arc of islands represent approximately 6,000 $km^2$ of land area and 546,420 $km^2$ of marine space (CIA, 2020; UNEP-WCMC, 2020). The following country profiles provide information on population, land and sea area, gross domestic product (GDP) and human development for each of the countries (Please refer to Appendix 2 for data tables and sources).


**Fig. 3 | ECROP Policies.**
*Source: OECS Commission, 2019*

## Antigua and Barbuda

Land Area (km²) A: 280, B: 161
Coastline (km) 153
Shelf Area (km²) 3,886
Exclusive Economic Zone (EEZ) (km²) 111,914

Population (2018) ~96,000
Human Development Index (HDI) (2018) 0.776
HDI Rank (2017) 73

Gross Domestic Product (GDP) (2018) US $1,611 million
GDP Per Capita (2018) US $16,727

Main Industries tourism, construction, light manufacturing

## Dominica

Land Area (km²) 751
Coastline (km) 148
Shelf Area (km²) 356
Exclusive Economic Zone (EEZ) (km²) 28,653

Population (2018) ~68,000
Human Development Index (HDI) (2018) 0.724
HDI Rank (2017) 98

Gross Domestic Product (GDP) (2018) US $551 million
GDP Per Capita (2018) US $7,691

Main Industries soap, coconut oil, tourism, copra, furniture, cement blocks, shoes

## Grenada

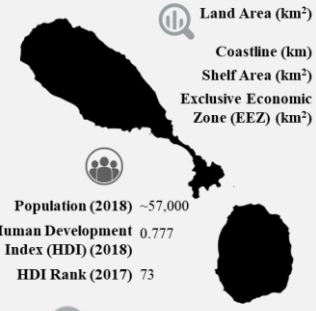
Land Area (km²) 344
Coastline (km) 121
Shelf Area (km²) 2,709
Exclusive Economic Zone (EEZ) (km²) 25,670

Population (2018) ~108,000
Human Development Index (HDI) (2018) 0.763
HDI Rank (2017) 78

Gross Domestic Product (GDP) (2018) US $1,186 million
GDP Per Capita (2018) US $10,640

Main Industries textiles, light assembly operations, tourism, construction, education, call-center operations

## St. Kitts and Nevis



Land Area (km²) SK: 168, N: 93
Coastline (km) 135
Shelf Area (km²) 855
Exclusive Economic Zone (EEZ) (km²) 9,533

Population (2018) ~57,000
Human Development Index (HDI) (2018) 0.777
HDI Rank (2017) 73

Gross Domestic Product (GDP) (2018) US $1,011 million
GDP Per Capita (2018) US $19,275

Main Industries tourism, cotton, salt, copra, clothing, footwear, beverages

## St. Lucia

Land Area (km²) 606
Coastline (km) 158
Shelf Area (km²) 593
Exclusive Economic Zone (EEZ) (km²) 15,470

Population (2018) ~188,000
Human Development Index (HDI) (2018) 0.745
HDI Rank (2017) 89

Gross Domestic Product (GDP) (2018) US $ 1,192 million
GDP Per Capita (2018) US $10,566

Main Industries tourism, clothing, assembly of electronic components, beverages, lime processing, coconut processing

## St. Vincent and the Grenadines

Land Area (km²) 389
Coastline (km) 84
Shelf Area (km²) 2,340
Exclusive Economic Zone (EEZ) (km²) 36,381

Population (2018) ~109,000
Human Development Index (HDI) (2018) 0.728
HDI Rank (2017) 95

Gross Domestic Product (GDP) (2018) US $811 million
GDP Per Capita (2018) US $7,361

Main Industries tourism, food processing, cement, furniture, clothing, starch

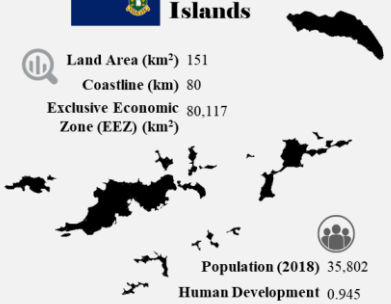
BRITISH OVERSEAS TERRITORIES

FRENCH OVERSEAS TERRITORIES

## Anguilla

Land Area (km²) 91
Coastline (km) 61
Exclusive Economic Zone (EEZ) (km²) 92,178
Population (2018) 17,422
Human Development Index (HDI) (2008) 0.865
HDI Rank High
Gross Domestic Product (GDP) (2009) US $175.4 million
GDP Per Capita (2008) US $12,000
Main Industries tourism, boat building, offshore financial services

## British Virgin Islands

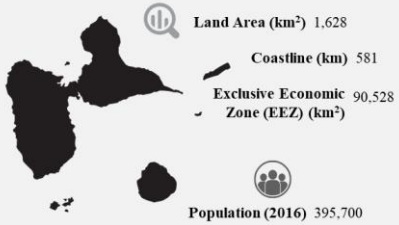


Land Area (km²) 151
Coastline (km) 80
Exclusive Economic Zone (EEZ) (km²) 80,117
Population (2018) 35,802
Human Development Index (HDI) (2008) 0.945
HDI Rank Very High
Gross Domestic Product (GDP) (2017) US $500 million
GDP Per Capita (2017) US $34,200
Main Industries tourism, light industry, construction, rum, concrete blocks, offshore banking

## Montserrat

Land Area (km²) 102
Coastline (km) 40
Exclusive Economic Zone (EEZ) (km²) 7,582
Population (2018) 5,315
Human Development Index (HDI) (2008) 0.821
HDI Rank High
Gross Domestic Product (GDP) (2011) US $167.4 million
GDP Per Capita (2011) US $34,000
Main Industries tourism, rum, textiles, electronic appliances

## Guadeloupe

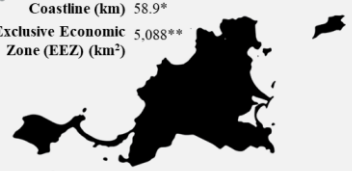


Land Area (km²) 1,628
Coastline (km) 581
Exclusive Economic Zone (EEZ) (km²) 90,528
Population (2016) 395,700
Human Development Index (HDI) (2018) 0.850
HDI Rank Very High
Gross Domestic Product (GDP) (2014) US $10.3 billion
GDP Per Capita (2014) US $25,479
Main Industries tourism, agriculture, light industry and services

## Martinique

Land Area (km²) 1,128
Coastline (km) 369
Exclusive Economic Zone (EEZ) (km²) 47,640
Population (2016) 376,480
Human Development Index (HDI) (2016) 0.863
HDI Rank Very High
Gross Domestic Product (GDP) (2012) US $10.7 billion
GDP Per Capita (2012) US $27,688
Main Industries tourism, agriculture, small industry

## St. Martin



Land Area (km²) 54.4
Coastline (km) 58.9*
Exclusive Economic Zone (EEZ) (km²) 5,088**
Population (2017) 35,334
Human Development Index (HDI) (2000) 0.702
HDI Rank High
Gross Domestic Product (GDP) (2014) US $636.9 million
GDP Per Capita (2014) US $18,140
Main Industries tourism, light industry, heavy industry

*entire island, **with St. Barthelemy

# STATE OF THE MARINE ENVIRONMENT AND ASSOCIATED ECONOMIES FOR THE OECS REGION

The coastal and marine environment encompasses a diversity of habitats such as coral reefs, mangroves, seagrass beds and nearshore/offshore areas that support an abundance of marine life. Through various supporting, provisioning, cultural and supporting services, these habitats and species supply dependent communities and nations with a variety of goods (e.g., fish and tourism products) and services (e.g., coastal protection). However, the health and existence of these coastal and marine ecosystems is threatened by the symbolic "double-edged sword" where human uses (e.g., coastal development and fishing) tend to overexploit the very resources upon which they depend. The resulting outcomes including degraded habitats, polluted waters and overfished stocks further increase the vulnerability of these intricately linked ecosystems to natural drivers and forces such as extreme weather events and climate change.

According to the 2020 draft report on the "State of Nearshore Marine Habitats in the Wider Caribbean" developed by the United Nations Environment Programme - Caribbean Environment Programme (UNEP-CEP), the outlook for the WCR is plagued by an overall poor status and declining trends in most indicators related to coral reefs, mangroves and seagrass beds (Fig. 4).[1]

The report postulates that despite being one of the most biologically diverse ecosystem centres of the world, there has been a declining trend in coverage and health of the three marine habitats in the Caribbean. Recovery of these areas tends to be linked to low levels of stress and effective management interventions

The following State of the Marine Environment and Associated Economies provides a discussion on the status of the coastal and marine environment and fish stocks, effects on human well-being, drivers and pressures, and responses taken or needed for the OECS Region.

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## STATE OF MARINE ECOSYSTEMS, HABITATS AND FISH STOCKS

***« How are the coastal and marine environment and fish stocks doing? »***

The OECS Sub-Region is rich in biodiversity that is supported by a variety of coastal and marine ecosystems. The extent and state of marine biodiversity, coral reefs, mangroves, seagrass beds, the nearshore environment and fish stocks are described below.

### Marine Biodiversity

The Wider Caribbean Region (WCR),[2] and the OECS Member States contained therein, is listed as one of the top five (5) biodiversity hotspots in the world due to its coastal and marine ecosystems.

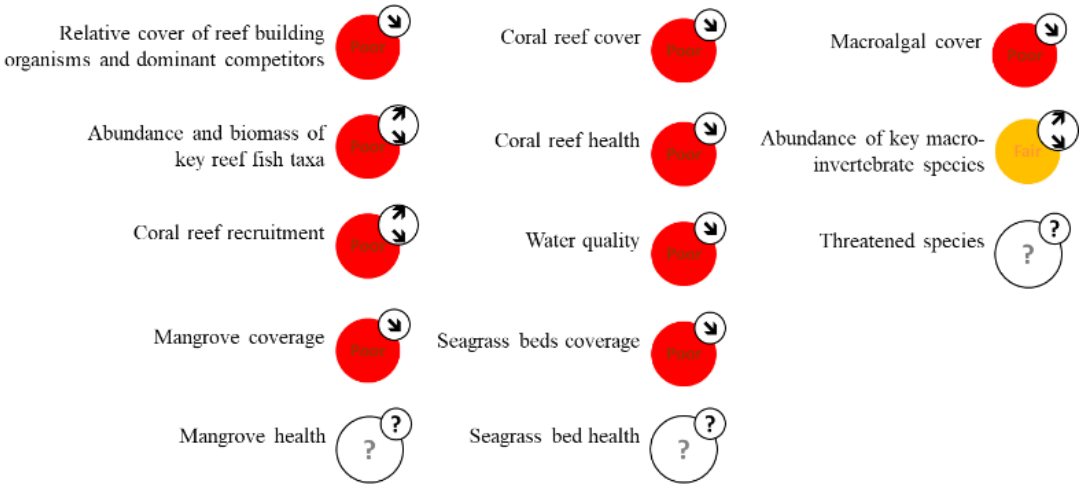


**Fig. 4 | Status and trends for coral reefs, mangroves and seagrass bed ecosystems in the Caribbean Region.**

[1] This report was developed by CANARI in collaboration with the UNEP CEP and the CLME+ Project Coordinating Unit. It is based on a literature review and has been validated by various experts at workshops and via report circulation. Please refer to this report for detailed information.

[2] "The Gulf of Mexico and Caribbean Sea proper including the bays and seas therein and that portion of the Atlantic Ocean within the boundary constituted by the 30° N parallel from Florida eastward to 77°30' W meridian, thence a rhumb line to the intersection of 20° N parallel and 59° W meridian, thence a rhumb line to the intersection of 7°20' N parallel and 50° W meridian, thence a rhumb line drawn south-westerly to the eastern boundary of French Guiana.

*Source: Adapted from UNEP-CEP, 2020. Data quality for coral reefs is 'mixed' and 'poor' or 'unknown' for mangroves and seagrass beds*

As the most geographically and oceanographically isolated tropical ocean on earth, the WCR is recognised for its range of reef and pelagic fish species, reptiles, marine mammals, and migratory and resident birds (Jackson et al., 2014). Mirroring the conditions of the larger marine area, the Eastern Caribbean is home to several marine species such as the queen conch (*Strombus gigas*), spiny lobster (*Panulirus argus*), reef fish (e.g., snappers and groupers), pelagic fish (e.g., tunas and dolphinfish), and sea and shorebirds (Fig. 5).

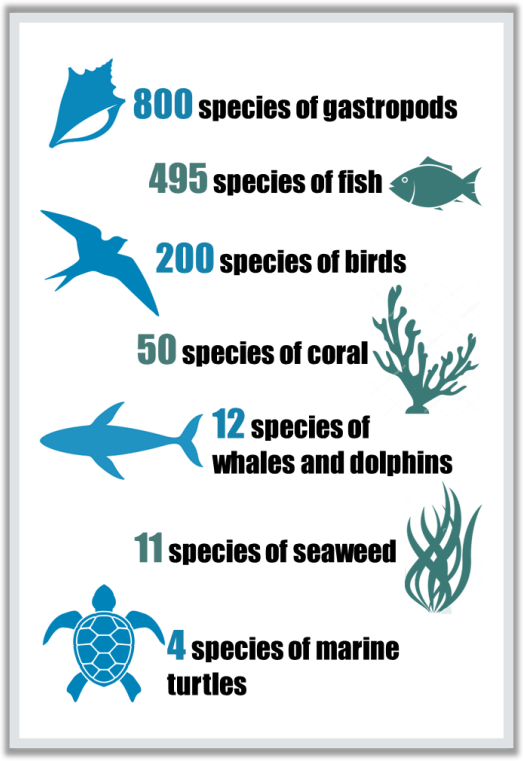


**Fig. 5 | Marine biodiversity of the OECS Sub-Region.**

Four species of sea turtles, including the endangered hawksbill (Eretmochelys imbricata), leatherback (Dermochelys coriacea), loggerhead (Caretta caretta), and green (Chelonia mydas) turtles, are known to traverse the waters and nest on the shores of Eastern Caribbean islands. Unfortunately, sea turtle populations are impacted by the destruction of critical nesting and foraging habitats due to coastal development, sand mining, pollution and overfishing. Coastal erosion and even the deposition of volcanic ash, as was the case in Montserrat, can also prevent turtles from nesting on beaches (de Bettencourt and Imminga-Berends, 2015). St. Kitts and Nevis, Dominica, Montserrat and Saint Lucia still permit the hunting of turtles; however, this is at a relatively small-scale. In St. Kitts, for example, less than 100 turtles are harvested annually according to the St. Kitts Turtle Monitoring Network (SKTMN) conservation group (Government of St. Kitts and Nevis, 2018).

Marine mammals such as the humpback whale (Megaptera novaeangliae) are observed on a seasonal basis in Grenada and Anguilla where they frequent in order to reproduce in warmer waters (Government of Grenada, 2014; Vaslet and Renoux, 2016). Dominica is also home to a resident breeding population of sperm whales (Physeter macrocephalus) (Government of the Commonwealth of Dominica, 2019).

According to a Situation Analysis conducted for the Wider Caribbean Region by the International Union for Conservation of Nature (IUCN), of the 206 marine species evaluated on the IUCN Red List for the area, 22% are considered threatened (i.e., listed as critically endangered, endangered or vulnerable). This assessment also noted that exploited near-shore fish stocks and commercial species such as lobster, grouper and snapper are declining in most countries. Nevertheless, due to its insular nature, the Caribbean has a relatively high proportion of endemic species (Brown et al., 2007). Overall, the Caribbean's biological diversity is supported by and inextricably linked to critical coastal and marine habitats including coral reefs, mangroves and seagrass beds. The importance, extent and status of these ecosystems in the OECS Sub-Region are described in further detail below.

**Coral Reefs**

Coral reefs are synonymous with a delicately balanced and complex ecosystem that is rich in biodiversity and productivity. These "rainforests of the sea" are essential providers of food and income from fishing and tourism, as well as protectors and supporters of the nearshore environment through the reduction of wave energy and production of sand (Fig. 6).

A variety of coral species such as staghorn coral (Acropora cervicornis), elkhorn coral (Acropora palmata), star coral (Montastrea faveolata) and brain coral (Colpophyllia natans), to name a few, are known to form fringing, barrier, platform and/or patch reefs throughout the Eastern Caribbean, hosting a wide range of reef fish and invertebrate species (OECS Secretariat, 2009).

The OECS Member States represent approximately 7.5% of the 25,960 $km^2$ coral reef area for the WCR. For comparative purposes, datasets from the Atlas of Ocean Wealth Mapping Portal (TNC, 2019) and the Reefs at Risk in the Caribbean Report (Burke and Maidens, 2004) are provided in Fig. 7. As illustrated in the graph, while the datasets vary slightly, the proportions are consistent and the overseas territories of Guadeloupe (including St. Martin and St. Barthelemy), the British Virgin Island and Martinique exhibit a relatively significant expanse of coral reefs with areas of 400 $km^2$, 380 $km^2$ and 260 $km^2$, respectively.

Coral reefs are extremely vulnerable to the negative impacts associated with coastal development, overfishing, pollution (land and marine-based), climate change, disease and hurricanes. In fact, according to the World Resources Institute, more than 75% of the reefs in the Caribbean are considered threatened, with more than 30% in the high and very high threat categories. Similarly, the majority of the reefs in the Eastern Caribbean countries have been classified as being under high or very high risk to these threats (Fig. 8).[3] According to the IUCN's Situation Analysis for the WCR (2007), 10% of the Caribbean's 62 reef-building corals were under threat, including staghorn and elkhorn corals, which are now listed as Critically Endangered on the Red List of Threatened Species.

These ecosystem pressures translate into a reduction in coral reef coverage and the OECS Member States are also experiencing this declining trend. According to the Global Coral Reef Monitoring Network's Status and Trends of Caribbean Coral Reefs Report for 1970-2012 (Jackson et al., 2014), with the exception of St. Kitts and Nevis and St. Martin, coral cover (i.e., the percentage of reef with living coral) has fallen throughout the Eastern Caribbean (Fig. 9).[4]

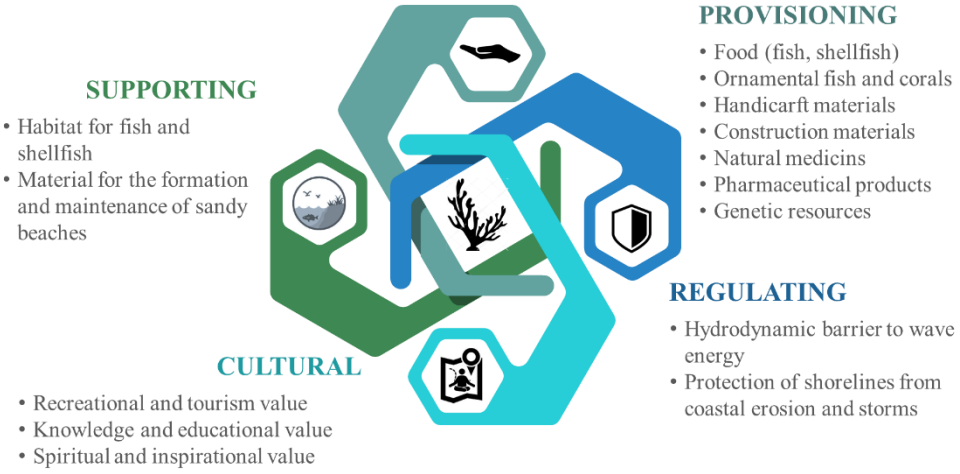


**Fig. 6 | Ecosystem services provided by coral reefs.**
*Adapted from: Whalley, 2011.*

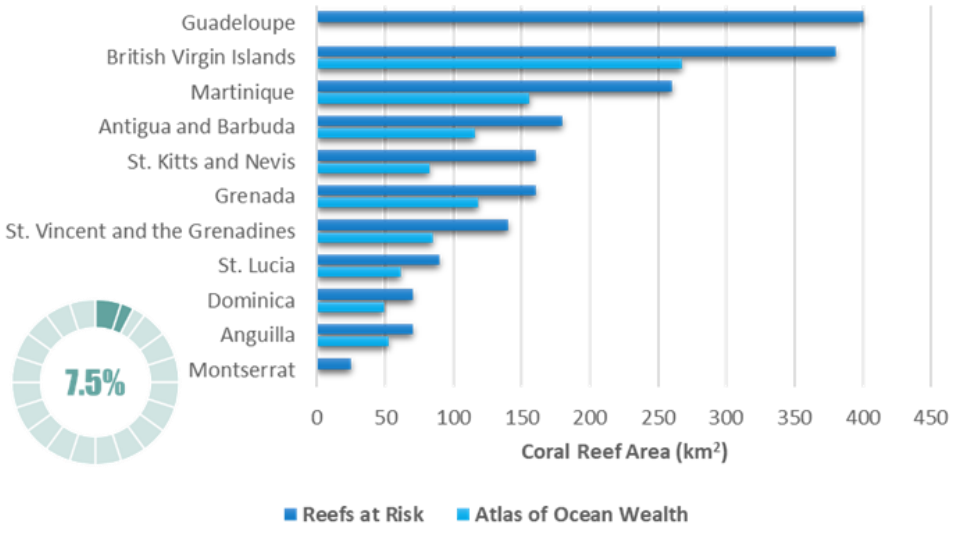


**Fig. 7 | Coral reef area in OECS Countries.**
*Sources: Burke and Maidens, 2004; TNC, 2019.*
*Note: Data for Guadeloupe includes St. Martin and St. Barthelemy. Please refer to Appendix 3 for data table.*

[3] The Reefs at Risk Threat Index reflects cumulative threat from four individual threats (coastal development, sediment and pollution from inland sources, marine-based sources of pollution, fishing pressure) (Burke and Maidens, 2004).
[4] The number of surveys, years, and depth ranges used to conduct this assessment vary by country (Jackson et al., 2014).

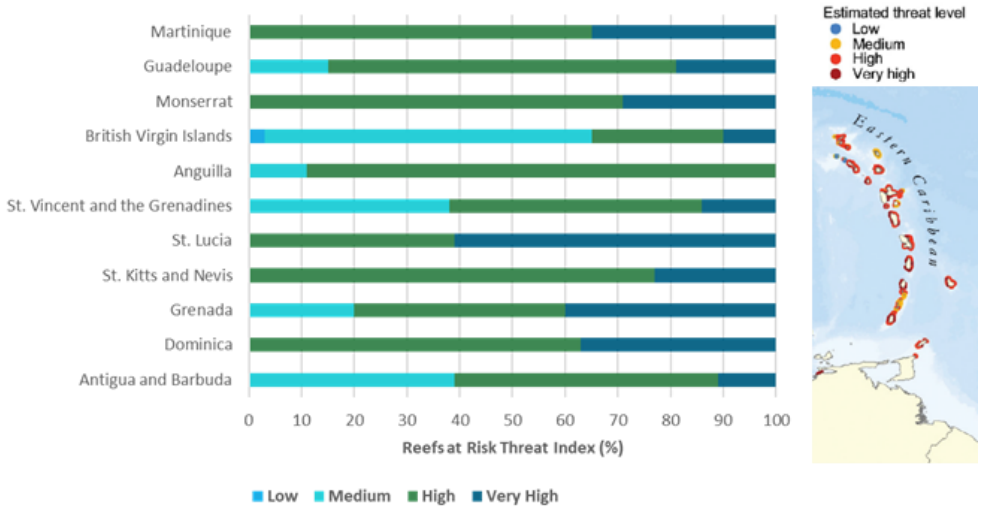


**Fig. 8 | Reefs at Risk Threat Index.**
*Source: Burke and Maidens, 2004.*
*Note: Reefs at Risk in the Caribbean coral reef area data for Guadeloupe includes St. Martin and St. Barthelemy. Please refer to Appendix 4 for data table.*

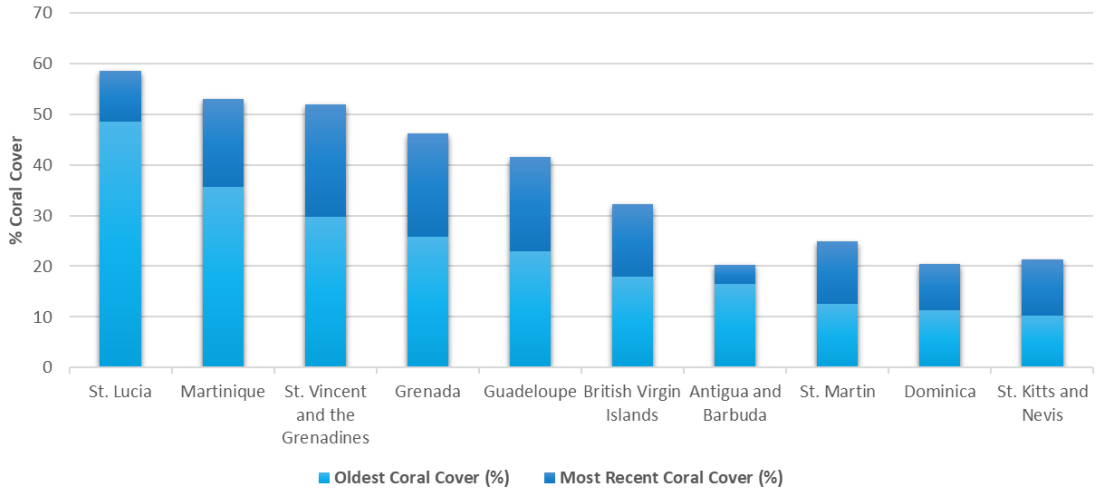


**Fig. 9 | I Changes in coral cover in the Eastern Caribbean.**
*Source: Jackson et al., 2014. Please refer to Appendix 5 for data table.*

Six (6) of the twelve (12) OECS countries have participated in the Climate-Resilient Eastern Caribbean Marine Managed Areas Network (ECMMAN) Project[5] that developed Coral Reef Report Cards. Fig. 10 summarizes the average results for coral cover, fleshy macroalgal cover, herbivorous fish and commercial fish for Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines. This assessment that also includes the Reef Health Index (RHI), is a standardised assessment tool used to measure coral reef health. As illustrated, coral cover (18.2%) and herbivorous fish (1,957.2 g/100 $m^2$) are "fair", while the level of fleshy macroalgae cover (18.3%) and commercial fish (563.7 g/100 $m^2$) is "poor". The RHI, which represents the average of these indicators, is calculated as 2.5 or "poor" (Kramer et al., 2016a-f).

In summation, these findings indicate that the coral reef ecosystems of the OECS Member States are in need of immediate attention with a strong focus on both protection and regeneration. The connectivity between the reefs and other tropical ecosystems including mangroves and seagrass meadows must also be considered when designing management efforts or interventions. Box 1 provides additional facts from select countries.

[5] Implementing Partners: The Nature Conservancy (TNC), OECS Secretariat, Social and Sustainable Development Division, UNEP/SPAW-RAC and Caribbean Regional Fisheries Mechanism (CRFM).

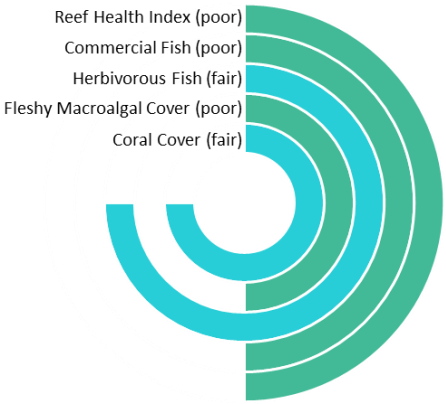


**Fig. 10 | Coral Reef Report Cards Results.**
*Source: Kramer et al., 2016a-f.*
*Note: Please refer to Appendix 6 for country level results.*

**BOX 1**

**Coral Reefs in the OECS Sub-Region**

- *According to the WRI's Reefs at Risk Revisited Report, Anguilla, Antigua and Barbuda, the British Virgin Islands, Dominica, Grenada, Guadeloupe, Martinique, St. Kitts and Nevis, and St. Lucia were listed as countries with the highest exposure to reef threats (Burke et al., 2011)/*
- *Anegada Horseshoe Reef in the British Virgin Islands is the third largest barrier reef in the world. In Anguilla, coral reef coverage dropped from 14% in the 1990s to 4% in 2009 (Vaslet and Renoux, 2016).*
- *Natural disturbances take their toll on reefs. For example, in Dominica, a 2018 survey of coral reefs in the shallow reef flats (<12 m) assessed the rate of damage from Hurricane Maria at 20-40% (Government of the Commonwealth of Dominica, 2019). Ongoing volcanic activity in Montserrat has inflicted significant damage to the environment, depositing ash on approximately one-third of Montserrat's coral reefs (de Bettencourt and Imminga-Berends, 2015).*
- *In the French West Indies, despite periods of stability and recovery over several years, monitoring reports have noted a progressive loss in coral cover, particularly on the outer reef slopes. Furthermore, coral cover in the reefs of the West Indies is at a critical stage since the major bleaching event of 2005 (Vaslet and Renoux, 2016).*

## Mangroves

Occurring in a range of coastal areas, mangrove forests are one of the most productive ecosystems providing critical habitats for marine fish and invertebrates, coastal protection, nutrient cycling and carbon sequestration (Fig. 11). The four common mangrove species in the OECS Sub-Region are the red mangrove (Rhizophora mangle), black mangrove (Avicennia germinans), white mangrove (Laguncularia racemosa) and the buttonwood (Conocarpus erectus) (Whalley, 2011; CANARI, 2018).

Collectively, the OECS Member States, have approximately 5,966 ha of mangroves (TNC, 2019). According to the most recent available survey for 2016, the largest proportions occur in Guadeloupe, Martinique and Antigua and Barbuda, whereas these valuable mangrove systems are found in less abundance in Dominica and Montserrat (Fig. 12).[6]

The main threat to mangrove ecosystems in the Caribbean has been the conversion of these areas to other uses such as agricultural and aquaculture activities as well as other infrastructure development including ports and resorts, etc. (CANARI, 2018). Furthermore, as experienced in Antigua and Barbuda, the occurrence of hurricanes and major storms has limited restorative efforts, (Government of Antigua and Barbuda, 2014). According to the 2015 Global Forest Resources Assessment conducted by the FAO, there has been some decline in the extent of mangroves in the Eastern Caribbean (FAO, 2015; Appendix 7). While the rate of decline has reduced over the period 1990-2015, this is likely the result of an increase in awareness of the value of mangroves, which has encouraged greater legislative and restorative efforts in the region (CANARI, 2018).

[6] The 2017 hurricane season had disastrous effects on mangrove coverage throughout the region; however, the extent of this was not available at the time of conducting this assessment.

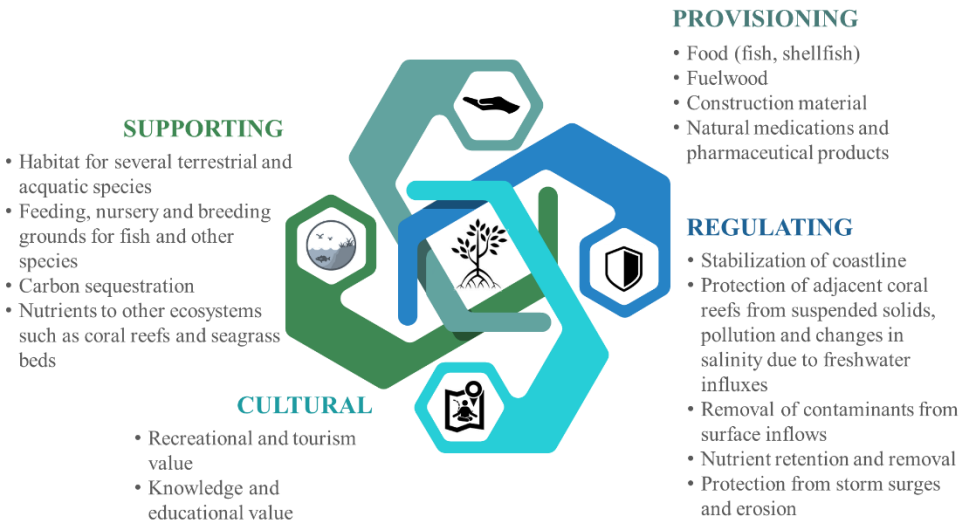


**Fig. 11 | Ecosystem services provided by mangroves.**
*Adapted from: Whalley, 2011.*

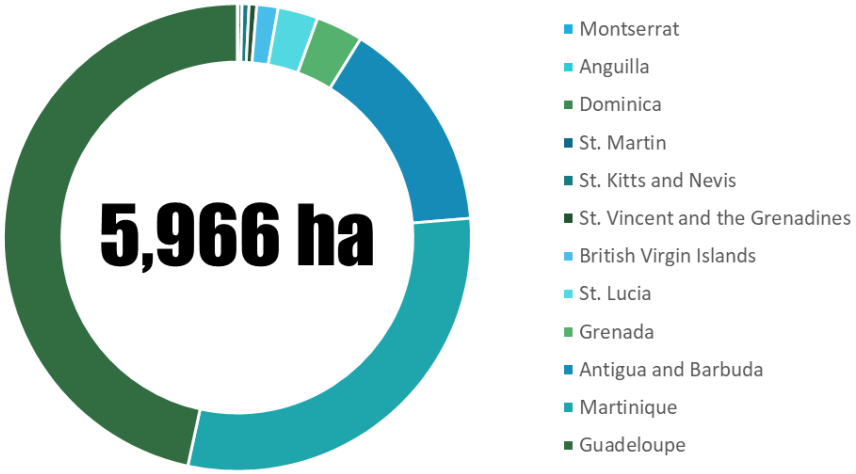


**Fig. 12 | Proportion of mangrove area for the OECS Member States.**
*Source: TNC, 2019. Note: Please refer to Appendix 7 for data table.*

## Seagrass Beds

Seagrass beds are found throughout the OECS Sub-Region and are a valuable yet underestimated coastal habitat supporting a variety of fish species, conch, sea turtles and manatees. Three main seagrass species in the Caribbean include the turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*). These highly productive ecosystems also support neighbouring coral reefs by filtering sediments, settling sediments and absorbing nutrients (Whalley, 2011; Fig. 13).

Growing mainly in the shallow sub-tidal zone (1-3 m), these ecosystems are especially vulnerable to coastal development, pollution, invasive species and deforestation. There is a general declining trend in seagrass area throughout the Caribbean, including the OECS Member States (CANARI, 2018). For example, in Anguilla, the native seagrass turtle grass declined by 21% from 56.2% to 44.6% (Government of Anguilla. 2015).

As shown in Fig. 14, all of the islands comprising the OECS have seagrass meadows in their coastal environments. Antigua and Barbuda and Guadeloupe have recorded significant proportions of the total seagrass area of 575 km$^2$ for the Sub-Region.

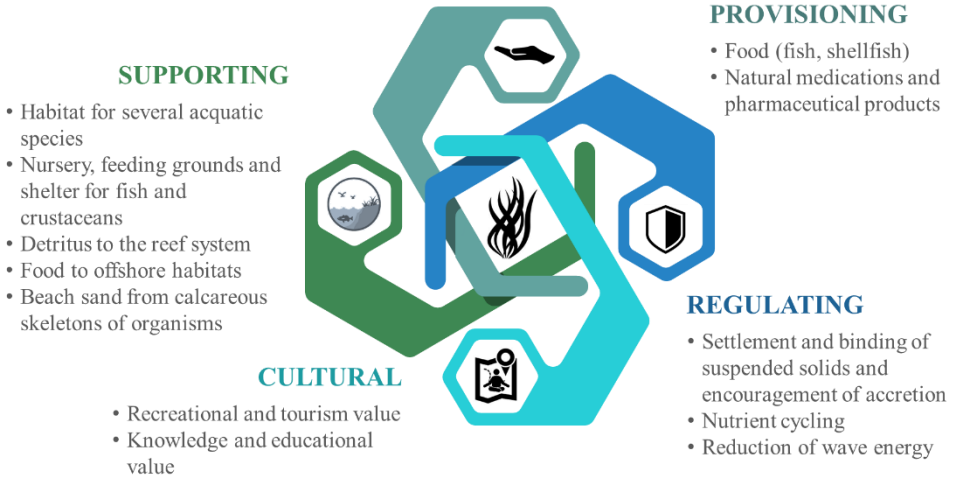


**Fig. 13 | Ecosystem services provided by seagrass beds.**
*Adapted from: Whalley, 2011.*

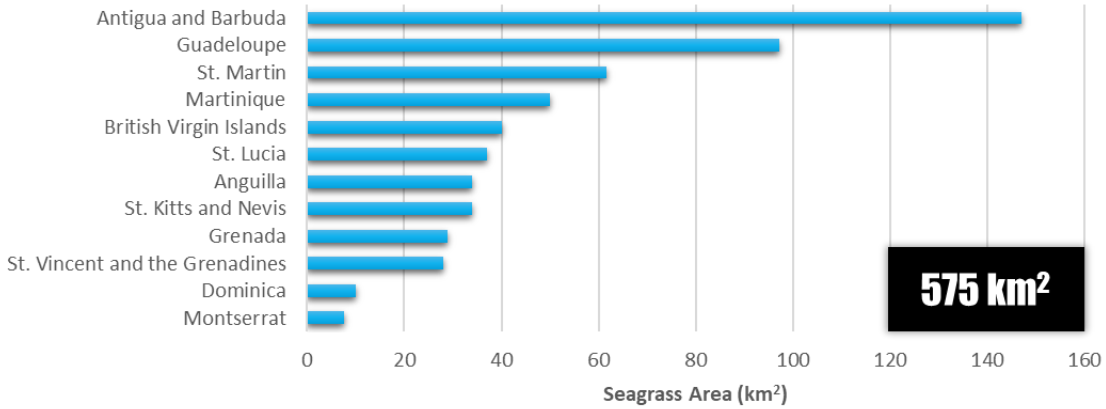


**Fig. 14 | Seagrass area in OECS Member States.**
*Please refer to Appendix 8 for data table and various sources.*

### Offshore/Pelagic Environment

Offshore waters provide habitat for numerous marine mammals and sea turtles, as well as deep water pelagic fish species. The pelagic ecosystem is also critical to climate regulation, maritime transport, energy potential and ecological connectivity (Whalley, 2011; Fig. 15).

