Saint Lucia

Coral Reef Report Card
2016

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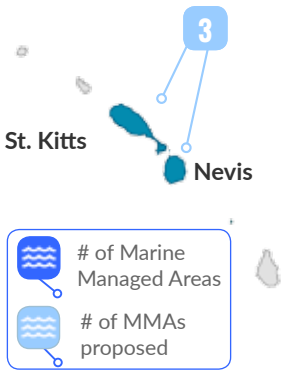
Eastern Caribbean Coral Reef Report Cards

6 PARTICIPATING COUNTRIES
224,813 SQUARE KM OF OCEAN

44 AREAS DESIGNATED SINCE 1973
526 SQUARE KM OF OCEAN

50 AREAS PROPOSED
990 SQUARE KM OF OCEAN



ECMMAN countries and number of MMAs with designated borders

The 2016 Coral Reef Report Cards

The Eastern Caribbean Seascape is an arc of islands linked through diverse coral reef ecosystems, oceanic currents, migratory pathways and a rich cultural heritage. The Eastern Caribbean Coral Reef Report Cards are a series of individual reports for the 6 participating countries and provide an easy-to-understand summary of the state of the region's marine resources. The Report Cards collate data from 277 comparable coral reef surveys and map in detail 383 km^2 of coral reefs, 19 km^2 of mangrove, 286 km^2 of seagrass, 44 designated and 50 proposed Marine Managed Areas (MMA).

The Report Cards provide an initial baseline on the current state of the reef and identify gaps. Reporting this type of information will help track progress in protecting reefs and inform future monitoring and management. The vision is to produce report cards every 2 years and share data through the CaribNode regional spatial data platform. Future report cards will include key socioeconomic and management effectiveness information.

Each Report Card includes information on:

- Key Habitats (location and extent of coral, mangrove, seagrass)
- Reef Health Index (a measure of the health of four key coral reef indicators)
- Marine Managed Areas (size and location of designated and proposed areas)

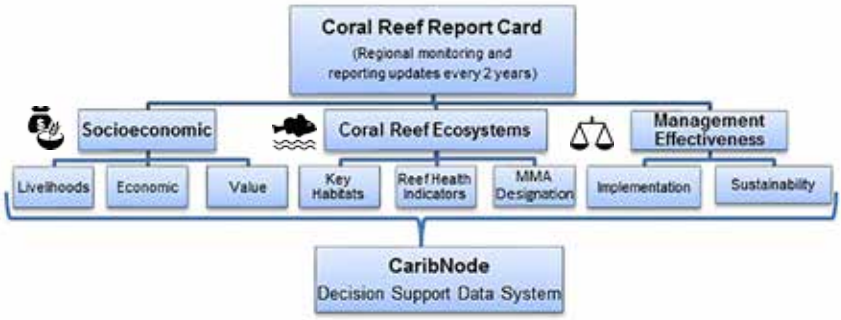
The Framework

To protect the region's marine biodiversity, it is essential to understand key issues and share critical data. The Climate-Resilient Eastern Caribbean Marine Managed Areas Network (ECMMAN) project developed the following framework to advance national and regional data collection and strengthen marine managed areas in the region.

1) **ECMANN Monitoring Network:** The Network collects, analyzes and shares data through standardized methods. Three main themes include ecological, socio-economic, and marine management effectiveness. Indicator data (diagram right) are shared through the CaribNode.

2) **CaribNode:** This online information system combines regional and national data to create resource management tools. The Coral Reef Assessment Tool provides standardized indicators to monitor the marine environment, evaluate management, and track the wellbeing of coastal communities (www.caribnode.org).

3) **Coral Reef Report Cards:** Includes the Reef Health Index, an assessment tool to measure coral reef health. The Report Card integrates monitoring data and engages stakeholders to help protect marine ecosystems.

