DRAFT

BARBADOS SARGASSUM ADAPTIVE MANAGEMENT STRATEGY (SAMS) VOLUME 2: ACTION APPENDICES

2021

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Suggested citation:

CERMES and MMABE. 2021. Draft Barbados Sargassum Adaptive Management Strategy. Volume 2: Action Appendices. Draft co-developed by the Centre for Resource Management and Environmental Studies (CERMES) and the Ministry of Maritime Affairs and Blue Economy (MMABE): Bridgetown, Barbados. 123pp

Photo credits: P. McConney (Welches Beach clean-up)| H. A. Oxenford (Bottom Bay) | A. Cox (Cove Bay)

Editorial note: *The appendices are intended to be converted into web pages and the companion electronic document finalised by the country is to follow the web format for consistency. This draft simply indicates some example initial content. Formatting and content to be later finalised. 'Clickable' images could link to resources.*

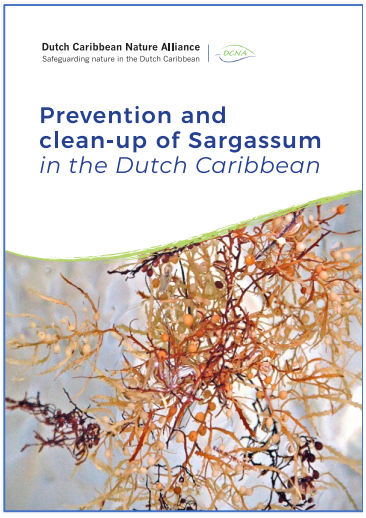
1 MANAGEMENT PLANNING APPROACHES AND PLANS

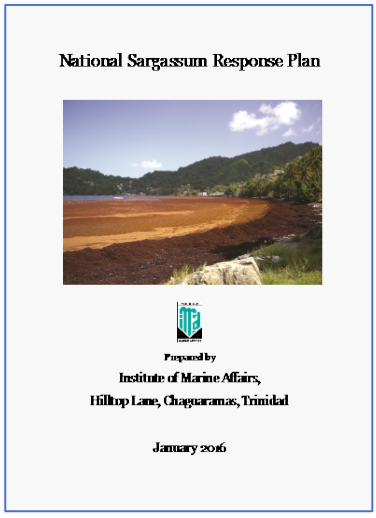
1.1 EXAMPLES OF RESOURCES FROM THE FAO/UWI 2018 SARGASSUM SYMPOSIUM

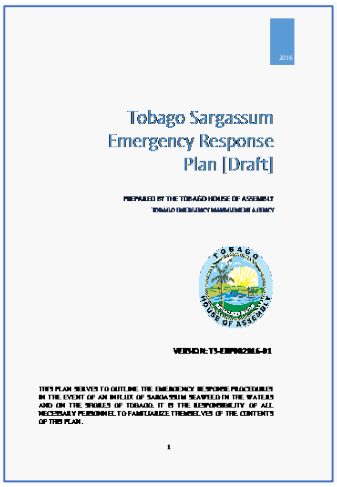
Click on image to visit website and/or download item

1.2 EXAMPLES OF SARGASSUM MANAGEMENT PLANS IN THE CARIBBEAN REGION

Click on image to visit website and/or download item







These are only a few examples. Sargassum stakeholders should all be encouraged to identify and add approaches and plans that are most relevant to the national need. This applies to most of the action appendices. Relying upon a single or a few means of updating will be inefficient and ineffective. This key message will not be repeated.

2 NATIONAL LEGISLATION AND ADMINISTRATION

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

3 INSTITUTIONAL ARRANGEMENTS FOR ADAPTATION

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.

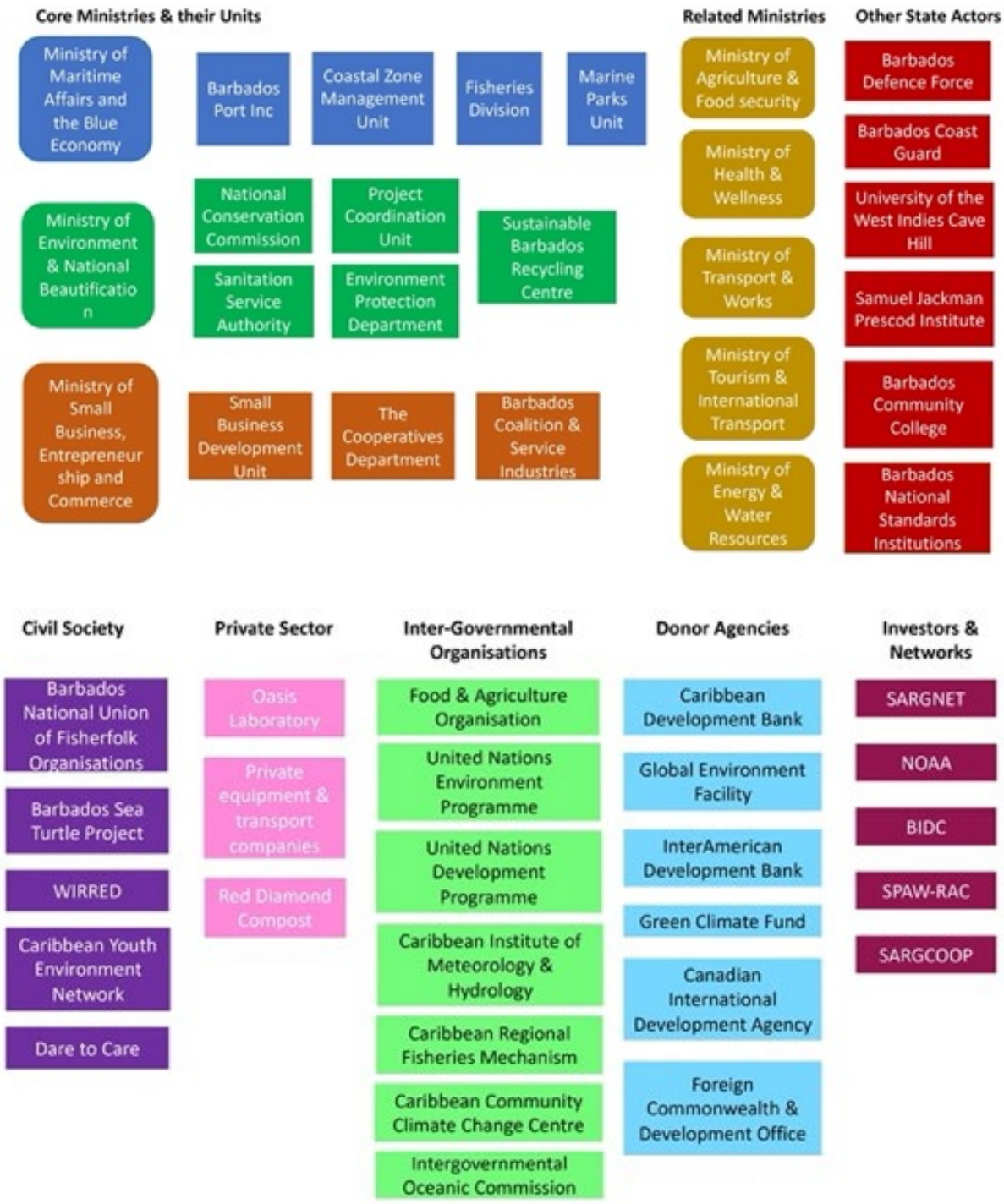
Although the above are well known to apply to many national intersectoral matters, not just sargassum, there are usually impediments to implementing them despite abundant guidance. An institutional arrangement for the SAMS must itself be adaptive to continuously improve. In Barbados, it is expected that 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) **MINISTRY OF MARITIME AFFAIRS AND THE BLUE ECONOMY (LEAD AGENCY FOR SAMS)**
   a) Core technical administrative staff … officers responsible for sargassum management
   b) Coastal Zone Management Unit … scientific-technical input from ocean to shore, MSP
   c) Fisheries Division … scientific-technical input, fishing industry engagement in all phases
2) **MINISTRY OF ENVIRONMENT AND NATIONAL BEAUTIFICATION**
   a) Core technical administrative staff … officers for overall environment, links to tourism
   b) National Conservation Commission … prioritized coastal clean-up, disposal, some uses
   c) Environmental Protection Department … all environmental impacts, uses, link to health
3) **MINISTRY OF SMALL BUSINESS, ENTREPRENEURSHIP AND COMMERCE**
   a) Core technical administrative staff … officers assist conditions enabling growth in uses
   b) Small Business Development Unit … support diverse, informed, financed, sustained use
   c) The Co-operatives Department … promote collectives for small enterprise use benefits
4) **OTHER STATE, PRIVATE SECTOR, CIVIL SOCIETY AND ACADEMIC ACTORS**
   a) Barbados Defence Force, private equipment and transport companies
   b) University, polytechnic, community college, secondary school actors
   c) Tourism, agriculture, energy, manufacturing, etc. commercial groups
   d) Health, communication, science, innovation, etc. supporting groups
   e) Youth, gender, wellness, social protection, etc. special interest groups
5) **EXTERNAL PARTNERS AND INTERESTS**
   a) International and regional technical assistance organisations (e.g. FAO)
   b) International and regional financial institutions (e.g. CDB, grant sources)
   c) International and regional investors and networks (e.g. SARGNET, NOAA)

The committee members, or preferably task force or working group, will be drawn from the above five categories, but only the first three need to be core members. With effective networking using information and communication technologies (ICT), all others should be easily accessible on a need basis. Commitment to participate through a memorandum of understanding could be advantageous. Membership or occasional engagement should not be onerous. The working group of about seven to nine core members should design flexible structure and operational procedures based on principles of good and effective governance for national intersectoral coordination[1]. The figure below illustrates the most relevant actors in the proposed

[1] Compton, S., P. McConney, I. Monnereau, B. Simmons and R. Mahon. 2020. Good practice guidelines for successful National Intersectoral Coordination Mechanisms (NICs): Second Edition. Report for the UNDP/GEF CLME+ Project (2015-2020). Centre for Resource Management and Environmental Studies, The University of the West Indies, Cave Hill Campus, Barbados. CERMES Technical Report. No. 88 2nd edition. 21pp.

institutional arrangements for adaptation to sargassum influxes. Their interactions are dynamic and cannot be easily shown on a two-dimensional image.



3.1 ROLES OF STAKEHOLDERS IN MANAGEMENT PLAN IMPLEMENTATION

(Example extracted from Sealys and Felix (2017))

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

(Example extracted from Ramlogan et al. 2017)

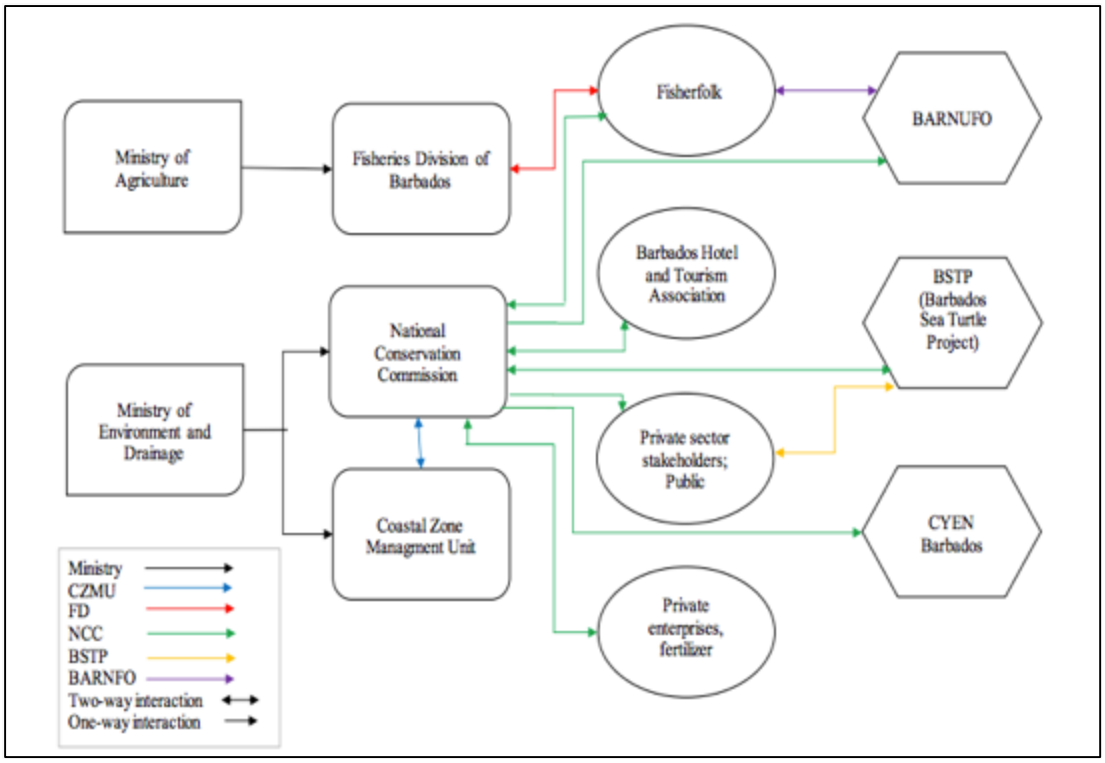


Diagram showing relationships between different stakeholders at different levels in the management of the sargassum influx in Barbados, in 2017.

4 CONSIDERATIONS FOR MONETARY MATTERS

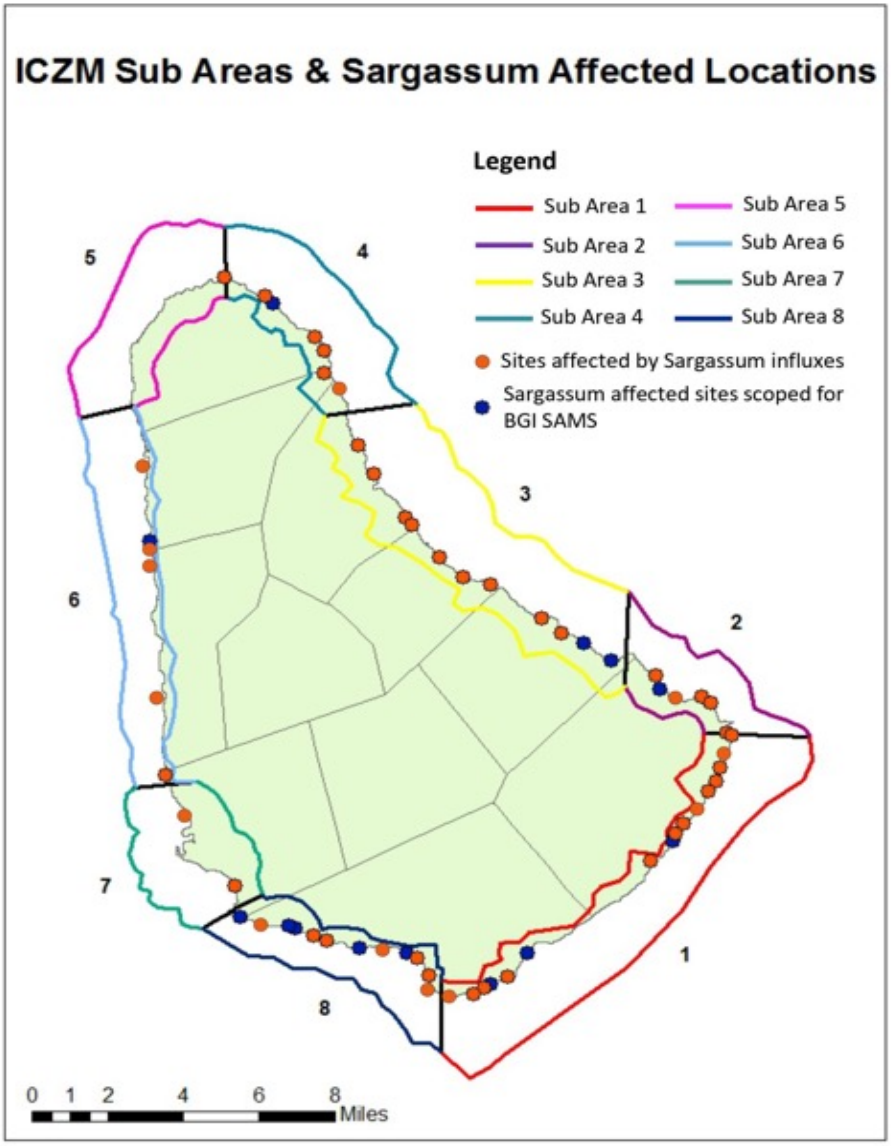
4.1 FINANCING THE BARBADOS SAMS

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.

