

UPDATED DRAFT

BARBADOS 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



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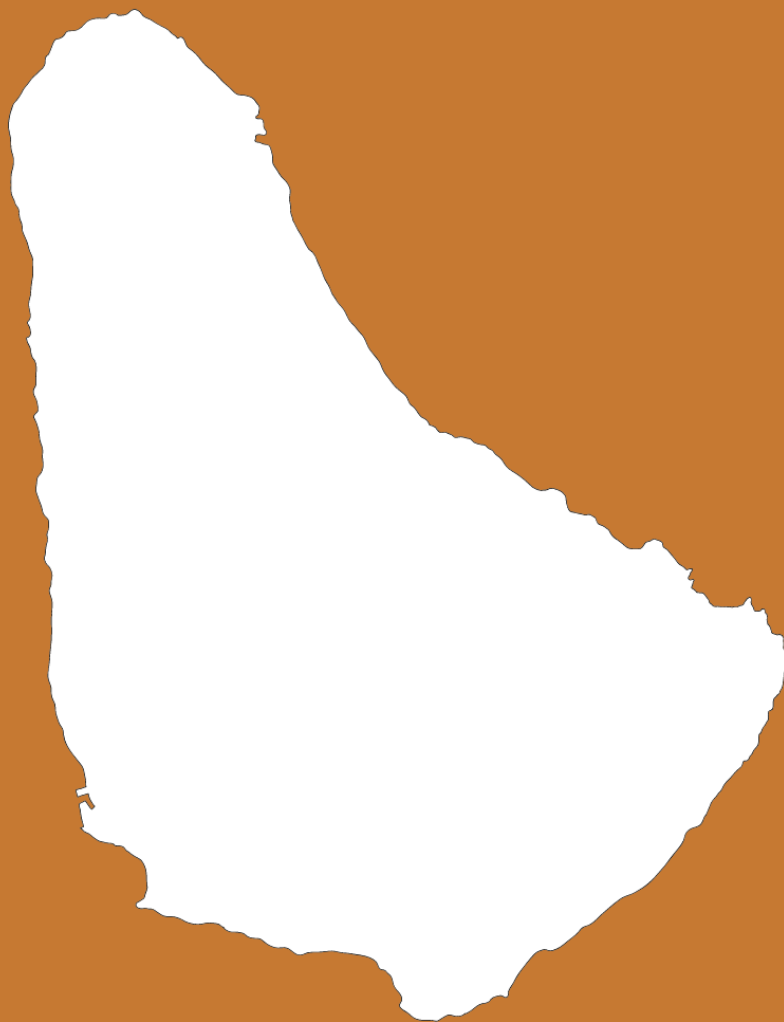
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Suggested citation:

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

Photo credit: H. A. Oxenford (from top left- Bridgetown Fisheries Complex, Bath Beach, Carlise Bay. Bottom- Conset Bay)

PART A: COUNTRY SPECIFIC



1 Institutional Arrangements

1.1 AUTHORITY

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

- Barbados Agricultural Development and Marketing Corporation Act
- Barbados Fisheries Policy (Forthcoming)
- Barbados Energy Policy (2019 – 2030)
- Barbados Integrated Solid Waste Management Programme
- Barbados Tourism Master Plan (2014-2023)
- Blue Economy Strategic Road Map (Forthcoming)
- Coastal Zone Management Act no. 394 (1998)
- Emergency Management Act (2006)
- Fisheries Act (1993)
- Health Act (1997)
- Integrated Coastal Zone Management Plan (1998)
- Marine Areas (Preservation and Enactment) Act (1985)
- Marine Pollution Control Act (1998)
- National Conservation Commission Act (2002)
- Planning and Development Act (2019)
- Physical Development Plan (2006)
- Tourism Development Act (2002)
- Town and Country Planning Act

Note: This list reflects the national legislation enacted before the publishing date of this document. Several other legal instruments are in draft.

The development of a Sargassum Management Act is currently being contemplated. There are also impending national maritime legislative instruments aimed at creating the enabling environment in internationally identified blue economy sectors. These sectors include:

- Marine Biotechnology and Bioprospecting
- Extractive Industries
- Maritime Transport, Ports and related Services, Shipping and Shipbuilding
- Desalination
- Waste Disposal Management
- Coastal and Marine Tourism
- Seafood Sector
- Offshore Infrastructure Development
- Maritime Cultural Activities

1.2 INSTITUTIONS

An intersectoral, multi-stakeholder committee or working group is appropriate, even necessary, for a fully functioning Sargassum Adaptive Management Strategy (SAMS). This is to:

- Improve effectiveness and efficiency by reducing or avoiding – duplication of effort, miscommunication, conflicting aims and actions, wastage of funds and resources, etc.
- Improve inclusiveness and responsiveness by ensuring – access to and use of the best available expertise and information for any situation, prioritizing resource use, etc.
- Improve participation and transparency by adopting – stakeholder engagement as an operational principle, an ethic of public communication, openness in data sharing, etc.
- Improve accountability and leadership by reinforcing – monitoring, evaluating, learning and adaptation, clarity in mandates and responsibilities, initiatives that enable etc.

Although the above are well known to apply to many national intersectoral matters, not just sargassum, there are usually impediments to implementing them despite abundant guidance. An institutional arrangement for the SAMS must itself be adaptive to continuously improve. In Barbados, it is expected that most of the strategy will be implemented via national mechanisms. Ministry level leadership with delegation to technical departments and close collaboration with private sector, civil society and academic actors is recommended. Suggested for testing is:

1. BLUE ECONOMY DIVISION, OF THE MINISTRY OF THE ENVIRONMENT AND NATIONAL BEAUTIFICATION (LEAD AGENCY FOR SAMS)

1. Core technical administrative staff ... officers responsible for sargassum management
2. Coastal Zone Management Unit ... scientific-technical input from ocean to shore, MSP
3. Fisheries Division ... scientific-technical input, fishing industry engagement in all phases
4. Has authority in research, monitoring, reporting in general, evaluation, learning, adaptation

2. MINISTRY OF ENVIRONMENT AND NATIONAL BEAUTIFICATION

1. Core technical administrative staff ... officers for overall environment, links to tourism
2. National Conservation Commission ... priority removals, disposal, reporting, some uses
3. Environmental Protection Department ... all environmental impacts, uses, link to health

3. MINISTRY OF ENERGY, SMALL BUSINESS AND ENTREPRENEURSHIP

1. Core technical administrative staff ... facilitate policies enabling further sargassum use
2. Small Business Development Unit ... support diverse, informed, financed, sustained use
3. The Co-operatives Department ... promote collectives for small enterprise use benefits

4. OTHER STATE, PRIVATE SECTOR, CIVIL SOCIETY AND ACADEMIC ACTORS

1. Barbados Defence Force, private enterprise equipment and transport companies
2. University, polytechnic, community college, secondary school applied science
3. Tourism, agriculture, energy, manufacturing, etc. commercial user value chains
4. Health, communication, science, innovation, etc. supporting general interest groups
5. Youth, gender, wellness, social protection, etc. special interest wellness groups

5. EXTERNAL PARTNERS AND INTERESTS

1. International and regional technical assistance, development organisations (e.g. FAO)
2. International and regional financial institutions and investors (e.g. CDB, grant sources)
3. International and regional science and technology networks (e.g. SARGNET, NOAA)

Note: The names of ministries and their portfolios are subject to change. Check for current nomenclature.

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
Provide use of boats and seine nets towards the cleanup of offshore areas	Identify groups and clubs to sign up for the volunteer beach clean- up sessions.	Discuss and help plan beach clean- up activities with the communities
Participate actively in beach cleanups. Form fisher groups specifically to assist in the beach cleanups	Promote the formation of new clubs and help strengthen weak groups.	Inform the communities of ecological advantages of sargassum (climate adaptation, sustainable & innovative project opportunities)
Report location and possible size of Sargassum sightings at sea	Provide support and volunteer to ensure project is a success	Ensure communities have the information, supplies, equipment to carry out the tasks at hand.
Promote the importance of good practices when removing sargassum	Share information on the project with individuals and households	Carry out monitoring and evaluation of project processes and procedures to ensure compliance with funding agency
	Ensure the safety of project assets – tools, equipment, supplies	Ensure proper utilization and allocation of resources
	Ensure cleanup is done thoroughly and diligently	
	Encourage innovation to create sustainable livelihoods among community, specifically the youth	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 (BBD)
Cane loader rental	Ministry of Agriculture	Average hourly rate	200.00/hr
Beach restoration	CZMU	Estimated contractor fee	1000/day
Biofuel production value	Energy Division	From xx biogas digester	5,000/ton wet weight
Decline in fish harvest	Fisheries Division	Based on ex-vessel price	750,000/ 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 and research:

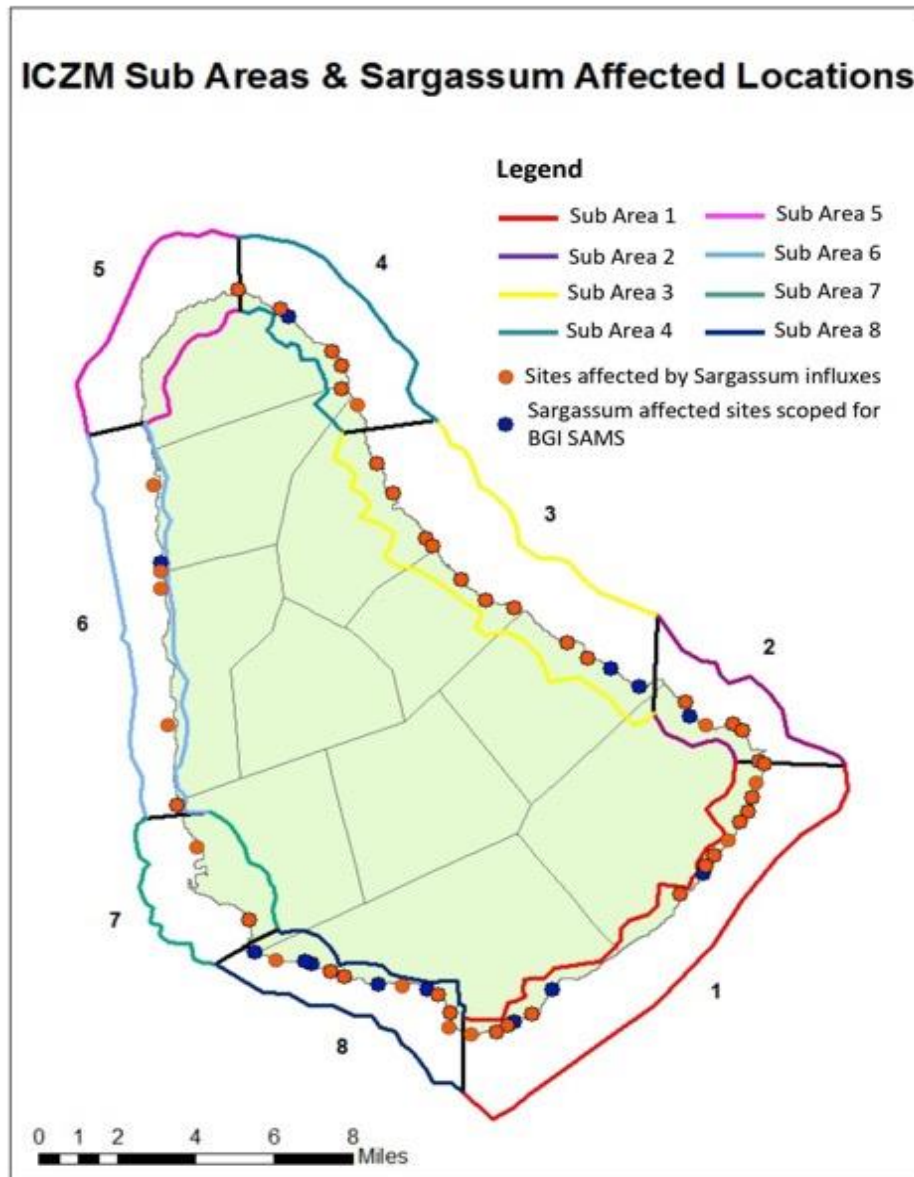
	NAME	POST	ORGANISATION	EMAIL
1.	David Carter	Project Coordinator	Ministry of Environment & National Beautification	david.carter@barbados.gov.bb
3.	Danny Babb	Asst. Coordinator	Ministry of Environment & National Beautification	danny.babb@barbados.gov.bb
4.	Tanbaje Sealy	Senior Economist	Ministry of Environment & National Beautification	Tanbaje.Sealy@barbados.gov.bb
5.	Patrick	Senior Lecturer	UWI-CERMES	patrick.mcconney@cavehill.uwi.edu

	NAME	POST	ORGANISATION	EMAIL
	McConney			
6.	Hazel Oxenford	Professor	UWI-CERMES	hazel.oxenford@cavehill.uwi.edu
7.	Janice Cumberbatch	Senior Lecturer	UWI-CERMES	janice.cumberbatch@cavehill.uwi.edu
8.	Kim Baldwin	Director	Marine Spatial Information Solutions, Inc.	marsis.solutions@gmail.com
9.	Karima Degia	Project Coordinator	UNDP	karima.degia@undp.org
10	Shelly-Ann Cox	Chief Fisheries Officer	Fisheries Division	shelly-ann.cox@barbados.gov.bb

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

Barbados has been heavily impacted by sargassum on the east, southeast and south coasts of the island. A preliminary island-wide overview of the spatial distribution of sargassum exposure and vulnerability is presented below. The existing coastal zone management sub-areas from the Integrated Coastal Zone Management Plan (ICZMP) have been used as a means of organising this overview. The sub-areas are already designated based on similar geophysical characteristics and other factors, and align with existing Coastal Zone Management and spatial planning policy. The figure below maps the spatial distribution of sargassum influxes within the 8 ICZMP sub-areas and identifies 60 stranding sites.



Of these 60 sites, 13 sites were prioritised in the first instance 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.

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.

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

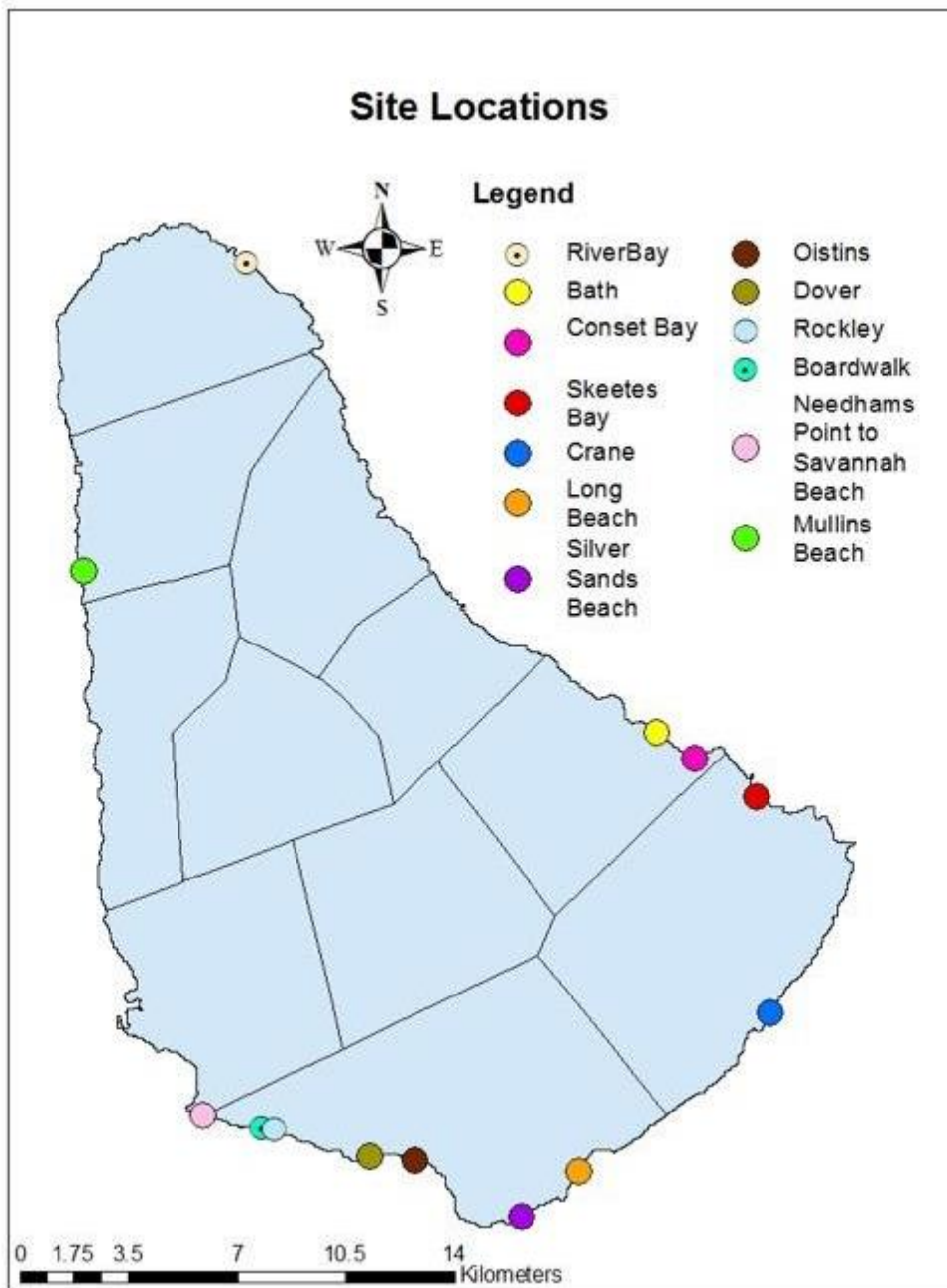
The findings from the study revealed based on available Google Earth imagery from 2010 to 2021, sites exposed to sargassum inundation make up 28.64 km (29.5%) of the coastline of Barbados. The level of inundation varies among sub-areas, with sub-areas 1 to 4 being the most exposed and sub-area 3 (southeast coast) receiving sargassum 90% of the time. Conversely, sub-area 5 (northwest coast) and 7 (southwest coast) receive sargassum just 8% of the time. There is also much variation in the frequency and magnitude of inundations among sites within sub-areas. Sites experiencing the most frequent (>15% of the time) high inundations levels include Skeete's Bay (sub-area 2), Conset Bay, Bath and Walkers (sub-area 3), and River Bay (sub-area 4). Of the four towns on the island, Oistins is the only town exposed to sargassum.