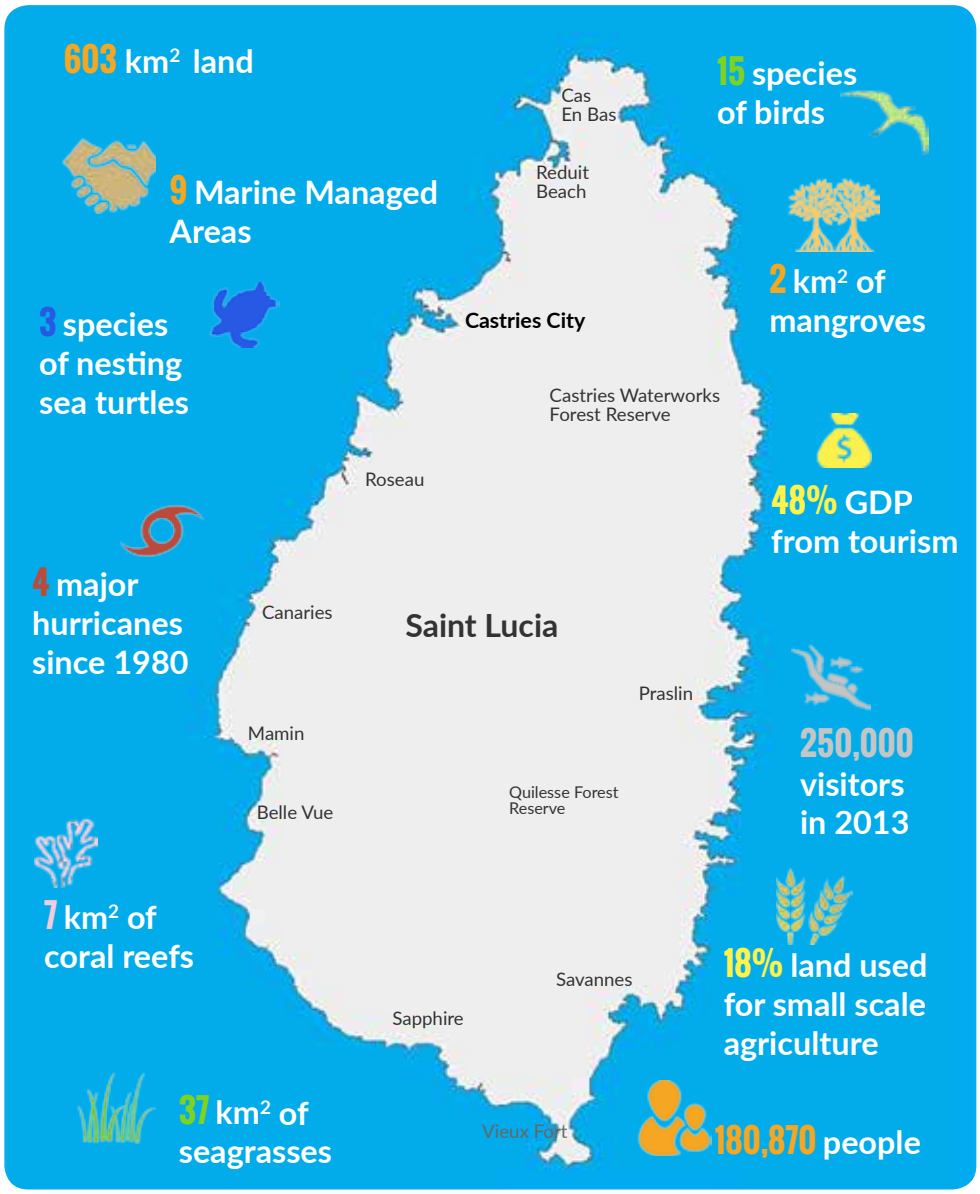


Kramer PR, Roth LM, Constantine S, Knowles J, Cross L, Steneck R, Newman SP, Williams SM. 2016. Saint Lucia's Coral Reef Report Card 2016. The Nature Conservancy. CaribNode.org.

Saint Lucia Coral Reef Report Card

Saint Lucia

Saint Lucia, located south of Martinique and north of St. Vincent and the Grenadines, is one of the largest of the Eastern Caribbean islands covering 603 km^2 of land with 208 km of coastline. The volcanic island has a steep rugged landscape surrounded by a narrow coastal shelf that supports a diverse marine ecosystem of mangroves, seagrasses, coral reefs and beaches. Saint Lucia's economy is dependent primarily on tourism, as well as artisanal fisheries, agriculture (bananas and root crops), and some manufacturing. Reef species harvested include parrotfish, angelfish, triggerfish, spiny lobster, conch and white sea urchin. Of the 17 fish landing sites, Vieux Fort is the largest followed by Dennery. The major threats to marine biodiversity are domestic and agrochemical pollution, sewage contamination, deforestation and associated sedimentation, coastal development, sand mining, unsustainable fishing, and hurricanes. Saint Lucia has several Marine Managed Areas; Soufriere Marine Management Area, the Canaries/Anse La Raye MMA and Pointe Sable EPA are the largest.



