

UPDATED DRAFT

ST. LUCIA SARGASSUM ADAPTIVE MANAGEMENT STRATEGY (SAMS)

VOLUME 2: ACTION APPENDICES



April 2023

SargAdapt

Adapting to a new reality: Managing responses to influxes of sargassum seaweed in the Eastern Caribbean as ecosystem hazards and opportunities



Supported by:



Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

IKI



INTERNATIONAL
CLIMATE
INITIATIVE

KFW

based on a decision of
the German Bundestag

TABLE OF CONTENTS

PART A: COUNTRY SPECIFIC	1
1 INSTITUTIONAL ARRANGEMENTS	2
1.1 Authority	2
1.2 Institutions	3
1.3 Roles of some stakeholders in management	3
2 MONETARY MATTERS	4
3 KEY SARGASSUM CONTACTS	5
4 SARGASSUM EXPOSURE AND VULNERABILITY ASSESSMENT	6
5 LOCATION PROFILES OF SARGASSUM STRANDING SITES	8
5.1 Cas en Bas & Anse la Voutte	10
5.2 Anse la Voutte	13
5.3 Esperance	17
5.4 Dennery	20
5.5 Praslin	24
5.6 Micoud, Lance Captain & Es Cap	29
5.7 Micoud	29
5.8 Lance Captain	33
5.9 Es Cap	36
5.10 Savannes	39
5.11 Sandy Beach	43
6 IN-COUNTRY USES OF SARGASSUM	47
PART B: CARIBBEAN GENERAL	47

7	LOCAL LEVEL SARGASSUM MANAGEMENT PLANS	49
8	ACTIONS AND OPERATIONS	51
8.1	Resources for responsible responses	51
8.2	Management of sargassum influxes	54
8.3	Sargassum forecasting and monitoring	62
8.4	Recommended actions for key sectors	66
8.5	Sargassum projects in the wider caribbean	70
9	SARGASSUM USES	77
9.1	Key resources	77
9.2	Challenges and considerations	80

Suggested citation:

CERMES. 2023. Updated Draft St. Lucia Sargassum Adaptive Management Strategy. Volume 2: Action Appendices. University of the West Indies (UWI) Centre for Resource Management and Environmental Studies (CERMES), Barbados.

PART A: COUNTRY SPECIFIC



1 INSTITUTIONAL ARRANGEMENTS

1.1 AUTHORITY

This section lists some existing documentation which provides the framework for sargassum management in St. Lucia.

- Beach Protection Act (1967 and Amendment of 1987)
- Disaster Management Act (2006)
- Disaster Preparedness and Response Act (2005)
- Environmental Management Act (2008) Revised draft (2018)
- Fisheries Act No.10 (1984)
- Fisheries Regulation No.9 (1994)
- Guidelines for the Development of Sectoral Adaptation Strategies and Action Plans: Saint Lucia's experience under its National Adaptation Planning Process
- Maritime Areas Act (1984)
- Monitoring and Evaluation Plan of Saint Lucia's National Adaptation Planning Process
- National Conservation Authority Act (1999)
- Physical Development and Planning Act (2001)
- Public Health Act Chapter 11.01 (1975 revised in 2001)
- Saint Lucia's Climate Change Communications Strategy
- Saint Lucia's Portfolio of Project Concept Notes for the Agriculture Sector 2018-2028
- Saint Lucia's Portfolio of Project Concept Notes for the Fisheries Sector 2018-2028
- Saint Lucia's Portfolio of Project Concept Notes for Resilient Ecosystems 2020-2028
- Saint Lucia's Portfolio of Project Concept Notes for the Water Sector 2018-2028
- Saint Lucia's National Adaptation Plan Roadmap and Capacity Development Plan 2018-2028
- Saint Lucia's National Adaptation Plan Stocktaking, Climate Risk and Vulnerability Assessment Report
- Saint Lucia's National Climate Change Research Policy 2020-2030
- Saint Lucia's National Climate Change Research Strategy 2020-2030
- Saint Lucia's Resilient Ecosystems Adaptation Strategy and Action Plan (REASAP) 2020-2028
- Saint Lucia's Sectoral Adaptation Strategy and Action Plan for the Agriculture Sector (Agriculture SASAP) 2018-2028
- Saint Lucia's Sectoral Adaptation Strategy and Action Plan for the Fisheries Sector (Fisheries SASAP) 2018-2028
- Saint Lucia's Sectoral Adaptation Strategy and Action Plan for the Water Sector (Water SASAP) 2018-2028
- Tourism Industry Development Act (1982)
- Wildlife Protection Act (1980)

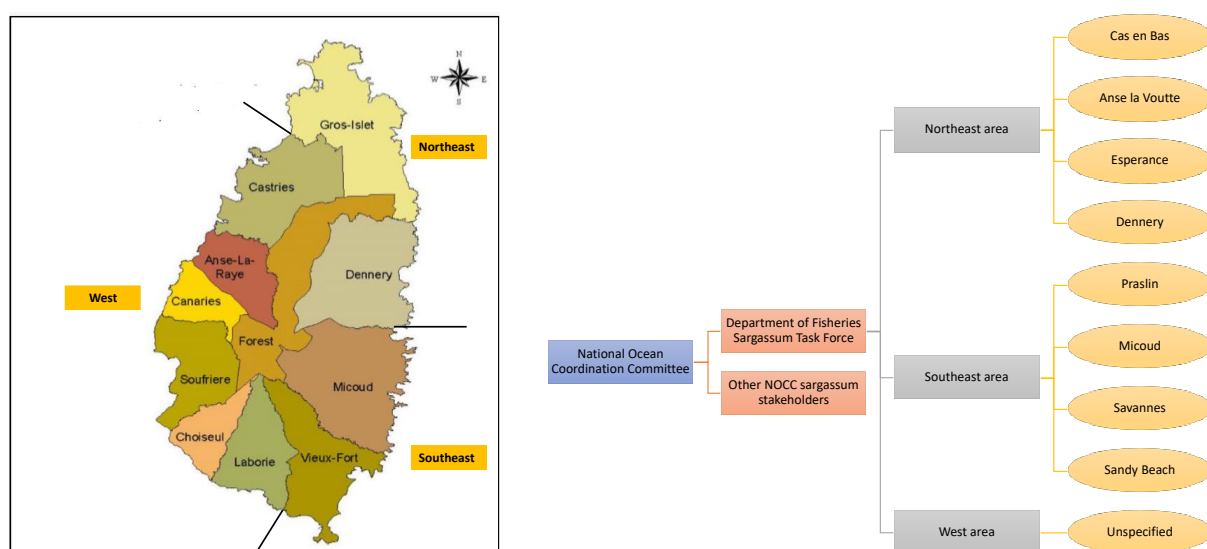
Saint Lucia's overarching NAP continues to be supplemented by several documents:

- Saint Lucia's Private Sector Engagement Strategy under its National Adaptation Planning Process (2019)
- Saint Lucia's Climate Financing Strategy under its National Adaptation Planning Process (2019)

Note: This list reflects the national legislation enacted before the publishing date of this document.

1.2 INSTITUTIONS

The 2021 draft SAMS note that there were several possible institutional arrangements. Both bottom-up and top-down arrangements for governance were said to be useful. It was proposed to start planning with the coastal sites most at risk and scale up (expand) response capability to national level. However, some components need to start at national level and scale down (delegate) authority for action to site level. Three national zones based on coastal parishes each with a few stranding sites were said to be appropriate sub-national districts: northeast, southeast and west (see map). For delegation the leading authority of the DoF, derived from the national ocean governance committee and delegated to the districts was thought feasible (see diagrams) with further delegation to customary parish and community governance where applicable. Other schemes (e.g., Degia et al. 2022) use four zones, but otherwise the institutional principles are similar. The institutional arrangements applicable in 2023 are unclear, but Saint Lucia has a large set of approved and draft guiding documents with a national ocean governance committee in place.



1.3 ROLES OF SOME STAKEHOLDERS IN MANAGEMENT

Management institutions can comprise a mix of actors and roles. The table provides a limited example such as can be constructed following stakeholder identification and analysis.

Fisherfolk or similar coastal area users	General public or civil society organisations	Sargassum authority (e.g. Fisheries Division)
Attend, contribute, participate in the information and education sessions	Attend, contribute, participate in the information and education session	Ensure project structure is well defined and in place

Fisherfolk or similar coastal area users	General public or civil society organisations	Sargassum authority (e.g. Fisheries Division)
Provide use of boats and seine nets towards the cleanup of offshore areas Participate actively in beach cleanups. Form fisher groups specifically to assist in the beach cleanups Report location and possible size of Sargassum sightings at sea Promote the importance of good practices when removing sargassum	Identify groups and clubs to sign up for the volunteer beach clean- up sessions. Promote the formation of new clubs and help strengthen weak groups. Provide support and volunteer to ensure project is a success Share information on the project with individuals and households Ensure the safety of project assets – tools, equipment, supplies Ensure cleanup is done thoroughly and diligently Encourage innovation to create sustainable livelihoods among community, specifically the youth	Discuss and help plan beach clean- up activities with the communities Inform the communities of ecological advantages of sargassum (climate adaptation, sustainable & innovative project opportunities) Ensure communities have the information, supplies, equipment to carry out the tasks at hand. Carry out monitoring and evaluation of project processes and procedures to ensure compliance with funding agency Ensure proper utilization and allocation of resources Work with community to encourage innovation, research and development to create sustainability after end of project

(Examples adapted from Sealys and Felix (2017))

2 MONETARY MATTERS

Line ministries, statutory corporations, non-governmental organisations and private sector managers and financial staff will have several different ways of presenting and analysing sargassum-related costs and earnings. It is not suggested that there should be a standard format, but there should be a simple means of estimating equivalence in order to easily determine and compare the costs and benefits of various operations at whatever scale is appropriate. The figures given below are entirely fictitious, but illustrate the kinds of information required.

EXAMPLES OF VALUE TYPES	AUTHORITY FOR VALUE ESTIMATE	UNITS AND NOTES	VALUE (EC)
Cane loader rental	Ministry of Agriculture	Average hourly rate	250.00/hr
Beach restoration	CZMU	Estimated contractor fee	1300/day
Biofuel production value	Energy Division	From xx biogas digester	6,500/ton wet weight
Decline in fish harvest	Fisheries Division	Based on ex-vessel price	1,000,000/ season

For a more thorough treatment see the journal article:

Rodríguez-Martínez, R.E., Torres-Conde, E.G. and Jordán-Dahlgren, E., 2023. Pelagic Sargassum cleanup cost in Mexico. *Ocean & Coastal Management*, 237, p.106542

3 KEY SARGASSUM CONTACTS

Key personnel of state and non- state entities involved in sargassum management, research and uses:

NAME	POST	ORGANISATION	EMAIL	PHONE
Sarita Williams-Peter	Chief Fisheries Officer	Department of Fisheries – Ministry of Agriculture, Fisheries, Food Security and Rural Development	sarita.peter@govt.lc	+ (758) 468 - 4135/ 43
Thomas Nelson	Deputy Chief Fisheries Officer	Department of Fisheries	thomas.nelson@govt.lc	+1 (758) 716-0836
Rita Harrison	Fisheries Assistant	Department of Fisheries	rita.harrison@govt.lc	+1 (758) 519-9995
Charlie Prospere	Fisheries Officer	Department of Fisheries	Charlie.prospere@govt.lc	+1 (758) 712-9571
Marie-Louise Felix	Lecturer	Sir Arthur Lewis Community College	mlfelixearth@gmail.com	+1 (758) 721-2019
Anthony Philgence	Agricultural Officer	Agricultural Division – Ministry of Agriculture, Fisheries, Food Security and Rural Development	pampoting@yahoo.com	+1 (758) 714-8570

NAME	POST	ORGANISATION	EMAIL	PHONE
Dawn Pierre-Nathaniel	Chief Sustainable Development & Environment Officer	Department of Sustainable Development - Ministry of Sustainable Development, Energy, Science and Technology	dpnathaniel@gmail.com	+1 758-468-5863
		National Conservation Authority	nca@govt.lc	(758) 459-0278
		St. Lucia National Trust	info@slunatrust.org	+1 758-452 - 5005
Christopher Alexander	Maritime Affairs	Director	Christopher.alexandra@sla.spa.com	
Johanan Dujon	Entrepreneur	CEO, Algas Organics	johanan@algasorganics.com	+1 (758) 461-5019
Craig Henry	CEO	Saint Lucia National Conservation Fund	info@sluncf.org	(758) 285 8137

This table should be expanded and updated to include other sectors and actors (public sector, private sector and civil society) such as renewable energy, tourism, coastal management, etc.

4 SARGASSUM EXPOSURE AND VULNERABILITY ASSESSMENT

It must be noted that generally, there has been little systematic monitoring of sargassum inundations and therefore lack of data on spatial and temporal distribution. However, under the Caribbean Biodiversity Fund (CBF) project 'Adapting to a new reality: managing responses to influxes of sargassum seaweed in the Eastern Caribbean' (SargAdapt), hazard risk assessments of sargassum inundations were created using a combination of the tools of hazard risk response and spatial planning¹.

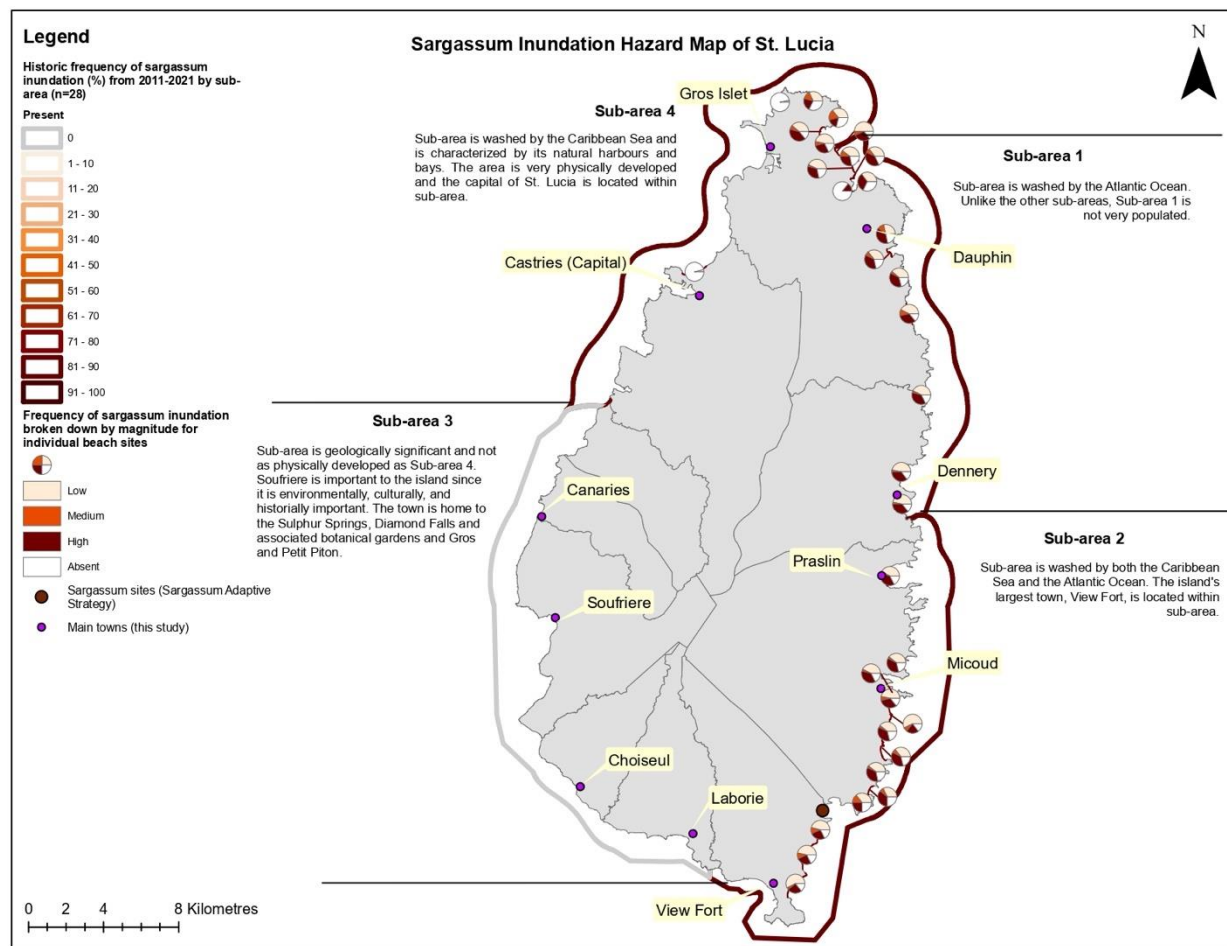
Sargassum inundations occur primarily on the southeast, east and northeast coasts and to a lesser extent on the northwest. Thirty-two (32) sites were identified as being prone to sargassum influxes in St. Lucia (see map below). The study revealed, based on available Google Earth imagery from 2010 to 2021, beaches exposed to sargassum inundation make up 19 km (12%) of the coastline of St. Lucia. Further examination of the four coastal zone sub-areas found that all except sub-area 3 have been exposed to sargassum inundations over the years. All exposed sub-areas receive sargassum 86% of the time and sub-area 1 and 2 both have the largest number of exposed beaches (13 each). However, sub-area 2 has the

¹ Degia, A.K., M. Small, H.A. Oxenford, 2022. Applying Hazard Risk Assessment and Spatial Planning Tools to Sargassum Inundations in the Eastern Caribbean Small Island States as a basis for improving response. SargAdapt Project Report, FINAL DRAFT. Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, Cave Hill, Barbados, 72pp

greatest length of exposed coastline (9.96 km). St. Lucia has 10 major coastal towns; however, Duaphin, Dennery, Parslin and Micoud are the only towns exposed to sargassum (Degia et al. 2022).