ITEM	RESPONSIBLE AGENCY	UNITS AND NOTES	COST (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

5 SARGASSUM HAZARD 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 preliminary 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.

The table below outlines a summary of the characterisation and an assessment of the exposure and vulnerability of each sub-area. The 13 sites assessed in a rapid scoping exercise were highlighted in their relevant sub-areas.

SUB-AREA	**CHARACTERISATION**	**AREA EXPOSURE, VULNERABILITY & SITE PROFILES**
1 - South Point to Kitridge Point	Coast - mostly barren cliff top interspersed with pocket beaches Marine Environment - Cobblers Reef/Fathom Reef complex lies parallel to shore. This complex is important for local biodiversity conservation programmes. Wave action from the east drives sediment movement shoreward and to the southeast. Refraction around Kitridge Point causes a clockwork gyre whose effects can be felt further south. Land use – mainly residential fringed by a natural heritage conservation area. There is also some agriculture, tourism, business sectors, manufacturing and trade centres along this stretch, as well as some undeveloped land. Activities– Fishing for lobster and shallow reef fishing takes place offshore and occasionally, seine netting for coastal pelagic fish.	HIGH Moderate – some areas of the subsection are remote and undeveloped while other areas are used frequently by tourists and locals. See Crane Beach, Long Beach, Silver Sands
2 - Kitridge Point to Conset Point	Coast – Rocky coastline dominated by uplifted marine terraces. Ragged Point & Skeete's Bay are the main landscape features of the coastline. Marine environment – Nearshore consists of coral rubble, algal pavement and gorgonian pavement, with the latter being of conservation importance. Sediment movement is predominantly to the north.	HIGH High – Nearby residential communities are affected by the unpleasant smell of the decomposing sargassum & associated health impacts. See Skeete's Bay

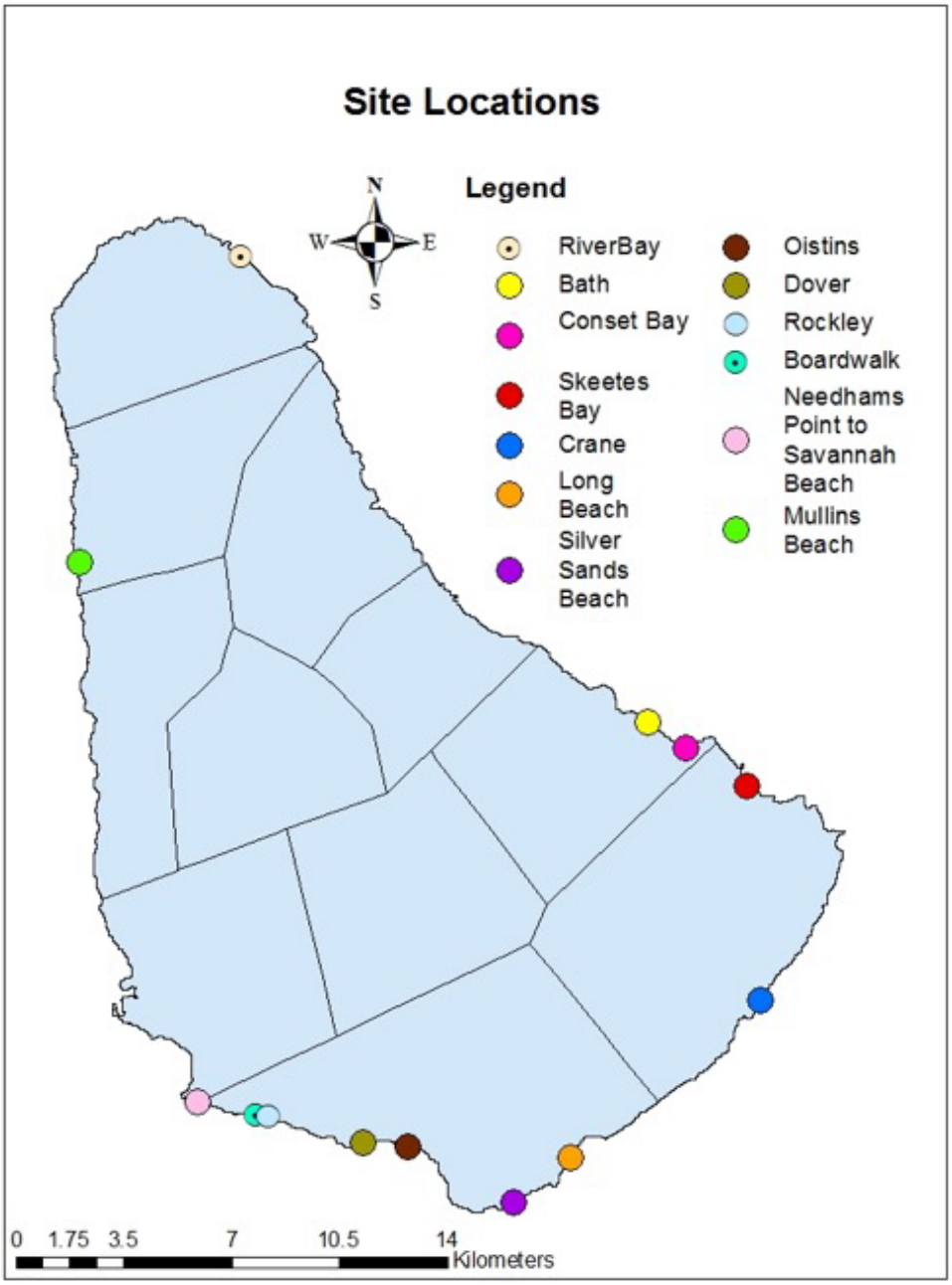
SUB-AREA	CHARACTERISATION	AREA EXPOSURE, VULNERABILITY & SITE PROFILES
	Land use – predominantly rural area; coast backed with agricultural land Activities– Previously, Skeete's Bay was a popular fish landing site with a fish market, however, the market is now closed & little fishing activity occurs.	
3 (Conset Point to The Choyce)	Coast – coastline is within the boundary of the proposed National Park. Mix of woodland, cliff scenery, bays, beaches and upland areas. Marine environment – Nearshore dominated by sand except for a small area of gorgonian pavement. The predominant direction of marine sediment movement is onshore and north west. Land use – mostly rural with coast backed by agricultural land Activities – Conset Bay & Tent Bay are important locations for fishing. There are also popular recreational and picnic areas with some tourist activity.	HIGH High – Affects livelihoods dependent on fisheries May also affect the use of bay houses & recreational areas along this stretch See Bath, Conset Bay
4 (The Choyce to North Point)	Coast- Characterised by cliff, interspersed by a number of small bays & pocket beaches. Within the boundary of the proposed National Park. Marine environment – coral rubble, algal pavement & gorgonian pavement. Large submarine canyon acts as a sediment sink trapping material transported by currents southwards. Land use – Mainly rural with some agricultural land. Informal recreational spots in some areas.	HIGH High – At River Bay, the sargassum often stagnates in the bay. This reduces the usability of the bay to locals. Additionally, the nearby communities are affected by the smell & associated health impacts of decomposing sargassum See River Bay

SUB-AREA	CHARACTERISATION	AREA EXPOSURE, VULNERABILITY & SITE PROFILES
5 (North Point to Maycock's Bay)	Coast - Mostly cliff top but with coastal vegetation Marine environment- Coral reefs are present in the southern part of the subarea. This area has the richest marine faunal communities in the Plan area. Sediment is driven southward due to wave refraction around North Point. Land Use – Small-scale agriculture & residential Activities - Cement plant & associated quarry in southern section	LOW Low – Seldom affected by influxes Not yet profiled
6 (Maycock's to Batts Rock Bay)	Lower reef terraces of coral rock fringed by sandy beaches, modern dune deposits & rubble strewn foreshore Coast - Shoreline is relatively straight & characterized by generally narrow, arcuate beaches located within numerous small bays, commonly separated by fringing reef headlands. Folkestone Marine Park located within this subarea. Marine environment – Fringing reefs (100-200m offshore) and bank barrier reef parallel to coast (800-1000m offshore) Tidal currents move north to south off coast, moving southwards during rising tides and northwards during falling tides Land use – tourism on the coast & residential further inland. Population density is highest in Speightstown & Holetown and increases with greater proximity to Bridgetown.	MEDIUM High – Although the West Coast has seldom been affected by sargassum influxes, social and ecological features make them extremely vulnerable. Beach access is severely limited and may be a hindrance to cleanup operations. See Mullins
7 (Batt's Rock to Needham's Point)	Coast - Orientation of coast changes in this subarea from west facing to south-west facing. Shoreline has been altered to create a deep water harbour.	LOW (with some intermittent moderate influxes) High – potentially affecting the navigation of vessels when entering

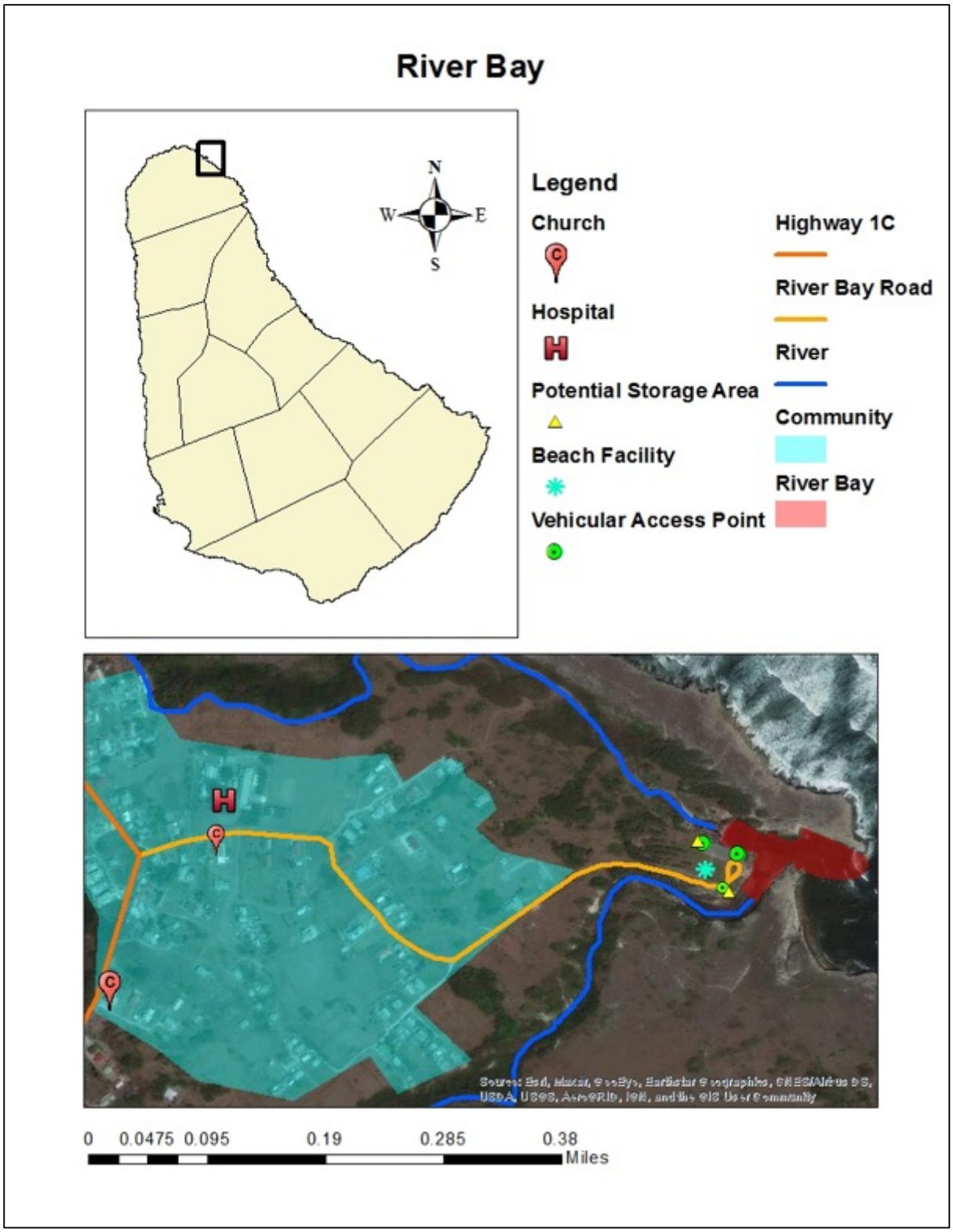
SUB-AREA	CHARACTERISATION	AREA EXPOSURE, VULNERABILITY & SITE PROFILES
	Marine environment – The nearshore environment is made up of rubble & sand, often intermixed with seagrass, algae & eroded Elkhorn coral. Linear bank reefs are present further offshore. Sediment transport direction is southerly off the west coast & southerly off the south-west coast. Land use - Most extensive & concentrated area of coastal development in Barbados. Dominated by the conurbation of Bridgetown, the national centre of the country. Popular recreational beaches are located within this subarea.	the harbour and shallow draught. May also affect recreational use of beaches Not yet profiled
8 (Needham's Point to South Point)	Contains one of the last remaining coastal wetlands in Barbados, comprising an extensive inland swamp, a large beach area, seagrass beds and an offshore reef complex. It has been designated as a Natural Heritage Conservation Area and National Attraction. Coast – The shore is fringed by sandy beaches interspersed with coral cliffs. Most beaches occur in conjunction with coast protection structures, typically shore-perpendicular groynes. Marine environment - Extensive patches of seagrass Sediment transport direction is predominantly westward. Land Use - Extensively developed urban corridor Mixed land use; tourism, residential and Oistins urban centre. Activities – Oistins is home to one of the main fish landing sites and fish markets on the island.	HIGH High – Affects fishing activity at Oistins and use of beaches frequented by tourists & locals See Needham's Point to Savannah Hotel, The Boardwalk, Rockley Beach, Dover Beach, Oistins

6 SARGASSUM STRANDING SITE MAPS AND LOCATION PROFILES

Barbados has been heavily impacted by sargassum on the east, south east and south coasts of the island. 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.