Saint Lucia Timeline

Protection for reefs (above line) / Key events impacting coral (below)

1970 - 1980

- Saint Lucia National Trust Act
- Fisher Cooperatives
- Fisheries Legislation

- Banana Industry - 1970-1990
- *Diadema* urchin die-off - 1980s
- Mass coral die-off due to disease
- White sea urchin collapse
- Hurricane Allen

1990

- Mankote Ramsar Site
- Soufriere/Canaries MMA
- National Conservation Act

- Tropical Storm Debbie
- Hurricane Lenny
- G. Odlum stadium (H_20 release to mangrove)

2000

- OPAAL
- Pointe Sable EPA Declared
- Pitons MA World Heritage Site
- PSEPA Management Plan

- Hurricane Dean
- Coral bleaching - 2005/2008
- Invasive Seagrass

2010

- TOT MPA Management Training
- ACP Fish II Program
- Protected Areas Trust Fund
- Mankote Mangrove dieback
- CARIFICO Management Project
- MTIASIC - Alien Species Program
- ECMMAN Project

- Hurricane Tomas
- Drought
- Lionfish invasion
- Coral Bleaching - 2010
- Mangrove dieback - 2010

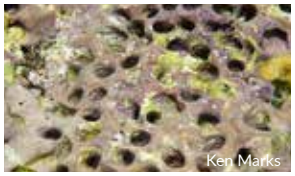
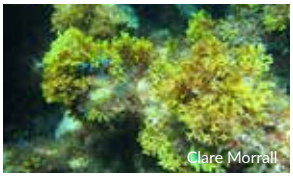
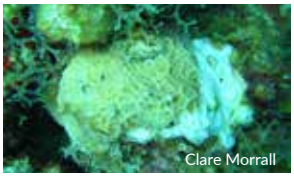
Tracking Coral Reef Health

The Reef Health Index (RHI) integrates four indicators to measure coral reef health (coral cover, fleshy macroalgae, herbivorous fish and commercial fish). The RHI "pie" symbol on the map is displayed at the site, subregional and national levels.* (For more information visit www.caribnode.org)

Saint Lucia

The Reef Health Index for Saint Lucia is based on data shared by Steve Newman and Stacey Williams of FORCE[1], who surveyed 8 fore reefs (10-15 m) in 2011 and Robert Steneck of University of Maine, who surveyed 9 fore reefs (6-11 m) in 2014. Saint Lucia is divided into subregions based on biogeographical features to facilitate the reporting of Reef Health Index data. Data were not available for two subregions.[2] The combination of data into the RHI pie symbol allows the visualization and mapping of reef health data. Subregions for the 6 ECMMAN countries are numbered 1 to 41 from Grenada north to St. Kitts and Nevis.

ID	Sub-region	Subregion Description	# Sites	Score
26	Saint Lucia South	**Southwest** - Laborie, few patch reefs, mangroves, seagrass. **Southeast** - wide shelf south tip, mosaic of coral reefs, seagrasses, mangroves. Pointe Sable - patch reefs Saltibus Pointe to Maria Islands, protected by Pointe Sable EPA (PSEPA), sea turtle nesting, recreational area. Maria Islands - exposed reef flats, wildlife reserve. Few or no reef health surveys.	0	
27	Saint Lucia West	**Western** - leeward narrow shelf, steep slope. Shallow - isolated patch reefs, small corals, elkhorn rare. Coastline - boulders from land covered with small corals, numerous fish in crevices. Slope - higher abundance/diversity of corals, sponges, seafans, fish in 15-30 m. Soufriere - largest reef complex, most people concentrated here, Soufriere MMA protects 17 km^2, Canaries Anse la Raye MMA protects 9 km^2.	17	
28	Saint Lucia East/ North East	**Eastern** - windward, high wave exposure, leatherback turtle nesting on Grand Anse Beach. Unique NE corner - near Anse Lavoutte/Esperance Harbor, wider shelf, numerous healthy endangered elkhorn coral. Reef flat - high energy areas along coast with hardbottom, small corals, gorgonians, West Indian urchins. No reef health surveys.	0	

Indicator	Description of Saint Lucia's Reef Health	Threatened	Healthy
Corals	*Corals build the reef's 3D structure, provide habitat, and protect coastlines* • Coral cover higher than other Caribbean reefs, but lower than historic • Previous surveys report loss of ~47% coral cover in SMMA ** • Vigie Beach Reef most impacted (silt, trash, dead corals, damage) • New healthy reefs of endangered elkhorn corals found on NE coast	 Patricia Kramer	 Frances Grenda
Fleshy macroalgae	*Fleshy macroalgae, when too abundant, outcompete corals* • Less macroalgae (3-56%) than other Caribbean reefs • High silt covering many reefs prevents coral growth or settlement • Macroalgae overgrowth at Turtle Reef, Coral Garden • Cyanobacteria high near populated areas (Coral Garden, Malgretoute)	 Andy Bruckner	 Ken Marks
Herbivorous Fish	*Herbivorous fish clean algae off reefs, large parrotfish remove more algae* • Herbivorous fish biomass was fair (range 918-4017 g/100 m^2) • Few large parrotfish, less grazing allows seaweed to grow • Herbivorous fish at CAMMA > SMMA; low at Malgretoute, Blue Hole • Parrotfish are harvested and caught in traps	 Clare Morrall	 Ken Marks
Commercial Fish	*Groupers & snappers are key predators that keep food chain in balance* • Fish biomass was low (155-1695 g/100 m^2), groupers absent • Fish were small in size meaning fewer mature females to produce eggs • More fish in protected areas, SMMA > CAMMA > Vigie Beach • Reefs with more complex structure had more fish	 Emma Doyle	 Ken marks
Diadema	*Diadema urchins clean algae off reefs and open space for coral recruits* • Urchins were abundant (~0.2/m^2) on several reef types • Eleven of 17 sites had urchins present • Many reefs with more urchins had less macroalgae • If nutrients and sediments reduced, urchins could increase	 Clare Morrall	 Patricia Kramer
Coral Recruits	*Coral recruits are "baby" corals. Recruits prefer macroalgal free areas* • Recruits present, but mostly of smaller sized corals • High siltation and sediments have reduced space for coral recruits • Lack of crustose coralline algae means less available substrate • Reducing sediments and increasing herbivory will improve substrate	 Clare Morrall	 Andy Bruckner