For example, larvae for the star coral can disperse over distances up to 3,000 km. This promotes the genetic connectivity of coral populations across the Eastern Caribbean islands and more generally in the Wider Caribbean Region (Vaslet and Renoux, 2016). Little information is available at the country level, with respect to the "status" of this expansive ecosystem. However, the total marine space occupied by the islands of the Eastern Caribbean arc equates to 546,420 km$^2$, with significant propotions exhibited in Antigua and Barbuda, Anguilla, Guadeloupe and the British Virgin Islands (Fig. 16).

### Nearshore Environment

Caribbean beaches are of critical importance, providing areas for tourist and recreational activities, materials for construction, and habitats and nesting sites for sea turtles and other marine life (Whalley, 2011). At the critical junction where natural forces such as wind and water interact with the land, the nearshore environment is dynamic, changing from season to season and year to year. As such, beaches are exposed to natural forces including storms, sea level rise and hurricanes, and human activities such as sand mining and coastal construction (Camber, 2003). As shown in Fig. 17, the OECS Member States have approximately 1,989 km of coastline to consider in the management of their coastal and marine resources.

Beaches are actively monitored throughout the Eastern Caribbean by various entities and erosion is being experienced, particularly after extreme events that tend to limit recovery. For example, according to Anguilla's Beach

Monitoring Report from 1992-2014, 81% of the beaches suffered from erosion, mostly due to a lack of recovery after hurricane events and strong swell seasons. This beach loss is further complicated by activities such as sea level rise, mining and coastal development occurring directly on the beach (Wynne et al., 2016).

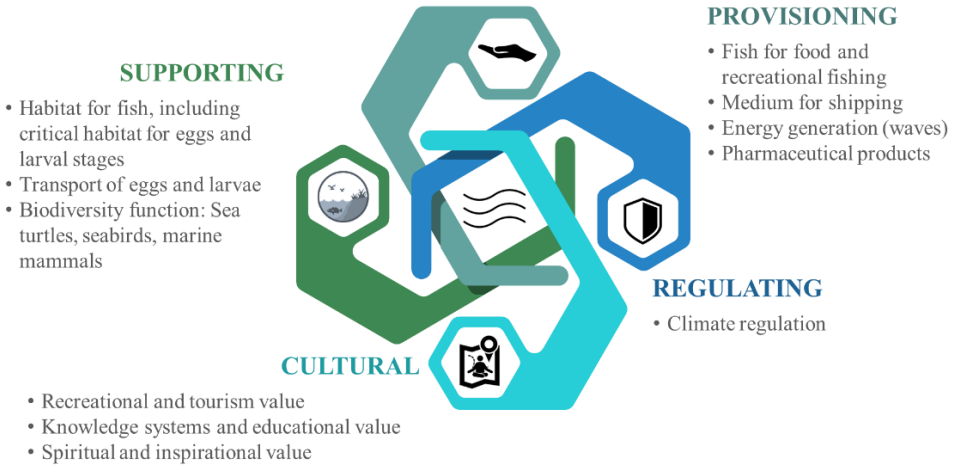


**Fig. 15 | Ecosystem services provided by the pelagic ecosystem.**
*Adapted from: Whalley, 2011.*

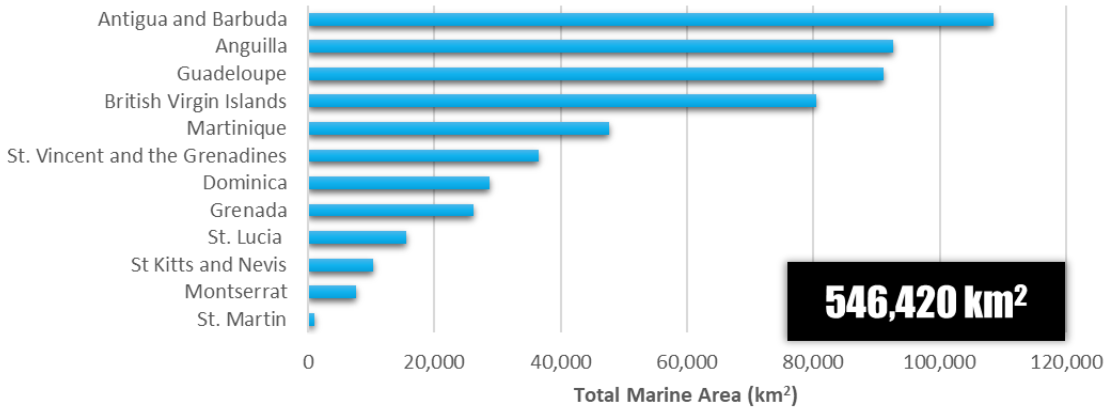


**Fig. 16 | Marine space area for OECS Member States.**
*Source: UNEP-WCMC and IUCN, 2020.*

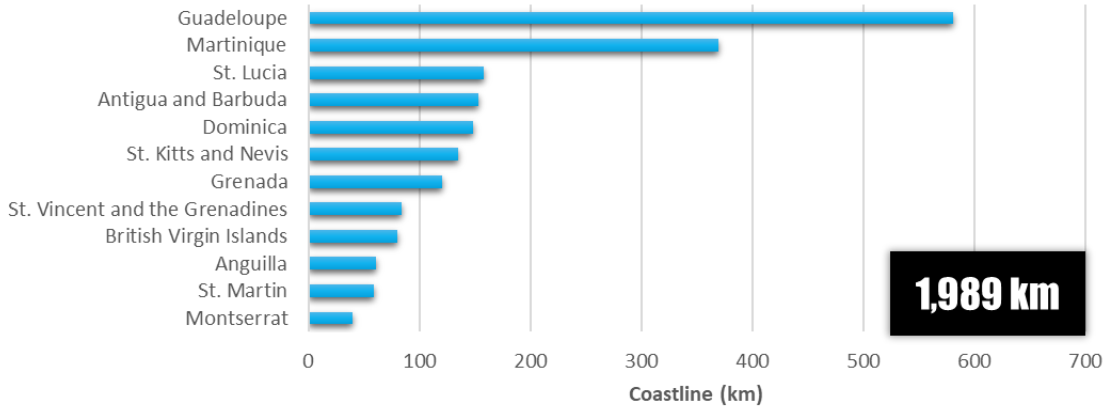


**Fig. 17 | Coastline lengths for OECS Member States.**
*Source: CIA, 2020. Note: St. Martin value represents he coastline for the entire island. Please refer to Appendix 2 for data table and sources.*

## Fish Stocks

Overfishing and habitat destruction have reduced fish stocks in reefs and nearshore fisheries, causing a greater dependency on pelagic fisheries, and can be attributed to illegal, unreported and unregulated fishing, poor regulation of fisheries, lack of enforcement of regulations and lack of political will. In the Caribbean Region, nearly 60% of fisheries are commercially exploited. Overfishing has affected coral reef ecosystems, which has resulted in reduced annual fish landings. The overexploitation of herbivorous fish such as the parrotfish has led to a decline in the health of coral reef ecosystems and overgrown algae on coral reefs (Patil et al., 2016; CANARI, 2018).

Overall trends within the region are listed as follows (Mumby et al., 2014; TWAP, 2015; Patil et al., 2016):

- Primary productivity within the region is at a medium level with decreasing trends. Primary production to sustain landings has been fluctuating
- Fish catch within the Caribbean Sea has increased since 1950, peaking in 1998 but has decreased slightly in the 2010s, particularly for the period 2010-2014. Catch value peaked in the 1980s and has been showing trends of slight decline.
- The decline in marine trophic index indicates fishing down the food web, which depletes stocks of larger carnivorous fish.
- Fishing effort continues to increase in the region despite declining catch.

The reduced abundance of stocks can result in decreased catches, lower catch per unit effort, threatened food security and reduced livelihood opportunities. If fishing targets lower trophic level species, this will result in lower market value for catches. Furthermore, trophic cascading can occur leading to reefs that are dominated by macroalgae, and hence, lower reef resilience. Tab. 1 summarizes the common fisheries and status of fish stocks for the OECS Member States. Transboundary Waters Assessment Programme (TWAP) 2015 data shows the OECS countries with medium biomass for fish stock (Fig. 18).

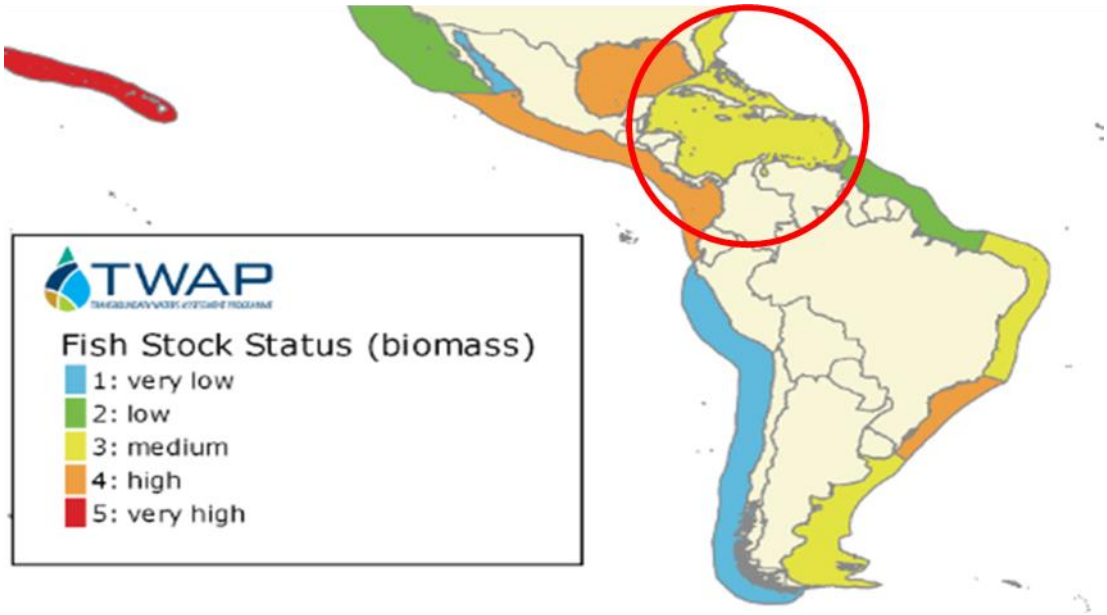


**Fig. 18 | TWAP fishing stock status for Large Marine Ecosystems**
*Source: TWAP, 2015.*

**Tab. 1 | Main fisheries and status of fish stocks in the OECS Sub-Region.**

| COUNTRY | MAIN FISHERIES | STOCK STATUS | NOTES |
|---|---|---|---|
| Anguilla [7, 8] | Spiny and spotted lobster, conch, reef fish, grouper, hinds, snappers, pelagics (jacks and herrings) | Exploited, declining fisheries. | Emerging Offshore FAD fishery for dolphin fish, wahoo, tuna, marlin and swordfish |
| Antigua and Barbuda [9] | Snappers and groupers, Caribbean spiny lobster and queen conch | Main resources Fully Exploited<br>FAO stated that a fishery representative suggested that lobster resource fully exploited but stable. | Challenges to fisheries include ciguatera fish poisoning. |
| British Virgin Islands [10, 11] | Reef species (yellow-tail snapper, silk snapper) and Caribbean spiny lobster, wahoo, tuna, kingfish, migratory billfish also important to recreational fisheries | Unknown | |
| Dominica [12] | Tuna (mainly yellowfin), dolphinfish (mahi mahi), blue marlin, ballyhoo and mackerels | Overall status Unknown; yellowfin exploited | No queen conch or lobster produced |
| Grenada [13] | Multispecies fishery. Main species: yellowfin tuna and big eye scad (jacks) | Yellowfin - not exploited<br>Small tunas, dolphinfish, mackerels - unknown status<br>Large tunas and billfishes - fully exploited / overexploited<br>Demersal Resources (north of Grenada) - exploited pass maximum sustainable yields<br>Small Pelagic (obtained from beach seining) - robust stocks | Bigeye scads landings declining; increasing yellowfin landings due to FADs |
| Guadeloupe [14, 15, 16] | Dolphinfish, Yellowfin tuna, sea catfish, blue marlin, triggerfish | *** No evidence of decline in dolphinfish<br>Yellowfin tuna stocks fully exploited in | Marine areas have been contaminated by chloredecone, a banned phytosanitary |

**Sources:**

[7] Ramdeen, R., Zylich, K. and Zeller, D. 2014 Reconstruction of total marine fisheries catches for Anguilla (1950-2010). pp. 1-8. In: Zylich, K., Zeller, D., Ang, M. and Pauly, D. (eds.) Fisheries catch reconstructions: Islands, Part IV. Fisheries Centre Research Reports 22(2). Fisheries Centre, University of British Columbia [ISSN 1198-6727].

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| COUNTRY | MAIN FISHERIES | STOCK STATUS | NOTES |
|---|---|---|---|
| | | Caribbean according to International Commission for the Conservation of Atlantic Tunas | product previously used in the banana industry has caused full or partial prohibition of fishing areas.<br>Toxic Algae, known as ciguatera, contaminates fish and makes it inedible; this issue limits exports.<br>Guadeloupe mainly imports spiny lobster and Queen Conch |
| Martinique [17] | | Decrease in fish landed | Production is sold locally<br>Fishery forbidden in some areas due to chloredecone pollution |
| Montserrat [14] | Reef (doctorfish, red hind and silk snapper), demersal, coastal pelagic, and pelagic species | Most fisheries slightly overfished<br>Reef fish may be overfished | |
| St. Kitts and Nevis [18] | Sardinellas, Atlantic chub mackerel and jacks and horse mackerel queen conch, Caribbean spiny lobster and reef fishes | declining stocks of queen conch, lobster and reef fishes | |
| Saint Lucia [19] | Pelagics - mahi mahi, wahoo and tuna and tuna-like species (mainly yellowfin and skipjack) | Not exploited overall | Flying fish important but variable catch |
| St. Martin [20] | Coastal fisheries | Coastal fisheries exploited | Presence of ciguatera limits access to some fish species.<br>Restricted fishing area due to proximity with Anguilla, Antigua and Barbuda and Sint Maarten.<br>Production is sold locally |
| Saint Vincent and Grenadines [21] | Most common coastal species include: balahoo jacks and robin.<br>Most common deep-water species include: dolphin, snapper, tuna and cavallie | No decline in major species caught<br>Decline in fish caught by beach seines | Tri-Tri' (juvenile Goby fish) has healthy population; delicacy and source of protein. |

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[20] COGEA, International, Fundación AZTI, Poseidon Aquatic Resources Management Ltd. 2017b. Realising the potential of the Outermost Regions for sustainable blue growth - Annex 3 To The Final Report The Blue Economy In St. Martin European Commission
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## ASSOCIATED SOCIO-ECONOMICS/IMPACTS

***« How does the state of coastal and marine resources affect human well-being? »***

Coastal and marine resources provide a variety of ecosystem services and products to dependent nations, and hence, human well-being is reliant on their overall state for the provision of tourism and fisheries products, and maritime and energy services. These are discussed below.

**Economic Value of the Coastal and Marine Environment**

In a 2016 publication, the Organisation for Economic Co-operation and Development (OECD) estimated the value of the world ocean economy at a very conservative US $1.5 trillion and projected to grow to US $3 trillion (in constant 2010 USD) by 2030. The World Bank estimates the value of the ocean economy in the Caribbean at US $407 billion (as of 2012). This estimate comprises the total value of economic activity in the region, including the value of some non-market ecosystem services such as coastal protection and blue carbon (Patil et al., 2016). Much of this value is attributed to global shipping passing through the Caribbean Sea, tourism and oil and gas. While a truer estimate of the actual value is yet to be calculated, there is little doubt that the ocean sector, given its vast exploitable resource sectors (shipping, tourism, oil and gas exploration, fisheries, renewable energy, aquaculture and ecosystem services), has the potential to contribute even further to the development of the economies of the region.

The economic value of coral reefs, mangroves and seagrasses has been evaluated to some extent in the Caribbean. Valuation estimates are determined based on the benefits derived from these ecosystems including coastal protection, tourism and fisheries. For example, the annual value of shoreline protection services provide by healthy coral reefs in the Caribbean has been estimated between US $740 million – US $2.2 billion (Burke and Maidens, 2004). In the French Overseas Territories of Guadeloupe, Martinique and St. Martin, the annual value of services provided by coral ecosystems is estimated at approximately US $339 million[22], which is greater than that of the estimated value of US $162 million[23] from coastal tourism (Fig. 19).

Fig. 20 presents the Atlas of Ocean Wealth's estimations for on-reef and adjacent reef tourism values of coral reefs in the OECS Independent States and two of the British Overseas Territories (Anguilla and Montserrat), which totals approximately US $422 million. An interesting observation is that in cases such as, Saint Lucia, Antigua and Barbuda, Anguilla and St. Kitts and Nevis, adjacent reef tourism (i.e., the value derived from the indirect use of coral reefs such as beaches, seafood, etc.) can be greater than direct uses such as snorkelling and diving. This reinforces the need for a holistic approach towards understanding the true value that coral reefs bring to the tourism industry.

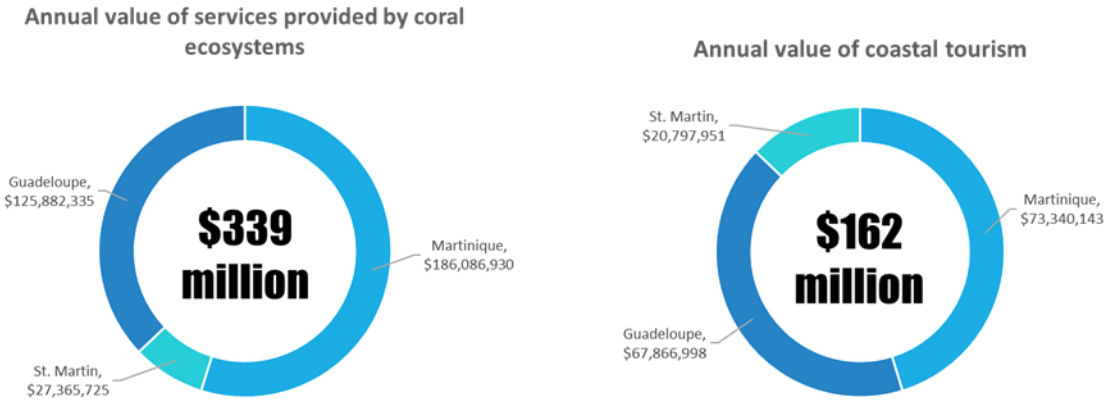


**Fig. 19 | Annual value of services provided by coral ecosystems and coastal tourism**
*Source: Pascal, 2016.*

[22] The ability of coral reefs, mangroves and sea grass beds to absorb up to 90% of energy generated by wave swells allows for the limitation of coastal damages during extreme weather events. This protection, (i.e., avoided costs) can be valued (Pascal, 2016).
[23] It is estimated that 20% of the benefits of the tourism sector depends directly on the reefs' good health (Pascal, 2016).

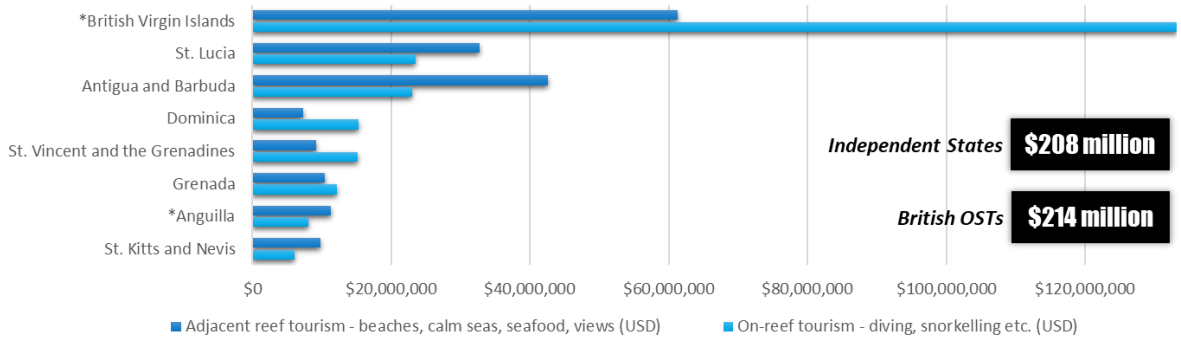


**Fig. 20 | On-reef and adjacent reef tourism value for Independent States and British Overseas Territories.**
*Source: TNC, 2019. Note: Montserrat excluded. Please refer to Appendix 9 for data table.*

## Tourism

Tourism within the Caribbean islands is a major contributor to the economic growth of island economies as a source of employment, income and foreign exchange. In 2017, the Caribbean welcomed 30 million stay-over visitors, a 1.7% increase over 2016, making it "the eighth consecutive year of growth," and better than the 3.9% overall internationally (Caribbean360, 2017). This increase translated into total visitor expenditure of approximately US $35.5 billion, an increase of 3.5% over the previous year (CTO, 2017). Recent data (Tab. 2) provided by the World Travel and Tourism Council (WTTC), the world's leading authority on the economic and social contribution of Travel and Tourism, indicated that in 2017, the direct contribution of Travel and Tourism to GDP in the Caribbean was US $17.9 billion (4.8% of total GDP).

Not only is the Caribbean heavily dependent on tourism, but it is also the most tourism-dependent region in the world (Thomas, 2015). Tourism is a key generator of foreign exchange and employment as well as a contributor to development given the investments in infrastructure usually associated with the development of port facilities, hotels and ancillary services, which develop around the hotel sector (Cabeza, 2008).

Sustainable tourism within the region is supported regionally by the policy directives of the Caribbean Tourism Organisation as well as the establishment of the Regional Sustainable Tourism Policy (2008). Countries with Sustainable Tourism policies / plans include Anguilla, Antigua and Barbuda, and Dominica (Sherma et al 2012).

Antigua and Barbuda, Dominica and St. Kitts have agencies responsible for monitoring implementation of sustainable tourism development. Projects in Dominica, Grenada, Antigua and Barbuda have supported sustainable livelihoods in tourism through various community-based programmes. In Dominica, the Kalinago community is supported through the heritage training programme. Small businesses operators are offered loans through the Grenada Development Bank whilst dedicated officers in the Ministry of Tourism in Antigua and Barbuda involve residents in tourism development (Sherma et al 2012).

Within the Caribbean, the accommodation sector has adapted sustainable practices such as energy conservation, water conservation and solid waste management mainly as cost saving measures. Although, regionally the Caribbean Hotel Association (1995) Environmental Toolkit for Caribbean Hotels' have served as an influence for sustainable practices. Also, hotels in Antigua and Barbuda, Dominica, Grenada, St. Lucia, St. Kitts and Nevis and St. Vincent and the Grenadines have obtained the Green Globe Certification which recognises sustainable tourism (Charles 2013).

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**Tab. 2 | Contribution of Travel and Tourism to GDP in the Caribbean.**

| GDP | US BILLION (2017) | % GDP (2017) | PROJECTED GROWTH GDP (2018) |
|---|---|---|---|
| Direct Contribution | $17.9 | 4.8 | 3.2 |
| Total Contributions | $57.1 | 15.2 | 15.5 |
| **EMPLOYMENT** | **JOBS** | **% JOBS (2017)** | **% INCREASE 2018** |
| Direct Contribution | 758,000 | 4.3% | 2.8% |
| Total Contribution | 2,434,000 | 13.8% | 2.8% |

*Source: WTTC, 2019.*

According to Sherma et al (2012), high priorities for sustainable tourism development within the entire region was found to be marketing and policy implementation whilst major barriers to sustainable development initiatives in the tourism sector within the regions included lack of information on funding and lack of access to low interest finance

Of the twelve regions[24] of the world for which data was collected by the WTTC, the Caribbean ranked first in terms of tourism's contribution to GDP, which was 15.2% and employment 13.8% (WTTC, 2018; Fig. 21). Using a broader measure of economic activity, such as the total value-added contribution, which considers indirect and induced contributions, Thomas (2015), noted that tourism's contribution of 19% "is almost three times the world average and considerably higher than those of other regions."

Islands are considered tourism vulnerability hotspots due to the high economic dependency for the industry and the vulnerability associated with natural, climate and anthropic pressures (Tonazzini et al., 2019). The main tourist attractions in the region are "sun-sand-sea" vacations (as monetised by over 250 all-inclusive resorts on Caribbean islands) and cruise destinations, particularly in island territories. Tourism within the Caribbean includes coastal (beach-based) and maritime (water-based) tourism, aspects of which include beach bathing, surfing, snorkelling, scuba diving, sailing, whale watching, cruises, and yachting. In Anguilla, a new niche tourism market in terms of water sports for visiting surfers is being explored (OECS Business Focus, 2019). Yachting is also a growing industry in the region with countries such as Antigua and Barbuda and St. Martin/St. Marteen having natural hubs for yachts. Antigua is particularly known for its marinas, dockage, services and events such as the Antigua sailing week. Saint Lucia has also promoted yachting with Atlantic Rally for cruisers, and the industry is also being promoted in Saint Vincent and the Grenadines (World Bank, 2015; McCabe, 2017). St. Kitts and Nevis is also looking to establish itself as a yachting destination with the opening of The Marina at Christophe Harbour in 2019. Intentionally designed to attract the high-end market, it has 65 berths and boasts the most modern facilities, including an automated pump-out facility to collect and dispose of liquid waste (Pers Communications, 2020). The growth of the yachting sector poses new problems as very few of those marinas have adequate facilities for the disposal of wastes, increasing the potential for marine pollution.

The British Virgin Islands, historically the leading yachting destination in the region suffered a major blow in 2017 when it received a direct hit by hurricane Irma, a Category 5 hurricane in September of that year. The impact of the Hurricane season 2017 on the region is estimated at a loss of 826,100 visitors, revenues of US $741 million and 11,005 jobs. A public misconception that the entire region was affected by the region also affected islands, not in the path of the Hurricane (WTTC, 2018b).

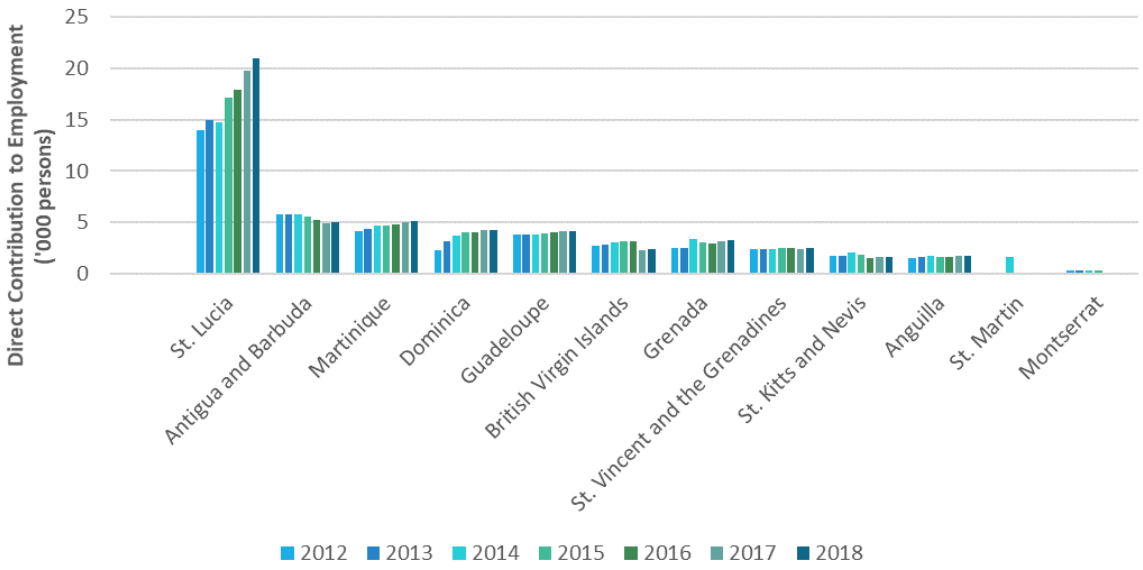



**Fig. 21 | Tourism's contribution to employment in OECS Member States**
*Source: Government of Montserrat, 2016; COGEA, 2017c; WTTC, 2018a. Please refer to Appendix 10 for data table.*

[24] North Africa, South East Asia, Caribbean, European Union, Latin America, Oceania. North East Asia, North America, Middle East, Sub Saharan Africa, Other Europe, and South Asia.

Within the OECS, there is limited land space, and a dearth of mineral resources leave limited options for diversification. Thus, most OECS countries are labelled as traditional tourist destinations. A trend in OECS countries has seen reductions in the agribusiness sector and increase in the tourism sector. However, a competitive tourism sector can support and encourage other economic activities such as agribusiness, construction and financial services (World Bank, 2015). In 2013, OECS countries (with the exception of the British Virgin Islands and St. Martin) accounted for 10.5% of tourist arrivals within the Caribbean Region (CTO, 2014). Countries such as Montserrat have lower tourism revenue due to the history of volcanic eruptions. Tourism arrivals in the OECS have been dominated by US, Canadian and European markets with 90% of the industry centred on leisure activities (Thomas, 2015). St. Kitts and Nevis broke records for stay-over passengers increasing by about 9,500 in 2017 and arrivals of 1,103,571 cruise passengers in 2018. St Kitts also registered an increase in cruise spending of 77% from 2014/2015 – 2017/2018 (OECS Business Focus, 2018a, 2019b). In Saint Lucia, tourist arrivals increased by 10.2% setting a new record with a total of 1,218,682 tourists in 2018 (Bishop, 2019).

Despite the strong reliance on that sector, tourism assets are foreign-owned, resulting in leakage of revenue from local economies. Coastal development associated with tourism has impacted the marine ecosystem through water pollution from tourism-related facilities, marine litter and plastic pollution, clearing natural habitats, and dredging for sea transport (Tonazzini et al., 2019).

Globally the cruise industry has grown rapidly and that is reflected in the fact that the Caribbean accounts for approximately 35% of the global market. Typically, northernmost countries tend to receive more cruise passengers than in southern countries. However, despite the heavy cruise traffic within the region, the contribution of the cruise industry to the region is negligible as cruise passengers do not stay-over as regular tourists, with an average of fewer than 10 hours with limited consumption (like food, accommodation and recreational activities are provided on-board). Cruise passengers also have less purchasing power being 30% less than regular tourists and head taxes per cruise passenger is low, on in some instances, non-existent. Cruises often provide a culture of dependency on a seasonal industry, causing increases in prices during high season. Also, overcapacity at some destinations has caused tourist flows to go beyond carrying capacity of ports and coastal communities. Authorities in the BVI have had to turn back visitors to The Baths, given the large numbers of visitors who come off the cruise ships. Cruise operators often pressure governments to upgrade infrastructure and services despite the seasonality of the cruise industry, and this comes at the expense of the destination and not the cruise operators (Tonazzini et al., 2019). Dominica's Tourism Minister, Robert Tonge, said over $60 million was spent to get Roseau, tourist sites and other areas ready for the cruise ship season (OECS Business Focus, 2018b).

Reef associated tourism expenditure was estimated at US $7.9 billion and over 11 million visitors, averaging at 660 visitors and US$ 473,000 per $km^2$ per year. Anguilla, Antigua and Barbuda, St. Kitts and Nevis and St. Martin are some of the islands most dependent on reef adjacent tourism (Tonazzini et al., 2019). Except for Dominica and the British Virgin Islands, cruise ship passengers within the OECS have been increasing. BVI dipped 167,000 passengers from 2014/2015 to 2017/2018 while Dominica saw a reduction by 69,000 passengers for the same period. Anguilla and Montserrat record the lowest cruise passengers at 4,677 in 2017/2018 and 7,100 in 2017/2018 respectively. St Kitts and Nevis has the highest within the OECS at 1,120,800 passengers in 2017/018, followed by Antigua and Barbuda at 790,200 passengers (BREA, 2009; BREA, 2012; BREA, 2015; CTO, 2016; BREA, 2018; ECCB, 2020; Anguilla Statistics Department n.d.; The Central Statistical Office of Saint Lucia n.d.).

Except for the French territories, stay-over tourists are lower than cruise passengers, with Montserrat having the lowest figures. The French territories, Guadeloupe and Martinique rank higher in total stay-over visits due to the European French market, which attracts more stay-over tourists to the islands for long periods (COGEA, 2017a; COGEA, 2017b). Data from Saint Martin also indicates a low cruise passenger count with 4500 in 2015 as 90% of cruise passengers arrive on the Dutch side of the island (COGEA, 2017c; Fig. 22).

Guadeloupe, Martinique, and the British Virgin Islands are the countries with the highest tourist expenditure, though BVI saw a declining trend from 2016 to 2018, going from US $789.5 million to US $657.6 million. Although BVI did not have the highest number of cruise passengers or stay-over tourists, the high tourism expenditure may be due to the high costs as well as the fact that it caters to the high end of the yachting sector. The BVI is known for its luxury yacht charter services and catering for up-market tourists who rent/own yachts. (WTTC, 2018a; Everitt 2007). Prior to the damage caused to its charter fleet during the 2017 hurricane season, BVI was a leader in the yachting industry which included 12 charter companies, approximately 1000 yachts and 500 private locally owned boats. (Gore et al 2019; Spalding et al 2007).

The contribution to GDP follows similar trends for tourism expenditure with the highest contributions found in British Virgin Islands, Guadeloupe and Martinique. The highest employment in the tourism sector is accounted for by Saint Lucia, and the lowest being Montserrat. Despite having lower figures, it was estimated that 70% of jobs in Guadeloupe were linked with the coastal tourism sector in 2012. And in 2015, it was estimated that 1 in 4 employees was working in the coastal tourism sector in St Martin

(Government of Montserrat 2016; COGEA, 2017a; COGEA, 2017b; COGEA, 2017c; WTTC 2018a).

Cruise tourism which is directly dependent on the use of ocean space is now considered the world's fastest-growing industry (WTTC, 2015). With the Caribbean featuring so prominently as a cruise destination and the industry generating huge profits, it is reasonable to expect that coastal states, in whose EEZ cruise ships operate, should benefit significantly from these activities. Though the region accounts for 35% of world's market share it generates "less than five per cent of the industry's revenue while imposing high financial and environmental costs" on Caribbean countries which are obliged to invest heavily in infrastructural improvements such as ports to accommodate the larger vessels (Pinnock, 2012, 2019).

Individual countries in the Caribbean charge a small, much disputed and robustly resisted "Head Tax" based on the number of passengers coming ashore at the respective destinations. However, with the cruise industry commissioning and using "mega-ships," increasing the amount of on-board entertainment provided to passengers, and the general trend (UNWTO, 2012) of cruise lines to increase the number and variety of on-board services provided to passengers at sea, they are not only engaging in direct competition with land-based tourism providers but signalling their intention to ensure that a greater share of the tourist dollar is spent on-board the ship, as opposed to the destination (Simmons, 2018). While there is little doubt that jobs are created and revenues generated in the localities of the various destinations, they are minuscule compared to what is generated through the controlled excursions ashore. In most instances, these are paid for on-board the ship and not at the destinations. This will undoubtedly result in a reduction of revenue (taxes and expenditure) as passenger expenditures at the destination is likely to decrease, negatively impacting on the economies of countries which are heavily dependent on tourism (Simmons, 2018).

The high dependence of the region on tourism requires a greater effort on the part of the authorities to reduce the leakages and ensure that a fair percentage of the benefits are retained in the destinations that provide the environment and ecosystem services essential to the tourism product. Only a regional approach, spearheaded by the OECS Commission, with the support of the international community, is likely to achieve positive results. This was evident in 1998 when the OECS countries, under the guidance of the Commission succeeding in getting the countries to institute a common head tax on cruise passengers arriving in the respective destinations. As seen in the OECS Ship Generated and Solid Waste Management project, a regional approach helps small islands developing states with limited resources by providing greater aid support. Also lessons learned regionally can be adapted to country specific components whilst also fostering competitive benchmarks for countries to seek to improve their national standards (World Bank, 2003).

