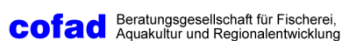


Caribbean Aqua-Terrestrial Solutions - CATS
Programme Component 2
Management of Coastal Resources and Conservation of Marine Biodiversity



co-implemented by



MARINE ZONING DESIGN FOR THE SOUTH COAST MARINE MANAGEMENT AREA (SCMMA)

ST: VINCENT

FINAL REPORT

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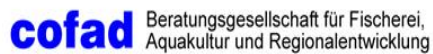
November 2015

Disclaimer

The views expressed in this report are those of the authors and do not necessarily reflect the views neither of the national country organisations nor of the international organizations involved (among them GOPA, CO-FAD, GIZ, BMZ, CARICOM, CARPHA).

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Abbreviations

| | |
|-------|---|
| CBD | Convention on Biodiversity |
| CCI | Caribbean Challenge Institute |
| CPACC | Caribbean Planning for Adaptation to Climate Change |
| EIA | Environmental Impact Assessment |
| GEF | Global Environment Facility |
| GIS | Government Information System |
| GIZ | Deutsche Gesellschaft für Internationale Zusammenarbeit |
| GOPA | Gesellschaft für Organisation, Planung und Ausbildung |
| LBS | Land Based Sources |
| MCA | Marine Conservation Area |
| MEA | Multilateral Environmental Agreement |
| MMA | Marine Management Area |
| MPA | Marine Protected Area |
| NGO | Non-Government Organization |
| NPA | National Protected Area |
| NPRBA | National Parks Rivers and Beaches Authority |
| OECS | Organization of the Eastern Caribbean State |
| PA | Protected Area |
| POW | Program Of Work |
| PPU | Physical Planning Unit |
| SCMCA | South Coast Marine Conservation Area |
| SCMMA | South Coast Marine Management Area |
| SCMP | South Coast Marine Park |
| SGD | St. George's Declaration |
| SIDS | Small Island Developing States |

| | |
|---------|---|
| SusGren | Sustainable Grenadines, Inc. |
| SVG | St. Vincent and the Grenadines |
| SWMU | Solid Waste Management Unit |
| TCMP | Tobago Cays Marine Park |
| TNC | The Nature Conservancy |
| UNCBD | United Nations Conventions for Bio-Diversity |
| UNCCD | United Nations Convention to Combat Desertification |
| UNFCCC | United Nations Framework Convention on Climate Change |

1 Introduction

1.1 The CATS Programme

The Caribbean Aqua-Terrestrial Solutions (CATS) Programme is the result of a merger of two initially separately conceptualised projects (now CATS Programme Components 1 and 2), namely the ‘Adaptation of Rural Economies and Natural Resources to Climate Change’ and the ‘Management of Coastal Resources and Conservation of Marine Biodiversity’. CATS as a whole is addressing the increasing vulnerability of Caribbean SIDS and low-lying coastal states to climate change and the attendant negative impacts on coastal communities and economies, ecosystems (terrestrial and coastal/marine), and coastal natural resources management. In CATS Component 2, GOPA is an implementation partner of GIZ (the Deutsche Gesellschaft für Internationale Zusammenarbeit) and is responsible for the provision of Technical Assistance. This programme is therefore implemented by GIZ and the Caribbean Public Health Agency (CARPHA) with assistance from GOPA and under funding from GIZ - GOPA Project Number 3871.

This project is part of a regional program between Germany and the Caribbean Community (CARICOM), titled CATS, specifically its Programme Component 2 ‘Management of Coastal Resources and Conservation of Marine Biodiversity’. CATS Component 2 focuses on improving the sustainable management of Marine Managed Areas (MMA) in five CARICOM countries (Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines). The objectives of the CATS 2 Component is to promote biodiversity management and conservation through the strengthening of the management of existing protected areas, in particular sustainable financial management, through:

- Support to capacity building in integrating aspects of land based sources of pollution into MMA management;
- Support to procurement of necessary equipment and/ or infrastructure
- Support to the updating of existing or preparation of new MMA Management Plans;
- Support to increased operational efficiency in MMA management;
- Support to enhanced revenue generation from MMAs
- Support to technical, administrative and managerial capacity building in areas identified through needs assessments; and
- Support to the development of communication and engagement strategies.

CATS 2 is being implemented from January 2013 - December 2015 and contributes to Programme Objectives 1 and 2. An objective of CATS Component 2 ‘Management of Coastal Resources and Conservation of Marine Biodiversity’ in SVG is to improve existing protected areas through improved management and the design of a zoning design and moorings plan for the South Coast Marine Management Area (SCMMA). This project is supervised by the National Project Implementation Team (PIT) of CATS 2, represented by its Chair, Mr Andrew Wilson, Director National Parks, Rivers and Beaches Authority, the Fisheries Division, the Ministry

of Health, Wellness and the Environment, the Maritime Administration along with the associated project Eastern Caribbean Marine Managed Areas Network (ECMMAN) funded by The Nature Conservancy (TNC) and other key marine stakeholders (i.e. the National Trust, Sustainable Grenadines Inc., SVGHTA, Calliaqua Fisher Folk Cooperative, Forestry Department) and will work in close coordination with the CATS 2 Principal Technical Adviser and GOPA Team Leader. Additional backup, guidance and advice regarding the conduct of the assignment will be provided by the CATS C2 Regional Technical Adviser, the GIZ Head of Programme (CATS) and by the CARPHA CATS Programme Management Team. Mission itineraries and work of the consultant will also be assisted with by CATS 2 National Project Officer (W. Tannis) in SVG.

In line with the goals and objectives of the Caribbean Aqua-Terrestrial Solutions (CATS) Project, the South Coast Marine Conservation Area (SCMCA) on the mainland of St. Vincent is being upgraded to a Marine Park, technically switching its existing designation from a Marine Conservation Area (MCA) to multi-use Marine Managed Area (MMA). Accordingly the objectives of this project are to develop a demarcated zoning design and associated mooring plan for the proposed SCMMA that will be incorporated into an overall management plan for SCMMA.