Reef Health Index

Saint Lucia's Reef Health Index

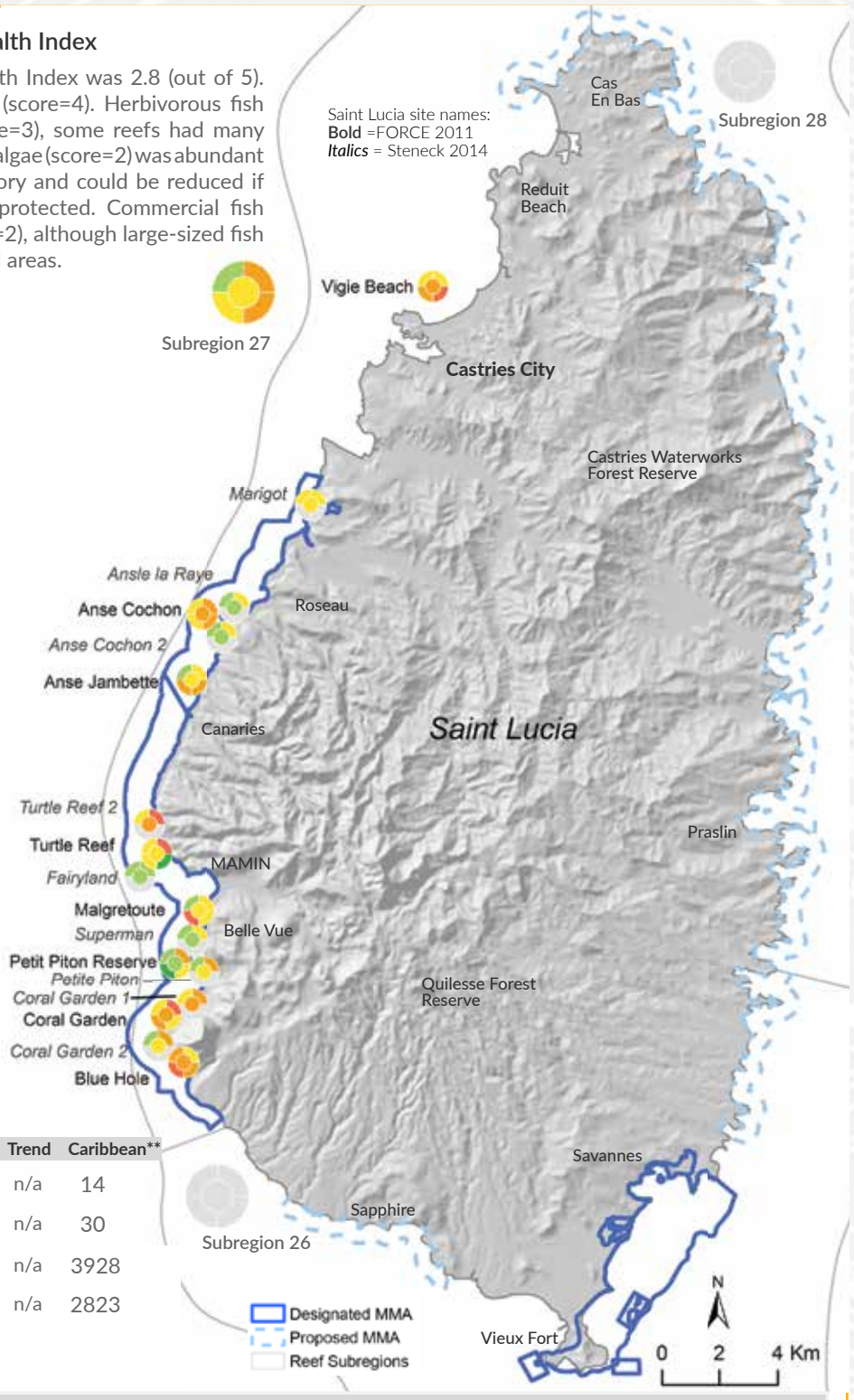
The National Reef Health Index was 2.8 (out of 5). Coral cover was 'good' (score=4). Herbivorous fish biomass was 'fair' (score=3), some reefs had many parrotfish. Fleshy macroalgae (score=2) was abundant in areas without herbivory and could be reduced if herbivorous fish were protected. Commercial fish biomass was low (score=2), although large-sized fish were found in protected areas.