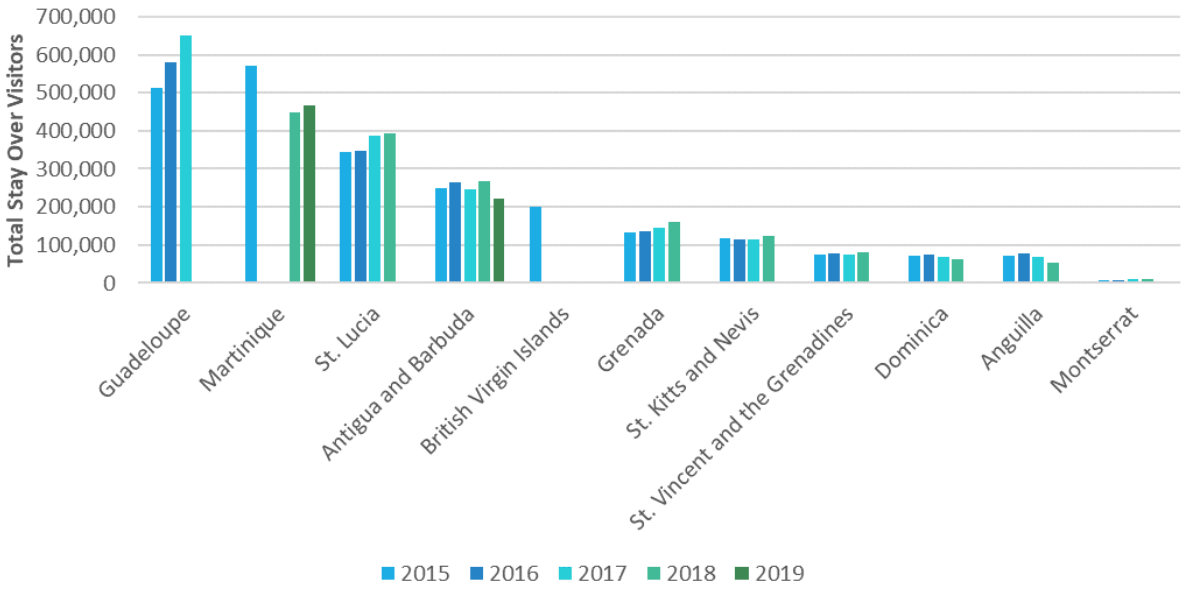



**Fig. 22 | Total stay-over visitors in OECS Member States.**
*Sources: COGEA, 2017b; CTO, 2015; ECCB, 2020; Statista, 2019; Tourism Analytics n.d. Please refer to Appendix 10 for data table.*
*Notes: Guadeloupe is calculated as international tourist arrivals. Data Gaps exists for Martinique and British Virgin Islands. St. Martin is not included in the data set but COGEA (2017c) states that more than 100,000 tourists arrived in the French part of the island for an undisclosed period.*

## Fisheries

The Caribbean Large Marine Ecosystem, which is influenced by the nutrient poor North Equatorial Current is a moderately productive ecosystem, and fisheries in the region support over 2 million people along coastal communities (Sevilla and Bail, 2017). Within the CLME, populations are located mainly along the coastal areas due to the topography of islands and the high coastline to land ratio. Approximately 2% of the population living along the coasts inhabit rural areas, and around one-third of them are considered poor/vulnerable. Therefore, activities dependent on coastal and marine areas are important for supporting livelihoods and economic growth (One Shared Ocean, 2018).

The fishing sector therefore acts as a safety net for rural coastal communities and complement seasonal employment from tourism and construction sectors. Fisheries also provide the main source of animal protein for fishing communities, which have some of the highest per capita consumption globally, almost twice the global average (Whalley 2011; Barange et al., 2018). Fisheries also provide a source of foreign exchange, in particular, Grenada is a net exporter of fish within the region, whilst Guadeloupe and Martinique provide pelagic species for the European market to some extent. However, the Caribbean Region is a net importer of fish to supplement local and tourism needs with approximately a US $ 8.5 billion deficit between exports and imports of fish products. This leads to a decrease in foreign exchange because of declining exports of high-value species (Sevilla and Bail, 2017; Barange et al., 2018; CANARI, 2018;).

The CLME has a high ranking in fishing revenues with over US $810 million from 2001-2010. In 2012 the fisheries industry in island states and territories accounted for only 7.5% of total revenue in the Caribbean Region (Patil et al., 2016). Tourism and fisheries are interrelated industries within the region. The fisheries industry provides fish to restaurants and hotels as well as provide recreational and sport fishing activities for tourists (Box 2). Whale watching in the region has also been promoted as a tourism activity which also contributes to the regional economy (TWAP, 2015; CANARI, 2018).

For Caribbean islands, including the OECS, fisheries play an important role in their economy (Fig. 23). Fisheries are primarily small-scale subsistence and artisanal operations. Modernisation of the industry has occurred to include updated vessels. The fisheries resource is diverse within the Caribbean region, and of particular importance to the OECS are the spiny lobster, queen conch, reef fish and pelagic; large oceanic fisheries have also grown (yellowfin tuna, skipjack tuna etc.). Caribbean reef fisheries provided easy access to a source of food and income through high-value species such as queen conch and spiny lobster. The fishers who access reef fisheries only require low capital investment in boats and gears and are often unregistered fishers. As traditional reef fisheries such as grouper and snapper decline, fishers indiscriminately target lower value herbivorous fish such as parrotfish (Mumby et al., 2014).

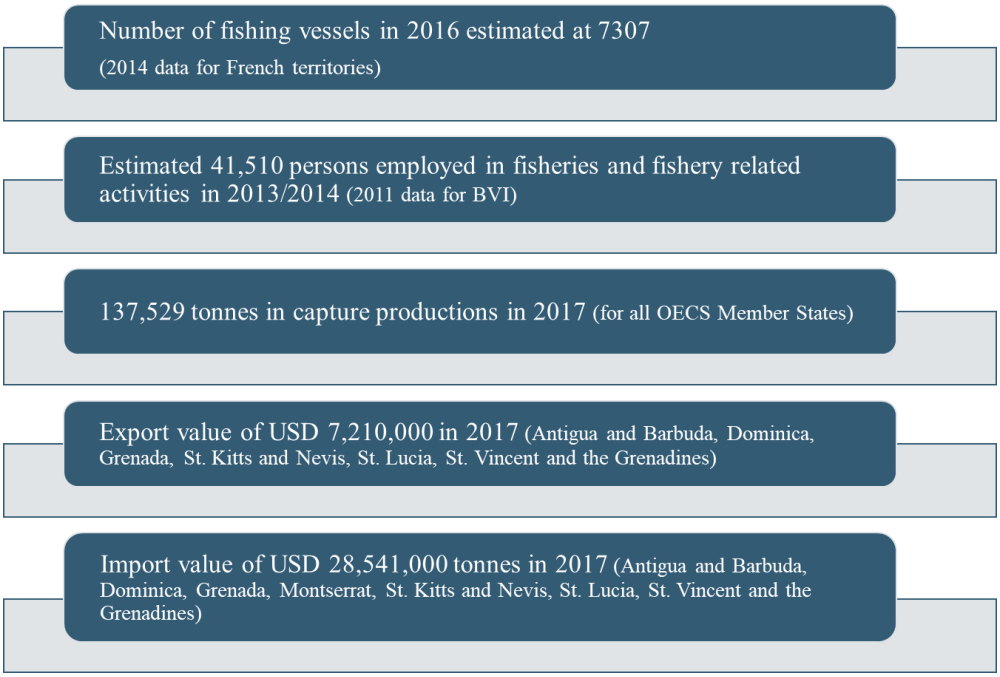



**Fig. 23 | Snapshot showing key figures for ten countries within the OECS Region.**
*Sources: Ramdeen et al, 2014; CRFM, 2015; COGEA, 2017 a-c, CRFM, 2018; FAO FishStat Plus, 2017.*

**BOX 2**

**Fisheries and Tourism in Antigua and Barbuda**

*The fisheries sector in Antigua and Barbuda supports tourism as high-valued species such as snappers, groupers, spiny lobsters and queen conch are marketed to hotels and restaurants, or are exported to the tourism industry in neighbouring countries. Additionally, the diamondback squid is expanding into the tourism market. Apart from supplying food for the tourism sector, large pelagic fisheries (e.g., tuna, wahoo and swordfish) also support recreational fisheries.*

*Live lobster domestic export was determined to be negatively correlated with stayover visitor arrivals, i.e., with every 1,000 hotel guests in Antigua and Barbuda, 533 kg less lobster is exported annually. With every 1,000 hotel guests arriving in Guadeloupe, 107 kg of lobster was imported from Antigua and Barbuda. Lobster exports were estimated at US $0.5 million per year (FAO, 2018a).*

*Fishing tournaments are held by the Antigua and Barbuda Sport and Fishing Association and the billfish tournaments attracts 30-40 vessels from the region. Also, an Annual Seafood Festival is held to showcase authentic seafood to locals and tourists and is organised in the villages of Urlings and Old Road by the state and fisherfolk.*

*Antigua Stingray City Limited offers cruise ship passengers, tourists and locals the opportunity to interact with sting rays in their natural environments apart from offering kayaking and snorkelling to offshore islands (Guiana Island and Great Bird Island). Stingray City revenue was US $1 million from around 20,000 visitors per year, exceeding the value of capture production for sharks, rays and skates of US $145,122 for 2014 (CRFM, 2016; FAO, 2018a).*

Poorer communities tend to depend on direct and indirect use of natural resources and are most vulnerable when natural resources are limited, degraded or denied. Their economic activities are linked to access issues and poor environmental quality leading to impacts on their wellbeing. Within the region, fishing communities are generally characterised as poorer communities due to limited alternative employment opportunities, poor infrastructure and living standards. However, households involved in the fish processing sector were not considered to be poor. A trend within the region was that there was less involvement by young persons and women in the fisheries sector. However, women are more involved in processing, aquaculture and marketing than captured fisheries.

Fishing communities also tend to form around family units. Grenada, Montserrat, St Kitts and Nevis, and Saint Vincent and the Grenadines had more fishing families involved in the sector (CRFM, 2012; FAO, 2016a). Also, the Kalinago people of Dominica still preserve fishing traditions within their indigenous communities (Box 3). Mumby et al. (2014) suggests that fisherfolk and their families have been involved and dependent on the fisheries sector for a long time. Any change to access can affect fishers' dependency on the resource, making livelihoods more insecure. Therefore, management strategies particularly as it relates to protection and restriction policies must include fisherfolk input.

**BOX 3**

**The Kalinago Tribe of Dominica**

*The Kalinago Tribe is the only major indigenous community within the region. Historically, fishing is one of the main types of employment for these natives of Dominica, and therefore, the preservation of fishing traditions is considered a priority for the people. The Kalinagos indicate that they practice sustainable fishing and are aware of the risks of unsustainable practices. Fishers from this community travel north or south to use fishing facilities as there is no proper boat launching facilities or landing sites within their territory. Whilst many fishers use modern boats within the community, traditional boat building practices are kept alive using the techniques to make fishing boats from Gommier trees (Kalinago Territory. n.d.; TNC, 2017).*

Aquaculture is still a fledging industry within the OECS and is limited to start-up businesses and small-scale productions (Whalley, 2011). According to the FAO Country Profiles, countries such as Antigua and Barbuda, Dominica, Guadeloupe, Martinique and Saint Lucia have aquaculture operations mainly focusing on tilapia and other freshwater species. Guadeloupe has one marine aquaculture production site producing drum fish, though there has been a decline due to chlorecocone in soils. Martinique has 15 active sites mainly producing red drum fish and bluefin trevally (COGEA 2017a; COGEA, 2017b).

The following presents a brief synopsis of fisheries-related data including capture production, exports/imports, consumption, contribution to GDP and employment.

**Capture Production:** Figs. 24, 25 and 26 depict capture production (tonnes) retrieved from the FAO's Fisheries and Aquaculture Software FishStat Plus (2017) online database for the period 2006-2017. Due to data gaps, estimates were provided mostly for the British Virgin Islands, Guadeloupe, Martinique and St. Martin as well for some years in Anguilla and Antigua and Barbuda. Most countries show a trend of having a peak year/s, then either declining or levelling off, following trends suggested by TWAP (2015). Data for St. Kitts and Nevis indicates an upward trend in 2017, and Saint Vincent and the Grenadines displays an extreme dip in 2012 and an extreme peak in 2014. Saint Vincent and the Grenadines and St. Kitts and Nevis had the highest capture production, while St. Martin and Montserrat experienced the lowest quantities.

For the period 2006-2017, miscellaneous pelagic fish makes up most of the catch in the region, amounting to 586,706 tonnes but this is mostly due to Saint Vincent and Grenadines and St. Kitts and Nevis contribution to the pelagic fisheries. Tunas, bonitos, billfishes fisheries also make a significant contribution to the region at 64,157 tonnes followed by abalones, winkles and conch fisheries contributing 40,305 tonnes to regional fisheries. All countries fished abalones, winkles and conchs except Dominica and Montserrat. Lobsters, spiny rock lobster, and coastal fish were resources for all countries except Dominica, Montserrat and Guadeloupe. Anguilla and Montserrat did not utilise pelagic fisheries, and Saint Vincent and the Grenadines was the only country to fish whales and other aquatic mammals.

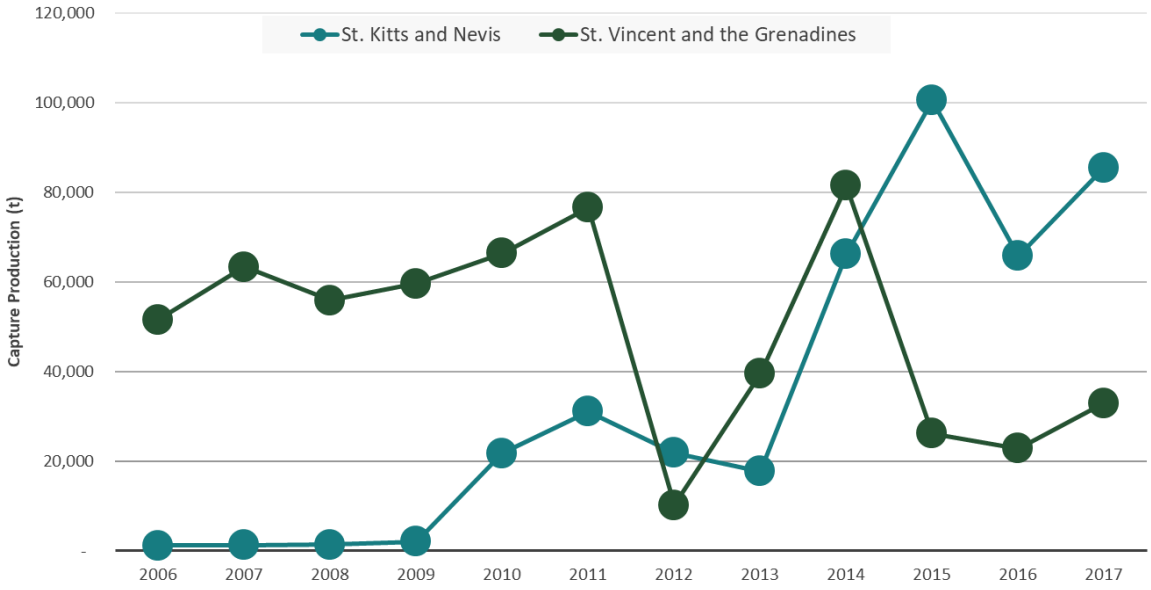



**Fig. 24 | Fish capture production data for St. Kitts and Nevis and Saint Vincent and the Grenadines.**
*Source: FAO FishStat Plus, 2017. Please refer to Appendix 11 for data table.*

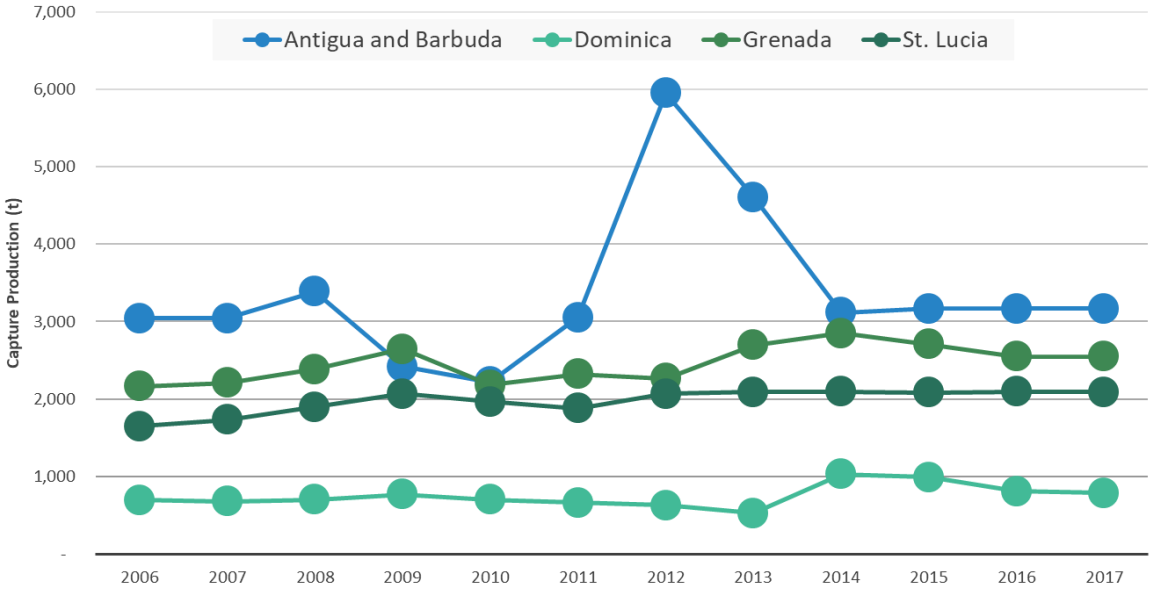



**Fig. 25 | Fish capture production data for Antigua and Barbuda, Dominica, Grenada and Saint Lucia.**
*Source: FAO FishStat Plus, 2017. Please refer to Appendix 11 for data table.*

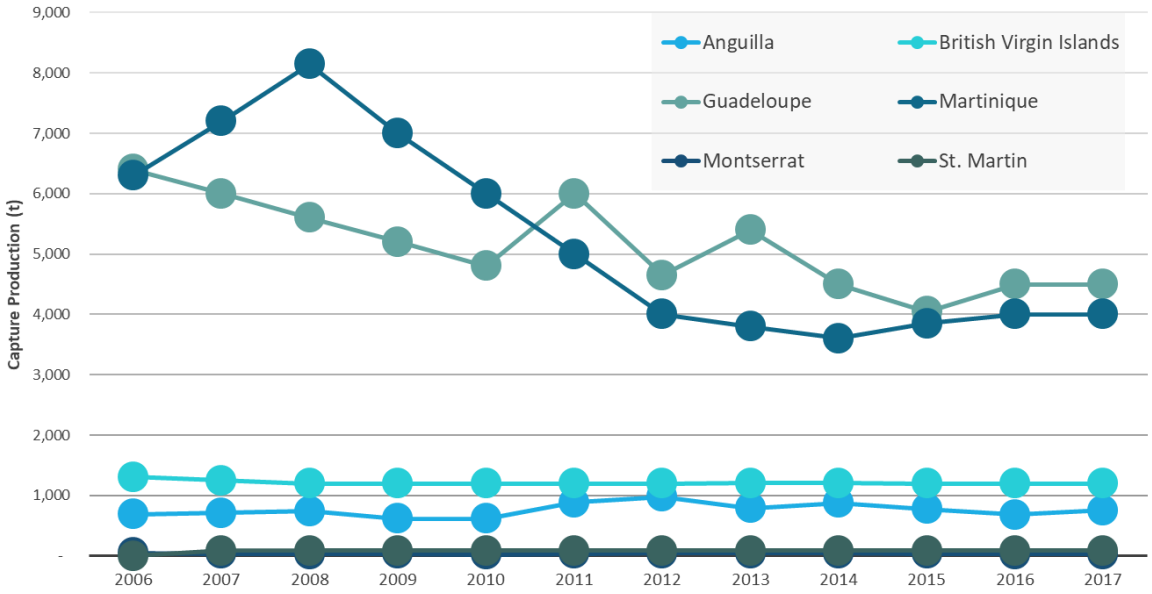



**Fig. 26 | Fish capture production data for the Overseas Territories.**
*Source: FAO FishStat Plus, 2017. Please refer to Appendix 11 for data table.*

According to the FAO FishStat Plus data, Saint Vincent and the Grenadines and St. Kitts and Nevis have the highest capture production within the region due to the contribution of pelagics and herrings, sardines, anchovies to the catch. For Saint Vincent and the Grenadines, a decline in both of these fisheries at around 88% was responsible for the dip in capture production in 2012, and conversely, the increase in these two also accounted for the peak in 2014. In 2014, Herrings, sardines, anchovies showed an increase of 57% and miscellaneous pelagic capture production increased by 140%.

The specific species responsible for the decline were European anchovy, European pilchard (Sardine) and

Sardinellas. Sardinellas also contributed to the peak capture production in 2014 for Herrings, Sardines and Anchovies category. The two most important species contribution to pelagic catch were Atlantic chub mackerel and, Jack and horse mackerels; both species contributed to the peak in 2014 but decline in 2013 could be mostly attributed to Jack and horse mackerels.

St. Kitts and Nevis showed a decline in capture in production for both 2013 and 2016. Herrings, Sardines and anchovies decreased by 41.5% and 44% for 2013 and 2016 respectively. Miscellaneous pelagics fisheries declined by 33% in 2016. Capture production significantly increase in 2014 with an increase of 409% for pelagic fisheries and 212% increase for herring, sardines and anchovies. In 2013, European anchovy and sardinellas were mainly responsible for the decline, while in 2016, Sardinellas, Atlantic chub mackerel and jacks and horse mackerel caused the dip in capture production; these same three were responsible for the increase in capture production in 2014. An increase in queen conch production was also attributed to the increase in 2014 (FAO, 2016a). The large increases in catch for both Saint Vincent and the Grenadines and St. Kitts and Nevis can possibly be attributed to fishers seeking an alternate stock in response to declining reef fisheries.

Another country with a prominent peak in capture production was shown to be Antigua and Barbuda, peaking in 2012 due to a 210% increase in abalone, winkles, conchs (specifically due to stromboid conchs) and a 30% increase in miscellaneous coastal fisheries (specifically due to groupers/seabasses and snappers/jobfishes). This increase was caused by increase in reef fish catches, increased harvest of queen conch (as demand for lobster decreased) and greater use of Fish Aggregating Devices (FADs) for pelagics (FAO, 2018a).

**Fish Consumption:** As shown in Fig. 27, fish consumption data was sourced for eight (8) OECS countries and except for Antigua and Barbuda, Dominica and Grenada, countries showed an overall increase in consumption (CRFM, 2014, 2015, 2018).

**Employment in the Fisheries Sector:** Except for Anguilla, all OECS countries show increasing trends in employment with Saint Lucia and Grenada having the highest numbers for 2015/2015 at 12,688 and 10,972, respectively (Fig. 28). Employment is considered to be employed in direct production, fishery-dependent activities and aquaculture. Data gaps exist for the British Virgin Islands, Guadeloupe, Martinique and St. Martin (CRFM, 2014, 2015, 2018; Masters, 2014; Ramdeen et al., 2014).

**Contribution to GDP:** The following Tab. 3 lists the contribution of the fisheries sector to GDP in OECS countries. Whilst a relatively small contribution, there are slightly increasing trends in most countries, with the largest portion exhibited by Anguilla (CRFM, 2018; Central Statistical Office, Government of the Virgin Islands; EU Annex).

**Imports and Exports:** As shown in Figs. 29 and 30, overall trends display import value exceeding export value. The French countries are not included; however, Grenada export value is the largest amongst the countries listed, and Saint Lucia has the highest import value for country data provided (FAO FishStat Plus, 2017).

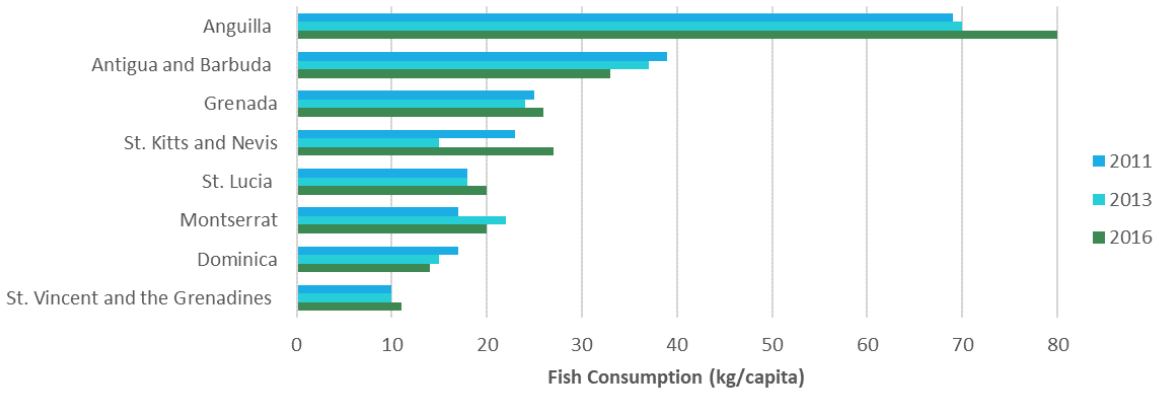



**Fig. 27 | Fish consumption for eight OECS Member States.**
*Sources: CRFM, 2014, 2015, 2018.*

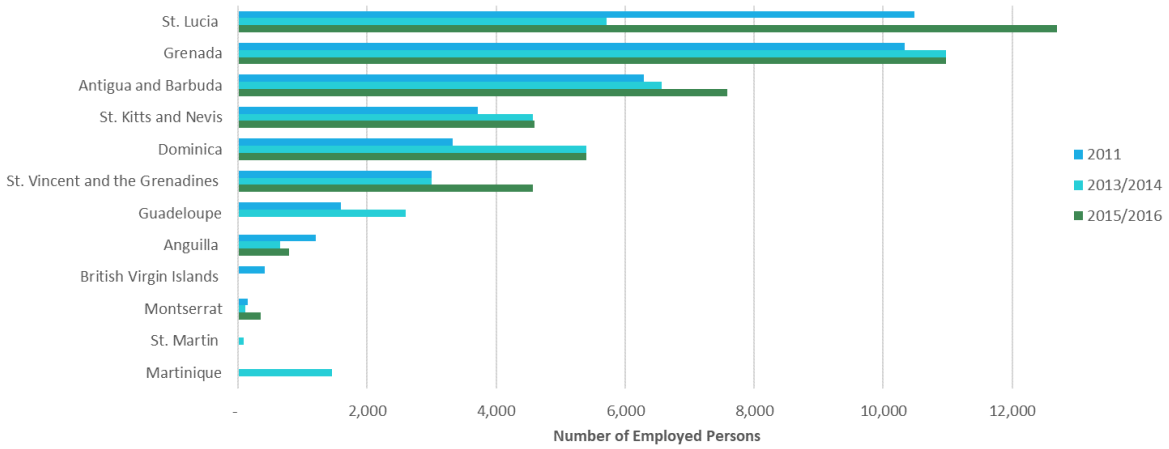
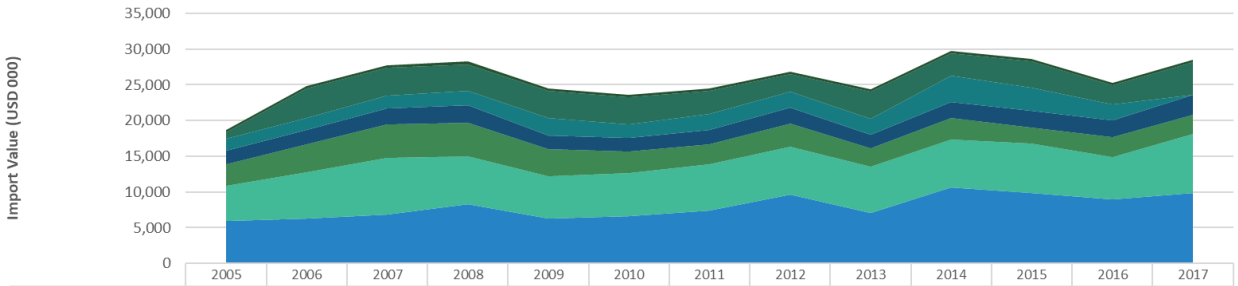



**Fig. 28 | Fisheries sector employment in the OECS.**
*Sources: CRFM, 2014, 2015, 2018; Ramdeen et al, 2014. Please refer to Appendix 11 for data table.*

**Tab. 3 | Contribution of the fisheries sector to GDP in the OECS.**

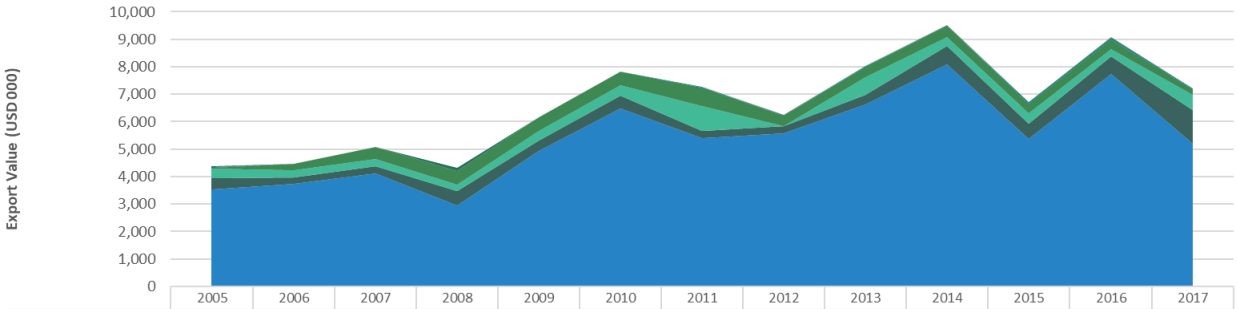
| COUNTRY | 2014 | 2015 | 2016 |
|---|---|---|---|
| Anguilla | 1.96 | 1.91 | 2.62 |
| Antigua and Barbuda | 0.8 | 0.98 | 0.96 |
| Dominica | 0.48 | 0.55 | 0.49 |
| Grenada | 1.39 | 1.4 | 1.4 |
| Montserrat | 0.38 | 0.31 | 0.29 |
| St. Kitts and Nevis | 0.4 | 0.39 | 0.32 |
| Saint Lucia | 0.55 | 0.52 | 0.54 |
| Saint Vincent and the Grenadines | 0.48 | 0.53 | 0.5 |
| The British Virgin Islands | | | 0.2 |

*Sources: CRFM, 2018; Central Statistical Office, Government of the Virgin Islands; EU Annex.*




| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Montserrat | 267 | 334 | 318 | 362 | 386 | 325 | 343 | 372 | 390 | 343 | 312 | 397 | 429 |
| Saint Kitts and Nevis | 995 | 4,128 | 3,931 | 3,717 | 3,785 | 3,854 | 3,241 | 2,521 | 3,814 | 3,160 | 3,704 | 2,675 | 4,577 |
| Dominica | 1,666 | 1,672 | 1,816 | 1,965 | 2,385 | 1,842 | 2,192 | 2,134 | 2,173 | 3,652 | 3,232 | 2,189 | - |
| Saint Vincent/Grenadines | 1,890 | 2,033 | 2,228 | 2,524 | 1,942 | 1,963 | 2,027 | 2,295 | 1,963 | 2,305 | 2,339 | 2,391 | 2,766 |
| Grenada | 2,966 | 3,922 | 4,704 | 4,622 | 3,807 | 2,980 | 2,815 | 3,233 | 2,499 | 3,008 | 2,294 | 2,780 | 2,668 |
| Antigua and Barbuda | 4,884 | 6,429 | 7,899 | 6,695 | 5,866 | 6,049 | 6,422 | 6,712 | 6,561 | 6,697 | 6,828 | 5,928 | 8,286 |
| Saint Lucia | 5,990 | 6,322 | 6,814 | 8,341 | 6,326 | 6,582 | 7,404 | 9,609 | 7,010 | 10,589 | 9,893 | 8,922 | 9,815 |

**Fig. 29 | Commodity trade and production: Value of fisheries imports in the OECS (US $ '000).**
*Source: FAO FishStat Plus, 2017.*




| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| St. Lucia | 1 | 1 | - | 107 | - | 1 | - | 31 | - | 29 | 14 | 13 | 8 |
| Dominica | 37 | 1 | 6 | 6 | 2 | - | 12 | - | 7 | 2 | 39 | 49 | 25 |
| St. Kitts and Nevis | 45 | 242 | 422 | 483 | 492 | 493 | 689 | 390 | 406 | 407 | 376 | 362 | 196 |
| Antigua and Barbuda | 328 | 248 | 259 | 249 | 345 | 400 | 890 | - | 623 | 319 | 354 | 270 | 558 |
| St. Vincent/Grenadines | 434 | 241 | 269 | 510 | 405 | 466 | 266 | 276 | 351 | 675 | 578 | 631 | 1235 |
| Grenada | 3,517 | 3,734 | 4,115 | 2,957 | 4,919 | 6,466 | 5,402 | 5,559 | 6,629 | 8,081 | 5,360 | 7,738 | 5,188 |

**Fig. 30 | Commodity trade and production: Value of fisheries exports in the OECS (US $ '000).**
*Source: FAO FishStat Plus, 2017.*

## Shipping/Maritime Transport

**Shipping, Maritime Transport and Services:** Within the Caribbean region, shipping represents 76.4% of the economy (Patil et al., 2016). The shipping sector in the Caribbean consists of both a formal and informal shipping. Larger international shipping lines, linking to regional hubs, make up the formal shipping sector. Smaller vessels, estimated at 500 tonnes in cargo capacity, form the local informal shipping industries. These smaller vessels form the OECS Maritime Shipping Cluster and conduct valuable inter-island trade within the OECS and to Barbados and Trinidad and Tobago. The OECS Maritime Shipping Cluster consists of both public and private stakeholders but at the core are small vessel operators and owners with limited coordination amongst stakeholders. The majority of the region's shipping occurs in Dominica, Grenada, Saint Lucia, and Saint Vincent and the Grenadines. The northern sector of the cluster goes from Dominica to St. Kitts and Nevis (including Martinique, Guadeloupe, St. Martin, Antigua and Montserrat). In contrast, the southern sector makes up the main shipping lanes between Saint Vincent and the Grenadines and Trinidad and Tobago as well as Barbados (OECS Commission, 2013b). It has been suggested that the informal shipping sector is on the decline due to the high insurance costs and flag restriction (CPCS Transcom Limited, 2018).

Port Throughput in the OECS region totalled 495,191 twenty-foot equivalent units (TEUs) in 2015 with Martinique and Guadeloupe recording the largest figures (Fig. 31). Intraregional trade in 2008 within the OECS was at an estimated US $27.8 million with 30,000 tonnes. However, only 2.6-4.5% of that trade was within the OECS. Most of the trading occurs with Barbados and Trinidad and Tobago. In 2008, small vessel operators generated US $2.9 million in total revenue but contributed to the OECS economy through trading/transporting of US $67.3 million in merchandise. The OECS maritime shipping industry supports small manufacturing, mining, agriculture and goods sectors in the domestic markets. This trade, in turn, supports the tourism industry and related construction projects. OECS countries, however, import most of their goods from extra-regional sources in bulk cargo vessels. These countries have trade imbalances (import exceeds exports). There is also, inefficiency and high costs associated with returning empty containers (OECS Commission, 2013b; Cubas et al., 2015).

Island states in the Caribbean have one of the highest costs of transporting goods due to procedural inefficiencies, management and their lack of connectivity (locked in by seas) and small economies. Generally, low connectivity increases the costs of maritime trade, as the competition among shipping lines is limited, and more transhipment moves are required for the containers to arrive at their destination (Cubas et al., 2015; CDB, 2016;). According to Cubas et al. 2015, the issue for OECS ports is not its cargo capacity and the need for expanding its facilities but rather the management and maintenance of current facilities and equipment. Port investments may not be feasible due to limited volumes of cargo handled in OECS ports, and maybe it is a waste of resources to invest in deep-sea facilities. It is suggested that instead of building new port facilities, OECS countries should optimise current operations. With bolder vision and regional support, this sector can realise growth (CDB 2016).

However, OECS port infrastructure is facing pressure and a demand for more facilities and terminals from cruise lines. Although separate terminals exist for cruise ships in Antigua, Saint Vincent and the Grenadines, and, Grenada, if there is a request for cruise ships to berth, the cruise vessels are prioritised over cargo vessels for docking. This competition for space is forcing many small ports to consider building new piers for cruise terminals as in the case of Sk. Kitts (Basseterre), St Lucia and Antigua and Barbuda (Lucenti, 2014; Cubas et al., 2015).