A clearly demarcated zoning design is required for the development of a management plan to support the protection, restoration and conservation of critical marine and coastal resources, as well as to promote sustainable resource use and reduce user conflicts occurring within the SCMMA. The zoning design will also incorporate where possible the water quality and habit degradation that is presently occurring within and surrounding the SCMMA. As such the program work for the zoning design project will review existing park boundaries and verify existing GPS coordinates and will propose new boundaries (if required) for the implementation of an ecosystem approach to management for the marine park. It is anticipated that a number of multiple-use spatial zones, each with recommended allowable activities will be included as part of the final zoning design.

An associated moorings plan will also be developed based on international best practices in regards to the identification of areas suitable for the installation of moorings. This includes the quantities, types, cost and methods of installation, maintenance and management with regard to the existing ad-hoc mooring regime to reform the existing moorings and ensure the protection of sensitive marine habitats, user safety, navigation and support for sustainable livelihoods and park financing. The objectives of the corresponding moorings plan are to:

- Identify, assess and georeference existing moorings including impacts and suitability
- GPS where required and assess existing moorings including impacts and suitability
- Identify locations for types, quantities, costs, methods of operation and management (inclusive of livelihoods and revenue-generating options) of moorings within the Park

1.2 Marine spatial planning

In the Caribbean and around the world, human use of coastal and marine resources including transportation, fishing, tourism, recreation, oil exploration and other activities, is placing growing and often

conflicting demands on natural resources (Burke et al. 2011). Consequently important marine areas are under increasing pressure threatening the health of coral reefs, wetlands, mangroves and seagrass beds and the environmental services they provide, such as coastal protection from storms, food security and tourism-based economies (Gattuso et al. 2015). As place-based activities continue to increase, resources are being over-exploited and conflicts among users are escalating (Tallis et al. 2010). It is clear that there is an urgent need for a process to guide sustainable development of the marine environment, one that provides for a diversity of uses while protecting biodiversity and maintaining resilience and the services people depend upon. An ecosystem approach offers a constructive means to deal with the uncertainties associated with complex systems by focusing on the distinctive features of an individual place and tailoring management to the local circumstance through an adaptive learning cycle (Young et al. 2008).

Marine spatial planning (MSP) provides a means to improve decision-making as it relates to the use of marine resources and space. MSP has emerged globally as a strategic approach to efficiently deliver ecosystem-based management (EBM) to the coastal marine environment (Crowder and Norse 2008). Analogous to land-use planning in the terrestrial environment, MSP aims to systematically identify an equitable balance between social and economic demands for development, while protecting the health and resilience of ecosystems. MSP is therefore a comprehensive multi-disciplinary planning process which lays out a spatially-focused, multi-objective vision to be developed for an area in which ecological, economic and social objectives can be simultaneously accommodated within prevailing political and administrative regimes (Ehler and Douvère 2009). MSP addresses governance challenges by supporting EBM and establishing conditions to promote economies of scale thereby reducing institutional overlaps, space-use conflicts and the loss of ecosystem services.

MSP is a strategic, forward-planning approach that seeks to better address activities taking place in the ocean and integrate marine management strategies (Arkema et al. 2006). One outcome of the MSP process is typically a marine multi-use zoning design (Agardy 2010, Ehler and Douvère 2009), whereby the boundaries of the various uses are delineated in the marine space. Thereafter the zoning design is translated into a management plan, in which levels of use are defined and implemented through regulations for each of the developed zones. Although the development of a marine multi-use zoning plan is often a central outcome of the MSP process, the two are not the same (Agostini et al. 2010). Marine spatial planning is the framework that makes comprehensive multi-use zoning credible (Foley et al. 2010).

As MSP has a spatial component and requires the integration of information from a variety of sources at multiple scales, the application of geographical information systems (GIS) has gained wide acceptance (Carocci et al. 2009). Yet due to a diversity of factors including the financial, technical and human resources required for MSP, its application has been less prominent in small island developing states (SIDS) than in developed countries (Baldwin et al. 2013, Pomeroy et al. in 2014). In recent years the use of GIS as a tool coupled with participatory and collaborative approaches has emerged as a novel science known as Participatory GIS (PGIS) (Baldwin 2012). In light of an ecosystem approach, the participation of stakeholders in the creation of MSP information, including representation of spatial knowledge, can support the production of cost-effective holistic information and increase understanding of the linkages between marine resources and livelihoods (Baldwin and Mahon 2014). The employment of multi-sectoral collaborative PGIS approach can maximise resources and management efforts thus better guiding MSP and aiding equity and ownership in decision-making (Pomeroy and Douvère 2008).

2 Background to the SCMCA

The economies of Small Island Developing States (SIDS) are highly dependent on the health of the coastal and marine environments that surround them as well as the services that these environments provide (Pomeroy et al 2014). In recognition of this St. Vincent and the Grenadines (SVG) is committed to implementing the Convention on Biological Diversity (CBD) Program of Work on Protected Areas (PoWPA) and more recently has committed to implementing the Caribbean Challenge Initiative (CCI) to conserve 20% of near shore marine areas by the year 2020 (CCI 2013). Presently in SVG, there is one designated marine park and six designated marine conservation areas (MCAs) in SVG (Lee 2009). The Tobago Cays Marine Park (TCMP), the first and only no-take marine park in SVG, was declared in 1997 under the Marine Parks Act (Pena 2006). Over the next ten years, regulations were adopted and a formal management plan for the TCMP was approved and implemented under the supervision of the Marine Parks Board (Hoggarth 2007). On the other hand the six designated MCAs are legally designated under Schedule 11 of the Fisheries Regulations as a 'Conservation Area'. Under this provision only spear-fishing is prohibited in these MCAs and is monitored by the Fisheries Division. The management of MCAs has proven difficult due to lack of an overall management responsibility responsible for the marine area and multiple users and activities occurring (Gaudin 2014).