Key findings:

- Marine managed areas are helping fish populations increase
- New healthy elkhorn corals provide hope for recovery
- Reefs with complex habitat structure had more diverse fish
- *Diadema* urchins are helping to keep seaweed in check
- Siltation harming corals and preventing new corals from growing
- Reefs in subregions where no surveys have been performed need further study

Reef Outlook:

- 30% of reefs are in 'good' condition and are likely more resilient to disturbances. Additional protection will keep larval sources abundant
- 35% of reefs are in 'fair' condition, but may recover if human impacts are minimized
- 35% of reefs are in 'poor' condition and may not recover unless human impacts are reduced and key processes restored
- No reefs were in 'very good' or 'critical' condition



Saint Lucia's Reef Health Index (RHI)

Indicator	Year	Score	Average	Trend	Caribbean**
Coral Cover	2015	Good	21	n/a	14
Fleshy Macroalgae	2015	Poor	17	n/a	30
Herbivorous Fish	2015	Fair	1987	n/a	3928
Commercial Fish	2015	Poor	820	n/a	2823

Reef Health Index Scores (RHI)

The Reef Health "grades" are calculated by converting the average data value of each indicator into a condition ranking from 'critical' to 'very good' based on reference values (right). The four grades are averaged to obtain the overall RHI score. The pie displays the overall RHI (middle) and each individual indicator to show how each indicator affects the score.

Reef Health Index Reference Values*					
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 (%)	<5	5.0-9.9	10.0-19.9	20.0-39.9	≥40
Fleshy Macroalgal Cover (%)	>25.0	12.1-25	5.1-12.0	1.0-5.0	0-0.9
Herbivorous Fish (g/100m^2)	<960	960-1919	1920-2879	2880-3479	≥3480
Commercial Fish (g/100m^2)	<420	420-839	840-1259	1260-1679	≥1680

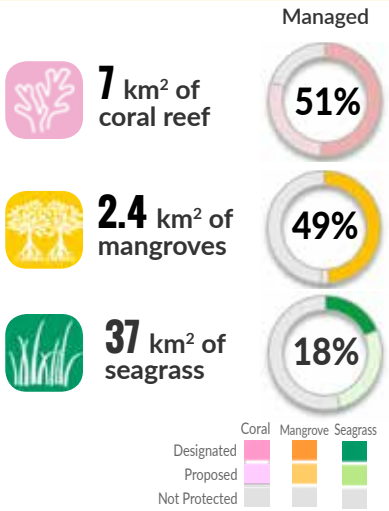
*Reef Health Index developed by Healthy Reefs Initiative (healthyreefs.org) **Caribbean average based on AGRRA regional database 2011-2014 (agrra.org) [1]Future of Reefs in a Changing Environment (FORCE) (force-project.eu). [2] Previous surveys summarized in Australian-Caribbean Coral Reef Collaboration. 2014. Outlook for the Pitons and Soufriere Marine Management Areas, Great Barrier Reef Marine Park Authority. A trend is calculated after an indicator has been assessed for at least two years, otherwise it is listed as not available (n/a). For maps & references see www.caribnode.org.

Protecting Key Habitats

Key Habitats of Saint Lucia

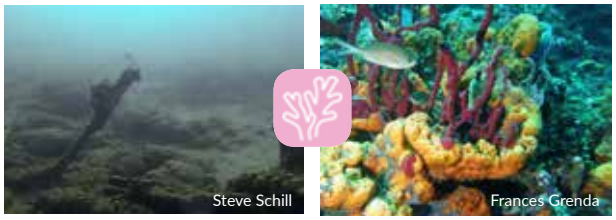
Three main habitats, coral reefs, mangroves and seagrass beds, support productive fisheries, stabilize coastlines and host tourism activities.

- The Nature Conservancy conducted detailed benthic habitat mapping survey in October 2015 (caribnode.org).
- Contiguous areas with corals, mangroves and seagrasses are important nursery areas and corridors for resident and transient species.
- Habitats are threatened by direct removal and damage, overfishing, human use, coastal development, poor water quality, and global climate change.
- New proposed managed areas will protect 29% more coral reefs, 2% more mangroves and 27% more seagrass.