6.1 River Bay


River Bay
N
W
E
S
Legend
Church
Hospital
Potential Storage Area
Beach Facility
Vehicular Access Point
Highway 1C
River Bay Road
River
Community
River Bay
0 0.0475 0.095 0.19 0.285 0.38
Miles

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 INNUNDATIONS	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	

DATE	SUMMARY OF INNUNDATIONS	SUMMARY OF RESPONSES
25 August 2016	High volume of sargassum present in the bay and in the river channels	
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	

DATE	SUMMARY OF INNUNDATIONS	SUMMARY OF RESPONSES
06 September 2018	In some areas of the bay the sargassum was light, in others there was a moderate amount	
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

DATE	SUMMARY OF INNUNDATIONS	SUMMARY OF RESPONSES
• 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:

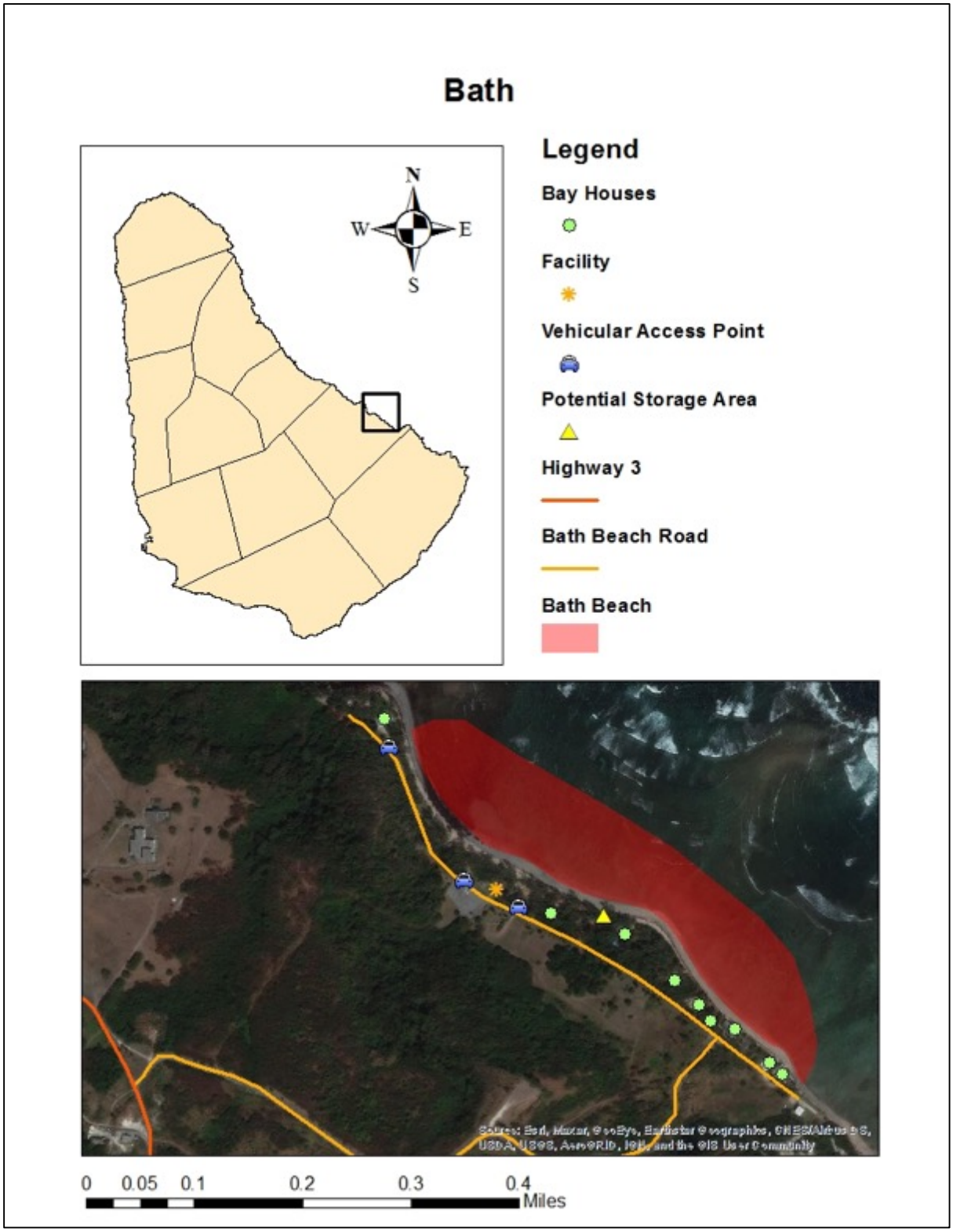
River Bay has been one of the most significantly impacted areas since the advent of mass sargassum inundation. The presence of freshwater promotes the anaerobic degradation of sargassum and the prevailing winds carry the smell to the nearby community which is upwind. The use of the bay has declined significantly. 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)

6.2 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 INNUNDATIONS	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 INNUNDATIONS	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	

DATE	SUMMARY OF INNUNDATIONS	SUMMARY OF RESPONSES
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
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

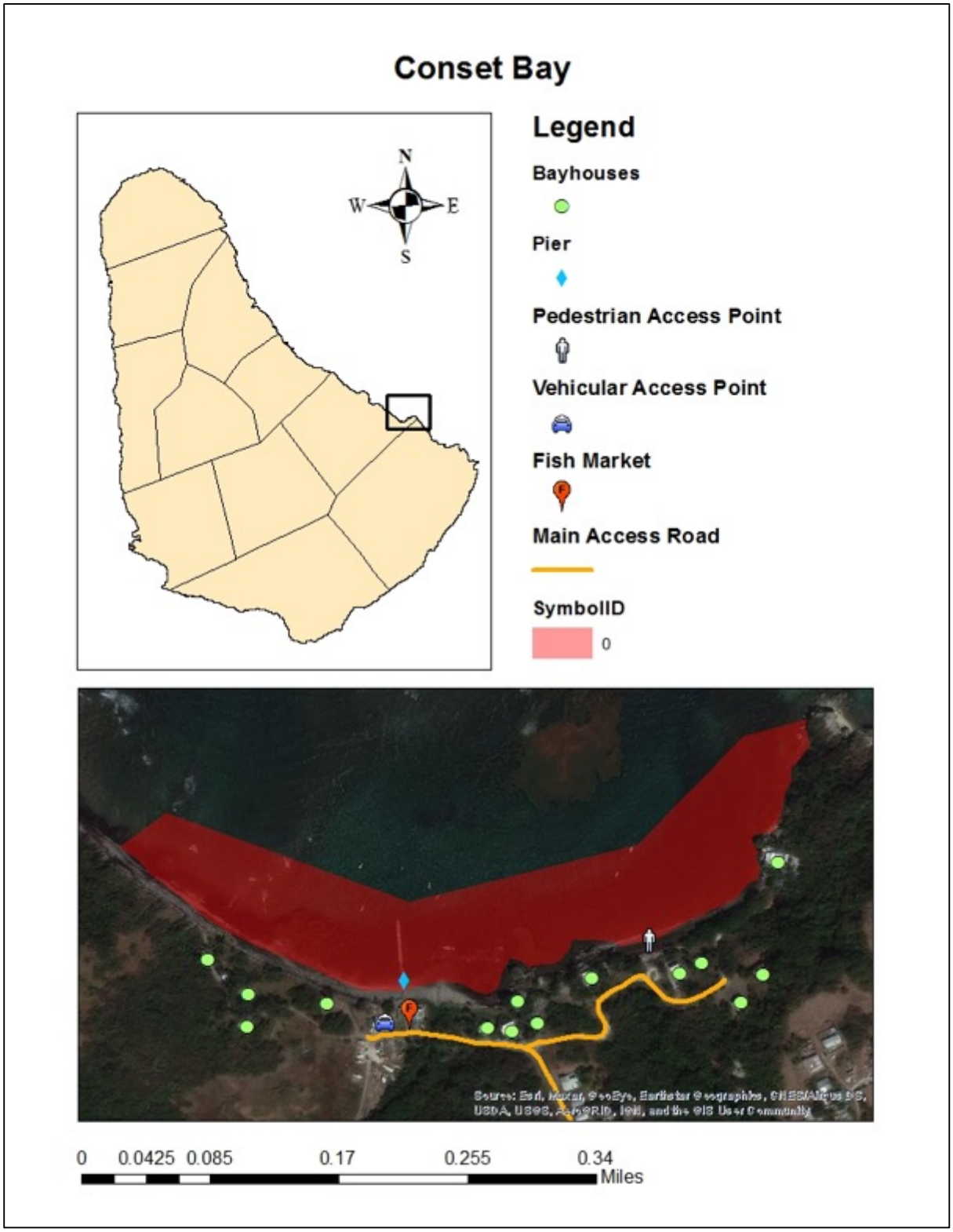
Overall comments on vulnerability and resilience:

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)

6.3 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 INNUNDATIONS	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	

DATE	SUMMARY OF INNUNDATIONS	SUMMARY OF RESPONSES
18 July 2018	Moderate amount of fresh sargassum in the bay	
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.

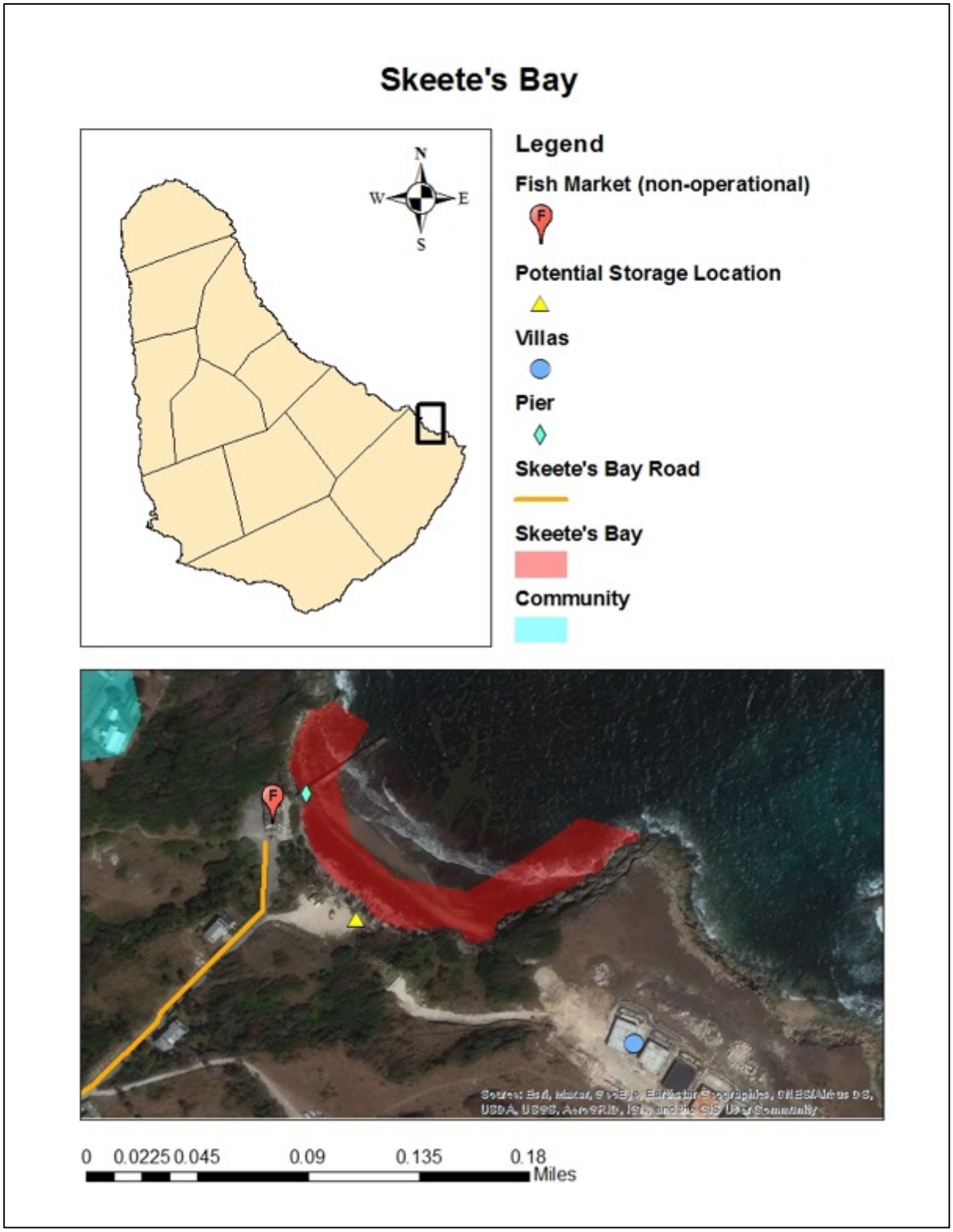
Many of the fishermen have found ways to mitigate the negative impacts of sargassum on their vessels and operations. The presence of the jetty also allows boats to continue to land their catches while there is low – high volumes of sargassum in the bay. The community demonstrates **MEDIUM/ MODERATE resilience**.

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)

6.4 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 INNUNDATIONS	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 INNUNDATIONS	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

DATE	SUMMARY OF INNUNDATIONS	SUMMARY OF RESPONSES
• Worst month in recent memory was June • 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 though 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

Vulnerability factors	
Volume of sargassum historically (2011 – present)	High
Is the beach heavily used by locals?	No
Is the beach heavily used for tourism?	No
Evidence of resilience	
Is there evidence of community efforts to clean-up?	No
Is there evidence of community efforts to use sargassum?	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)

6.5 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	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
04 June 2018	Extremely high volume of sargassum stranded overnight on the beach and filled the nearshore areas	
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

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
April 2019	Very high volume of sargassum on the beach and in the nearshore areas	Cleaned manually by resort staff
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 be 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.