In accordance with the CBD and the CCI, the National Protected Areas System Plan (2010-2014) the NPRBA has proposed the development of four new marine parks, all of which are located on the mainland of St. Vincent (e.g. South Coast, Chateaubelair Islet, Petit Byahaut, Anchor Reef). Over the past three years work has begun to declare the South Coast Marine Management Area (SCMMA) as the first marine park on the mainland of St. Vincent.

The legally designated South Coast MCA (established in 1987) is located on the south east coast of St. Vincent and includes Indian Bay, Calliaqua Bay and Blue Lagoon Bay between Latitudes 13° 07.2' N and 13° 08' N and between Longitudes 61° 11.9' W and 61° 13' W (Figure 1).

The SCMCA encompasses the coastal and marine areas of three major bays (Indian Bay, Calliaqua Bay and Blue Lagoon) and is surrounded by seven communities (Canash, Ratho Mill, Calliaqua, Rose Cottage, Villa, Indian Bay and Arnos Vale) located along the south coast of St Vincent. There are three watercourses; two rivers (Arnos Vale and Calliaqua); and four ephemeral streams that flow through the area providing fluvial and estuarine habitats which are home to various waterfowl and fish species (Baldwin 2014b). Blue Lagoon (and Canash) comprise a natural lagoon that provides a safe harbor for boats during storms and contains a small marina that is capable of docking thirty five (35) vessels (Murray 2014).

The waters of the SCMCA are home to a great variety of marine organisms including: various reef fish, a number of nearshore pelagic fish species, sea turtles, sea eggs, sea horses and a variety of crustaceans (i.e. conch, lobster, crabs). There are six beaches (e.g. Indian Bay, Villa, Canash, White Sand, Blue Lagoon, Young Island, Calliaqua Fisheries Centre) that are actively used for diving, snorkeling, swimming, fishing and

other recreational uses. Blue Lagoon and Canash also comprise a representative reef ecosystem, containing three stands of mangrove forest with adjacent seagrass beds and reefs, which provides essential nursery and life cycle habitat for fish and other threatened and endangered marine organisms (Baldwin 2014). Moreover, the proposed SCMMA contains the only white sand beaches on mainland St. Vincent and has significant expanses of coral reef and sea grass habitat critical for tourism, coastal protection and ecosystem goods and services. Along with these natural resources, the SCMCA is also home to a number of historical and cultural resources including Fort Duvernette (Rock Fort), the Calliaqua Fisheries Centre, petroglyph sites, lime kiln and sugar mill ruins (Villa and Ratho Mill).



Figure 1: Map of the designated South Coast Marine Conservation Area (SCMCA).

Due to the dense population and high amount of coastal development and human activities present within the area, the SCMCA is of particular management importance (Gaudin 2014). The SCMCA and surrounding coastal area provide the epicenter of tourism operations on the mainland of St. Vincent, hosting the majority of the mainland's accommodation sector and a full-service marina (Blue Lagoon) in which several charter yacht companies operate (presently Barefoot and Horizon Yacht Charters). Moreover the SCMCA comprises a substantial amount of commercial activities (mainly in Calliaqua) including a highly productive fisheries landing site, the Coast Guard Base, Police Station, fuel tanks, a number of engine and boat repair yards as well as a large number of other local businesses. In addition the SCMCA is a well-known low-lying flood risk zone (CCCRA 2012). As a result the coastal communities are extremely vulnerable to climatic factors including storm surges, flooding and high levels of sedimentation (White 2012). Increasing commercial and recreational exploitation together with insufficient solid, liquid and sewage waste disposal are placing significant stress on the coastal and marine environment as well as have health implications

for the surrounding communities. For these reasons it has become evident that a move should be made to increase and coordinate management of the coastal and marine resources from the ad hoc regime to an integrated management structure with clear authority and roles (Murray 2014).

As a result of the multifaceted importance of the south east coast of St. Vincent, efforts have been made to upgrade the designation of the area to a marine park (CEHI 2013). Considering the large diversity and level of activities occurring in the area, a place-based holistic management strategy, or a collaborative Marine Spatial Planning (MSP) approach, that aims to facilitate sustainable development and equitable use for all activities occurring in a defined area comprising the marine environment and surrounding coastal area is endorsed. One outcome of a MSP process is typically a comprehensive marine zoning design that allocates space-uses by addressing ecological, economic and social considerations in an integrated and equitable fashion. Increasingly, MSP and the development of marine multi-use zoning design together with a corresponding management plan have proven to be successful tools for reducing space-use conflicts, while also providing the protection of cultural and natural resources as well as the provision of sustainable livelihood opportunities for the community (Agardy 2010). In SVG, a MSP process (including a marine multi-use zoning design) was undertaken from 2010-2012 for the Grenadine Islands (Baldwin 2011). This MSP work has also been used to inform the drafted St. Vincent and the Grenadines National Ocean Policy (NOP) implemented by the Maritime Administration is presently before Cabinet (SVG MARAD 2014). A strategy of the NOP is the further development of the MSP process with the mainland of St. Vincent. In accordance with the NOP and a number of other national policies, the SCMCA is scheduled to be upgraded and designated as multiple-use Marine Park. The South Coast Marine Management Area (SCMMA) zoning and moorings plans will therefore support the development of this larger national MSP initiative and the SCMMA Management Plan.

3 Literature and data compilation, review and analyses

In recent years a number of ecological and socio-economic studies have been conducted for the South Coast of St. Vincent. A literature and spatial data compilation, review and synthesis was conducted to integrate and examine existing social, cultural, economic, institutional and ecological information relevant to the SCMMA project area. This included an examination of the various types of stakeholders, uses, threats and other issues occurring within the proposed SCMMA.