To view the entire Project Report visit:

https://iweco.org/sites/default/files/202204/IWEco_Project_C2_Final_Report_Applying_Hazard_Risk_Assessment_and_Spatial_Planning_Tools_to_Sargassum_Inundations_in_the_Eastern_Cbean.pdf

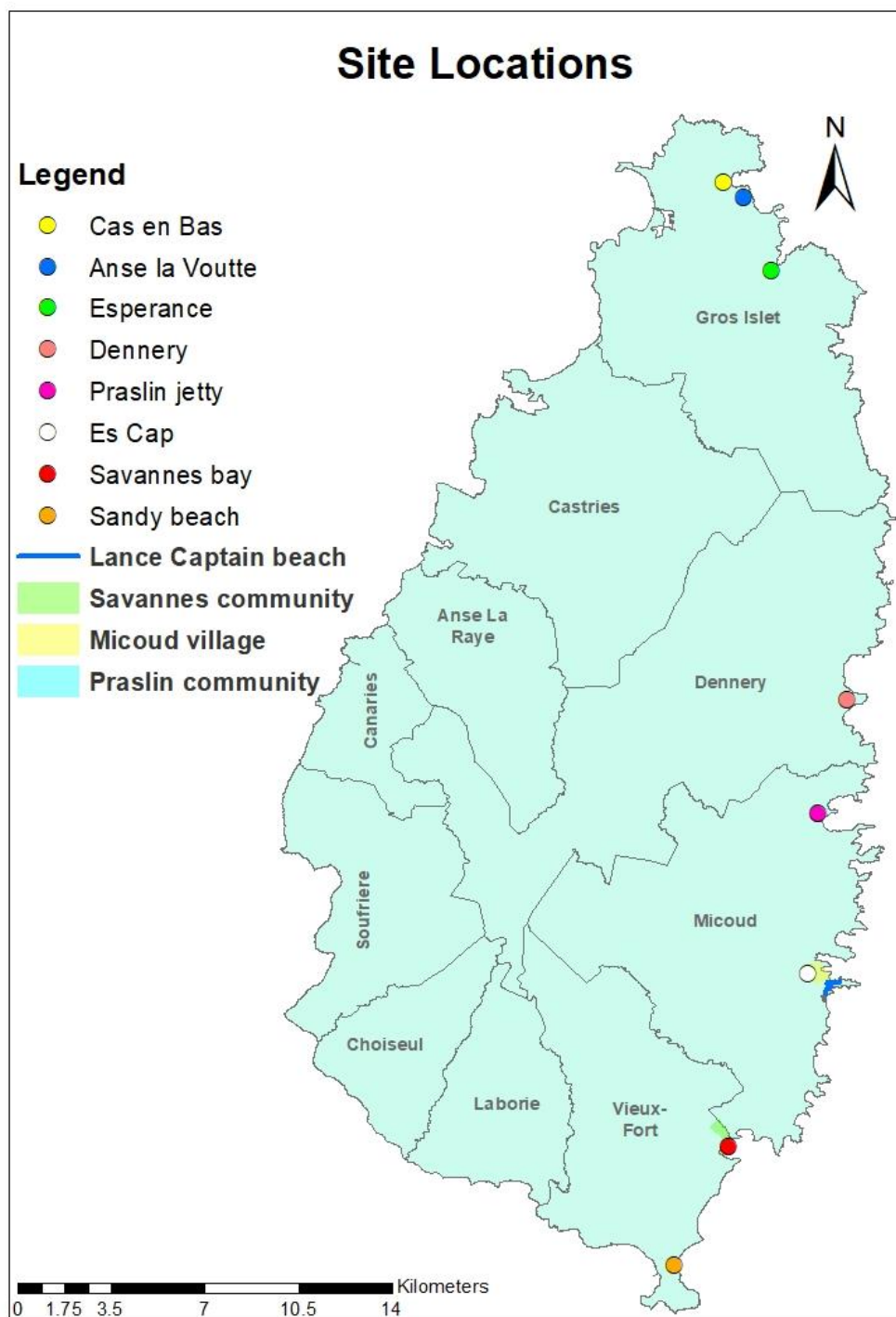


Map of St. Lucia showing the level of sargassum inundations within the four coastal sub-areas. (Source: Degia et al. 2022)

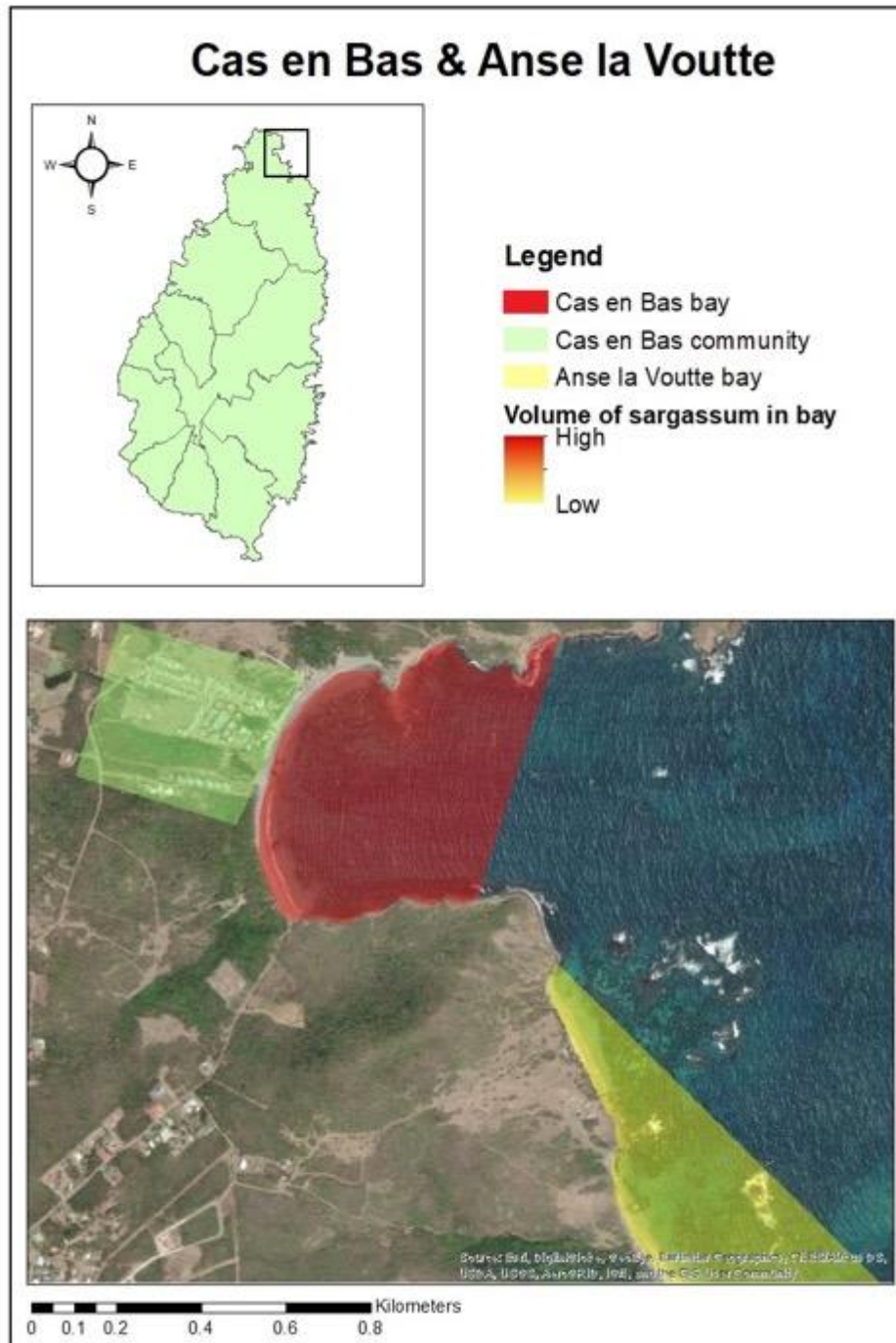
During the rapid scoping assessment exercise, 9 sites were prioritized, based on their social and ecological characteristics and the severity of impacts in the past. This assessment provides useful information to support the design of targeted interventions for maximum impact. This is needed to inform decision making by assessing the most suitable interventions for each site to increase resilience and reduce vulnerability.

5 LOCATION PROFILES OF SARGASSUM STRANDING SITES

The nine sites prioritized are shown in the map below. Key physical, social and ecological features were identified for each site and a historical matrix was created to identify past sargassum impacts and responses.



5.1 CAS EN BAS & ANSE LA VOUTTE



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- Upscale residential area - Community heavily dependent on tourism - Beach is extensively used for recreational activities including horseback riding	- Steep rugged topography - Dry micro-climate - Coastal dry forest - Remnants of mangrove forest

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April-July 2018	High volume of sargassum restricted beach use and resulted in the closure of social amenities	In an attempt to rectify impact, excavation was done. This resulted in the deterioration of beach front
January-March 2019	Influx events blocked the river and reduced beach recreational activities.	No machinery was used in the removal of sargassum. Hand clearing was done to prevent erosion.
February 2020	Sargassum blocked the river, preventing the movement of fish and resulted fish deaths.	Attempts were made to unblock the river to minimise the putrid scent released from the decaying sargassum

Vulnerability factors	
Geophysical features	Presence of bay with circulation currents that may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	Yes
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. Jetty)	No
How close is the community to Bay?	The community is located extremely close to bay (approximately 30 metres).
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	There are no primary, secondary or tertiary schools in the area. However, the St. Lucia's premier kitesurfing school is located within Cas en Bas and uses the Cas en Bas Bay for kitesurfing lessons and other watersports.
Volume of sargassum during scoping assessment	High
Volume of sargassum historically (2011 – present)	High

Is the beach heavily used by locals?	Yes: The beach is used for horseback riding and by wind surfers
Is the beach heavily used for tourism?	Yes: The area has numerous hotels and Airbnb premises whose guests utilize the beach.
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes: During 2019 influx events some community members and other paid personnel tried to haul truck loads of sargassum off the beach but efforts were abandoned as the sargassum was piling much faster than it could be removed.
Is there evidence of community efforts to use sargassum?	No: There is no wide-scale community efforts to use sargassum. However, some community members collect stacks of sargassum to use for their home gardening.
Presence of church and community groups that advocate for government assistance?	No

Overall comments on vulnerability and resilience:

The Cas en Bas community is located extremely close to the bay which makes the community susceptible to the economic and health impacts of sargassum influx events. During influx events livelihoods are affected as the beach is heavily used by locals, tourists and various water sports businesses. Given the importance of the beach to locals and tourists, Cas en Bas displays a **medium/moderate** vulnerability to influx events.

No evidence was found to support increased resilience of the Cas en Bas community to sargassum influx events. Efforts were made to remove sargassum from beaches but these efforts were not sustained. In the absence of community groups to advocate for government assistance and organized community efforts to address the challenges faced with influx events, Cas en Bas demonstrates **low** resilience.





Photo credit: Bethia Thomas (8 March 2020)

5.2 ANSE LA VOUTTE

SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• There are no residents within the immediate vicinity • Beach occasionally used by residents in Beausejour however a four-wheel drive is needed to access beach	• Very rough rugged terrain • Coastal dry forest • Moderate amounts of mangrove • Many coves within the area • Important turtle nesting beach

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April-July 2018	Reefs became covered with sargassum making spear fishing very difficult	Beached sargassum was removed by hand.
January-March 2019	Reefs became covered with sargassum making spear fishing very difficult. Decreased recreational activities on the beach.	Beached sargassum was removed by hand.

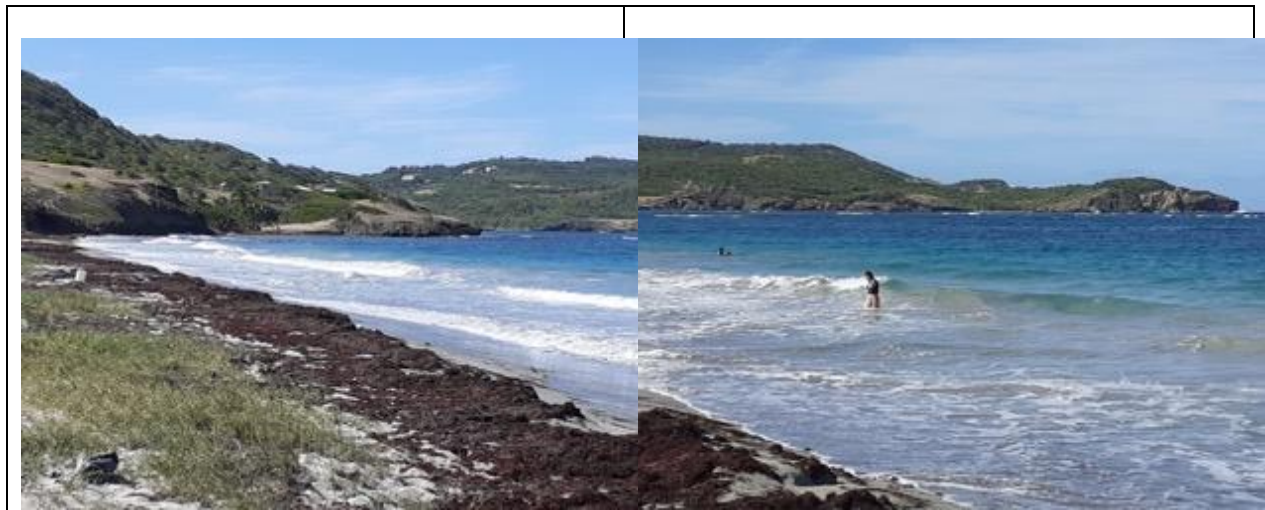
Vulnerability factors	
Geophysical features	Presence of bay with circulation currents that may retain sargassum during influx events.
Is there easy access to the bay to facilitate clean-up efforts?	No: Beach access requires a four-wheel drive due to the rugged terrain and coastal dry forest.
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. Jetty)	No
How close is the community to Bay?	There are no residents within the immediate vicinity. The closest community is located approximately 0.5 miles away. Despite their distance from the bay community members are affected by the scent of rotting sargassum.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	No: There are no schools in the area. However, the Darren Sammy Cricket Grounds are located 1 mile away from bay. During some influx events individuals using the cricket field are affected by the odor released by rotting sargassum.
Volume of sargassum during scoping assessment	Low
Volume of sargassum historically (2011 – present)	Low
Is the beach heavily used by locals?	No
Is the beach heavily used for tourism?	No
Evidence of resilience	
Is there evidence of community efforts to clean-up sargassum?	No

Is there evidence of community efforts to use sargassum? E.g. Mulch, fertilizer	No
Presence of church and community groups that advocate for government assistance?	No

Overall comments on vulnerability and resilience:

Geophysical features at Anse la Voutte increases the likelihood of sargassum becoming trapped in the bay and makes beach clean-ups more difficult. However, given the low beach use by locals and tourists, and the distance between the bay and the community, Anse la Voutte has a **low** vulnerability to the impacts of sargassum during influx events.

No evidence was found to support increased resilience of the Anse la Voutte community to sargassum influx events. In the absence of community groups to advocate for government assistance and community efforts to clean-up/utilize sargassum, Anse la Voutte demonstrates **low** resilience.