To view the entire Project Report visit:

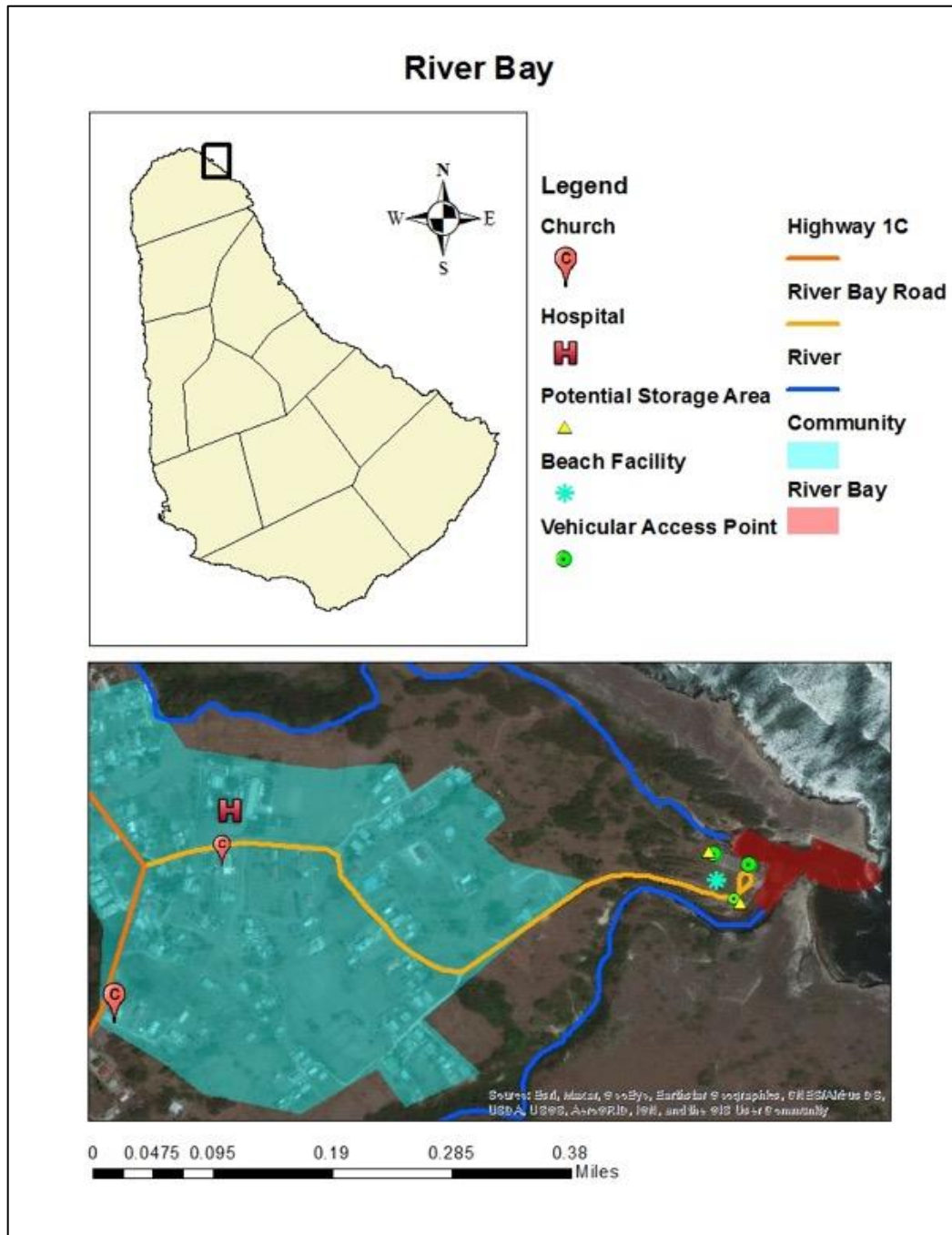
https://iweco.org/sites/default/files/202204/IWEco_Project_C2_Final_Report_Applying_Hazard_Risk_Assessment_and_Spatial_Planning_Tools_to_Sargassum_Inundations_in_the_Eastern_Cbean.pdf

5 LOCATION PROFILES OF SARGASSUM STRANDING SITES

During a rapid scoping exercise thirteen frequently impacted beaches and bays were identified (see 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 RIVER BAY



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• District hospital and quarantine facility approx. 0.4 miles from bay • Two churches within close proximity • The beach is extensively used for recreational activities including picnics • The surrounding cliffs are popular for rock fishing • Beach facility present • NCC beach attendants assigned to the location	• Long narrow bay enclosed by towering cliffs to the north and south • Two streams flow into the bay • Dry micro-climate • Coastal dry forest • Remnants of mangrove forest • Foraging shore birds present

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
14 June 2014	High volume of sargassum present in the bay and in the river channels	
March 2015	High volume of sargassum present in the bay and in the river channels	Cleaned by the National Conservation Commission (NCC) in partnership with other agencies
02 April 2015	Extremely high volume of sargassum filling the bay and blocking the river channels	
13 June 2015	Extremely high volume of sargassum filling the bay and blocking the river channels	
29 June 2015	High volume of sargassum present in the bay and in the river channels	
03 July 2015	Extremely high volume of sargassum filling the bay and blocking the river channels	
13 July 2015	Extremely high volume of sargassum filling the bay and blocking the river channels	
25 March 2016	Extremely high volume of sargassum filling the bay and blocking the left river channel. The right channel was clear	
25 August 2016	High volume of sargassum present in the bay and in the river channels	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
01 March 2018	Moderate amount of sargassum present in the bay. Dead juvenile green turtle found stranded in the sargassum in the river channel.	
13 May 2018	Extremely high volume of sargassum filling the bay and blocking the river channels	
20 May 2018	High volume of sargassum in the bay and river channels	Cleaned mechanically by tractors. The effort was a partnership between the NCC, BADMC and Soil Conservation. The sargassum was taken to Apes Hill Plant Nursery. 26 truck-loads were removed.
25 May 2018	Extremely high volume of sargassum filling the bay and blocking the river channels	
26 May 2018	A moderate volume of sargassum present in the bay. The reduction from the previous day is likely due to ongoing cleaning efforts	Cleaned mechanically by tractors. The effort was a partnership between the NCC, BADMC and Soil Conservation. The sargassum was taken to Apes Hill Plant Nursery.
08 to 11 June 2018	High volume of sargassum in the bay	Cleaned mechanically by tractors. The effort was a partnership between the NCC, BADMC and Soil Conservation. The sargassum was taken to Apes Hill Plant Nursery.
18 June 2018	Extremely high volume of sargassum filling the bay and blocking the river channels	
29 June 2018	Extremely high volume of sargassum filling the bay and blocking the river channels	
18 July 2018	Extremely high volume of sargassum filling the bay and blocking both river channels. There was also sargassum forced inland into the channels.	
14 August 2018	High volume of sargassum present in the bay. A combination of decaying sargassum as well as a fresh inundation	
06 September 2018	In some areas of the bay the sargassum was light, in others there was a moderate amount	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
20 September to 12 October 2018	Light sargassum present mainly on the edges of the river channels	Intent to clean recorded (NCC)
09 October to 29 November 2018	Moderate amounts at the end of the north river channel and small amounts in the south channel	
January 2019	High volume of sargassum present in bay	Intent to clean recorded (NCC)
Mid-February to End March	High volume of sargassum present in the north river channel and light sargassum in the south channel.	Cleaned by the NCC
May 2019	An extremely high volume of sargassum in the bay.	
June 2019	An extremely high volume of sargassum filling the bay and forced inland into both river channels	
27 December 2019	No sargassum present	
23 April 2020	Extremely high volume of sargassum present in the bay	
30 April 2020	Extremely high volume of sargassum present in the bay	
19 October 2020	No sargassum present	
November 2020	Remnants of sargassum present	
GENERAL RECORDED IMPACTS		
- Consistent mechanical cleaning has removed sand from the bay resulting in damage to the beach; what was once a dry beach is now only exposed at low tide - Impacts of decomposing sargassum on the surrounding communities is worse in the dry season when the water in the streams is blocked by the sargassum and stagnates - Since the start of large sargassum landings the use of the bay by the public has declined - The scent has negatively affected persons resulting in sinus issues - At least one individual was hospitalized with chest and stomach problems - The patients at the St. Lucy district hospital have been negatively impacted on occasion by the strong scent of decaying sargassum - Sargassum has been recorded more than 270m inland after being forced up the river channels by wave action and wind		

BEACH ACCESS	LOCATION	TERRAIN
Vehicular	Southern end of the bay leading to the mouth of the southern river channel. This access does not lead directly onto the sand, there is a short but steep and rocky path to the beach which can be traversed by tractor	Paved/ rocky, steep
Vehicular	The access is chained and located at the western end of the parking lot. It leads to the northern river channel	Paved/ grass, gently sloping
Vehicular	Southern side of the bay by the stand-pipe, it leads to the southern river channel	Paved/gravel, sloped
Paved road onto the beach proffers access to both the north and south river channel. A paved parking area provides ample space for the maneuvering of machinery. There is adequate space for the temporary storage of 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 close to the bay. The nearest residence is approximately 236m from the bay
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	The bay is in close proximity to three churches (~670m ~ 829m ~877m), the St. Lucy District Hospital (~627 m) and the St. Lucy Quarantine Centre (~627m)
Volume of sargassum during scoping assessment	Low
Volume of sargassum historically (2011 – present)	Extremely high
Is the beach heavily used by locals?	Yes: The beach is used for picnics, as an island tour stop, for limited swimming, and for rock fishing
Is the beach heavily used for tourism?	No
Evidence of resilience	
Is there evidence of community efforts to clean-up?	No: The volumes have generally been extreme and manual cleaning would be extremely difficult and ineffective without significant manpower
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 sargassum to use for their home

	gardening, including the owner of the nearby Animal Flower Cave.
Presence of church and community groups that advocate for government assistance?	Yes – Both residents and the staff of nearby organisations have, in the past, advocated for assistance.

Overall comments on vulnerability and resilience:

River Bay has been one of the most significantly impacted areas since the advent of mass sargassum inundation. The presence of freshwater promotes the anaerobic degradation of sargassum and the prevailing winds carry the smell to the nearby community which is upwind. The use of the bay has declined significantly. Once sargassum comes into the bay, because of the low internal wave energy and the narrow mouth, it is not removed naturally. Without human intervention the sargassum would remain for months. Given the importance of the beach to locals, the proximity of the nearby community inclusive of hospital, quarantine center and churches, the positioning of the bay and the limitations affecting natural removal, River Bay displays a **HIGH vulnerability** to influx events.

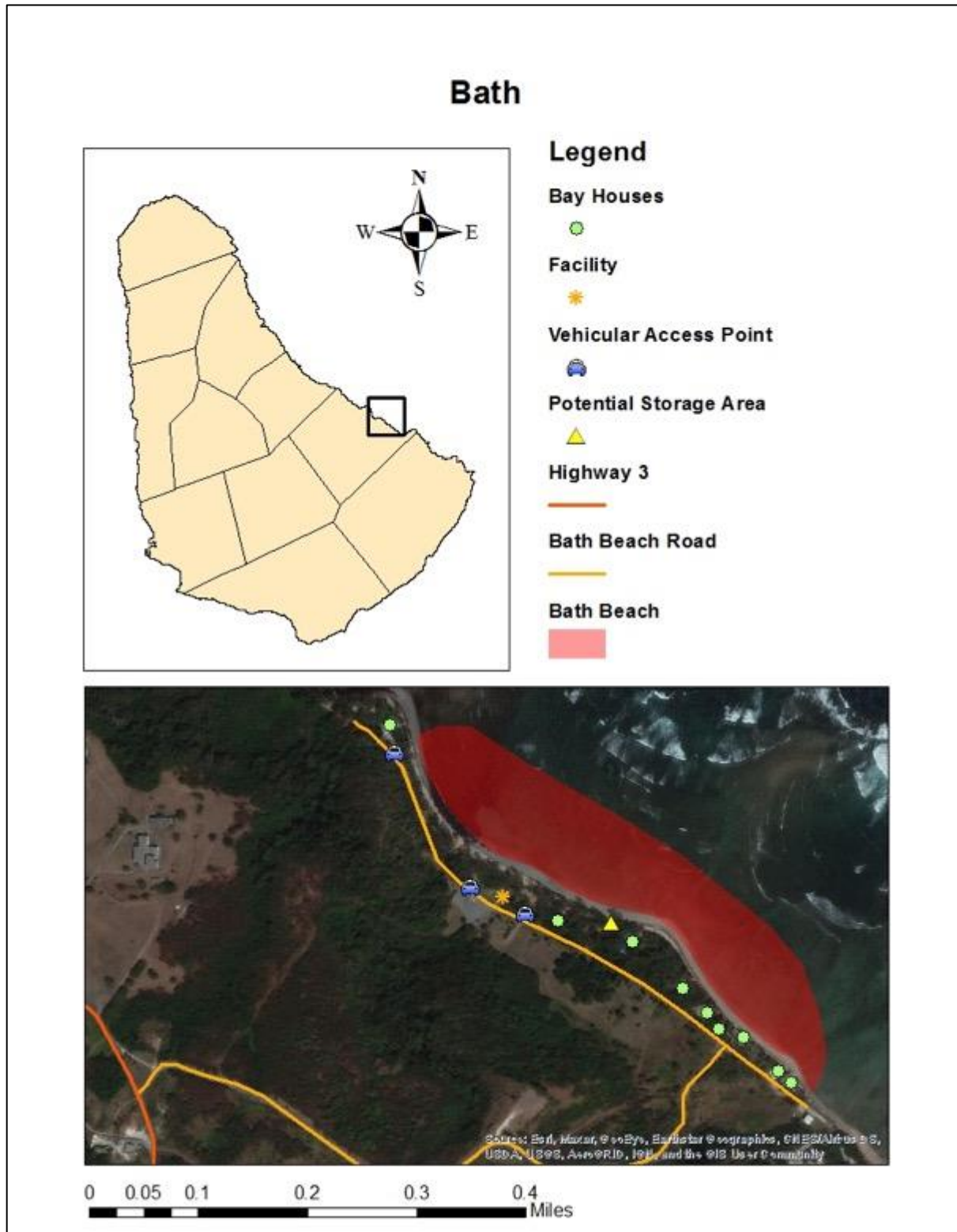
No evidence was found to support increased resilience of the River Bay community to sargassum influx events. Significant on-going efforts have been made to remove the sargassum as it enters the bay, but these efforts are limited by a scarcity of resources and equipment and come at a significant cost to the agencies involved. While these efforts have been successful in mitigating the worse of the impact of sargassum in the bay, they are not sustainable. As a result, River Bay demonstrates **LOW resilience**.



Photo Credits: Top Left - Carla Daniel (2018), Top Right- Carla Daniel (March 2016)

Photo Credits: Bottom left: Sargassum inland in the left river channel - Carla Daniel (2015), Bottom right –
Carla Daniel (2020)

5.2 BATH BEACH



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• Moderately developed • 15 seasonally used bay houses present • One of the calmer beaches on the rough east coast, popular with swimmers • A paved road provides easy vehicular access to the beach • Public beach facility with bathrooms and showers present • National conservation commission lifeguards and beach attendants stationed • The beach is used by locals for a number of fishing activities including but not limited to: spearfishing, cast-net fishing, bait fishing and rock fishing, • Occasional kayaking • Traditional and popular picnic spot	• Flat terrain • Coastal shrubs and trees • Calm sea • Highest density hawksbill turtle nesting beach on the east coast of the island • Hosts a genetically distinct population of nesting hawksbills • Important location for foraging green turtles • Presence of foraging sea birds • Moderate wave action

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
May 2015	High volume of sargassum on the beach and in the water	
29 August 2015	Extremely high volume of sargassum on the beach and in the water	Sargassum cleaned mechanically by tractor
September 2015	High volume of old dry sargassum on the beach and in the water	Sargassum cleaned mechanically by tractor
25 March 2016	Moderate volume of sargassum present	
31 August 2016	Moderate volume of sargassum present	
12 April 2017	Moderate volume of sargassum present	Cleaned mechanically by the NCC's Sheridan
24 June 2017	Moderate volume of sargassum present	Targeted on the National Sargassum Cleanup day and cleaned by the community
18 February 2018	Moderate volume of sargassum present	
25 April 2018	High volume of sargassum present	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
08 June 2018	High volume of sargassum present	Sargassum cleaned manually by Barbados Defence Force (BDF) and NCC staff
08 -09 June 2018	High volume of sargassum present	Cleaned mechanically with a D9 Dozer, beach damaged in turtle nesting areas by equipment
10 – 11 June 2018	High volume of sargassum present	Cleaned manually by BDF personnel (2 days)
12 -13 June 2018	High volume of sargassum present	Cleaned manually (2 days) by BDF and NCC personnel, work was slow going as each tide brought fresh sargassum
14 June 2018	Moderate volume of sargassum present	
18-24 June 2018	Moderate volume of sargassum present	Cleaned by NCC approx. 20m ³
18 July 2018	Moderate volume of old, dry sargassum present	
14 August 2018	High volume of very decayed and fresh sargassum present.	
27 August to 07 September 2018	Moderate to high volumes of sargassum present along the beach	Intent to manually clean recorded - NCC
20 September to 12 October 2018	Moderate (North) to light (South) volumes of sargassum present along the beach	Intent to clean recorded - NCC
January 2019	High volume of sargassum present	Cleaned by the BDF (Community service personnel) (intent recorded)
Mid Feb to End of March 2019	Moderate amount of fresh and dried sargassum present on the beach	Cleaned by NCC
28 April 2019	Moderate amount of fresh sargassum present on the beach	
27 February 2020	Light – small amount of fresh sargassum on the beach	
July 2020	Light amount of old sargassum on the beach	Cleaned manually (8 days) ~ 170 tons removed (the team from the Ministry of Maritime Affairs and the Blue Economy (MMABE)). Sargassum collected and utilised by the NCC

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
December 2020	Light amounts of sargassum on the beach	
GENERAL RECORDED IMPACTS		
• Reduced use of bay houses • Reduced use of the picnic areas by locals • Temporary damage to the beach as a result of mechanical cleaning • Significantly reduced swimming • Significant areas of darkened sand		

BEACH ACCESS	LOCATION	TERRAIN
Vehicular	South of South View bay house. Space available for the short-term storage of sargassum	Paved / Flat sand
Vehicular	Public picnic area – north of public beach facilities. Space available for the short-term storage of sargassum	Paved/ Flat sand
Vehicular	South of drain/public beach facilities	Grass/ Flat sand
Pedestrian	Open area between Resthaven and Dunworkin bay houses	Grass / Flat sand
The beach is generally flat and easy to access by pedestrians. There is adequate space available for the temporary storage and collection of sargassum		

Vulnerability factors	
Geophysical features	Rocky breaks decrease wave action resulting in a calm nearshore
Is there easy access to the bay to facilitate clean-up efforts?	Yes, there are multiple vehicular access points.
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. Jetty)	The area is moderately important for shore-based fishing.
How close is the community to Bay?	There are seasonally occupied bay houses in the immediate vicinity of the bay.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	No: There are no schools, churches or other institutions in the immediate area. The nearest village is ~1 km inland of the bay.
Volume of sargassum during scoping assessment	Low

Volume of sargassum historically (2011 – present)	Moderate
Is the beach heavily used by locals?	Yes
Is the beach heavily used for tourism?	No
Evidence of resilience	
Is there evidence of community efforts to clean-up sargassum?	Minimal
Is there evidence of community efforts to use sargassum? E.g. Mulch, fertilizer	Minimal
Presence of church and community groups that advocate for government assistance?	No

Overall comments on vulnerability and resilience:

Geophysical features at Bath beach and the typically low wave energy reduces the likelihood of sargassum being removed naturally. While there are no permanent residents at the bay, the presence of degrading sargassum affects the rental of the bay houses as well as local use of the popular picnic spot. Bath beach has a **MEDIUM/MODERATE vulnerability** to the impacts of sargassum during influx events.