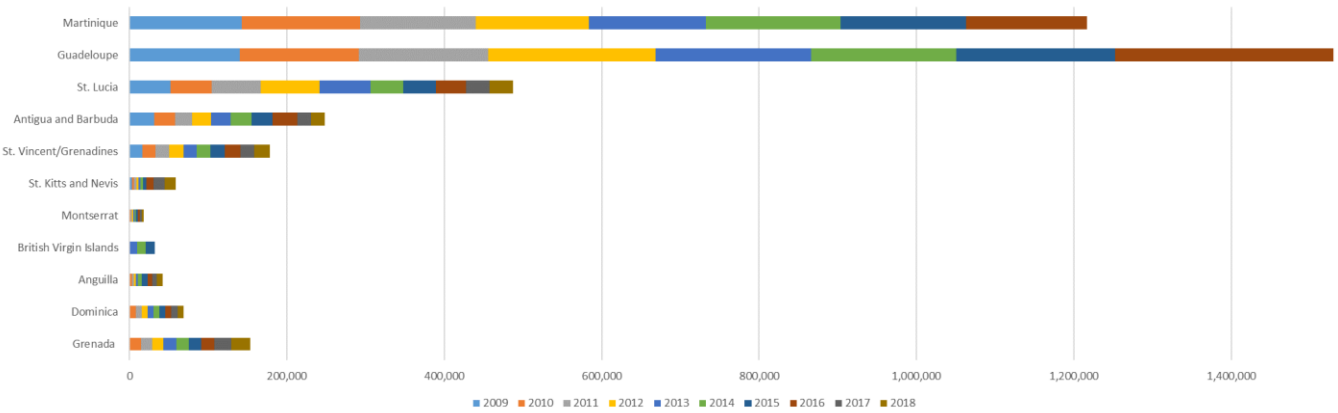



**Fig. 31 | Port Throughput in the OECS Sub-Region.**
*Sources: ECLAC, n.d.; CPCS Transcom Limited, 2018; UNCTADStat, 2019. Please refer to Appendix 12 for data table.*

Antigua (St Johns), St Kitts (Basseterre) and St Lucia (Castries) receive large amounts of traffic from cruise vessels. In response to this, Saint Lucia invested US $18.8 million in berth extensions and construction of new moorings at the Pointe Seraphine facility. This was the largest project undertaken in 20 years and resulted in the most extensive cruise ship docking at Port Castries in January 2018. Antigua and Barbuda, in partnership with the Chinese government, modernised their port at St. Johns, costing US $90 million with the objective of growing container transhipment traffic; further to this, an additional US $80 million was spent on a fifth berth for cruise ships at Point Wharf (CPCS Transcom Limited, 2018; Port Briefing, 2018). Montserrat recently invested US $27 million in port development, given the urgent need for adequate port facilities for all vessels. Dominica has undeveloped infrastructure and has seen a decline in passenger vessels calling due to small ports. Port development on coastlines can also compete for limited coastal space in the significant tourism industry and the fishing industry which sustains livelihoods (Lucenti, 2014; Cubas et al. 2015).

**Marina Sector:** Marina development in the Caribbean has been influenced by geographical and nautical factors which make the islands of the Caribbean ideally suited for sailing. A large number of islands in close proximity, natural attractions, as well as safe anchorage due to indented coastlines make the Caribbean a yachters paradise. Most common yachts visiting the region include the 46 ft catamaran and the 65 ft monohulled motor yacht, and more recently destinations are developing facilities for 130 ft mega yachts. Due to the growth of the yachting sector, countries have been increasing their port capacities and offering more services (Tab. 4). Peak season in the region is from July to December with around 70-100% occupancy (Phillips, 2014).

**Tab. 4 | Number of ports, marinas and berths, which give an indicator for each country's capacity to support a thriving maritime sector.**

| COUNTRY | NUMBER OF PORTS | NUMBER OF MARINAS | NUMBER OF BERTHS |
|---|---|---|---|
| Anguilla | 1 | 11 | 113 |
| Antigua and Barbuda | 2 | 10 | 248 |
| The British Virgin Islands | 4 | 9 | 586 |
| Dominica | 3 | 1 | 3 |
| Grenada | 1 | 13 | 659 |
| Guadeloupe | 7 | 6 | - |
| Martinique | 6 | 2 | - |
| Montserrat | 2 | (In the process of expanding the maritime sector) | - |
| St Martin | - | 15 (including Dutch side) | 750 |
| St Kitts and Nevis | 3 | 2 | 65 |
| St Lucia | 4 | 6 | 567 |
| St Vincent and the Grenadines | 10 | 8 | 120 |

*Sources: Phillips, 2014; Superyacht Services Guide, 2020 (Updated for this Report); Marina Reservations n.d.*

Regionally, marinas can accommodate a wide variety of sailing crafts ranging between 40-300 ft in length overall. Marinas in the Caribbean offer the following – wet storage and anchorage, charter services, boat servicing and repairs, accommodations/recreational amenities and hurricane shelter. Within the Caribbean region, shipbuilding is not a main tradition and marinas mostly accommodate visiting vessels. While marinas usually have high costs, revenues are generated form berth rentals (based on type and length of boats), boat charter, fuel and repair and various services (Phillips 2014).

**Maritime Administration:** In each of the OECS Member States, a maritime administrative unit has been established and entrusted with the responsibility of managing and providing a high level of quality service at the main ports of entry, as well as ensuring that vessels are inspected and satisfy high standards. These functions usually involve:

- Operation and administration of the ports
- Regulate and control navigation within such ports
- Applying the most modern standards of safety and security
- Maintain, improve and regulate the use of such ports and its facilities
- Exercise the duties and functions outlined in any enactment relating to shipping and navigation.

The Department of Marine Services and Merchant Shipping in Antigua and Barbuda sets its focus on applying the most modern standards of safety with competitive fiscal and other incentives to meet the needs of ship and yacht owners seeking an effective registry option. They have modern national legislation, covering all aspects of safety, security and the requirements for cleaner oceans. In Saint Vincent and the Grenadines, the Commission approved the Maritime Action Plan to enhance the Administration's capacity to effectively implement and discharge Saint Vincent and the Grenadines' (SVG's) maritime obligations in keeping with international law, with multilateral instruments to which SVG is party and the Shipping Act. Similar to other ports in the Caribbean the Anguilla Air and Seaports Authority is tasked with the exclusive right to manage the ports of Anguilla as stated in Anguilla Air and Sea Ports Authority Act (2010).

The Grenada Port's Authority has recently thought of new initiatives and made some investments which have boosted Grenada's potential for cargo handling, the cruise sector and tourism. All of these bring direct benefits to the economy and people of the country. In 1997, the Government of Montserrat created the Port Authority Act to establish a port authority to provide and administer a coordinated and integrated system of port facilities and services. The Dominica Maritime Administration specialises in Vessel Registration, Yacht Registration, Statutory Services, Flag State Services, Mariner Education, Mariner Certification, Anti-Piracy Services, Corporate Services, Technical Services, and International Maritime Organisation Participation.

**Ship Registries in OECS:** Several countries have also sought to capitalise on the very lucrative "Flags of Convenience" (FOC)[25] operations by establishing Open Ship Registry and extending their maritime services to the international community. It is estimated that approximately 73% of the world fleet is flagged in a country other than that of its beneficial ownership. Such an operation allows the beneficial owner to avoid paying taxes and applying less stringent safety measures. For small economies, such as those of the OECS, open ship registry can be a very profitable business as shipowners are required to pay an annual registration fee, pay taxes and benefit from legal services. Countries are, however, required to provide stringent safeguards, but they usually do not live up to those standards. In the Caribbean, The Bahamas, Cayman Islands and Saint Vincent and the Grenadines are some of the more well-established countries with ship registry.

Among the OECS Member States Saint Vincent and the Grenadines has a long background in the maritime industry and has developed globally as an important open flag registry. Antigua and Barbuda has also established a shipping registry and seeks to make it very accessible to international clientele. The British Virgin Islands, with a ship registry of its own, specialises in the registration of yachts though vessels registered are British Ships. St. Kitts and Nevis also established an open ship registry. However, they gained the notorious reputation as the fourth largest "shipbreaking" or "end-of-life" flag state due to slack implementation of maritime regulations. Growing concern regarding this practice and a backlash from the international community, including the IMO, resulted in St. Kitts and Nevis having to shut down its ship registry. Dominica and Saint Lucia have also established shipping registry and like the other countries, hope they will become lucrative industries.

**Energy**

The generation of marine renewable energy is seen as an important activity stemming from the transition to a blue economy as jobs and energy can be generated without depleting natural resource (Greenhill et al., 2016; Patil et al., 2016; Lemessy et al., 2019). The OECS Member States are primarily net importers of fossil fuels. The fuel imported are required primarily for transportation and electricity generation, hence supporting local needs and the needs of the tourism sector (Greenhill et al., 2016). Generally, Caribbean Small Island Developing States (SIDS) have low

[25] Note that a flag of convenience means registering with another nation to reap certain benefits. These countries include Antigua and Barbuda, and Saint Vincent, where vessels take advantage of cheap labour. (Morris, 2019; Official Guide to Ship and Yacht Registries, n.d.)

energy consumption (Tab. 5), yet high electricity prices due to imported fuel. (Lemessy et al., 2019).

**Tab. 5 | Electricity Net Consumption (Billion kWh) in OECS countries.**

| COUNTRY | ELECTRICITY NET CONSUMPTION (BILLION KWH) |
|---|---|
| Anguilla | - |
| Antigua and Barbuda | 0.3 |
| British Virgin Islands | 0.2 |
| Dominica | 0.1 |
| Grenada | 0.2 |
| Guadeloupe | 1.5 |
| Martinique | 1.4 |
| Montserrat | Negligible |
| St. Kitts and Nevis | 0.2 |
| Saint Lucia | 0.4 |
| Saint Vincent and the Grenadines | 0.1 |
| St. Martin | - |

*Source: US Energy Information Administration, Independent Statistics and Analysis. n.d.*

The OECS countries, being small island states, already face challenges in the energy sector (Fig. 32). Further to this, they are limited by land size, required for solar and wind energy, and not all islands possess active volcanoes to generate geothermal energy. Other alternatives such as biofuels would again require additional land space, which would inevitably mean the use of agricultural lands. Along with high coastline to land ratio, these factors narrow down options to marine energy as a practical option for SIDS (Lemessy et al., 2019). Compared to regional electricity tariffs, the cost competitiveness of renewables shows potential for expansion (e.g., ocean tidal range) costs 20-30 kWh compared to Saint Lucia's electricity tariff of 30-40 kWh (Ochs et al., 2015).

The push towards renewable energy generation has been driven by the private sector and enabled by costs reductions in technologies and supporting policies. However, declining oil prices can risk lack of investment in the sector if it is not sufficiently profitable. Though subsidies and taxes may ensure profitability of renewable energy, overreliance of Caribbean Community (CARICOM) SIDS on importing fuel puts their energy security at risk (Griffith-Jones et al., 2017).

Whilst renewable energy in the Caribbean has seen greater investments in solar, hydro and geothermal power, the marine renewable energy sector is yet to be developed. Within the region, total renewable energy generated revenues of US $1.3 million in 2012 accounted for 3.66 billion kWh of renewable electricity. Lower energy consumption makes renewable energy technology more feasible in SIDS, and the greater percentage of electricity supplied from renewable energy, the more willing the population may be to introduce another form of renewable energy such as marine (Patil et al., 2016).

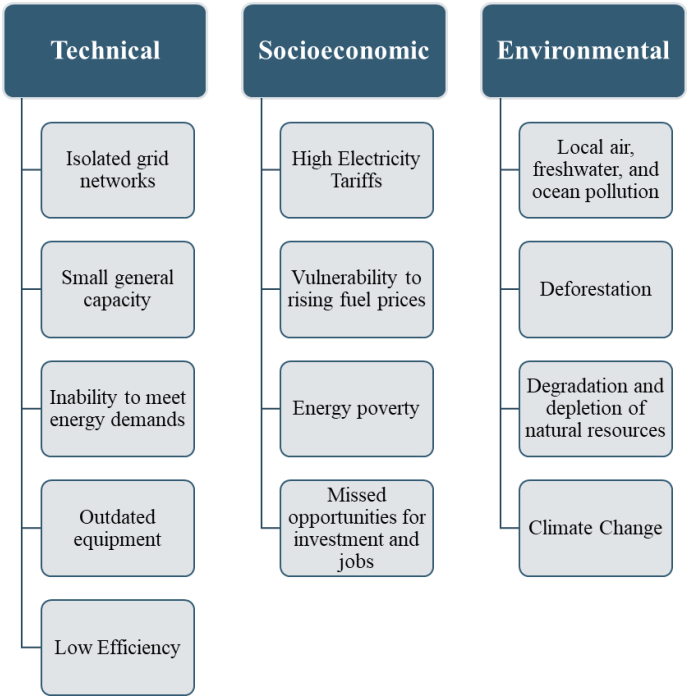



**Fig. 32 | Energy Challenges faced by Caribbean countries.**
*Source: Lemessy et al 2019.*

As shown in Tab. 6, within the OECS Sub-Region, marine renewable energy projects are limited to preliminary phases of assessments in countries such as Anguilla, Antigua and Barbuda, Guadeloupe and Martinique. However, more countries such as Antigua and Barbuda, British Virgin Islands, Guadeloupe, Martinique and Montserrat, have given consideration to marine renewable energy in national policies and legislation. With the exception of Anguilla, all OECS countries have set renewable energy targets with countries such as Dominica (26%), Guadeloupe (17.45%), and Saint Vincent and the Grenadines (17.28%) having the highest percentage of renewable energy capacity. This suggests that the region is committed to shifting to renewable energy sources and will be willing to explore renewable energy projects.

**Tab. 6 | Renewable energy snapshot in OECS Countries.**

| COUNTRY[26] | FUEL IMPORTS AS % OF GDP | % RE CAPACITY OF TOTAL INSTALLED CAPACITY | FINALIZED ENERGY POLICY/ ACTION PLAN | RE ACT | RE TARGETS | MENTIONS OF MARINE RE IN ACT/POLICY | POTENTIAL MARINE RE PROJECTS | OTHER MARINE CONSIDERATIONS |
|---|---|---|---|---|---|---|---|---|
| Anguilla [27] | 18.3 | 0.13 | Present | No | None | No | MIT Student working in partnership with Australian company to test prototype wave energy technology in Anguilla. Groundwork and Government support required.[28] | National Energy Policy makes considerations for submarine cables linking Anguilla to St Martin for electricity and to Nevis for geothermal energy [29] |
| Antigua and Barbuda[30] | 7.5 | 11.11 | Present | Present | Yes - 15% RE by 2030 [31] | Recognition as potential source [28] | 1. Marine Energy technologies need further assessment. [32]<br>2. Memorandum of understanding signed between Government and Swedish marine energy company, Minesto, (in collaboration with the UN Office Project Services) to conduct a feasibility study to determine possibility of providing renewable ocean energy [33] | Potential for RE to be used in desalination plants which currently accounts for 10% of electricity consumptions [29] |
| British Virgin Islands [34] | 4.8 | <1 | Present | Present | Yes - 30% RE by 2023 [32 a,b] | Green Energy License Charge included in Renewable | None | Islands connects electricity supply with submarine cables [32] |

**Sources:**
[26] CARICOM Secretariat. 2018. 2017 Energy Report Card – CARICOM.
[27] National Renewable Energy Laboratory. 2015. Energy Snapshot Anguilla. Energy Transition Initiative, Islands.
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[34] National Renewable Energy Laboratory. 2015. Energy Snapshot British Virgin Islands. Energy Transition Initiative, Islands.

| COUNTRY[26] | FUEL IMPORTS AS % OF GDP | % RE CAPACITY OF TOTAL INSTALLED CAPACITY | FINALIZED ENERGY POLICY/ ACTION PLAN | RE ACT | RE TARGETS | MENTIONS OF MARINE RE IN ACT/POLICY | POTENTIAL MARINE RE PROJECTS | OTHER MARINE CONSIDERATIONS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Energy Regulations 2018 for Ocean Energy [35a,b] | | |
| Dominica [36] | 2 | 26.00 | Draft/In Development | Present | Yes - 100% RE by 2030 | No | None | Submarine cables to supply Guadeloupe and Martinique with excess power generated from geothermal energy sources. [37] |
| Grenada [38] | 4 | 5.39 | Present | No | Yes - 100% RE by 2030 | No | None | Discovery of oil [39] |
| Guadeloupe [40] | 6 | 17.45 | Present | | Yes - 50% by 2030 | Recognized as a potential option [41] | 1. Possible site identified in feasibility study on the potential of floating windfarms carried out by Akuo Energy Caraibes for French Environment and Energy Management Agency with a capacity of 40-50MW<br>2. Feasibility study on sea water air conditioning of Basse-Terre hospital. This has the potential to reduce the energy bill by 80-90% [42] | Submarine cables to supply Guadeloupe and Martinique with excess power generated from geothermal energy sources from Dominica. Source - Regional Plan for Renewable Energy and the Rational Use of Energy [34] |

[35] a. Government of the Virgin Islands. 2016. Energy Policy. b. Government of the Virgin Islands. 2018. Renewable Energy Regulations.
[36] CARICOM Secretariat. 2018. 2017 Energy Report Card – Dominica.
[37] Maynard-Date, A. 2015. The Eastern Caribbean Geothermal Energy Interconnection Grid Feasibility Study. Proceeding the World Geothermal Congress, Melbourne.
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[40] National Renewable Energy Laboratory. 2015. Energy Snapshot Guadeloupe. Energy Transition Initiative, Islands.
[41] ADEME. 2012. Plan for Climate, Air and Energy for Guadeloupe (SRCAE Guadeloupe).
[42] COGEA, International, Fundación AZTI, Poseidon Aquatic Resources Management Ltd. 2017a. Realising the potential of the Outermost Regions for sustainable blue growth - Annex 1 To The Final Report The Blue Economy In Guadeloupe. European Commission.

| COUNTRY[26] | FUEL IMPORTS AS % OF GDP | % RE CAPACITY OF TOTAL INSTALLED CAPACITY | FINALIZED ENERGY POLICY/ ACTION PLAN | RE ACT | RE TARGETS | MENTIONS OF MARINE RE IN ACT/POLICY | POTENTIAL MARINE RE PROJECTS | OTHER MARINE CONSIDERATIONS |
|---|---|---|---|---|---|---|---|---|
| Martinique [43 a,b] | | 7 | Present | | | Yes [44] | Ocean Thermal Energy Project called NEMO is under development with the aim to establish a supply energy of 16MW for 35000 households with operations to start in 2020. [45] | Another OTE project, NAUTILUS, cancelled due to impacts of pipes on coast. [42] |
| Montserrat [46] | 25 | 0 | Present | No | Yes - 100% RE by 2020 | Yes - there is the intention to explore marine technologies (desalination, Sea Water Air Cooling (SWAC) and Ocean Thermal Energy Conversion (OTEC) [47] | None | Subsea fiber optic cable for internet connectivity through Guadeloupe and Antigua [48] |
| St. Kitts and Nevis [49] | 13.2 | 6.70 | Present | No | Yes - 100% in power sector | No | None | No |
| Saint Lucia [50] | 7.7 | 4.02 | Present | Present | Yes - 35% by 2020 | No | None | No |
| Saint Vincent and the Grenadines [51] | 6.2 | 17.28 | Present | Yes - Geothermal | Yes - 60% by 2020 | No | None | - |

[43] a - EDF. 2018. Island Energy Systems: Martinique; b- National Renewable Energy Laboratory. 2015. Energy Snapshot Martinique. Energy Transition Initiative, Islands.
[44] IRENA and Republic of France. 2015. Martinique Action Plan for Renewable Energy Development on Islands.
[45] COGEA, International, Fundación AZTI, Poseidon Aquatic Resources Management Ltd. 2017b. Realising the potential of the Outermost Regions for sustainable blue growth - Annex 2 To The Final Report The Blue Economy In Martinique. European Commission.
[46] CARICOM Secretariat. 2018. 2017 Energy Report Card – Montserrat.
[47] Government of Montserrat.2016. The Montserrat Energy Policy 2016-2030.
[48] Fibre Optic Cable Project Breakthrough. 2019. The Montserrat Reporter, 22nd November. Available at https://www.themontserratreporter.com/fibre-optic-cable-project-breakthrough/. Accessed 12th February 2020.
[49] CARICOM Secretariat. 2018. 2017 Energy Report Card – St. Kitts and Nevis.
[50] CARICOM Secretariat. 2018. 2017 Energy Report Card – Saint Lucia.
[51] CARICOM Secretariat. 2018. 2017 Energy Report Card – Saint Vincent and the Grenadines.

| COUNTRY[26] | FUEL IMPORTS AS % OF GDP | % RE CAPACITY OF TOTAL INSTALLED CAPACITY | FINALIZED ENERGY POLICY/ ACTION PLAN | RE ACT | RE TARGETS | MENTIONS OF MARINE RE IN ACT/POLICY | POTENTIAL MARINE RE PROJECTS | OTHER MARINE CONSIDERATIONS |
|---|---|---|---|---|---|---|---|---|
| St. Martin [52] | Unknown | 3 | Yes | - | Current figure unknown; previously set at 10% by 2020 | - | - | - |

[52] National Renewable Energy Laboratory. 2015. Energy Snapshot St. Martin. Energy Transition Initiative, Islands.

Marine Renewable Energy is inclusive of wind, wave, tidal energy, sea cooling as well as ocean thermal energy conversion (OTEC) and can be a medium to long-term energy option for many small island developing states. Tab. 7 provides a brief comparison between ocean renewable energy technologies and hydrocarbons. Offshore wind is the most installation ready of marine renewable technologies and reduces the demand for land space whilst taking advantage of constant wind speeds. Ocean energy refers to the conversion of tidal and wave energy. Tidal energy is a more mature commercial technology and reliable due to the predictability of tides. Wave energy is still in early stages of development with high costs. Ocean thermal energy drives a turbine by using the natural temperature gradient of oceans. This technology has high capital costs and engineering challenges (Greenhill et al., 2016).

Notable challenges for marine renewable energy, especially in small-scale operations, can include institutional capacity, local infrastructure, and knowledge and financial capital. However, collaborative regional approach in the OECS can be a solution for the marine renewable energy sector (Greenhill et al., 2016).
On the other hand, certain marine energy technologies may not be commercially viable due to the cost of installing systems and underwater cables. The corrosion of equipment by seawater is also a challenge along with user conflict in the marine space with the fishing and tourism sector. There can also be potential disruption to the marine ecosystem. With wave energy, for example, there may be a concern of the visual impacts of devices on the tourism industry and the intermittent nature of waves cannot be controlled so power quality from wave energy is considered to be low, which makes commercialization challenging (Ochs et al., 2015; Lemessy et al., 2019).

**Tab. 7 | Comparison between oceanic renewable energies and hydrocarbons.**

| ENERGY SOURCE | WAVE POWER | OCEAN THERMAL ENERGY CONVERSION (OTEC) | OFFSHORE WIND | OIL AND NATURAL GAS (HYDROCARBONS) |
|---|---|---|---|---|
| Mechanism | Energy harnessed from the rise and fall of waves | Electricity produced from the ocean's thermal gradient | Uninterrupted flow of winds in ocean powers wind turbines | Chemical energy in fuel converted to electrical energy through steam cycle |
| Start-up Cost | High | Scalable for SIDS | High | N/A |
| Cost per kWh | 5-10c | 5-25c | 10-16c | 5-40c |
| Potential | $1/5^{th}$ of global energy demand (2 TW) | Equal to current global energy demands (10 TW) | Over 1000 TW concentrated in Northern Europe | 2012 reserves can supply global energy needs for 60 years |
| Current Status | Commercial in countries such as Scotland | Pre-commercial | Used in countries in Denmark, UK and Netherlands | Prolific |
| Environmental Impact | Very low | Benign though possible mortality amongst coral and fish | Significant effects on fisheries, seabed ecosystems and birds | Global warming and Oil Spills. |

***Source: Henry et al., 2015.***

## DRIVERS AND PRESSURES

***« What are the drivers and pressures that negatively impact the coastal and marine environment? »***

Various anthropogenic and natural drivers and pressures are causing negative impacts on the coastal and marine environment in the OECS Sub-Region. Pollution, overfishing, habitat degradation, invasive species and climate change are of primary consideration in these countries.

**Pollution**

The marine environment is at risk from pollution from several different sources. According to the recently published World Bank Report, 80% of marine pollution results from direct or indirect discharge of solids and liquid waste, which is as a result of "runoff from land-based sources such as rivers, outfalls, waterways, agricultural runoff, and infrastructure. The rest enters the oceans through petroleum exploration and production, shipping, discarded fishing gear, and the atmosphere" (Diez et al., 2019). The Caribbean Region has one of the highest deforestation rates in the world (Aide et al, 2012; CARICOM, 2019). As a result, millions of tonnes of topsoil are dumped into the Caribbean Sea on an annual basis via rivers and streams. In addition, because of the concentration of hotels and other urban infrastructure located on or near the coast, some 70-80% of sewage enters the sea after only partial on no treatment (Diez et al., 2019). Wastewater is high in nitrogen and phosphorous and promotes the growth of excess algae reducing the oxygen in the water and affecting marine life. These sources are projected to increase as populations, coastal cities, and tourism continue to grow. They will negatively impact aquatic ecosystems if nothing is done to address the source of the problems.

Pollution, or the reduction in water quality and increase in nutrients, imposes severe pressures on the coastal and marine environment throughout the Caribbean. Second to overfishing, sediment and inland sources of pollution are the biggest threats to coral reefs, leading to smothering and light reduction and changes in reef community structure, as well as the occurrence of coral diseases, which has been linked to introduction of pathogens and chemicals (Diez et al., 2019; CANARI, 2018). Soil runoff, along with other solid waste including plastics, ends up on the seafloor the remainder on the reefs and beaches. Approximately 60% of coral reefs in the OECS Sub-Region have been categorized at medium to high levels of threat to sedimentation and pollution from land-based sources (Burke and Maidens, 2004).

Furthermore, land-based sources of pollution from agricultural and industrial activities also release harmful pesticides and fertilizers into the marine environment and are therefore a significant concern. Seagrasses are impacted by reduced light penetration from sedimentation, and excess nutrients result in the growth of epiphytes on the seagrass blades. In general, high nutrient levels can lead to plant overgrowth, reduction in oxygen and fish kills. With respect to mangroves, studies in the Caribbean have indicated that hydrocarbon spills are the greatest pollutant threat that leads to tree and organism die-offs. The absorption of excess silt, nitrogen and toxins inhibit the growth and natural functions of these coastal habitats, limiting their ability to provide services such as acting as a buffer for storms, tsunamis and hurricanes and protecting the nearshore marine environment, human lives and property (Diez et al., 2019). Tab. 8 summarizes some of the key points related to marine litter, and land-based and marine-based sources of pollution, and Box 4 identifies OECS country-level issues associated with the various types of pollution discussed.

Marine source pollution is also a growing problem given the large number of ships (cargo and passenger) that traverse the regional waters or engage in oil exploration daily. Of particular concern are cruise ships, over 200 of which sail the ocean 365 days a year. Cruise ships generate several waste streams that can result in discharges to the marine environment, including sewage, greywater, hazardous wastes, oily bilge water, ballast water, and solid waste. A medium-sized cruise ship on a week voyage can generate 795,000 litres of sewage, 3.8 million litres of greywater, 95,000 litres of oily bilge water and 8 tonnes of garbage. However, there are limited facilities within the regions small ports to handle waste from cruise ships (Wan et al., 2016). Accidental loss of cargo through shipping routes is also a source of marine litter. Antifouling paints which are used to discourage organisms from growing on hulls contain heavy metals and toxic chemicals such as tributyltin (TBT) which have harmful effects on marine life (Diez et al., 2019; Singh et al., 2015).

Ballast water is used to maintain the stability of ships, and during discharge, various bacteria, viruses, microorganisms, larvae, juvenile shellfish can be transferred over long distances. The organisms transported by ballast water can become invasive in the right conditions, become toxic for both human and marine life or even harm local fisheries. Ballast water can also transfer microalgae which causes algal blooms called 'red tides.' This algae, when found in shellfish, oysters, etc., can cause seafood poisoning in humans (Diez et al., 2019). A new recently discovered coral disease called stony coral disease originating from Florida has spread throughout the eastern Caribbean, as far as St. Martin, due to ballast water discharged from ships (Staletovich, 2020).

**Tab. 8 | Main types of pollution in the Wider Caribbean Region.**

| POLLUTION TYPE | KEY POINTS |
|---|---|
| Marine Litter (plastics and Abandoned, lost, or otherwise discarded fishing gear (ALDFG)) | - Litter clogs waterways and leads to flooding<br>- Beach litter reduces the tourism product<br>- Plastics break down into micro plastics and interact with marine wildlife<br>- ALDFG can entangle with wildlife<br>- Marine litter can transport wildlife beyond natural ranges<br>- Marine litter can concentrate other pollutants such as pesticides and persistent organic pollutants (POPs) |
| Land-based Sources (Wastewater, Sewage and Sediment) | - High concentrations of nutrients from poorly treated sewage are a main cause of coral death<br>- Wastewater treatment facilities are absent or insufficient<br>- The collection of data related to nitrates and phosphates entering the marine environment is lacking<br>- Run-off from agricultural non-point sources such as sediments, fertilizer and pesticides are a major concern<br>- An increase in sediments has been known to reduce biodiversity |
| Marine-based Sources (Ships) | - Maritime traffic in the WCR is increasing<br>- The WCR is one of the busiest cruise ship destinations in the world and is expanding<br>- Small ports in the Caribbean do not have adequate facilities for handling waste and sewage from cruise ship, yachts and other maritime vessels<br>- The shipping industry is also a source of marine litter (overboard containers and garbage)<br>- Industrial antifouling paints used on ships contain heavy metals and toxic chemicals<br>- Ship ballast water can carry larvae, bacteria, organisms and viruses across long distances and threaten/compete with endemic species |
| Industrial (Oil, Heavy Metals, Toxic Chemicals) | - Industrial waste is difficult to quantify; however industrial activities such as oil refining, food processing, chemical processing and mining are potential threats to the marine environment<br>- 90% of hydrocarbon pollution in the WCR stems from land-based industrial activities<br>- Toxic by-products from industrial processes that are discharged into the marine environment are a concern<br>- Marine sediments are reservoirs for heavy metals in coastal environments<br>- There are limited studies that examine heavy metal pollution in coral reefs in the Caribbean |

*Source: Summarized from Diez et al., 2019.*

**BOX 4**

**Impacts of Pollution in OECS Member States**

- ***Antigua and Barbuda:*** *Improper sewage/liquid waste disposal practices, as well as run-off of fertilizers and chemicals affects coral reef. Sewage from coastal holiday developments are partly treated and released directly into the sea (Government of Antigua and Barbuda, 2014).*
- ***Dominica:*** *Approximately 50% of the waste collected in coastal clean-ups were plastic. Transboundary marine and coastal debris is also an issue of concern, as several of the items collected during the clean-ups appear to originate from the neighbouring islands. There is also some concern about transboundary chemical marine pollution originating from land-based sources, particularly in relation to fertilisers and pesticides that are commonly used in neighbouring islands (Government of the Commonwealth of Dominica, 2019).*
- ***St. Kitts and Nevis:*** *An increase in cruise and cargo vessel traffic in the Caribbean Sea results in the disposal of grey water and sea borne waste. There is also pollution from excessive use of single-use plastics, the lack of recycling opportunities, and inadequate solid and liquid waste management (Government of St. Kitts and Nevis, 2014).*
- ***St. Lucia:*** *Additional pollution comes from poorly managed treatment facilities in a number of hotels, and from yachts discharging sewage, which has impacted the health of the reef systems (Government of Saint Lucia, 2014).*
- ***St. Vincent and the Grenadines:*** *A 2004 study confirmed that marine-based pollution and sedimentation were estimated as threatening 30% and 15% of the reefs, respectively (Government of St. Vincent and the Grenadines, 2019).*
- ***Guadeloupe:*** *One of the biggest pressures on the coastal environment is untreated wastewater that causes nitrate enrichment and eutrophication. Pesticide use/run-off from banana plantations is widely distributed in the soil and now found in the flesh of fish products, resulting closure of fishing areas in some cases. (Bourgeois, Personal Interview, 2020).*
- ***British OSTs:*** *The lack of recycling activities and the disposal of hazardous waste streams such as industrial waste, oils and abandoned cars have been noted as major concerns (de Bettencourt and Imminga-Berends, 2015).*

A growing concern among the international community and ports in the Caribbean is the air pollution from ships, which is compounded when they dock for several hours at regional ports. The carbon emissions and particulates emitted by cruise ships are a result of the quantity and quality of the fuel they use. In 2018, the German watchdog Nature and Biodiversity Conservation Union (NABU) surveyed 77 cruise ships and found that all but one used toxic heavy fuel oil that the group described as “dirtiest of all fuels.” Meanwhile, in the United Kingdom, local environmental groups called for a ban on cruise ships using “dirty fuel” has pointed out that a single cruise ship can emit as much pollution as 700 trucks and as much particulate matter as a million cars (Gabbatiss, 2018; Ellsmoor, 2019).

Caribbean states are ill-equipped to deal with this massive amount of waste, solid and liquid entering the marine environment. Ports, particularly those in the smaller Caribbean states such as the OECS sub-grouping, including marinas, in the region lack adequate facilities for receiving and treating with both solid and liquid waste. They also lack the facilities and capacities for monitoring the discharge of both liquid and air effluent discharge giving rise to concerns that there is a high probability that illegal dumping may be going undetected (ACS, 2019). Ultimately, pollution reduces the aesthetic value of the tourism products associated with coastal environments, impacts human health and reduces the quality of fish products, and is also a transboundary issue that travels across EEZs in wind and ocean currents. It is therefore imperative that Caribbean countries, including the members of the OECS, approach waste management and marine pollution prevention at both national and regional levels (Whalley, 2011).

**Overfishing**

The FAO estimates that approximately 80% of the world’s wild marine fish stocks are fully exploited or overexploited (FAO, 2009). This trend is also observed in the Caribbean as indicated by fisheries scientists at the 8$^{th}$ session of the Scientific Advisory Group (SAG) of the Western Central Atlantic Fishery Commission (WECAFC), where it was stated that 54% of species or species groups were considered overfished or over-to-fully fished (FIS, 2017). In five of the countries that participated in the ECMMAN Project (Antigua and Barbuda, Grenada, St. Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines), commercial fish catch was rated as “poor” or within a range of 420-839 g/100 m$^2$, while Dominica’s value was ranked as “critical” with a value of 395 g/100 m$^2$ (Appendix 6). According to the National Reports to the Convention on Biological Diversity, all of the Independent OECS States have indicated that nearshore fish species are overexploited, and Section 4.1.7 on Fish Stocks provides information on exploited stocks.

The impact of overfishing various fish groups can have cascading ecosystem effects (Burke et al., 2011). For example, the feeding of large herbivores is typically correlated to a reduction in algal biomass and even enhancing coral cover. This functionality is reduced when these species are overfished, resulting in shifts in community structure of fish species and sizes, reef communities and coastal biodiversity as a whole (Burke and Maidens, 2001; Whalley, 2011). All of the OECS Member States have been classified at a medium to high risk threat with respect to the negative impacts overfishing can have on coral reef health (Burke and Maidens, 2004).

**Habitat Modification/Physical Degradation**

In addition to pollution and overfishing that alter and degrade the nearshore marine environment, coastal development is another major pressure on this ecosystem and its resources. Throughout the Caribbean, extensive construction and development for tourism, housing, roads, ports, and other development has been required to support both native residents and visiting tourists. Poorly managed development activities can destroy coastal habitats from sand mining, land reclamation, run-off from roads and construction sites, and direct removal of corals, mangroves and seagrasses (Burke and Maidens, 2004).

Based on various factors including population and tourism growth, distance of cities, ports and dive tourism centres, approximately 80% of the reefs in the OECS Member States have been classified at medium to high threat to coastal development (Burke and Maidens, 2004). This trend continues as Antigua and Barbuda, Dominica, St. Kitts and Nevis, and Saint Lucia, have announced the development of resorts, marinas, and ports in or near to areas that have sensitive coastal ecosystems such as mangroves (CANARI, 2018). According to the Coasts at Risk Report, Antigua and Barbuda and St. Kitts and Nevis are listed in the top 10 countries with the greatest coastal risk, mainly due to the high exposure of their populations to coastal hazards such as storm surges, floods and sea level rise (Beck, 2014). Box 5 summarizes some of the issues faced by the OECS countries with respect to coastal development in particular.

**BOX 5**

**Impacts of Coastal Development in OECS Member States**

- ***Antigua and Barbuda:*** *Mangroves have been previously destroyed at an alarming rate due to the demand for coastal development linked to tourism; however, with an increase in knowledge and awareness of the intrinsic values associated with mangroves, the enforcement of legislation within designated marine reserves, and Environmental Impact Assessment (EIA) procedures, it is hoped that the loss of mangroves from anthropogenic activities will be reduced (Government of Antigua and Barbuda, 2014). There is still a lot of coastal developments taking place and the general view is that EIAs are not rigorously applied.*
- ***Dominica:*** *Coastal development is a significant problem as there is substantial quarrying activities along the coast that poses challenges to the fishers (fish pots/nets) (Theophille, Personal Interview, 2020).*
- ***St. Lucia:*** *Coastal habitat changes due to inappropriate land use and uncontrolled development is presently occurring at a rapid rate. This is expected to increase even further in the near future, with the proposed increase in hotel plants, marinas and golf courses earmarked for coastal regions (Government of Saint Lucia, 2014). (What does recent studies like the NBSAP have to say about that?*
- ***St. Vincent and the Grenadines:*** *A 2004 study confirmed that almost two-thirds of coral reefs are threatened by coastal development. A loss of coastal forests, effects on ecosystem connectivity and increasing fragmentation are observed along the coasts due to residential and tourism development (Government of St. Vincent and the Grenadines, 2019).*
- ***Guadeloupe:*** *One of the biggest pressures on the coastal environment is untreated waste water that causes nitrate enrichment and eutrophication. Pesticide use/run-off from banana plantations is widely distributed in the soil and now found in the flesh of fish products, resulting in the closure of fishing areas in some cases. (Bourgeois, Personal Interview, 2020).*
- ***British OSTs:*** *Inadequate coastal development (especially for tourism-related infrastructure) contributes to beach erosion, greater flood events and increased sedimentation, degradation of the coral reefs and diminished water quality. The lack of Integrated Coastal Zone Management to combat these issues has also been noted (de Bettencourt and Imminga-Berends, 2015).*

Hurricanes also cause immense physical damage to coastal and marine environments as these organised systems with a central calm eye that is surrounded by strong winds and rain bands cause the steepening of waves (i.e., storm surge) upon approaching land. The intensified waves and movement of water can affect all parts of coral reefs, causing physically damage through breakage and overturning. Branching coral species (e.g., *Acropora* spp.) are particularly vulnerable to these events. Recovery from hurricane damage is variable and can be stalled by further movement of dislodged coral rubble generated by the hurricane (Wilkinson and Souter, 2008). Macroalgae communities also tend to rapidly colonize and compete for space after hurricanes, resulting in a decline in coral cover, as was the case in Martinique's southern reefs after hurricane Dean in 2007 (Rousseau et al., 2010). Additional stresses related to extreme weather events include terrestrial runoff from heavy rainfall that introduce a flux of sediment and other debris, as well as pollutants and nutrients that can stress corals. Alternatively, hurricanes can benefit thermally stressed coral reefs somewhat as they dredge up cooler and deeper waters (Thompson, 2017).