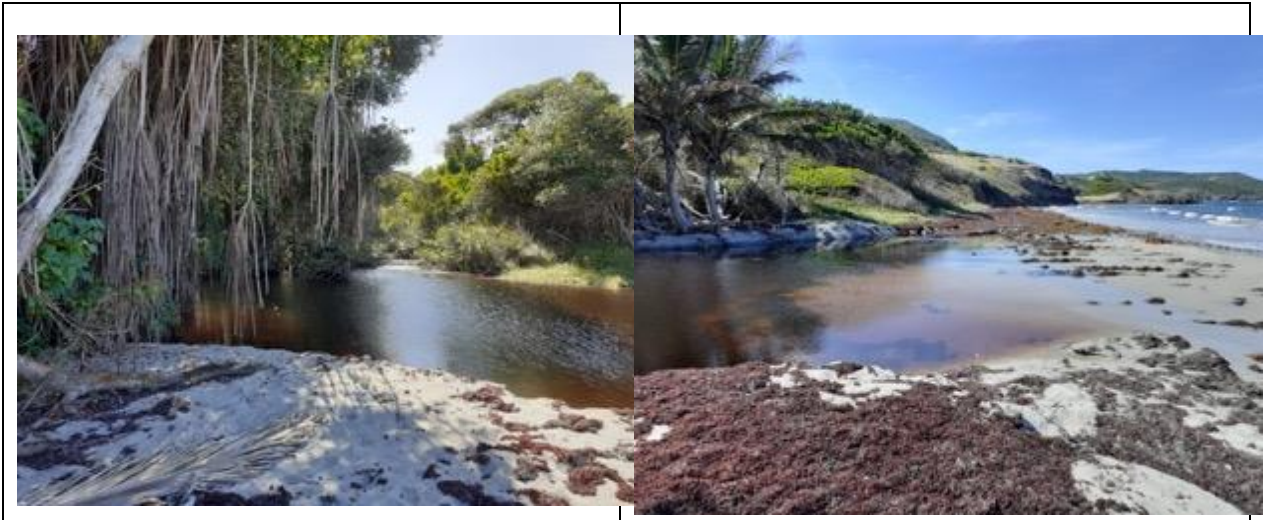
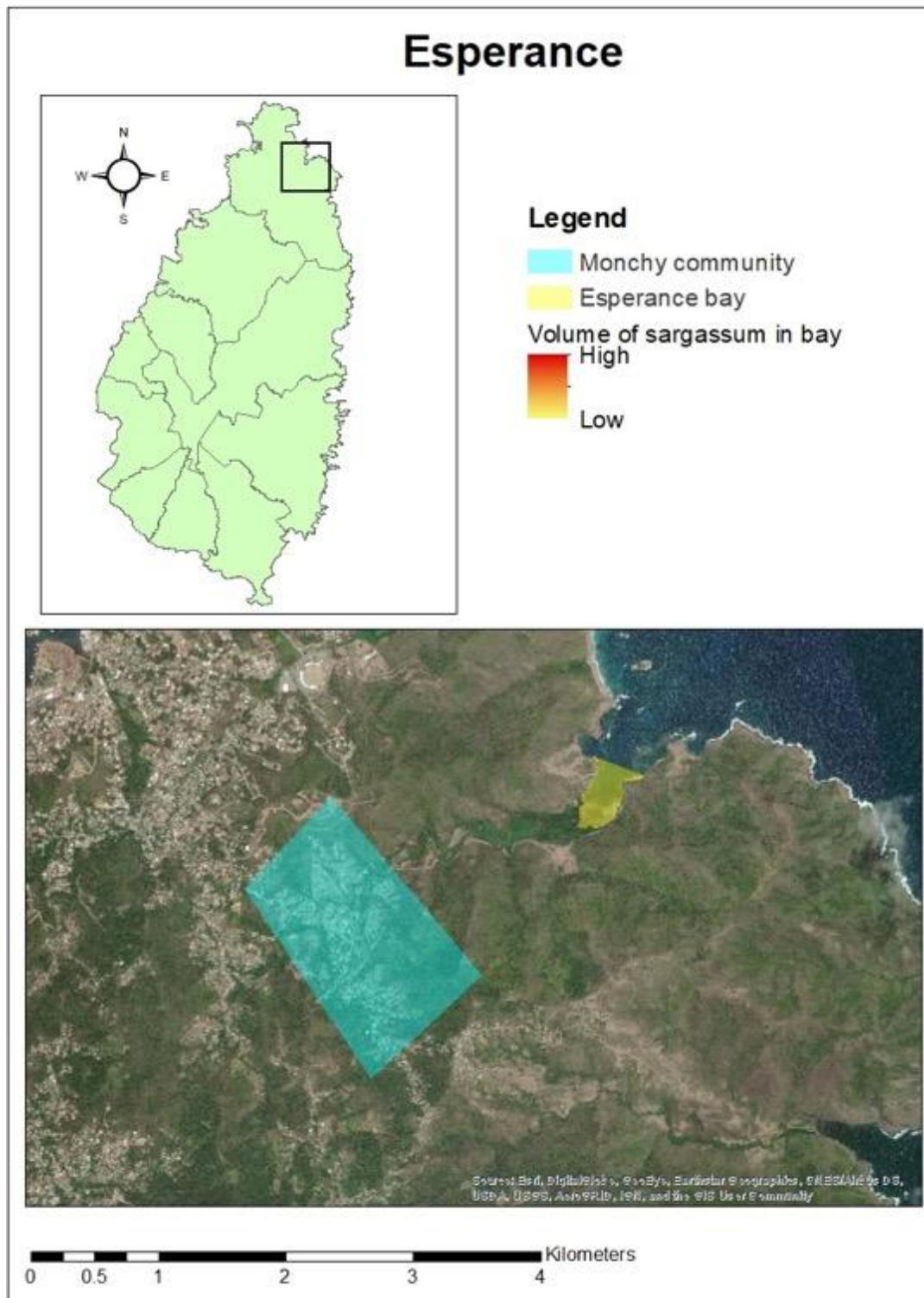


Photo credit: Bethia Thomas (8 March 2020)

5.3 ESPERANCE



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- The closest community is approximately 1 mile from the beach - A four-wheel drive is needed to access beach and the long-rugged road makes sargassum clean-ups difficult - The area used to be important to the conch fishery many years ago	- Steep rugged topography - Coastal dry forest - Dense mangrove forest - Short beach

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
2018	Sargassum accumulated on the west part of cove. Effect of sargassum on the community was very negligible due to the distance between the community and the beach.	No action taken.
2020	Minimal to moderate influxes	No action taken.

Vulnerability factors	
Geophysical features	Presence of bay which may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	No: Dense mangroves and rough, rugged road to the beach makes cleaning impossible. A 4-wheel drive is needed to access the beach.
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	No: The area was once an important site for conch diving but is no longer in use.
How close is the community to Bay?	Community is located approximately one mile from the bay.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	There are no schools, hospitals or polyclinics in the area.
Volume of sargassum during scoping assessment	Low
Volume of sargassum historically (2011 – present)	Low
Is the beach heavily used by locals?	No
Is the beach heavily used for tourism?	No

Evidence of resilience	
Is there evidence of community efforts to clean-up?	No
Is there evidence of community efforts to use sargassum?	No
Presence of church and community groups that advocate for government assistance?	No

Overall comments on vulnerability and resilience:

The Esperance community is located approximately one mile away from the bay however the community is susceptible to the health impacts of sargassum influx events. Given the fact that the beach is rarely used by locals or tourists and does not provide any major sources of income to the Esperance community; the community displays a **low** vulnerability to influx events.

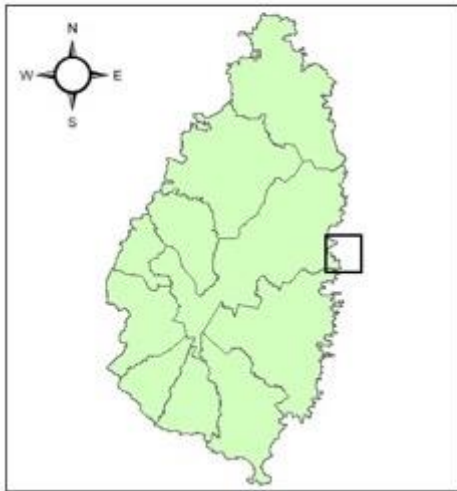
No evidence was found to support increased resilience of the Esperance community to sargassum influx events. The Esperance community demonstrates **low** resilience.



(Photo credit: Bethia Thomas, Dated 19 March 2020)

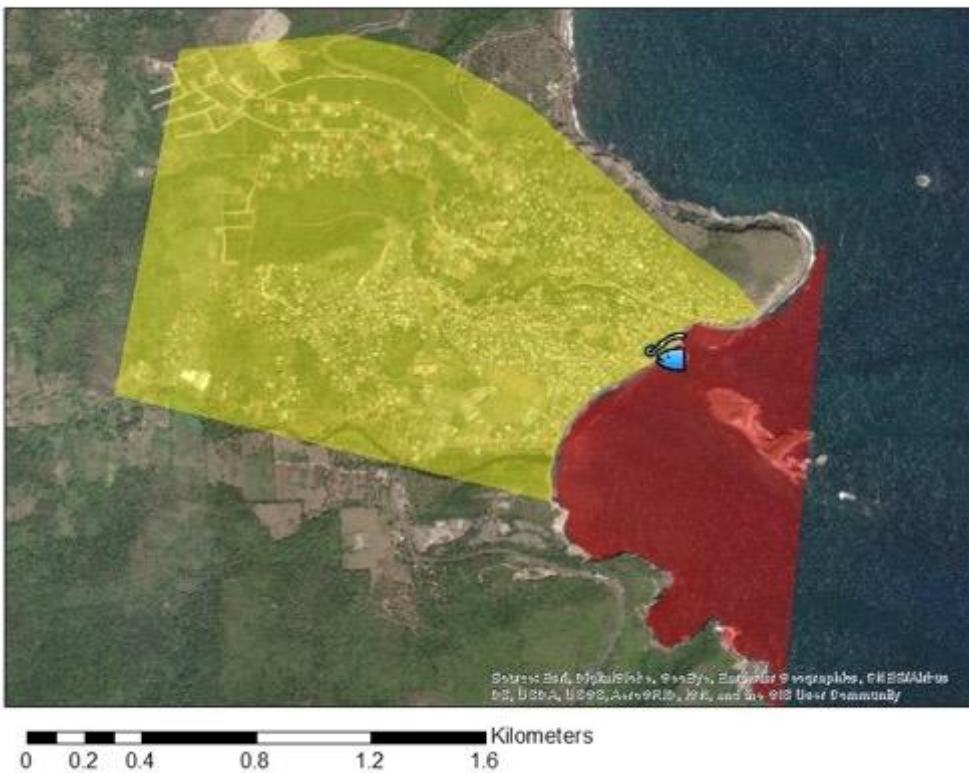
5.4 DENNERY

Dennerly community



Legend

-  Dennerly fishing complex
-  Dennerly village
-  Dennerly bay
- Volume of sargassum in bay**
 -  High
 - Low



SELECT SOCIAL KEY FEATURES

SELECT ECOLOGICAL KEY FEATURES

- Community is heavily reliant on fishing - Weekly Friday night fish-fries provide a major source of income for the community	- Gently sloping to rugged topography - Coastal dry forest - Offshore island
--	--

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April-July 2018	Sargassum mats drifting towards the shore brought several fish species which increased fish landings. On the other hand, sargassum clogged the river causing fish to die. High volume of beached sargassum rendered 95% of the beach unusable for bathing.	Increased fish landings resulted in increased fish sales and a decrease in fish price. Sargassum was removed from the beach and fish landing pond
January-March 2019	Sargassum mats drifting towards the shore brought several fish species which increased fish landings. On the other hand, sargassum clogged the river causing fish to die. High volume of beached sargassum rendered 95% of the beach unusable for bathing.	Increased fish landings resulted in increased fish sales and a decrease in fish price. Sargassum was removed from the beach.
February 2020	High volume of sargassum covered 85% of the beach thus reducing space available for beach users.	

Vulnerability factors	
Geophysical features	Presence of bay with circulation currents that may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	Yes
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	Yes: Dennery has one of the largest fisheries complexes on the island. In Dennery, fishing is a major source of income for community members. Fishing also provides livelihoods to many homes through the weekly Friday night fish fry.
How close is the community to Bay?	Community is located directly within bay.

Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	Yes: There are several primary and secondary schools within Dennery. Dennery Infant School is the closest school (less than 400 meters) to the bay.
Volume of sargassum during scoping assessment	Moderate
Volume of sargassum historically (2011 – present)	High
Is the beach heavily used by locals?	Yes
Is the beach heavily used for tourism?	Yes: There are several small guest houses but no major hotels. Dennery caters mostly to French tourists.
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes: Clean-up efforts have been made by the Government and the Dennery South Constituency Council.
Is there evidence of community efforts to use sargassum?	Yes: The Government has been removing sargassum in Micoud, Praslin, Savannes Bay and Dennery to help support the efforts of the local entrepreneur Johanan Dujon who has been converting the sargassum into fertilizer.
Presence of church and community groups that advocate for government assistance	Yes: There are several community groups including the Dennery Fishermen Cooperative and the Dennery South Constituency Council.

Overall Comments on vulnerability and resilience:

The Dennery community is located in the bay which makes the community susceptible to the economic and health impacts of sargassum influx events. Furthermore, there are several schools in the area which may also be affected by the gases released from beached sargassum. During influx events the livelihoods of fishers are severely affected and beach use is restricted. Given the importance of the beach to the fishing community and the income fishing generates through the weekly Friday night fish fry, Dennery displays a **high** vulnerability to influx events.

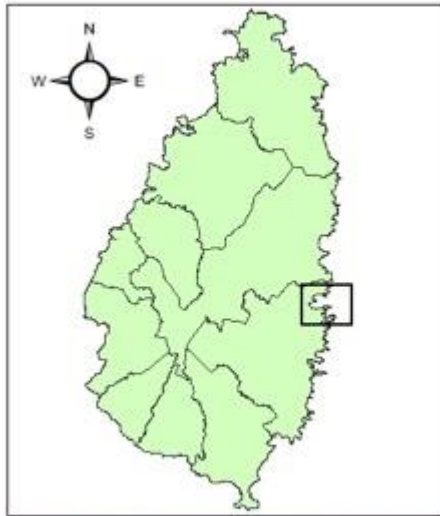
Since the arrival of sargassum in Dennery, efforts were made by the government to assist with beach clean-ups and partner with local entrepreneurs to find innovative uses for sargassum. The Dennery Fishermen Cooperative and/or the Dennery South Constituency Council can take the lead to further advocate for government assistance and galvanize the community to take actions that can further increase the resilience of Dennery to influx events. Dennery demonstrates **medium/moderate** resilience.



Photo credit: Top left- Anthony Philgence (13 January 2019) | Top right- Anthony Philgence (5 July 2019)
 Photo credit: Bottom left and right – Bethia Thomas (1 March 2020)

5.5 PRASLIN

Praslin community



Legend

-  Praslin jetty
-  Micoud-Vieux Highway
-  Praslin bay
-  Praslin community
-  Fregate Island Minor
-  Fregate Island Major
- Volume of sargassum in bay**
 -  High
Low



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- Community relies on fishing, sea-moss farming, agro-processing and farming to provide livelihoods - Prior to the first sargassum influx, the beach was used for recreational activities and baptisms	- Low-lying land with dense mangrove forest - Two offshore islands that provide habitats for migratory birds

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April- July 2018	High volume of sargassum negatively affected the ecology of the bay and restricted beach use by approximately 90%.	No action taken.
January- March 2019	High volume of sargassum clogged bay.	Fishing boats forced to dock further away
February 2020	Minimum amount of sargassum present.	No action taken.