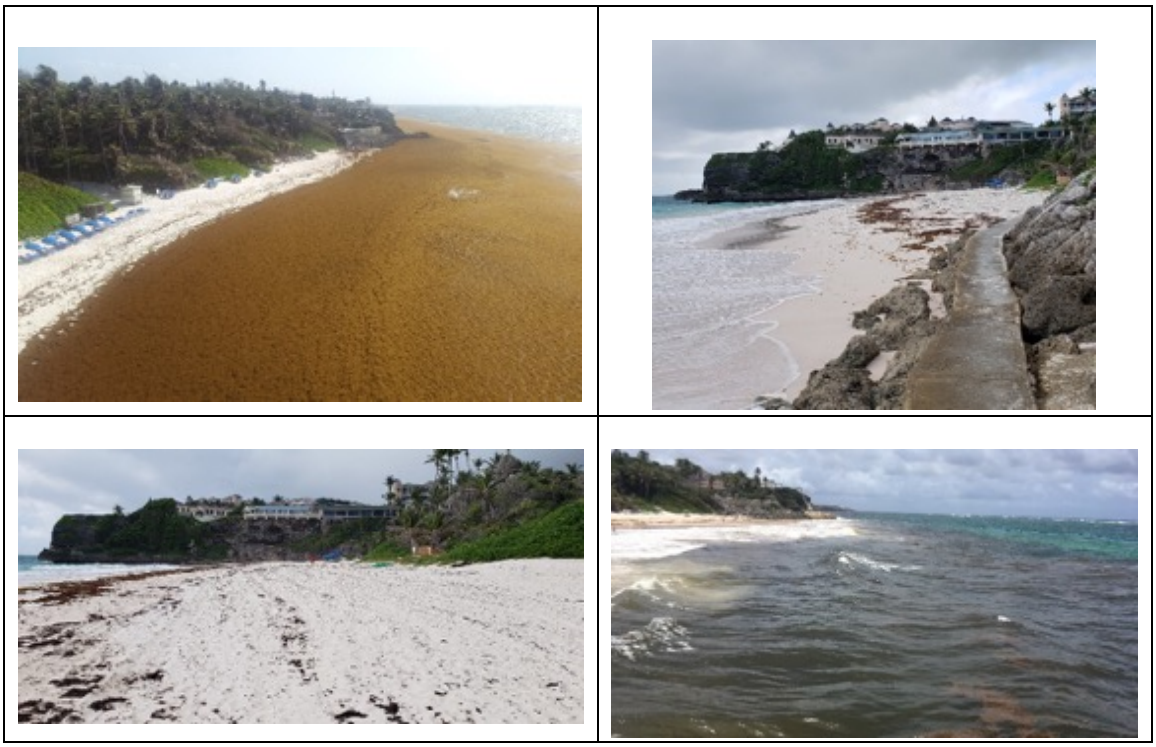
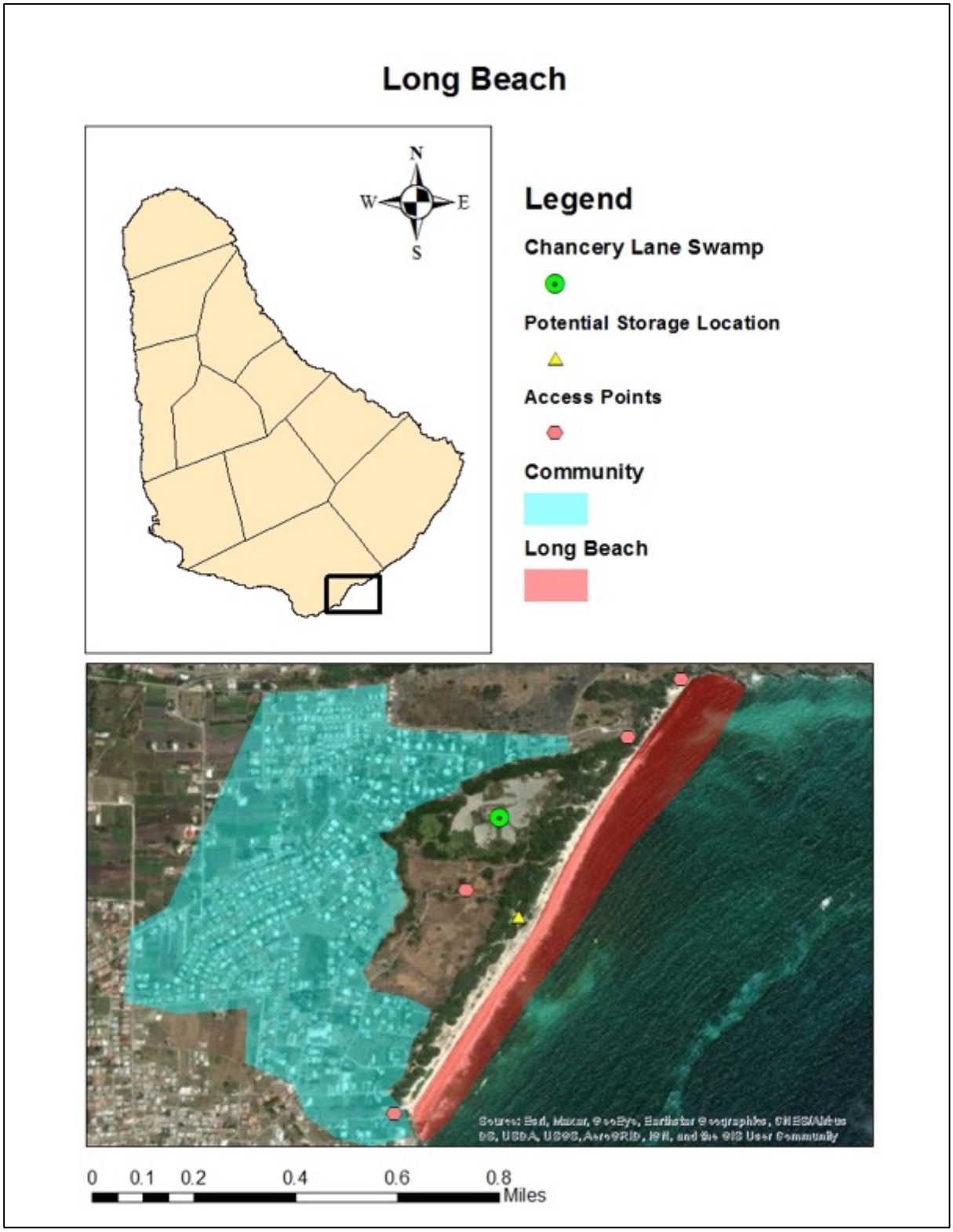


Photo Credits: Top Left Carla Daniel (June 2018), Top Right Carla Daniel (2018)

Bottom Left – Carla Daniel (2020), Bottom Right – Hazel Oxenford (June 2019)

6.6 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

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
		and Works (MTW) and NCC. Approximately 23 loads removed
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

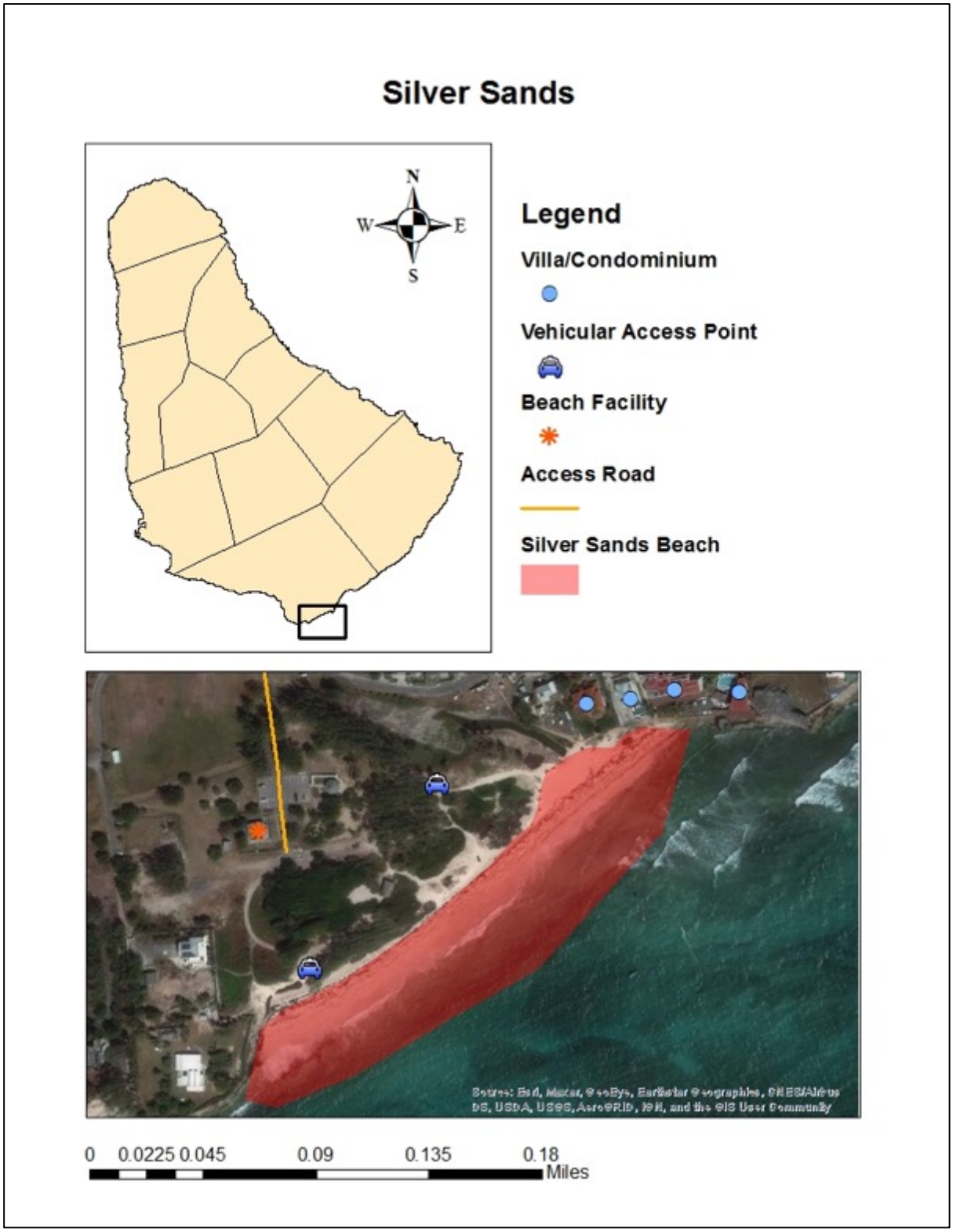
Overall comments on vulnerability and resilience:

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)

6.7 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

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
25 June to 02 July 2018	Moderate amount of sargassum present	Cleaned by the BDF and NCC
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		

DATE	SUMMARY OF IMPACTS	SUMMARY OF 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		

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

Vulnerability factors	
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

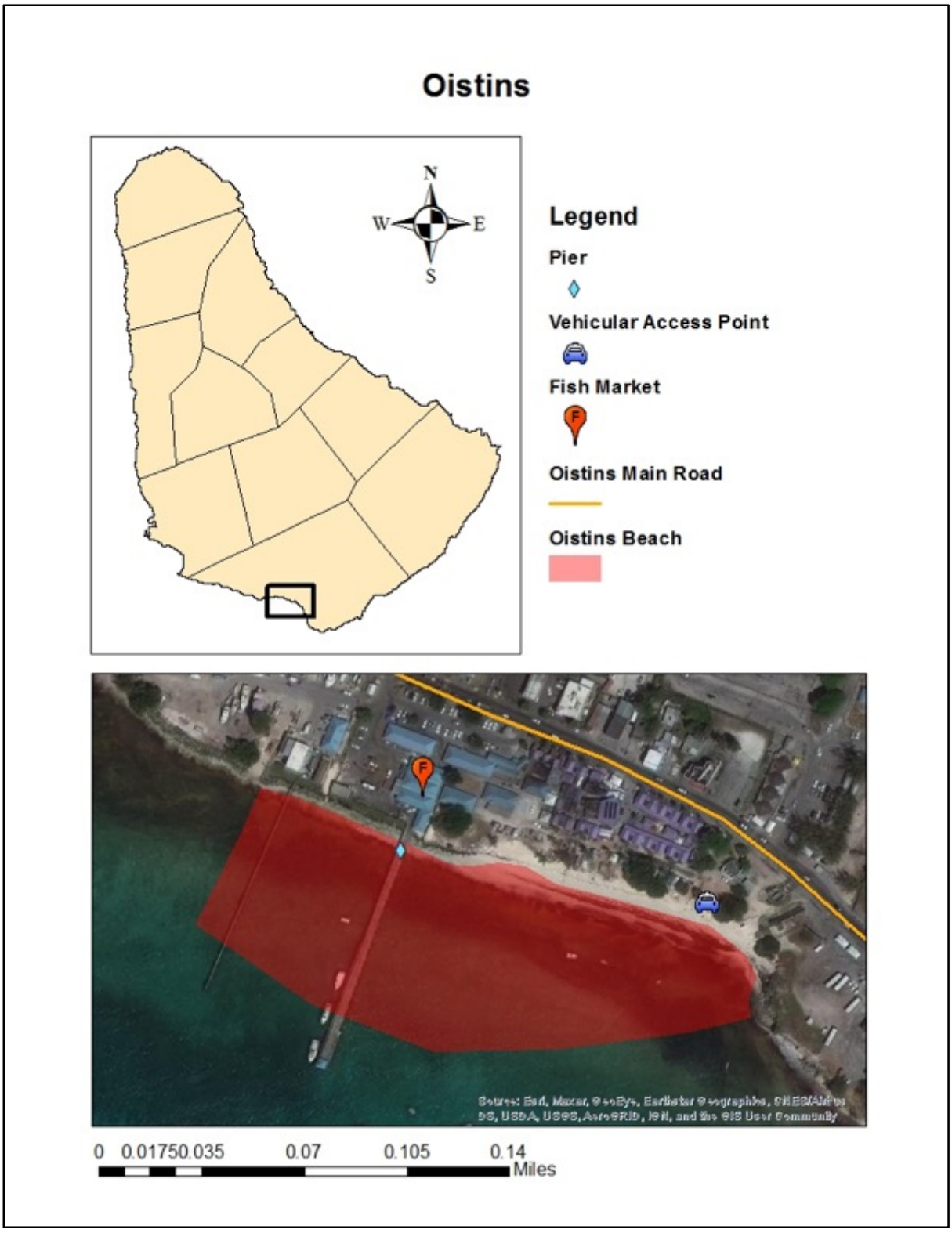
Overall comments on vulnerability and resilience:

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)

6.8 OISTINS


Oistins
N
W
E
S
Legend
Pier
Vehicular Access Point
Fish Market
Oistins Main Road
Oistins Beach
0 0.01750.035 0.07 0.105 0.14
Miles

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

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
07 July 2018	Light to moderate volume of old sargassum present	
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

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
• 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 • 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.