Tropical cyclones have become more frequent and intense in the Caribbean, and models predict that there will be more category 4 and 5 storms in the future; however, the number of storms may not increase. As recently observed in Antigua and Barbuda, Anguilla, the British Virgin Islands, St. Martin and Dominica, the nearshore reefs were devastated by hurricanes Irma and Maria in 2017 (Wilkinson and Souter, 2008; Thompson, 2017).

**Invasive Species**

Invasive species are accidentally transported from distant locations in the ballast water of ships or released from aquariums. They impact coral communities by killing off or displacing native species (Burke et al., 2011). Examples in the Eastern Caribbean include the lionfish, sargassum and other non-native species of seagrass.

**Lionfish:** The lionfish originates from the Indo-Pacific Region and it is postulated that its introduction and eventual invasion along the east coast of the United States, the Gulf of Mexico and the Caribbean Sea in the 1990s stems from the marine ornamental aquarium trade. The two visually identical species, *Pterois volitans* and *P. miles*, are of major concern due to their consumption of native fish species and competition for fishery resources such as food and space, which in-turn, lead to a reduction in coral reef ecosystem health and related quantity and quality of fishery and tourism products. The lionfish also impact human health as greater densities can increase the potential for venomous stings (Gomez et al., 2013).

The invasion and distribution of lionfish throughout the Eastern Caribbean (Fig. 33) began in 2010 where it first became an issue in Guadeloupe (Bourgeois, Personal Interview, 2020). By 2014 populations exploded in Grenada (Harvey, Personal Interview, 2020) and in 2017, this marine predator and competitor was determined to be a priority invasive species in Dominica (Government of the Commonwealth of Dominica, 2019).

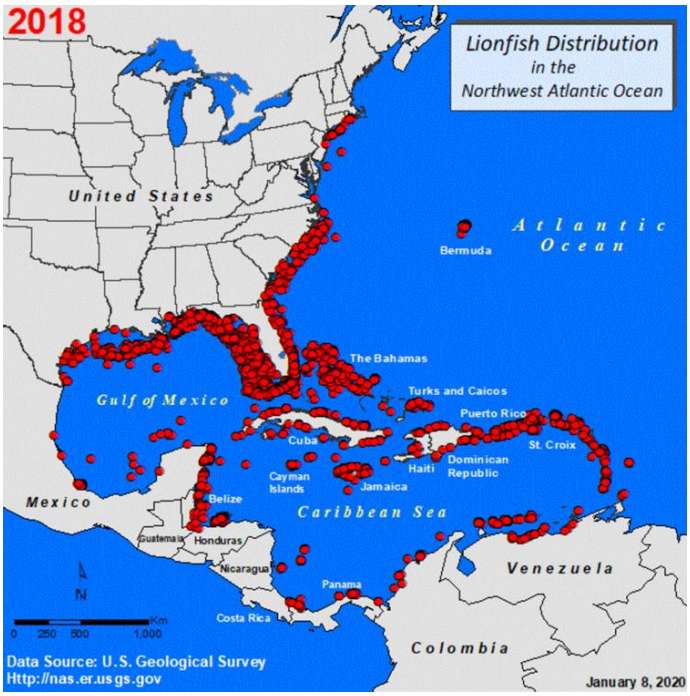


**Fig. 33 | Reported lionfish sightings in the Atlantic.**
*Source: USGS, 2020.*

Recognizing the urgency of the problem, in January 2010 at its 24th General Meeting, the International Coral Reef Initiative (ICRI) agreed establish an Ad Hoc Committee to develop a strategic plan for the control of lionfish in the WCR with the following objectives: (i) facilitate collaboration and coordination of efforts between actors; (ii) encourage a coordinated research and monitoring agenda; (iii) encourage governments to review and amend relevant legislation or develop new regulations and policies to control lionfish; (iv) control invasive lionfish populations at the regional level using effective methods and (v) provide education, information and outreach to generate public support and stewardship for lionfish programmes. In line with this strategy, Grenada began an aggressive programme to market lionfish meat in 2015-16. This has proven quite lucrative, even more so than lobster, as lionfish can fetch a higher price per pound in some instances (Harvey, Personal Interview, 2020). Similarly, in St. Kitts and Nevis, lionfish numbers appear to be declining in shallow waters due to activities geared towards targeting the species for consumption (Government of St. Kitts and Nevis, 2019).

**Sargassum:** Pelagic sargassum is a genus of free-floating, brown macroalgae, which are distributed throughout tropical and temperate oceans of the world. While it provides a natural habitat, food, shelter and nursery for many species of fish including sea turtles and tunas, its pervasive and voluminous bloom and eventual concentration in shallow waters and coral reefs make its arrival a problem for several Caribbean coastal states, including those of the OECS Sub-Region (Box 6).

Sargassum spread in large mats and large blooms through ocean currents are caused by eutrophication through excess nutrient influx into oceans. Sargassum blooms have also been associated with increases in temperatures associated with climate change. Two species, *Sargassum natans* and *Sargassum fluitans*, are responsible for the sargassum influxes within the Caribbean Region, which has become an issue in the health, fisheries and tourism sectors. Major sargassum blooms have occurred within the region in 2011, 2015 and 2018 (Thomas, Personal Interview 2020; Doyle and Franks, 2015.)

Sargassum blooms also are associated with influxes of nitrogen and phosphorus, which has resulted in algae dominating seagrass meadows, resulting in biomass loss of seagrass by 62-99%. Sargassum blooms are also associated with a reduction in light, oxygen and pH levels. This can also adversely affect coral reef ecosystems and in turn coral reef fisheries (van Tussenbroek et al., 2017).

**BOX 6**

**Impacts of Sargassum in OECS Member States**

*Although sargassum washes up on beaches naturally, problems arise when it hits the shoreline and begins to decay. Large amounts decomposing on beaches can release hydrogen sulphide gas over long periods. Hydrogen sulphide can cause nausea, headaches, tearing of eyes and loss of sleep, which can affect nearby coastal communities. In St. Lucia, three meters were installed to detect levels of the gas to determine if evacuation would be needed if normal levels are exceeded (Thomas, personal interview, 2020).*

*Sargassum does not affect the same region in the Caribbean throughout the year, and some fishing areas are affected more than others. However, sargassum can tangle in boat motors, causing economic strain on fisherfolks. As sargassum mats act as nurseries, fisheries have seen an increase in juvenile fishes that are at risk of being overfished.*

*In contrast, flying fish and dolphin fish, which are important species to the region's pelagic fisheries, are experiencing negative impacts. Within the Eastern Caribbean, in St. Kitts and Nevis and St. Lucia, there are reported smaller sizes of dolphin fish due to sargassum mats. With each of the sargassum incidents in 2011 and 2015, St. Lucia's flying fish fishery saw a significant drop. In St. Vincent and the Grenadines, smaller dolphinfish sizes were reported after the sargassum influx in 2011.*

*Due to the sargassum blooms, fishers have reported an increase in fuel costs and maintenance, reduction in fishing days, and longer working hours for the same fishing effort (Lay, 2018). A suggestion to deal with the effects on fisheries is to develop new fishing techniques to increase the catch of flying fish in sargassum, target alternative species, such as tunas, or improve the efficiency of fishing vessels to ensure profitability (Oxenford et al., 2019).*

*Tourism activities dependent on beaches, snorkelling and scuba diving can be affected by sargassum blooms. Bathing and other recreational users are disinclined to use the waters given the large spread of the macroalgae. Hotels and resorts near coastlines incur huge costs as they seek to clean up their beaches to avoid possible visitor decline. In 2019, Coconut Bay in St. Lucia was forced to conduct daily clean up during periods of sargassum influxes (Thomas, Personal Interview, 2020).*

*Cleaning up of sargassum comes at a cost in the use of equipment and heavy machinery. However, the use of heavy machinery can compress sand, affecting turtle nesting areas and can also destroy dune vegetation. Less invasive methods such as hand raking are preferred on the beach, and community support in clean-ups can prevent extreme build-up on beaches. Other innovative clean-up methods include curbing the build-up at sea through the use of booms and excavators with conveyor belts (Thomas, Personal interview, 2020).*

*Once collected, sargassum can be used as mulch, biofuel, fertilisers, fish food or livestock feed. Algas Organics is a company based in St Lucia that have converted sargassum to an organic bio-fertiliser and has won the Blue Tech Challenge for the sustainable economy through marine technology (New Energy Events, 2019).*

Countries in the region have established Task Forces to address the influx of sargassum, and various management plans have been floated to deal with the problem when it arises. Among these, is the suggestion to use satellite imagery for early detection to determine the severity of the problem. It is hoped that this approach will provide countries with additional time to establish management measures. Currently, there are draft sargassum management plans being developed for Grenada, St. Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines. These have been submitted to the Centre for Resource Management and Environmental Studies (CERMES) for review (Cox et al. 2019), and will hopefully be implemented before the next bloom occurs.

At the Fifth Meeting of the OECS Council of Ministers: Environment (COMES 5), outcomes regarding the issues of Sargassum urged member states to strengthen the Draft Sargassum Management Plans under the CC4Fish, examine the potential of sargassum as a source of biofuel, and advocate for the polluter pays principle as it relates to climate change and marine pollution, amongst other suggestions. Following this, the OECS Commission was mandated to (i) disseminate knowledge and best practices within the region, (ii) coordinate research and procure clean-up equipment (iii) support exploration of commercialisation and use of sargassum (iv) support the creation of Caribbean Sargassum monitoring network and (v) continue to support member states in management of sargassum influxes (OECS Commission n.d.).

**Seagrass:** *Halophila stipulacea* is a native seagrass to the Red Sea and Indian Ocean that has spread rapidly throughout the Caribbean. From the first sighting in 2002 in Grenada, this species is now well established throughout the Eastern Caribbean, as exhibited in Martinique, Dominica, Saint Lucia, Guadeloupe, St. Martin and Saint Vincent and the Grenadines (Fig. 34). This invasive seagrass is known to be extremely fast-growing and flexible, occupying anchorages used by commercial and recreational boats at a range of depths in a variety of salinity conditions (Willette et al., 2014).

Competing for space with native seagrasses including *Thalassia testudinum* and *Syringodium filiforme*, *H. stipulacea* has been observed to overtake sandy/muddy seafloors by either intermixing with or replacing them entirely. The potential positive and negative ecological impacts associated with this species are not fully understood at this time, and further studies and research are warranted. For example, *H. stipulacea* could stabilize previously unvegetated sand bottoms, thereby reducing coastal erosion; however, the impact on neighbouring coral reefs for example, would be partly dependent on the selective feeding of herbivorous fish (Rogers et al., 2014).

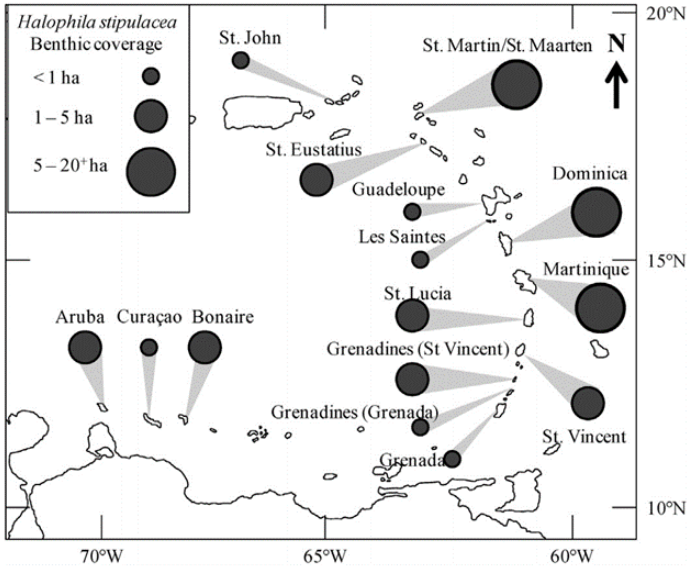


**Fig. 34 | Geographic distribution of Halophila stipulacea in the Caribbean and estimated benthic coverage.**
*Source: Willette et al., 2014.*

**Disease**

Diseases are a natural characteristic of any ecosystem and on coral reefs they usually occur in response to biological stresses, such as bacteria, fungi and viruses, and nonbiological stresses, such as increased sea surface temperatures, ultraviolet radiation and pollutants. Coral diseases have increased in the last decade, both in terms of frequency and distribution, and although the drivers for this increased incidence are not fully understood, research suggests that coral communities have become more susceptible to disease due to reduced water quality and warmer waters (Burke et al., 2011; NOAA, 2020b).

With largely unknown pathologies, the majority of coral diseases are identified by the pathological expression or impact displayed by the affected coral. For example, the black-band and and yellow-band disease appear as discoloured bands or lesions on the surface of the coral that expand and consume living coral tissue over time. Other diseases such as rapid wasting, white-band, white-plague and the more recent Stony Coral Tissue Loss (SCTL) disease (Box 7) tend to cause large patches of living coral tissue to fall off. Once exposed, the skeleton can be colonized by other organisms, thereby affecting the overall health of the colony (Jackson et al., 2014; NOAA, 2020b).

**BOX 7**

**Stony Coral Tissue Loss (SCTL) Disease**

*An emerging concern for the Caribbean is the recently discovered SCTL disease. First reported in 2014 off the coast of Florida, the SCLR disease spreads rapidly, affecting several species of coral especially brain, pillar, star and starlet corals. Research also suggests that it could be bacterial or viral in nature and pathogens may be transported in the ballast water of ships. Characterized by high prevalence, mortality and transmission rates, this disease has now spread to Caribbean islands including the US Virgin Islands (USVI), Turks and Caicos, Dominican Republic and St. Maarten (Dutch), rendering the OECS member countries at risk of being affected (ICRI, 2020).*

*Although not yet officially reported in the sub-region, countries such as the BVI are taking proactive measures by developing educational material to improve SCTL disease detection and putting together "Disease Detective/Rescue" kits that include an antibiotic known to slow the spread of the disease (Gore, Personal communication, 2020).*

The Caribbean is noted as the region with the greatest prevalence of observed coral disease throughout the world. With over twenty (20) different variations identified, the black-band, white-band and white plague diseases are the most common (Burke and Maidens, 2004), and this trend is also observed in the OECS Sub-Region (Fig. 35).

The white-band disease in particular has had an unprecedented deleterious effect on the critical reef-building elkhorn (*Acropora palmata*) and staghorn (*Acropora cervicornis*) corals. Another disease that affects the long-spined sea urchin (*Diadema antillarum*), has also dramatically altered Caribbean reefs (Burke et al., 2011). Ultimately, the resulting shift in community structure leads to algal-dominated reefs, a problem that is compounded by the reduced abundance of herbivorous fish (Jackson et al., 2014). The limited understanding of pathologies, exact causes and transmission methods of coral diseases will continue to be a challenge to coastal managers as external stressors intensify. However, it is widely appreciated that research into the drivers and impacts of diseases must be in collaboration with management efforts.

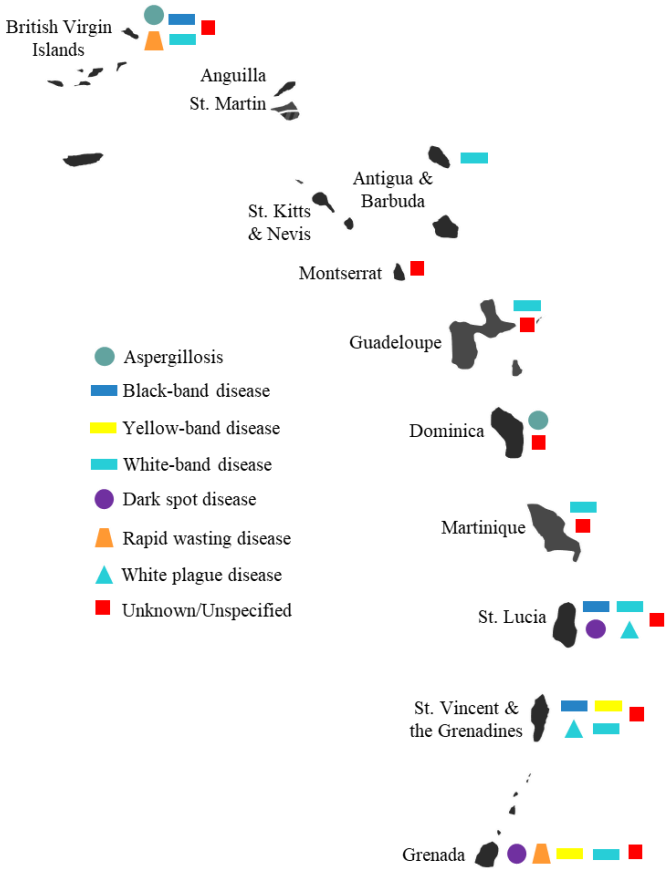


**Fig. 35 | Coral disease observations in the Eastern Caribbean.**
*Source: ReefBase Coral Disease dataset (2020). Please note that there is limited monitoring and reporting of coral disease, and therefore, this information is likely underestimated.*

**Climate Change**

The OECS Member States are particularly vulnerable to climate change as they are all small island developing states that are located at low elevations and are dependent on a narrow resource base, such as their natural marine resources, to support livelihoods and their economy. It is estimated that 66% of the Caribbean population would be affected by climate change, with the most affected activity being tourism (Paterson et al., 2018; Tonazzini et al., 2019).

The effects of climate change are already observed throughout the region as extreme weather events, including increasing number and strength of storms/hurricanes, changing patterns of rainfall leading to droughts and extreme flooding events. It is projected that there may be an increase in category 4/5 storms by 80%. Sea levels in the region have raised 20 cm over the past ten years and are projected to increase a further 26-82 cm in the next century, and sea surface temperature (SST) is expected to warm 2-3℃ by 2080. Furthermore, due to the increased amounts of dissolved carbon dioxide ($CO_2$) in the ocean, ocean acidity has risen by 26% (reduced pH by 0.1 units) and Caribbean coral reefs have experienced a reduction in calcification, and hence, reef degradation, leading to a decline of 15% in coral cover; this can also affect other organisms with calcareous exoskeletons including crustaceans and molluscs. It is projected pH levels would decrease by 0.3-0.4 units (Fig. 36, CMEP, 2017).

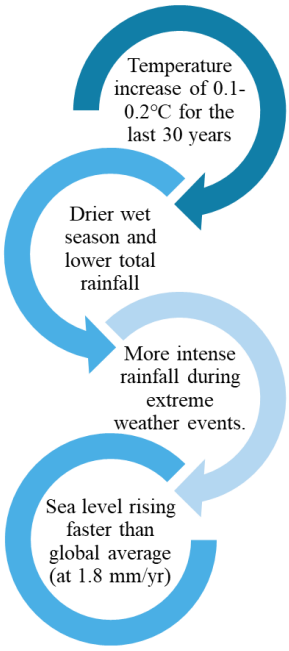


**Fig. 36 | Impact of climate change on OECS States.**
*Source: Paterson et al. 2018.*

According to the Caribbean Marine Climate Change Report Card developed in 2017 (CMEP, 2017), the potential impacts of climate change in specific OECS countries include the following:

- Saint Vincent and the Grenadines has permanent fishing camps in low lying areas which may be completely submerged due to sea level rise.
- In Dominica, ports are also at risk of inundation with a 1 m sea level rise scenario.
- Grenada and Saint Lucia have experienced increased droughts, longer dry seasons, increased temperature and coastal degradation.

The negative impacts of climate change are observed in coral reef habitats as coral bleaching and disease outbreaks from increased temperatures along with physical damage caused by extreme weather events and reduced calcification from ocean acidification. As shown in Fig. 37, the OECS Sub-Region was under 'watch' for coral bleaching events in December 2019, and Fig. 38 presents reported coral bleaching from 1980-2010.

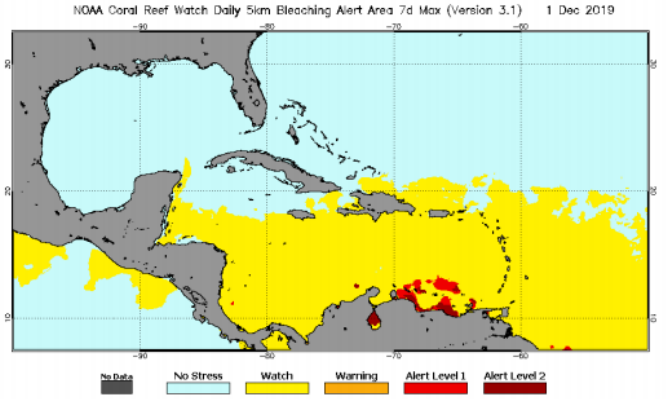


**Fig. 37 | Coral Watch for Bleaching Events within the Caribbean Region during December 2019.**
*Source: Caribbean Regional Climate Centre, 2019.*

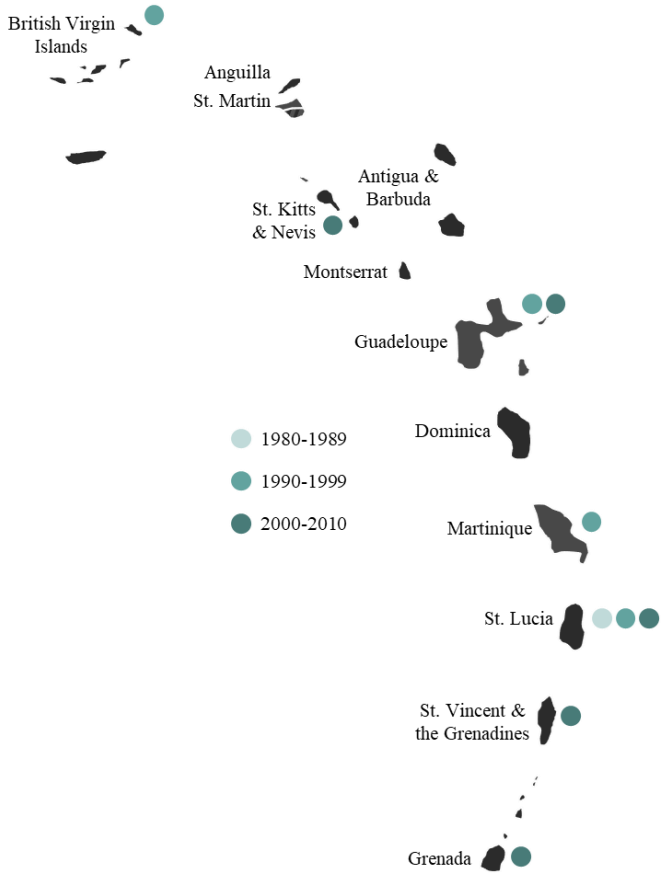


**Fig. 38 | Coral bleaching observations in the Eastern Caribbean.**
*Source: ReefBase Coral Bleaching dataset (2020). Please note that there is limited monitoring and reporting of coral disease, and therefore, this information is likely underestimated.*

The following lists some of the key facts associated with coral bleaching and sea level rise in particular (Burke et al., 2011; McField, 2017):

- If temperatures in the region increase by 1℃, coral bleaching will occur with coral death occurring at higher temperatures.
- Although coral reefs show some capacity to adapt, coral bleaching events have already impacted the Caribbean Region in 1998, 2010 and 2015/2016 with the most severe being in 2005 with 80% of reefs being affected.
- Reef-building corals, such as the staghorn and elkhorn corals, are the most sensitive to rising sea temperature.
- Bleaching is also projected to become more frequent in the coming decades driving reef decline with severe bleaching projected in 2040-2043.
- Increased sea level rise would also increase the depth of coral reef ecosystems, thereby causing low productivity.

Caribbean reefs are also subjected to bioerosion with 37% of Caribbean reefs already eroded due to reduced calcification rates. Eroded reefs are less effective at protecting the shoreline from storm damage, and also reduce the availability of sand on beaches, resulting in lower tourism value (McField, 2017).

Having declined by 24% over the last 25 years, mangroves are increasingly vulnerable to climate change due to sea level rise, which ultimately results in saltwater intrusion. The decline in coral reef coverage may reduce mangrove protection from storm surges. Increases in temperature may also affect the geographic range of mangroves. Mangroves are particularly susceptible to sea level rise due to their natural habitat being the intertidal zone and having a limited range to shift due to limited land available due to a poor sediment environment, and other land uses in coastal zones. Apart from saltwater intrusion, sea level rise can lead to sediment erosion and inundation stress (Wilson, 2017).

From a biodiversity perspective, climate change will impact fish and shellfish, including valuable species such as the Caribbean spiny lobsters and queen conch, and cause declines in biomass in herbivorous fish. With increased ocean temperatures, there will be more thermal layering of waters, less oxygen would be available to marine species, and the effects on marine fish and shellfish would be compounded by ocean acidification. This can lead to the migration of species, changes in community structures, lower spawning rates and smaller fish sizes (CMEP, 2017).

Fisheries in the region that are dependent on coral reefs would be the most affected in the near future, and the degradation of reefs can result in losses of US $95-140 million in coral reef associated fisheries (McField, 2017). In addition to the loss of habitats (including key nursery habitats such as reefs, mangroves and seagrass beds), changing ocean currents and fish distribution can affect fish stocks. Fisheries assets are susceptible to coastal erosion affecting landing sites, and increased intensity of storms. Caribbean fishing communities are already on the lower end of the socio-economic spectrum, and their situations can be further impacted by increases in flooding and storm events. Coastal communities can also suffer economic losses and means to sustain a livelihood through loss of boats, gears, markets, harbours and fishing days (Monnereau and Oxenford, 2017).

Climate change would alter the distribution, spawning and larval survival of pelagic fisheries due to changes in sea surface temperatures and circulation patterns. Pelagic stocks are projected to move northwards in response to increased sea surface temperatures, and this will lead to increasing efforts from fishers to access these resources. Small-scale fishers in the southern Caribbean would be the most vulnerable to the impacts of climate change due to declining reef fish catches (as a result of declining reef health), which is compounded by limited capacities to expand their efforts towards pelagic fisheries. There is a risk of increasing fishing effort with decreasing catches as fishers may have to travel further to maintain catches and rely on moored fishing aggregating devices (FADs). With rising seas surface temperature, there is expected to be an increase in ciguatera fish poisoning. This will negatively impact consumption in a region that depends largely on fisheries for animal protein. The loss of high-value species (lobster and conch) will affect income earned from the industry, impacting supplies to tourism hotels and restaurant industries (CMEP, 2017; Monnereau and Oxenford, 2017).

It is estimated that by 2050, if there is a 4℃ rise and a 1 m rise in sea levels, damages and losses would cost US $22 billion within the Caribbean (CMEP, 2017). These projections are particularly important for the OECS Member States as these countries are heavily dependent on the tourism industry and their coastal and maritime tourism industry would be at risk due to the concentration of activities and tourism infrastructure on low lying coastal areas. Caribbean reef degradation could result in a loss of US S100-300 million in the tourism industry as coral bleaching will affect income earned from dive and snorkel tourism (McField, 2017). Increased intensity of weather events has already cost Dominica 90% of their GDP in 2015. Water scarcity in the region due to longer dry seasons and decreased rainfall would affect water consumption demands for visitors and cruise ships. Increased intensity of storms and hurricanes would dissuade the attraction for tourists, cruise ships and affect port infrastructure, causing an increase in shipping costs. As visitor countries begin to warm, they may be less persuaded to come to the Caribbean due to unreliable weather, and along with other

factors listed above, this can cause the employment in the sector to decline (CMEP, 2017; Layne, 2017).

Tab. 9 presents the estimated projected costs of not responding to climate change as a percentage of 2004 GDP for 2100. As the figures demonstrate, if no action is taken to adapt to this phenomenon, incurred cost will increase exponentially over the century. The cost of inaction as a percentage of 2004 GDP was estimated to be the highest for Grenada (111.5%), St. Kitts and Nevis (89.3%) and Dominica (77.3%) for the year 2100. For these countries, the high estimates were due to potential storm impacts and high cost associated with impacts on infrastructure; Guadeloupe (9.5%) and Martinique (8.1%) were among the countries with the lowest cost of inaction estimated for the year 2100. With respect to tourism, the cost of inaction for Anguilla (25.5%), Antigua and Barbuda (16.4%) and the British Virgin Islands (14.2%) ranked among the highest for 2100 projections, with Martinique (0.7%) and Guadeloupe (0.6%) being the lowest (Bueno et al., 2008).

**Tab. 9 | Estimated costs of climate change inaction in the OECS (by % Total Impact in 2100).**

| COUNTRY | GDP (2004) | PERCENTAGE OF GDP | | | | US $ MILLION | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | STORMS | TOURISM | INFRASTRUCTURE | TOTAL | STORMS | TOURISM | INFRASTRUCTURE | TOTAL |
| Grenada | $391 | 63.0% | 7.8% | 40.7% | 111.5% | $247 | $31 | $159 | $437 |
| St. Kitts and Nevis | $359 | 60.5% | 8.5% | 20.3% | 89.3% | $217 | $31 | $73 | $321 |
| Dominica | $249 | 28.8% | 5.0% | 43.5% | 77.3% | $72 | $12 | $108 | $192 |
| Antigua and Barbuda | $750 | 22.7% | 16.4% | 19.3% | 58.4% | $170 | $123 | $145 | $438 |
| Montserrat | $34 | 20.2% | 8.0% | 21.3% | 49.5% | $7 | $3 | $7 | $17 |
| Saint Lucia | $699 | 1.6% | 12.1% | 35.4% | 49.1% | $11 | $85 | $247 | $343 |
| Saint Vincent and the Grenadines | $371 | 0.0% | 9.5% | 37.7% | 47.2% | $0 | $35 | $140 | $175 |
| Anguilla | $120 | 0.0% | 25.5% | 15.9% | 41.4% | $0 | $31 | $19 | $50 |
| British Virgin Islands | $967 | 0.4% | 14.2% | 3.4% | 18.0% | $4 | $138 | $33 | $175 |
| Guadeloupe | $8,623 | 1.2% | 0.6% | 7.7% | 9.5% | $101 | $52 | $667 | $820 |
| Martinique | $9,896 | 1.4% | 0.7% | 6.0% | 8.1% | $137 | $67 | $596 | $800 |
| Total OECS | $22,459 | 18.2% | 9.8% | 22.8% | 50.8% | $966 | $608 | $2,194 | $3,768 |

*Source: Bueno et al., 2008. Note: Estimations are based on 2004 GDP, millions of 2007 US dollars.*

## RESPONSES

***« What is being done to address these issues? »***

Coastal and marine resources are integral to the socio-economic fabric of Caribbean islands and the coastal region, inclusive of the terrestrial and aquatic ecological processes, which are at the centre of most national development and management plans. Cognizant of the inter-linkages of environmental systems in relatively small island states, management and governance approaches have sought to minimise conflicts while promoting and adopting policies, strategies and legislative instruments that acknowledge the linkages between and among habitats.

### Management

#### *Integrated Coastal Zone Management*

Given the challenges and concerns regarding the management of coastal and marine resources, many countries have approached them using an Integrated Coastal Zone Management (ICZM) approach and articulated Coastal Marine Spatial Plans (CMSP). Policy 4 of the ECROP highlights the need for the adoption of multiple-use ocean planning and integrated management to optimise the sustainable development of marine resources and calls on member countries to establish legal frameworks that reflect an integrated approach to marine management. Unfortunately, not all Member States have initiated policies plans to such an integrated policy and legislative framework. Antigua and Barbuda, Grenada and Saint Lucia are three of the Member States that have articulated efforts to develop and implement ICZM plans.

Since 2004, the Government of Saint Lucia adopted a National Coastal Zone Management Policy and subsequently prepared a draft Coastal Zone Management (CZM) Strategy and Action Plan, in 2008. The 2004 Policy established an interagency Coastal Zone Management Advisory Committee and a Coastal Zone Management Unit (CZMU) to coordinate the implementation of the initiatives outlined in the Coastal Zone Management Strategy and Action Plan.

In 2012, the Government of Antigua and Barbuda approved the Sustainable Island Resource Zoning Management Plan, which outlines a forward-looking development framework for Antigua and Barbuda. This policy document draws on, for the first time, spatial geographic information systems (GIS) to map out a spatial development plan that addresses current development issues, and provides a platform for going forward with development initiatives for the twin-island state. The Sustainable Island Resource Zoning Management Plan designates different categories of land and marine resource use with associated activities, guidelines, and regulation. It provides for the protection of critical ecosystem functions and habitats, minimises environmental risks and seeks to optimise the productive use of ecological resources

Grenada also prepared an ICZM draft policy in 2015, which was approved by Cabinet in 2016. However, the authorities in Grenada have yet to initiate an ICZM strategy and action plan. What they have done is prepared a “Blue Growth Master Plan” (BGMP), a Cabinet-approved visioning document that sets out an investment strategy for the development of their coastal and maritime resources. The Blue Growth Master Plan (BGMP) is a Cabinet-approved visioning document and investment strategy launched in 2016. The BGMP builds on the ICZM policy. While its strength is as an investment plan, the development of CMPs and MSPs will help bring a more balanced approach to achieve goals of sustainable development.

In the absence of an ICZM or CMSP, the Commonwealth of Dominica is seeking to regulate development activities in a holistic way through the development of a Climate Resilient Integrated Coastal Management programme. Though being undertaken by UNDP with funding from GEF, the OECS, through the CROP project, will be liaising with the parties concerned to inform on all pertinent policy and administrative matters that will lead to the establishment of an agency with responsibility for co-ordinating ICZM/CMSP (CROP, 2019).

Subcomponent 1.1 of the CROP has sought to address the shortcomings in respect of ICZMP and CMSP by making available the necessary financial resources to undertake the development of coastal and marine spatial plans and providing training to entities in the participating countries. This subcomponent will, therefore, support improved decision-making over the use of the countries’ coastal zones and including ocean space falling under their Exclusive Economic Zones (EEZs). The subcomponent would finance: (a) the development of five national CMSPs and a regional MSP, which is in alignment with national CMSP.

#### *Marine Protected Areas*

Marine Protected Areas (MPAs) are a common management tool applied to geographically defined coastal and marine areas and their resources and can be defined as “areas where natural or cultural resources are given greater protection than the surrounding waters (NOAA, 2020a)”. With a variety of

objectives and levels of protection, MPAs typically restrict human activity for the purpose of conservation. Having increased substantially in numbers and size within the Caribbean LME in the past decade, MPAs are important for protecting marine biodiversity by conserving critical habitats, providing refuge zones for exploited fish species, reducing negative impacts associated with human use, fostering greater sustainable use and increasing community involvement and educational opportunities (Kramer et al., 2016a-f).

Over the past several years, countries, international organisations, environmental groups, and other entities have called for the establishment of networks of MPAs and for set percentages of the oceans to be declared as MPAs. The Caribbean Marine Protected Area Management Network and Forum (CaMPAM)[53] and the more recent Caribbean Challenge Initiative (CCI) are examples of initiatives that have been instrumental in supporting these efforts as well as promoting effective MPA management in the Caribbean. The CCI's 20-BY-20 GOAL encourages partners "to conserve and effectively manage at least 20% of the marine and coastal environment by 2020 (CCI, 2016)." Of the eleven (11) participating countries, five (5) are members of the OECS, including the British Virgin Islands, Grenada, Saint Lucia, Saint Vincent and the Grenadines, and St. Kitts and Nevis. Through this initiative, St. Kitts and Nevis declared a new protected area that encompasses a 2-mile radius around the entire island nation and includes 60% of its nearshore marine and coastal areas (CCI, 2016).

According to UNEP-WCMCP's Protected Planet database (Appendix 13), there are approximately 169 MPAs, occupying roughly 140,420 km$^2$ in the OECS Sub-Region (Figs. 39, 40). The vast majority of this area is due to Agoa, which was created in 2010 as a marine mammal sanctuary encompassing all of the French Antilles (almost 100% of their marine area) and has also been recognized as a Specially Protected Areas and Wildlife (SPAW) area under the Cartagena Convention.