The following is a list of documents and secondary information relevant to the SCMMA that were reviewed for use in the project and used to build on existing information and data where possible.

- A vulnerability assessment of the proposed, St. Vincent and the Grenadines South Coast Marine Conservation Area (SCMCA) to climate variability and human activities (White 2013)
- A national- level economic valuation study of the environmental services provided by marine habitats in St. Vincent and the Grenadines (Christie and Teelucksingh 2012)
- South Coast Marine Conservation Area AGRRA Surveys (Kilgo and Edwards 2010)
- Assessments and Recommendations pertaining to National Organisational and Legislative Frameworks for MMA Management in SVG (CATS 2014)
- Baseline assessment and Baseline Mapping of Coastal and Marine Resources in Five Marine Protected Areas (Marchesi 2014)
- Developing a Framework for a Comprehensive Marine Multi-use Zoning Plan for the Grenadine Islands (Baldwin 2012)
- Draft Strategic Plan for National Legal Organisational Framework: The South Coast Marine Conservation Area (SCMCA) (Andrade 2015)
- Environmental, Natural Resources and Socio-economic Assessments and Specific Recommendations for SVG (CATS 2014)
- Evaluation of National Legal Organisational Frameworks for MPA Management and Recommendations for Project Support Options in five Caribbean Island Countries (Gaudin 2014)
- The Reef Fishery of St. Vincent (Labban, Isaacs and Oxenford 2013)
- Grenadines Network of Marine Protected Areas Monitoring Framework Progress Report 2014- 2015. Draft Report. (2015 Sustainable Grenadines Inc.)
- Incorporating GIS into Socio-economic Monitoring for Coastal Managers (SocMon) for St Vincent (Wood 2013)
- International best practices in zoning, boundary demarcation, and mooring installation and maintenance, in national parks and protected areas
- Livelihoods Options Assessments and Specific Recommendations for SVG (CATS 2014)
- Management Plan for the Pointe Sable Environmental Protection Area, 2009-2014. Government of Saint Lucia (Gardner 2009)

- Mooring buoy planning guide (PADI 2005)
- Sand mining in St. Vincent: Impacts and Options (USAID-COTS 2010)
- SCMP organisational and operational assessments and recommendations (CATS 2013)
- Socio-economic monitoring (SocMon) (Lockhart et al. 2013)
- St. Vincent and the Grenadines National Ocean Policy. St. Vincent and the Grenadines: Maritime Administration (SVG MARAD 2014)
- St. Vincent South Coast MMA Management Plan – Zero Draft (Murray 2014)
- SVG Sea Turtle Recovery Action Plan (1993/2012 WIDECAS; Dow 2007)
- Training exercise and rapid assessment of the proposed South Coast Marine Park, St. Vincent, St. Vincent and the Grenadines (Baldwin 2014)

3.1 Marine habitats and ecological resources

The majority of reef-related habitat, and subsequently dive sites on the mainland are located on the south-eastern coastal shelf and the leeward coast of St. Vincent. Until recently detailed information on the distribution and abundance of coastal and marine habitat was lacking for the mainland of St. Vincent (Baldwin 2014a). As part of the on-going ECMMAN project (implemented by The Nature Conservancy), marine habitats of St. Vincent were mapped using remote sensing and ground-truthing techniques (Purkis 2015). Table 1 provides a summary of the amount of coastal marine habitats mapped in the proposed South Coast Marine Park (SCMP) listed both by area (in hectares) and as a percent (%) total. Figure 2 provides a map of the distribution of these habitats. Sand/silt comprises the largest proportion of habitat (45%) followed by seagrass (40%), coral reefs (14%) and beaches (< 1%). For management purposes, the adjacent coastal land (seaward side of the main road) as a coastal buffer in the proposed marine park boundary is also depicted in the map.

Table 1. Area (hectares) of coastal marine habitats of the south coast marine park, St. Vincent.

| Habitat | Area in hectares (Ha) | Percent total |
|----------------------------|-----------------------|---------------|
| Hard coral framework | 27.811 | 13.34 |
| Soft coral garden | 0.874 | 0.42 |
| Hardground with turf | 0.172 | 0.08 |
| Dense seagrass | 28.552 | 13.70 |
| Sparse seagrass with algae | 55.685 | 26.72 |
| Sand | 93.780 | 45.00 |
| Beaches | 1.529 | 0.73 |
| | 208.405 | |

Mangrove forests are rich in terrestrial and marine biodiversity as they provide a complex and important habitat for a variety of birds while also providing a safe haven for juvenile fish. Mangrove forests protect coastal areas and built environments from storm surges and flooding, especially during hurricanes and tsunamis. Furthermore, mangroves also provide numerous ecosystem services, these include slowing

water flow, trapping and recycling sediments and organic matter, while also acting as a biological filter able to break down a variety of heavy metals and nutrients (Baldwin 2014a). Mangroves also play an important role in carbon sequestration (the capturing and storing of carbon), absorbing five times as much carbon as rainforests. There are only five small stands of mangrove remaining on the mainland of St. Vincent (Brighton Beach, White Sand, Canash, Blue Lagoon and Sion Hill), of which four are located within the vicinity of SCMMA (Baldwin 2014b). Figures 4 and 2 provide maps of the extent of mangrove stands located within the proposed South Coast Marine Park boundaries. There are only two types of mangroves are found on the mainland of St. Vincent today and include the buttonwood and white mangrove species. As such the south east coast of St. Vincent is considered as one of the most important ecological units in the country and has a large potential impact on the economic state of SVG (CATS 2014).