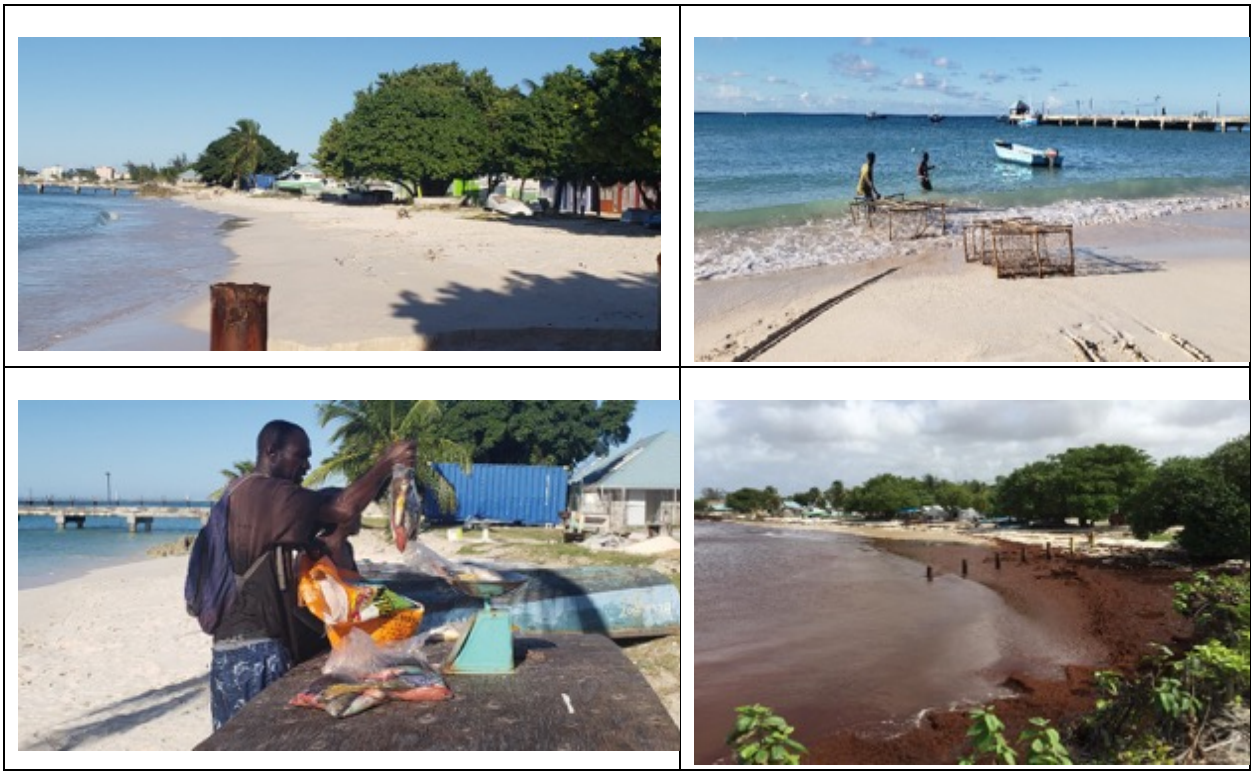
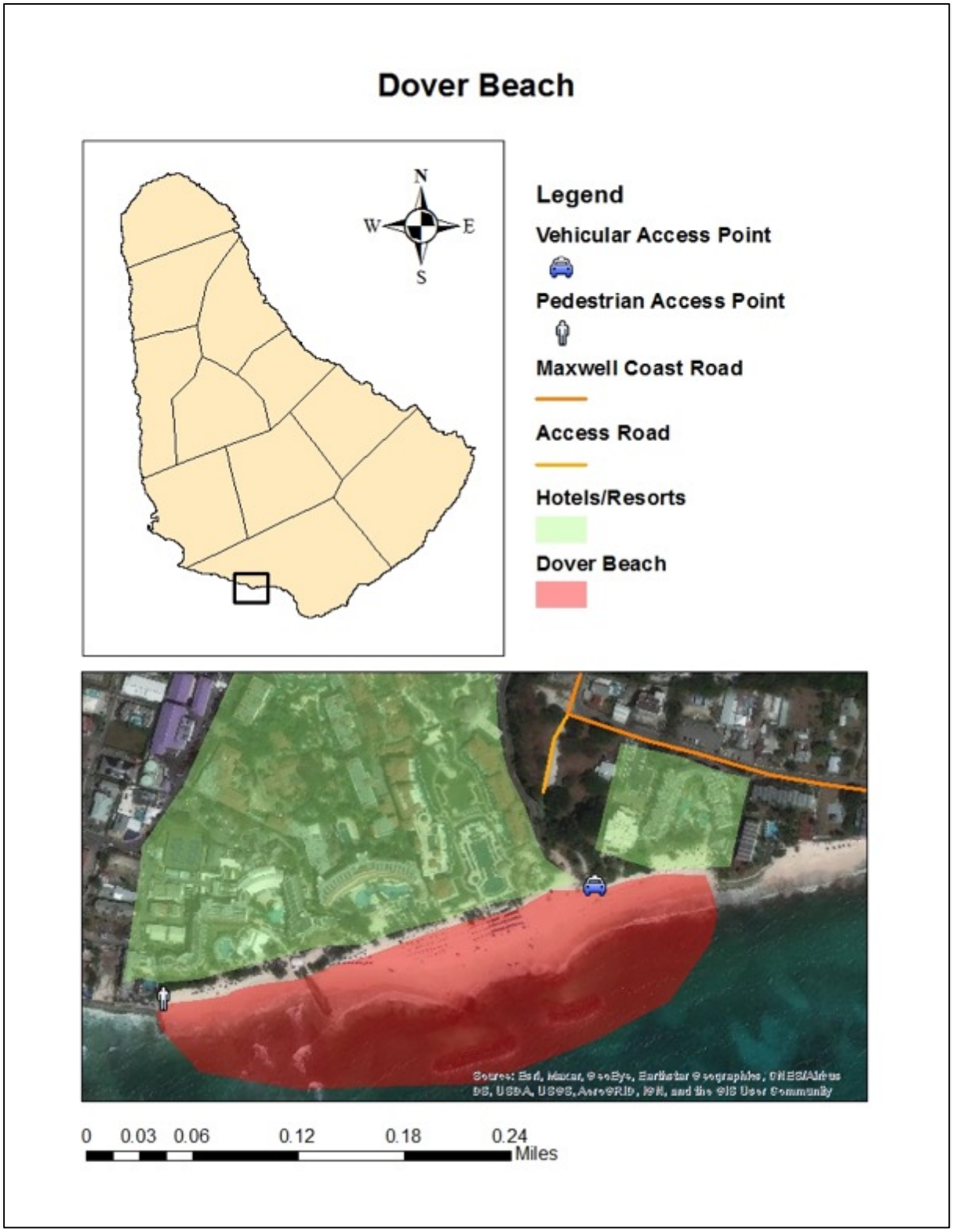


Photo credit: Top left- Carla Daniel (2020) | Top right- Carla Daniel (2020)
Bottom left Carla Daniel (2020), Bottom right – John Webster (July 2018)

6.9 Dover Beach | Graveyard Beach | Cemetery Beach | Churchyard 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

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
January 2019	No sargassum present	
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

Vulnerability factors	
Volume of sargassum during scoping assessment	None
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

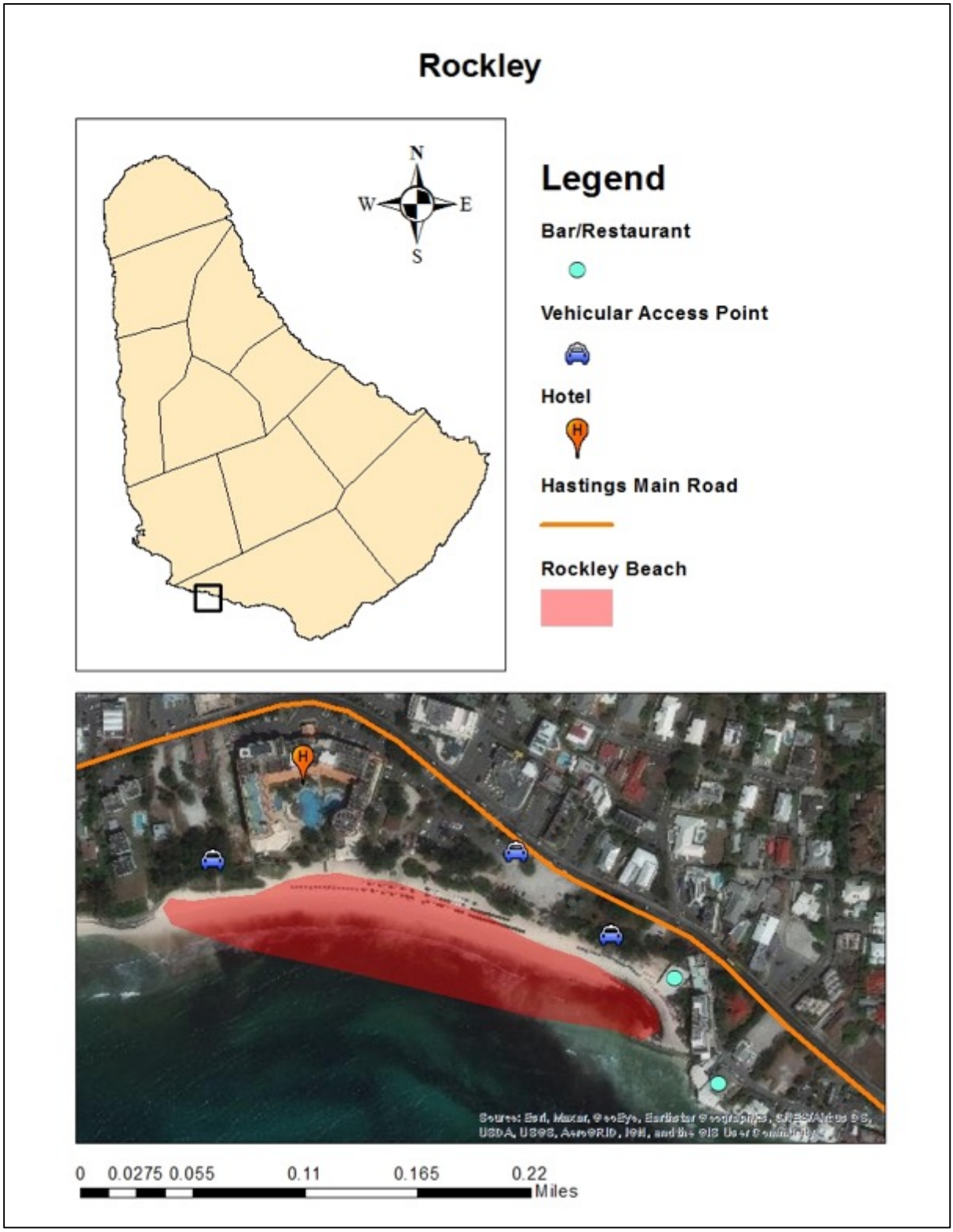
Overall comments on vulnerability and resilience:

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)

6.10 Rockley


Rockley
N
W
E
S
Legend
Bar/Restaurant
Vehicular Access Point
Hotel
H
Hastings Main Road
Rockley Beach
0 0.0275 0.055 0.11 0.165 0.22
Miles

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

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
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
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
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

Vulnerability factors	
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

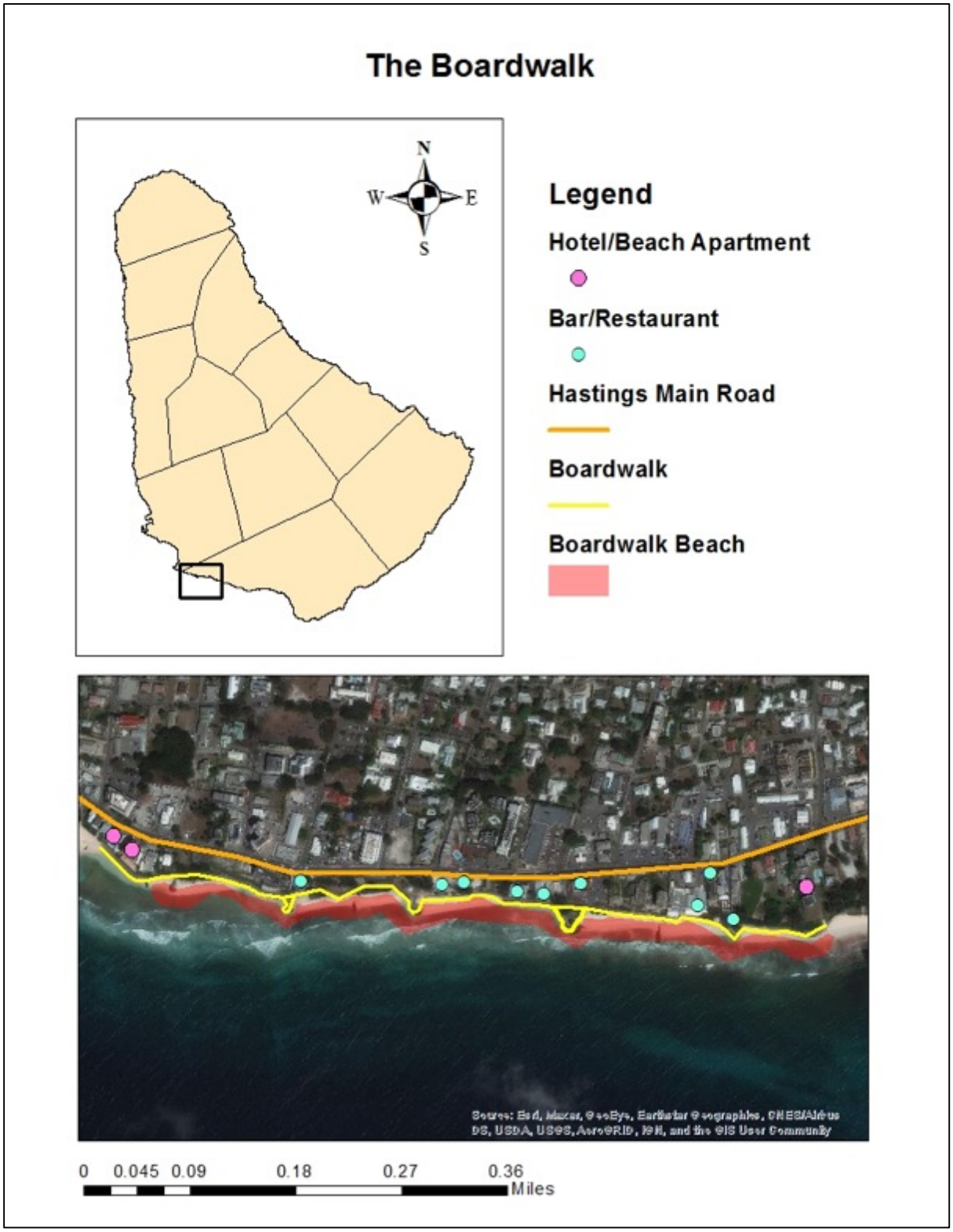
Overall Comments on vulnerability and resilience:

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)

6.11 Richard Haynes Boardwalk | South Coast 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	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
09 October to 29th November 2018	Sargassum remnants present	
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.