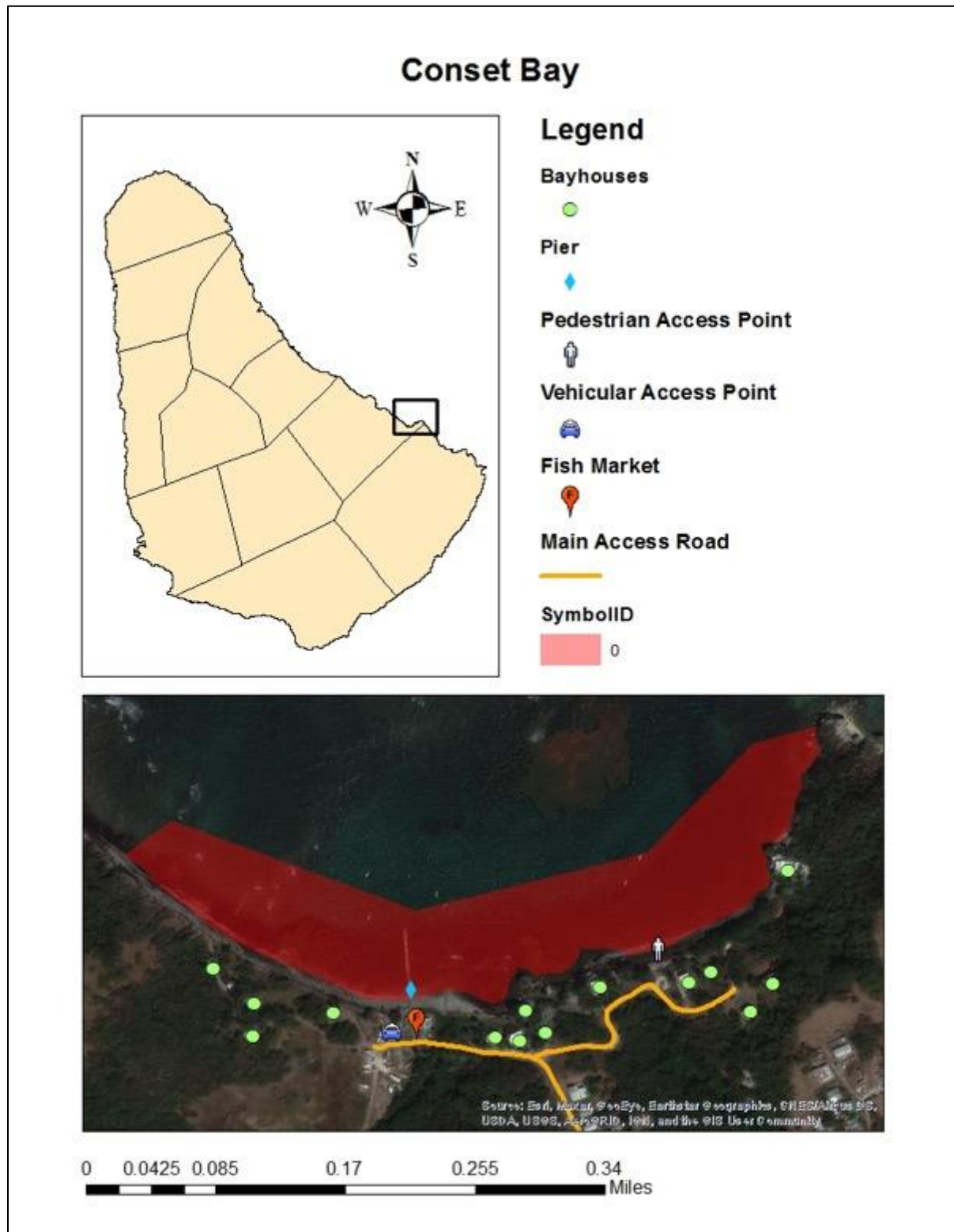
No evidence was found to support increased resilience of the Bath community to sargassum influx events. There are no active community groups engaging in cleaning and no sections of the beach are cleaned by property owners. Cleaning thus far has been dependent on the activities of government agencies. As a result, Bath beach demonstrates **LOW resilience**.





Photo credit: Top Left Carla Daniel (July 2018), Right- Julia Horrocks, Centre Left Carla Daniel,
Bottom- Carla Daniel (2015)

5.3 CONSET BAY



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• Conset Bay is a primary east coast fish landing site • There is a pier and fish market • Many fishing vessels operate out of and land their catches at Conset Bay • There are approx. 7 bay houses and residences on the bay • There is little to no tourism activity • There are no lifeguards or beach attendants stationed at the bay • It is not a popular swimming location although there is some swimming activity at the southern end of the bay • The jetty is a popular location for rock fishing • Moderately popular site for recreational diving • Conset bay is an important site for the launching of large fishing vessels	• Bay with circulation currents • Cliffs and a narrow beach • Low levels of turtle nesting • Important foraging area for green turtles • Nearshore reefs and sea grass • Moderate wave action • Small freshwater stream flowing into bay • Small number of foraging shorebirds present

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
June 2014	Moderate amount of old sargassum in the bay	
April 2015	An extremely high volume of sargassum filled the bay	
May 2015	An extremely high volume of sargassum filled the bay	
January 2016	No sargassum present	
25 March 2016	Moderate volume of sargassum in the bay	
June 2018	Extremely high volume of sargassum filled the bay	Cleaned using a cane loader tractor (MMABE and Min. of Agriculture) approx. 200 tons removed
15 July 2018	High volume of sargassum sitting in the bay	
18 July 2018	Moderate amount of fresh sargassum in the bay	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
21 July 2018	High volume of sargassum in the bay	
14 August 2018	High volume of fresh sargassum in the bay	
27 August to 07 September 2018	A moderate volume of old sargassum sitting on the rocks at the back of the bay	
06 September 2018	Light volume of old decayed sargassum in the bay	
20 September to 12 October 2018	Light volume of sargassum in the bay	
09 October to 29 November 2018	Remnant onshore with traces in the water	
February 2019	Moderate amount of old sargassum present	
June 2019	Moderate amount of sargassum on the beach	
Mid-February to End March	Light volume of sargassum on the beach and in the bay.	
GENERAL IMPACTS		
- Sargassum has made it difficult or impossible for fishing vessels to leave their moors - Boats have had to be towed free of sargassum - The presence of the jetty improved a difficult situation allowing vessels to land their catches - Sargassum associated fish have allowed for an extended fishing season. Previously the flying fish season ended in June, however, now the fishermen are able to target other sargassum associated species and fish through to October - The bay has been impacted every year since inundations began		

BEACH ACCESS	LOCATION	TERRAIN
Vehicular	Boat ramp to the north of the fish market with a narrow wet beach at the end.	Paved / Cement
Pedestrian	Southern end of bay. Beach access which due to erosion ends abruptly ~2.5 ft above the beach.	Gravel onto rocks
Limited access for machinery onto beach, generally good pedestrian access along the bay. Boatyard provides potential short-term storage for sargassum		

Vulnerability factors	
Geophysical features	Presence of bay which may retain sargassum, currents and the headlands impede natural removal.
Is there adequate access to the bay to facilitate clean-up efforts?	There is adequate access to the north of the bay, however, there is at present pedestrian access only to the south. With minor repairs vehicular access can be restored.
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	The area is very important for fishing with a fish market, boat yard, jetty and other infrastructure.
How close is the community to Bay?	There are a small number of residences on the bay and a nearby village less than 120m inland.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	There are no schools, hospitals or polyclinics in the area. The nearest church is approximately 550m away.
Volume of sargassum during scoping assessment	Low
Volume of sargassum historically (2011 – present)	High
Is the bay heavily used by locals?	Yes
Is the bay 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?	Minimal
Presence of church and community groups that advocate for government assistance?	Yes: Fisher folk and market staff advocate for assistance

Overall comments on vulnerability and resilience:

The nearby community, the residents and the fisher folk that are based in the bay are heavily impacted by fresh and decomposing sargassum. The bay and market are a major source of income for many persons from the nearby communities. Given the low wave energy present, the natural removal of sargassum rarely occurs; the community displays a **HIGH vulnerability** to influx events.

Many of the fishermen have found ways to mitigate the negative impacts of sargassum on their vessels and operations. The presence of the jetty also allows boats to continue to land their catches while there is low – high volumes of sargassum in the bay. The community demonstrates **MEDIUM/ MODERATE resilience**.

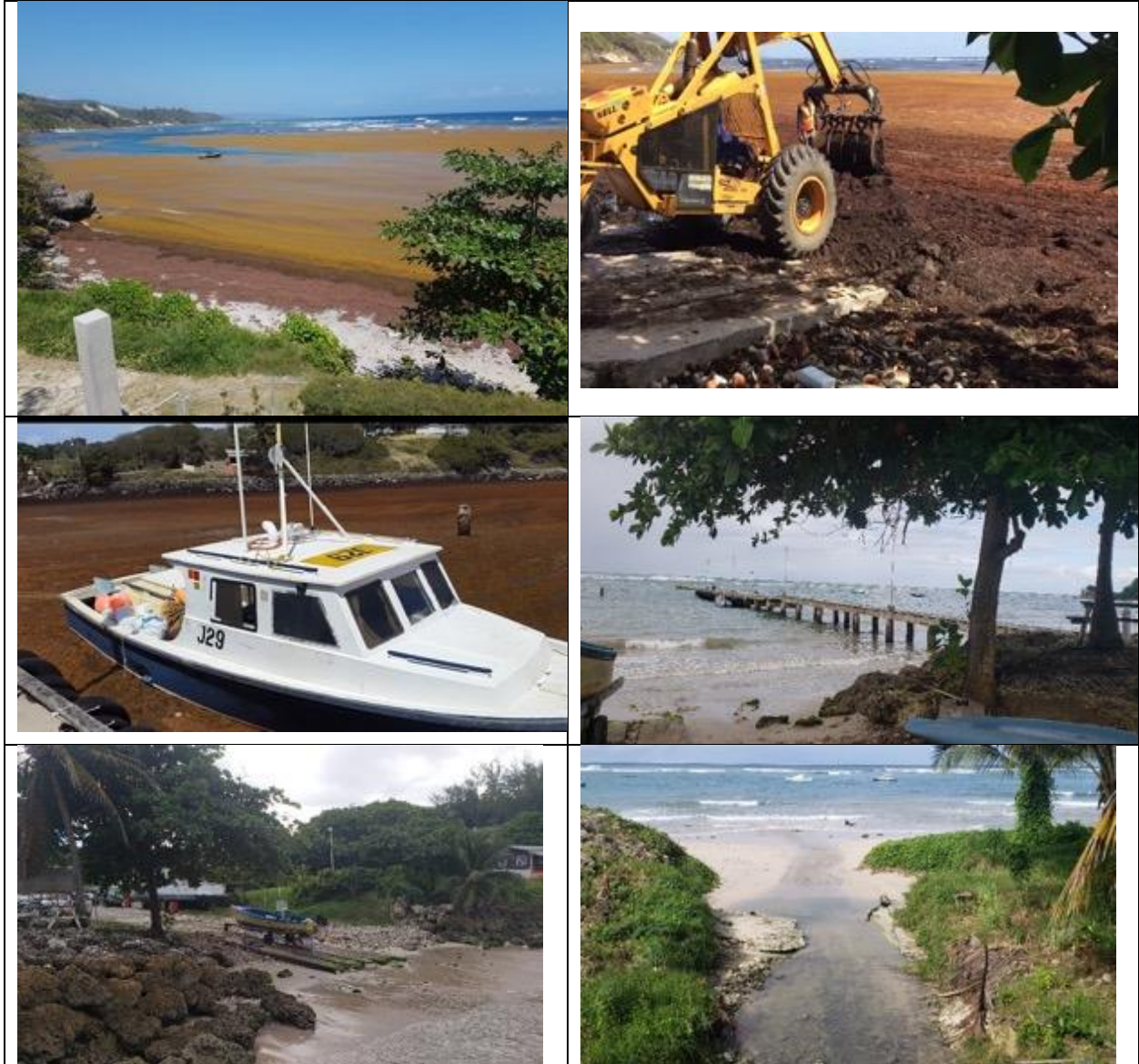
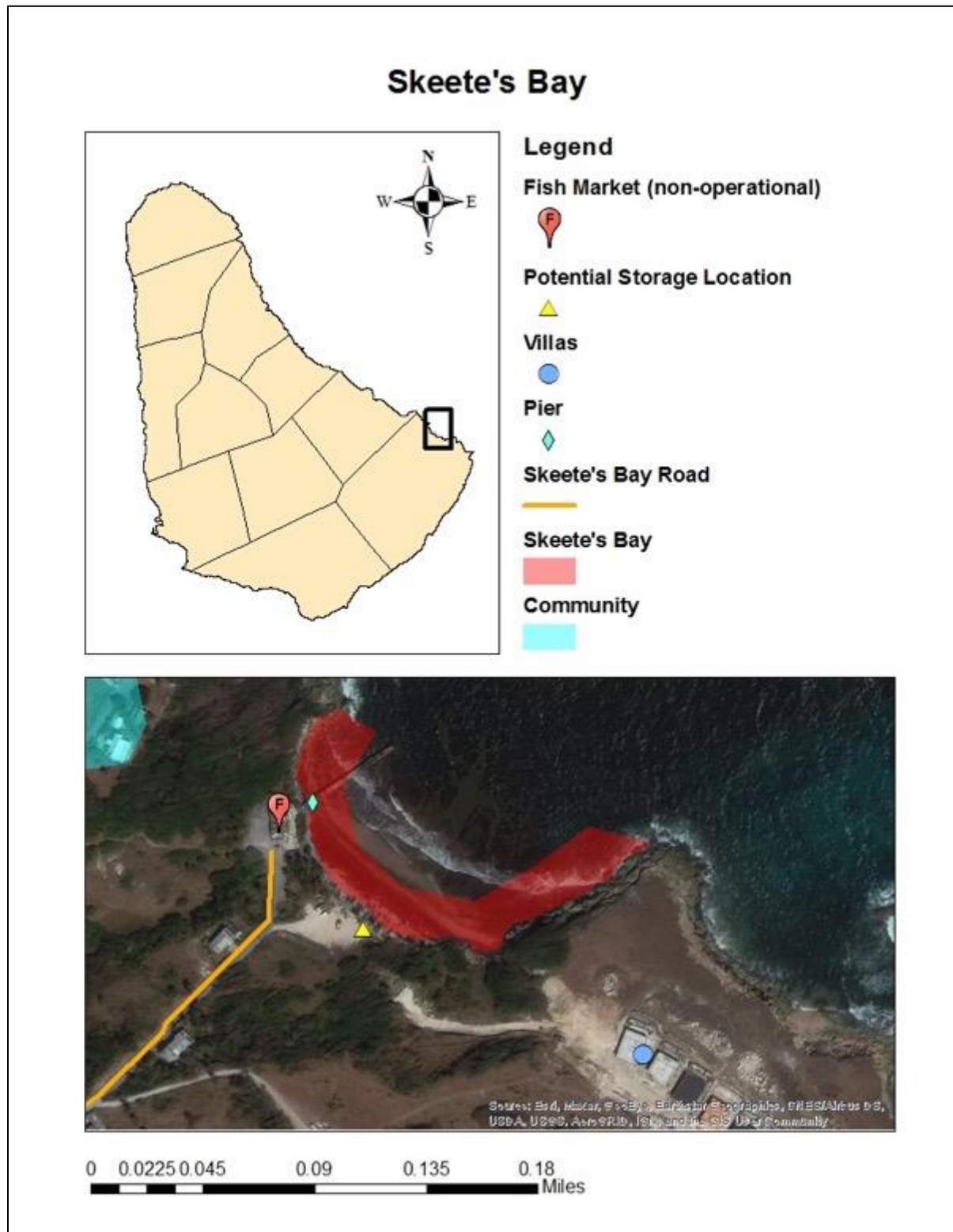


Photo Credits: Top Left Gary Marshall (March 2018), Top Right Carla Daniel (2018)

Centre Left Carla Daniel (2018), Centre right Carla Daniel (2020)

Bottom Left – Carla Daniel (2020), Bottom Right – Carla Daniel (2020)

5.4 SKEETE'S BAY



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• This bay was once a popular fishing landing location with a public market. That market has subsequently closed and there is now little fishing activity • There is a new development of luxury condominiums on the headland to the south of the bay • There is a village to the north-west of the bay • Limited swimming - by locals • Few guest/bay houses • No permanent residences on bay • Jetty used for rock fishing by locals • Some spear fishing occurs in the bay	• Moderately sized beach with rough wave action • Enclosed by headlands to the north and south • Small stream flows into bay • Low levels of hawksbill nesting • Moderate green turtle foraging

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
17 May 2008	Remnants of sargassum observed on the beach	
31 July 2011	Light volume of sargassum on beach	
20 July 2014	Moderate amount of sargassum present	
14 Aug 2014	Moderate amount of sargassum present	
18 Feb 2015	Light volume of sargassum on beach	
24 May 2015	Extremely high volume of sargassum present in the bay	
01 July 2015	Extremely high volume of sargassum present in the bay	
10 October 2015	Light volume of sargassum on beach	
20 October 2015	Moderate volume of sargassum present	
19 September 2017	No sargassum present	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
01 January 2018	High volume of sargassum present	
14 June 2018	Extremely high volume of sargassum filling the bay and decomposing	
17 June 2018	High volume of sargassum present	Cleaned by NCC
18 July 2018	High volume of decaying sargassum present with a small amount of fresh sargassum	
14 August 2018	Extremely high volume of decaying and fresh sargassum present in the bay	
06 September 2018	High volume of decaying sargassum present with a small amount of fresh sargassum	
27 August to 07 September 2018	Extremely high volume of sargassum present in the bay	
20 September to 12 October 2018	Light volume of sargassum on beach	Intent to clean recorded - NCC
09 October to 29 November 2018	Low volume of both fresh and dried sargassum present	
June 2019	High volume of both dry and fresh sargassum present on the beach, small amount in the water	Cleaned by the MMABE sargassum team
Mid-February to End March 2019	Moderate amount of both fresh and dried sargassum present	
27 December 2020	Moderate volume of sargassum present	
GENERAL IMPACTS		
- The strong scent of decomposing sargassum has negatively impacted residents in the nearby village - Residents reported the tarnishing of metal items in their home - The scent is worse when the rain falls and stagnant pools of water are created in the sargassum - When sargassum is decomposing in the bay, the wind carries sediments which dirty windows - Worst month in recent memory was June		

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
When sargassum comes into the bay it stays, stagnates and decomposes unless there is human intervention or very rough seas		

BEACH ACCESS	LOCATION	TERRAIN
Vehicular	Southern end of the bay. There is a large graded, gravel area which acts as a parking lot which is approx. 60m wide. There is an almost 2m drop to the beach for most of the area, however, it is possible to access the beach by travelling through the palm trees to the north of the lot.	Gravel/ Grass
Limited access for machinery onto beach, generally good pedestrian access along the bay with potential short-term storage areas for sargassum. Difficult to access the smaller northern portion of the bay due to a very steep rocky slope.		

Vulnerability factors	
Geophysical features	Bay bound by headlands. Presence of bay with circulation currents that may retain sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	There is limited access
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	In previous years it was, however, there is currently no ongoing fishing activity excluding rock fishing from the pier
How close is the community to Bay?	The nearby village is approx. 150m to the north west and the luxury development to the south is approx. 70m away.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	The nearest church is ~550m away, there are no nearby schools, polyclinics or other organizations.
Volume of sargassum during scoping assessment	Low
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

Vulnerability factors	
Is there evidence of community efforts to use sargassum?	Minimal
Presence of church and community groups that advocate for government assistance	Yes: The nearby Bayfield community and the developer to the south both advocate for assistance

Overall Comments on vulnerability and resilience:

The Bayfield community is located to the north and west of the bay which makes the community susceptible to health impacts of sargassum influx events. The smell has been a discomfort to residents, however, the use of the bay at present is limited. Bayfield displays a **LOW vulnerability** to influx events which may change if the fish market is redeveloped and when the development to the south is completed.

Efforts have been made by the government and private sector to assist with cleanups. The community demonstrates **MEDIUM/MODERATE resilience**.