A rapid marine inventory and assessment was conducted in 2014 in which the SCMCA was grouped into five general areas (e.g. Blue Lagoon, Calliaqua, Young Island, Villa and Indian Bay). The following section briefly summarises the ecological significance of the coastal marine habitats and resources in each area as well as other key issues or threats observed (Baldwin 2014).

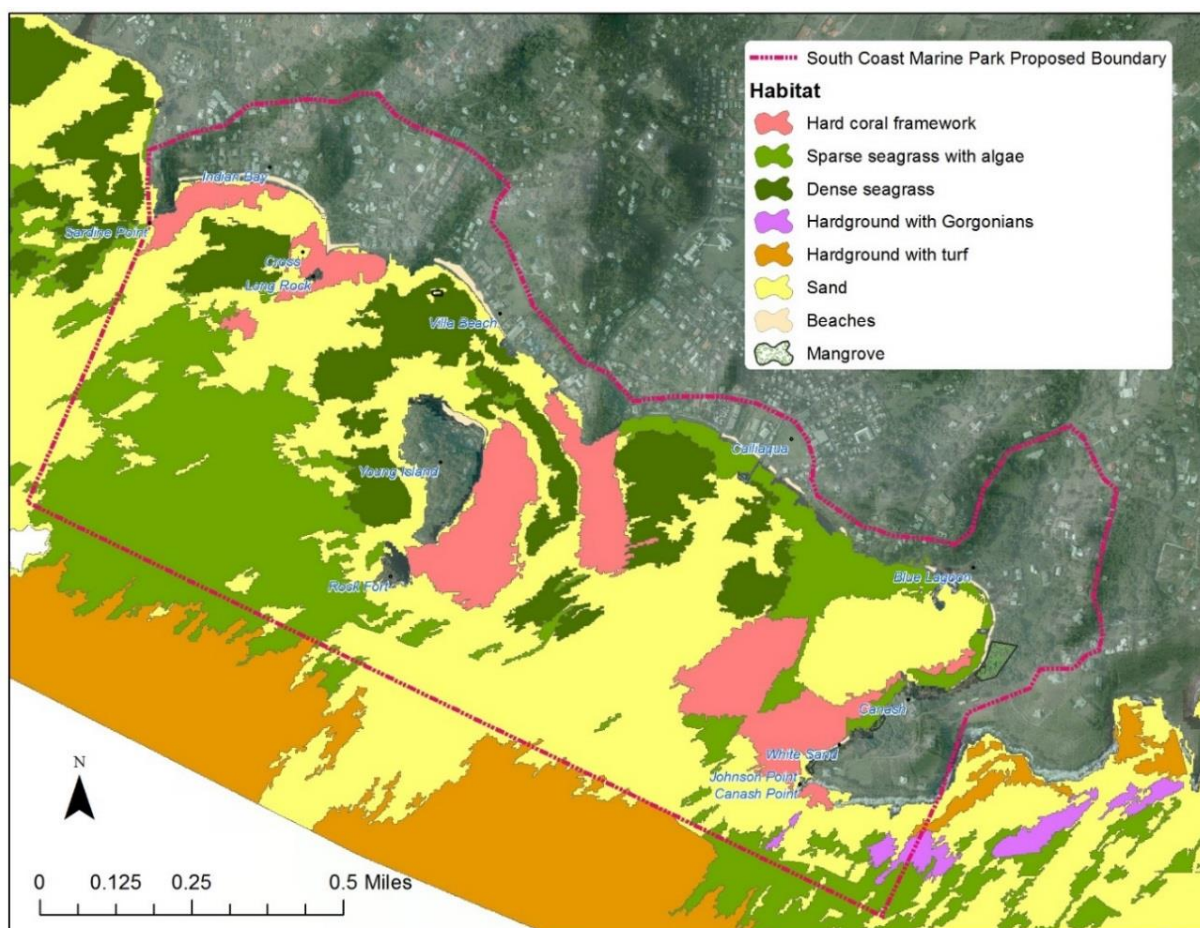


Figure 2: Map of the coastal marine habitats of the South Coast Marine Park (PURKIS 2015).



Figure 3: Map of the location of mangrove stands found within the SCMMA (BALDWIN 2014)

3.1.1 Blue Lagoon, Canash, White Sand (create feature map for each)

Most notable is that the Blue Lagoon and surrounding Canash area contains the only representative reef ecosystem on the mainland of St. Vincent, which includes adjacent areas of mangrove, seagrass and reef habitat. There is also a high density of West Indian sea eggs (*Tripneustes ventricosus*) and black sea urchins (*Diadema antillarum*) located on the barrier reef surrounding the Blue Lagoon. This type of representative reef ecosystem is essential for biodiversity and fisheries by providing a number of important ecosystem services, fish nursery and life-cycle habitats. Additionally, there is a high density of Elkhorn coral (*Acropora palmata*) which is listed as a high risk species on the IUCN Red List as well as a critically endangered species (CITES Appendix II) considered to be one of the most important reef-building corals in the Caribbean. There is a large number of young *Acropora* recruits comprising a natural 'coral nursery' area on the outer edges of this barrier reef. Care should be taken to carefully protect and monitor this fragile coral nursery area. Moreover this area (if carefully regulated) could potentially be promoted as an ecotourism attraction (comprising of both a representative ecosystem containing both fish and coral nurseries) within the new Marine Park.

Despite these highlights there are several indicators of poor water quality in the Blue Lagoon, Canash and White Sand area. A large abundance of nutrient indicator algae is present in the lagoon with a high amount of sedimentation and trash scattered along on the seafloor. Notwithstanding the poor water quality, there is a moderate density of reef and seagrass that provides important nursery grounds for a number of fish and invertebrate species.