Vulnerability and resilience

Vulnerability factors	
Geophysical features	Presence of bay with circulation currents that may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	Yes
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	Yes: Community members are heavily dependent on fishing to provide livelihoods.
How close is the community to Bay?	The community is located approximately 60 meters way from the bay?
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	There are no schools in the area
Volume of sargassum during scoping assessment	Moderate
Volume of sargassum historically (2011 – present)	High

Is the beach heavily used by locals?	Yes: Not usually for swimming but it is an event location where beach parties and limes are hosted
Is the beach heavily used for tourism?	No
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes: Complete Marine Services Ltd. (CMS) removed sargassum in Praslin with the use of an innovative drag net.
Is there evidence of community efforts to use sargassum?	The Government has been removing sargassum in Micoud, Praslin, Savannes Bay and Dennerie to help support the efforts of the local entrepreneur and Praslin community member Johanan Dujon who has been converting the sargassum into fertilizer. Furthermore, the sargassum which was removed by CMS was used by community members as fertilizer.
Presence of church and community groups that advocate for government assistance	Yes: Praslin Conservation and Development Foundation

Overall comments on vulnerability and resilience:

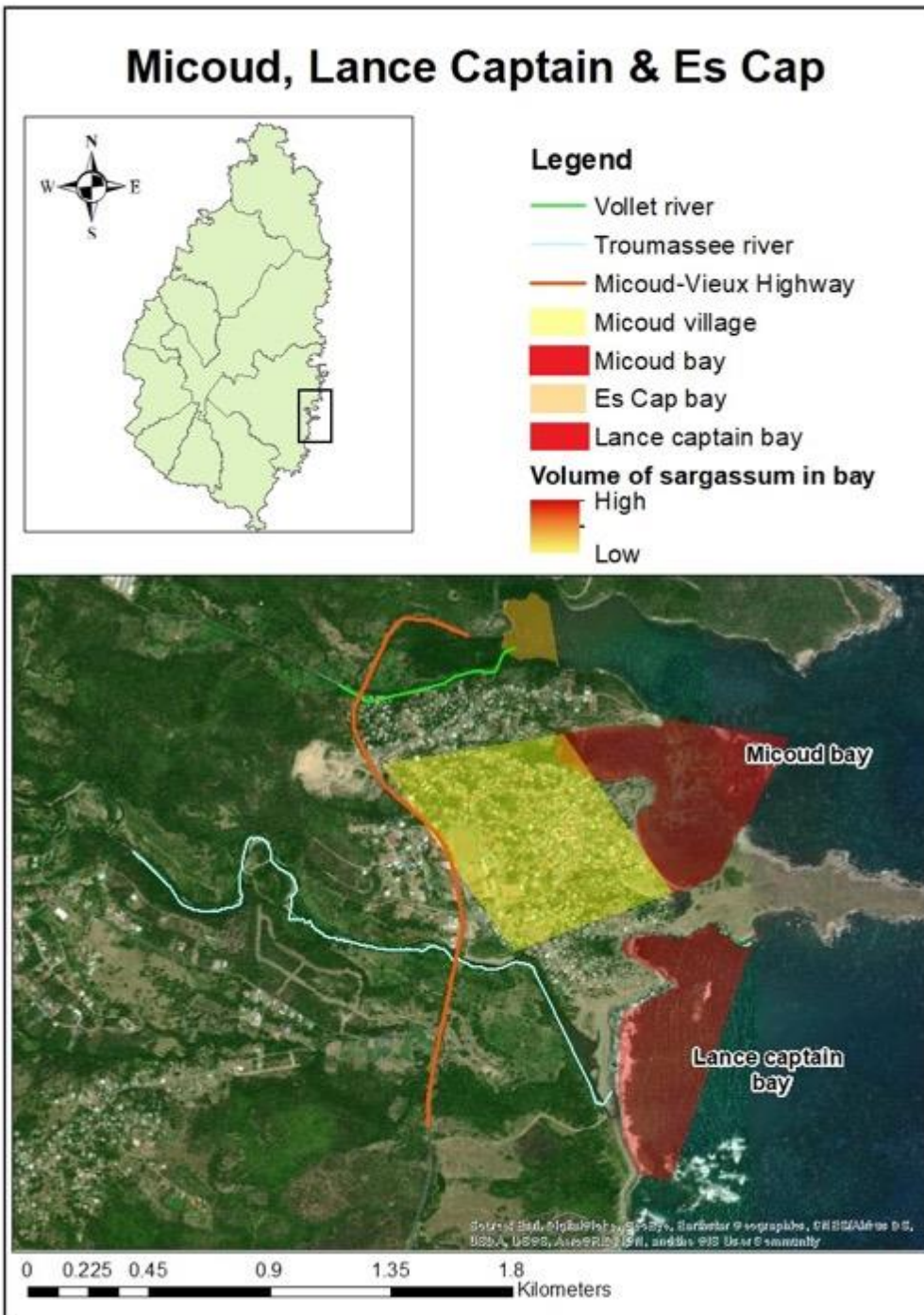
The Praslin community is located close to the bay which makes the community susceptible to the economic and health impacts of sargassum influx events. During influx events fishing livelihoods are severely affected and beach use is restricted. Given the importance of the beach to the fishing community, Praslin displays a **high** vulnerability to influx events.

Since the arrival of sargassum in Praslin, efforts were made by the government to assist with beach clean-ups and partnerships with local entrepreneurs were formed to find innovative uses for sargassum. The presence of a community group that advocates for government assistance and galvanizes the community to take actions, can further increase the resilience of Praslin to influx events. Praslin demonstrates **medium/moderate** resilience.



Photo credit: Bethia Thomas (25 February 2020)

5.6 MICOUD, LANCE CAPTAIN & ES CAP



5.7 MICOUD

SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- Estimated to be one of the poorest communities in St. Lucia based on the 2010 National Census - High level of unemployment - Community members heavily dependent on farming and fishing	- Gently sloping to rugged topography - Coastal dry forest - Village is located between the Vollet and Troumassee Rivers

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April- July 2018	Sargassum influx negatively affected travel by sea, especially for fishermen. Decomposing sargassum caused damage to household appliances.	Use of protective gear by fishers. Residents replaced damaged household appliances at their own expense.
January- March 2019	The influx of sargassum resulted in fish kills and negatively affected travel by sea, especially for fishermen. Decomposing sargassum caused damage to household appliances and affected the health of individuals within the community.	Sea birds moved closer to shore to scavenge on dead fish trapped within the sargassum
February 2020	High volume of sargassum in the bay resulted in 90% fish loss. Decomposing sargassum caused damage to household appliances	Residents replaced damaged household appliances at their own expense.

Vulnerability factors	
Geophysical features	Presence of bay with circulation currents that may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	Yes
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	Yes: Community members are heavily dependent on fishing to support livelihoods. Micoud is one of the fish landing sites in the island. The absence of a jetty has significantly disadvantaged Micoud fishermen during sargassum influx events and they are unable to launch their boats.
How close is the community to Bay?	Community is located directly in the bay.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	No

Volume of sargassum during scoping assessment	High
Volume of sargassum historically (2011 – present)	High
Is the beach heavily used by locals?	Yes
Is the beach heavily used for tourism?	Yes: There are small guest houses and Airbnbs in the area.
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes: Some efforts have been made. There was also a meeting held by the Department of Fisheries and the CC4Fish project to seek support for the clean-up of sargassum in Micoud Bay and other south-east beaches.
Is there evidence of community efforts to use sargassum?	Yes: The Government has been removing sargassum in Micoud, Praslin, Savannes Bay and Dennery to help support the efforts of the local entrepreneur Johanan Dujon who has been converting the sargassum into fertilizer.
Presence of church and community groups that advocate for government assistance?	Yes: Micoud Youth and Sports Council. No community groups directly relating to environmental awareness or fishing groups were identified.

Overall comments on vulnerability and resilience:

The Micoud community is located directly in the bay which makes the community susceptible to the economic and health impacts of sargassum influx events. During influx events fishing livelihoods are severely affected and beach use by locals and tourists is restricted. Given the importance of the beach to locals, tourists and the fishing community, Micoud displays a **high** vulnerability to influx events.

Since the arrival of sargassum in Micoud, there has been community meetings with the Department of Fisheries to seek support for clean-ups and discuss the challenges faced. Efforts were made by the government to assist with beach clean-ups and partnerships were with local entrepreneurs to find innovative uses for sargassum. The presence of a community group that advocates for government assistance and galvanizes the community to take actions, can further increase the resilience of Micoud to influx events. Micoud demonstrates **medium/moderate** resilience.



Photo credit: Top left- Anthony Philgence (14 January 2019) | Top right- Anthony Philgence (7 May 2019)
 Photo credit: Bottom left and right – Bethia Thomas (25 February 2020)

5.8 LANCE CAPTAIN

SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- Community is largely occupied by squatters - Community members depend heavily on fishing.	- Steep rugged topography - Coastal dry forest

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April- July 2018	Piles of sargassum washed up along the shore and decreased sand mining by approximately 45%. Decomposing sargassum damaged household appliances.	No action was taken.
January-March 2019	High influx of sargassum decreased sand mining by approximately 60%. Decomposing sargassum damaged household appliances.	Removal of sargassum restricted to the upper part of beach to curb sand mining
February 2020	Influx resulted in piles of sargassum on the beach. Quantity of sargassum reduced the occurrence of sand mining.	No action was taken at the time of assessment.

Vulnerability factors	
Geophysical features	Presence of bay with circulation currents that may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	Yes
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	No
How close is the community to Bay?	Community is very close to bay (Less than 50 meters).
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	There are no schools in the area

Volume of sargassum during scoping assessment	High
Volume of sargassum historically (2011 – present)	High
Is the beach heavily by locals?	No
Is the beach heavily used for tourism?	No
Evidence of resilience	
Is there evidence of community efforts to clean-up?	No
Is there evidence of community efforts to use sargassum?	No
Presence of church and community groups that advocate for government assistance?	No

Overall comments on vulnerability and resilience:

The Lance Captain community is located close to the bay which makes the community susceptible to the health impacts of sargassum influx events. However, the beach is rarely used by locals or tourists and does not provide any major sources of income to the Lance Captain community. The Lance Captain community displays a **moderate** vulnerability to influx events.

No evidence was found to support increased resilience of the Lance Captain community to sargassum influx events. The Lance Captain community demonstrates **low** resilience.





Photo credit: Top left- Anthony Philgence (19 Sept 2018) | Top right- Anthony Philgence (20 Sept 2018)
Photo credit: Bottom left and right – Bethia Thomas (25 February 2020)

5.9 Es CAP

SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- Upscale residential area - Community members are not dependent on fishing - The beach is not well known or utilized by locals or tourists	- Short beach with moderately dense mangrove forest - Beach had large quantities of marine litter in March 2020

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April-July 2018	Release of gases from decaying sargassum caused discomfort in breathing and damaged household appliances	No action taken
January-March 2019	Influx event clogged mangroves and compromised air quality	No action taken
February 2020	Moderate volumes sargassum washed into mangroves and sank to the bottom	No action taken

Vulnerability factors	
Geophysical features	Presence of bay with circulation currents that may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	No: The beach is largely inaccessible. A small footpath is the only access to the beach.
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	No: Some residents may use rods occasionally for recreational fishing.
How close is the community to Bay?	The community is very close to the bay (approximately 100 meters).
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	There are no schools in the area

Volume of sargassum during scoping assessment	Moderate
Volume of sargassum historically (2011 – present)	Moderate
Is the beach heavily used by locals?	No
Is the beach heavily used for tourism?	No
Evidence of resilience	
Is there evidence of community efforts to clean-up?	No
Is there evidence of community efforts to use sargassum?	No
Presence of church and community groups that advocate for government assistance?	Yes: ESCAP Community Association Inc.

Overall comments on vulnerability and resilience:

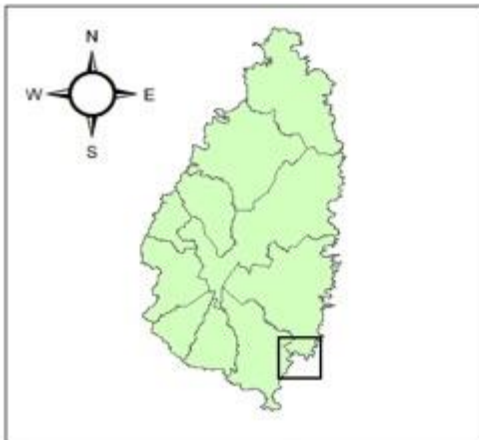
The Es Cap community is located close to the bay which makes the community susceptible to the health impacts of sargassum influx events. However, the beach is rarely used by locals or tourists and does not provide any major sources of income to the Es Cap community. The Es Cap community displays a **moderate** vulnerability to influx events.

No evidence was found to support increased resilience of the Es Cap community to sargassum influx events. The Es Cap community demonstrates **low** resilience.



Photo credit: Bethia Thomas (1 March 2020)

Savannes community



Legend

- Savannes jetty
- Micoud-Vieux highway
- Savannes community
- Savannes bay
- Volume of sargassum in bay**
 - High
 - Low



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- Two new upscale residential areas (Castles in Paradise and Emerald Villas) - Savannes bay fishermen cooperative and locals from the Vieux Fort district use jetty for fishing and sea-moss farming	- Gently sloping to steep topography - Bay comprises mangrove forest, seagrass beds and coral reefs and is a designated Ramsar site - Savannes bay makes up part of the proposed Point Sable National Park complex.

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April-July 2018	Moderate influx of sargassum within bay. Sargassum sank to the bottom of the bay, fishers were not restricted	No action taken.

Vulnerability factors	
Geophysical features	Presence of bay with circulation currents that may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	Yes
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	Yes: The Savannes bay fishermen cooperative and fishermen from Vieux-Fort use the jetty and small fishing complex to sell their catch. Fishers in Savannes were not as restricted as fishers in other areas.
How close is the community to Bay?	Community on the other side of the Micoud Highway (less than 100 meters away from bay).
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	There are no schools in the area
Volume of sargassum during scoping assessment	Moderate
Volume of sargassum historically (2011 – present)	High
Is the beach heavily used by locals?	No
Is the beach heavily used for tourism?	No
Evidence of resilience	

Is there evidence of community efforts to clean-up?	No
Is there evidence of community efforts to use sargassum?	Yes: The Government has been removing sargassum in Micoud, Praslin, Savannes Bay and Dennery to help support the efforts of the local entrepreneur Johanan Dujon who has been converting the sargassum into fertilizer.
Presence of church and community groups that advocate for government assistance	Yes: Savannes bay fishermen cooperative

Overall Comments on vulnerability and resilience:

Savannes Bay community is located approximately one mile away from the bay however the community is susceptible to the health impacts of sargassum influx events. Given the fact that the beach is rarely used by locals or tourists and fishers using the jetty were not severely affected like those in Micoud and Praslin, the Savannes community displays a **moderate** vulnerability to influx events. However, the system of reefs, seagrass beds and mangroves at the site should be monitored during influx events and plans should be put in place to protect these ecological features.

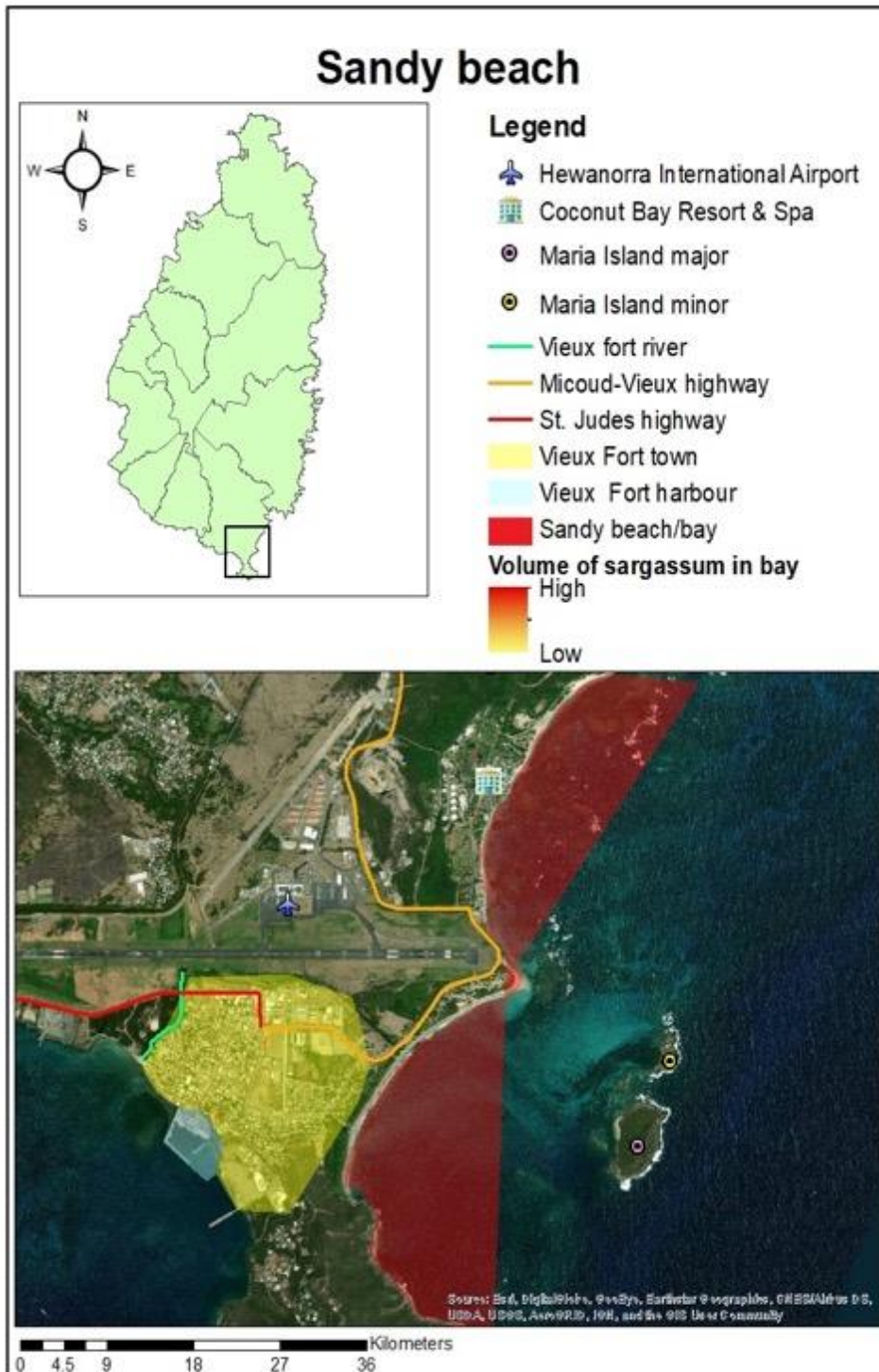
Efforts to clean-up/utilize sargassum were made by the government however no evidence was found to support increased resilience of the Savannes community to influx events. The Savannes community demonstrates **low** resilience.