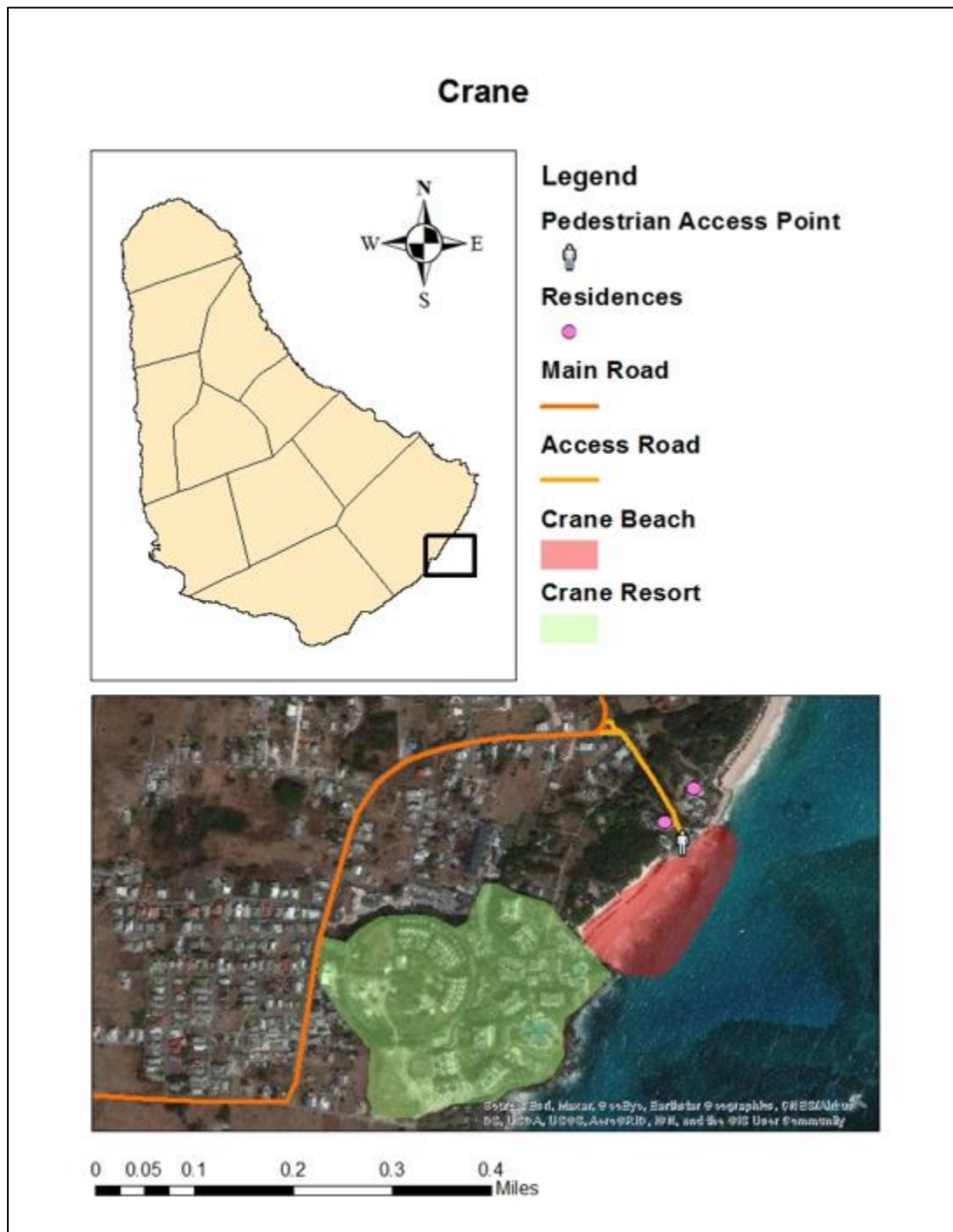


Photo credit: Top left- Carla Daniel (2018) | Top right- Carla Daniel (2020)

Centre Left - Carla Daniel (2020), Centre right Carla Daniel (2020)

Bottom left Carla Daniel (2020) Bottom right – Southern Development – Carla Daniel (2020)

5.5 CRANE BEACH



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• This beach is used primarily by the guests of the nearby Crane Resort • It is an important swimming beach used by both locals and tourists • It is used moderately for rock fishing and spear fishing by locals • There are a number of small business operators based at the beach including 2 independent chair vendors, 3 individuals who sell jewelry and at least one food vendor who also operates from the beach • Tourists engage in water sport activities – kayaking and body boarding • Limited kite/ wind surfing occurs • There are 3 large permanent residences on the cliff overlooking the beach • The beach is primarily maintained by resort staff	• High levels of green turtle foraging • Moderate amounts of hawksbill turtles nesting on the beach each season • Moderate amounts of shorebirds foraging • Caribbean martins may nest in the cliffs to the west • Small dune system • Dry coastal scrub and woodland

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
May 2014	No sargassum present	
01 August 2015	Remnants of sargassum present on the beach	
March 2015	Extremely high volume of sargassum on the beach and filling the nearshore areas	
28 January 2016	No sargassum present	
August 2016	Light volume of sargassum present on the beach	Cleaned mechanically and manually by resort staff
31 January 2018	Extremely high volume of fresh and old sargassum on the beach and filling the nearshore areas	
April 2018	High volume of sargassum on the beach and in the nearshore areas	
04 June 2018	Extremely high volume of sargassum stranded overnight on the beach and filled the nearshore areas	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
08 – 09 June 2018	Extremely high volume of sargassum on the beach and filling the nearshore areas	Cleaned manually BDF personnel
15 July 2018	High volume of fresh sargassum on the beach and in the nearshore areas	
18 July 2018	Moderate to high volumes of sargassum on the beach	
31 July 2018	Moderate volume of fresh sargassum on the beach and in the nearshore areas	Cleaned mechanically by resort staff
13 August 2018	Light volume of sargassum on the beach	
27 August to 07 September 2018	Moderate volume of fresh sargassum on the beach and in the nearshore areas	Intent to clean recorded – resort
06 September 2018	Remnants of dried sargassum on the beach	
20 September to 12 October 2018	Light volume of sargassum on the shore and in the water	Intent to clean recorded – resort
09 October to 29 November 2018	Light volume of sargassum on the shore and in the water	
23 November 2018	No sargassum present	
07 December 2018	No sargassum present	
January 2019	Moderate volume of fresh sargassum on the beach and in the nearshore areas	Cleaned by NCC (intent recorded)
Mid-February to End March 2019	Light volume of sargassum on the beach and in the nearshore	Cleaned by resort staff
April 2019	Very high volume of sargassum on the beach and in the nearshore areas	Cleaned manually by resort staff

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
May 2019	Moderate volume of fresh sargassum on the beach and in the nearshore areas	Cleaned mechanically by resort staff
June 2019	Moderate to light volumes of sargassum on the beach	Cleaned by resort staff
16 September 2019	Remnants of sargassum on the beach	
27 October 2019	No sargassum present	
GENERAL IMPACTs/RESPONSES		
- The presence of sargassum made the beach unusable by hotel guests and upon occasion, they were bussed to another beach at the expense of the hotel. - On 2 occasions the resort sought to implement a permanent solution by placing a sargassum boom to prevent the sargassum from reaching the beach and the nearshore. Due to the strong currents and rough wave action, there were significant difficulties in the placement of the booms which also broke easily. Both attempts failed - One of the cleaning methods implemented was to dump the sargassum collected into the sea where it was carried onward by the currents. While not an ideal method, the beach is enclosed by the cliffs and the primary access points are pedestrian, it is extremely difficult to get machinery onto the beach and it would be impossible for the sargassum to be removed by truck - The resort, which depends on the beach, has taken primary responsibility for its cleaning in the past. at times with government assistance		

BEACH ACCESS	LOCATION	TERRAIN
Pedestrian	Eastern end of the beach, 1.5 – 2m wide	Paved, terraced
There are a number of other private pedestrian access points to the beach which are associated with the residences and resort. There is limited to no access for machinery/ trucks to the beach.		

Vulnerability factors	
Geophysical features	Short continuous beach bracketed by headlands
Is there adequate access to the bay to facilitate clean-up efforts?	No. There is very limited access to the beach which is bracketed by a cliff. The majority of land is privately owned and inaccessible. There is one public pedestrian access

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 a number of residences lining the cliffs.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	There are no schools etc. in the area
Volume of sargassum during scoping assessment	Low
Volume of sargassum historically (2011 – present)	High
Is the beach heavily used by locals?	Yes: swimming
Is the beach heavily used for tourism?	Yes: swimming and sunbathing
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes: the clean ups of the beach have been managed by the resort with occasional assistance from government. There have been two failed attempts at permanent solutions using booms
Is there evidence of community efforts to use sargassum?	Minimal
Presence of church and community groups that advocate for government assistance	The resort has lobbied strongly for government assistance

Overall comments on vulnerability and resilience:

The geophysical features and location of Crane Beach make it vulnerable to large sargassum influxes. The western cliff which forms the boundary of the beach traps sargassum and impedes natural removal to some degree. The primary activity on the beach is heavily influenced by the tourism industry which is particularly sensitive to the presence of sargassum. During large influx events the use of the beach by tourists and locals is severely compromised. Given the importance of the beach to the small vendors and hotel which depend on it, Crane Beach displays a **HIGH** vulnerability to influx events.

Since the arrival of sargassum at the Crane, the resort has taken charge of the primary clean-up efforts. Resort staff clean the beach daily and efforts to create a permanent solution, through the installation of booms on two occasions, have been attempted. While these efforts failed, they indicate a strong commitment and willingness to invest in the problem. The resort has also been a strong advocate for assistance from the government which has been provided on occasion. Unfortunately, the lack of beach access limits what can be done. The Crane beach community demonstrates **MEDIUM/MODERATE** demonstrates resilience.

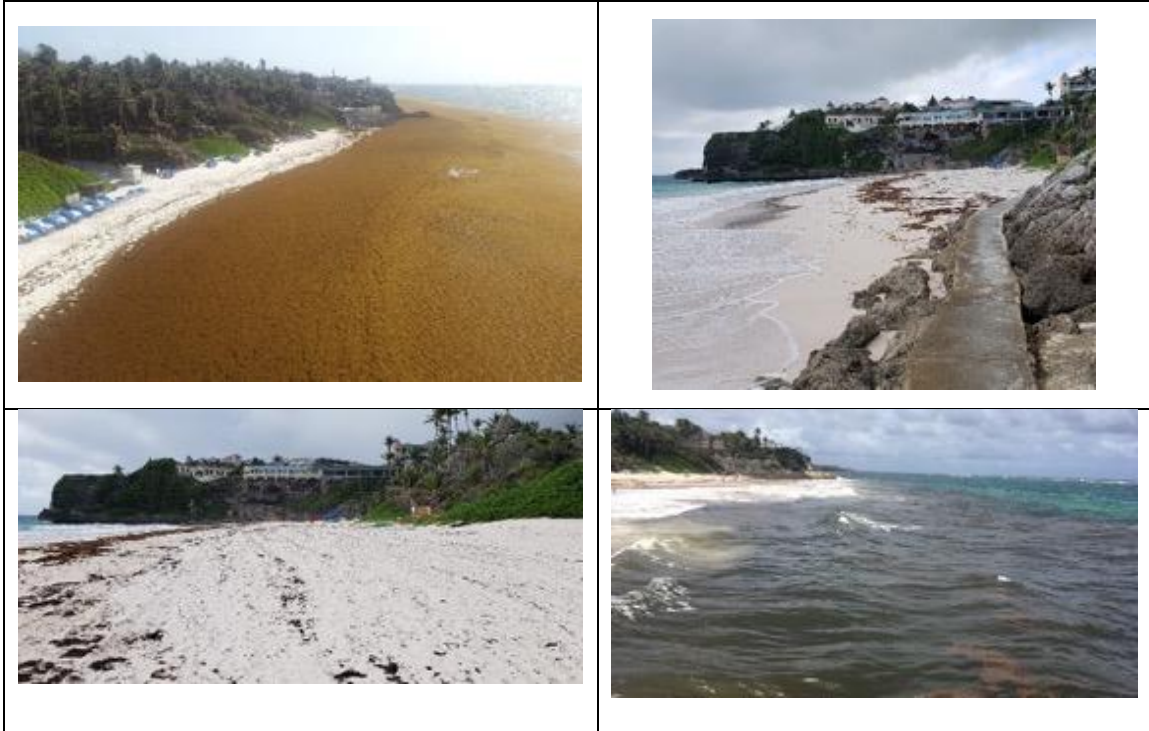
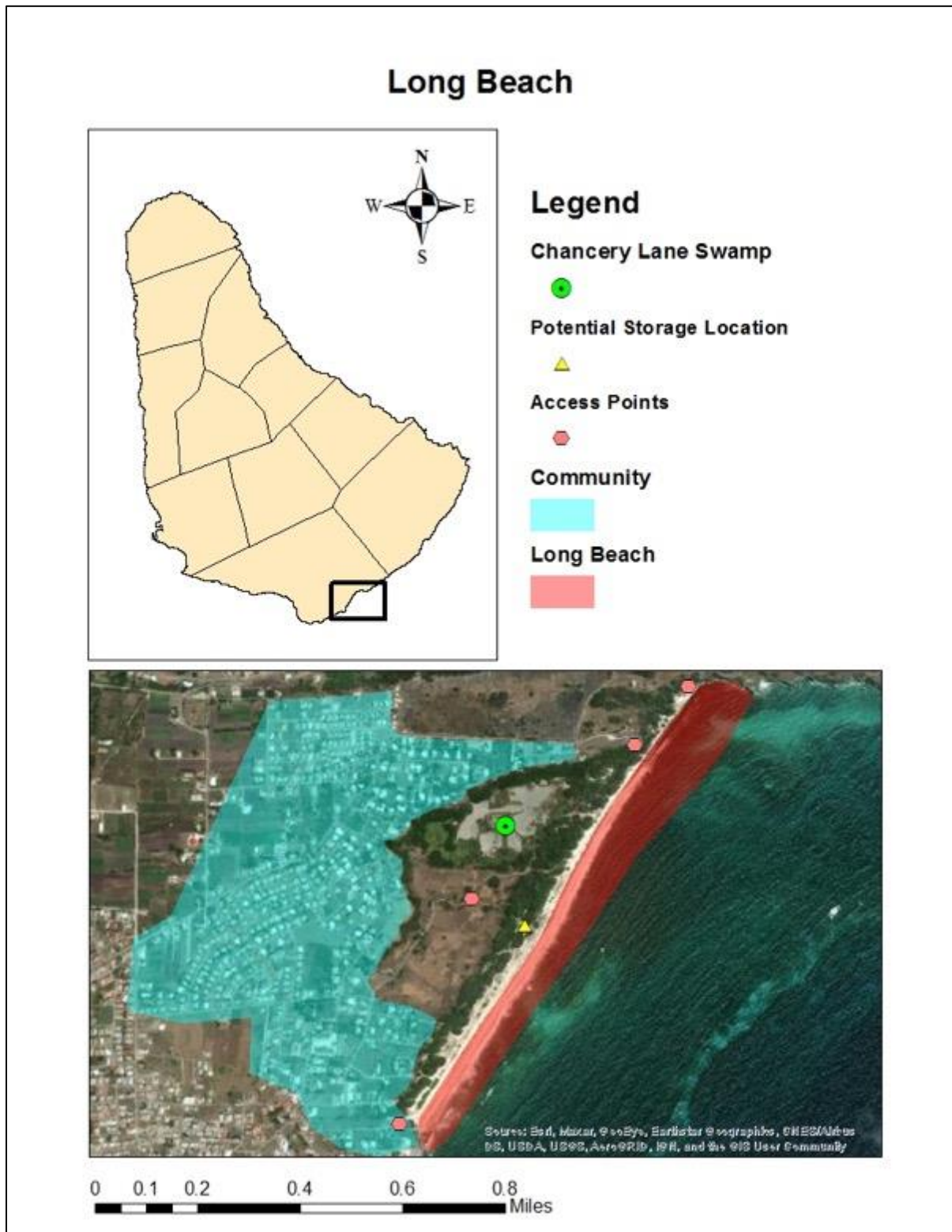


Photo Credits: Top Left Carla Daniel (June 2018), Top Right Carla Daniel (2018)
 Bottom Left – Carla Daniel (2020), Bottom Right – Hazel Oxenford (June 2019)

5.6 LONG BEACH



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• An undeveloped beach • A moderate amount of rock fishing takes place • There is limited kite/ wind surfing activity • No tourism activity • No swimming • Nearby residential area but no residences on the beach	• One of the longest continuous beaches on the island • Supports both hawksbill and green turtle nesting • Important foraging area for juvenile turtles • Coastal dry forest • Fronts one of the island's important wetlands which supports both resident and migrant birds • Hosts an important dune system which protects the unique and fragile Chancery Lane wetland • Important foraging location for shorebirds • Presence of sensitive habitats: nearshore corals, reef rubble, sea grass

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
29 June 2015	Extremely high volume of sargassum along the length of the beach, dozens of juvenile hawksbill and green turtles found stranded dead in the sargassum. Juvenile whale discovered stranded dead.	
24 June 2017	Sargassum present – volume unknown.	The beach was cleaned by community members as a part of the National Sargassum Cleanup
12 February 2018	A moderate volume of old sargassum was present along the beach	
20 April 2018	Extremely high volume of fresh sargassum along the length of the beach primarily at the northern and southern ends	
29 April 2018	Extremely high volume of fresh sargassum along the length of the beach primarily at the northern and southern ends	
8-9 June 2018	High volume of sargassum on the beach	Cleaned manually by the BDF and mechanically by the Ministry of Transport and Works (MTW) and NCC. Approximately 23 loads removed

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
10 – 13 June 2018	High volume of sargassum present. The beach was damaged by the cleaning efforts	Cleaned mechanically (2 days) - MTW tractors used to create furrows in compacted sargassum and to pile dried sargassum on the beach. Removal was done using NCC and SBRC resources.
18 July 2018	Extremely high volume of fresh sargassum along the length of the beach primarily at the northern and southern ends	
August 2018	High volumes of sargassum present	
13 August 2018	Some sections of the beach had no sargassum and in other areas there was a light amount	
06 September 2018	Light volumes of fresh sargassum present along the beach	
15 September 2018	Moderate volume of sargassum present	Cleaned manually by community members
20 September to 09 October	Extremely high volume of fresh sargassum along the length of the beach primarily at the northern and southern ends	
09 October to 29 November 2018	Light volume on the southern section to a moderate volume on the northern section of the beach	
26 January 2019	Moderate volume of sargassum present	
Mid February/ March 2019	Moderate volume of sargassum present	
22 March 2019	Extremely high volume of fresh sargassum along the length of the beach primarily at the northern and southern ends	Cleaned by the MMABE sargassum team
18 May 2019	Moderate volume of old sargassum present	
June 2019	High volume of both old and fresh sargassum present	Cleaned by the sargassum team

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
24 May 2020	High volume of both old and fresh sargassum present	
05 August 2020	Moderate volume of old sargassum present	
GENERAL IMPACTS/RESPONSES		
- Long beach is subject to high wave action which has been very effective in removing sargassum naturally - When the sargassum becomes compact, natural removal has been aided by the creation of channels in the sargassum - Long beach is a large area and subject to very heavy inundations which cannot be cleaned manually. Mechanical cleaning with heavy machinery in the past has done significant damage to the beach. - There have been claims that the presence of sargassum increases beach erosion, but this theory lacks evidentiary support		

BEACH ACCESS	LOCATION	TERRAIN
Pedestrian	Rocky path down northern cliff	Steep, rocky
Pedestrian	Wooden/ cement stairs at the site of the old Long Beach Hotel	Steep
Vehicular 4WD	Flat open area around the mid-point of the beach in the area of chancery lane swamp	Paved/Mud/Grass/Sand
Vehicular	Southern most end of the beach at the end of the road	Paved/Compact sand/ Soft sand
There are numerous other paths that pedestrians might take to the beach. As the beach is undeveloped, access is only restricted by the topography and terrain in some areas.		

Vulnerability factors	
Geophysical features	Long (~1.64 km) beach with strong currents and rough wave action
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 infrastructure present; fishing activity primarily limited to rock fishing

How close is the community to Bay?	Inch Marlow community is very close to the bay in the south and the Chancery Lane community is ~ 365m away in the north.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	No
Volume of sargassum during scoping assessment	Low
Volume of sargassum historically (2011 – present)	High
Is the beach heavily used by locals?	There is limited use for exercise, rock fishing and surfing
Is the beach heavily used for tourism?	No
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes: Some efforts have been made.
Is there evidence of community efforts to use sargassum?	Minimal
Presence of church and community groups that advocate for government assistance?	Yes: In the past the nearby communities have requested assistance

Overall comments on vulnerability and resilience:

The nearby Inch Marlow community is susceptible to the smell caused by decomposing sargassum and its associated health impacts, however, there are no livelihoods directly impacted. The beach and associated sensitive habitats have, in the past, been negatively impacted by cleaning efforts. Given the remote and undeveloped nature of the beach, the community displays a **MODERATE to LOW vulnerability** to influx events.