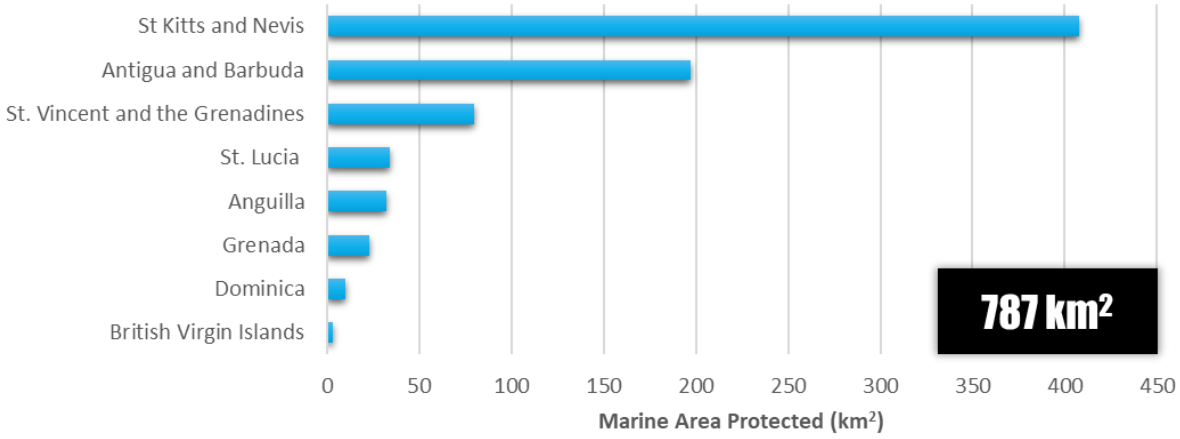


**Fig. 39 | Marine area protected in OECS Independent States and British Overseas Territories.**
*Source: UNEP-WCMC and IUCN, 2020.*

[53] CaMPAM was created in 1997 under the framework of the Caribbean Environment Program of the UN Environment Programme (UNEP-CEP) and the Specially Protected Area and Wildlife (SPAW) Protocol of the Cartagena Convention (CaMPAM, 2016).

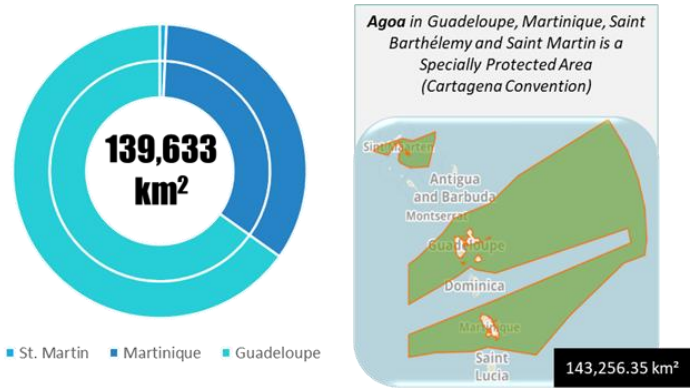


**Fig. 40 | Marine area protected in the French Overseas Territories.**
*Source: UNEP-WCMC and IUCN, 2020.*

There are also seven (7) sites in approximately 378 km$^2$ of marine space designated as Ramsar Sites under the International Convention on Wetlands (Ramsar Convention) (Fig. 41).[54] Based on the total estimated marine space of 546,420 km$^2$, approximately 26% of the marine space in the OECS Sub-Region is protected (Fig. 42).[55]

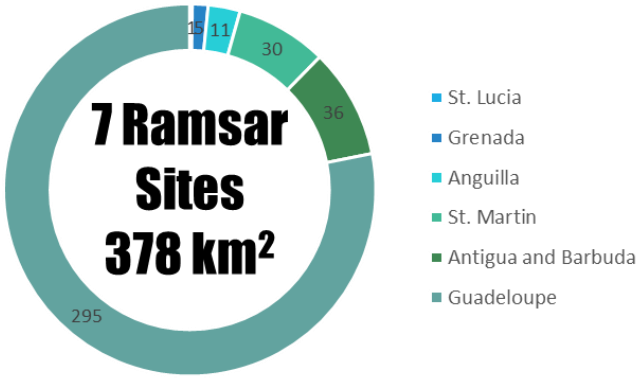


**Fig. 41 | Designated Ramsar Sites in the OECS Sub-Region.**
*Source: UNEP-WCMC and IUCN, 2020.*

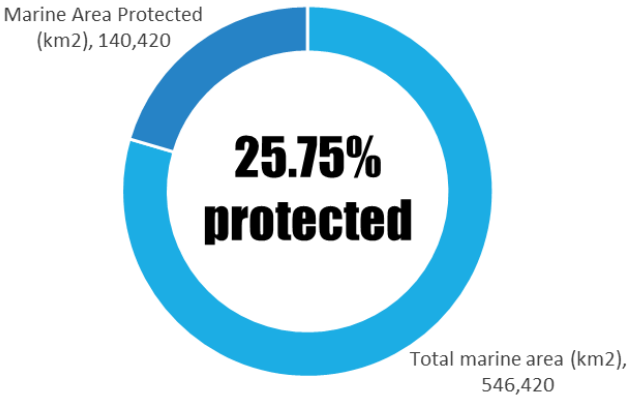


**Fig. 42 | Marine Area Protected in the OECS.**

*Source: UNEP-WCMC and IUCN, 2020.*

## Habitat Restoration

There are several habitat restoration activities including mangrove replanting, coral microfragmentation and the establishment of nurseries that are active in various locations throughout the Eastern Caribbean. As partnerships between international organizations, government agencies, and local environmental and community groups, these initiatives focus on ecosystem- and community-based management approaches, capacity building and awareness raising and climate change adaptation, with the overarching goals of repairing habitats, increasing coverage and increasing resiliency to stressors. The following provides a snapshot of habitat restoration projects at various stages of implemented within the OECS:

- Antigua and Barbuda: A total marine ecosystem restoration initiative with 3,500 prefabricated concrete reef balls installed and

[54] Ramsar Sites include only those that are marine or coastal and marine (not terrestrial).
[55] UNEP-WCMC only use protected areas that meet the IUCN and CBD definitions of protected areas when calculating protected area coverage. These statistics might differ from those reported officially by countries due to difference in methodologies and datasets.

4,200 red mangrove seedlings planted around Maiden Island.[56]

- Grenada: Restoration and Community Co-Management of Mangroves (RECCOMM) Project planted over 1900 mangrove seedlings in Telescope.57 At the Water's Edge (AWE), community-based initiative pilot tested a reef-based hybrid submerged breakwater structure, and a Coral Restoration Project in Carriacou that outplanted 52 corals.[58]
- Saint Lucia: Through the Eastern Caribbean Marine Managed Areas Network (ECMMAN), TNC and partner agencies came together to implement the community-based mangrove restoration project in Ma Kôté and planted around 4,000 seedlings.[59]
- Saint Vincent and the Grenadines: A mangrove restoration project in Ashton Lagoon by SusGren community members, the government and national and international environmental groups replanted over 3,000 red mangroves.[60]
- Anguilla: Several buttonwood, red and white mangroves replanted in the West End Pond Important Bird Area (IBA) by the Nature Explorers Anguilla group.[61]
- British Virgin Islands: Mangrove restoration efforts spearheaded by the Jost Van Dykes Preservation Society planting of over 1,000 trees in the area as part of the larger initiative on Establishing Flood-Resilient SMART Communities through Non-Government Partnerships.[62]
- Martinique: Efforts to restore the fast growing staghorn and elkhorn corals through cutting.[63]

### *Waste Management*

Solid waste has been highlighted as one of the major contributors to marine pollution. It has the potential to negatively impact some of the environmental and natural attributes, which account for the large numbers of visitors to the Caribbean. In the late 1990s several of the OECS Member States, with financing from the GEF, took steps to drastically alter that trend by developing the infrastructure (replacing waste dumps with sanitary landfills), and providing reliable garbage collection facilities. They also articulated new policies and replaced outdated legislation with new legislation and regulations, strengthened the administrative capacities of existing institutions to deal with illegal dumping of waste and achieve a more efficient waste management system. While tremendous improvements were made in that regard, growing population and changing lifestyles have resulted in an increase in the generation of solid waste, particularly the use of plastics, much of which is discarded inappropriately. Though on average, 90 % of the waste generated is collected, structural deficiencies in the waste collection and disposal systems (narrow roads and remote settlements) and financial challenges in some of the countries, have prevented them from adequately controlling the increasing amount of garbage entering the marine environment.

Several of the Member States have also taken steps towards addressing the issue of plastic pollution. The objective is to reduce the generation of everyday litter items, which has proven successful in countries such as Antigua and Barbuda introduce the Litter Control and Prevention Act to address to curtail littering and a ban on plastic shopping bags. These measures have resulted in a reduction of plastics reaching the landfill from 19.5% - 4.4% in 2017 (Diez et al., 2019). Other countries including the British Virgin Islands, Dominica, Grenada, Saint Lucia and Saint Vincent and the Grenadines have all instituted measures to curtail the use of plastics and Styrofoam significantly. These included placing bans on the importation and use of Styrofoam in food services, a ban on the use of single-use plastic, and taxes on similar items to discourage their widespread use (Tab. 10). Notwithstanding those initiatives, the avoidance of solid waste, particularly plastics, entering the marine environment will require a more holistic approach that extends beyond the focus on single items and incorporates initiatives such as waste reduction, recycling and circular management.

[56] https://www.ser-rrc.org/project/antigua-maiden-island-total-reef-restoration/
[57] https://panorama.solutions/en/solution/restoration-and-community-co-management-mangroves-reccomm
[58] https://pressroom.oecs.org/innovative-restoration-of-coral-reefs-helps-protect-island-nations; http://www.caribbeanreefbuddy.org/coral-nursery.html
[59] https://www.nature.org/en-us/about-us/where-we-work/caribbean/stories-in-caribbean/restoration-of-saint-lucias-ma-kote-mangrove/
[60] https://bb.usembassy.gov/ashton-lagoon-restored-after-24-years-of-severe-degradation/
[61] http://natureexplorersanguilla.com/bring-back-the-buttonwoods.html
[62] https://www.bvibeacon.com/mangroves-on-the-move-habitat-restoration-efforts-underway/
[63] https://repeatingislands.com/2015/07/21/martinique-works-on-coral-restoration/

**Tab. 10 | Responses to plastic pollution in OECS Countries.**

| COUNTRY | MATERIALS TARGETED | DESCRIPTION | DATE OF IMPLEMENTATION |
|---|---|---|---|
| Antigua and Barbuda | Plastic bags | Ban on importation and commercial use other than garbage collection.<br>Alternative products are tax- free. | January 2016: Ban on importation<br>July 2016: Ban on use. |
| | Styrofoam for food service (1st phase)<br>Plastic utensils, Styrofoam trays, and egg cartons (2nd phase)<br>Styrofoam coolers (3rd phase) | Ban on importation and use.<br>Applies to all businesses in the food service industry.<br>Alternative products are tax free. | January 2017: 1st phase.<br>January 2018: 2nd phase.<br>January 2019: 3rd phase. |
| British Virgin Islands | Plastic bags | 15-cent charge on plastic bags at grocery stores that sign a voluntary agreement. | March 2013 |
| Dominica | Plastic straws, plastic plates, plastic forks, plastic knives, Styrofoam cups and Styrofoam containers. | Restrictions on imports of non-biodegradable containers for stores and restaurants that distribute them. | January 2019 |
| Grenada | Styrofoam food containers and plastic bags. | Ban on importation of Styrofoam food containers, plastic shopping bags (single use bags), and disposable plastic plates, spoons and forks. | August 2018: Ban on importation for Styrofoam.<br>February 2019: Ban on importation of single-use plastic bags, disposable plates, forks and spoons. |
| Saint Lucia | Styrofoam and single use plastic including plates and cups. | Ban on importation and subsequent total ban on use. | December 2018: Ban on importation. |
| Saint Vincent and the Grenadines | Styrofoam food service products. | Ban on importation, manufacture, sale, and use of Styrofoam food service products. | May 2017: Ban on importation.<br>January 2018: Ban on use. |

***Source: Diez et al., 2019.***

## *Responses to Climate Change*

The global response to climate change is epitomized by the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC), that brings 197 countries together towards the common goal of undertaking efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. This international agreement entered into force in November 2016 with the main objective of keeping global temperature rise this century well below 2℃ above pre-industrial levels and to pursue the enhancement of efforts to limit the temperature increase even further to 1.5℃. Every five (5) years, countries are required to communicate their post-2020 climate actions through the submission of Nationally Determined Contributions (NDCs) that articulate a country's goals and efforts for reducing to reduce national emissions and adapting to the impacts of climate change (UNFCCC Secretariat, 2020).

For many countries, especially SIDS, adaptation (i.e., the process of adjusting or avoiding the impacts of changing climate), features prominently in their NDCs because they are already experiencing the negative effects of climate change. Additionally, due to the linkages between adaptation and Sustainable Development Goals (SDGs) such as health and well-being (SDG 3), and ecosystems and biodiversity (life below water: SDG 14, life on land: SDG 15), implementing NDCs can contribute towards overall sustainable development. The UNFCCC's National Adaptation Plan (NAPs) process outlines the steps required to implement the adaptation goals set out in a country's NDC, and is instrumental for countries seeking to build resilience and therefore reduce their vulnerability to the impacts of climate change, as well as facilitate the integration of climate change adaptation into relevant new and existing policies, programmes and activities (CDKN, 2020).

Climate change management/responses within the OECS Sub-Region are summarized in Tabs. 11 and 12 that highlight each country's status as it relates to climate change policies, NDCs and NAPs. With the exception of St. Martin, all countries listed either have or are in the process of formulating a climate change policy, and those with already developed policies provide considerations for the impacts of climate change on the coastal/marine environment.

**Tab. 11 | Status of key climate change documents for OECS Countries**

| COUNTRY | CLIMATE CHANGE POLICY/POLICY FRAMEWORK | NATIONALLY DETERMINED CONTRIBUTIONS (NDCS) | NATIONAL ADAPTATION PLANS (NAPS) |
|---|---|---|---|
| Anguilla | | | |
| Antigua and Barbuda | | | |
| British Virgin Islands | | | |
| Dominica | | | |
| Guadeloupe | | | |
| Grenada | | | |
| Martinique | | | |
| Montserrat | | | |
| St. Kitts and Nevis | | | |
| Saint Lucia | | | |
| St. Martin | | | |
| Saint Vincent and the Grenadines | | | |
| | Present | | |
| | Ongoing/intend to start | | |
| | Not present/Status unknown | | |
| | Overseas territories contribution part of wider mainland territory's NDC/NAP | | |

The French (Guadeloupe, Martinique and St. Martin) and United Kingdom Overseas Territories (Anguilla, British Virgin Islands and Montserrat) are unable to formally ratify the Paris Agreement, and therefore, their national contributions fall under the contributions of their mainland territory (Brunert et al., 2018). The French National Plan for Adaptation to Climate Change (2011-2015) responds to the needs of the French Outermost Regions but does not specifically address individual country's issues (European Commission, 2014). A second national adaptation plan is being worked on for France and includes consideration for coastal, fisheries and tourism sectors. The NAP will include recommendations for increasing the participation of OTss in their regional organisations and gives attention to particular requirements of OTss. A new law came into effect in February 2017 to reduce the disparity between the mainland and overseas territories (ONERC, 2017). The Regional Climate, Air and Energy Schemes (SRCAE) published in 2012 assesses vulnerability to climate change and lists priority adaptation actions for Guadeloupe and Martinique. Recommended actions for the marine sector in the SRCAE for Guadeloupe include adaptation strategies for the fisheries sector. Martinique and Guadeloupe are both part of the French Initiative for Coral Reefs (IFRECOR) Project related to coral reefs adaptation plans. St. Martin has no climate strategy or SRCAE (European Commission, 2014).

The United Kingdom's 2nd National Adaptation plan makes consideration for protection of oceans and management of protected areas in overseas territories but does not address individual countries. However, programmes such as the 'Enhancing Capacity for Adaptation to Climate Change (ECACC) in the UK Caribbean Overseas Territories Project' and CANARI's partnership with the UK's Joint Nature Conservation Committee have provided support for adaptation strategies within United Kingdom OTss in the region.

Apart from the oversea territories, only three countries have submitted National Adaptation Plans (Grenada, Saint Lucia, and Saint Vincent and the Grenadines), all of which include considerations for the marine environment and associated livelihoods. Furthermore, an Eastern Caribbean Climate Change Implementation Plan is being developed by the UK's Foreign and Commonwealth Office and the OECS. This plan aims to improve climate change resilience in the water sector by providing desalination services powered by renewable energy (Brunert et al., 2018).

**Tab. 12 | Snapshot of climate change management within the OECS.**

| COUNTRY | CLIMATE CHANGE POLICY / POLICY FRAMEWORK | NATIONAL DETERMINED CONTRIBUTIONS (NDCS) | NATIONAL ADAPTATION PLANS (NAPS) |
|---|---|---|---|
| Anguilla | Draft [64]<br>Policy directives given for coastal and marine resources, tourism. | Under United Kingdom's NDC | - |
| Antigua and Barbuda | Present [65]<br>Policy directives given for adaptation in fisheries, tourism as well as coastal and marine resources. | Present [66]<br>Adaptation targets includes insurance scheme for fishers and business owners<br>Mitigation strategies includes protection of wetlands | In Process [67]<br>After consultations, the NAP was submitted for review to Green Climate Fund. |
| British Virgin Islands | Present [68]<br>Policy directives given for coastal resources, fisheries and tourism | Under United Kingdom's NDC | - |
| Dominica | Present [56]<br>Dominica Low Carbon Development Strategy 2012 – 2020 covers fisheries, tourism and coastal ecosystems | Present [69]<br>Adaptation strategies included insurances for affected vulnerable communities, community warning systems and risk mapping; all of which benefits fishing communities<br>Within NDC climate resilience includes building capacity for food security (such as fisheries). Risks to tourism and coastal ecosystems are recognized. | Ongoing |
| Grenada | Present [70]<br>Consideration for coastal management, fisheries and tourism | Present [71]<br>Adaptation measures include:<br>- Mapping of coastal features<br>- Ecosystem based adaptation including coral restoration, mangrove restoration | Completed [72]<br>Under Programmes of Action, the following are considered: -<br>- Recognizing threat of heavy rainfalls and increase of fertilizer runoff into marine environment |

[64] Hodge, K , Connor, R., Romilly, G. 2011. Transforming to a Climate-Resilient, Energy Efficient and Low Carbon Economy – Anguilla's Climate Change Policy (Draft)
[65] James, P. 2002. Policy Framework for Integrated Adaptation Planning and Management in Antigua and Barbuda. In Collaboration with Caribbean Planning for Adaptation to Climate Change (CPACC)
[66] Government of Antigua and Barbuda. 2015. Intended Nationally Determined Contribution (INDC).
[67] National Adaptation Plan Global Support Programme (NAP-GSP). 2017. Regional briefing on National Adaptation Plans: Caribbean in Focus.
[68] Government of the Virgin Islands. 2012. Climate Change Adaptation Policy.
[69] Commonwealth of Dominica. 2015. Intended Nationally Determined Contribution (INDC) of the Commonwealth of Dominica. Communicated to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) on the 30thSeptember, 2015
[70] Government of Grenada. 2017. National Climate Change Policy for Grenada, Carriacou and Petite Martinique (2017 – 2021)
[71] Government of Grenada. 2016. Intended Nationally Determined Contribution (INDC). Communicated to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) on the 22nd April 2016.
[72] Government of Grenada, 2017, National Climate Change Adaptation Plan (NAP) for Grenada, Carriacou and Petite Martinique 2017-2021, Ministry of Climate Resilience, the Environment, Forestry, Fisheries, Disaster Management and Information

| COUNTRY | CLIMATE CHANGE POLICY / POLICY FRAMEWORK | NATIONAL DETERMINED CONTRIBUTIONS (NDCS) | NATIONAL ADAPTATION PLANS (NAPS) |
|---|---|---|---|
| | | - Supporting alternate livelihoods<br>- Technology needs assessment for the tourism sector | - Vulnerability analysis to determine impacts of climate change on marine fisheries and improved data collection and analysis of Grenada's fish catch<br>- Integration of Climate Change Risk Adaptation Tool (CCORAl) in the fisheries sector<br>- Involvement of fisherfolk in adaptation projects<br>- Possibility of fishing insurance<br>- Development of/updating legislation to encourage management of mangroves<br>- Collection and analysis of data on MPAs and expanding MPA network<br>- Expansion and creation of coral nursery and artificial reef and collaboration with local community<br>- Coral monitoring<br>- Expansion of lionfish monitoring and training<br>- Updating of mangrove maps<br>- Adopt a mangrove/adopt a coral into tourism initiatives<br>- Researching potential harvest and exploitation of sargassum<br>- Initiating Seagrass monitoring programme<br>- Assessing vulnerability of tourism infrastructures. |
| Montserrat | Present [73]<br>Provisions for coastal marine resources, fisheries and tourism | Under United Kingdom's NDC | In Progress [74]<br>Marine Considerations include:<br>- Reduced Land based pollution to marine areas<br>- Promoting non-extractive use of coastal resources (turtle watching)<br>- Creating and managing buffer zones<br>- Monitoring and data collection within coastal areas.<br>- Conserving key habitats for fisheries.<br>- Relocating tourism infrastructure<br>- Insurance for tourism industry<br>- Less emphasis on dive and beach tourism and more focus on heritage and terrestrial tourism<br>- Protecting marine biodiversity by enforcing and creating new Environmental Impact Assessment requirements. |

[73] Government of Montserrat. 2011. Transforming to a Climate Resilient and Low Carbon Economy - Montserrat's Climate Change Policy (Draft)
[74] Ministry of Agriculture, Land, Housing and The Environment. 2010. Montserrat National Climate Change Issues Paper – Towards the Formulation of a National Climate Change (Adaptation) Policy and Action Plan. Published by Caribbean Community Climate Change Centre, Belmopan, Belize.

| COUNTRY | CLIMATE CHANGE POLICY / POLICY FRAMEWORK | NATIONAL DETERMINED CONTRIBUTIONS (NDCS) | NATIONAL ADAPTATION PLANS (NAPS) |
|---|---|---|---|
| St. Kitts and Nevis | Developing [56] | Present [75]<br>Adaptation measures for protection of coastal infrastructure | To begin process [76] |
| Saint Lucia | Present [77]<br>Considerations for integrated coastal management, fishing and cross-sectoral policies linkages with tourism. | Present [78]<br>Adaptation for coastal zone management and food security | Completed [79]<br>Marine Considerations Include:<br>- Maintaining existing mangrove and coral cover; protecting wetland ecosystems<br>- Enhancing marine spatial planning with considerations for fisheries and aquaculture.<br>- Integrating Climate Change into Fisheries policies<br>- Increasing capacity of fisherfolk in value chain and identifying fishing grounds<br>- Enhancing fisheries habitat through mangrove restoration or reef establishment.<br>- Monitoring and collecting data on lionfish<br>- Altering anchoring systems to protect reefs<br>- Gaining greater access to high value markets for fisheries.<br>- Increasing vessel safety for fishers and promoting fuel efficient technologies<br>- Diversifying livelihoods to reduce dependency on fisheries and aquaculture<br>- Researching into alternate fisheries e.g., diamond back squid fishery<br>- Reducing ghost fishing<br>- Monitoring and alert systems for sargassum<br>- Implementing projects such as converting sargassum into fertilizer or use as biofuel<br>- Insurance and social benefits for fisherfolk and families<br>- Enhancing data collection for fisheries<br>- Early Warning System for fishery sector<br>- Monitor and control for invasive species |

[75] Government of St. Kitts and Nevis. 2016. Intended Nationally Determined Contribution (INDC). Communicated to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) on the 22nd April 2016.
[76] National Adaptation Plan Global Support Programme (NAP-GSP) and REGATTA. 2017. Caribbean National Adaptation Plans Training Workshop Workshop Report, 31st May – 2nd June 2017, Georgetown Guyana.
[77] Government of Saint Lucia. 2015. The Saint Lucia Climate Change Adaptation Policy.
[78] Government of St Lucia. 2015. Intended Nationally Determined Contribution (INDC). Communicated to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) on the 17th November 2015.
[79] Government of Saint Lucia. 2018. Saint Lucia's National Adaptation Plan (NAP): 2018-2028. Department of Sustainable Development, Ministry of Education, Innovation, Gender Relations and Sustainable Development.

| COUNTRY | CLIMATE CHANGE POLICY / POLICY FRAMEWORK | NATIONAL DETERMINED CONTRIBUTIONS (NDCS) | NATIONAL ADAPTATION PLANS (NAPS) |
|---|---|---|---|
| | | | - Sea walls to protect livelihoods of fishers<br>- Strengthening coastal infrastructure<br>- Buffer zones for coastal habitats<br>- Programme for coastal hotel development. |
| Saint Vincent and the Grenadines | Developing [56] | Present [80]<br>Adaptation planning in fisheries, and consideration for adaptation regarding coastal zones (policies and projects) | Completed [81]<br>Activities include:<br>- Assessment of climate change on commercial fisheries and coastal and marine ecosystems<br>- Development of sectoral adaptation plan for tourism<br>- Reef protection and Marine rehabilitation<br>- Update building codes to prevent waste discharge into marine environment. |

[80] Government of St Vincent and the Grenadines. 2015. Intended Nationally Determined Contribution (INDC). Communicated to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) on the 18th November 2015.
[81] Government of Saint Vincent and the Grenadines. 2019. National Adaptation Plan for Saint Vincent and the Grenadines.

## *Financial Mechanisms*

While the promise of growth and development of the blue economy has raised and excited possibilities of transforming and growing the economies of small island developing states, the reality is that these resources must be harnessed and converted into revenue generating initiatives. The 2013 OECS ECROP document noted that among the many challenges faced by the Member States in the development of their ocean resources is the inadequacy of financial support (OECS Commission, 2013). Since then, and notwithstanding the renewed awareness of the vast potential which exists to harness the numerous resources and development potential, very little in terms of revenue generating opportunities have been created.

Much of the excitement regarding the development potential of the blue economy lies in the Wider Caribbean Region in the fact that it provides a range of services, supports numerous industries, and generated, in 2012 US $407 billion in gross revenue. Within the insular Caribbean, the island countries of the region, that amount was US $57 billion. Tourism was the leading revenue generator, amounting to US $47.1 billion, followed by oil and gas at US $5.6 billion and seafood, US $370 million (Patil et al., 2018). It is projected that these figures could triple by 2030 if harnessed and developed sustainably. Unfortunately for most of the countries of the OECS, regional entities are not the owners of the largest revenue generators, shipping and tourism. In the absence of oil and gas deposits in the Exclusive Economic Zone of OECS Member States, options for generating revenue from the blue economy are limited.

In 1998, conscious of the need to create a sustainable financing mechanism to defray the cost of establishing and maintaining solid waste collection and disposal facilities, the OECS Commission provided support to its Members in implementing a US $5.00 Head Tax on cruise ship passengers arriving at the ports in the respective countries. That initiative, which was part of the GEF funded OECS Solid and Ship-generated Waste Management project being implemented in six Member Countries,[82] was vehemently opposed by the cruise industry. Cruise industry personnel refused to acknowledge that this initiative was intended to be used as part of the overall effort to ensure that visitors would be welcomed and accommodated in a pristine environment. Twenty-two years later, the head tax has hardly changed, while the revenues generated by the respective cruise lines have more than tripled.

Since the Head Tax was implemented in 1998, and despite threats by the cruise industry to blacklist countries that implemented the tax, it has become a valuable source of funding to offset the high cost associated with maintaining the pristine environment. Since then, some Member States have either reduced that tax or refrained from increasing the amount charged. The Cabinet of Montserrat approved the reintroduction of the $5.00 Head Tax but decided to issue a waiver given the fact that their port facilities are not adequate. However, this may change when the new port, which is currently under development at Little Bay, is completed in 2020. Notwithstanding the lobbying and threats coming from the cruise lines, some of the other OECS countries have introduced fees as a means of generating revenue to offset tourism infrastructure development costs (See Tab. 13 for a breakdown of charges being implemented by the various countries).

**Tab. 13 | Cruise Tourism Head Tax Charges in OECS Member States**

| COUNTRY | HEAD TAX (US) |
|---|---|
| Anguilla | - |
| Antigua and Barbuda | $2.50 |
| The British Virgin Islands | $10 |
| Dominica | $5.00 |
| Grenada | $5.00 |
| Guadeloupe | $1.50 |
| Martinique | $38.2 |
| Montserrat | $5.00* |
| St. Kitts and Nevis | $5.00 |
| Saint Lucia | $5.00 |
| Saint Vincent and Grenadines | $10.00 |
| St. Maarten | $143.2 |

**Not collected.*

Antigua and Barbuda, though initially agreeing to the US $5.00 per passenger tax later reduced it to US $2.50. However, in 2019 the Government of Antigua and Barbuda granted Global Ports Holding (GPH) Antigua, US $1.00 out of that US $2.50 as part of the agreement under which the company will continue the redevelopment of the cruise ship terminal. While the BVI was not part of the OECS Solid and Ship-generated Waste Management Project, they recognized the need for a funding mechanism to support initiatives at enhancing the tourism infrastructure in that country. In this regard, under an Act of Parliament, in 2017, the Government of the BVI established the Environmental Protection and Tourism Improvement Fund, which empowered the Financial Secretary to collect US $10.00 from each non-resident passenger arriving in the Virgin Islands by air or sea.

[82] Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St Lucia, and Saint Vincent and the Grenadines.

Since the late 1990s, the fisheries sector in several Member States, most notably Antigua and Barbuda, Dominica, Grenada, Saint Lucia, and Saint Vincent and the Grenadines, have been the recipients of technical and financial assistance from the Governments of Japan and Canada to improve port, landing, marketing and distribution facilities in their respective countries. There have been other initiatives, though not directly aimed at generating revenue from the blue economy, to raise funds for biodiversity conservation initiatives as well as the development and management of marine protected areas. Some of the more notable efforts were the Caribbean Challenge Initiative (CCI), the Caribbean Biodiversity Fund (CBF), and the establishment of National Conservation Trust Funds (NCTF) in several countries, including five OECS Member countries.

Under the CCI eleven (11) Caribbean governments have joined together with responsible business leaders to take collaborative action to protect and sustainably manage their marine and coastal environment. As previously discussed, the objective of the programme in which five (5) OECS Member States[83] are participating, is to set aside 20% of their marine space as protected areas by 2020. Countries are also required to establish fully functioning sustainable finance mechanisms that will provide long-term and reliable funding to conserve and sustainably manage the marine and coastal resources and the environment in each participating countries and territories. Part of the commitment includes the establishment of national action plans which incorporate effectively managed coastal and marine protected areas, as well as restoration activities, responsible fishery and tourism practices, efforts to reduce marine pollution and climate change adaptation.

The CBF is a regional endowment fund that was established in 2012 to provide a sustainable flow of resources for the conservation, protection and maintenance of biodiversity within national protected area systems and any other areas of biological importance in the Caribbean. The CBF is part of the sustainable financing architecture that has been set up to support the CCI and its 20 by 20 goal to effectively conserve and manage at least 20% of the marine and coastal environment by 2020 in participating countries. The CBF, which was initially capitalised at US$42 million,[84] reserves a portion of the monies of the CBF endowment for each participating country. These funds are provided to National Conservation Trust Funds (NCTFs) established in the CCI participating countries. Each participating country's NCTF may access 4.5% of the monthly value of the portion of its earmarked CBF (averaged over the previous 3 years). However, the CBF also encourages the creation of country-led conservation finance mechanisms, such as user fees in protected areas, to help cover the cost of operating the national trust funds and local conservation efforts (CBF 2016).

Individual countries and national entities have also been engaging in various financing initiative to support the conservation of coastal and marine ecosystems and the rich historical legacies that are being preserved at these entities. Not all of them are financially viable and some still depend on state funding to achieve their objectives. However, some operations like the Nelson's Dockyard in Antigua, Pigeon Island National Park, managed by the Saint Lucia National Trust, and the Tobago Cays Marine Park are models of financial sustainability which can be replicated and used as emerging vehicles for scaling up similar initiatives in the other OECS Member States. Some of these initiatives include the establishment of entrance/admission fees, mooring fees, leasing of properties for special events, and souvenir fees.

More recently, suggestions for developing the blue economy have focused on establishing the policy framework on which a sustainable blue economy structure could be established and creating the climate in which private sector entities will be encouraged to invest in blue industries. This initiative is led by the OECS under the GEF funded and World Bank executed CROP. While these investment initiatives are still to be outlined, there are already well recognized revenue earning activities which offers some indication of the potential revenue earning capacities. These include traditional industries such as maritime tourism (cruise tourism, yachting and recreational activities such as sports fishing), fishing, shipping/transportation and to a very limited extent, the energy (oil and gas) sector. In respect of the non-traditional sectors, there is great expectation that with expanding technologies, countries in the region could ceate opportunities for development of marine aquaculture, offshore wind energy and marine biotechnology.

Notwithstanding these initiatives, and those listed in Tab. 14, and the optimistic views being portrayed, it should be acknowledged that in the absence of financial resources or dedicated funding sources to support research to inject into exploring the development potential, countries would have to explore other financing opportunities. The CDB, in

[83] The British Virgin Islands, Grenada, St. Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines.
[84] Contributors to the endowment fund were Government of Germany, GEF, the World Bank, the UNDP, and the Nature Conservancy (TNC).

seeking to identify pathways for developing the blue economy identified eight financing instruments and strategies to overcome financial challenges (CDB, 2018). These instruments are as follows:

- Blended finance
- Development impact bonds
- Climate finance
- Debt swaps
- Domestic (Levy and insurance)
- Crowdsourcing – diaspora financing
- Contingently recoverable grants
- Blue bonds.

While these are indeed innovative, it would be a significant oversight, if not extreme negligence, to seek grant funding or sign on to debt financing or any of the above innovating financing mechanisms before seeking to explore opportunities for revenue generation from existing sectors. An in-depth analysis of existing industries will reveal that there already are revenue generating sectors (e.g., maritime tourism), but very little of the revenue generated in those sectors come to the countries in whose coastal and economic zones these revenues are generated. In pursuing the development of their blue economy, the Member States, with the support of the OECS Commission, will have to pursue and develop the policy, legislative and institutional infrastructure that will allow the countries to truly benefit from the development potential around which the revised ECROP has been designed.

**Tab. 14 | Initiatives lead by multilateral donor agencies to support the development and management of ocean resources.**

| INITIATIVE | IMPLEMENTING AGENCIES | TARGET COUNTRIES | DESCRIPTION |
|---|---|---|---|
| Caribbean Regional Oceanscape Project (CROP) 2017 – 2021 | OECS Commission and the World Bank | Grenada, Saint Lucia, Saint Vincent and the Grenadines, Dominica, and St. Kitts and Nevis, regional OECS | CROP is designed in alignment with Eastern Caribbean Regional Ocean Policy (ECROP). ECROP and has an overall objective to develop and implement integrated ocean governance policies to leverage sustainable public and private investment in the waters of OECS member states. Activities include the development of coastal and marine spatial plans and national coastal blue growth master plans. |
| Grenada – Blue Growth Coastal Master Plan 1026 | Government of Grenada | Grenada | Blue growth vision and coastal master plan for the islands of Grenada, Carriacou, and Petite Martinique that outlines an approach for development to improve sustainable productivity on land and at sea. Promotes maritime clusters of industries, suppliers, and educational and research institutions that reinforce each other and encourages investment into strategic projects via public-private partnerships, and or private development (Patil and Diez, 2016). |
| First Fiscal Resilience and Blue Growth Development Policy Credit – Grenada 2018 – 2019 | World Bank and Government of Grenada | Grenada | Development Policy Credit to support fiscal measures and compliance with the Fiscal Responsibility Law; and support Grenada's transition to a Blue Economy by strengthening marine and coastal management, marine ecosystem health, and climate resilience. Supports implementation of the Grenada – Blue Growth Coastal Master Plan. |
| Commonwealth Marine Economies Programme 2016 – 2020 | United Kingdom Government | Antigua and Barbuda, Dominica, Grenada, Saint Lucia, and Saint Vincent and the Grenadines | This UK Government programme aims to support the marine economies (also referred to as blue economies) of 17 Commonwealth Small Island Developing States (SIDS). It aims to support them in identifying the potential of, and developing, their marine economies in a sustainable, resilient, and integrated way.<br>The programme promotes growth, innovation, jobs and investment, whilst safeguarding healthy seas and ecosystems. In partnership with the SIDS, the programme will develop and implement national Maritime Economy Plans to ensure the programme leaves a lasting legacy. |
| Blue Tech Challenge 2018 – 2020 | InterAmerican Development Bank and Compete Caribbean Partnership Facility | Antigua and Barbuda, Dominica, Grenada, Saint Lucia, St. Kitts and Nevis, and Saint Vincent and the Grenadines | Grant and loan facility to support business models that apply new technologies or solutions to foster the long-term sustainability of the ocean economy in 14 target countries. |
| Ocean Innovation Challenge (OIC) | UNDP (Barbados) | Barbados and the OECS Member States. | The objective of the programme is to accelerate progress on SDG 14 targets. The OIC seeks innovations that are transferable, replicable and scalable. The Challenge grants range from $50,000 to $250,000. Recognizing the increasing urgency of tackling ocean pollution, particularly from plastics and nutrients, the first of several planned OICs focuses on SDG. "Innovation" here can include both truly new approaches or the transfer or adaptation of existing, proven approaches to new contexts and/or locales. |
| OECS Green Blue Economy Strategy and Action Plan 2019 – 2020 | OECS Commission with technical assistance from CANARI | Anguilla, Antigua and Barbuda, the British Virgin Islands, the Commonwealth of | Sub-regional strategy and plan which will define key principles, objectives, policy needs, pathways and capacity needs for environmentally sustainable, inclusive and resilient economic transformation in OECS members. |

| INITIATIVE | IMPLEMENTING AGENCIES | TARGET COUNTRIES | DESCRIPTION |
|---|---|---|---|
| | | Dominica, Grenada, Guadeloupe, Martinique, Montserrat, St. Kitts and Nevis, Saint Lucia, and St. Vincent and the Grenadines | |

*Adapted from UNEP(DEPI)/CAR WG.40/ INF.13 2 December 2018.*

## Governance

### *International Governance*

The governance of ocean resources in the Wider Caribbean Region (WCR) has its foundation in the 1982 United Nations Convention of the Law of the Sea. Generally described as the "Constitution of the Ocean" because of its comprehensive coverage of all of the matters pertaining to management and regulations of the ocean and maritime services, it has been ratified by 165 nations, including all of the Member States of the OECS. As signatories to the 1982, Law of the Sea Convention (LOS Convention), Member States can claim not only an expanded Territorial Sea of 12 nautical miles but also a 200 nautical mile Exclusive Economic Zone (EEZ). In the EEZ, each State is accorded sovereign rights and jurisdiction to explore and exploit all living and non-living resources found in that zone. With rights also come responsibilities and under Part XII of the LOS Convention States are obligated to provide for protection and preservation of the marine environment.