Photo credit: Top left- Shelly-Ann Cox (April 2018) | Top right- Anthony Philgence (28 Sept 2018)
Photo credit: Bottom left and right – Bethia Thomas (25 February 2020)

5.11 SANDY BEACH



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- The community of Bruceville/Shanty town is a squatter settlement - Many persons within the community are involved in fisheries and the service sector - Most commercial properties are found within Vieux Fort town - Kite surfing and watersports hotspot	- Very flat to gently sloping topography - Coastal dry forest - Two offshore islands that provide habitats for endemic species and serve as nesting sites - Sandy beach makes up part of the proposed Point Sable National Park complex

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April- August 2018	No ecological impacts reported. Use of beach by beach users was restricted by approximately 80% due to the piles of sargassum on beach	No action taken.
January-March 2019	No ecological impacts reported. Use of beach by beach users was restricted by approximately 50% due to the piles of sargassum on beach	No action taken.
February 2020	No ecological impacts reported. Amount of sargassum did not affect users.	No action taken.

Vulnerability factors	
Geophysical features	Presence of bay with circulation currents that may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	Yes
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	Yes: However, most fishing occurs at the fisheries complex in Vieux Fort (0.5 miles away from bay). Fishing complex in Vieux Fort is one of the main fish landing sites on the island.
How close is the community to Bay?	Community is located directly in the bay.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	Yes: Vieux Fort has several primary and secondary schools along with poly clinics and hospitals located in close proximity to the bay. The closest school to the bay is Destiny University School of Medicine and Health services, it is located approximately 100 meters from Sandy beach.

Volume of sargassum during scoping assessment	High
Volume of sargassum historically (2011 – present)	High
Is the beach heavily used by locals?	Yes
Is the beach heavily used for tourism?	Yes: There are several guest houses and Airbnbs in the areas as well as the Coconut Bay Hotel. The area is frequently used for kite surfing and lies within 200 meters of the Hewanorra International Airport.
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes: Beach clean-ups were organized by The Saint Lucia National Trust (SLNT).
Is there evidence of community efforts to use sargassum?	No
Presence of church and community groups that advocate for government assistance	Yes: There are several community groups with Vieux Fort including the Goodwill Fishermen's Cooperative Society

Overall comments on vulnerability and resilience:

Sandy beach community is located directly in the bay and lies adjacent to the Vieux Fort town. Due to the close proximity to the bay, residents are susceptible to the economic and health impacts of sargassum influx events. Some fishing occurs in the Sandy beach bay however most fishers utilize the fishing complex in Vieux Fort. The extent to which sargassum influx events at sandy beach disrupts fishing practices remains unknown. Apart from fishing, Sandy beach is used heavily by locals and tourists who are guests at Coconut Bay and other small guest houses in the area. Given the importance of the beach to locals and tourists, the Sandy beach community displays a **high** vulnerability to influx events.

Since the arrival of sargassum in Sandy beach, efforts were made by the St. Lucia National Trust to assist with beach clean-ups. The presence of a community group that advocates for government assistance and galvanizes the community to take actions, can further increase the resilience of the Sandy beach community to influx events. Sandy beach demonstrates **low** resilience.



Photo credit: Bethia Thomas (25 February 2020)

6 IN-COUNTRY USES OF SARGASSUM

Sargassum uses, primarily in agriculture, have been investigated in St. Lucia. Dubbed the 'Caribbean's First Indigenous Biotech Company', Algas Organics founded by Johanan Dujon, utilises massive quantities of sargassum influxes, to produce a world class plant tonic². Since its inception in 2014, the company has evolved from a modest start-up in Dujon's parents' garage to a thriving venture, converting over one million pounds of sargassum into plant amendment products on an annual basis. Algas exports to over ten countries around the world, and has created job opportunities for members of the local community e.g. collecting, transporting, fertilizer processing, packaging, and quality control³.

In addition to producing a top-quality product, Algas reportedly found a way to remove the heavy metals found in sargassum such as arsenic, cadmium, mercury, and lead, during its patented Pro-Enzymo™ hybrid fermentation process⁴. For more information visit: <https://www.algasorganics.com/>.



Source: Algas Organics

²OECS. 2017. Accessed from: <https://pressroom.oecs.org/oecs-30-under-30-award-winner-how-johanan-dujon-built-an-agricultural-biotech-company-in-st-lucia>

³ The GEF. 2018. Communities innovate to address Sargassum seaweed on coasts of Saint Lucia. Accessed from: <https://www.thegef.org/news/communities-innovate-address-sargassum-seaweed-coasts-saint-lucia>

⁴ Algas Organics. Accessed from: <https://www.algasorganics.com/>

PART B: CARIBBEAN GENERAL



7 LOCAL LEVEL SARGASSUM MANAGEMENT PLANS

Context

An adaptive management strategy, rather than a more site-specific management plan, is needed at the national level. This is due to the many uncertainties associated with sargassum and responses to it at the geographic, ecological, social and institutional scales of an entire island. However, at the local or site level, it is usually possible and desirable to specify management plans at much finer detail. People will usually seek and depend on this plan first for guidance.

Coherence

In order for a national strategy to be coherent, local management plans must be closely linked to each other and to the strategy for ease of rep and execution. Thus, plans contribute to the strategy by using a similar layout, but with detailed content relevant to specific locations. If most of the response and use is scaled to be nationally decided and implemented, then there may be limited or no need for local level plans. Avoid making local plans that are unnecessary.

Management unit

What is considered “local” will differ, even within the same country. The planning unit could be a single bay with its one community, or perhaps a stretch of well-connected villages that form a cluster. For sargassum, the main aim is for the local unit to be practical. It need not coincide with other units such as village or town boundaries, watersheds, parishes, enumeration districts or other national divisions. However, there are often benefits to using well accepted functional boundaries, and associated resources, to take advantage of harnessing what is already working.

Annotated outline

The following is an annotated outline of a generic local sargassum management plan. It has to be customised and evolves like, and with, the national strategy. Stakeholders and others may prefer to put the plan on paper or use in electronic form, rather than as a website. The plan should be updated annually, or more often if there have been changes that affect responses to the sargassum hazard or opportunities for its use. As with the national strategy, the content below is not intended to be prescriptive. Hence the annotations are general suggestions. Local formal (documented) and informal (people just know) knowledge will provide specific content. Matters such as literacy and language, formatting preferences (text, tables, charts, diagrams, maps), print size and font, colours, overall length, bound or loose leaf etc. may influence use.

INTRODUCTION

- Remind the reader how the plan is set out, will be kept updated, and how to use it
- Don't repeat the adaptive approaches unless some are very site critical, e.g. DRM

PURPOSE AND PRINCIPLES

- Mainly to align the plan with the national strategy and any critical local initiatives
- Highlight any local social or ecological considerations critical to sargassum such as protected areas, highly valuable or vulnerable assets or sargassum opportunities

SCOPE

- Clearly identify the geographic or spatial scope of the plan, including demarcation of boundaries covering the terrestrial, coastal and marine areas addressed in the plan
- Boundaries can be 'fuzzy' if they are functional (e.g. "to just beyond the reef" or to "where farmland turns into forest in the hills") rather than specifying precise areas
- Identify the key sargassum-related features within the area in a broad profile, noting intersections with other bounded areas and the agencies that have jurisdiction within

AUTHORITY

- Identify authority linkages to the national strategy, describing what powers for decisions and action have been formally delegated so that there can be no misunderstanding of who the leader is, and with what authority to do what. This is key for conflict management.
- If there is legislation, a policy or another plan that impacts sargassum operations, then these should be listed with the operative extracts from them extracted for reference, e.g. laws or regulations for a specific protected area, economic activity area or beach.

INSTITUTIONAL ARRANGEMENTS

- A detailed, downscaled counterpart to the national strategy including making links to the strategy and its actors so there is a clear chain of accountability and responsibility
- Fit the leader(s) of the management plan, identified in the authority section, into the institutional arrangements of the strategy as such leaders cannot operate in isolation
- Chains of command for different aspects of local sargassum operations must be clear
- List local contact information along with expected roles and responsibilities (in a table)
- Similarly set out resources (e.g. labour, equipment, expertise) available at local level

MONETARY MATTERS

- Set out the local estimated budget elements, sources of funds and likely main expenses
- Include not only cash (e.g. funds transfer, subventions) but values of in-kind resources
- Estimate the limits of local support for both the hazard responses and sargassum uses
- Identify financing available locally for innovation, technical assistance, entrepreneurship

LOCAL MAP AND PROFILE

- Build on the site profile map and other content in the appendix of the national strategy
- Use the same content categories, but add as much site-level detail as practically useful
- Focus on the vulnerabilities and responsible responses, including for sargassum uses
- There should be no large contradictions between information in the strategy and plan
- Provide accurate plan information to update the national strategy as situations change
- Consider this section as requiring the most investment in accuracy to prioritise action

ACTIONS AND OPERATIONS

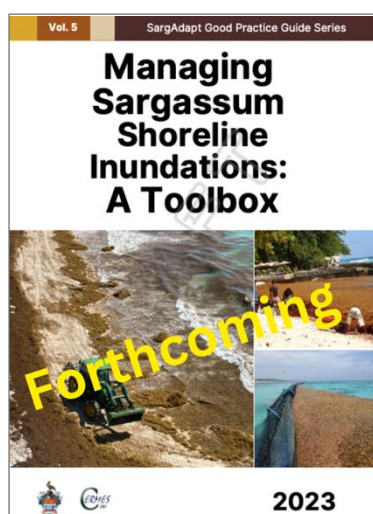
- Set out only the details of pre-impact, impact and post-impact specific to the local level
- Set out practical ecosystem measures for nearshore marine habitats, shoreline vegetation and wildlife
- To avoid being overwhelmingly extensive refer to guidance in the strategy or elsewhere
- Consider limitations in local capacity to manage and adapt, including building capacity

8 ACTIONS AND OPERATIONS

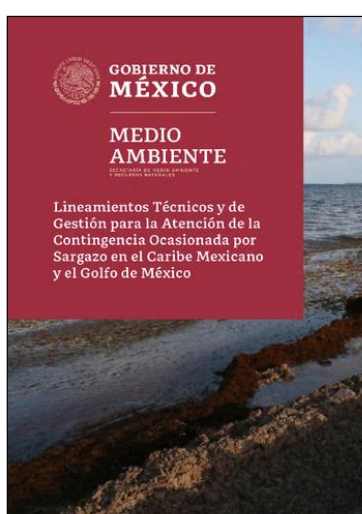
Several diverse types of knowledge products have been developed and made accessible throughout the years, mostly related to sargassum monitoring, management, coping and adaptive mechanisms for key sectors, removal and uses. Post 2021, the number of protocols and guidelines on sargassum-related actions and operations continues to grow slowly. Most territories in the Caribbean have sargassum management strategies in place, however, few have a publicly available policy institutionalised by national government. This section highlights some of the resources for responsible responses.

8.1 RESOURCES FOR RESPONSIBLE RESPONSES

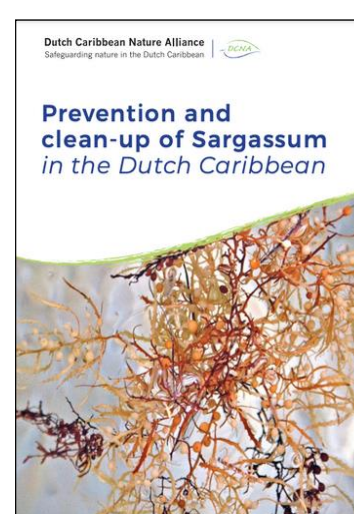
Guidance documents on **sargassum removal** have been produced at the national and regional levels. Click on the images below to peruse the documents!



Tags: good practices, onshore and in-water collection, containment barriers



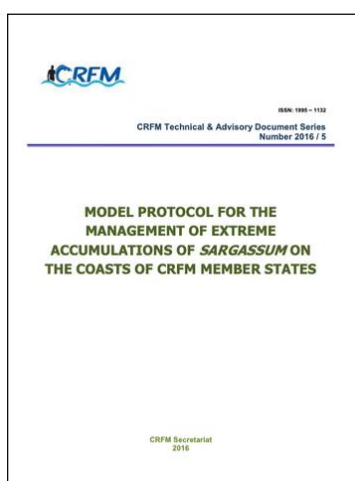
Tags: onshore and in-water collection, containment barriers, turtle nesting beaches, disposal, health and safety, monitoring, uses



Tags: good practices, onshore and in-water collection, containment barriers, disposal, health and safety



Tags: good practices, onshore and in-water collection, public awareness, uses

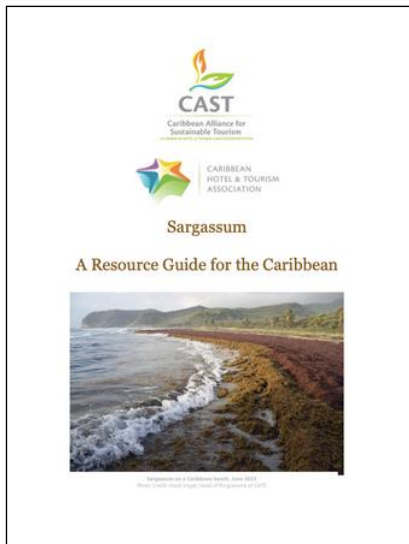


Tags: template, national-level management plans



Tags: good practices, public awareness, onshore and in-water collection, disposal

A few of the **sector specific** guidance resources are shown below. Click on the image to visit the website!



Tags: tourism, public awareness, impacts, good practices, onshore collection



Tags: good practices, impacts, small-scale fishers, coping mechanisms

UWI-CERMES has developed a range of protocols on **sargassum monitoring**. Check out the [UWI-CERMES Good Practice Guide Series](#) for more information!



8.2 MANAGEMENT OF SARGASSUM INFLUXES

Over the years various collection techniques were tried and tested, with many lessons learned, as highlighted in the various guidance documents presented in the previous section. A systems approach is essential for improving national capacities for sargassum management. It is assumed that if mechanisms to support the effective and continuous collection of sargassum seaweed are implemented, and the technical capacity for sargassum removal is increased, then the resilience of coastal areas will be improved⁵. The figure below illustrates further⁶.



Source: UNDP. 2022. Project Document- Improving National Sargassum Management Capacities in the Caribbean.

It is important to note that there is not a “one-size-fits-all-solution” and best practice will require site-specific solutions, but general guidance for removal of sargassum is as follows:



⁵ United Nations Development Programme. 2022. Project Document- The Project for Improving National Sargassum Management Capacities in the Caribbean.

⁶ The images and names of commercial merchandise in this appendix do not constitute an endorsement or product review. They are for information only as explanatory examples.

STEP 1: Assess the level of impact first to determine if conditions are:



Low- just a small amount of sargassum. Sparse, less than 2 inches in depth. Faint seaweed odor. Small amounts of sargassum on the beach will do no harm and may not require intervention.



Medium– About 6 – 9 inches in depth. Strong odor, several insects. Moderate amounts may also not require intervention.



High– more than 10 inches in depth. Pungent odour, significant impairment of movement of vessels and use of beachfront. Large inundations need to be cleared quickly (within 24-72 hours).