Since the arrival of sargassum there have been numerous attempts made to tackle the vast amounts of sargassum, but most have proven ineffective and some damaging. It has become apparent that natural removal and aids to natural removal may be the best option at this location. Long beach demonstrates **MODERATE to HIGH resilience**.

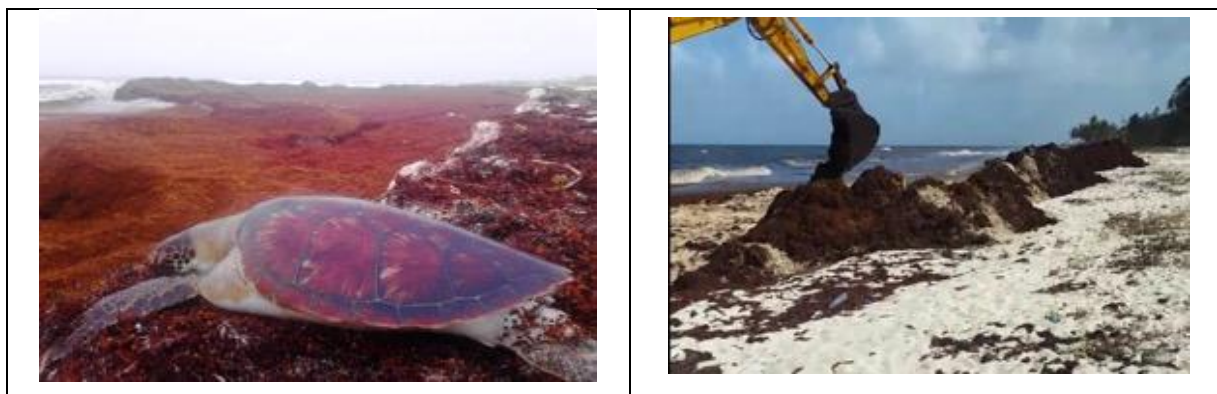




Photo credit: Top left- Carla Daniel (2015) | Top right- Carla Daniel (July 2018)
Photo credit: Bottom left Carla Daniel (2018) and right – Carla Daniel (2020)

5.7 SILVER SANDS

Silver Sands



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- Moderately developed, primarily on the eastern end of the beach 1 guest house, 1 hotel - Nearby residences - Public picnic area - Infrequently used for swimming - Public beach facility with bathrooms and showers present - National conservation commission beach attendants stationed - One of the primary locations on the island for wind and kite surfing - The beach is used by locals for rock fishing and spear fishing	- Beach is backed by dunes which protect the nearby community in the event of extreme weather events - Wave action is moderate to rough - The beach provides nesting habitat for low numbers of green turtles and leatherbacks and moderate numbers of hawksbills - Shore birds forage on the beach - Presence of sensitive habitats: nearshore corals, reef rubble, sea grass

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
01 May 2015	Extremely high volume of sargassum on the beach	
02 May 2015	Moderate volume of sargassum on the beach	Cleaned manually by volunteers and BDF personnel
14 June 2015	Moderate volume of sargassum on the beach	Cleaned manually by volunteers
03 July 2015	High volume of sargassum on the beach	
15 January 2017	Moderate volume of sargassum on the beach	Cleaned manually by the community
24 June 2017	Moderate volume of sargassum on the beach	Cleaned by the community as a part of the Country's National Sargassum Cleanup
08 – 09 June 2018	Moderate volume of sargassum present	Cleaned by NCC
10 June 2018	Moderate volume of sargassum present	Cleaned by NCC, approx. 25 m ³ removed
25 June to 02 July 2018	Moderate amount of sargassum present	Cleaned by the BDF and NCC

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
18 July 2018	High volume of sargassum on the beach	
13 August 2018	Light volume of sargassum present	
27 August to 07 September 2018	Moderate to high volumes of sargassum along the beach	Intent to manually clean recorded – BDF, NCC, probation department
06 September 2018	Moderate amount of old sargassum on the beach	
20 September to 12 October 2018	Light volume of sargassum present	Intent to manually clean recorded – BDF, NCC, probation department
09 October to 29 November 2018	Light volume of dried sargassum	
January 2019	Moderate amount of sargassum on the beach	
Mid-February to End of March	Light coverage of dried sargassum	Cleaned by NCC
24 April 2019	Moderate amount of sargassum on the beach	
June 2019	Moderate amount of sargassum on the beach	Cleaned by the Sargassum team (MMABE) and NCC
June 2020	Moderate amount of sargassum	Cleaned manually (1 day) ~27 tons removed (MMABE), sargassum removed and utilized by NCC
July 2020	High amount of sargassum	Cleaned manually~ 68 tons removed (MMABE)
August 2020	Light thin layer of dry sargassum covered the beach	Cleaned manually (3 days) ~67 tons removed (MMABE), sargassum removed and utilized by NCC
26 December 2020	Sargassum remnants present on the beach	
GENERAL IMPACTs/RESPONSES		
• During and after inundations, visibility is negatively impacted and spear-fishers are unable to dive • The community response has been good – they have organised independent cleanups		

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES

BEACH ACCESS	LOCATION	TERRAIN
Vehicular	At the eastern end of the beach - travel through the trees in the picnic area and drive along the western end of the pond to the beach.	Compact sand/ soft sand
Vehicular	Western end of the beach, drive over path /road by the dune in front of the beach facility	Soft sand, moderately steep slope down to beach
There are numerous other paths that pedestrians might take to the beach. As the beach is undeveloped, access is only restricted by the topography and vegetation in some areas.		

Vulnerability factors	
Geophysical features	Short beach with strong currents and rough wave action
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 infrastructure present, fishing activity primarily limited to rock fishing and spear fishing
How close is the community to Bay?	The community is less than 100m from the beach
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	No
Volume of sargassum during scoping assessment	Low
Volume of sargassum historically (2011 – present)	High
Is the beach heavily used by locals?	Yes: It is the primary beach on the island for wind and kite surfing
Is the beach heavily used for tourism?	Yes: Visitors come to surf, there are guest houses and villas nearby
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes: Some efforts have been made.
Is there evidence of community efforts to use sargassum?	Minimal
Presence of church and community groups that advocate for government assistance?	Yes: In the past the nearby communities have requested assistance

Overall comments on vulnerability and resilience:

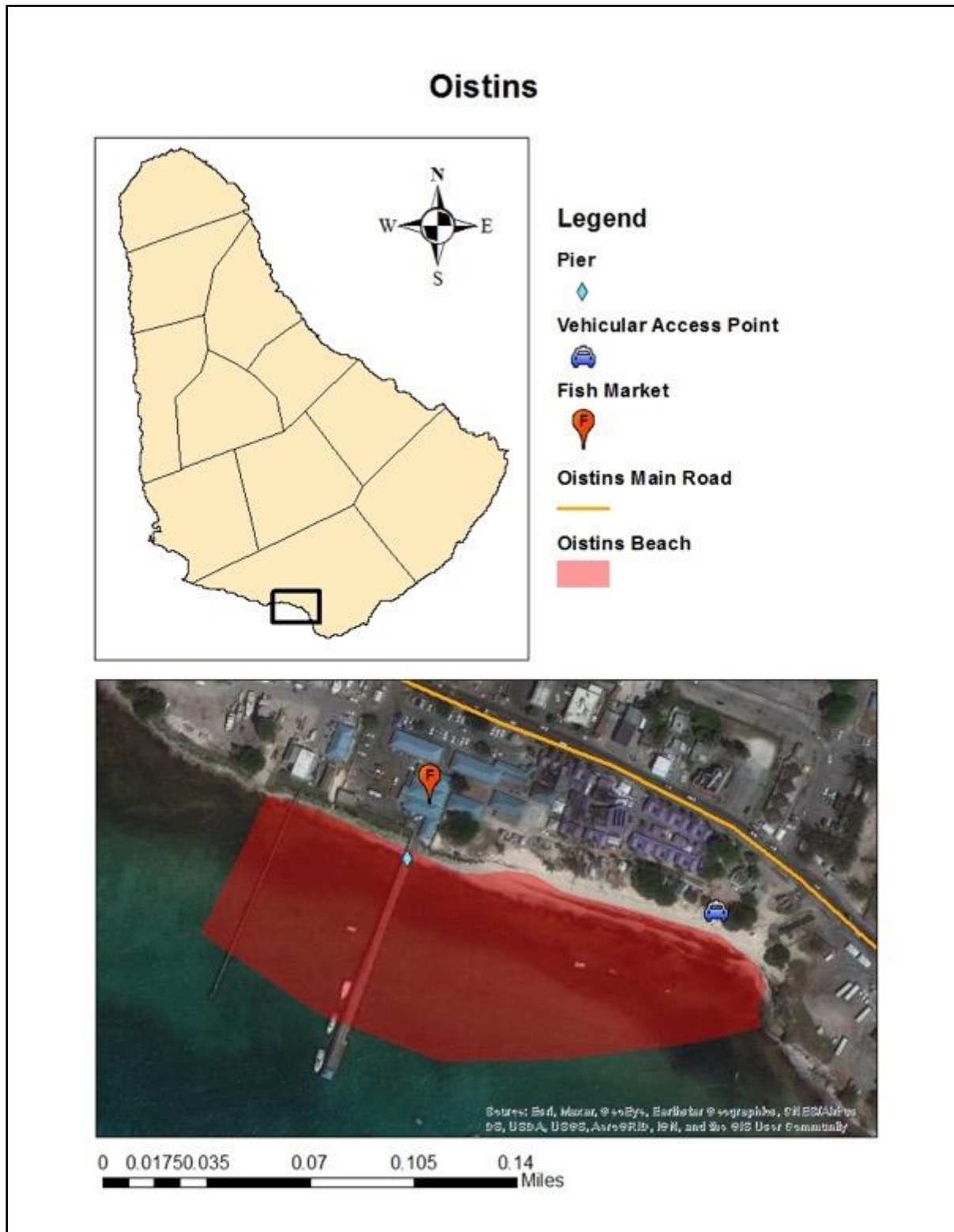
Silver Sands beach is well known on the island as the heart of wind and kite surfing; there is a well-established beach culture associated with the sports and the location. When sargassum influxes are bad, surfing is impacted and individuals employed in the sector lose revenue. It should be noted that surfing can still take place during low and moderate influxes. The scent of decaying sargassum also deters locals from the popular picnic spot. The community has a **MEDIUM/MODERATE vulnerability** to influx events.

There has been strong community mobilization by persons from the area, often organised by Arthur Collymore. The constituency representative for the area has also showed a strong interest in sargassum cleaning. At times the sargassum has also been quickly removed naturally. These factors support a **MEDIUM/MODERATE resilience**.



Photo credit: Top left- Carla Daniel (June 2018) | Top right- Carla Daniel (2020)
Bottom left Barbados Today (May 2015) , Bottom right – U.S Embassy Bridgetown (June 2015)

5.8 OISTINS



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
- Oistins comprises of a historic fishing village, fish market, fish processors and a collection of bars, shops and food stalls catering to tourists and locals. - There are a number of fish fry nights with the Friday night fish fry being one of the most popular tourist attractions on the island. - There are public bath facilities and attendants - While persons do not typically go to Oistins to swim, they commonly swim over from the nearby Miami beach - The jetty is a popular site for rock fishing - Both the jetty and beach are used for bait fishing - While there is little spear fishing in the environs of Oistins, most of the grainers in Barbados use it as a base and land their catches on the beach - When sargassum makes it difficult to land fish onshore pot fishers and grainers will use the jetty	- Flat beach - Little vegetation - Popular with foraging green turtles which are frequently provisioned from the jetty - Presence of sensitive habitats: corals and reef rubble - Low level of turtle nesting on the beach - Utilised by foraging shorebirds

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
July 2015	Moderate volume of old sargassum present in the bay	
14-15 February 2018	High volume of sargassum present	Cleaned manually by the MMABE team (2 days)
20 May 2018	Extremely high volume of old sargassum present	Cleaned mechanically with heavy machinery which resulted in damage to the beach
14-16 June 2018	High volume of decomposing sargassum landing on the beach	
05 July 2018	Moderate volume of sargassum present in the bay	Cleaned manually by fish vendors
07 July 2018	Light to moderate volume of old sargassum present	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
16 July 2018	High volume of degrading sargassum on the beach extending into the water up to 50m from shore	Intent to clean recorded – NCC
18 July 2018	High to moderate volumes of sargassum present	
13 August 2018	No sargassum present	
27 August to 07 September 2018	No sargassum present	
06 September 2018	No sargassum present	
09 October to 29 November 2018	Remnants of sargassum on the beach	
14 – 15 February 2019	Moderate volume of old sargassum present	Cleaned manually – NCC, BDF, MMABE
Mid-February to End of March 2019	Remnants of sargassum on the beach	Cleaned by NCC
22 April 2019	Moderate volume of sargassum present	Intent to clean recorded
June 2019	Light volume of sargassum present	Cleaned by MMABE sargassum team and NCC
July 2019	Moderate volume of sargassum present	Cleaned manually by MMABE (1 day) ~18 tons removed, sargassum collected and utilised by the NCC
GENERAL IMPACTs/RESPONSES		
- Decomposing sargassum attracts swarms of flies which negatively impact on the workers cleaning and processing fish at the back of the market - At times, fish pots have to stay down longer as sargassum affects the ability of fishermen to find and retrieve them - There have been occasional issues with sargassum clogging boat propellers and intake valves - It has also benefited fishermen by extending the fishing season, they are able to catch sargassum associated fish such as amber fish and mahi-mahi outside of the traditional fishing seasons		

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
	- The community response has been good – they have organised independent cleanups - The scent negatively impacts those selling food and operating souvenir stalls	

BEACH ACCESS	LOCATION	TERRAIN
Vehicular	At the eastern end of the beach, just to the east of the bay garden and domino shed.	Compact sand/ paved
There are numerous other paths that pedestrians might take; the beach is open and easily accessible. The rocky area to the west of the jetty is, however, very difficult to access without climbing across the rocks or venturing in by boat.		

Vulnerability factors	
Geophysical features	Partially sheltered beach
Is there adequate access to the bay to facilitate clean-up efforts?	There is access to the eastern section of the beach, however, there is no access to the section west of the jetty
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	Yes: Oistins is one of the main fishing villages and fish markets on the island, providing a large number of individuals and businesses with fresh fish.
How close is the community to Bay?	While there are no residences on the beach, the community of fisher folk and friends spend long hours in the area.
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	No
Volume of sargassum during scoping assessment	Low
Volume of sargassum historically (2011 – present)	Moderate
Is the beach heavily used by locals?	Yes
Is the beach heavily used for tourism?	Yes
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes
Is there evidence of community efforts to use sargassum?	Minimal
Presence of church and community groups that advocate for government assistance	Yes: Oistins Market and Bay Garden management

Overall Comments on vulnerability and resilience:

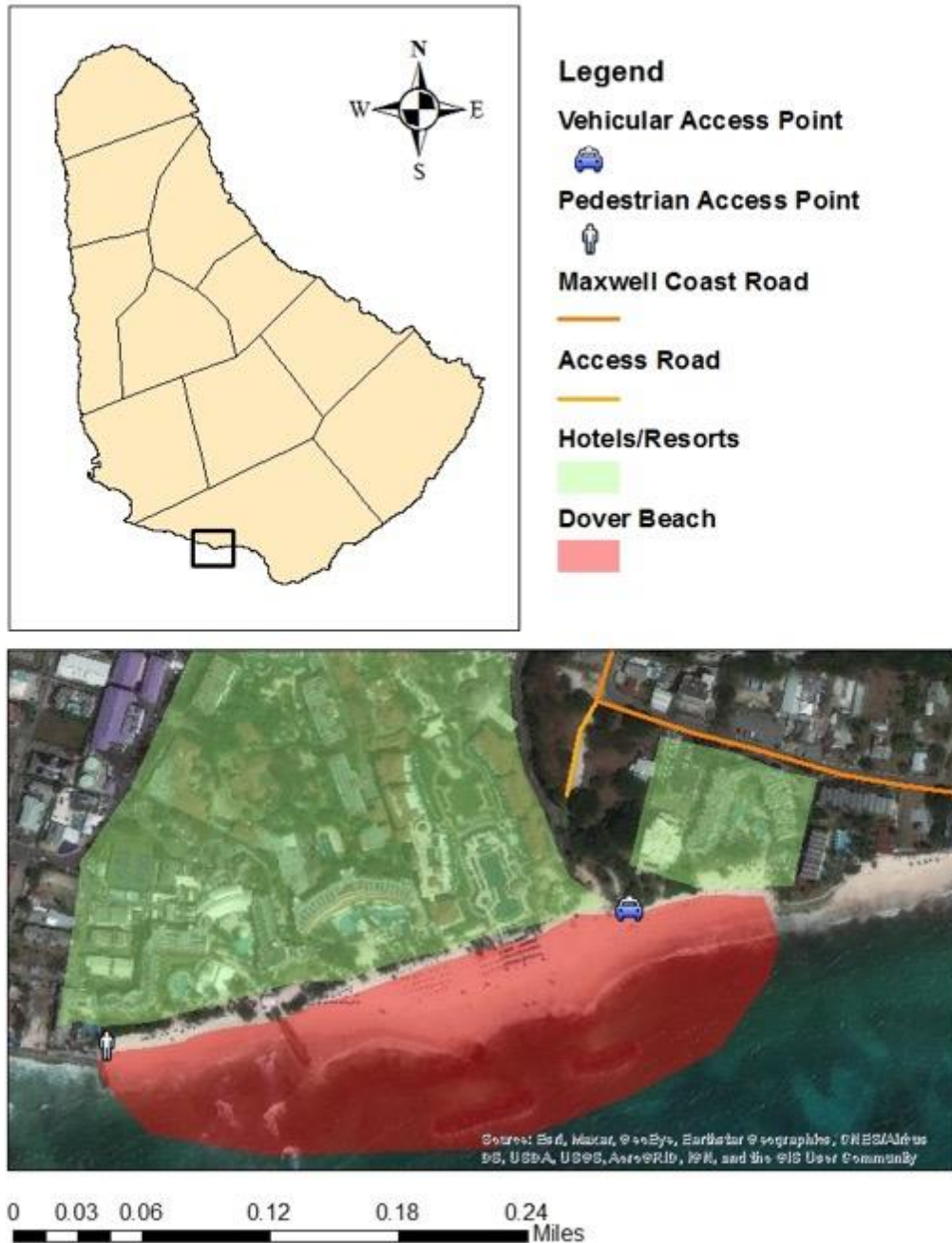
As with Conset Bay, the presence of the jetty minimizes the impact of sargassum influxes on fish landings. However, the strong smell of decomposing sargassum and the potential health issues are a problem for workers and can deter persons from eating at nearby establishments. The beach is subject to moderate wave action and natural removal does not occur as easily as it might at Long Beach or Silver Sands. The Oistins community displays a **MEDIUM/MODERATE vulnerability** to influx events.

Efforts to clean-up/utilize sargassum were made both by the government and the local community. The community demonstrates **MEDIUM/MODERATE** resilience.