3.1.2 Calliaqua

The marine habitat of Calliaqua is primarily comprised of mud, slit, sand and seagrass. The area is surrounded by a large number of commercial uses (i.e. Coast Guard Base, Police Station, Howard Marine, Fisheries Centre and fish market as well as many other local businesses and residents) that surround the adjacent coastal area. Calliaqua is also actively used by fishers in the area to harvest coastal pelagics and reef fish using seine nets and hand lines. As a result of high population density, improper coastal development practices and watersheds that drain into the marine environment, high levels of sedimentation are frequently observed in the water column resulting in extremely low visibility (less than 3-5 feet in areas). Additionally large amounts of trash, fishing line and derelict ship wrecks are scattered on the seafloor throughout the area. Previous water quality monitoring has also shown that Calliaqua comprises some of the poorest water quality within the SCMCA (Baldwin 2014b). Overall a low abundance of fish were observed and the presence of the invasive lionfish was also seen in the area. Despite this, there is a fringing reef in the area located along the western side of Calliaqua Bay (e.g. locally called 'Corner'). This reef shows high levels of stress from sedimentation and pollution resulting in low visibility and the presence of nutrient indicator algae. Notwithstanding this, there is a limited amount of coral recruitment and juvenile fish were observed. Improved management of LBS pollution to increase the water quality within Calliaqua is recommended and will serve to increase the potential for recovery of the marine ecosystem in the area.

3.1.2.1 Young Island / Fort Duvernette

The marine environment surrounding Young Island and around Fort Duvernette (Rock Fort) comprises a vast areas of relatively healthy coral reefs as well as a number of seagrass beds. A high diversity and density of hard and soft corals surrounding the area (Baldwin 2014b). Likewise fish abundance and diversity is high, with the shallow areas around Young Island and Rock Fort providing critical nursery habitat for a number of juvenile fish and invertebrate species. Important bird nesting sites are also found on Young Island and Fort Duvernette in which the Long-tailed Tropic Bird, Little Blue Heron, Yellow Crown Night Heron (Crab Heron) and Egrets can be seen (Baldwin 2014b). Hawksbill sea turtles were observed foraging during surveys (Baldwin 2014b, 2015). Overall trash, sedimentation and nutrient indicator algal levels were observed to be low indicating good water quality in this area.

Furthermore the boulder reefs and seagrass beds on the western side of Young Island provides a critical biodiversity area that is also important to the livelihood of dive tourism operators. A specialty 'Critters' SCUBA dive in which sea horses, shrimps and other small crustaceans/invertebrates as well as a large diversity of juvenile reef fish can be seen living within the seagrass beds, reefs and mooring systems is marketed by local dive shops. This area of high biodiversity should be protected and highlighted as a conservation-based attraction within the new marine park. Additionally this same area is frequently used by fishers in the area to harvest baitfish using seine nets and reef fish using hand lines and spear guns.

3.1.2.2 Villa

The coastal area of Villa Beach and surrounding waters comprise the largest number of marine uses (i.e. yachts, water taxis, ferry, divers, bathing, kayaking, fishing) in the SCMP study area (Baldwin 2014b). Correspondingly the area hosts the highest density of coastal hotels and tourism-related restaurants/bars on the

mainland of St. Vincent. An ecologically significant and relatively healthy reef with a high density and diversity of juvenile fish located on the eastern side of the Young Island Cut channel (adjacent to Young Island). All of the coastal fringing reefs and seagrass beds in the Villa area are found to provide nursery grounds for fish. There is a high density of West Indian sea egg (*Tripneustes ventricosus*), black sea urchins (*Diadema antillarum*) can be found. The invasive seagrass species (*Halophila*) is now abundant throughout the Villa area. Hawksbill sea turtles intermittently nest on Villa beach (Baldwin 2014b, C. Tango personal comm. 2015). There is a large amount of yachts, trash, derelict ship parts and sewage/grey water drainage outfall pipes were observed in the area and contributes to the poor water quality observed (Baldwin 2014b). Improved management of coastal development and sources of both land and marine-based pollution are needed to improve the marine ecosystem and tourism potential in the Villa area.

3.1.2.3 Indian Bay

Indian Bay contains sand, reef and seagrass bed habitats. Again the presence of the invasive seagrass species *Halophila* was dominant, with the exception of a small patch of *Thalassia testudium* near the east end of Indian Bay beach. Overall there was a medium abundance and diversity of fish and nursery grounds were observed throughout the bay. One area of notable ecological significance is a relatively healthy *Montastraea annularis* patch reef south-east of Grand View Point in which a high diversity and density of reef and fish were observed. Hawksbill sea turtles intermittently nest on Indian Bay beach (Baldwin 2014, C. Tango personal comm. 2015). There is a high density of West Indian sea egg (*Tripneustes ventricosus*) urchins found around Dove and Dike Islands (off Indian Bay).

A number of indicators of poor water quality are present, namely the presence of nutrient indicator algae on the fringing reefs as well as high levels of sedimentation and trash found throughout the seafloor. Indian Bay is frequently used for diving, snorkeling and swimming by both the community and tourists alike. Additionally Indian Bay is frequently used by fishers in the area to harvest baitfish using seine nets and reef fish using hand lines and spear guns.

3.2 Cultural and historical resources

Apart from hosting a variety of critical marine habitats such as coral reefs, seagrass beds and mangroves noted in the previous section, the SCMMA is also home to a number of historical sites and cultural resources (Figure 4).