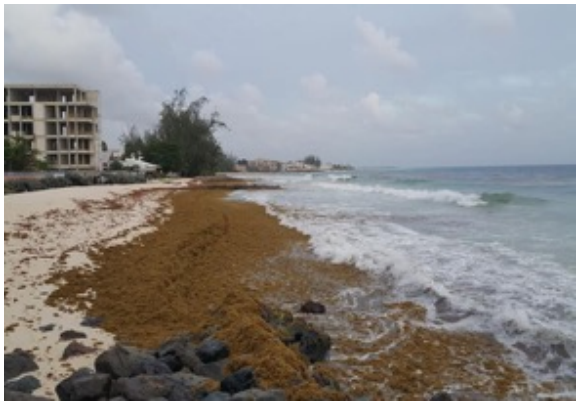





Photo credit: Top left- Carla Daniel (April 2019) | Top right- Carla Daniel (April 2019)
Centre Left – Carla Daniel (December 2019), Centre right – Carla Daniel (May 2020)
Bottom left and right Carla Daniel (May 2020)

6.12 NEEDHAMS POINT TO SAVANNAH HOTEL

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	

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
8-9 June 2018	Savannah – Moderate sargassum present	Cleaned manually by hotel staff
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

DATE	SUMMARY OF IMPACTS	SUMMARY OF RESPONSES
GENERAL IMPACTs/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)	These 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

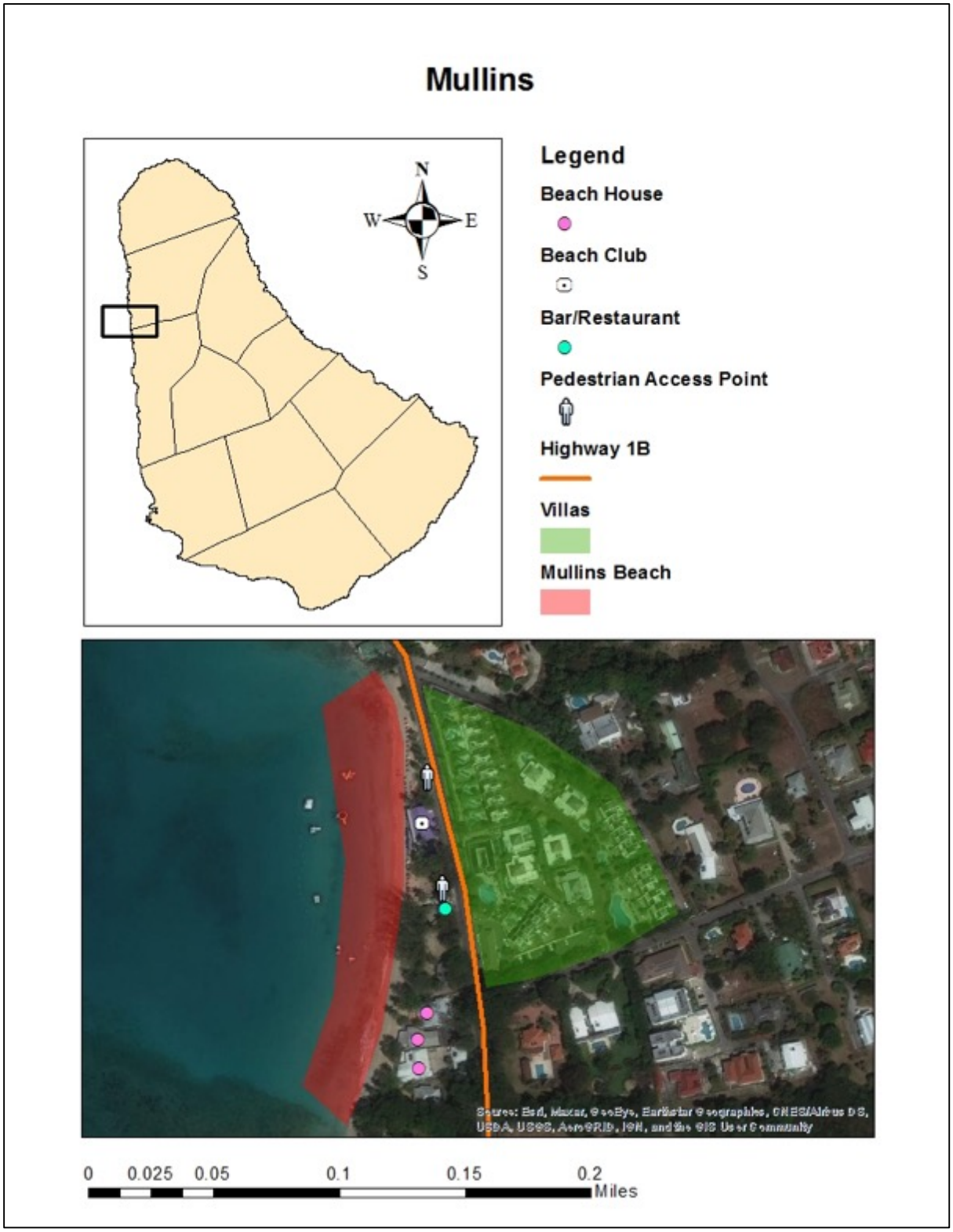
Vulnerability factors	
Is the beach heavily used by locals?	Moderately used
Is the beach heavily used for tourism?	Sections of it are, primarily in-front of the 2 hotels
Evidence of resilience	
Is there evidence of community efforts to clean-up?	Yes
Is there evidence of community efforts to use sargassum?	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)

6.13 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

Vulnerability factors	
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.**

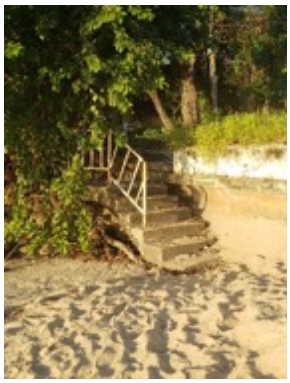




Photo credit: Carla Daniel (December 2020)

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 reference 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
- 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 KEY SARGASSUM CONTACTS

	NAME	POST	ORGANISATION	EMAIL
1.	Kevin Lorde	Research Officer	MMABE	kevin.lorde@barbados.gov.bb
2.	Joyce Leslie	Chief Fisheries Officer	Fisheries Division	joyce.leslie@barbados.gov.bb
3.	Richard Suckoo	Marine Biologist	CZMU	rsuckoo@coastal.gov.bb
4.	Ann-Marie Eversley	Senior Marine Pollution Officer	EPD	ann-marie.eversley@epd.gov.bb
5.	Ryan Als	General Manager	NCC	ryan.als@barbados.gov.bb
6.	Col. Glyne Grannum	Chief of Staff	BDF	grannum.g@bdf.gov.bb
7.	Commander Mark Peterson	Commander of the Barbados Coast Guard	BCG	COBCG@bdf.gov.bb
8.	Carl Alf Padmore	Public Relations Officer	SSA	carl.padmore@ssa.gov.bb
9.	Patrick McConney	Director	UWI-CERMES	patrick.mcconney@gmail.com
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11.	Janice Cumberbatch	Lecturer	UWI-CERMES	janice.cumberbatch@cavehill.uwi.edu
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17.	Anne Desrochers	PhD Candidate	UWI-CERMES	anne.desrochers@gmail.com
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18.	Legena Henry	Lecturer	UWI	Legena.henry@cavehill.uwi.edu

	NAME	POST	ORGANISATION	EMAIL
19.	Nikolai Holder	Research Scientist	UWI	nikolai.holder@gmail.com
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21.	Kemar Codrington	Entrepeneur/Chemist	Oasis Laboratory	sustainable@oasislaboratory.com
22.	Vernel Nicholls	President	BARNUFO	vernel.nicholls@gmail.com
23.	Kerri-Ann Bovell	Entrepeneur	UWI Affiliated/Entrepreneur	kerri-ann.bovell@mycavehill.uwi.edu
24.	Mark Hill	Entrepeneur	Biogen	markhill@thinkdesignbarbados.org
25.	Joshua Delmas	Entrepeneur	Barbados Game Fishing Association	joshua.delmas@gmail.com
26.	Joshua Forte	Entrepeneur	Red Diamond	info@reddiammondcompost.com
27.	Kerry Allen	Research Officer	Ministry of Tourism and International Transport	allenk@tourism.gov.bb
28.	Rudy Grant	CEO	BHTA	rudyg@bhta.org
29.	Petra Roach	Interim CEO	BTMI	petrar@visitbarbados.org
30.	Denise Carter-Taylor	Senior Communications Officer	Ministry of Health and Wellness	denise.cartertaylor@health.gov.bb

9 ACTION AND OPERATION GUIDELINES

There are a large number of diverse, evolving and sometimes conflicting guidelines from national to global sources on appropriate sargassum-related actions and operations. This section sets out only a small sample.

9.1 RESOURCES FOR RESPONSIBLE RESPONSES

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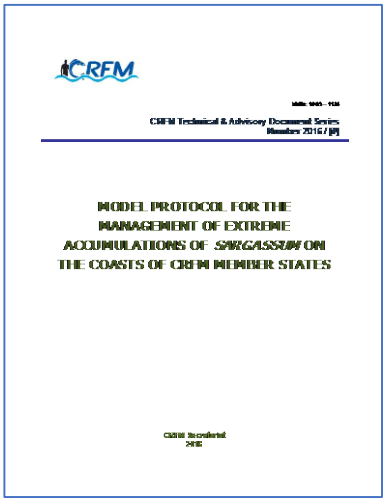
<td> 
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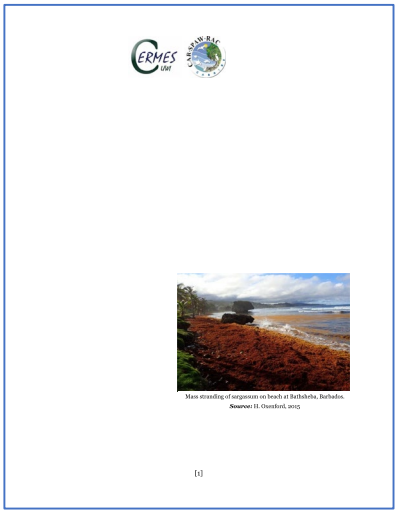
<td>  </td>
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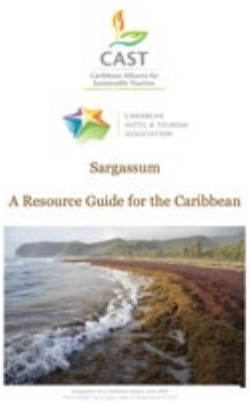
<td> 
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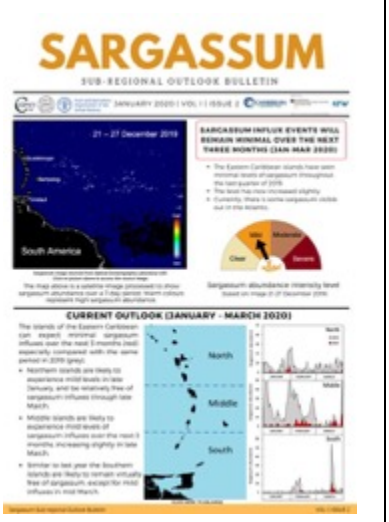

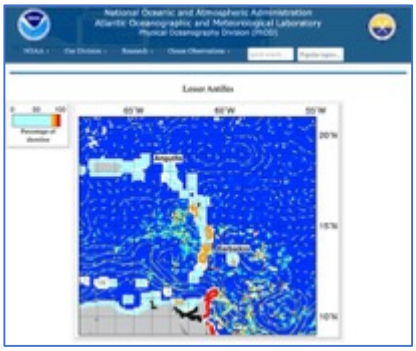

9.2 SARGASSUM MONITORING AND DETECTION

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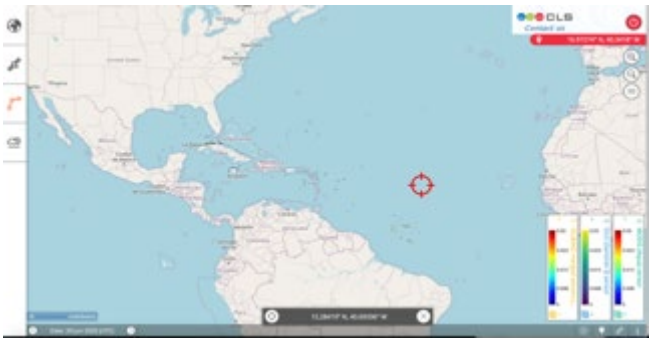
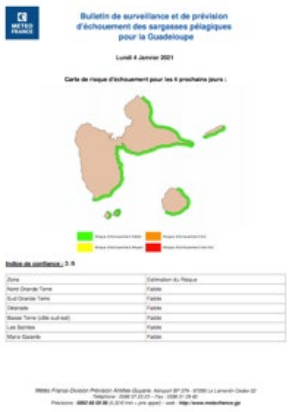
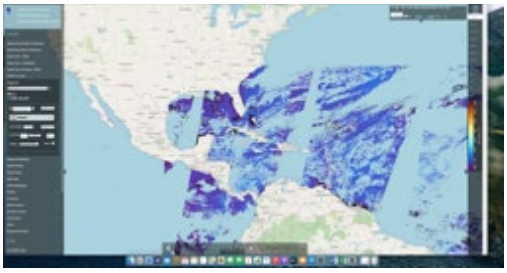






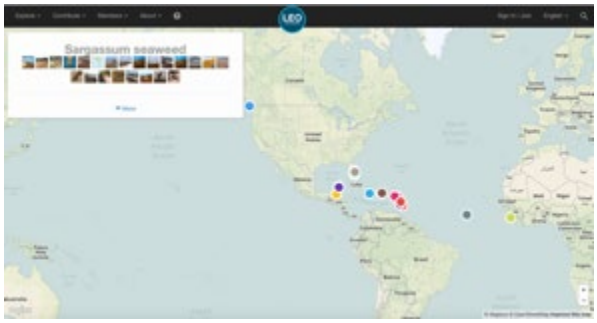
9.3 SARGASSUM MONITORING AND REPORTING

There are a few existing platforms that monitor sargassum influx events and collect reports of sargassum strandings. These initiatives are important for ground truthing influx events and validating forecasts. This section features platforms that are frequently used by citizen scientists.

Click on image to visit website and/or download item. Check for relevance and update prior to use.

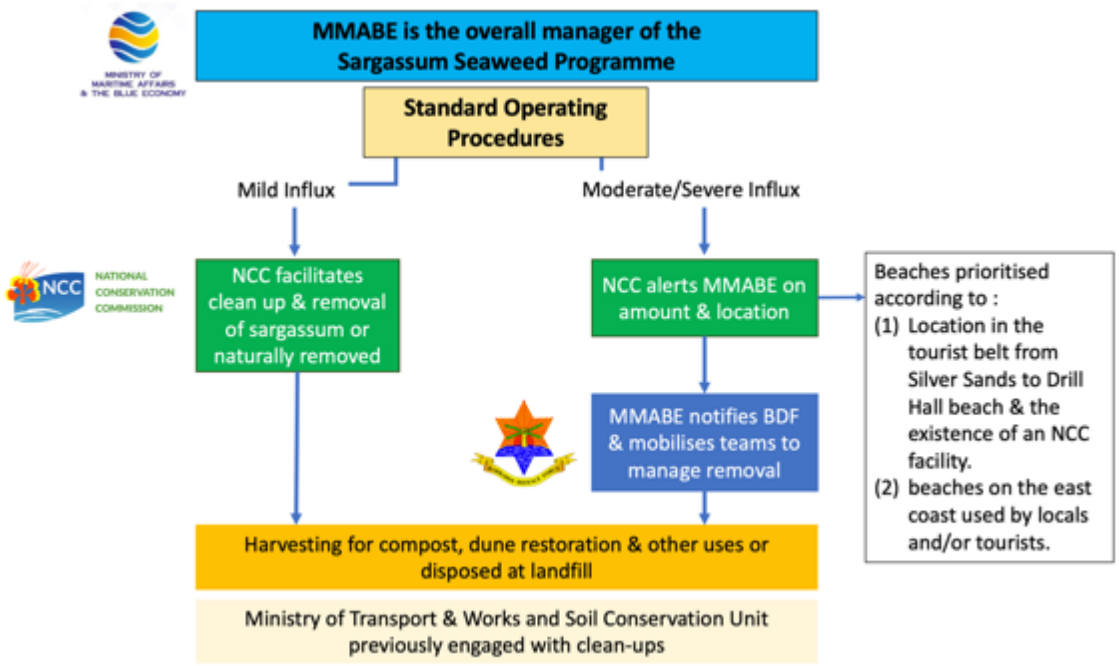
epicollect5


Sargassum Monitoring
2020 Sargassum - Sargasses - Sargazo
LANGUAGE


Sargassum seaweed

9.4 MANAGEMENT OF SARGASSUM BASED ON SITUATION SEVERITY

The figure below illustrates the existing standard operating procedures enacted by the MMABE based on the severity of the influx event.