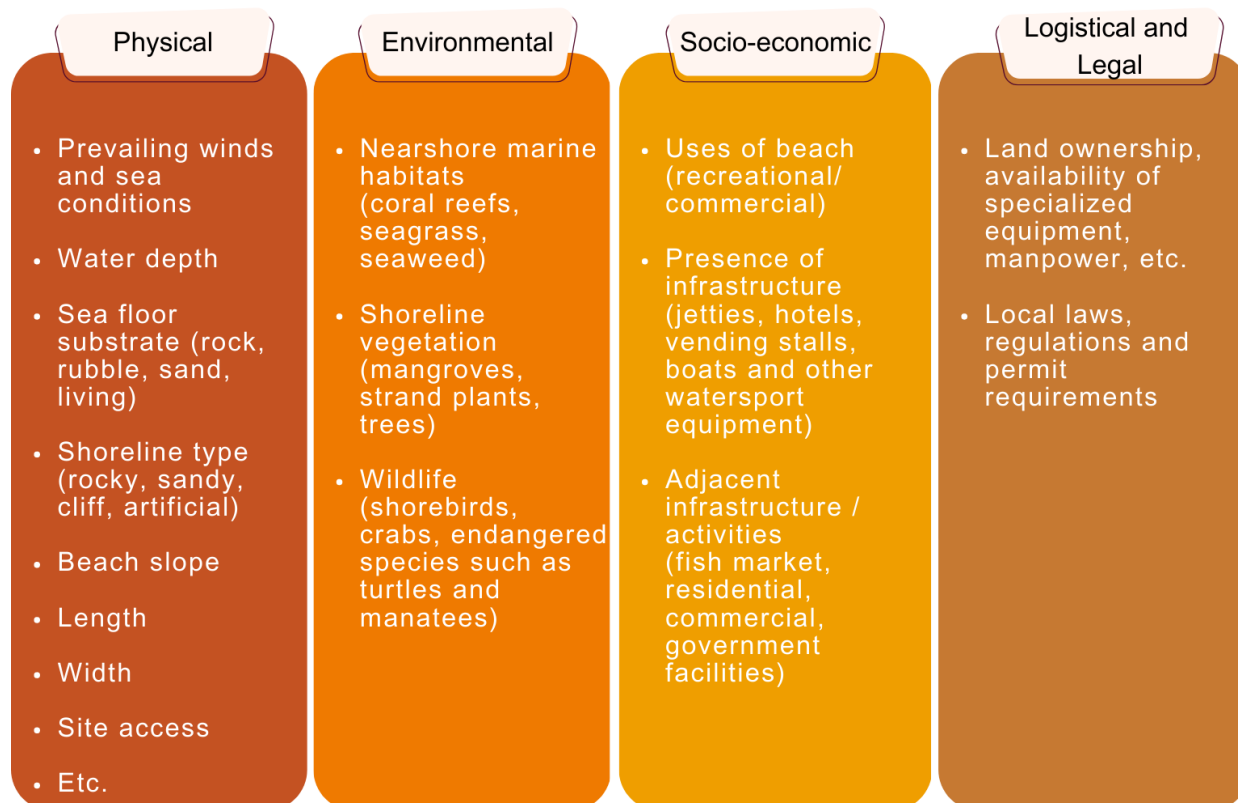
STEP 2: Communicate with coastal stakeholders and the wider public

Communication is key! Stakeholder collaboration and engagement is critical to ensure the continued success and support of clean-up initiatives.

- Stakeholders should be informed of interventions both at the local and national levels, to manage their expectations.
- They should know who the lead agency is for executing clean-ups and other partners that will be involved.
- Each stakeholder group will have distinct concerns, therefore a range of media targeted to the specific needs of the various groups is needed.
- Use effective methods of communication to ensure the intended messages are received.
- Encourage public participation in clean-up initiatives. It is acknowledged that each affected community will require equipment support, some training, assistance in removing and transporting aggregated material from the beaches.

STEP 3: Consider the physical, environmental, socio-economic, logistical and legal conditions:

It may not always be necessary to collect or clear up after all sargassum beaching events. Before investing in a specific method and/or type of collection equipment, the local context and potential environmental impact must be considered. Physical, environmental, socio-economic, logistical and legal conditions vary at any given site which should inform the appropriate response.



(Adapted from the CERMES SargAdapt Good Practice Guide Series: *Managing Sargassum Shoreline Inundations: A Toolbox*)

STEP 4: Determine method of collection (onshore or in-water)

Onshore collection

Removal can either be manual using rakes, pitch forks, wheelbarrows and buckets, or mechanized using machinery such as surf rakes, excavators and other heavy machinery. While manual removal is a preferred method, mass strandings will require the use of mechanical equipment, or a combination of both.



Belize (2018). Credit: Caribbean Press Releases



The Barber Surf Rake at Playa Paraiso, Tulum, Mexico (2018). Credit: Marc Bruxelle



Bath Beach, St. John, Barbados (2018). Credit: The Barbados Advocate

The table below provides further guidance and considerations on the removal methods.

	Manual onshore collection (rakes, pitch forks, wheelbarrows, buckets)	Mechanised onshore collection (mechanised rake)	Mechanised onshore collection (excavator & other heavy machinery)
Suitable conditions	Volume is low to medium Low frequency events Beach with high ecological sensitivity	Volume is low to medium Frequent inundations Long, wide, flat or gently sloping sand beach No or little beach infrastructure	Huge accumulations of sargassum where other onshore methods are initially impractical Public health and the environment may be at risk Sediment that can bear the weight of heavy machinery Available dedicated access for heavy equipment
Unsuitable conditions	High amounts of beached sargassum Long inundation events with continuous high supply daily Decomposing sargassum producing high levels of toxic gases posing a health risk to workers	Piles of sargassum more than 30-40 cm deep Narrow, short or steeply sloping beaches or those comprising pebbles Beaches with high density of beach infrastructure or vegetation	Narrow beach, rocky shoreline Presence of dense beach infrastructure No vehicular access Ecological sensitive beach
Good practice	Collect sargassum as fresh as possible. This minimizes health issues and maximizes valorisation potential	Operate when beach use is low Operate during low tide Retrieve sand for beach nourishing where possible Implement a equipment maintenance routine, including freshwater cleaning	Always avoid use of heavy tracked vehicles on sandy beach Use vehicles with large pneumatic tyres to spread load Use a mechanized bucket to remove only the top layer of sargassum Use an environmental monitor to keep an eye on the operation
Operating costs	Low (Low cost, low technology equipment, cost determined largely by cost of labour, time needed and transport and disposal costs)	High (cost to purchase, ongoing maintenance, driver to operate machinery, transport and disposal costs)	Very High (cost to purchase, ongoing maintenance, machine operators require training)

(Adapted from the DRAFT CERMES SargAdapt Good Practice Guide Series: *Managing Sargassum Shoreline Inundations: A Toolbox*)

The Barber Company is a distributor of the surf rake, with three models, Optimized for different-sized beaches. The largest rake cleans sand up to nine acres an hour. The three cubic yard hopper can hydraulically lift up to 4,500 pounds of material to a clearance height of nine (9) feet and dump its contents. For more information visit [The Barber Company](#) webpage.



To see the surf rake in operation in Mexico click [here](#).



In-water collection

In-water collection close to shore, where possible and permitted, is often preferable to beach collection as it avoids removal of sand and damage to coastal vegetation. It may also prevent sargassum from rotting in the water (Hinds et al. 2016). Offshore barriers and boat harvesters are the methods commonly used for in-water collection. A combination of the offshore barrier and harvest barge yield optimal results.

Offshore barriers work either through diversion away from sensitive areas or through storage and containment.



Source: Algeanova- Offshore barriers designed and deployed by Algeanova in the Dominican republic.

Boat harvesters are motorised vessels (often barges) which harvests sargassum mats offshore (close to the coast) on a tilted conveyor belt as the barge moves through the water (Chereau 2019).



Source: Algeanova- Custom built Algeanova boat harvester operating in Dominica Republic

Source: The Ocean Cleaner- Custom built boat harvester operating in Mexico, designed by The Ocean Cleaner

The table below provides further guidance and considerations for in-water collection.

		
Suitable conditions	Relatively calm sea conditions Shallow waters with suitable anchoring substrate (sand, rock) Good accessibility at sea, and relatively close to safe harbour/docking facilities	Relatively calm sea conditions Easily accessed from safe harbour/docking facilities Must have other vessel(s), dock or beach facility for frequent unloading
Unsuitable conditions	Prevailing rough seas Deep water Sensitive substrates for anchoring (coral reefs) Not easily accessible from sea or far from docking facilities	Rough seas or open ocean No transport vessels available or nearby onshore offloading facility
Good practices	Thorough investigation of the local geomorphic and hydrodynamic conditions Ensure ample anchoring points, preferably with Halas-type moorings Frequent cleaning of barrier to avoid sargassum build up Keep barrier and netting (skirt) clean of settling organisms Consider openings for boat traffic and nesting turtles. Use observers to assist escape of turtle hatchlings Consider barrier removal during periods of low or no sargassum inundation. Ensure adequate storage space	Works best in tandem with barrier to aggregate the material Have observer(s) watching the conveyor system to remove and release any turtle hatchlings and other larger marine organisms
Operating costs	High Cost of suitable barrier, continuous maintenance, harvest boat to continuously remove sargassum from barrier and maintenance and skilled vessel operator(s)	High Cost for purchase of custom-built vessel(s), running and maintenance costs, skilled operators and others required to operate the collecting system

(Adapted from the DRAFT CERMES SargAdapt Good Practice Guide Series: *Managing Sargassum Shoreline Inundations: A Toolbox*)

AlgaeNova is a distributor of both offshore barriers and boat harvesters. The offshore barriers (ProjiNova patent) have been successful in retaining sargassum at sea in the Dominican Republic and Mexico. The AlgaeNova boat harvesters can collect approx. 200 tons of fresh seaweed per day and sail in the open sea as well as shallow water.



For more information visit the [AlgaeNova](#) webpage.

To see videos of the AlgaeNova offshore barrier and boat harvester in operation click [here](#).

The Ocean Cleaner is another distributor of offshore barriers and boat harvesters. The patented 'Sargaboard' works with the Sargabarrier to collect sargassum seaweed. One Sargaboard can harvest about 500m³ of sargassum in 8 hours and the autonomous Sargatrailer has a capacity of 8m³. For more information visit [The Ocean Cleaner](#) webpage.



The Ocean
Cleaner



To see The Ocean Cleaner offshore barrier and boat harvester in operation click [here](#).

STEP 5: Transport to an appropriate disposal/storage site

Collected sargassum must be transported to an appropriate disposal or storage site. This is likely to require the selection of a suitable temporary or permanent on-site location and/or some kind of transport mechanism to move it directly from the collection site. Where possible, the costs of routine transportation of the sargassum to the dump sites should be incorporated into contracts created between the SSA and the Waste Removal Company. This may be the most cost-efficient way to manage routine transportation to the dump site.

Equipment commonly used in construction and agriculture (backhoe, caterpillar excavator, cane grabs, etc.) have been used to collect and transport sargassum to disposal/storage sites. However, machinery with a solid digger, bulldozer or backhoe bucket can inadvertently damage the beach. Instead, lifting sargassum using grabs, or screening and claw buckets remove less sand and minimise damage to the beach. Machinery with metal caterpillar tracks on beaches should also be avoided.



Cane grabs used for lifting sargassum. Credit: erosionpollution.com

Disposal/storage sites should:

- ✓ Allow sargassum to dry out to prevent anaerobic decomposition and production of toxic hydrogen sulphide and ammonia gases. After drying separate the sand before removal, wherever practical.
- ✓ Not be near drinking water supply as leachates from decomposing sargassum are likely to be high in arsenic and possibly other elements that are damaging to the environment. Lining with geomembranes to prevent escape of leachates should be considered where possible.
- ✓ Be outfitted with hydrogen sulphide and methane meters to monitor air quality.

Note: In- country inundation removal responses and results vary

There is no “one size fits all” solution and sometimes equipment may not function as anticipated. For example, in Barbados the seaweed harvester and offshore barrier were deployed, however, due to prevailing ocean conditions including rough waters and strong currents, the desired results were not achieved.

Lessons learned

- Can be costly
- Highly repetitive
- Often ineffective
- Sometimes futile
- Needs a system

Factors to be considered

- Environment
- Technology
- Ecology
- Humans
- Funding



Seaweed harvester



Crane Hotel's offshore barrier



The Japanese Government in collaboration with UNDP, has embarked on a three-year (2022-2025) project “*The Project for Improving National Sargassum Management Capacities in the Caribbean*” to support the enhancement of national capacities for the management of sargassum. Under the Project, beneficiary countries including Barbados, Saint Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines and Trinidad and Tobago will be provided with removal equipment, technical expertise and gender responsive training for removal, transport and disposal and overall long-term management of sargassum⁷.

7

<https://www.undp.org/barbados/sargassum#:~:text=The%20project%20aims%20to%20support,to%20mitigate%20the%20reoccurring%20threat>

8.3 SARGASSUM FORECASTING AND MONITORING

Sargassum monitoring has been gaining much attention, especially at the regional and international levels. Below features a few platforms that monitor sargassum influx events and collect reports of sargassum strandings. Click on the images to visit the websites for more information!

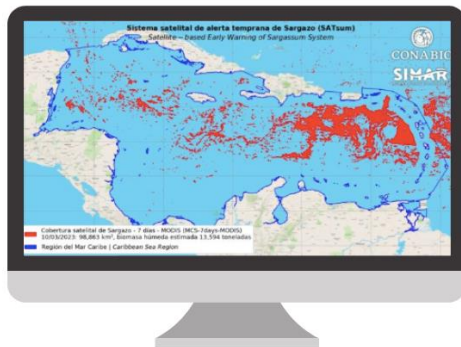
Sargassum Monitoring- Detection using on satellite imagery



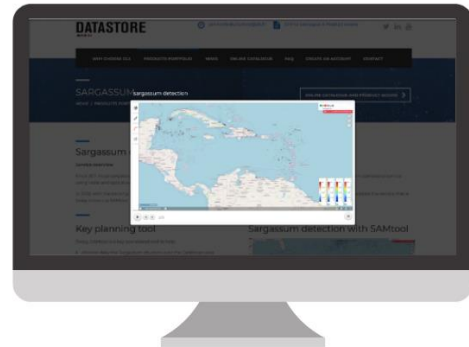
NOAA Coastwatch
Oceanviewer



Caribbean Coastal Ocean
Observing System (CariCOOS)



Sargassum Satellite Early
Warning System (SATsum)



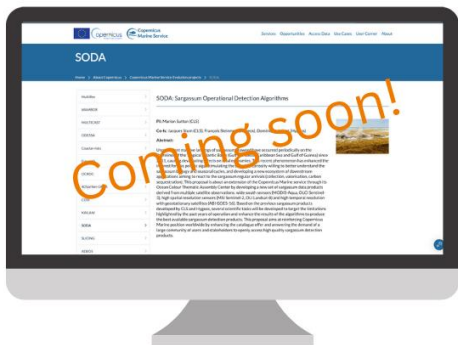
CLS Sargassum Detection and
Monitoring Tool



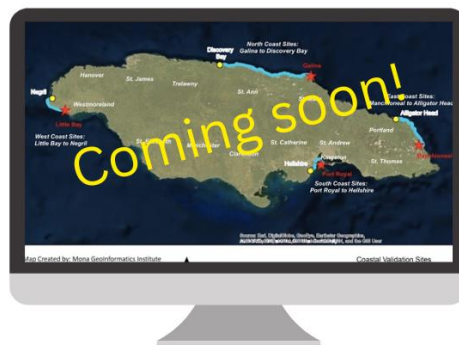
Sargassum Watch
System (SAWS)



Sargassum Monitoring



Sargassum Operational Detection Algorithms (SODA)

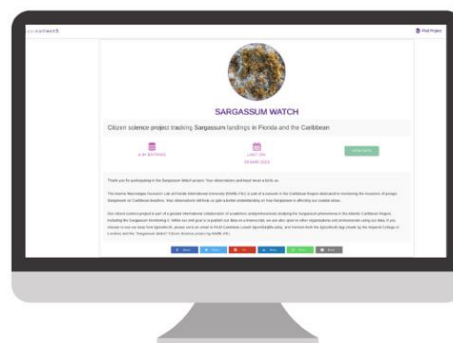


SARTRAC Sargassum Detection Algorithm

Sargassum Monitoring- Citizens Science

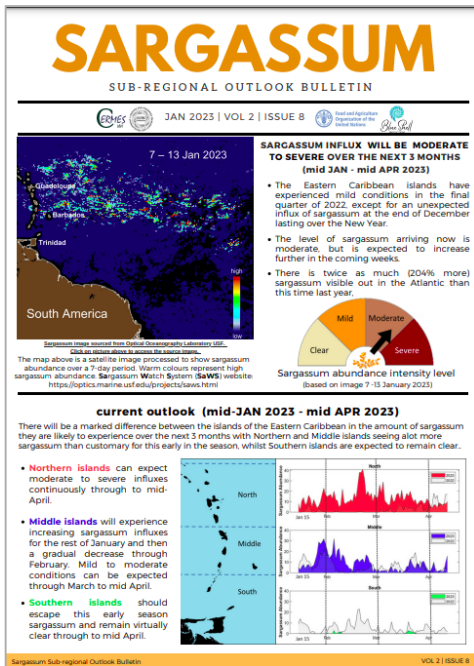


SargSNAP

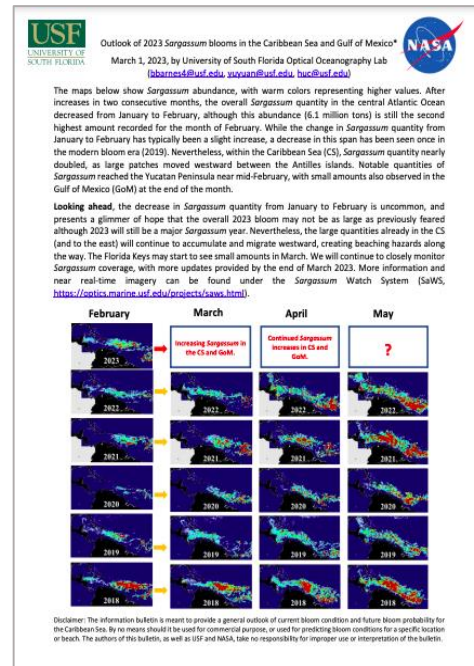


Epicollect Sargassum Watch

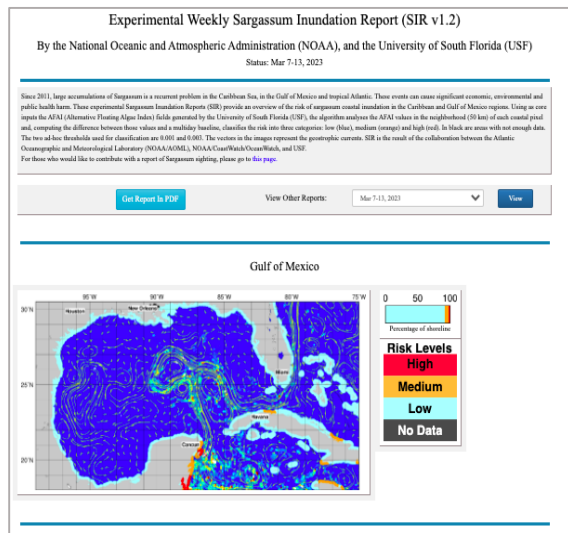
Sargassum Reporting- Bulletins and Reports