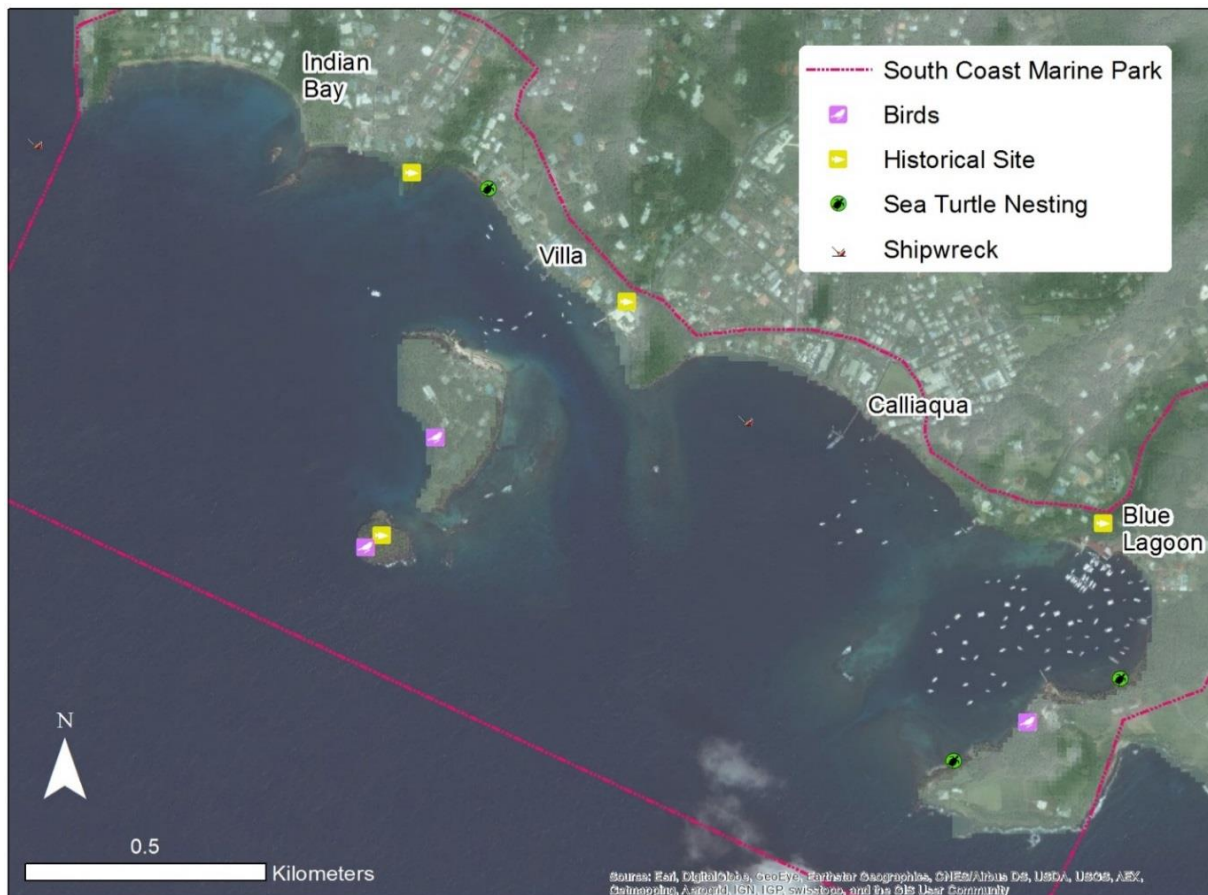


Figure 4: Map of coastal and marine resources and historical sites found along the SCMMA.

Fort Duvernette (Rock Fort) is a rocky volcanic plug pinnacle (60 m above sea level) comprised of hard columnar basalt and is located next to Young Island (SVGTA 2015). Fort Duvernette is a designated National Historical Site owned and operated by the SVG National Trust (since 1971). Rock Fort is home to the ruins of two elevated batteries with cannons that were constructed to defend the town of Calliaqua during the colonial era of St. Vincent and the Grenadines (SVGTA 2015). Today the National Trust has constructed a small jetty, bridge and signage with garbage receptacles on site. There is also 255 steps that wrap around to the peak of Rock Fort which provides a gazebo and picnic tables hosting phenomenal vistas of the surrounding SCMMA. Rock Fort is actively used by locals and tourists alike for hiking, picnicking and sightseeing and host a large amount of biodiversity which should be conserved and carefully managed.

There is also a petroglyph site in Villa as well as lime kiln and sugar mill ruins located in Ratho Mill. Although these sites are presently undeveloped they could be potentially developed and showcased as additional historical sites within the SCMMA.

The Calliaqua Fisheries Centre and adjacent playing field are heavily used by the community surrounding the SCMMA. It is recommended that infrastructure in this central community-based area should be further developed to support alternative livelihoods and increase community education of and support for the SCMMA.

Villa is the epicenter of tourism operations on the mainland of St. Vincent, hosting the majority of the mainland's accommodation sector yet lacks basic coastal infrastructure such as restrooms, water/showers and trash facilities. It is recommended that infrastructure is also developed in this central tourism area to increase the potential for tourism and supporting alternative livelihoods provided by the SCMMA.

Renovations to the Blue Lagoon marina and hotel has recently improved the aesthetics of the Canash area. Blue Lagoon Marina now hosts a full-service hotel, number of restaurants, beach bar and café. As a result the area has seen an increase in usage by the surrounding communities and tourists.

Indian Bay Beach is extremely popular area for Vincentians to swim / bathe. Some initial infrastructure (for a park office, vending and washrooms) was recently constructed in 2015 (Photo 1). Since there is already two full-time year round vendors and a number of seasonal vendors (particularly during cruise ship days and bank holidays) additional infrastructure will be required to support the local needs and future development of the SCMMA.



Figure 5: Beach facilities recently constructed for the SCMMA in Indian Bay.