As a multilateral, international treaty, it also provided for a range of regional arrangements and a number of international cooperation mechanisms, resulting in the establishment of several subsidiary regimes, conventions and programmes. These include the International Maritime Organisation (IMO) and its various conventions (e.g. MARPOL Convention, International Convention for the Safety of Life at Sea (SOLAS), International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW); the Straddling Fish Stocks and Highly Migratory Fish Stocks Agreement (Fish Stock Agreement); the Convention on Biodiversity (CBD); the United Nations Framework Convention on Climate Change (UNFCCC); and, the Ramsar Convention on Wetlands of International Importance. Tab. 15 provides a listing of the most relevant Conventions. Having signed and ratified these conventions, Member States have a duty to ensure that they comply with the various mandates, while also seeking to benefit from the opportunities that membership in those bodies or signatories to those Conventions provide.

**Tab. 15 | Relevant international Conventions and Status of Ratification.**

| CONVENTION | ANTIGUA & BARBUDA | DOMINICA | GRENADA | ST. KITTS & NEVIS | SAINT LUCIA | SAINT VINCENT & THE GRENADINES | ANGUILLA | BRITISH VIRGIN ISLANDS | MONTSERRAT | GUADELOUPE | MARTINIQUE | ST. MARTIN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UN Convention of the Law of the Sea (UNCLOS) | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A |
| Cartagena Convention | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A |
| Oil Spill Protocol | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A |
| SPAW Protocol | S | No | R/A | No | R/A | R/A | R/A | R/A | | R/A | R/A | R/A |
| LBS Protocol | R/A | No | R/A | No | R/A | No | No | No | No | R/A | R/A | R/A |
| Convention for the Prevention of Pollution from Ships (MARPOL) | R/A | R/A | No | R/A | R/A | R/A | | | | R/A | R/A | R/A |
| Convention on Biological Diversity (CBD) | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A |
| Convention to Combat Desertification and Land Degradation (UNCCDD) | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A |
| UN Framework Convention on Climate Change (UNFCCC) | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A |
| RAMSAR Convention on Wetlands | R/A | no | R/A | no | R/A | no | R/A | R/A | R/A | R/A | R/A | R/A |
| Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) | R/A | no | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A | R/A |
| Basel Convention | R/A | R/A | R/A | R/A | R/A | R/A | | | R/A | R/A | R/A | R/A |

| CONVENTION | ANTIGUA & BARBUDA | DOMINICA | GRENADA | ST. KITTS & NEVIS | SAINT LUCIA | SAINT VINCENT & THE GRENADINES | ANGUILLA | BRITISH VIRGIN ISLANDS | MONTSERRAT | GUADELOUPE | MARTINIQUE | ST. MARTIN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Convention on Migratory Species of Wild Animals | R/A | | Pending | | Observer | | R/A | R/A | R/A | | | |
| World Heritage Convention concerning the Protection of World Cultural and Natural Heritage | | | | | R/A | | R/A | R/A | R/A | | | |
| International Convention on the Regulation of Whaling | R/A | | | | | | R/A | | R/A | | | |
| Straddling Fish Stocks and Highly Migratory Fish Stocks | | | | | R/A | | | R/A | | | | |

*Note: R=Ratified, A=Acceded, S=Signed.*

## *Regional Treaties*

Among the many initiatives coming out of the LOS Convention was the establishment of the Regional Seas Program. The objective of these programmes, such as the Caribbean Environment Programme (CEP), is to implement the UN Environment's marine-related policies. They also provide a vehicle through which the national and regional maritime goals of the member countries are further advanced. These programmes are designed to address the accelerating degradation of the world's oceans and coastal areas by engaging neighbouring countries in comprehensive and specific actions to protect the marine environment they have in common. The establishment of the CEP programme resulted in the development and adoption of the Convention for the Protection and Development of the Marine Environment of the WCR "Cartagena Convention" on 24 March 1983. Its construction, together with that of its three technical protocols (Oil Spills; SPAW, and LBS), are focused on addressing oil spills, specially protected areas and land-based pollution in the WCR. It also recognises the importance and value of the fragile and vulnerable coastal and marine ecosystems of the region and reflects a collective response to these concerns. The goal of the CEP is to facilitate the implementation of the Convention in a systemic way, including by coordinating the exchange of information and technical expertise (CEP 2014-2015), to promote regional cooperation for the protection and sustainable development of the marine resources of the WCR. The Regional Coordinating Unit (UNEP-CAR/RCU) is the Secretariat to toe Convention. Based in Jamaica, it was established in 1986.

The other regional regime of significant interest to countries of the WCR is the Western Central Atlantic Fishery Commission (WECAF). The objective of WECAF is to promote the effective conservation, management and development of the living marine resources of the area of competence of the Commission, in accordance with the FAO Code of Conduct for Responsible Fisheries, and address common problems of fisheries management and development faced by members of the Commission. In that regard, the work of the organisation is guided by the following three principles:

- Promote the application of the provisions of the FAO Code of Conduct on Responsible Fisheries and its related instruments, including the precautionary approach and the ecosystem approach to fisheries management;
- Ensure adequate attention to small-scale, artisanal and subsistence fisheries; and
- Coordinate and cooperate closely with other relevant international organisations on matters of common interest.

The significance of these initiatives is their acknowledgement that the LOS Convention, while having the potential to deliver tremendous benefits, required appropriate regimes and management structures for those benefits to be realised. Small Island Developing States with vast ocean resources had neither the financial resources, institutional capacity or technical expertise to develop and manage these resources. More significantly, the transboundary nature of ocean resources, together with the challenges of environmental monitoring, could only be effectively undertaken and managed through collaborative mechanisms that superseded the individual political structures of the respective countries.

## *Regional Programmes*

The Caribbean Region's colourful colonial heritage ensures that ocean governance is not a straightforward issue but one in which different political systems, institutional structures and capacity institutions must be considered when problems have to be addressed or when programmes are being developed. The Treaty of Chaguaramas gave rise to the establishment of the Caribbean Community (CARICOM) in 1973, with the goal of uniting the region through economic and political integration while also providing for human and social development and security. Currently, with a membership of twenty countries (fifteen Member States and five Associate) CARICOM represents one of the most dispersed, multi-country, political organisation in the Western Hemisphere.

The 1973 Treaty of Chaguaramas was amended in 1989 to create the Caribbean Single Market and Economy (CSME). The primary objective of the CSME is to establish a single economic space within which business and labour operate; to achieve sustained economic development based on international competitiveness, coordinated economic and foreign policies, functional cooperation and enhanced trade and economic relations with third States.

There are several provisions in the Revised Treaty that seek to ensure that developments are tied to environmental consideration and specifically, management of resources in the surrounding seas (Caribbean and Atlantic). The Councils of the Community (Council on Trade and Economic Development [COTED] and Council for Human and Social Development [COHSOD]) are obliged to promote and develop policies that encourage

protection and preservation of the environment, and for sustainable development, and the promotion of human and social development in the Community. Some of the other intended policies are:

- Development, management and conservation of the fisheries resources in and among the Member States on a sustainable basis;
- Effective management of the soil, air and all water resources, the exclusive economic zone and all other maritime areas under the national jurisdiction of the Member States;
- Development and expansion of air and maritime transport capabilities in the Community;
- Management of straddling and highly migratory fish stocks;
- Ongoing surveillance of their exclusive economic zones;
- Safeguarding their marine environment from pollutants and hazardous wastes.

Concerns regarding food security for the region was undoubtedly a significant consideration in the establishment of the Caribbean Regional Fisheries Mechanism (CRFM). Established in 2003, and headquartered in Belize City, Belize, CRFM is an inter-governmental organisation with its mission being "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" (CRFM 2019). Membership of CRFM are Anguilla, Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago and the Turks and Caicos Islands. Among the many valuable contribution of CRFM to its members are the following:

- Promoting the protection and rehabilitation of fisheries habitats and the environment generally;
- Encouraging the establishment of effective mechanism for monitoring, control and surveillance of fisheries exploitation;
- Collecting and providing relevant data on fisheries resources, including sharing, pooling and information exchange;
- Seeking and mobilising financial and other resources in support of the functions of the mechanism;
- Supporting and enhancing the institutional capacity of Member States in fisheries' areas such as policy formulation; economics and planning; registration and licensing systems; information management;
- Resource monitoring, assessment and management; education and awareness building; harvest and postharvest technologies;
- Addressing urgent or ad hoc requests outside of the regular work program presented by Member governments.

In 2014, the members of CRFM adopted the Caribbean Community Common Fisheries Policy (CCCFP). The CCCFP is a binding treaty fostering greater harmonisation across the Caribbean in the sustainable management and development of the region's fisheries and aquaculture resources, with particular emphasis on promoting the most efficient use of shared resources while aiming to improve food security and reduce poverty in the region. Key elements include addressing illegal, unreported and unregulated (IUU) fishing and the integration of environmental, coastal and marine management matters into fisheries policies, safeguarding the fisheries and related ecosystems from threats and lessening impacts of climate change or natural disasters. The framework of the CCCFP has supported regional activities such as the development of policies on fisheries co-management, fisher engagement and participation, and a protocol on securing sustainable small-scale fisheries.

Another initiative of high relevance to the OECS Member countries is the *"CLME+: Catalysing Implementation of the Strategic Action Programme for the Sustainable Management of shared Living Marine Resources in the Caribbean and North Brazil Shelf Large Marine Ecosystems"*. It is a 5-year project that specifically aims at facilitating the implementation of the 10-year politically endorsed Strategic Action Programme for the Sustainable Management of the Shared Living Marine Resources of the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME+ SAP). The project seeks to achieve this by facilitating ecosystem-based management/ an ecosystem approach to fisheries (EBM/EAF) within the CLME+ region, in such a way that a sustainable and climate-resilient provision of goods and services from the region's living marine resources can be secured.

Given its regional and comprehensive nature, the UNDP/GEF CLME+ Project is uniquely positioned to address the root causes of environmental degradation, in particular the gaps and weaknesses in transboundary and cross-sectoral governance arrangements. In this same context, the project will assist stakeholders in achieving improved coordination, collaboration and integration among the vast array of ongoing and newly planned projects and initiatives that are of relevance to the broader objectives of the CLME+ SAP. As a Co-Executing

Agency for the "UNDP/GEF CLME+ Project", the OECS is supporting effective implementation of the CLME+ SAP across OECS and throughout the Caribbean through the ECROP including related deliverables under the CROP. The countries benefiting from this significant project include both GEF-eligible and non-eligible countries, including all of the member countries of the OECS sub-grouping.

## *The Organisation of Eastern Caribbean States (OECS)*

As an organisation comprised of 12 members, nine of whom are also members of CARICOM, the OECS has carved out a niche for itself in representing the interest of the smaller islands of the Caribbean. Established in 1981, under the Treaty of Basseterre, the OECS is an International Inter-governmental Organisation dedicated to regional integration in the Eastern Caribbean. The 1981 Treaty was replaced in 2010 with a Revised Treaty of Basseterre, building on the fundamental principles of cooperation, unity and solidarity among Members by creating an economic union. This new regime established a single financial and economic space within which goods, people and capital move freely, monetary and fiscal policies are harmonized, and countries continue to adopt a common approach to trade, health, education and the environment, as well as to the development of such critical sectors as agriculture, tourism and energy.

From the perspective of the OECS regional sub-grouping, several legal instruments define the shape of governance. These include the Revised Treaty of Chaguaramas, which established the Caribbean Single Market and Economy, The Revised Treaty of Basseterre, which created the Economic Union, and the St. Georges Declaration of Principles. While the St. Georges Declaration of Principles makes no mention of the ocean sector, it is considered as the benchmark environmental management framework in the Eastern Caribbean region. In that regard, the 21 principles outlined in that Declaration, serves to shape the sustainable development mandates of the OECS Member States and sets out precise requirements for monitoring environmental impacts and trends in ecosystem health.

Given that so much of OECS territory is ocean space, ocean resources are so critical to the region's sustainable development. In addition, given the proximity of several of the islands forming this subgrouping, and much of the ocean resources are migratory, it is only natural that they should seek a coordinated approach to the management of their resources. In that regard, the Revised Treaty of Basseterre stipulates that the OECS Economic Union shall pursue a common policy for "matters relating to the sea and its resources" (Article 4.2(o)). Article 14 also gives the organisation legislative competence concerning maritime jurisdiction and maritime boundaries (Article 14.1 (d)). Recognising also, the importance of marine transport to the Member States, the Treaty calls on each one of them to work towards the progressive harmonisation of "air and maritime transport policies", conscious of its relevance to tourism and trade (Article 19.2).

In 2013, the highest decision-making body of the Union (the Authority) approved and adopted the Eastern Caribbean Regional Ocean Policy (ECROP) and its Strategic Action Plan, which articulates some clear priorities for improving ocean governance in the Member countries. It also encourages the collaborative formulation of well-integrated governance frameworks capable of addressing marine user conflicts and protecting the fragile marine environments of Member States. The 2013 ECROP document outlined seven policies and thirteen goals to achieve the plan outlined in the SAP.
In 2014, the Commission commenced implementation of ECROP, and to date, several notable milestones have been achieved. Among those milestones are the following:

(i) A structure for research has been developed to strengthen the science-policy interface (including a marine research strategy, a code of conduct for responsible marine research, a data platform to support greater access to information, and a guideline of maritime standards);
(ii) An OECS Ocean Governance Team (OGT) has been established, comprising one nominated representative of each member State who supports the connectivity and articulated the needs on behalf of the state;
(iii) Three National Ocean Governance Committees (NOGCs) are established though still encountering challenges in becoming operational;
(iv) A revised ECROP and SAP completed in 2019 under the CORP, which will position ocean policy as an integral activity of the Commission and ensure it is aligned to the 2030 Sustainable Development, and in particular, SDG 14.

Under the CROP initiative, a revised ECROP has been prepared, which seeks to promote and guide the future sustainable use and development of the region's marine waters and resources, and includes the policy elements that was approved by the OECS Authority in 2013. Among the initiatives being pursued under this new ECROP programme will be "the development of

National Ocean Policies and Strategies; National Coastal and Marine Spatial Plans; a regional Marine Spatial Planning Framework; readily available web-based and OECS relevant ocean education materials and courses; and spatial tools to enhance decision making on ocean matters" (OECS 2019b).

The emphasis on aligning the new ECROP with the 2030 Sustainable Development Goals (SDG), and in particular, SDG 14 heralded a new global awareness regarding a comprehensive effort to manage the resources in an integrative and sustainable manner (UNGA, 2015). Outlining 17 Goals, the SDG 14 "Life Below Water" is of great importance to small island developing states (SIDS) and their particular vulnerabilities. For islands, oceans underpin their entire sustainable development agenda, with interlinkages between SDG 14 and other goals addressing poverty (SDG 1), food security (SDG2), water and sanitation (SDG 3), sustainable economic growth (SDG 8), reduced inequality (SDG 10); resilient communities (SDG 11), sustainable consumption and production (SDG 12), and, adapting to climate change impacts (SDG 13). Most importantly, SDG 14 lays out a plan and targets for achieving the Goals identified in SDG 14. That plan and targets revolve around a set of critical issues which are of significant relevance to the OECS Member States. These are as follows:

- Reduce Marine pollution
- Ecosystem-based sustainable management and protection of coastal and marine ecosystems
- Address and minimise Ocean acidification
- Increase economic to SIDS from the use of their Fisheries, aquaculture and tourism
- Conservation and sustainable use of marine areas, including Marine Protected Areas
- Sustainable management of sectors affecting or using the marine area
- Increase scientific knowledge and develop research capacity
- Provide access to resources and markets for small scale fishers
- Apply international law, as provided in LOS Convention to enhance conservation and sustainable use of ocean resources.

The Economic Commission for Latin America and the Caribbean (ECLAC) a Sub-Regional Headquarters for the Caribbean in Trinidad and Tobago has assumed responsibility for monitoring the implementation of the SDGs. In that regard, its focus has been on assisting States with monitoring and reporting on targets and national-level institutional arrangements for SDGs; in particular an integrated approach to the SDGs. At its workshop in 2016, ECLAC prioritized SDG target according to relevance to member countries and data availability. In respect of Goal 14, 14.4 (focusing on IUU fishing and restoration of fish stocks) and 14.5 (conservation of 10% of coastal and marine areas by 2020) was assigned a high priority (ECLAC, 2017). The OECS and its Member States must be required to work closely, both individually and collectively, with ECLAC to realise and fulfil the 2030 Sustainable Development agenda.

### *OECS Region-wide Governance Arrangements and Processes for Sustainable Fisheries*

A review of the fisheries legislation in nine OECS countries (excluding the French territories) revealed that all countries have fisheries legislation and include regulations to varying degrees. Most regulations identify conservation measures such as closed seasons, prohibited areas, size restrictions and gear restrictions. Though Fishery Advisory Committees are mentioned in most legislation, none of the OECS countries considered (with the exception of the British Virgin Islands) currently have one that is active (Government of the Virgin Islands, 2016). This is an important tool that can be used in fisheries management to represent varying interests from governmental agencies, fisherfolk organisations and/or NGOs, promoting participatory management within the sector and also assisting in reforming legislation, policies and plans. Some countries make provisions for management plans within their fisheries legislation. For example, the management plans in Montserrat and Grenada provide some of the more detailed guidance on fisheries management along with St Kitts and Nevis. Dominica, Grenada and St. Lucia currently have no provisions for FADs in legislation, whereas FADs are treated extensively within regulations in Montserrat, Anguilla, and St. Vincent and the Grenadines (Gore et al., 2019; FAO, 2016b; Singh-Renton and McIvor, 2015).

### *Overseas Countries and Territories*

In its quest to address the concerns of small island states, the OECS Commission has reached out to neighbouring states, even though their political structures, affiliation and language does present some challenges. Notwithstanding those challenges, it should be recognized that the United Kingdom Overseas Territories (UKOTs) and French Overseas Countries (FOC) have a governing structure of their own. In respect of UKOTs, they each have separate constitutions made by Order in Council. All have Governors or Commissioners (UK Civil Servants) who represent both Her Majesty the Queen in the Territory and the Territory's interests to Her Majesty's Government in London. The OTs Directorate in the

Foreign and Commonwealth Office (FCO) takes the overall lead on managing the UK's relationship with its OTs. Still, all Government Departments have a responsibility towards the OTs (DEFRA, 2012).

The responsibility for environmental management in the UKOTs, however, has been devolved to the UKOTs' Governments. In that regard, three UK Government Departments support UKOTs on ecological issues: Department for Environment, Food and Rural Affairs (Defra), Department for International Development (DFID), and the Department for Energy and Climate Change (DECC). The Foreign and Commonwealth Office (FCO) leads on overall Government's policies on the UKOTs. What this means is that these overseas territories cannot enter into any legal agreement with foreign entities. In the case of multilateral environmental agreements, e.g., LOS Convention, the UK government will sign on their behalf (Vaslet and Renoux, 2016).

Among the French West Indies (FWI), Guadeloupe, Martinique and St-Martin are recognized as European ORs and St. Barthélemy is a European OT. The State is represented in the Overseas entities by the Prefet in Guadeloupe and Martinique, and a delegated Prefet for the Overseas Collectivities of St-Martin and St. Barthélemy. Guadeloupe is an Overseas Department and Region (DROM - Département et Région d'Outre-Mer) administrated by a departmental and regional councils. St-Martin, and Martinique (formerly a DROM that became a COM in 2015) are Overseas Collectivity (COM) administrated by a Territorial Council (Vaslet and Renoux, 2016).

### *Security*

The Caribbean Sea, as noted previously, is a major shipping route for many human activities. In that regard, sea safety and security are vital for the continued and peaceful operations of those activities. In the Caribbean, there are many threats to maritime security, such as pollution, natural disasters, irregular migration and illicit trafficking, piracy, smuggling and human trafficking. Given the transnational nature of these challenges, these problems cannot be addressed by any one country alone. It is only by working together that the countries of the region are best able to respond to these global challenges and improve the safety and security of the ocean. While some of the OECS Member States have dedicated marine vessels to patrol their coast, the vast amount of ocean space, together with the high cost of surveillance vehicles (air and sea), makes it impossible for each country to provide and sustainably support the level of coverage required.

Traditionally, the countries have relied on the neighbouring superpowers, primarily the United States, United Kingdom, the Dutch and Canadians to provide a more extensive and sophisticated level of maritime security. That interest and support are predicated on geopolitical issues which saw the United States taking a keen interest in defending its interest in the Americas. Likewise, the British, French and Dutch also sought to protect the interest of their colonies in the Caribbean. In recent years concerns regarding drug and human trafficking, piracy and security of national assets and responding to disasters have raised the significance of maritime security and the need to ensure that countries are adequately equipped to address those threats. An emerging threat for the Caribbean is the issue of cybersecurity, where navigational systems can be hacked or where port/customs software can be compromised (Caribbean Maritime, 2015).

Combating maritime threats and overcoming challenges, therefore, requires cooperation among regional partners, and this they have sought to do through the establishment of the Regional Security System and the utilisation of various regional and international instruments. Unfortunately, due to financial and capacity constraints, the implementation of these instrument has not kept pace with the threats, raising the prospects that the maritime security apparatus in the region is extremely vulnerable to the threats identified above.

### *National Governance Processes*

As noted above, under the ECROP initiative, ocean matters are intended to be addressed by a NOGC as a priority. This initiative was agreed upon by the OECS Council of Ministers of Environmental Sustainability at the 27th April 2017, held in St. George's, Grenada. At that meeting, Member States were asked to give priority to the establishment of National Ocean Governance Committees (NOGC) and the updating or preparation of a National Ocean Policy (NOP). The NOGC, it is envisaged, will provide the overarching structure at the national level to guide their respective governments on the management of the marine space that falls under their jurisdiction. They are also required to take responsibility for coordinating and implementing the national ocean policies and action plans. Primarily, they are meant to be the mechanisms for bringing together diverse stakeholders with competing demands for Marine Resources, as well as coordinating line Ministries and agencies whose functions concern the health and wealth of the ocean.

Areas of responsibilities for NOGCs include issues related to maritime boundary delimitation; management and sustainable use of fisheries and other living marine resources; exploration and exploitation of non-living

marine resources including hydrocarbons; protection of the marine environment; marine scientific research; customs, immigration and maritime enforcement; and maritime administration including shipping. To date, only Saint Vincent and the Grenadines has prepared a NOP, and one of two countries to have a functioning NOGC.

The Department of Maritime Administration in Saint Vincent and the Grenadines, with assistance from the Commonwealth Secretariat, completed the first draft in 2012. However, that document was subsequently refined and updated by the Economic Planning and Sustainable Development Division, in consultation with other key agencies in 2018. The vision for ocean governance as set out in the document is "*To maintain healthy and richly biodiverse oceans by securing, enforcing and sustainably managing the space in an integrated way to promote social, cultural and economic development*". It sets out the goals for ocean use and management and provides a framework for legal and institutional development. The policy document also includes a strategic plan, which sets out the Government's initial priorities and will be implemented by the government, private sector, civil society and non-governmental organisations

The BVI, with assistance from the UNDP, completed their "Strategic Blue Economy Roadmap" in 2019. The vision, as articulated in that document, is "*To develop the blue economy as a means to promote sustainable economic growth while protecting and enhancing the habitats and resources that underpin that growth through improved environmental governance and stewardship, better education and an improved understanding of our shared marine space*". That document sets out an integrated approach to ocean-based sustainable development, which brings together economy, environment and society, consistent with the Sustainable Development Agenda (2030), Aichi Target 11 of the Convention on Biological Diversity and the Paris Agreement on Climate Change (2015).

The roadmap sets the direction and development pathways for future investment in and development of a sustainable ocean-based economy in the Virgin Islands. Specifically, the roadmap aims to create a revitalisation process that results in healthy ecosystems that can sustain growth in several economic sectors and provide an opportunity for building equitable societies. It is envisaged that over time this revitalisation will support the development of new sectors attracting greater investment and financial support to the blue economy resulting in a higher number of businesses supported by the blue economy. Based on a recent review, it was determined that in the NOP currently demonstrates proper alignment with ECROP and the 2030 agenda plus the new international agreements coming out of the UNFCCC (OECS 2019a).

Grenada has provided no clear indication that a NOP will be prepared in the future nor any immediate plans to establish a NOGC. However, there are already several policies and plans in place (e.g., Blue Growth Plan) that are relevant to marine management. Likewise, there are coordinating mechanisms established to support a National Ocean Governance Committee, such as the Department of Economic and Technical Cooperation who have a programme objective to coordinate technical and economic cooperation programmes with selected regional and international development agencies.

Although a Draft National Maritime Policy has been prepared in St. Kitts and Nevis, it has not been endorsed by cabinet. Plans are, however, underway to update that policy, in alignment with the ocean policies articulated by ECROP. While Antigua and Barbuda has announced the establishment of a NOGC, they have yet to indicate plans to undertake the preparation of their NOP. Likewise, Saint Lucia has outlined the framework for the establishment of a NOGC.

The importance of these councils lies not so much in the institutional architecture but more as a means of ensuring that the NOGCs will ensure that adequate consultations are held, and the views of relevant parties are taken into consideration during national decision-making. Notwithstanding the merits of such a coordinating mechanism, capacity constraints, brought on by overburdened staff could delay the pace at which these NOGCs becomes operational. Another consideration is the cross-cutting and overlapping ministerial portfolios under which several ocean activities fall. These are sensitive, but relevant structural issues which will have to be resolved and may require consideration of different approaches, including external support from the OECS Commission, to move the policy implementation process forward by the time the ECROP is rolled out.

# CONCLUSION

The coastal and marine environment of the Caribbean consists of a diversity of habitats such as coral reefs, mangroves, seagrass beds and nearshore/offshore areas that support an abundance of marine life. Through various provisioning, cultural and supporting services, these habitats and species supply dependent communities and nations with a variety of goods (e.g., fish and tourism products) and services (e.g., coastal protection, and carbon sink). However, the health and existence of these coastal and marine ecosystems are threatened by both natural and anthropogenic factors including hurricanes, storms surges, climate variability, pollution and coastal developments. Mirroring the conditions of the larger marine area, the smaller countries of the region, located in the Eastern Caribbean, is acutely dependent on the resources provided by surrounding ocean and thus facing more significant threats from their degradation and destruction.

What this snapshot has revealed, is that coastal and ocean resources inclusive of mangroves, reefs, seagrass beds and fisheries, require immediate attention with a strong focus on both protection and regeneration. The main threat to mangrove ecosystems in the Caribbean has been the conversion of these areas to other uses such as agricultural and aquaculture activities as well as additional infrastructure development including ports and resorts. Overfishing and habitat destruction have also contributed to the reduction of stocks in reefs and nearshore fisheries, causing a greater dependency on pelagic fisheries. They can be attributed to illegal, unreported and unregulated fishing, poor regulation of fisheries, lack of enforcement of regulations and lack of political will. In addition, the invasion by foreign flora and fauna, such as the sargassum seaweed and the lionfish have created additional challenges and threatens the livelihood of a large percentage of the population across the OECS Member States.

Given the significance of coastal and marine resources to the socio-economic fabric of islands of the Eastern Caribbean they have sought to engage various management and governance approaches that seek to minimise conflicting uses while promoting the adoption of policies, strategies and legislative instruments that will ensure the integrity of the resource base. These management measures such as the adoption and implementation of integration coastal zone management plans, national adaptation plans and the establishment of marine protected areas, will require a vast amount of technical and financial resources to implement the action plans proposed. However, both of these have been identified as being in short supply in economically challenged small island developing states. Various financing instruments such as the establishment of regional and national trust funds have provided some immediate, if not, short-term relief; however, much more innovating financing mechanisms will be required. In pursuing the development of their blue economy, the Member States, with the support of the OECS Commission, will have to pursue and develop the policy, legislative and institutional infrastructure that will allow the countries to truly benefit from the development potential around which the revised ECROP has been designed. The effort by the OECS Commission to create robust institutional mechanisms at the regional and national levels is a first step in creating the foundation on which that future can be realised. With the continued support of Member States, and other regional and international community, it is not a far-fetched reality.

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# ACRONYMS

| |
|---|
| **BREA**<br>Business Research and Economic Advisors |
| **BVI**<br>British Virgin Islands |
| **CARICOM**<br>Caribbean Community |
| **CANARI**<br>Caribbean Natural Resources Institute |
| **CBD**<br>Convention on Biodiversity |
| **CBF**<br>Caribbean Biodiversity Fund |
| **CCI**<br>Caribbean Challenge Initiative |
| **CCCFP**<br>Caribbean Community Common Fisheries Policy |
| **CDB**<br>Caribbean Development Bank |
| **CDKN**<br>Climate Development and Knowledge Network |
| **CEP**<br>Caribbean Environment Programme |
| **CERMES**<br>Centre for Resource Management and Environmental Studies |
| **CIA**<br>Central Intelligence Agency |
| **CLME**<br>Caribbean Large Marine Ecosystem |
| **CMEP**<br>Commonwealth Marine Economics Programme |
| **CRFM**<br>Caribbean Regional Fisheries Mechanism |
| **CROP**<br>Caribbean Regional Oceanscape Project |
| **CTO**<br>Caribbean Tourism Organisation |
| **DPSIR**<br>Driver (D) - Pressure (P) - State (S) - Impact (I) - Response (R) |
| **ECCB**<br>Eastern Caribbean Central Bank |
| **ECLAC**<br>Economic Commission for Latin America and the Caribbean |
| **ECMMAN**<br>Eastern Caribbean Marine Managed Areas Network |
| **ECROP**<br>Eastern Caribbean Regional Ocean Policy |
| **EEZ**<br>Exclusive Economic Zone |
| **FAO**<br>United Nations Food and Agriculture Organisation |
| **FOC**<br>French Overseas Countries |
| **DEFID** |

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|---|
| Department for International Development |
| **DEFRA**<br>Department for Environment, Food and Rural Affairs |
| **FCO**<br>Foreign and Commonwealth Office |
| **FWI**<br>French West Indies |
| **GDP**<br>Gross Domestic Product |
| **GEF**<br>Global Environmental Facility |
| **ICRI**<br>International Coral Reef Initiative |
| **ICZM**<br>Integrated Coastal Zone Management |
| **IMO**<br>International Maritime Organisation |
| **IUCN**<br>International Union for Conservation of Nature |
| **LBS**<br>Land-based Sources of Marine Pollution |
| **LME**<br>Large Marine Ecosystem |
| **NAPs**<br>National Adaptation Plans |
| **NCTF**<br>National Conservation Trust Funds |
| **NDC**<br>National Determined Contribution |
| **NOAA**<br>National Oceanic and Atmospheric Administration |
| **NOGC**<br>National Ocean Governance Committee |
| **NOP**<br>National Ocean Policy |
| **OECD**<br>Organisation for Economic Co-operation and Development |
| **OECS**<br>Organisation of Eastern Caribbean States |
| **OGT**<br>Ocean Governance Team |
| **OTs**<br>Overseas Territories |
| **OTEC**<br>Ocean Thermal Energy Conversion |
| **RHI**<br>Reef Health Index |
| **SAG**<br>Scientific Advisory Group |
| **SAP**<br>Strategic Action Plan |
| **SCTL**<br>Stony Coral Tissue Loss |

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|---|
| **SDG**<br>Sustainable Development Goal |
| **SIDS**<br>Small Island Developing States |
| **SOMEE**<br>State of the Marine Environment and Associated Economies |
| **SPAW**<br>Specially Protected Areas and Wildlife |
| **TEUs**<br>Twenty-foot equivalent units |
| **TNC**<br>The Nature Conservancy |
| **TWAP**<br>Transboundary Waters Assessment Programme |
| **UKOT**<br>United Kingdom Overseas Territories |

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|---|
| **UN**<br>United Nations |
| **UNCLOS**<br>United Nations Convention on the Law of the Sea |
| **UNDP**<br>United Nations Development Programme |
| **UNEP-WCMCP**<br>UN Environment Programme World Conservation Monitoring Centre |
| **UNEP-CEP**<br>United Nations Environment Programme - Caribbean Environment Programme |
| **UNFCCC**<br>United Nations Framework Convention on Climate Change |
| **UNWTO**<br>United Nations World Tourism Organization |
| **USGS**<br>United States Geological Survey |
| **WCR**<br>Wider Caribbean Region |
| **WECAFC**<br>Western Central Atlantic Fishery Commission |
| **WTTC**<br>World Travel and Tourism Council |