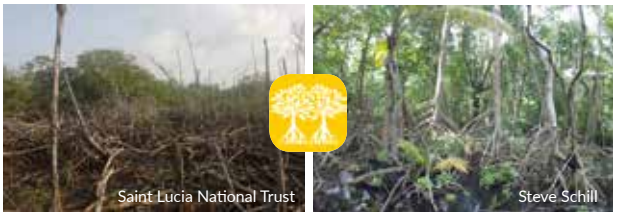


Saint Lucia's Habitat Types	Threatened	Healthy

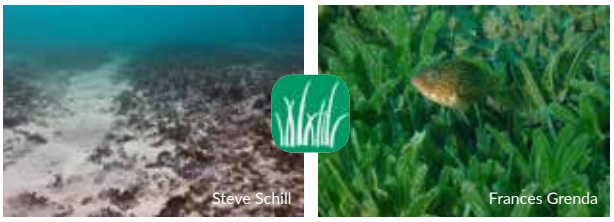
Coral reefs: Variety of reefs. **West coast**: narrow shelf shallow patch reefs, nearshore boulders with small corals, steep slope wall reefs have high sponge and fish diversity. **East coast**: wide shallow shelf, reef flats, numerous elkhorn in NE. **South coast**: patch reefs. Shallow reefs most impacted by sediment from land clearing, sewage runoff, pollution, high tourist use. All reefs vulnerable to unsustainable fishing, coral bleaching/disease. Healthier reefs provide greater shoreline protection, more food resources, and higher economic and recreational benefits.



Mangroves: Highly productive forests in 14 areas. Red, black, and white mangroves and buttonwood. **East coast:** Praslin, Fond D'Or. **North east:** Esperance. **South west:** Laborie. **South east:** Savannes Bay (Ramsar site), Scorpion Island (wildlife reserve) and Mankote (largest, Ramsar site). Historic use for timber or charcoal. Pollution and trash dumping impact mangroves. New efforts to protect and increase sustainable use. Healthy mangroves provide habitat, protect shorelines, and improve water quality.



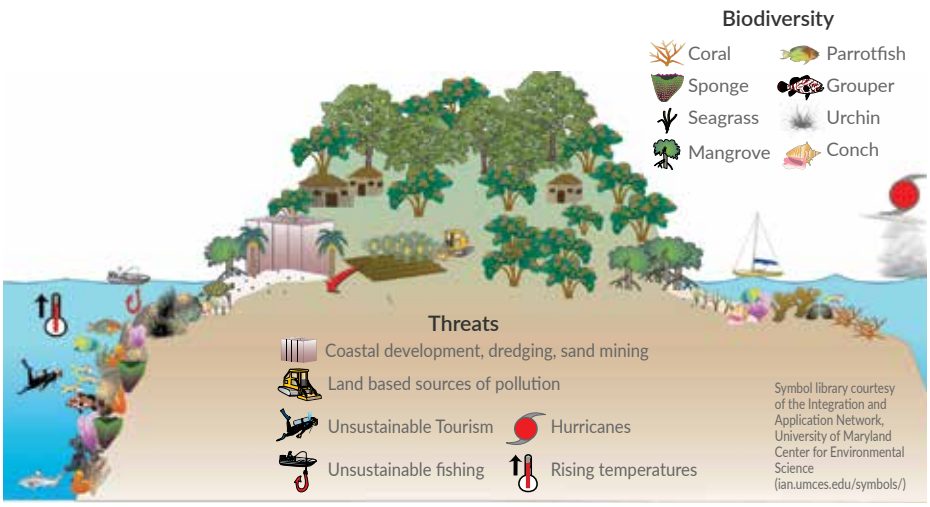
Seagrass: Rich seagrass meadows, more extensive on east and southern coasts, in protected bays and patches on west coast. Manatee, turtle, and some shoal grass species common. Invasive seagrass very abundant, impact on native habitat unknown. Seagrass beds provide key fish, conch, and lobster nursery areas and sea turtle and bird foraging areas. Impacted from sediments, pollution, direct damage. Healthy seagrass meadows stabilize sediments, reduce beach erosion and improve water clarity.



Climate Change Impacts

Local and regional resource managers need to incorporate planning for climate change in their efforts to protect coral reefs.