Photo credit: Top left- Carla Daniel (2020) | Top right- Carla Daniel (2020)
Bottom left Carla Daniel (2020), Bottom right – John Webster (July 2018)

Dover Beach



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• Heavily developed tourist-oriented beach • 6 hotels and 1 set of condos present • No residences present • Heavily used for swimming (locals and tourists), snorkeling and watersports • There are lifeguards stationed at the beach, however, there is no public beach facility • The majority of the beach is maintained by the staff of private entities	• High density hawksbill turtle nesting beach • There are two groynes and two breakwaters present which may trap sargassum and impede its natural removal • Small stream flows onto beach (blocked by a sandbar in the dry season) • Presence of sensitive nearshore habitats: corals

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
14 June 2018	Moderate volume of sargassum present	Cleaned mechanically by Sandals staff with a small tractor
15-16 June 2018	Sargassum remnants present	
25 June to 02 July 2018	Moderate volume of sargassum present	Cleaned by the NCC and BDF
16 July 2018	Light volume of sargassum present on the beach	The section in front of Turtle Beach Hotel was cleaned by resort staff
27 August to 07 October 2018	Sargassum remnants present	Cleaned by hotels
06 September 2018	No sargassum present	
20 September to 12 October 2018	Sargassum remnants present	Intent to clean the Turtle Beach Hotel and Sandals recorded
Mid-February to End March 2019	Sargassum remnants present	Cleaned by NCC
January 2019	No sargassum present	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
June 2019	Light volume of sargassum present	The section in front of Sandals Barbados and Sandals Royal was cleaned by resort staff
GENERAL IMPACTs/RESPONSES		
• Beaches are cleaned almost daily by resort staff at most of the properties • In an effort to clean the beaches as quickly as possible, tractors are often used which may potentially damage turtle nests		

BEACH ACCESS	LOCATION	TERRAIN
Pedestrian	Located between the Dover Beach Hotel and Turtle Beach Hotel properties. A narrow path, 1m wide, and narrower in places. There is no area available to hold sargassum for collection	Compact sand/ paved
Vehicular	Through the cemetery located between Sandals Royal and the Ocean 1 property. There is space for the temporary storage of the collected sargassum	Compact sand
The beach is heavily developed and public access is limited. There may be private vehicular/pedestrian access available through resort properties.		

Vulnerability factors	
Geophysical features	The beach has been altered by the presence of breakwaters and groynes which have reduced wave action and may trap sargassum
Is there adequate access to the bay to facilitate clean-up efforts?	Limited access
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 beach is located in the tourist belt and is surrounded by hotels, guest houses and restaurants
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	Wills Primary School is ~ 0.5km from the beach
Volume of sargassum during scoping assessment	None

Vulnerability factors	
Volume of sargassum historically (2011 – present)	Moderate
Is the beach heavily used by locals?	Moderately
Is the beach heavily used for tourism?	Yes: There are 6 large hotels and a residence
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes, the hotels and private properties on the island have been consistent in their attempt to remove sargassum from their sections of the beach
Is there evidence of community efforts to use sargassum?	Minimal
Presence of church and community groups that advocate for government assistance	Yes: There are several hotels that advocate for government assistance when necessary

Overall comments on vulnerability and resilience:

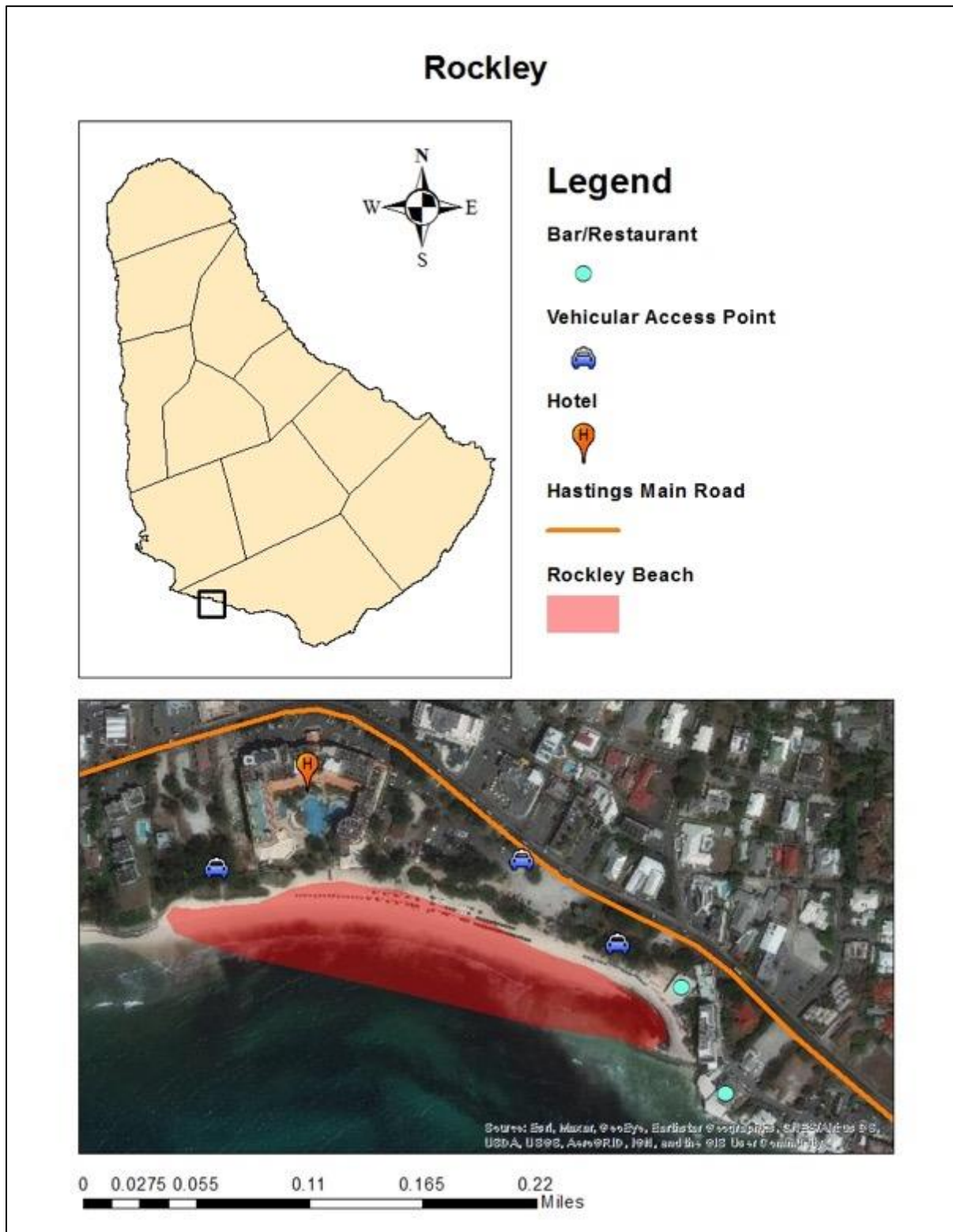
The tourism community, which is in close proximity to Dover beach, depends on the happiness and good will of their guests. Locals may have a relatively high tolerance for the presence of sargassum, however, tourists become upset when their ability to use the beach is impeded – when the appearance of the beach/water is not as advertised or when their comfort is reduced because of noxious odours. Due to the sensitivity of the tourist community to sargassum, the community displays a **HIGH vulnerability** to influx events.

Since the arrival of sargassum on Dover beach, the hotels have been consistent in their efforts to keep the beach clear of sargassum. They have, at times, been overly zealous in their approach resulting in significant damage to the high density turtle nesting beach. The beach has a history of light to moderate inundations in comparison to those beaches on the east and south-east coasts. These inundations in the past have generally be manageable and so, Dover beach demonstrates **MEDIUM /MODERATE resilience**.



Photo credit: Top left- Island-wide Protection Cameras (December 2020) | Top right- Carla Daniel (December 2020)

Bottom left- Nicholas Deane (June 2020)



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• Heavily used for swimming and sunbathing by tourists and locals • 1 hotel, 2 restaurants and numerous small shops • Condominiums, apartment buildings and residences present • Provides livelihoods for a number of small businesses including beach chair vendors • Public beach facilities • NCC beach attendants and lifeguards stationed • Popular for rock fishing, snorkelling and body boarding	• High density hawksbill nesting beaches • Occasional green turtle and leatherback nests • Foraging site for green turtles • There is a groyne and a breakwater at the eastern end of the beach which may trap sargassum and impede its natural removal • Presence of sensitive habitat: coral and reef rubble

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
22 July 2015	No sargassum present	
12 August 2015	No sargassum present	
25 March 2016	Moderate to high volumes of fresh sargassum present along the beach	
07 August 2016	Light volume of sargassum present	
29 May 2017	Light volume of fresh sargassum present	
01 April 2018	Light volume of fresh sargassum present	
22 May 2018	Moderate volume of fresh sargassum present	
08 – 10 June 2018	Light volume of sargassum present	Cleaned by NCC
14-16 June 2018	Sargassum remnants present	
18-24 June 2018	Extremely high to high volumes of fresh sargassum present on the beach	Cleaned by NCC approx. 60 m ³ removed
25 June to 02 July 2018	High volume of fresh sargassum present	Cleaned by the BDF and NCC
03 to 13 July 2018	High volume of fresh sargassum present	Cleaned by the BDF and NCC

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
16 July 2018	No sargassum present	
18 July 2018	Light volume of fresh sargassum present	
20 July 2018	Light volume of fresh sargassum present	
27 August to 07 September 2018	Light volume of fresh sargassum present	Intent to manually clean recorded – NCC
09 October to 29 November 2018	Sargassum remnants present	
06 February 2019	Light volume of fresh sargassum present	
19 February 2019	No sargassum present	
Mid-February to End March 2019	Sargassum remnants present	Cleaned by NCC
25 April 2019	High volume of fresh sargassum present	
June 2019	Sargassum remnants present	Cleaned by the MMABE sargassum team and NCC
09 August 2019	Moderate volume of sargassum present	
18 May 2020	Light to high volumes of fresh sargassum across the beach	
June 2020	Moderate volume of sargassum present	Cleaned manually by MMABE sargassum team (2 days) ~12 tons removed. Collected and utilised by NCC
30 July 2020	No sargassum present	
GENERAL IMPACTs/RESPONSES		
- In comparison to beaches on the east and south east coast, the volume of sargassum impacting this beach is low with the occasional high inundation - The beach is occasionally impacted by discoloured water as a result of decaying sargassum which originates at other beaches. - The government has responded well and frequently coordinates cleaning of the beach		

BEACH ACCESS	LOCATION	TERRAIN
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Vehicular	Opposite Bubba's sports bar across private, undeveloped land	Soil/ Compact sand
Vehicular	East of the public parking area	Gravel
Vehicular	Gravel parking area opposite the Blue Horizon Hotel (Private lands)	Gravel
Vehicular	Through the parking area for the Tiki Bar (Private, publicly used land)	Compact soil
There is good pedestrian access available along the length of the beach.		

Vulnerability factors	
Geophysical features	The beach has been altered by the presence of breakwaters and groynes which have reduced wave action and may trap sargassum on the eastern end of the beach
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 beach is located in the tourist belt and is surrounded by hotels, guest houses and restaurants
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	No
Volume of sargassum during scoping assessment	None
Volume of sargassum historically (2011 – present)	Moderate
Is the beach heavily used by locals?	Yes: It is one of the most popular swimming beaches for locals on the island
Is the beach heavily used for tourism?	Yes
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes
Is there evidence of community efforts to use sargassum?	Minimal
Presence of church and community groups that advocate for government assistance	Yes: Hotels, vendors and local users

Overall Comments on vulnerability and resilience:

The tourism community, which is in close proximity to Rockley beach, depends on the happiness and good will of their guests. Locals may have a relatively high tolerance for the presence of sargassum, however, tourists become upset when their ability to use the beach is impeded - when the appearance of the beach/water is not as advertised or when their comfort is reduced because of noxious odours. Rockley is also one of the most popular beaches for swimming by locals and is heavily used. It also supports the livelihood of several small businesses including chair vendors, bar and food establishments and craft and souvenir shops. Due to the sensitivity of the primary activities, Rockley displays a **HIGH vulnerability** to influx events.

Since the arrival of sargassum on Rockley beach, the hotels, vendors, NCC and more recently MMABE have been consistent in their efforts to keep the beach clear of sargassum. Due to the wide flat nature of the beach, the NCC has been relatively successful in using its beach cleaning Sheridan. The beach has a history of light to moderate inundations in comparison to those beaches on the east and south-east coasts with the occasional high influx. These inundations in the past have generally be manageable and so Rockley beach demonstrates **MEDIUM /MODERATE resilience**.

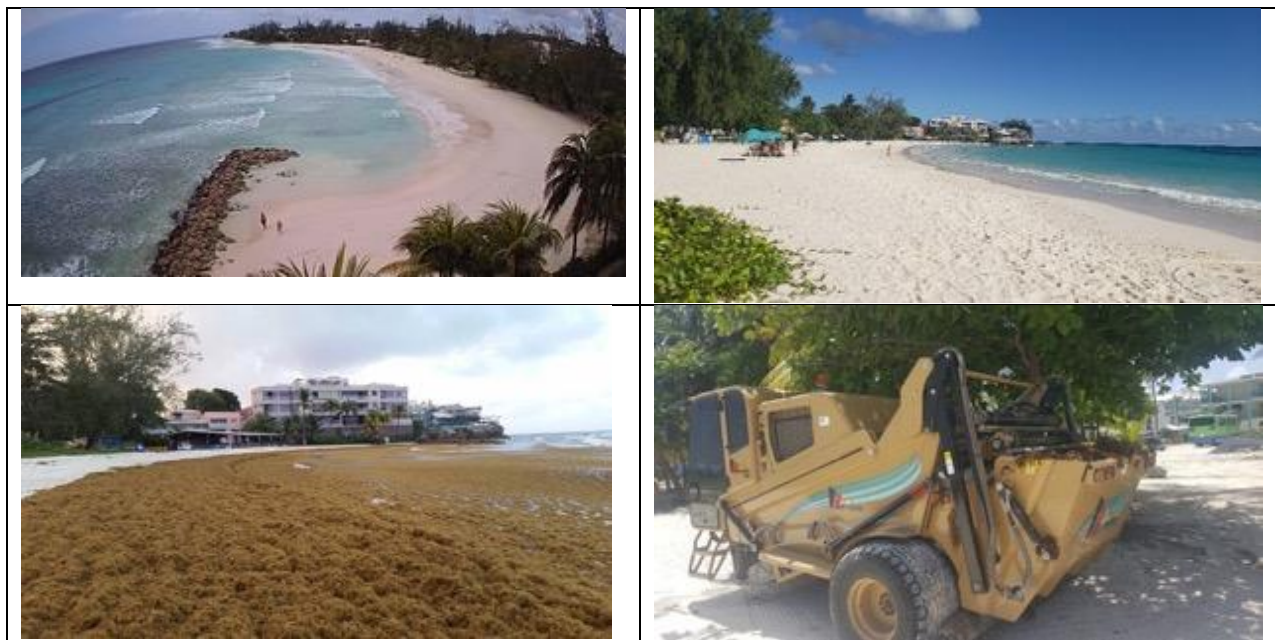


Photo credit: Top left- Island-wide Protection Cameras (December 2020) | Top right- Carla Daniel (December 2020)
Bottom left - Carla Daniel (June 2018) , Bottom right – Carla Daniel (2018)

The Boardwalk



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• Heavily used boardwalk • Numerous bars, restaurants and guest houses • Active permanent residences present • Utilised for recreation and exercise by tourists and locals • Public beach facilities • NCC beach attendants stationed • Popular for rock fishing and spearfishing	• Construction of the boardwalk inclusive of headlands has led to the formation of a number of new “pocket” beaches • High density hawksbill nesting beaches • The most stable of these small beaches are naturally vegetated

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
11Aug 2014	Moderate volume of sargassum present	Cleaned manually by NCC staff
19 June 2015	Extremely high volume of sargassum present	
28 May 2017	Light volume of sargassum present	
24 June 2017	Light volume of sargassum present	Cleaned during the National Sargassum Clean up
10 October 2017	Light volume of sargassum present	
14 February 2018	No sargassum present	
16 July 2018	Light volume of fresh sargassum present	
27 August to 07 September 2018	Moderate volume of sargassum present	Intent to manually clean recorded- BDF and the Probation Department
06 September 2018	Light volume of sargassum present	
09 October to 29 th November 2018	Sargassum remnants present	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
January 2019	Light volume of sargassum present	Intent to clean recorded - NCC
25 April 2019	Light volume of sargassum present	
28 May 2019	Moderate volume of sargassum present	Cleaned manually by the MMABE sargassum team
June 2019	Sargassum remnants present	Cleaned manually by the MMABE sargassum team and NCC
26 July 2019	Sargassum remnants present	
Mid-February to the End of March	Sargassum remnants present	
10 September 2019	Sargassum remnants present	
24 December 2019	No sargassum present	
May 2020	Light volume of sargassum present	Cleaned manually (MMABE) ~38 tons removed over 8 days. Sargassum collected by NCC and utilised
June 2020	High volume of sargassum present	Cleaned manually (MMABE) ~138 tons removed over 2 days.
GENERAL IMPACTs/RESPONSES		
- In comparison to beaches on the east and south east coast the volume of sargassum impacting this beach is low - The sargassum is often tossed onto the boardwalk by waves impeding its use - The boardwalk's drainage channels and boulder revetment become clogged with sargassum during heavy inundations and are difficult to clean		

BEACH ACCESS	LOCATION	TERRAIN
Vehicular	In the area of the public washrooms, there is public space available for the temporary holding of sargassum.	Paved

There is good pedestrian access available along the length of the boardwalk. The wooden slats on the boardwalk would be damaged by heavy machinery, making it difficult to impossible to access the pocket beaches on the boardwalk with machinery.

Vulnerability factors	
Geophysical features	The boardwalk was constructed to armour this portion of the south coast and to create a recreational space. Its construction has resulted in the formation of numerous pocket beaches along its length, in areas where beaches did not previously exist.
Is there adequate access to the bay to facilitate clean-up efforts?	There is adequate access to facilitate manual cleanup, however, vehicular access is severely limited
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	No, there is no fishing related infrastructure. There is moderate use of the area for spear and rock fishing
How close is the community to Boardwalk?	The community is directly along the length of the boardwalk
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	The St. Mathias Church is ~ 170 m N, The PomMarine Institute is ~ 250m N and the St. Mathias Primary School is ~ 440m N
Volume of sargassum during scoping assessment	None
Volume of sargassum historically (2011 – present)	Moderate
Is the beach heavily used by locals?	Yes
Is the beach heavily used for tourism?	Yes
Evidence of resilience	
Is there evidence of community efforts to clean-up?	No
Is there evidence of community efforts to use sargassum?	Minimal
Presence of church and community groups that advocate for government assistance	In addition to the businesses that operate from the boardwalk there is a very vocal community of users who advocate for its maintenance quite successfully.

Overall Comments on vulnerability and resilience:

The Richard Haynes Boardwalk's primary use is for exercise and recreation; there are rarely sunbathers or swimmers using its beaches and as a result, the presence of sargassum does not have the impact it typically does on south coast beaches. Occasionally, however, when there are large swells, sargassum is tossed/washed onto the boardwalk and can significantly impact its use. The noxious hydrogen sulphide produced as it decays negatively impacts users and patrons of nearby establishments. As with other south coast beaches, currents often carry rafts of sargassum past the boardwalk and so it is not as heavily

impacted by sargassum landings as those beaches on the east and south east coasts of the island. There is also a contracted company charged with the cleaning of the boardwalk and NCC beach attendants regularly clean the beach. In the past, when there have been moderate to high influxes, the MMABE sargassum team responded quickly providing additional support. The Richard Haynes Boardwalk community displays a **MEDIUM/MODERATE vulnerability** and a **HIGH** resilience to influx events.