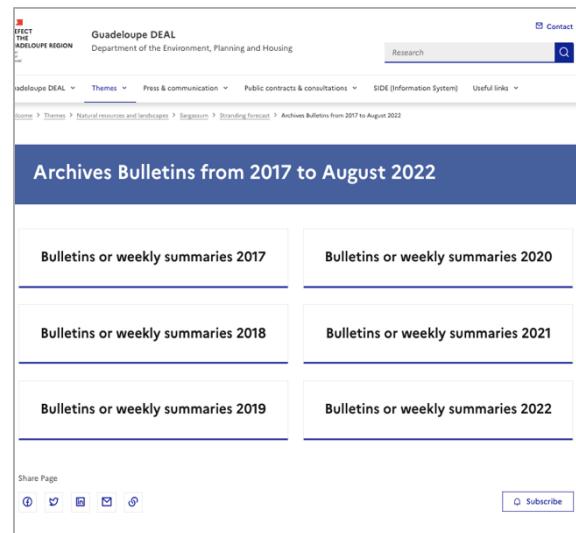
UWI-CERMES Sub-regional Sargassum Outlook Bulletin



USF Sargassum Outlook Bulletin



NOAA Experimental Weekly Sargassum Inundation Report



Sargassum Surveillance Bulletin for Guadeloupe

Sargassum Reporting- Citizens Science

Pelagic Sargassum Report

This form can be used to provide in-situ Sargassum observations. It is compatible with desktop, tablet and smartphones devices.

Date/Time of Observation*

3/19/2023 10:06 PM

Country or Region*

Landmark, point of reference, county, municipality or parish.

Where was Sargassum Observed?*

☐ Washed-up on the shore
 ☐ Floating along the shoreline
 ☐ Floating in bays, channels, harbors

☐ Floating over reefs or seagrass
 ☐ Offshore

Sargassum Observed As

☐ Line(s) of Sargassum
 ☐ Mats/rafts
 ☐ Scattered clumps

Sargassum Pelagic Report

Sargassum sightings form. CEP UNEP

Please fill in to your best knowledge, and put "N/A" if the information is not available.

—Creating a shortcut to this form in I Phone: Click on the share button> Add to home screen. Now, a screen opens where you can customize the name of the shortcut. —Creating a shortcut to this form in Android: Click on the menu, the three points in the upper right corner. Choose "Add to home screen" and you will have direct access to the web on your main desktop.

[→ Next](#)

[↶ Return to Beginning](#)
[Go to End ↷](#)

Sargassum Sightings Form

8.4 RECOMMENDED ACTIONS FOR KEY SECTORS



HEALTH

Impacts

- 1) Hydrogen sulphide (H₂S) can **affect the air quality** for individuals, especially those with asthma or other respiratory conditions.

Recommended Actions

- 1) **H₂S Detection Equipment** should be carefully positioned in communities, to prevent high exposure of H₂S taking into consideration wind levels, humidity and temperature. Emergency plans should be set in place if levels exceed acceptable standards.
- 2) **Installation of Wi-Fi video camera – CCTV** across beaches, bays and coastlines commonly affected by sargassum. Surveillance equipment should include night-time surveillance capabilities, operation without infrastructure support, long range and resistance motors for resistance to harsh weather.
- 3) **Prioritising removal of sargassum seaweed** in high-risk areas using data from surveillance and H₂S equipment. This will guide & increase the effectiveness in determining areas for frequent collection of the seaweed from the various beaches.
- 4) **More bioprocessing sites** should be identified for composing of seaweed. Locations should not be located close to human settlements and have adequate areas of unused land with soil properties useful in leaching heavy metals in the seaweed. Sites should also be rotated.
- 5) Beaches and bays should be classified as high and low risk areas of seaweed exposure. This can be done through **public notification and risk communication** using easy to read signs for beaches.

Capacity and Resource Needs

- Procurement of monitoring equipment including H₂S detectors
- Wi-Fi video cameras.
- Dedicated funding to develop/support consistent monitoring.
- More technical personnel to carry out monitoring measures.
- Training of staff in the use & maintenance of H₂S equipment.
- Engagement with community representatives, fisherfolk and tourism operators.
- Development of a clear health early warning and reporting syst
- Procurement of drying or ensiling technology/equipment, materi
- needed for treatment of biomass.
- Dedicated funding to facilitate operation of the bioprocessing sites.
- Procurement and training of workers to operate in the bioprocessing facility.
- Structured public education and communication plan.





Impacts

- 1) The main impact on tourism is caused by **negative guest perception** and reaction to sargassum. In addition to the **visual impact** on beaches, there is also the **unpleasant smell** (caused by decaying organisms trapped in the seaweed) that is generated as it decomposes in the sun.
- 2) Large sargassum influxes can lead to a **lack of beach access** and a **decline in ocean and beach-based activities and business**. In severe cases, it can also lead to **vacation cancellations, closure of beachfront accommodations and businesses**, with a rollover effect on staff layoffs and reduced economic activity.

Recommended Actions

- 1) **Provide guests with as much educational material as possible.** Forecasting websites can help with predicting where and when the sargassum will be located. This is bolstered by the placement of signage along beaches and frequented coastal areas with quick fact sheets on sargassum and the country's commitment to removing the seaweed quickly & safely.
- 2) Where there are low to moderate influxes, beachgoers can be provided with buckets and fact sheets to go on **"sargassum scavenger hunts"**. This strategy was employed in Galveston, Texas where it was popular with guests and positively changed perceptions of the sargassum.
- 3) **Develop a comprehensive beach cleaning programme** to be enacted at the national level during heavy influxes. This involves partnering with hotels, the tourism associations, other beach front businesses and local communities to have appropriate sargassum removal equipment and agreement on regular cleaning and maintenance schedules.

Capacity and Resource Needs

- Better engagement of tourism and hotel operators as well as other related enterprises in adaptation planning.
- Improved communication and data sharing from Sargassum Management Authorities to the tourism sector, e.g. increased use of The Sargassum Outlook Bulletin.
- Capacity building programme for hotel staff, lifeguards and tourism operators.
- Sargassum public education programme.
- Communication through both print and electronic mediums.
- Greater use of social media and/or the development of an easy platform for sharing information (e.g., through a mobile application).
- Procurement of appropriate clean-up equipment.





At landing sites fishers battle with impeded access, difficulty maneuvering vessels through bays and the unpleasant smell as sargassum decomposes. Challenges encountered at sea include engine overheating, loss of steerage, entangled fishing gear, poor visibility and skin irritation. In addition to disrupted fishing operations, fishers have reported that the behaviour of target species e.g. flying fish in Barbados.

The impacts to the harvest sector also extend to those working in the post-harvest sector and beyond, e.g. fish vendors & processors, restaurateurs and general consumers.

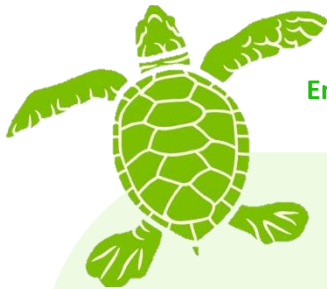
Recommended Actions

- 1) **Removal of severe onshore and nearshore sargassum mats** mitigates against loss of access to boats for fisherfolk.
- 2) **Public education on the availability of new fish stocks** will lessen the impact of reduced fish sales. Amberjacks are plentiful and viable for sale in the Barbados market, have begun to replace flying fish and the usual dolphinfish catches during acute sargassum events.
- 3) **Ensuring boat insurance policies cover damage** caused by sargassum entanglement gives boat owners some financial coverage during large sargassum events.
- 4) **Promote citizen science.**

Capacity and Resource Needs

- Budget for sargassum clean-up and management.
- Financial support for an Early Warning System (EWS) at the national level to mobilise resources and equipment before influx arrives.
- Improved communication and engagement between Fisheries Management Authorities and fishers to support monitoring and early warning.
- Greater use and sharing of free or inexpensive early detection, warning and forecasting data on influxes, e.g. increased use of The Sargassum Outlook Bulletin. Also, more guidance on risk mitigation.
- Marketing strategy to maximise the economic opportunities associated with increased catches of species such as the almaco jack.
- Better loss and damage data collection on fishing gear, loss of revenue/fishing days.
- Risk insurance for fisherfolk for sargassum.





Environment

Impacts

In addition to the strong odour from sargassum onshore, high quantities of sargassum impact **biodiversity** which can lead to:

- **Loss of some marine species** - Barbados has seen a near depletion of some marine life such as its seasonal flying fish and dolphin
- **Key processes become affected** – large quantities of sargassum can hinder light from reaching marine plants
- **Eutrophication** – excessive quantities of nutrients such as nitrogen are brought to marine ecosystems resulting in large growth within these areas.
- **Entangled marine life**

Recommended Actions

- 1) The environmental impact of removing sargassum must always be considered. **Where it is possible, it is always best to leave the sargassum on the beaches.**
- 2) When removal is necessary, it must be done in a way that **preserves the coastline and the does the least damage to marine life.** Mechanical removal poses the highest risk in this regard, and so **removal should be done manually whenever possible.** Mechanical rakes and cranes that remove sand can disturb sand dwelling critters, nests, sea turtles and sea turtle nests. Consult sargassum removal guidance documents for appropriate responses.
- 3) **Avoid burying sargassum** on turtle nesting beaches. Transport sargassum away from these sites.

Capacity and Resource Needs

- A management framework for systematic monitoring of the turtle nesting beaches is needed.
- Greater public awareness of safe removal and disposal practices on turtle nesting beaches.



8.5 SARGASSUM PROJECTS IN THE WIDER CARIBBEAN

In order to keep abreast of sargassum initiatives, and develop an effective SAMS, there must be dedicated persons and agencies networking online to make contacts and obtain the most current and appropriate information. It is possible to do some of this networking through subscription mail, podcasts and webinars, but reaching out to key contacts in person will be necessary if resources are to be mobilised sufficient to keep the country in the forefront.

	Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
1.	Sargassum hub Click here to visit website!	Website that integrates information from multiple sources. Items featured include monitoring systems, in-situ observations, bulletins issued and good practices for management & use.	Geoplanet, IOCaribe, Atlantos, Air Centre	2020
2.	SargNet Click here to visit website!	A listserv and online network of sargassum stakeholders hosted by Florida International University (FIU).	Florida International University (FIU)	2019
3.	SPAW-RAC/UNEP-CEP Sargassum on-line forum Click here to visit website!	Online forum that provides easy access to relevant documents on awareness, management and research about the Sargassum influx, as well as direct exchanges between stakeholders to share their experiences.	UNEP-CEP	2015
4.	Caribbean Cooperation Programme against Sargassum (SARG'COOP) Click here to visit website!	The Caribbean cooperation programme for the monitoring of sargassum seaweed' is bringing together regional partners to share knowledge and expertise and foster collaboration across language barriers.	Regional Council of Guadeloupe	2019

Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
5. SargAdapt (Adapting to a new reality: Managing responses to influxes of sargassum seaweed in the Eastern Caribbean as ecosystem hazards and opportunities) Click here to visit website!	The ultimate goal of SargAdapt is to reduce the impacts of and improve adaptation to sargassum influxes in the Eastern Caribbean with emphasis on converting a climate-linked ecosystem hazard into an asset that supports opportunities for socio-economic development.	UWI-CERMES, Caribbean Natural Resources Institute (CANARI)	2019 - 2022
6. SARTRAC (Teleconnected SARGassum risks across the Atlantic: building capacity for TRansformational adaptation in the Caribbean and West Africa) Click here to visit website!	SARTRAC identifies new transformational developmental opportunities that build resilience equitably, for people affected by changing biomes/ecosystems in developing countries.	University of Southampton, UWI-CERMES, University of Ghana, University of York	2019 - 2022
7. Climate Change Adaptation in the Eastern Caribbean Fisheries Sector (CC4FISH) Sargassum Subproject Click here to visit website!	This sub-project aims to increase resilience and reduce vulnerability to climate change impacts including sargassum influx events in the Eastern Caribbean fisheries sector.	FAO, UWI-CERMES, USM	2017-2021
8. SASAMS (SAteellite SArgassum Monitoring System) Click here to visit website!	This project aims to develop a near real-time service for monitoring pelagic sargassum seaweed beaching, initially aimed at Mexico's Caribbean Coast	University of Nottingham, Specto Natura Ltd, Triple Line Consulting Ltd. CONABIO, UNAM, CentroGeo, Planet Inc.	2020
9. Sargassum Products for Climate Resilience in the Caribbean Click here to visit website!	The overall aim of the project is to mitigate the environmental and economic impacts of Sargassum seaweed influxes in affected Caribbean countries through the creation of inclusive value chains for Sargassum seaweed.	CRFM, Plant and Food Research, A New Zealand Crown Research Institute	2020 - 2023
10. Activated Carbon: A successful multi-lateral	This research project is investigating different activation	Université des Antilles (Guadeloupe)	2019

Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
and multi-national research project	methods and different pyrolysis temperatures (600 – 900 °C) to obtain activated carbon using sargassum.	(COVACHIMM2E laboratory), Instituto Tecnológico de Santo Domingo (INTEC) (Dominican Republic),	
11. CESAR (Coastal environment under sargassum crisis) Click here to visit website!	This project seeks to develop tools and methods to manage sargassum influxes in the Caribbean, particularly in the French West Indies.	Coordinator and collaborators can be found here	2019
12. CORSAiR (Atmospheric and marine corrosions) Click here to visit website!	The main aim of this project to investigate the corrosion rate of exposure sites and modelling the phenomenon of corrosion and its natural inhibitory solution. It also seeks to characterize of biofilms and compile legal tools	Coordinator and collaborators can be found here	2019
13. FORESEA (Forecasting of sargassum stranding in the Tropical Atlantic) Click here to visit website!	The purpose of the FORESEA research proposal is to advance the current understanding of Sargassum bloom and drift in the open and coastal ocean and help transfer this understanding into a seasonal forecast of the quantity of Sargassum and probability of stranding at the coast.	Coordinator and collaborators can be found here	2019
14. PYROSAR (Valorisation of sargassum by pyrolysis-application for food safety) Click here to visit website!	This project aims to optimize the production of biochar and activated carbon from sargassum at laboratory and industrial scale using the solar microwave process of NST	Coordinator and collaborators can be found here	2019
15. Sarg As Cld (Environmental impacts of sargassum leachate due to arsenic and chlordecone: quantification) Click here to visit website!	The initiative seeks to improve knowledge on sargassum contamination by arsenic (marine origin) and chlordecone (terrestrial origin).	Coordinator and collaborators can be found here	2019

Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
16. SARGACARE (Human health effects of chronic exposure to gaseous fumes from decomposing brown algae in the French West Indies) Click here to visit website!	Goal: Conduct a detailed study of the clinical, biological, functional and socio-anthropological consequences of gaseous emissions produced by decomposing sargassum in the Caribbean.	Coordinator and collaborators can be found here	2019
17. SARGASSUM ORIGINS (Identity and origins of pelagic sargassum) Click here to visit website!	This project aims to identify sargassum species growing in the North Atlantic (co-occurrence) by studying the connectivity of sargassum at the Atlantic scale.	Coordinator and collaborators can be found here	2019
18. SARGOOD (Holistic approach to sargassum valorisation) Click here to visit website!	The project will conduct an assessment of the sargassum life cycle and develop innovative materials and technologies	Coordinator and collaborators can be found here	2019
19. SARGSCREEN (Pharmaco-toxicological screening of molecules extracted from Caribbean sargassum: highlighting their impact on certain pathologies widespread in the Caribbean) Click here to visit website!	The project aims to detect pharmacological potential of sargassum extracts against pathologies spread over the Caribbean	Coordinator and collaborators can be found here	2019
20. SARtrib (Tribological and electrochemical valorisation of sargassum) Click here to visit website!	Aim: Valorisation of vacuum pyrolysis by-products of sargassum: electrodes for lithium batteries and new generation of lubricant	Coordinator and collaborators can be found here	2019
21. SAVE (Sargassum agricultural valorisation and energy production) Click here to visit website!	This project seeks to identify non-destructive sargassum harvest methods and develop a social and environmental approach to integrating the treatment of sargassum and local bio wastes.	Coordinator and collaborators can be found here	2019

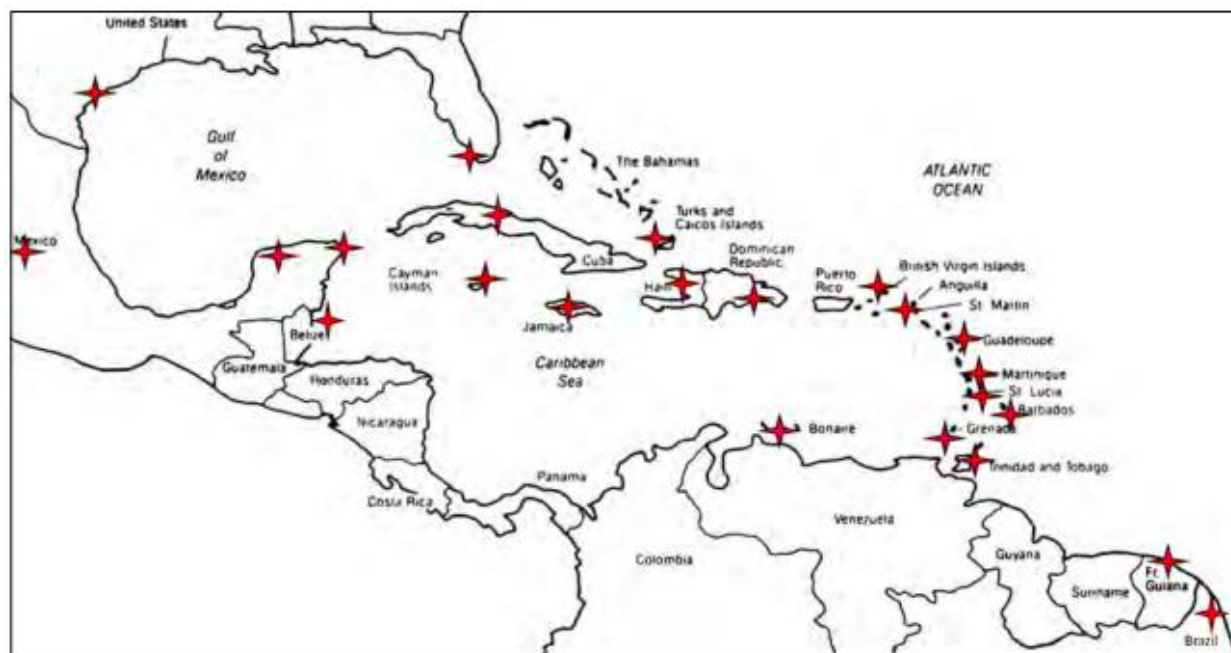
Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
22. SAVE-C (Study of holopelagic sargassum responsible of massive beachings: valorisation and ecology on Caribbean Coasts) Click here to visit website!	This project aims to better understand the diversity and the functioning of pelagic sargassum, from the drifting rafts until their beaching	Coordinator and collaborators can be found here	2019
23. Developing a sustainable sargassum value chain	Research project seeking to identify sustainable business opportunities utilizing sargassum seaweed that could lead to the development of a sustainable sargassum value chain, easy to replicate and scaled- up in other areas or countries	Polytechnic University in Quintana Roo (UPQRoo)	2019
24. SOS (Sargassum Ocean Sequestration) of Carbon Click here to visit website!	This project supports the production of a specialized machine used as an alternative way to manage pelagic sargassum strandings. The machine pumps sargassum to a critical depth where it becomes negatively buoyant. Also exploring carbon credit or carbon trading opportunities.	Massachusetts Institute of Technology (MIT)	2019
25. EnergyAlgae Click here to visit website!	Multi-sectoral and multi-national initiative developing sustainable sargassum uses with a focus on bioenergy.	AlgaeNova, Grupo Puntacana, University APEC (UNAPEC), Y.A. MAOF Holdings & Management Ltd.	2019
26. Closing the Circle Programme Click here to visit website!	Exploring challenges and advancing potential solutions to marine debris, Sargassum threats and marine spatial planning in Small Island Developing States with a particular focus on the Eastern Caribbean region.	World Maritime University	2020

Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
27. Sargassum Podcast Click here to visit website!	A podcast hosted by marine educators and scientists with a range of expertise in Sargassum and Coastal Communities. The podcasts interviews a variety of stakeholders about how they experience Sargassum, a floating algae that has caused severe problems when beaching in the wider Caribbean and West Africa.	Marine conservation without borders	2021
28. Sustainable Sargassum Management in Anguilla, British Virgin Islands, and Montserrat Click here to visit website!	The project aims to enhance the knowledge, institutional frameworks, experience and commitment of coastal and marine resource managers and users in Anguilla, BVI and Montserrat to manage the ecological and socio-economic risks from sargassum influxes.	CANARI, UWI-CERMES and OECS Commission	2021-2024
29. The Project for Improving National Sargassum Management Capacities in The Caribbean Click here to visit website!	This project aims to support the enhancement of the national capacity for the management of sargassum inundations by providing five small island developing states in the Eastern Caribbean with equipment, expertise, and technical knowledge to collect, remove, transport, and dispose of sargassum accumulated on shore and/or in the nearshore.	Government of Japan and UNDP	2022-2025
30. Sargasse Project Click here to visit website!	This project involves converting sargassum into a useful, ecological biomaterial, which will become an ecological packaging product of the future.	Coordinator and collaborators can be found here	

Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
31. Building capacity to monitor and manage sargassum seaweed inundations in Western Africa (SARCAP) Click here to visit website!	This project aims to build capacity within West African schools, local communities, research institutes and environmental management organisations to monitor, manage and use sargassum.	Tecnológico de Monterrey, the University of Ghana, the University of Southampton and the University of York	
32. Monitoring a large Sargassum bloom subject to a major volcanic eruption (MONISARG) Click here to visit website!	This project aims at understanding variations in Sargassum inundation within the Caribbean region following the eruption of the La Soufrière volcano in St. Vincent.	The Mona Geoinformatics Institute (MGI), the University of Southampton (UoS) and CERMES	
33. Half Moon Bay (HMB) Sargassum Project Click here to visit website!	This project aims to mitigate the environmental damage caused by sargassum influxes through the construction and deployment of an offshore barrier outside the reef of Half Moon Bay, Mexico.	Mexican Secretariat of the Environment & Natural Resources (The Yucatan Environmental Fund (YEF) and Ecoproteccion Akumal (EPA)	2021

9 SARGASSUM USES

There continues to be a rapidly growing interest across the Caribbean region in utilizing sargassum as a primary resource for developing value-added compounds for varied industries, to help to mitigate damage caused by repeated strandings. Entrepreneurs and research teams across the region have been working over the last few years to develop innovative projects and businesses using sargassum seaweed including agricultural uses, biofuels, bioplastics, alginates, cosmetics and environmental restoration. Below is a map showing the sargassum entrepreneurs and researchers across the Wider Caribbean (last update was 2020).



(Extracted from The Sargassum Uses Guide (2020))

Applications of sargassum for example agriculture, have reportedly been explored in Bequia. Testing has also taken place to determine its use as a bio-fertiliser.

9.1 KEY RESOURCES

The Sargassum Uses Guide⁸ remains the most comprehensive and authoritative resource on potential applications of sargassum biomass. Potential uses were identified across 14 different sectors, including agriculture, biofuels, cosmetics, bioplastics, construction, pharmaceutical, among others. Below shows

⁸ Desrochers, A., S-A. Cox, H.A. Oxenford and B. van Tussenbroek. 2020. Sargassum uses guide: a resource for Caribbean researchers, entrepreneurs and policy makers. Report funded by and prepared for the Climate Change Adaptation in the Eastern Caribbean Fisheries Sector (CC4FISH) Project of the Food and Agriculture Organization (FAO). Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, Cave Hill Campus. Bridgetown: Barbados. CERMES Technical Report No. 97, 172 pp.

Sargassum Biomass Index, illustrating the relative product yields that could potentially be produced from one metric tonne (1000 kg) of fresh sargassum. Click [here](#) to access the full document.



Other highlights of the document include:



In addition to the Sargassum Uses Guide, below are some useful open access (free) seaweed databases and a podcast on sargassum uses ranging from micro, small and medium sized enterprises (MSMEs) to larger scale ventures.

The Phyconomy Seaweed Database

This database contains extensive information about over 1000 organisations in the global seaweed industry. Of these, 50 focus particularly on sargassum in the Wider Caribbean region and beyond (at the time of writing). The database also tracks investments in the seaweed economy, as well as information on algae species, harvesting volumes and more.

Click [here](#) to visit the database!

Phyconomy seaweed | Copy base | Airtable

Companies | Investments | Investors | Algae species | Research institutes | Jobs

Views | All companies | 5 hidden fields | Filtered by Species, Industry (Applications) | Group | Sort | Search

Find a view	Name	Headquarters	Value chain	Website
1	Abapias	Mexico	Applications	
2	Akki Foods	Japan	Applications	https://akki
3	Algas Organics	Saint Lucia	Farming & harvesting	https://alga
4	AlgaeNova	Dominican Republic	Farming & harvesting	https://www
5	Algopack	France	Applications	https://alga
6	Alquimar	Mexico	Applications	https://alq
7	Awaginic Inputs	Jamaica	Farming & harvesting	Applications
8	BiogasTiger (FWE Energy)	Germany	Applications	https://ww
9	Biomava	Mexico	Farming & harvesting	Applications
47 records				

The UWI-CERMES Sargassum Reference Repository

This is a living and growing collection of scientific works related to the biology, impacts and uses of sargassum within the Wider Caribbean Region and beyond. The references are organised and searchable based on a predetermined set of tags, including uses. At the time of writing, 92 entries were compiled under the uses tag.

Click [here](#) to visit the database!

zotero | Groups | Documentation | Forums | Get Involved | Log In | Search: Title, Creator, Year | Upgrade Storage

Other Group Libraries	Title	Creator	Date	Info	Notes	Tags	Attachments	Related
Sargassum Reference Repository	A critical review of analytical me...	Ford et al.	2019					Journal Article
Biodiversity Collection	A natural history of floating Sarg...	Godínez-Ortega et al.	2021					
Nova_Hedwigia_Bellett_H183_L...	A novel α-glucosidase inhibitor ...	Zhang et al.	2022					
	A Promising Potential of Brown ...	Hannun et al.	2022-01-06					
	A review on bio-based lubricant...	Syahrir et al.	2017					
	Activated carbon synthesized fro...	Francoeur et al.	2021					
	Algae application in civil constru...	Rossignolo et al.	2022					
	An exposition on potential seaw...	Falcaya et al.	2011					
	Antiangiogenic and antitumoral ...	Dias et al.	2005					
	Antimicrobial activity of most ab...	Borbin et al.	2012					
	Antioxidant, Antiproliferative, an...	Namvar et al.	2013					
	Arsenic removal from the popu...	Wang et al.	2022					
	Bioactive potentials of sulfated ...	Sarjewa et al.	2018					
	Biocatalytic characteristics of c...	Mohapatra	2020					
	Biochar and activated carbons p...	Ranquin et al.	2021					
	Biochar from commercially culti...	Roberts et al.	2015					
	Biochar derived from wasted m...	Poo et al.	2018					
	Biogenic acidification of Portuga...	Han et al.	2020					
	Bioremediation potential of Sarg...	Saldamag-Hernandez et al.	2020					

The Sargassum Podcast

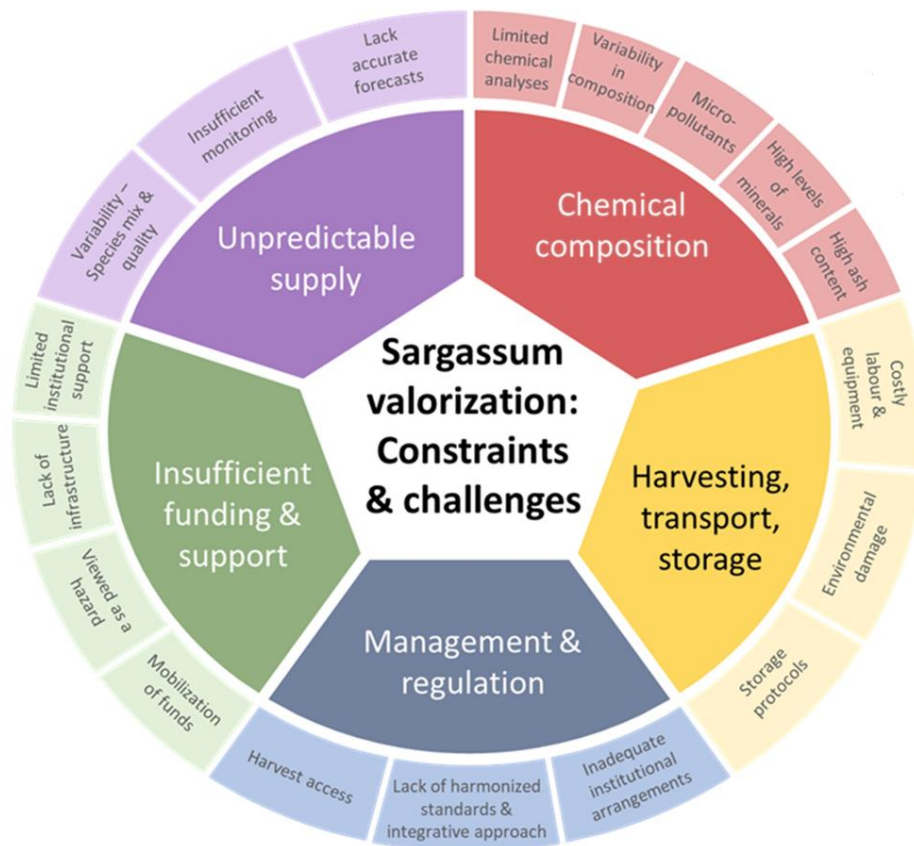
The podcast is hosted by marine educators and scientists with vast expertise in sargassum and coastal communities. The sargassum podcast hosts interviews with a wide range of stakeholders including scientists and innovators with information exchange on where the science is headed based on new emerging information, including uses.

Click [here](#) to visit the website!



9.2 CHALLENGES AND CONSIDERATIONS

Although strides have been made in exploring ways to valorize this feedstock, converting sargassum biomass into value-added does not come without its constraints and challenges. Oxenford et al. (2021)⁹ conducted a comprehensive investigation of the challenges and constraints to starting up, expanding, and scaling-up existing sargassum-related ventures, as summarized in the following image. Click [here](#) to access the publication.



Source: Oxenford et. al (2021)

⁹ Oxenford, H., S-A. Cox, B. Tussenbroek, A. Desrochers. 2021. Challenges of Turning the Sargassum Crisis into Gold: Current Constraints and Implications for the Caribbean. *Phycology* 1(1), 27-48.



Due to the widespread use of sargassum in agriculture, the chemical composition of sargassum, in particular the concentration of heavy metals, has drawn more and more attention over time. Emerging studies cautioned its use in animal feed and fertilizer for consumables due to **elevated levels of arsenic and cadmium**, which can be toxic to humans and animals. Notably, some companies e.g. [Algas Organics](#) have reportedly found successful methods of extracting heavy metals during their production process.

Notwithstanding, more research is needed to understand impacts of these higher levels of heavy metals and the long -term effects when ingested. The door is open for sargassum to be used as building material, biofuel or perhaps fertilizer for decorative plants or construction material, such as bamboo.

Click in the links below to view some of the studies on heavy metal concentration in sargassum:

- [Element concentrations in pelagic Sargassum along the Mexican Caribbean coast in 2018-2019](#)
- [Sargassum Fertilizer Transfers Heavy Metals to Vegetables](#)
- [Opportunities for Valorisation of Pelagic Sargassum in the Dutch Caribbean](#)