- Rising ocean temperatures increase coral bleaching, disease and mortality
- Oceans will become more acidic as more atmospheric carbon dioxide is dissolved reducing calcification in corals and other calcifying animals
- The intensity and frequency of hurricanes will increase as oceans continue to warm and will damage corals, coastlines and infrastructure
- Rising sea levels will flood coastal areas and may reduce light in seagrass beds and coral reefs



Marine Managed Areas

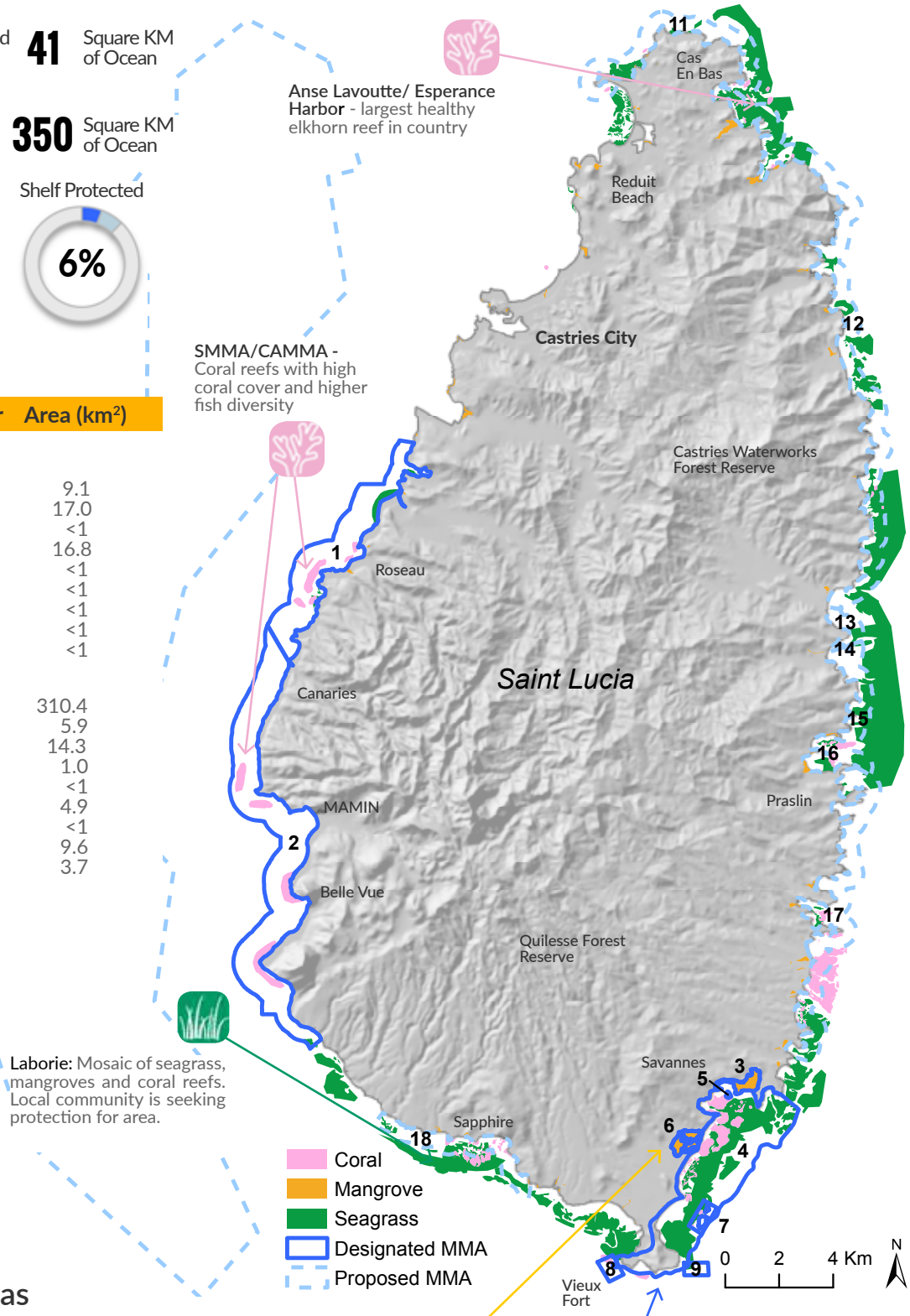
9 Areas Designated Since 1973 **41** Square KM of Ocean

9 Areas Proposed **350** Square KM of Ocean

Ocean Protected

Shelf Protected

Marine Managed Area	Year	Area (km²)
Designated*		
1 Canaries Anse la Raye	1998	9.1
2 Soufriere MMA	1995	17.0
3 Savannes Bay MR	1984	<1
4 Pointe Sable EPA	2007	16.8
5 Scorpion Island MR	1984	<1
6 Mankote MR	1986	<1
7 Maria Islet Reef MR	1986	<1
8 Ceasar-Mathurin MR	1986	<1
9 Moule a Chique MR	1986	<1
Proposed		
10 Cold Upwelling MMA		310.4
11 East Coast MMA 1		5.9
12 East Coast MMA 2		14.3
13 East Coast MMA 3		1.0
14 Dennery Island NR		<1
15 East Coast MMA 4		4.9
16 Praslin Island NR		<1
17 East Coast MMA 5		9.6
18 Laborie MMA		3.7



Marine Managed Areas

Saint Lucia's MMAs are important as they:

- Protect marine biodiversity by conserving critical habitats
- Provide refugia and replenishment zones for exploited fisheries
- Reduce negative impacts associated with human use
- Foster a higher level of sustainable use
- Increase community involvement and educational opportunities

SE Peninsula Mankote Reserve -largest mangrove forest, Ramsar Site, provides critical nursery habitat, stabilizes shorelines, and is large carbon sink.