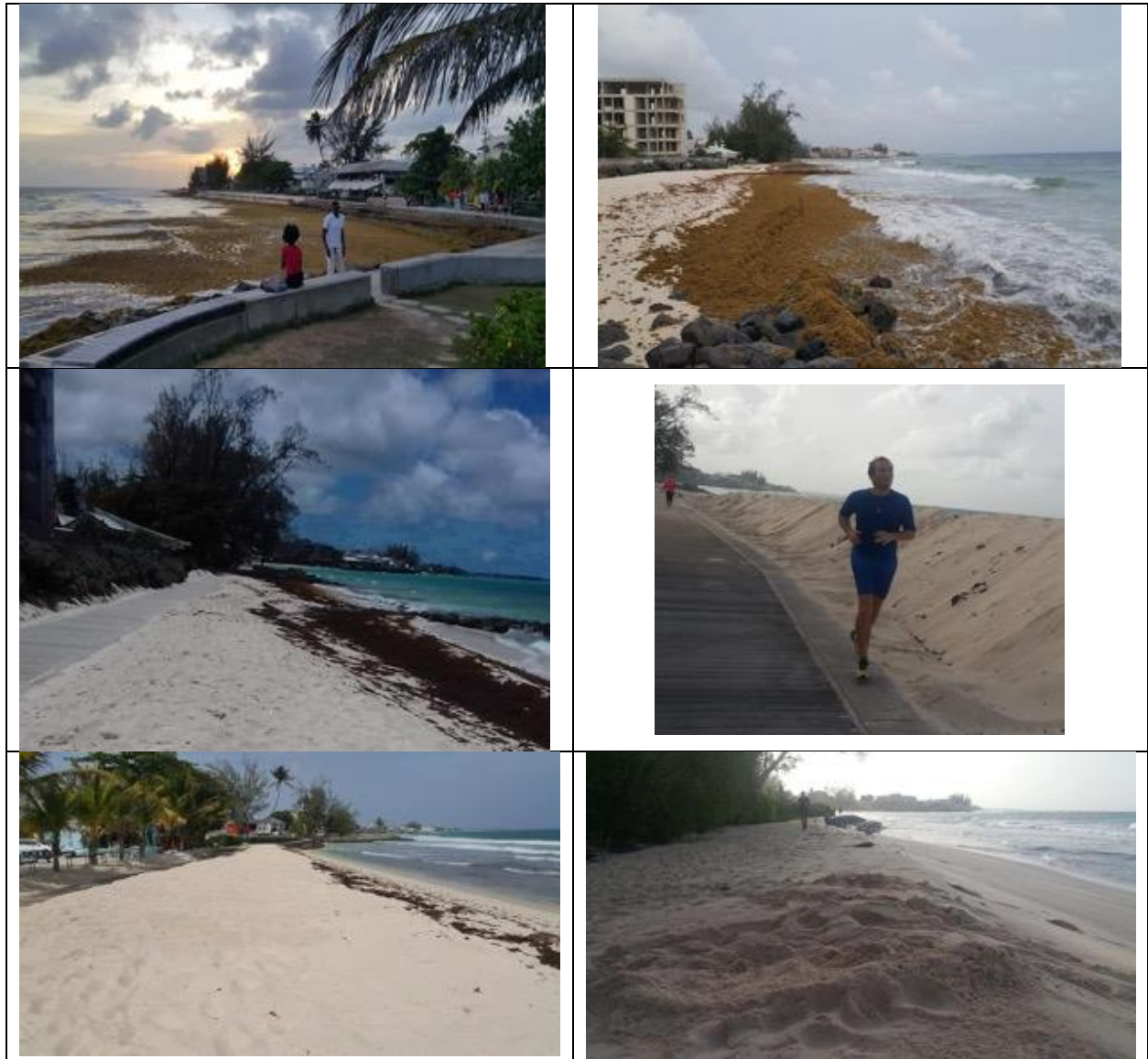


Photo credit: Top left- Carla Daniel (April 2019) | Top right- Carla Daniel (April 2019)
Centre Left – Carla Daniel (December 2019), Centre right – Carla Daniel (May 2020)
Bottom left and right Carla Daniel (May 2020)

Needham's Point to Savannah Beach



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• 2 hotels on the extreme ends of the beach, the central portion is undeveloped • No residences present • Swimming primarily occurs in-front of the 2 hotel properties where the beach has been altered with the addition of groynes and breakwaters • One section of the beach, in the centre, is heavily used for surfing and surf lessons • Popular beach for rock fishing • There are lifeguards stationed at the southern end of the beach, however, there is no public beach facility • The headquarters for the Barbados Defence Force abuts the back of a section of the beach • There are beach attendants assigned to the area	• This section of the coast forms a part of the national index nesting beach for hawksbill turtles. This is the most important beach for hawksbill nesting on the island and arguably in the insular Caribbean • There are three groynes and two breakwaters present which may trap sargassum and impede its natural removal • The beach is listed as a Natural Heritage Conservation Area in the draft Physical Development Plan • Presence of sensitive nearshore habitats: corals and reef rubble

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
19 June 2015	Drill Hall – Moderate volume of sargassum present	
November 2015	Hilton – Moderate volume of sargassum present	Manual community clean up
25 August 2015	Hilton Hotel – High volume of sargassum present	Mechanical cleaning observed
24 June 2017	Moderate volume of sargassum present	Cleaned as a part of the National Sargassum Clean-up
15 March 2018	Drill Hall – Moderate volume of sargassum present	
02 April 2018	Moderate volume of sargassum present along the beach	Section by Savannah Hotel cleaned manually by hotel staff
22 May 2018	Drill Hall – Moderate volume of sargassum present	
8-9 June 2018	Savannah – Moderate sargassum present	Cleaned manually by hotel staff

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
18-24 June	Drill Hall- Moderate sargassum	Cleaned by NCC – 20 m ³
16 July 2018	Light to moderate volume of sargassum present	Section by Savannah Hotel cleaned manually by hotel staff, the remainder of the beach cleaned by BDF and NCC personnel
18 July 2018	Moderate volume of sargassum present along the beach	
20 July 2018	Savannah Hotel – Moderate volume of sargassum present	Cleaned manually by hotel staff
10 August 2018	Drill Hall – sargassum remnants present	
27 August to 07 September 2018	Light to moderate volumes of fresh sargassum present along the beach	Intent to clean recorded – BDF, Probation Department
06 September 2018	Light volume of fresh sargassum present along the beach	
20 September to 12 October 2018	Sargassum remnants present	Intent to clean recorded – BDF, Probation Department, Savannah Hotel
January 2019	Moderate volume of sargassum present along the beach	
Mid -February to the End of March 2019	Light volume of sargassum present along the beach	
25 April 2019	Light to moderate volume of sargassum present along the beach	
June 2019	Light sargassum present in the area of Savannah Hotel	
3-13 July 2019		Hilton – Cleaned by the BDF and NCC
20 May 2020	High volume of sargassum present	
June 2020	Light volume of sargassum present	Cleaned manually by the MMABE sargassum team (1 day) ~4 tons removed
GENERAL IMPACTs/RESPONSES		

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
	- In comparison to beaches on the east and south east coast, the volume of sargassum impacting this beach is low - Physical alterations of the beach have impeded natural removal and trapped sargassum in some areas - Sargassum at times makes it difficult for sea turtle hatchlings to reach the water and swim off shore	

BEACH ACCESS	LOCATION	TERRAIN
Vehicular	West of Savannah Hotel	Compact sand
Vehicular	In the area of the lifeguard hut	Compact sand
The beach is open and generally undeveloped with pedestrian access available along its length		

Vulnerability factors	
Geophysical features	The two ends of this location have been altered by the addition of groynes and breakwaters and are more heavily impacted than the rest of the beach
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)	There is no commercial fishing activity, however, the location is important for rock fishing
How close is the community to Bay?	
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	The headquarters for the Barbados Defence Force abuts a section of the beach
Volume of sargassum during scoping assessment	None
Volume of sargassum historically (2011 – present)	Moderate
Is the beach heavily used by locals?	Moderately used
Is the beach heavily used for tourism?	Sections of it are, primarily in-front of the 2 hotels
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes
Is there evidence of community efforts to use sargassum?	Minimal
Presence of church and community groups that advocate for government assistance	Yes: Hotels, Barbados Surfing Association, BDF

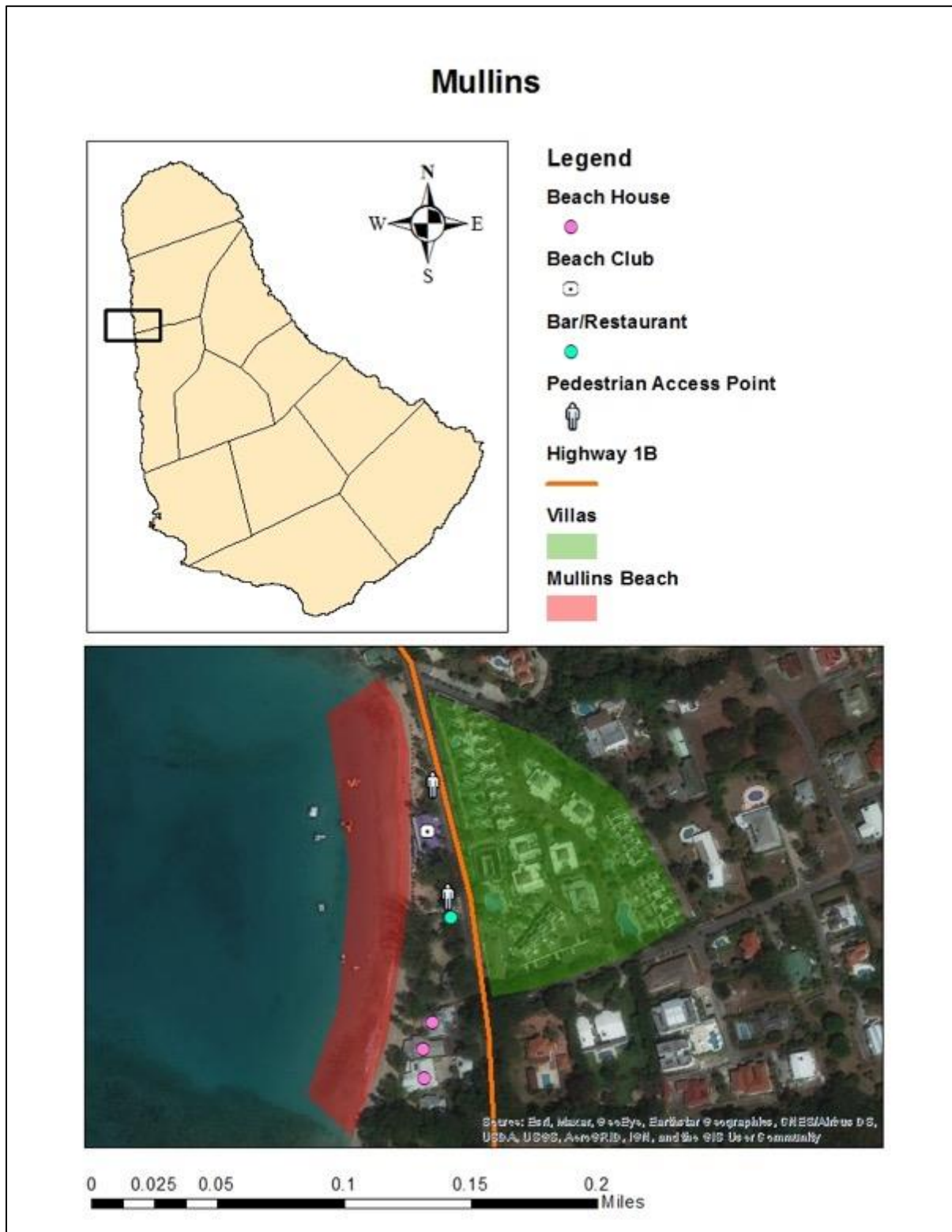
Overall Comments on vulnerability and resilience:

The majority of this beach is undeveloped and not used for swimming and sunbathing. The activities which do take place – primarily rock fishing and surfing - are less vulnerable to sargassum influxes than the former tourism related activities. The community using the areas in-front of the Hilton and Savannah hotels, which are heavily used by tourists, display a **HIGH vulnerability** to influx events while the community utilizing the stretch of beach in-between displays **MODERATE vulnerability**. Due to low influxes, natural removal and the cleaning efforts of a number of agencies, the sargassum rarely produces noxious odours. Since the arrival of sargassum on the Needhams point to Savannah beach, the hotels have been consistent in their efforts to keep the beach clear of sargassum. Savannah Hotel, in particular, should be commended as they have avoided damaging mechanical cleaning and employed a number of young men from the surrounding communities to manually remove the sargassum. These gentlemen have been remarkably effective even when there are high inundations. This is particularly important on high density turtle nesting beaches such as this one. The beach has a history of light to moderate inundations in comparison to those beaches on the east and south-east coasts. These inundations in the past have generally be manageable and so, this beach demonstrates **MEDIUM /MODERATE resilience**.



Photo credit: Top left- Carla Daniel (2018) | Top right- Carla Daniel (April 2019)
Bottom left- Carla Daniel (June 2017), Bottom right – Carla Daniel (2020)

5.13 MULLINS BEACH



SELECT SOCIAL KEY FEATURES	SELECT ECOLOGICAL KEY FEATURES
• Heavily developed tourist-oriented beach • 2 high-end restaurants • 6 Beach villas commonly rented to tourists and locals • Heavily used for water sports e.g. tubing, skiing, jet skis, surfing, paddle boarding • Heavily used for swimming (locals and tourists), • No public beach facilities • A number of small businesses are based on the beach inclusive of but not limited to chair vending, watersport operators, a small bar/ shop, vending • Sections of the beach maintained by property staff	• High density hawksbill turtle nesting beach • Presence of sensitive nearshore habitats: corals

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
18 September 2017	Light volume of sargassum present	
14 June 2018	No sargassum present	
20 September to 12 October 2018	No sargassum present	
07 August 2019	Moderate volume of sargassum present	
October 2018	No sargassum present	
November 2018	No sargassum present	
May 2020	No sargassum present	
December 2020	No sargassum present	

GENERAL IMPACTs/RESPONSES	
• Beaches on the west coast are seldom affected by sargassum • When an influx occurs, it is typically due to the presence of a northern swell	

BEACH ACCESS	LOCATION	TERRAIN
Pedestrian	Northern most end of the beach	Cement steps
Pedestrian	North end of Mullins restaurant	Cement steps
Pedestrian	South end of Mullins restaurant	Cement steps
No vehicular access, no parking areas, no holding/loading areas for sargassum		

Vulnerability factors	
Geophysical features	Short natural beach
Is there adequate access to the bay to facilitate clean-up efforts?	No: there are no holding areas for sargassum, no parking and no areas to facilitate collection for disposal
Is the area important for fishing? (Presence of fish market and other infrastructure e.g. jetty)	No
How close is the community to Bay?	Adjacent
Proximity of bay to schools and other infrastructure (e.g. polyclinics etc.).	There are no schools etc. in the area
Volume of sargassum during scoping assessment	None
Volume of sargassum historically (2011 – present)	Low
Is the beach heavily used by locals?	Yes
Is the beach heavily used for tourism?	Yes
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 – assistance is not typically required

Overall Comments on vulnerability and resilience:

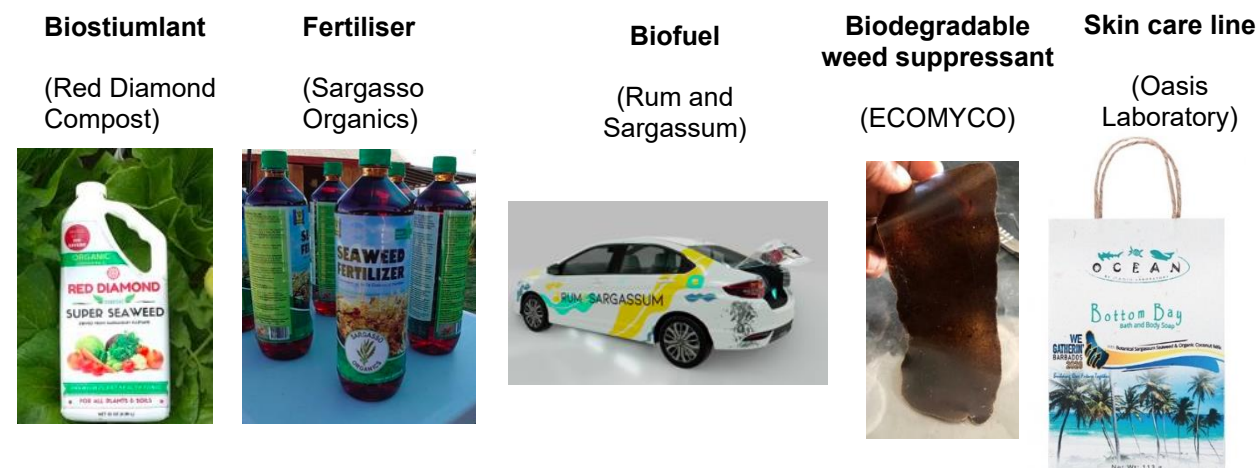
Mullins beach is one of the most popular west coast beaches on the island, known for white sand, good food and numerous watersport activities, with both locals and tourists flocking there each weekend. On the leeward side of the island, the beach is seldom impacted by sargassum influxes. To date, there have been few significant negative impacts recorded. Beach users have stated that when the sargassum arrives close to shore, it is quickly pulled back to sea when the tide changes. However, given the sensitivity of the activities conducted on the beach and the limited access, the community demonstrates a **MODERATE/MEDIUM vulnerability** and a **HIGH resilience**.



Photo credit: Carla Daniel (December 2020)

6 IN-COUNTRY USES OF SARGASSUM

Entrepreneurs and research teams across the island 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. There are many inspiring innovators that have become leaders in this emerging industry, several of these are young businessmen and women. This section provides examples of initiatives with links to their websites. Below shows some of the products developed by Barbadian innovators.



Use	Name of Business/Organisation /Project	End Product/Service	Contact Links
Agricultural- Crop Production	Red Diamond Compost	Biostimulant	Joshua Forte (Founder & CEO) info@reddiamondcompost.com Click here to visit the website!
	Sargasso Organics	Fertiliser	Roett's Garage roettsgarage@gmail.com Click here to visit the website!
	University of the West Indies	Research - mulch, fertilizer, Bioelicitor	- Dr. Francis Lopez, Dept. of Biological and Chemical Sciences, Barbados (mulch & fertilizer) francis.lopez@cavehill.uwi.edu - Prof. Jayaraj Jayaraman, Dept. of Life Sciences, Trinidad (bio-elicitors, nanopesticides & biocontrol) Jayaraj.Jayaraman@sta.uwi.edu
Alginates	University of the West Indies	Alginate extracts	Dr. Bidyut Mohapatra, Dept. of Biological and Chemical Sciences, Barbados (nanobiocatalytic alginate lyase) bidyut.mohapatra@cavehill.uwi.edu

Biofuels	Biogen Biotechnologies Inc.	Biofuel	Mark Hill (Director) biogengas.barbados@gmail.com markhill@thinkdesignbarbados.org Click here to visit website!
	Rum and Sargassum	Biofuel, bioethanol	Dr. Legena Henry, Dept. of Computer Science, Math & Physics, Barbados legena.henry@cavehill.uwi.edu Click here to visit the website!
	University of the West Indies	Biofuel	Dr. Nikolai Holder, Dept. of Biological and Chemical Sciences, Barbados nikolai.holder@gmail.com
Bioplastics	ECOMYCO	Research- bioplastics (biodegradable weed suppressant)	Kerri-Ann Bovell kbovell@ecomyco.com
	University of the West Indies	Research- bioplastics	Dr. Srinivasa Popuri, Dept. of Biological and Chemical Sciences, Barbados srinivasa.popuri@cavehill.uwi.edu Dr. Keeran Ward, Dept. of Chemical Engineering, Trinidad (thin film composite - biodegradable water container) keeran.ward@sta.uwi.edu
Cosmetics	Oasis Laboratory	Skin care line	Kemar Codrington & Mikhail Eversley (Founders, CEOs) sustainable@oasislaboratory.com Click here to visit website!
Environmental Restoration	Walkers Institute for Regenerative Research Education and Design (WIRRED)	Dune Restoration	Kiesha Farnum, Managing Director info@wirred.org Click here to visit website!