Recommendations outlined below offer more specifics actions to be taken at the community level based on the situation severity.

(Adapted from Sealys and Felix (2017))

- ✓ The following proposed actions are community- based and will not be possible if each target site does not have a committed team of community groups that are willing to volunteer their time and effort towards cleaning up the beaches.

- ✓ It is acknowledged that each affected community will require equipment support, some training, assistance in removing and transporting aggregated material from the beaches.

- ✓ All equipment needed to maintain the beaches should be maintained by the community counsel or suitably identified Government Agency.

- ✓ It is also imperative that the Sanitation Service Authority (SSA) identify and or create appropriate disposal sites for the decomposing, salt laden seaweed. These sites should be as close to the communities as is possible to keep transportation costs to a minimum.

- ✓ Where possible, the costs of routine transportation of the sargassum to the dump sites should be incorporated into the 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.

Assess the situation first to determine if conditions are:

I. **Mild** – just a small amount of sargassum. Sparse, less than 2 inches in depth. Faint sea weed odor. Covers less than 50% of beach surface.
II. **Moderate** – About 6 – 9 inches in depth. Covers more than 60% of beach surface. Strong odor, several insects.
III. Or **Severe** – more than 10 inches with 80% or more beach surface area. Pungent odour.
IV. **Critical** - > 10 inches, 100% coverage. Significant impairment of movement of vessels and use of beachfront.

Response to Onshore Accumulation: Based on Severity of Influx

BLUE **Mild**	**YELLOW** **Moderate**	**GREEN** **Severe**	**ORANGE** **Critical**
Leave the material on the beach to decay. Ignore any floating Sargassum.	Remove material manually with rakes. Relocate the material without burying to the back of the beach or nearby vegetation. Bury in trenches or drains. Compile the material on dunes. Ignore material in the water.	Remove material manually with rakes. Dispose inside or outside of the area/beach. Aggregate the material on dunes. Where several beaches are involved, coordinate removal and use trucks to collect for disposal. Select a site where a trench can be dug and bury Sargassum (a depth of 5-6 feet /1.5 – 2.0 m is recommended). The site should be approved by the SSA.	Use a tractor with shovel. This method may be used when the accumulated quantity exceeds 10 inches. The shovel of the tractor will be used to **scrape** not **dig** the material off the sand. The shovel must not be buried in the sand at any time. Sargassum should be trucked away and buried in a specially selected area which has been designated by the SSA Area selection must be based on an environmental impact study.

BLUE Mild	YELLOW Moderate	GREEN Severe	ORANGE Critical
		Use scoop nets or a small seine, and rakes to remove excess Sargassum from the near shore waters.	Engage fishers to use a seine net to remove Sargassum from the water.

9.5 RECOMMENDED WAYS TO ADDRESS SARGASSUM INFLUXES OFFSHORE

(Extracted from Sealys and Felix (2017))

No	Tasks	Actions/Resources	Outcomes
1	**Improvement in forecasting of Sargassum arrival and an estimate on quantity.** • The regional/national protocol strategy should consider the broader establishment of an early warning system through use of satellites images from other partners, to inform coastal communities and national authorities on when the seaweed would be washed ashore and their expected volume.	MMABE must form alliances with agencies with capacity for tracking, monitoring and conducting research on sargassum such as: 1. Centre for Resource Management and Environmental Management (CERMES), 2. University of the West Indies 3. Regional Activity Centre for Specially Protected Area and Wildlife (SPAW-RAC), Parc National de la Guadeloupe, 4. Gulf and Caribbean Fisheries Institute, Charleston SC USA,	A set protocol to determine the arrival of sargassum and volume which will allow communities to plan and organize their cleanup activities accordingly.
2	Cleanup methods for offshore sargassum, can cause damage such as trapping juvenile fish and turtles etc. therefore equipment and cleaning methods must be well thought and organized during low tide to minimize any damage.	An assessment should be made to determine the types of tools and equipment to be used. (a) Boats (rental) (b) Net for trapping sargassum	List of tools and supplies including quantities: a) Boats (rental) b) Nets c) Boom

No	Tasks	Actions/Resources	Outcomes
	Cleaning offshore before sargassum reaches the coast is imperative to prevent coastal beaches and communities from being inundated. Offshore cleaning will create a manageable level of sargassum so community can cope more effectively when cleaning up beaches. 1. Identify & designate an area to bury sargassum either on the beach or away from the beach. 2. Explore the possibility of construction of a solar dryer to wash and dry seaweed for commercial use.	(c) Boom to serve as a strong and effective barrier to protect the beach area from floating Sargassum • Dedicated equipment for deflection of the sargassum from the inshore areas • Schedule for offshore cleanup; • Number of boats and fishers to be used; • A rotation schedule is important to ensure equal participation and rewards to every participating group within the affected communities; • Determine and designate custodians for tools and supplies • Competition to design and construct a solar dryer	Schedule for each community including: - Number of persons - Schedule for clean up - Agreed protocol for cleaning and disposal - Determine custodian for tools and supplies (i) Community; (ii) Constituency Councils Agree on designated area for disposal; How disposal will be done: a) Truck, b) Wheelbarrow c) Other Protocols to protect the beach and associated wildlife defined.

9.6 RECOMMENDED WAYS TO ADDRESS SARGASSUM INFLUXES ON BEACHES

(Adapted from Sealys and Felix (2017))

No	Tasks	Actions/Resources	Outcomes
1	**Improvement in forecasting of sargassum arrival and an estimate on quantity.** • The regional/national protocol strategy should consider the broader establishment of an early warning system through use of satellites images	MMABE must form alliances with agencies with capacity for tracking, monitoring and conducting research on sargassum such as: 5. Centre for Resource Management and Environmental Management (CERMES), 6. University of the West Indies	Signed MOU with respective agencies to provide information on sargassum location, pending arrival and expected quantities so that MMABE may activate their management plan and alert communities and other stakeholders.

No	Tasks	Actions/Resources	Outcomes
	from other partners, to inform coastal communities and national authorities on when the seaweeds would be washed ashore and their expected volume.	7. Regional Activity Centre for Specially Protected Area and Wildlife (SPAW-RAC), 8. Parc National de la Guadeloupe, 9. Gulf and Caribbean Fisheries Institute, Charleston SC USA,	Information is available to communities to encourage continued research and development on the economic benefits that can be derived from sargassum to create livelihoods. Research and development for climate adaptation using sargassum.
2	• **Public Education & Awareness and community participation to sensitize the affected communities and by extension the island on the advantages and disadvantages of Sargassum** • Posters/flyers • Community meeting with residents to discuss Sargassum management & clean up • Incentives for organizing cleanup for groups, organizations, residents • Responsibilities of Fishers, residents and community groups	Engage the creativity and energy of Community Based Organizations (CBO) (Youth, Mothers & Fathers and Church Groups, Constituency Councils, etc) to create a logo & jingle for branding through a competition, the winner will receive a mini grant to implement an environment project associated with sargassum. Organize community meetings with communities to mobilize and educate on cleaning protocols and procedures and to encourage the communities to organize clean-up and beach maintenance activities *1.* River Bay Community; *2.* Conset Bay Fish Landing Site; *3.* Silver Sands Community; *4.* Oistins Fish Landing Site; *5.* Rockley Beach & the Boardwalk *6.* Needham's Point to Savannah Hotel	Communities identify clean – up clubs and groups. Groups sign up for clean- up programme. Design templates for posters, t-shirts, etc. Jingle for campaign created for communities to come together to manage their problem. Tools and equipment purchased and agency identified to store and mange use. Beach cleanups undertaken.
3	**Economic Opportunities & Community Employment Generation**	Meeting with local entrepreneurs to discuss and generate an MOU to facilitate cooperation	MOU with local entrepreneurs

No	Tasks	Actions/Resources	Outcomes
	1. Exploration of possible economic opportunities must be encouraged such as selling dried and bagged sargassum to a processing plant. Also, the production of liquid organic fertilizer and the use as mulch and compost for the farming community.	Draft terms and conditions to receive rewards for community groups participating in Sargassum cleanup. Discuss structure of proposal to maintain part of the beach on a daily basis or as necessary by community groups. Discuss collaboration with other agencies such as GEF & EDF to collaborate with community on creating livelihoods from Sargassum.	Terms of conditions for community groups to receive grants.
4	Cleaning up methods for land based sargassum, can cause damage such as erosion, destruction of turtle nesting sites, and other organisms critical to our ecosystems, cleaning must be organized and strategic. 1. Although some level of beach cleaning can take place using a front end loader to lightly remove only sargassum and avoid touching the sand, there is still a risk of damage to beach organisms. Therefore, we propose a more vigorous effort at offshore cleaning, so beaches can be cleaned manually with rakes and other manual garden tools; 2. Identify & designate an area to bury Sargassum either on the beach or away from the beach	An assessment should be made during community mobilization efforts on the quantity of tools and supplies required for each community based on level of participation and enthusiasm. a) Rakes b) Gloves c) Face Masks d) Rubber boots e) Wheelbarrows f) Garden Forks g) T-shirts h) Rental of front-end loader i) Water j) Solar Dryer Draft schedule and number of persons allowed per community; Associated rewards; Determine custodian for tools and supplies; Designate a team leader to be responsible for work schedules, tools and equipment;	List of tools and supplies including quantities Schedule for each community including: - Number of persons - Rewards per group - Agreed protocol for cleaning and disposal - List of custodians for tools and supplies (iii) Community groups /clubs (iv) Constituency Councils

No	Tasks	Actions/Resources	Outcomes
	3. Explore the possibility to identify and designate an area to construct a solar dryer and bagging depot 4. While cleaning be mindful of turtle nesting areas and small animals caught in seaweed 5. Bagging of seaweed is not recommended as the plastic bags will create and compound environmental problems. 6. Use wheelbarrows to transport seaweed to dumpsite to avoid damage… use same track for duration of the daily cleanup.	Competition to design and construct a solar dryer	

(Adapted from Husbands and Rouse (2020))

Sector	Impact	Recommended Actions
Health	Hydrogen sulphide (H_2S) can affect the air quality for individuals. Those with asthma or other respiratory conditions, are particularly affected.	1) H_2S Detection Equipment To prevent high exposure of H_2S, levels should be monitored & suitable actions taken when levels rise above minimum. H_2S detectors should be carefully positioned in communities, taking into consideration wind levels, humidity and temperature. H_2S ppm concentration should also be measured using portable or fixed equipment. The information should be sent to monitoring centres and emergency plans set in place if levels exceed acceptable standards. 2) Installation of Wi-Fi video camera – CCTV

Sector	Impact	Recommended Actions
		To be placed across beaches, bays and coastlines commonly affected by sargassum. Surveillance captured would be sent to monitoring centres such as NCP facilities. Surveillance can be multi-purpose since it may also be used for the protection of endangered species from poaching and to collect data on the species. 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 This can be determined by using data from surveillance and H_2S equipment. This will guide & increase the effectiveness in determining areas for the and the frequency of the collection of the seaweed from the various beaches. This information can then be used to generate monthly sargassum forecast, trends & management options that can be distributed to relevant parties. 4) Training of NCP workers NCP personnel should be trained in the use & maintenance of H_2S equipment. 5) Bioprocessing sites The main bioprocessing sites will be used for composing of seaweed. A proposed location is St. Andrew since there are adequate areas of unused land and the clay in the land is useful in leaching heavy metals in the seaweed. 6) Public Risk Communication 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.
Tourism	1) Guest perception and reaction	1) Guest involvement Careful guest relations, public relations and media management are critical in dealing with the effects of sargassum on tourism.

Sector	Impact	Recommended Actions
	The main impact on tourism is caused by negative guest perception and reaction to sargassum. While it does not pose a threat to human life, it disrupts the marketable "crystal-clear sea and sand" that is the driving force of Barbados' tourism product. 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) Blue economy Large sargassum influxes that are not managed 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.	It is important to provide guests with as much educational material as possible. Assuring all guests that sargassum is not harmful, does not sting or pose any severe threat to human health is vital. Sargassum 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 Barbados' commitment to removing the seaweed quickly & safely. In line with this strategy is encouraging tourists to participate in keeping the beaches and coastlines clean, with signage on location and media outreach. Placing special composting bins along the beaches with a simple "Dos and Don'ts" checklist of acceptable disposal material. The bins would have to be cleared regularly to control odours and to transport compostable materials to the proccessing sites. 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. 2) Safe removal from beaches Develop a comprehensive beach cleaning programme to be enacted at the national level during heavy influxes. This involves partnering with hotels, the BHTA, other beach front businesses and local communities to have sargassum removal equipment at every beach, and agreement on regular cleaning and maintenance schedules. Where possible, it is best to leave sargassum on the beaches and when removal is necessary, it should be done manually if possible. 3) Seaweed booms Booming of high traffic beaches may be possible to create sargassum-free areas. This allows for the natural inflows of sargassum along some portions of the beach while providing cleared "splash zones". Booms can be made locally, creating jobs surrounding their manufacture, deployment & maintenance.

Sector	Impact	Recommended Actions
		4) Burial on beaches A small volume of sargassum can be buried further up the beach for beach nourishment and to help combat beach erosion.
Fisheries	Typical circulation of small sargassum mats are beneficial to fisheries. However, the overwhelming volumes seen recently has disrupted normal fish migration patterns and caused a shift in the species and volumes of fish normally found in Barbadian waters. Damage to boats, nets and other fishing gear is caused when sargassum is caught in equipment. Severe onshore influxes also prevent access of fishers to their boats. The impact on fishers and boat owners then lead to impacts on fish vendors & processors, restauranteurs and to general consumers.	1) Sargassum removal Removal of severe onshore and nearshore sargassum mats mitigates against loss of access to boats for fisherfolk 2) Public outreach Public education on the availability of new fish stocks will lessen the impact of reduced fish sales. Amberjacks and smaller dolphinfish types, both viable for sale in the Barbados market, have begun to replace flying fish and the usual dolphinfish catches during acute sargassum events. 3) Updated boat insurance Ensuring boat insurance policies cover damage caused by sargassum entanglement gives boat owners some financial coverage during large sargassum events.
Environment	In addition to the strong odour from sargassum onshore, high quantities of sargassum impact biodiversity which can lead to: • Loss of some marine species -	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. 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 will also disturb sand dwelling critters, nests, sea turtles and sea turtle nests.