Pointe Sable EPA – largest seascape of interconnected coral reef, seagrass, mangrove habitat in country. Many species like conch, grouper, and lobster rely on this area for different stages of their life cycle. Management efforts seek to balance protecting biodiversity and promoting sustainable livelihoods.

**Saint Lucia has several other marine managed areas not listed as geospatial data on the boundaries were not available.*

Eastern Caribbean Regional Overview

Status of coral reefs in the Eastern Caribbean (EC)

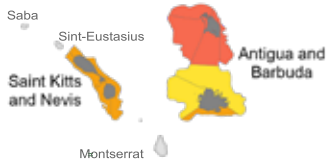
The Region's overall Reef Health Index (RHI) score was "fair" (2.5 of 5). Coral cover and herbivorous fish biomass were scored "fair", while fleshy macroalgae and commercial fish biomass were "poor". Reef condition varied at the local scale, but several regional patterns of reef condition were common:

- Endangered elkhorn/staghorn corals are recovering (NE island areas)
- Fleshy algae are often found on leeward reefs and near settlements
- Lack of large parrotfish has reduced grazing on several reefs
- *Diadema* urchins are abundant on several reef types in the EC
- Reefs with greater structure and relief have higher fish abundance
- Reefs under some level of protection have higher fish abundance, especially fully protected areas and longer established MMAs

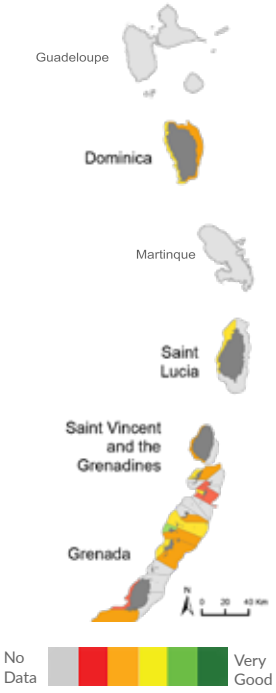
Status of MMAs in the Eastern Caribbean

The long-term health and resilience of these ecosystems will depend on both effective local management and adopting collaborative and transboundary management strategies among the 6 nations.

- Currently 44 designated MMAs protect 526 km^2 of marine resources
- Many MMAs were designated >25 years ago (17 of 44)
- Most of the designated MMAs are small (27 of 44 are <10 km^2)
- Few MMAs are fully protected "no take" zones, which had more fish
- Several key nursery areas with adjacent coral, mangrove & seagrass remain unprotected
- 50 new proposed MMAs will protect 990 km^2 of marine resources



# sites	Reef Health Index	Score
St. Kitts & Nevis 25		2.3
Antigua & Barbuda 29/121		2.3
Dominica 16		2.8
Saint Lucia 17		2.8
St. Vincent & Grenadines 42		2.8
Grenada 27		2.5



Next Steps

The following Management Recommendations and Monitoring Priorities are suggested to help protect Saint Lucia's coral reefs:

I. Management Recommendations

A. Continue to support MMAs to help reefs recover
B. Protect parrotfish and other herbivores to reduce seaweed
C. Create more fully protected replenishment areas to let fish grow larger and produce more fish for the future
D. Protect reefs with endangered elkhorn corals
E. Improve nearshore water quality to increase reef resilience
F. Improve ridge to reef management to reduce impact of land based activities

II. Monitoring Priorities

A. Coral Reef Monitoring
   1. Representative island wide surveys
   2. Strategic surveys to fill data gaps: NW Coast, NE coast – especially elkhorn reefs, Laborie & Pointe Sable, E Coast MMA
   3. Establish long term monitoring sites (Pitons, Laborie, Pointe Sable, W. Coast MMA, NE Coast)
B. Socioeconomic monitoring
C. MMA effectiveness monitoring
D. Produce Report Cards in 2017 based on 2016 surveys
E. Update CaribNode data platform with new data

The return of healthy endangered elkhorn corals gives hope for the future

The Nature Conservancy
Protecting nature. Preserving life.
AGRRA
Healthy Reefs for healthy people
Supported by:
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
based on a decision of the German Bundestag