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

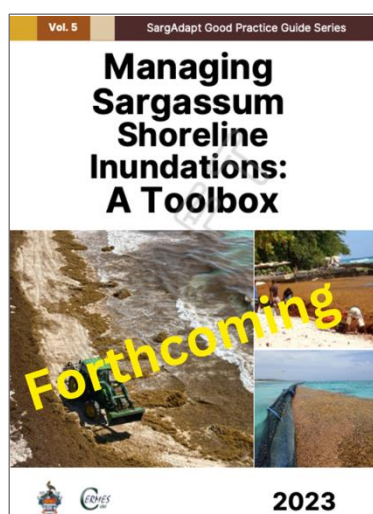
- Set out only the details of pre-impact, impact and post-impact specific to the local level
- Set out practical ecosystem measures for nearshore marine habitats, shoreline vegetation and wildlife
- To avoid being overwhelmingly extensive refer to guidance in the strategy or elsewhere
- Consider limitations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

8 ACTIONS AND OPERATIONS

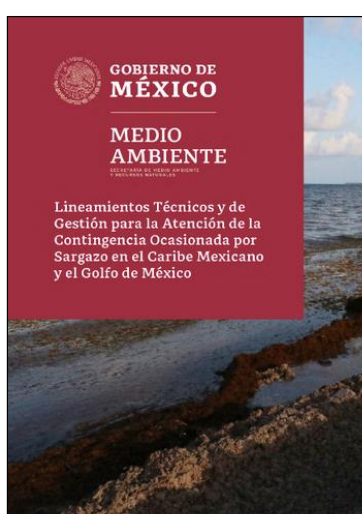
Several diverse types of knowledge products have been developed and made accessible throughout the years, mostly related to sargassum monitoring, management, coping and adaptive mechanisms for key sectors, removal and uses. Post 2021, the number of protocols and guidelines on sargassum-related actions 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

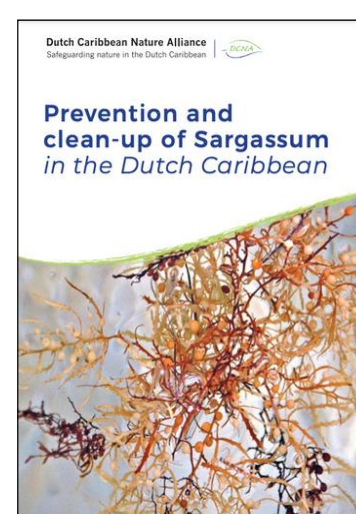
Guidance documents on **sargassum removal** have been produced at the national and regional levels. Click on the images below to peruse the documents!



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



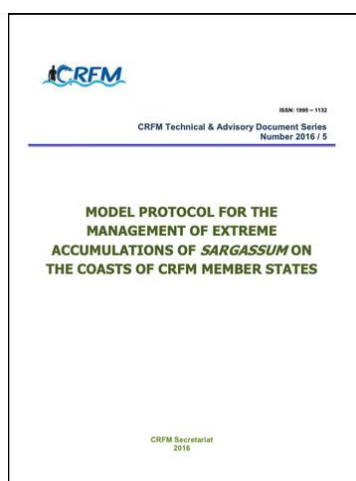
Tags: onshore and in-water collection, containment barriers, turtle nesting beaches, disposal, health and safety, monitoring, uses



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

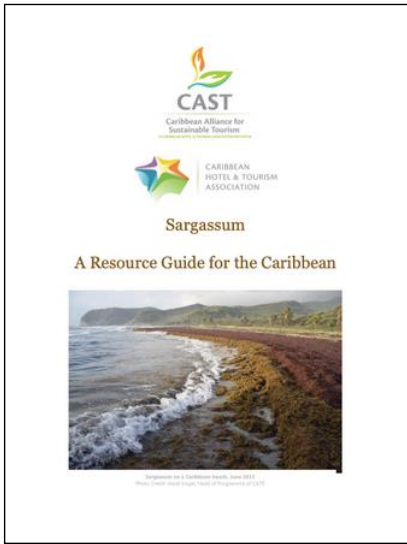


Tags: template, national-level management plans



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 improved². The figure below illustrates further³.



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:



² United Nations Development Programme. 2022. Project Document- The Project for Improving National Sargassum Management Capacities in the Caribbean.

³ 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).

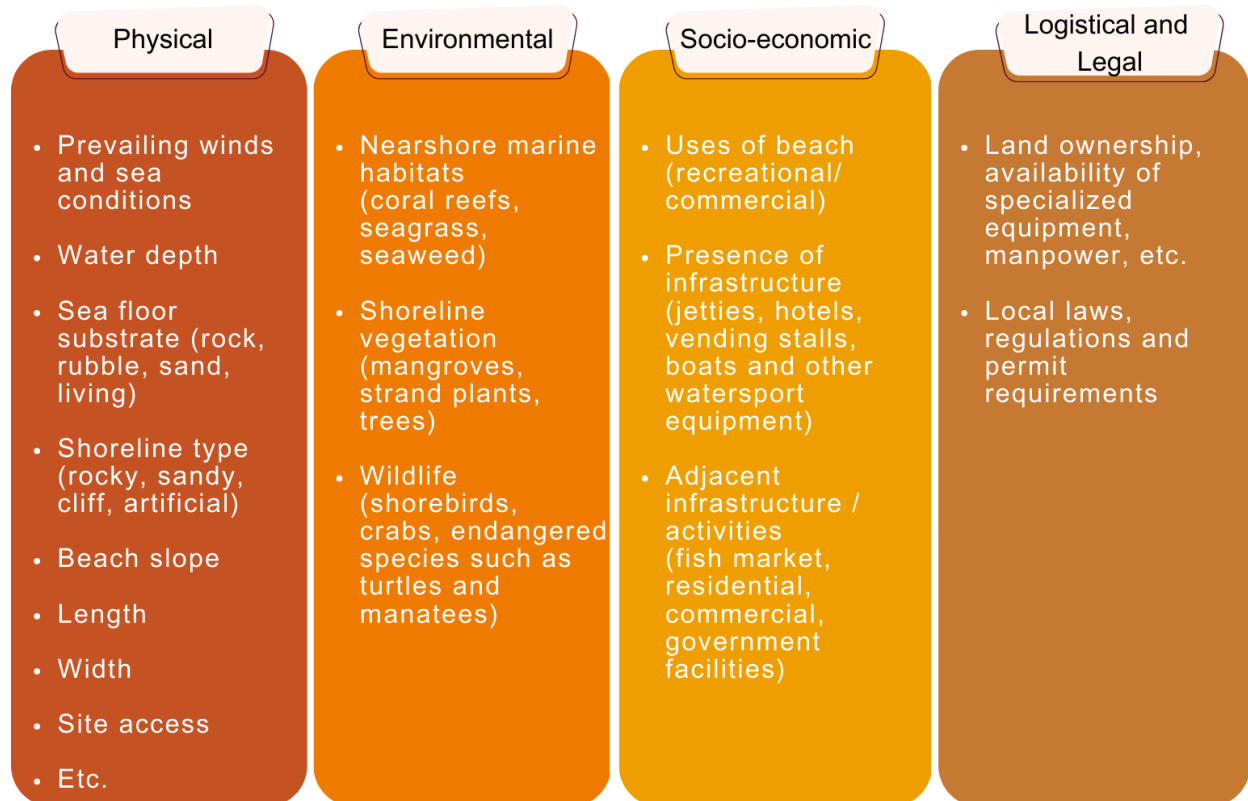
STEP 2: Communicate with coastal stakeholders and the wider public

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 and logistical and legal conditions:

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 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, 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	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 sensitivity
Good practice	Collect sargassum as fresh as possible This minimizes health issues and maximizes valorisation potential	Operate when beach use is low and during low tide Retrieve sand for beach nourishing where possible Wash equipment with freshwater	Works best on beaches with low relief, and when sargassum volume is moderate Sand collection is low so it is suitable for regular cleanups
Operating costs	Low (rakes, wheelbarrows, buckets) Cost determined largely by cost of labour, time needed and transport and disposal	High (cost to purchase, ongoing maintenance, driver needed to operate machinery, transport and disposal)	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.



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

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).

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

	 Offshore barriers	 Boat harvesters
Suitable conditions	Calm and relatively shallow waters, good accessibility at sea, medium to high beach use	Calm, semi-enclosed bays, ideally used in tandem with the barrier
Unsuitable conditions	Prevailing rough and deep water, strong current, very deep water column, pocket beach, known sea turtle beach nearby	Prevailing rough seas, strong current, known turtle nesting beach nearby, no adjacent onshore offloading mechanism or facility
Considerations	An appropriately sized anchoring system Bathymetry, sea floor substrate A clear plan of where the sargassum will be directed to or regular removal of the built-up sargassum along the barrier	Works best in tandem with barrier to aggregate the material and reduce the surface area to be cleaned
Operating costs	Variable Depending on tier of equipment, (handmade or improvised), more workers needed for collection during inundation events, maintenance and cleaning of barrier (by hand or mechanised equipment)	Likely high Maintenance, fuel costs, skilled operators and others required to operate 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 'Sargaboat' works with the Sargabarrier to collect sargassum seaweed. One Sargaboat 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.



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.

Storage sites must:

- ✓ Allow sargassum to dry out to prevent anaerobic decomposition and production of toxic hydrogen sulphide and ammonia gases.

Disposal sites must:

- ✓ Ensure that sargassum leachates do not contaminate the environment including the freshwater supply since they are likely to contain various toxins, especially high levels of arsenic.

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 sargassum⁴.

⁴<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!

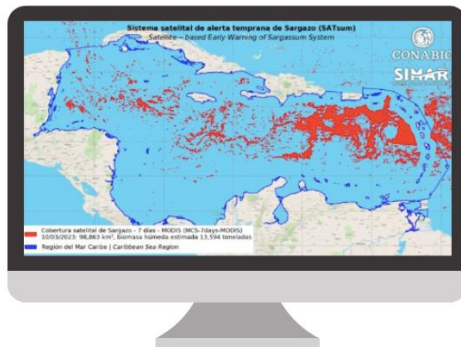
Sargassum Monitoring- Detection using on satellite imagery



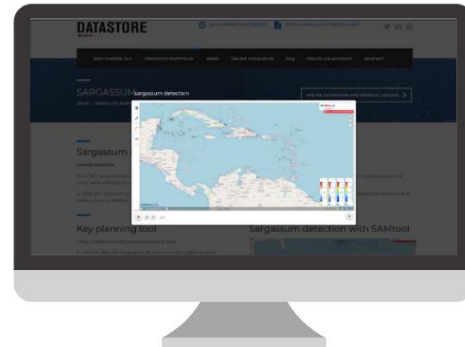
NOAA Coastwatch
Oceanviewer



Caribbean Coastal Ocean
Observing System (CariCOOS)



Sargassum Satellite Early
Warning System (SATsum)



CLS Sargassum Detection and
Monitoring Tool

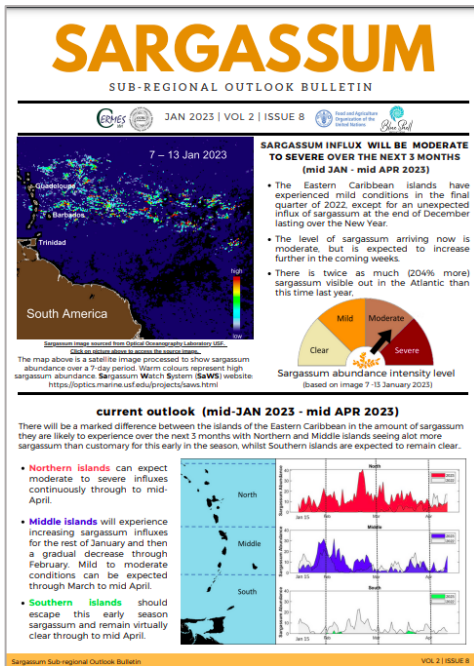


Sargassum Watch
System (SAWS)

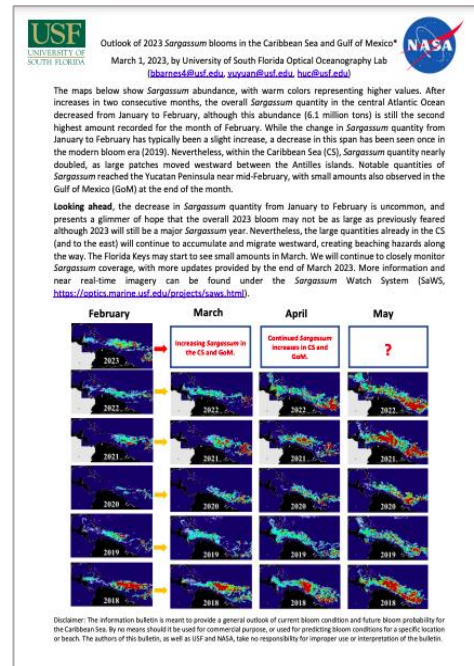


Sargassum Monitoring

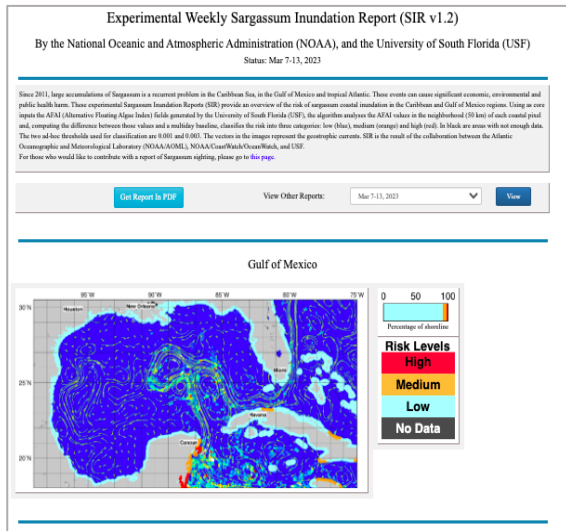
Sargassum Reporting- Bulletins and Reports



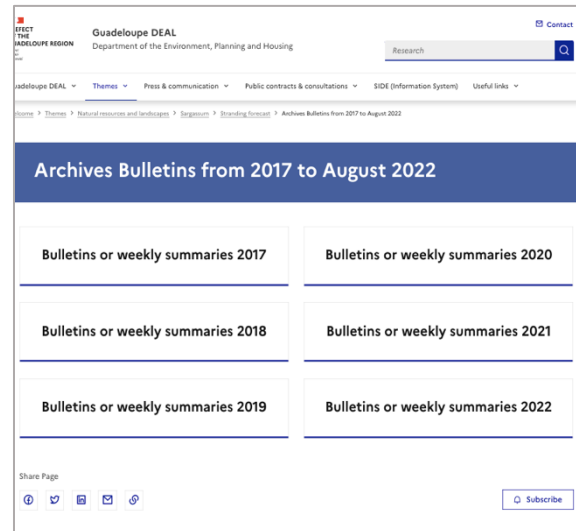
UWI-CERMES Sub-regional Sargassum Outlook Bulletin



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*

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.

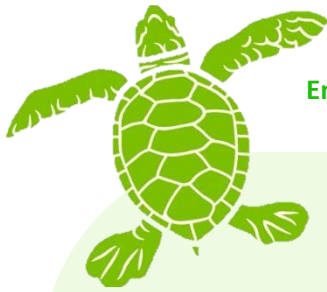
Recommended Actions

- 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 corruptions) 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

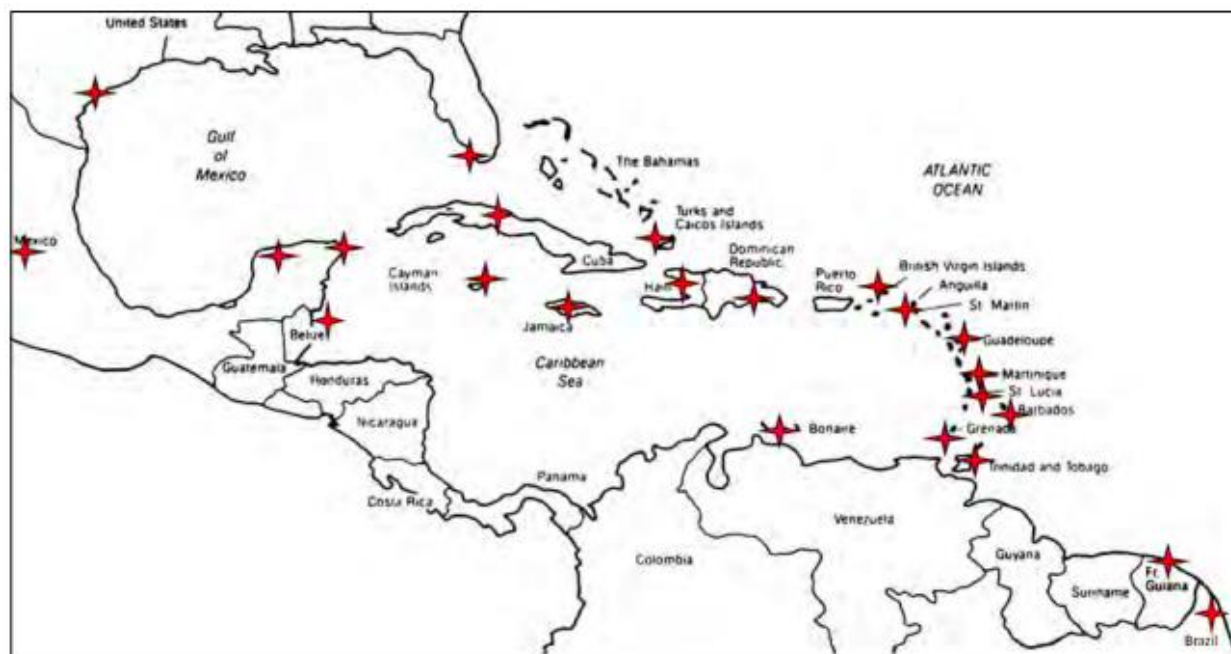
Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
22. SAVE-C (Study of holopelagic sargassum responsible of massive beachings: valorisation and ecology on Caribbean Coasts) Click here to visit website!	This project aims to better understand the 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. 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))

9.1 KEY RESOURCES

The Sargassum Uses Guide⁵ 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 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.

⁵ 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.



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 | IT Sorted

Find a view	Name	Headquarters	Value chain	Website
All companies	1 Abaplas	Mexico	Applications	
Startups (pre-f...)	2 Akki Foods	Japan	Applications	https://akki...
Scale-ups (hig...)	3 Algas Organics	Saint Lucia	Farming & harvesting	https://alg...
Breeding & pro...	4 AlgaeNova	Dominican Republic	Farming & harvesting	https://www...
Cultivation & w...	5 Algopack	France	Applications	https://alga...
Processing	6 Alquimar	Mexico	Applications	https://alq...
Infrastructure ...	7 Awganic Inputs	Jamaica	Farming & harvesting	Applications
Monitoring tec...	8 BiogasTiger (FWE Energy)	Germany	Applications	https://ww...
Associations &...	9 Biomava	Mexico	Farming & harvesting	https://ww...

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 | Q: 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_Belhel_Vol153_L...	A novel α-glucosidase inhibitor ...	Zhang et al.	2022					
	A Promising Potential of Brown ...	Hannan et al.	2022-01-06					
	A review on bio-based lubricant...	Syahrir et al.	2017					
	Activated carbon synthesized fro...	Francœur et al.	2021					
	Algae application in civil constru...	Rosengruber et al.	2022					
	An exposition on potential uses...	Faloutsos et al.	2011					
	Antiangiogenic and antitumoral ...	Diaz et al.	2005					
	Antimicrobial activity of most ab...	Borlón et al.	2012					
	Antioxidant, Antiproliferative, an...	Namvar et al.	2013					
	Arsenic removal from the popu...	Wang et al.	2022					
	Bioactive potentials of sulfated ...	Sanjeewa et al.	2018					
	Biocatalytic characteristics of c...	Mohapatra	2020					
	Biochar and activated carbons p...	Rangnin et al.	2021					
	Biochar from commercially cultu...	Roberts et al.	2015					
	Biochar derived from wasted m...	Pico et al.	2018					
	Biogenic acidification of Portuga...	Han et al.	2020					
	Bioremediation potential of Sarg...	Salazar-Hernandez et al.	2020					

use - cosmetics
use - environmental restoration
use - food & beverages
use - lubricants, surfactants & adhesives
use - pharmaceutical & biomedical
use - other

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)⁶ 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)

⁶ 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](#)