Sector	Impact	Recommended Actions
	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	

9.7 INTERVENTION ISSUES, GOOD PRACTICES AND LESSONS LEARNED

(Adapted from Daniel-Thomas (2020))

INTERVENTIONS	GOOD PRACTICES & LESSONS LEARNT	STAKEHOLDERS	RESOURCES REQUIRED
- Beach clean-ups have been reactive rather than proactive. - Beach clean-ups are only undertaken when the sargassum begins to rot and becomes a nuisance. - Beach clean-ups are undertaken by MMABE, the Soil Conservation Unit and the NCC - Beach clean-ups are all conducted on-shore and involve an excavator, hand rakes and wheel barrows. - The Ministry of Health and Wellness role? - The Ministry of Tourism and International Transport role? - Several hotels take responsibility of the clean-up of the beaches in their vicinity. - BNOCL developed a sargassum management plan. - There is no register of damages and losses. MMABE is responsible for recording the quantity of Sargassum stranded during a beaching event.	- The Sargassum Task Force has to be revitalised and an annual budget dedicated to Sargassum clean-ups. - Sargassum poses serious problems when it is wet and left to rot on the beach. - Sargassum is easier to clean when dry and can be undertaken by community members. - Where possible, dry Sargassum should be incorporated into the sand to encourage beach building and dune nourishment. - Identify a dedicated team of community members who are willing to volunteer their time and effort towards cleaning up the beaches. - Apart of equipment support, the team members should receive training in the safe handling, removal and transportation of sargassum. - Encourage the use of satellite imagery for forecasting, tracking and monitoring of sargassum. Incorporate this data in decision making. - Exploration of economic activities from sargassum must be encouraged. - Develop a Communication Strategy to ensure that key stakeholders and the general public are not misinformed and understand the facts about sargassum. - Encourage scientific research by students and scientists alike.	Ministry of Agriculture and Food Security MMABE Ministry of Health and Wellness Ministry of Tourism and International Transport Ministry of Environment & National Beautification NCC Fisherfolk Farmers Agro-processors Academia Civil society Private Sector	Funding Equipment Technical expertise Access to updated, accurate information Access to tracking/monitoring systems. Access to researchers Local inventions/solutions

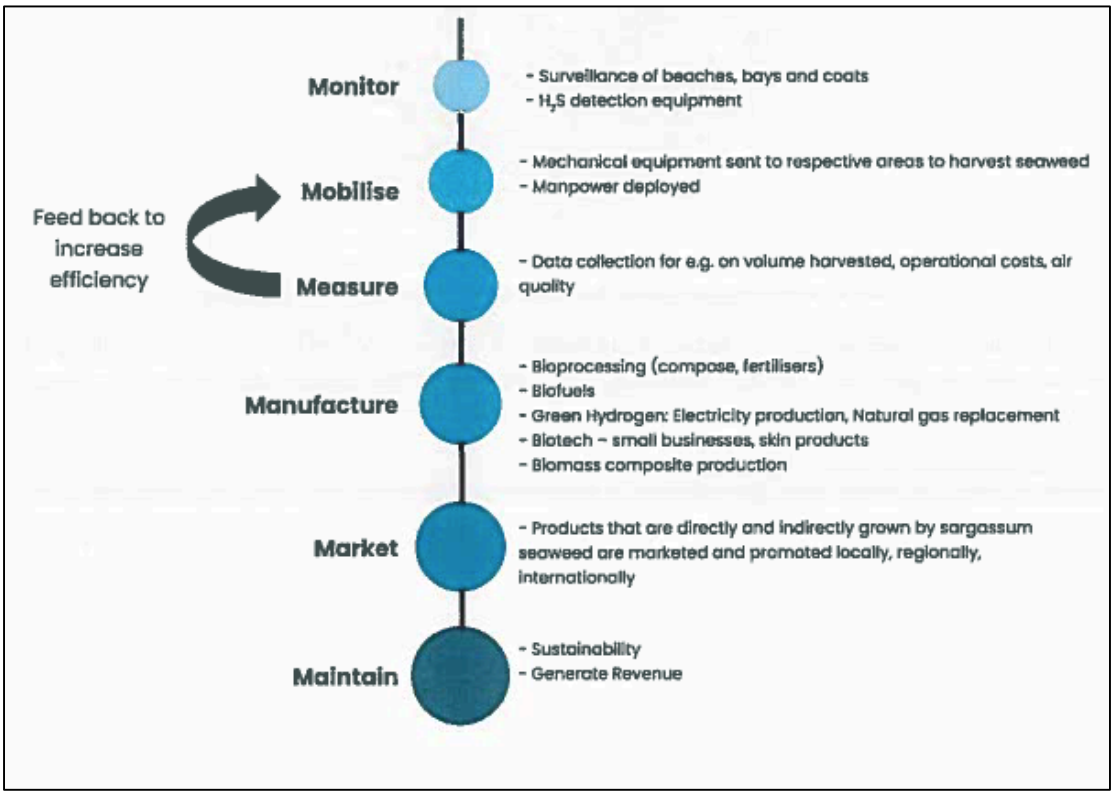
9.8 INTERVENTIONS AND RECOMMENDATIONS IN CROSS-CUTTING MANAGEMENT

(Extracted from Daniel-Thomas (2020))

CATEGORY	INTERVENTIONS TO DATE	RECOMMENDATIONS
Increasing Knowledge on Sargassum	- Use of Sargassum Outlook Bulletin, SargNet and Sargassum Hub for sargassum management	- Encourage research and innovation - Develop a public education and awareness strategy/communication strategy to ensure that persons are not misinformed
Data Collection	- The BDF has been collecting data on the quantity of stranded sargassum - Drone Monitoring Protocol is being developed under the SargAdapt project to allow easier quantification of stranded sargassum on beaches	- Ensure that the different stakeholders including community members (citizen science), NGOs and CBOs are involved.
Forecasting and Early Warning Systems	- Barbados Coast Guard access to SAMTool. Insight on their use would be helpful	- Explore what free or inexpensive forecasting, early warning and monitoring systems are available. - Consider using the following: (i) USF Satellite-based Sargassum Watch System (SaWS); (ii) CLS operational sargassum monitoring service (SAMtool). - Establish formal partnerships with the French Overseas Territories for satellite imagery and data.
Best Practices and Lessons Learnt	- There is currently no publicly available national protocol for the cleaning up the Sargassum after it lands on the beach	- Develop protocol and ensure that it is adaptable. Tests methods, improving those which work and eliminating those which do not achieve the desired results.
Financing and Investment	- There is currently no national budget assigned to Sargassum Management.	- Encourage investment in appropriate innovative technologies - Access low interest loans from the Climate Change Adaptation Fund (CCAF) or grants from the GEF Small Grants Project and the Conservation Fund - Develop innovative financing partnerships

9.9 SARGASSUM MANAGEMENT WORKFLOW

Flow diagram extracted from Husbands and Rouse (2020) proposed as a potential strategy for management of sargassum influxes in Barbados.



9.10 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	Website that integrates information from multiple	Geoplanet, IOCaribe, Atlantos, Air Centre	2020

	Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
		sources. Items featured include monitoring systems, in-situ observations, bulletins issued and best practices for management & use.		
2.	SargNet	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:	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)	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
5.	**SargAdapt** (Adapting to a new reality: Managing responses to influxes of sargassum seaweed in the Eastern Caribbean as ecosystem hazards and opportunities)	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

	Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
6.	**SARTRAC** (Teleconnected SARgassum risks across the Atlantic: building capacity for TRansformational adaptation in the Caribbean and West Africa)	SARTRAC identifies new transformational developmental opportunities that build resilience equitably, for people affected by changing biomes/ecosystems in developing countries.	University of Southamptom, UWI-CERMES, University of Ghana, University of York	2019 - 2022
7.	Climate Change Adaptation in the Eastern Caribbean Fisheries Sector (**CC4FISH**) Sargassum Subproject	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** (SAtellite SArgassum Monitoring System)	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	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 and multi-national research project	This research project is investigating different activation methods and different pyrolysis temperatures (600 – 900 ^{o}C) to	Université des Antilles (Guadeloupe) (COVACHIMM2E laboratory), Instituto Tecnológico de Santo	2019

	Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
		obtain activated carbon using sargassum.	Domingo (INTEC) (Dominican Republic), Institut National de la Recherche Agronomique (INRA) (Guadeloupe & Nancy, France), Queen Mary University (UK), Instituto Superior de Tecnologías y Ciencias Aplicadas (InSTEC) (Cuba), Centre Inter-universitaire de Recherche et d'lngénierie des Matériaux (CIRIMAT) (Toulouse, France), Université d'État d'Haïti (Haiti), Université Quisqueya, NBC (French Guiana), TECMALAB (Dominican Republic), NUM SMO Technologies (NST) and Phytobokaz (Guadeloupe)	
11.	**CESAR** (Coastal environment under sargassum crisis)	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

	Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
12.	**CORSAiR** (Atmospheric and marine corrosions)	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)	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 pyrolosis-application for food safety)	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)	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
16.	**SARGACARE** (Human health effects of chronic exposure to gaseous fumes from decomposing brown algae in the French West Indies)	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

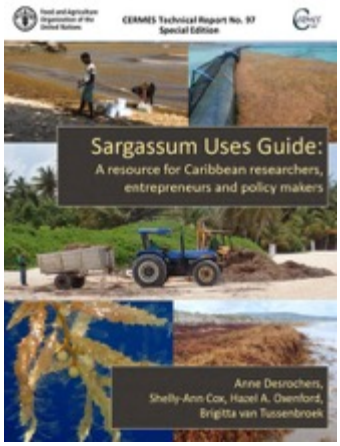
	Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
17.	**SARGASSUM ORIGINS** (Identity and origins of pelagic sargassum)	This project aims to identify sargassum species growing in the North Atlantic (co-occurrence) by studying the connectivity of sargassum at the Atlantic scale.	Coordinator and collaborators can be found here	2019
18.	**SARGOOD** (Holistic approach to sargassum valorisation)	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)	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)	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)	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
22.	**SAVE-C** (Study of holopelagic sargassum responsible of massive beachings: valorisation and ecology on Caribbean Coasts)	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

	Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
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	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	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	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

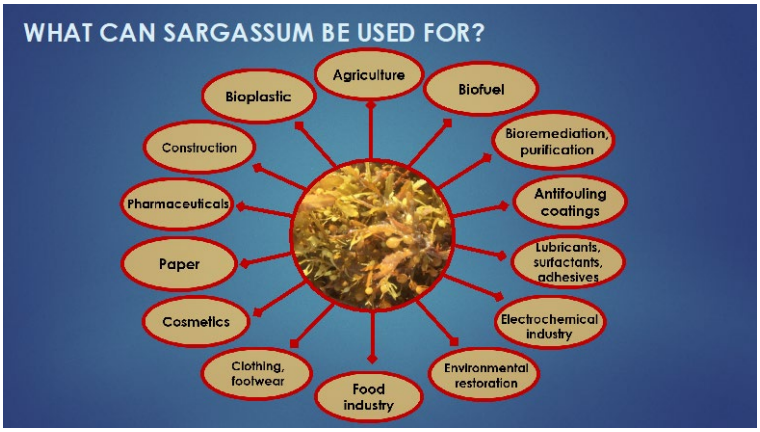
	Sargassum Caribbean Projects, Programmes and Initiatives	Brief Description	Organisation/agency	Start Year
27.	Sargassum Podcast 	A podcast hosted by marine educators and scientists with a range of expertise in Sargassum and Coastal Communities. The podcasts interviews a variety of stakeholders about 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

10 SARGASSUM USES

Several entrepreneurs and research teams across the region have been working over the last few years to develop innovative projects and businesses using sargassum seaweed. 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 reports, events and products.



Of the resources on the various uses of sargassum, that shown above as a joint output from CERMES and FAO is currently the most comprehensive and authoritative. It has been referenced several times in the SAMS. Below are some summary images from a presentation on the guide which covers several sectors and potential innovations.



11 OTHER USEFUL ONLINE LINKS

Barbados Sargassum Uses	Online link
Bajan chemists tap into beauty industry with sargassum skincare line	https://www.loopnewsbarbados.com/content/bajan-chemists-tap-beauty-industry-sargassum-skincare-line-3
World's 1st producer of sargassum skincare products is a Barbadian company	https://www.stemcaribbean.com/worlds-1st-producer-of-sargassum-skincare-products-is-a-barbadian-company/
Innovation Key To Growing Economy	https://www.barbadosadvocate.com/news/innovation-key-growing-economy
From Sargassum to Soap	https://medium.com/@krystalpennybowen/from-sargassum-to-soap-3b9c393e366a
New types of plastic and fertilizers . . . Youth present innovative ideas at Blue Lab	https://barbadostoday.bb/2019/11/09/new-types-of-plastic-and-fertilizers-youth-present-innovative-ideas-at-blue-lab/
In the Spotlight: Red Diamond (Joshua Forte, Finalist of 1M1B Change the World Internship 2015)	http://activate1m1b.blogspot.com/2015/08/in-spotlight-red-diamond-joshua-forte.html

DATE/SOURCE	TITLE OF ARTICLE	SYNOPSIS
June 20th, 2015 Above Barbados (Youtube Video)	Sargassum Seaweed in Barbados	https://www.youtube.com/watch?v=Izd02hm8bI0 Aerial footage showing parts of the coastline which were affected by sargassum influxes in 2015.
November 29th, 2018 CERMES (YouTube Video)	Sargassum: The Golden Tide	https://www.youtube.com/watch?v=rYrU8Ev6i4o Summarises the impacts of sargassum and management responses.
June 13th, 2018 The Barbados Government Information Service (Youtube Video)	Sargassum A Coastal Crisis	https://www.youtube.com/watch?v=lChG4XKo_nk Ministers, the BDF Chief of Staff, and other Government officials give a press briefing on Bath Beach explaining Barbados' response to the inundation of sargassum seaweed.

DATE/SOURCE	TITLE OF ARTICLE	SYNOPSIS
September 12th, 2011 The Barbados Government Information Service (Youtube Video)	Sargassum Seaweed from Problem to Profit	https://www.youtube.com/watch?v=6nkRU0-4Kf8 A local entrepreneur, Mr. Cavendish Atwell, discusses his use of the sargassum seaweed as a fertiliser.
October 26th, 2016 UWI Cave Hill Campus (YouTube Video)	Sargassum Symposium	https://www.youtube.com/watch?v=ceT8JEIr_yU Recording of the first session of the 2016 Sargassum Symposium
June 22nd, 2018 BLP News (Youtube Video)	How Barbados is Tackling the Seaweed	https://www.youtube.com/watch?v=wTwI0AdIMUc Briefly discusses the response of the Barbadian government in managing sargassum influxes.
March 28th, 2020 Barbados Today	Sargassum harvester 'to start work' on beach cleanup	https://barbadostoday.bb/2020/05/28/sargassum-harvester-to-start-work-on-beach-cleanup/
July 22nd, 2018 Loop News Jamaica	Bajan chemists tap into beauty industry with sargassum skincare line	https://www.loopjamaica.com/content/bajan-chemists-tap-beauty-industry-sargassum-skincare-line-2
June 30th, 2018 Nation News	Doubt about Sargassum fertiliser	https://www.nationnews.com/2018/06/30/doubt-about-sargassum-fertiliser/
September 14th, 2019 Loop News Barbados	Sargassum strangling South Coast hoteliers	https://www.loopnewsbarbados.com/content/sargassum-strangling-south-coast-hoteliers
May 2nd, 2018 Loop News Barbados	NCC working on cleaning sargassum	https://www.loopnewsbarbados.com/content/ncc-working-cleaning-sargassum

12 USEFUL READING

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