# APPENDIX

## APPENDIX 1: LIST OF STAKEHOLDER CONSULTATIONS

| DATE | COUNTRY | PRESENT | ORGANISATION/POSITION | EMAIL CONTACT |
|---|---|---|---|---|
| 4-Feb-20 | Antigua and Barbuda | Hon. Molwyn Joseph | Minister of Health and the Environment,<br>Ministry of Health and Environment | Tel: (268) 462-1372 |
| | | Mr. Ian Horsford | Chief Fisheries Officer (Ag).,<br>Fisheries Division | Tel: (268) 462-5522 |
| | | Mr. Hilroy Simon | Fisheries Officer,<br>Fisheries Division | Tel: (268) 462-5522<br>Email: hilroy.simon@ab.gov.ag |
| | | Mr Jason P. Williams | Data Manager, Department of the Environment<br>Ministry of Health and the Environment | Tel: (268) 462-625<br>Email: jasonp.williams@ab.gov.ag |
| | | Mr. Mitchell Lay | Antigua and Barbuda Fishers Alliance & Coordinator of the Caribbean Network of Fisherfolk Organisation | Tel: (268) 784-4690<br>Email: mitchlay@yahoo.co.uk |
| | | Ms. Arica Hill | Executive Director<br>Environmental Awareness Group (EAG) | Tel: (268) 462 6236<br>Email: arica.eag@gmail.com |
| | | Ms. Ruleta Camacho | General Manager<br>Nelson's Dockyard National Parks, | Tel: 1(268) 481-5021/22<br>Email: ruleta_j@yahoo.com |
| | | Mrs. Indira James-Henry | Environmental Implementation Coordinator, Ministry of Health and Environment | Tel: (268) 462-5522<br>Email: |
| | Dominica | Derrick Theophille | Senior Fisheries Officer, Fisheries Division | Email: derkjt@gmail.com |
| 15-Jan-20 | Grenada | Ian Noel | Grenada Port Authority | Email: allauno@hotmail.com |
| | Grenada | Orlando Harvey | Fisheries Division | Email: landokeri@yahoo.com |
| 19 - 22 January 2020 | St. Kitts and Nevis | Mr. McClean Hobson | Director/Maritime Affairs, Ministry of Tourism & International Transport | Tel: 1 (869) 467-1385<br>Email: maritimeaffairsskn@gmail.com |
| | | Mr. Mark Williams | Director of Marine Resources, Department of Marine Resources | Tel: (869) 465-8045<br>Tel: (869) 466-8739 |
| | | Mr. Joel Williams | Deputy Director of Planning, Department of Physical Planning, Natural Resources and Environment (Nevis) | Tel:<br>Email: joel.williams@niagov.com |
| | | Ms. Thema Ward | Environmental Officer, Department of Physical Planning, Natural Resources and Environment (Nevis) | Tel:<br>Email: jamila_w60@hotmail.com |
| | | Mr. Regiwell A. Francis | Director, St. Kitts Marine Works Ltd. | Tel: (869) 667-8930<br>Email: bentels@hotmail.com |
| | | Mr. Aeneas "Nee" Hollins | Director of Yachting<br>The Marina at Christophe Harbour | Tel: (869) 465-9755<br>Email: aeneas_hollins@christopheharbour.com |
| 14 – 19 January 2020 | Saint Lucia | Ms. Annette Rattigan-Leo | Sustainable Development and Environment Division, Ministry of Education, Innovation, Gender Relations, and Sustainable Development | Tel: 758-451- 8746<br>Email: aleo@sde.gov.lc |

| DATE | COUNTRY | PRESENT | ORGANISATION/POSITION | EMAIL CONTACT |
|---|---|---|---|---|
| | | Ms. Lavina Alexander | Sustainable Development and Environment Division<br>Department of Sustainable Development | Tel: 1 (758) 468-5833<br>Cell: 1 (758) 723-4998<br>Email: lalexander@sde.gov.lc |
| | | Ms. Bethia Thomas | Sustainable Development and Environment Division, Department of Sustainable Development | Tel: (758) 468-5833<br>Email: bethia.thomas2015@gmail.com |
| | | Mr. Christopher Alexander | Director Maritime Affairs, Saint Lucia Air & Sea Ports Authority | Tel: (758) 468-4617<br>E-mail: christopher.alexander@slaspa.com |
| | | Ms. Samantha Charles | Tourism Officer, Ministry of Tourism | Tel: (758) 468-4617<br>Cell: (758) 720-4618<br>Email: samantha.charles@govt.lc |
| 17 – 19 December 2019 | Saint Vincent and the Grenadines | Mr. Hyrone Johnson | Director Maritime Administration / SVG Ocean Governance | Tel: (784) 456 1378<br>Email: director.svgmarad@gmail.com |
| | | Mr. Glen Beache | Chief Executive Officer<br>St. Vincent and the Grenadines Tourism Authority | Tel: (784) 456-6222<br>Email: gbeache@discoversvg.com<br>Website: www.discoversvg.com |
| | | Ms. Yassa Belmar | Biodiversity Officer<br>Ministry of | Tel: (784) 485-6992<br>Email: yasa.belmar@gmail.com |
| | Anguilla | Ms. Sharma Flemming | Department of Environment | Melissa.Meade@gov.ai |
| | | Ms. Dallenn Conner | | |
| | | Mr. Kafi Gumbs | Department of Fisheries | |
| 22 – 24 January 2020 | The British Virgin Islands | Mr. Mervin Hastings | Marine Biologist, Ministry of Natural Resources, Labour & Immigration | Tel: 284 468 3701<br>Email: mhastings@gov.vg |
| | | Mr. Joseph Smith-Abbott | Deputy Permanent Secretary, Ministry of Natural Resources, Labour & Immigration | Tel: 284 468 3701 ext. 2147<br>Fax: 284 494 4283<br>JSmith-Abbott@gov.vg |
| | | Ms. Patlian Johnson | Consultant – Recovery & Development, Premiere's Office<br>Government of The Virgin Islands | Tel:<br>Email: pjohnson@policysolutionsbvi.com |
| | | Mr. Ken Pemberton | Fisheries Offices, Fisheries & Agriculture | Tel: 1 (284) 468-6123/6124<br>Email: Kpemberton@gov.vg |
| | | Ms. Argel Horton | Marine Biologist, Ministry of Natural Resources<br>Labour and Immigration | Tel: 1 (284) 468-2147<br>Email: aahorton@gov.vg |
| | | Ms. Irene Smith | Conservationist, Ministry of Natural Resources & Labour<br>Immigration | Tel: 1(284) 468-2147<br>Email: ismith@gov.vg |
| | | Ms. Rozina Gumbs | GIS Officer (geographical info systems) | Phone: 1 (284) 468-3701<br>Email: rngumbs@gov.vg |
| | | Cpt. Raman Bala | Director, Virgin Islands Shipping Register | Tel: 1 (284) 468-2902<br>Email: rbala@gov.vg |

| DATE | COUNTRY | PRESENT | ORGANISATION/POSITION | EMAIL CONTACT |
|---|---|---|---|---|
| | | Ms. Nancy Pascoe | Deputy Director, National Parks Trust of the Virgin Islands | Tel: (284) 345-3650<br>Email: deputydirector_nwp@bvinpt.org |
| 4 – 6 February 2020 | Montserrat | Hon. Easton Taylor-Farrell | Premier and Minister of Finance, Economic Development, Access and Tourism | Tel: 664-491-3378/3462/2066/2557<br>Email: op@gov.ms |
| | | Hon. Crenston Buffonge | Minister of Agriculture, Lands, Housing and Environment | Tel:<br>Email: |
| | | Mr. Alwyn Ponteen | Chief Ocean Governance and Fisheries Officer<br>Ministry of Agriculture, Lands, Housing & Environment<br>Brades | Tel: (664) 496-1996<br>Email: ponteena@gov.ms;<br>alwyn.ponteen@myport.ac.uk |
| | | Mrs. Beverly Mendes | Permanent Secretary, Ministry of Agriculture, Lands, Housing & Environment | Tel:<br>Email: Mendesb@gov.ms / Malhemail@gov.ms |
| | | Ms. Melissa O'garro | Director of Agricultural Services, Ministry of Agriculture, Lands, Housing & Environment | Email: Ogarrom@gov.ms |
| | | Mr. Colin Owen | Financial Secretary, Ministry of Finance, Economic Development, Access and Tourism | Tel: (664) 491-2777/3057/2356<br>Email: owenc@gov.ms |
| | | Mr. Warren Solomon | Director of Tourism, Montserrat Tourism Division<br>Office of the Premier | Tel: 1(664) 491-4702/4703, 495-7101<br>Mob: 1(664)392-3061<br>Email: warrensolomon@montserrattourism.ms |
| | | Ms. Roestta West Gerald | Product Development Officer<br>Montserrat Tourism Division<br>Office of the Premier | Tel: 1(664) 491-4702/4703, 495-7101 |
| | | Mr. Ashley Lindsey | Access Coordinator & Operations Manager<br>Air and Sea Ports Authority<br>Office of the Premier | Tel: 1(664) 496-6229<br>Email LindseyA2@gov.ms |
| | | Mr. Joseph Irish | Airport Manager | |
| | | Mr. Andrew Myers | Director – Project Manager<br>Island Solutions | Tel: 1 (954) 769-0079 (664) 496-7333<br>Email: islandsolutions.org@gmail.com<br>Skype: andrewjmyers |
| | | Mr. Albert Williams | Deputy Com. Of Police | |
| | | Mr. Courtney Rodney | Superintend Ag and responsible for the Marine Vessel – Marine Unit | |
| | | Mr. Paul Lewis, | Leader of the Opposition | |
| | | Mr. Hero Cassel | Community Facilitator | |
| | | Ms. Emmy Aston | Project Director, Island Solutions | Tel: 1 (664) 496-9283<br>Email: bluemermaid.yoga@gmail.com |
| | | Mr. Sheldon Carty | Montserrat Boaters and Fishing Association | Tel:<br>Email: sheldoncarty@hotmail.com |

| DATE | COUNTRY | PRESENT | ORGANISATION/POSITION | EMAIL CONTACT |
|---|---|---|---|---|
| | | Cpt. John Howes | Fisher | Email: safe500@hotmail.com |
| 16 January 2020 | St. Martin | Omar Morales | INTERREG Caraïbes European Program | Omar.MORALES@com-saint-martin.fr |
| 24 January 2020 | St. Martin | Elie Touze | Head of Rural and Maritime Development including Fisheries | Elie.Touze@com-saint-martin.fr |
| 24-Jan-20 | | | | |
| 17 February 2020 | Guadeloupe | Emily Siousaram | Head of Service, Institutional Cooperation Unit<br>Direction de la Coopération International Cooperation Department, Conseil Régional de Guadeloupe | emily.siousarram@cr-guadeloupe.fr |
| 17 February 2020 | | Ruddy Blonbou | Deputy director of cabinet<br>Conseil Régional de la Guadeloupe | rblonbou@cr-guadeloupe.fr |
| 17 February 2020 | | Nathalie Isaac | Director of International cooperation<br>Région Guadeloupe | natalie.isaac@cr-guadeloupe.fr |
| 17 February 2020 | | Nicolas Diaz | Head of the Blue Strategy and Maritime Activities Service<br>Blue Growth Department | nicolas.diaz@cr-guadeloupe.fr |
| 17 February 2020 | | Jérôme Dancoisne | Head of the Environment and waste, service<br>Région Guadeloupe | jerome.dancoisne@cr-guadeloupe.fr |
| 17 February 2020 | | Pierre Bourgeois | Direction de la Coopération<br>Région Guadeloupe | pierre.bourgeois@cr-guadeloupe.fr |
| 17 January 2020 | OECS | Mr. Chamberlain Emmanuel | Head, Environmental Sustainability Cluster<br>Organisation of Eastern Caribbean States (OECS) Commission | Tel: (758) 455-6387<br>Email: chamberlain.emmanuel@oecs.int |
| 17 January 2020 | | Mr. David Robin | Oceans Governance & Fisheries Coordinator<br>Organisation of Eastern Caribbean States (OECS) Commission | Tel: (758) 455-6344<br>Email: david.robin@oecs.int |
| 17 January 2020 | | Ms. Sonia Rees | Communications Officer<br>Organisation of Eastern Caribbean States (OECS) Commission | Tel:<br>Email: sonia.rees@oecs.int |
| 19 December 2019 | CRFM | Dr. Susan Singh-Renton | Deputy Executive Director<br>CRFM | Tel: (784) 457-3474<br>Email: susan.singhrenton@crfm.int |
| 19 December 2019 | | Ms. June Masteers | Statistics & Information Analyst<br>CRFM | Tel: (784) 457-3474<br>Email: june.masters@crfm.net |

## APPENDIX 2: COUNTRY PROFILE DATA AND SOURCES

| COUNTRY | EEZ ($KM^2$) | SHELF AREA ($KM^2$) | COASTLINE (KM) | LAND AREA ($KM^2$) | POPULATION (2018) | GDP (US) (2018) | GDP PER CAPITA (US) (2018) | HDI (2018) | HDI RANK (2017) | MAIN INDUSTRIES |
|---|---|---|---|---|---|---|---|---|---|---|
| Antigua and Barbuda | 111,914 | 3,886 | 153 | 280 (A), 161 (B) | 96,000 | $1,611 million | $16,727 | 0.776 | 73 | tourism, construction, light manufacturing |
| Dominica | 28,653 | 356 | 148 | 751 | 68,000 | $551 million | $7,691 | 0.724 | 98 | soap, coconut oil, tourism, copra, furniture, cement blocks, shoes |
| Grenada | 25,670 | 2,709 | 121 | 344 | 108,000 | $1,186 million | $10,640 | 0.763 | 78 | F&B, textiles, light assembly operations, tourism, construction, education, call-centre operations |
| St. Kitts and Nevis | 9,533 | 855 | 135 | 168 (SK), 93 (N) | 57,000 | $1,011 million | $19,275 | 0.777 | 73 | tourism, cotton, salt, copra, clothing, footwear, beverages |
| Saint Lucia | 15,470 | 593 | 158 | 606 | 188,000 | $1,922 million | $10,566 | 0.745 | 89 | tourism; clothing, assembly of electronic components, beverages, corrugated cardboard boxes, lime processing, coconut processing |
| Saint Vincent and the Grenadines | 36,381 | 2,340 | 84 | 389 | 109,000 | $811 million | $7,361 | 0.728 | 95 | tourism; food processing, cement, furniture, clothing, starch |
| Anguilla | 92,178 | | 61 | 91 | 17,422 | $175.4 million (2009) | $12,000 (2008) | 0.865 (2008) | High | tourism, boat building, offshore financial services |
| British Virgin Islands | 80,117 | | 80 | 151 | 35,802 | $500 million (2017) | $34,200 (2017) | 0.945 (2008) | Very High | tourism, light industry, construction, rum, concrete block, offshore banking centre |
| Montserrat | 7,582 | | 40 | 102 | 5,315 | $167.4 million (2011) | $34,000 (2011) | 0.821 (2008) | High | tourism, rum, textiles, electronic appliances |
| Guadeloupe | 90,528 | | 581 | 1,628 | 395,700 (2016) | $10.3 billion (2014) | $25,479 (2014) | 0.850 (2018) | Very High | tourism, agriculture, light industry and services |
| Martinique | 47,640 | | 369 | 1,128 | 376,480 (2016) | $10.7 billion (2012) | $27,688 (2012) | 0.863 (2016) | Very High | tourism, agriculture, small industry |
| St. Martin | 5,088 (with St. Barthelemy) | | 58.9 (entire island) | 54.4 | 35,334 (2017) | $ 636.9 million (2014) | 18,140 (2014) | 0.702 (2000) | High | tourism, light industry, heavy industry |

## Data Sources

| PARAMETER | COUNTRIES | SOURCE |
|---|---|---|
| Exclusive Economic Zone (EEZ) | Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines | FAO, 2020 |
| | Anguilla, British Virgin Islands, Montserrat, Guadeloupe, Martinique, St. Martin | Vaslet and Renoux, 2016 |
| Shelf Area | Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines | FAO, 2020 |
| Coastline | All OECS Member States | CIA, 2020 |
| Land Area | Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Anguilla, British Virgin Islands, Montserrat, St. Martin | CIA, 2020 |
| | Guadeloupe, Martinique | Vaslet and Renoux, 2016 |
| Population, Gross Domestic Product (GDP) and GDP per capita | Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines | FAO, 2020 |
| | Anguilla, British Virgin Islands, Montserrat | CIA, 2020 |
| | Guadeloupe, Martinique, St. Martin | INSEE, 2020 |
| | Anguilla, British Virgin Islands, Montserrat | CIA, 2020 |
| Human Development Index (HDI) and HDI Rank | Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines | UNDP, 2019 (out of 189 countries and territories) |
| | Anguilla, British Virgin Islands, Montserrat, Guadeloupe, Martinique, St. Martin | Hastings, 2009 |

## APPENDIX 3: APPENDIX 3: DATA TABLE FOR CORAL REEF AREA

| COUNTRY | ATLAS OF OCEAN WEALTH – MAPPING OCEAN WEALTH EXPLORER ($KM^2$) | REEFS AT RISK ($KM^2$) |
|---|---|---|
| Montserrat | | 25 |
| Anguilla | 52 | 70 |
| Dominica | 49 | 70 |
| Saint Lucia | 61 | 90 |
| Saint Vincent and the Grenadines | 85 | 140 |
| Grenada | 118 | 160 |
| St. Kitts and Nevis | 82 | 160 |
| Antigua and Barbuda | 116 | 180 |
| Martinique | 155 | 260 |
| British Virgin Islands | 267 | 380 |
| Guadeloupe* | | 400 |
| **Total** | **985** | **1,935** |

**Sources:** Reefs at Risk (Burke and Maidens, 2004); Atlas of Ocean Wealth (TNC, 2019).
*Data for Guadeloupe includes St. Martin and St. Barthelemy.

## APPENDIX 4: REEFS AT RISK THREAT INDEX

| COUNTRY | REEFS AT RISK THREAT INDEX (%) | | | | INDIVIDUAL THREATS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | COASTAL DEVELOPMENT (%) | | | SEDIMENT AND POLLUTION FROM INLAND SOURCES (%) | | | MARINE-BASED SOURCES OF POLLUTION (%) | | | FISHING PRESSURE (%) | | |
| | LOW | MEDIUM | HIGH | VERY HIGH | LOW | MEDIUM | HIGH | LOW | MEDIUM | HIGH | LOW | MEDIUM | HIGH | LOW | MEDIUM | HIGH |
| Antigua and Barbuda | 0 | 39 | 50 | 11 | 29 | 55 | 16 | 71 | 29 | 0 | 71 | 18 | 11 | 0 | 39 | 61 |
| Dominica | 0 | 0 | 63 | 37 | 4 | 49 | 47 | 0 | 25 | 75 | 86 | 10 | 4 | 0 | 0 | 100 |
| Grenada | 0 | 20 | 40 | 40 | 15 | 22 | 63 | 43 | 27 | 30 | 76 | 14 | 10 | 0 | 37 | 63 |
| St. Kitts and Nevis | 0 | 0 | 77 | 23 | 5 | 67 | 28 | 0 | 81 | 19 | 74 | 15 | 11 | 0 | 3 | 97 |
| Saint Lucia | 0 | 0 | 39 | 61 | 1 | 32 | 67 | 0 | 51 | 49 | 60 | 29 | 11 | 0 | 2 | 98 |
| Saint Vincent and the Grenadines | 0 | 38 | 48 | 14 | 36 | 29 | 35 | 84 | 0 | 16 | 71 | 19 | 10 | 0 | 59 | 41 |
| Anguilla | 0 | 11 | 89 | 0 | 33 | 33 | 34 | 99 | 1 | 0 | 100 | 0 | 0 | 0 | 11 | 89 |
| British Virgin Islands | 3 | 62 | 25 | 10 | 54 | 29 | 18 | 83 | 17 | 0 | 76 | 16 | 8 | 4 | 77 | 19 |
| Monserrat | 0 | 0 | 71 | 29 | 8 | 81 | 11 | 0 | 30 | 70 | 24 | 47 | 29 | 0 | 100 | 0 |
| Guadeloupe | 0 | 15 | 66 | 19 | 15 | 33 | 52 | 55 | 32 | 13 | 73 | 23 | 4 | 1 | 28 | 71 |
| Martinique | 0 | 0 | 65 | 35 | 9 | 43 | 48 | 2 | 79 | 19 | 62 | 30 | 8 | 0 | 0 | 100 |

**Note:** Reefs at Risk in the Caribbean coral reef area data for Guadeloupe includes St. Martin and St. Barthelemy. The Reefs at Risk Threat Index reflects cumulative threat from four individual threats (coastal development, sediment and pollution from inland sources, marine-based sources of pollution, fishing pressure) at a single location. In areas where three or four of the threats were rated as high, the index is set to very high. Threats % add up to 100 (Burke and Maidens, 2004).

Threats to reefs from **sedimentation and pollution from inland sources** were modelled for over 3,000 watersheds discharging into the Caribbean. Threats to coral reefs from **marine-based sources** were evaluated based on distance to ports (stratified by size), intensity of cruise ship visitation, and distance to oil and gas infrastructure, processing, and pipelines. Threats to coral reefs from **overfishing** were evaluated based on coastal population density adjusted by the shelf area (up to 30 m depth) within 30 km of the reef. Threats to reefs from **coastal development** were estimated based on distance from cities, ports, airports, and dive tourism centres, as well as population density, population growth, and tourism growth in the area (Burke and Maidens, 2004).

## APPENDIX 5: CORAL COVERAGE: STATUS AND TRENDS OF CARIBBEAN CORAL REEFS: 1970-2012 (GCRMN)

| COUNTRY | # OF SURVEYS | START YEAR | END YEAR | DEPTH RANGE (M) | OLDEST CORAL COVER (%) | MOST RECENT CORAL COVER (%) | CHANGE IN CORAL COVER (%) |
|---|---|---|---|---|---|---|---|
| Saint Lucia | 12 | 1993 | 2009 | 8-21 | 48.5 | 10.1 | -38.4 |
| Martinique | 38 | 2001 | 2007 | 5-10 | 35.7 | 17.4 | -18.3 |
| Saint Vincent and the Grenadines | 412 | 1976 | 2009 | 2-17 | 29.8 | 22.2 | -7.6 |
| Grenada | 23 | 2005 | 2009 | 2-30 | 25.9 | 20.25 | -5.65 |
| Guadeloupe | 192 | 1988 | 2011 | 1-15 | 23 | 18.6 | -4.4 |
| British Virgin Islands | 292 | 1992 | 2012 | 5-13 | 18 | 14.3 | -3.7 |
| Antigua and Barbuda | 227 | 2005 | 2008 | 2-14 | 16.5 | 3.8 | -12.7 |
| St. Martin | 52 | 1999 | 2007 | 8-12 | 12.5 | 12.5 | 0 |
| Dominica | 9 | 2007 | 2009 | 5-14 | 11.4 | 9 | -2.4 |
| St. Kitts and Nevis | 446 | 2007 | 2011 | 4-24 | 10.3 | 11.1 | 0.8 |

**Note:** List of coral reef locations used in the study with the extent of sampling, range of years, depth and changes in coral cover for locations sampled more than once. Number of surveys, years, and depth ranges vary by country (Jackson et al., 2014).

## APPENDIX 6: CORAL REEF REPORT CARDS

| COUNTRY | YEAR | NUMBER OF SITES | CORAL REEF AREA ($KM^2$) | CORAL COVER (%) | FLESHY MACROALGAL COVER (%) | HERBIVOROUS FISH (G/100M2) | COMMERCIAL FISH (G/100M2) | REEF HEALTH INDEX |
|---|---|---|---|---|---|---|---|---|
| Antigua and Barbuda | 2015 | 29/121 | 76 | 9 | 18 | 2810 | 500 | 2.3 |
| Dominica | 2005 | 16 | 0.8 | 25 | 4 | 1200 | 395 | 2.8 |
| Grenada | 2015 | 27 | 78 | 22 | 20 | 1004 | 692 | 2.5 |
| St. Kitts and Nevis | 2011 | 25 | 52 | 11 | 35 | 2538 | 412 | 2.3 |
| Saint Lucia | 2015 | 17 | 7 | 21 | 17 | 1987 | 820 | 2.8 |
| Saint Vincent and the Grenadines | 2015 | 42 | 168 | 21 | 16 | 2204 | 563 | 2.8 |
| Total/Average | various | 277 | 455.8 | 18.2 | 18.3 | 1957.2 | 563.7 | 2.5 |

| KEY |
|---|
| Critical |
| Poor |
| Fair |
| Good |
| Very Good |

**Sources:** Kramer et al., 2016a-f
**Note:** The Reef Health Index "scores" are calculated by converting the average data value of each indicator into condition ranking from 'critical' to 'very good' based on reference values. The four scores are averaged to obtain the overall RHI score.
The Reef Health Index (RHI) - Critical: 1-1.8 | Poor: 1.9-2.6 | Fair: 2.7-3.4 | Good: 3.5-4.2 | Very Good: 4.3-5
Coral Cover (%) - Critical: <5 | Poor: 5.0-9.9 | Fair: 10.0-19.9 | Good: 20.0-39.9 | Very Good: ≥40
Fleshy Macroalgal Cover (%) - Critical: >25.0 | Poor: 12.1-25 | Fair: 5.1-12.0 | Good: 1.0-5.0 | Very Good: 0-0.9
Herbivorous Fish (g/100m2) - Critical: <960 | Poor: 960-1919 | Fair: 1920-2879 | Good: 2880-3479 | Very Good: ≥3480
Commercial Fish (g/100m2) - Critical: <420 | Poor: 420-839 | Fair: 840-1259 | Good: 1260-1679 | Very Good: ≥1680

## APPENDIX 7: MANGROVE AREA

| COUNTRY | ATLAS OF OCEAN WEALTH - MAPPING OCEAN WEALTH EXPLORER | | FAO GLOBAL FOREST RESOURCES ASSESSMENT 2015 COUNTRY REPORTS | | | | |
|---|---|---|---|---|---|---|---|
| | AREA IN 2016 (HA) | PROPORTION | 1990 | 2000 | 2005 | 2010 | 2015 |
| Montserrat | 0 | 0% | 0 | 0 | 0 | 0 | 0 |
| Anguilla | 1 | 0% | 90 | 90 | 90 | 90 | 90 |
| Dominica | 2 | 0% | n/a | n/a | n/a | n/a | n/a |
| St. Martin | 16 | 0% | n/a | n/a | n/a | n/a | 26.2 |
| St. Kitts and Nevis | 29 | 0% | n/a | 14 | 14 | 14 | 14 |
| Saint Vincent and the Grenadines | 31 | 1% | 51 | 34 | 34 | 34 | 34 |
| British Virgin Islands | 88 | 1% | 627 | 591 | 572 | 554 | 536 |
| Saint Lucia | 166 | 3% | 260 | 220 | 200 | 180 | 160 |
| Grenada | 194 | 3% | 180 | 180 | 180 | 180 | 180 |
| Antigua and Barbuda | 886 | 15% | 1,211 | 850 | 669 | 669 | 669 |
| Martinique | 1773 | 30% | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |
| Guadeloupe | 2780* | 47% | 5,660 | 5,660 | 5,660 | 5,660 | 5,660 |

**Sources:** Atlas of Ocean Wealth (TNC, 2019); Global Forest Resources Assessment 2015 Country Reports (FAO, 2015).
*Source for Guadeloupe: Vaslet and Renoux, 2016.

## APPENDIX 8: SEAGRASS AREA FROM VARIOUS SOURCES

| COUNTRY | AREA ($KM^2$) |
|---|---|
| Montserrat | 7.5 |
| Dominica | 10 |
| Saint Vincent and the Grenadines | 28 |
| Grenada | 29 |
| St. Kitts and Nevis | 34 |
| Anguilla | 34 |
| Saint Lucia | 37 |
| British Virgin Islands | 40 |
| Martinique | 50 |
| St. Martin | 61.52 |
| Guadeloupe | 97.26 |
| Antigua and Barbuda | 147 |
| **Total** | **575.28** |

**Sources:** Independent States (Kramer et al., 2016a-f); Anguilla, British Virgin Islands, Montserrat (Vaslet and Renoux, 2016); Guadeloupe (Reefbase, 2020); Martinique (Failler and Maréchal, 2012); St. Martin/Saint Maarten (Vaslet, A. and AGRNSM, 2018).

## APPENDIX 9: ECONOMIC VALUE OF COASTAL RESOURCES

| COUNTRY | ATLAS OF OCEAN WEALTH - MAPPING OCEAN WEALTH EXPLORER | | | FRENCH INITIATIVE FOR CORAL REEFS (2016) | |
|---|---|---|---|---|---|
| | ON-REEF TOURISM - DIVING, SNORKELLING ETC. (US) | ADJACENT REEF TOURISM - BEACHES, CALM SEAS, SEAFOOD, VIEWS (US) | TOTAL | ANNUAL VALUE OF COASTAL TOURISM | ANNUAL VALUE OF SERVICES PROVIDED BY CORAL ECOSYSTEMS (US) |
| St. Kitts and Nevis | $6,121,000 | $9,796,000 | $15,917,000 | | |
| *Anguilla | $8,112,000 | $11,339,000 | $19,451,000 | | |
| Grenada | $12,179,000 | $10,437,000 | $22,616,000 | | |
| Saint Vincent and the Grenadines | $15,132,000 | $9,219,000 | $24,351,000 | | |
| Dominica | $15,374,000 | $7,353,000 | $22,727,000 | | |
| Antigua and Barbuda | $23,036,000 | $42,645,000 | $65,681,000 | | |
| Saint Lucia | $23,579,000 | $32,758,000 | $56,337,000 | | |
| *British Virgin Islands | $133,349,000 | $61,342,000 | $194,691,000 | | |
| Montserrat | n/a | n/a | n/a | | |
| Guadeloupe | | | | $67,866,998 | $125,882,335 |
| St. Martin | | | | $20,797,951 | $27,365,725 |
| Martinique | | | | $73,340,143 | $186,086,930 |
| ***Independent States Subtotal*** | ***$95,421,000*** | ***$112,208,000*** | ***$207,629,000*** | | |
| ***British OTs Subtotal*** | ***$141,461,000*** | ***$72,681,000*** | ***$214,142,000*** | | |
| ***French OTs Subtotal*** | | | | ***$162,005,092*** | ***$339,334,990*** |

**Sources:** Atlas of Ocean Wealth (TNC, 2019); French Initiative for Coral Reefs (Pascal et al., 2016). Data for Montserrat not available. Adjacent reef tourism from the Mapping Ocean Wealth Explorer is determined through a study that developed machine-learning algorithms to analyse social images and text posts for visual and language identifiers that indicated reef-adjacent activities (beaches, turquoise waters, reef fish, and sea turtles, etc.) (TNC, 2019).

## APPENDIX 10: TOURISM DATA: CONTRIBUTION TO EMPLOYMENT AND STAY-OVER VISITORS

**Tourism's contribution to employment in OECS Member States (Government of Montserrat, 2016; COGEA 2017c, WTTC, 2018a).**

| COUNTRY | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|
| Saint Lucia | 14 | 15 | 14.7 | 17.2 | 17.9 | 19.8 | 21 |
| Antigua and Barbuda | 5.8 | 5.8 | 5.8 | 5.6 | 5.2 | 4.9 | 5.0 |
| Martinique | 4.1 | 4.4 | 4.7 | 4.7 | 4.8 | 5 | 5.1 |
| Dominica | 2.3 | 3.1 | 3.7 | 4.0 | 4.0 | 4.2 | 4.2 |
| Guadeloupe | 3.8 | 3.8 | 3.8 | 3.9 | 4 | 4.1 | 4.1 |
| British Virgin Islands | 2.7 | 2.8 | 3.0 | 3.1 | 3.1 | 2.3 | 2.4 |
| Grenada | 2.5 | 2.5 | 3.4 | 3 | 2.9 | 3.1 | 3.2 |
| Saint Vincent and the Grenadines | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.4 | 2.5 |
| St. Kitts and Nevis | 1.7 | 1.7 | 2 | 1.8 | 1.5 | 1.6 | 1.6 |
| Anguilla | 1.5 | 1.6 | 1.7 | 1.6 | 1.6 | 1.7 | 1.7 |
| St. Martin | | | 1.6 | | | | |
| Montserrat | 0.25 | 0.25 | 0.25 | 0.25 | | | |

**Total stay-over visitors in OECS Member States (COGEA, 2017b; CTO, 2015; ECCB, 2020; Statista, 2019; Tourism Analytics n.d.)**

| COUNTRY | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|
| Guadeloupe | 512,000 | 581,000 | 650,000 | | |
| Martinique | 570,000 | | | 448,377 | 467,209 |
| Saint Lucia | 344,908 | 347,872 | 386,127 | 394,780 | n.a. |
| Antigua and Barbuda | 250,450 | 265,187 | 247,311 | 268,949 | 222,875 |
| British Virgin Islands | 199,031 | | | | |
| Grenada | 132,547 | 135,306 | 146,376 | 160,975 | n.a. |
| St. Kitts and Nevis | 116,871 | 115,765 | 114,861 | 122,946 | n.a. |
| Saint Vincent and the Grenadines | 75,381 | 79,395 | 75,972 | 80,080 | n.a. |
| Dominica | 71,419 | 75,204 | 69,794 | 62,985 | n.a. |
| Anguilla | 73,232 | 79,239 | 68,254 | 54,533 | n.a. |
| Montserrat | 8,944 | 8,842 | 9,539 | 10,232 | n.a. |
| Guadeloupe | 512,000 | 581,000 | 650,000 | | |

## APPENDIX 11: FISHERIES DATA: CAPTURE PRODUCTION AND EMPLOYMENT

### Fish capture production data for the OECS Member States (FAO FishStat Plus, 2017)

| COUNTRY | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Anguilla | 688 | 713 | 739 | 617 | 620 | 884 | 981 | 788 | 876 | 780 | 684 | 758 |
| Antigua and Barbuda | 3,044 | 3,042 | 3,389 | 2,416 | 2,219 | 3,055 | 5,951 | 4,605 | 3,114 | 3,165 | 3,165 | 3,165 |
| British Virgin Islands | 1,308 | 1,251 | 1,202 | 1,201 | 1,201 | 1,200 | 1,196 | 1,203 | 1,205 | 1,200 | 1,200 | 1,200 |
| Dominica | 694 | 677 | 699 | 772 | 700 | 662 | 625 | 527 | 1,029 | 990 | 809 | 784 |
| Grenada | 2,163 | 2,207 | 2,386 | 2,648 | 2,182 | 2,322 | 2,263 | 2,695 | 2,850 | 2,707 | 2,550 | 2,550 |
| Guadeloupe | 6,400 | 6,000 | 5,600 | 5,200 | 4,800 | 6,000 | 4,650 | 5,400 | 4,500 | 4,050 | 4,500 | 4,500 |
| Martinique | 6,300 | 7,200 | 8,142 | 7,000 | 6,000 | 5,000 | 4,000 | 3,800 | 3,600 | 3,850 | 4,000 | 4,000 |
| Montserrat | 49 | 35 | 31 | 37 | 24 | 33 | 41 | 44 | 41 | 34 | 31 | 26 |
| St. Kitts and Nevis | 1,179 | 1,275 | 1,342 | 2,064 | 21,754 | 31,071 | 21,896 | 17,710 | 66,139 | 100,429 | 65,734 | 85,456 |
| Saint Lucia | 1,647 | 1,732 | 1,895 | 2,066 | 1,964 | 1,878 | 2,066 | 2,090 | 2,096 | 2,083 | 2,097 | 2,091 |
| Saint Vincent and the Grenadines | 51,584 | 63,309 | 55,898 | 59,587 | 66,367 | 76,578 | 10,186 | 39,507 | 81,401 | 26,207 | 22,808 | 32,909 |
| St. Martin | - | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |

### Fisheries sector employment in the OECS (CRFM, 2014, 2015, 2018; Ramdeen et al, 2014.)

| COUNTRY | 2011 | 2013/2014 | 2015/2016 |
|---|---|---|---|
| Martinique | - | 1,451 | - |
| St. Martin | - | 80 | - |
| Montserrat | 155 | 115 | 344 |
| British Virgin Islands | 410 | - | - |
| Anguilla | 1,200 | 656 | 792 |
| Guadeloupe | 1,588 | 2,593 | - |
| Saint Vincent and the Grenadines | 3,000 | 3,000 | 4,568 |
| Dominica | 3,320 | 5,396 | 5,396 |
| St. Kitts and Nevis | 3,720 | 4,564 | 4,592 |
| Antigua and Barbuda | 6,288 | 6,565 | 7,584 |
| Grenada | 10,332 | 10,972 | 10,972 |
| Saint Lucia | 10,488 | 5,708 | 12,688 |

## APPENDIX 12: PORT THROUGHPUT IN THE OECS SUB-REGION

| COUNTRY | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|
| Grenada | | 15,000 | 14,200 | 14,000 | 16,100 | 16,100 | 16,000 | 16,050 | 21,900 | 23,900 |
| Dominica | | 7,974 | 7,836 | 6,890 | 7,469 | 7,744 | 7,361 | 7,553 | 8,006 | 8,160 |
| Anguilla | | 2,863 | 2,543 | 2,504 | 2,465 | 5,498 | 7,021 | 5,754 | 6,134 | 7,357 |
| British Virgin Islands | | | | | 9,372 | 11,217 | 11,489 | | | |
| Montserrat | | 1,675 | 1,650 | 1,700 | 1,600 | 1,800 | 2,010 | 2,374 | 2,531 | 2,582 |
| St. Kitts and Nevis | 3,002 | 2,424 | 3,046 | 2,665 | 3,064 | 3,209 | 3,511 | 9,500 | 13,767 | 14,402 |
| Saint Vincent and the Grenadines | 16,238 | 16,967 | 17,488 | 18,340 | 16,561 | 16,737 | 18,620 | 19,941 | 17,500 | 19,800 |
| Antigua and Barbuda | 31,332 | 26,366 | 21,824 | 24,449 | 24,842 | 26,475 | 26,500 | 31,165 | 17,311 | 17,657 |
| Saint Lucia | 51,942 | 52,478 | 62,598 | 74,831 | 64,415 | 41,521 | 41,500 | 38,383 | 29,706 | 29,706 |
| Guadeloupe | 140,506 | 150,534 | 165,093 | 211,871 | 198,142 | 183,922 | 201,948 | 277,922 | | |
| Martinique | 142,240 | 150,710 | 147,258 | 143,728 | 147,989 | 171,889 | 159,231 | 153,453 | | |

## APPENDIX 13: MARINE PROTECTED AREAS DATA (PROTECTED PLANET)

| COUNTRY | TOTAL MARINE AREA ($KM^2$) | MARINE PROTECTED AREAS | | | RAMSAR SITE | | SPECIALLY PROTECTED AREA (CARTAGENA CONVENTION) | |
|---|---|---|---|---|---|---|---|---|
| | | MARINE AREA PROTECTED ($KM^2$) | NUMBER OF MPAS (FROM DOWNLOADED DATASETS) | % COVERAGE | # | AREA | # | AREA |
| Anguilla | 92,654 | 32 | 9 | 0.03% | 1 | 10.51 | 0 | 0 |
| Antigua and Barbuda | 108,492 | 197 | 8 | 18.00% | 1 | 36.00 | 0 | 0 |
| British Virgin Islands | 80,529 | 3 | 13 | 0.00% | 0 | 0.00 | 0 | 0 |
| Dominica | 28,749 | 10 | 2 | 0.03% | 0 | 0.00 | 0 | 0 |
| Grenada | 26,282 | 23 | 4 | 0.09% | 1 | 5.18 | 1 | 0.22 |
| Guadeloupe | 91,039 | 90,958 | 53 | 99.91% | 1 | 295.00 | 2 | 2,475 |
| Martinique | 47,644 | 47,644 | 41 | 100.00% | 0 | 0.00 | 0 | 0 |
| Montserrat | 7,628 | 0 | 0 | 0.00% | 0 | 0.00 | 0 | 0 |
| St Kitts and Nevis | 10,263 | 408 | 2 | 3.98% | 0 | 0.00 | 0 | 0 |
| Saint Lucia | 15,560 | 34 | 10 | 0.22% | 2 | 0.85 | 0 | 0 |
| St. Martin | 1,069 | 1,031 | 6 | 96.50% | 1 | 29.97 | 1 | 34 |
| Saint Vincent and the Grenadines | 36,511 | 80 | 21 | 0.22% | 0 | 0.00 | 1 | 5,469 |
| **Total** | **546,420** | **140,420** | **169** | **26%** | **7** | **378** | **5** | **7,977** |

**Note:** Source: UNEP-WCMC and IUCN, 2020. UNEP-WCMC only use protected areas that meet the IUCN and CBD definitions of protected areas when calculating protected area coverage. These statistics might differ from those reported officially by countries due to difference in methodologies and datasets used to assess protected area coverage and differences in the base maps used to measure terrestrial and marine area of a country or territory.
**Sites included:** (1) Protected areas that meet the IUCN and CBD definitions of protected areas when calculating protected area coverage; (2) Coastal and marine and or 100% marine; (3) Those with reported area; (4) Sites with Status = designated, inscribed, adopted and established are included.