3.3 Socio-economic context

Historically the GoSVG has placed a large amount of effort on the agriculture sector and as a result the tourism and fisheries sectors have predominately remained small-scale in nature. Fishing is a main source of employment and livelihood in SVG with 29 landing sites and 5 fisheries centers located on the mainland (Labban and Oxenford 2013). The Calliaqua Fishing Centre is the second largest landing site in St. Vincent and is located within the SCMMA. The Fisheries Division has registered 59 fishers and 51 fishing boats based in Calliaqua (the actual number of fishers in the area is thought to be slightly larger). The Calliaqua Fishing Centre hosts a fishing jetty, an active fish market, storage freezer facilities, water and ice machine, fishing gear lockers as well as a fisheries officer on duty. Additionally there is a long standing fishing cooperative (CALFICO) with more than 79 active members (Tannis 2015, pers. comm.). The use of seine nets, spear guns and hand line fishing gear was frequently observed being utilised in the SCMCA. Moreover there are a number of persons that engage in shore fishing (using handlines off of rocks/wharfs on a recreational basis) as well as a limited number (< 10) of older fishers using non-motorised (or low <10 hp) row boats to fish with hand lines in the coastal waters. The SCMP is also of high significance to Calliaqua fishers

in relation to the catching of baitfish (primarily jacks and robin) using a seine net. The entire SCMCA is well recognised by fishers as providing critical fish nursery grounds (i.e. fish, turtles, queen conch, lobsters) and corroborated by marine surveys undertaken (Baldwin 2014b; Baldwin 2015).

More recently SVG has sought to become an emerging tourist market in which marine-based tourism (scuba diving and yachting) is rapidly growing (ECLAC 2002, Baldwin 2012, CATS 2014). Indian Bay, Villa Bay, Calliaqua and Young Island are among the locations where the majority of tourism development has occurred on the southeastern coast of St. Vincent where a coral shelf has resulted in the creation of white sand coral beaches (Baldwin 2014b). A rapid marine resource user (MRU) inventory was undertaken (2014) to better understand the abundance and distribution of space-use patterns and socio-economic conditions of the SCMCA marine resource users. MRUs identified include yacht charter/provisioning companies, fishers, dive operators, day tour/water taxi operators and vendors. It was estimated that at least 57 individuals are directly employed from livelihoods based on the marine environment (N.B. The actual number of direct and indirect livelihoods are thought to be substantially higher than reported in this preliminary inventory and assessment).

A few small-scale day tour / water taxis catering to both visiting yacht-based and cruise ship arrival tourists operate primarily from the Young Island dock. A variety of day tours and beach BBQs are offered in the SCMCA. Rock Fort is identified as an area of high importance for day tours to host picnic-style BBQs and sightseeing. There are beach vendors located at the main Young Island jetty, Villa beach and Indian Bay beach. The number of tourists, watertaxi operators and vendors are known to dramatically increase on days in which the cruise ships are in at the Kingstown Port. Services currently provided by vendors include the sale of drinks, snacks and crafts with one vendor offering beach chairs for rent on Villa beach.

All hoteliers and vendors indicate facilities such as washrooms, showers and pipe borne water and a crack-down on crime/left in the area are urgently needed to improve their livelihood and guest satisfaction (Baldwin 2014b, Baldwin 2015). Vendors in the Villa and Indian Bay area presently use the local waste collection system; and plastics are sometime given to private individuals that recycle them. The glass bottles sold are collected as a deposit refund system is in place. Despite this there is a large amount of trash found both on land and on the seafloor in these high use areas. Waste storage facilities were only found on Young Island and at Indian Bay. MRUs in Villa and Indian Bay indicate a need for increased waste storage, removal and recycling facilities. Improving coastal infrastructure and an improved system of recycling and garbage disposal should be a priority for the new marine park. This threat can also be developed into an alternative livelihood opportunity for at least one individual in the community.

Economically, visitors play an important role to the SCMMA as they bring revenue to the area when arriving to snorkel, swim, dive and sight-see (CATS 2014). User conflicts have arisen as a result of the intense usage of the area by a variety of stakeholders including residents, hoteliers, visitors and vendors (CATS 2014). In 2012 an economic valuation study was conducted (using both Choice Experiments and Contingent Valuation surveys) to assess the economic value of ecosystem services associated with the SCMCA (Christie and Teelucksingh 2012). These surveys found that there is a willingness to pay for enhancement of ecosystem services through the improvement of the South Coast MCA. Ecosystem services that were among the most highly valued are the protection and enhancement of the coastal environment, increases in the

abundance of fish, maintenance of human health and ecosystem resilience (Christie and Teelucksingh 2012). Therefore Christie and Teelucksingh (2012) found that the greatest ecosystem service benefit would be achieved by preventing LBS pollution and controlling sewage, sand loss and the destruction of coral as well as the introduction of no-take management zones.

Lastly, the present network of roads and beach access in the proposed SCMMA is considered to be poor. Despite that all beaches are property of the State, the majority of beach access presently occurs through private properties (CATS 2014). This issue should be further explored by the GoSVG and addressed in the SCMMA management plan and other subsequent initiatives.

3.4 Institutions, organisations and stakeholders

Stakeholders of the SCMMA range from marine-related government and non-governmental agencies, individuals and a variety of groups that depend on marine resources for livelihood or as users of the resource (Baldwin 2014b). The following stakeholders are identified as being central to the SCMMA.

Government

- National Parks, Rivers and Beaches Authority
- Fisheries Division
- The Marine Parks Board
- Ministry of Health, Wellness and the Environment
- Maritime Administration
- Ministry of Tourism, Board of Tourism
- Forestry Department
- Coast Guard
- Central Planning Division
- Physical Planning Unit
- Port Authority

NGOs

- SVG National Trust
- SusGren, Inc. and the Grenadine network of MPAs
- The Nature Conservancy, Eastern Caribbean Programme (and the ECMMAN Project)
- Birdlife International
- Richmond Vale Academy

Civil society, community groups and resource users

- Calliaqua Fisher Folk Cooperative (CALFICO)
- Coastal communities (Canash, Ratho Mill, Calliaqua, Rose Cottage, Villa, Indian Bay)

- Dive shops, day tours, watertaxis, yachting charter companies, vendors, marina
- Inivershall Rastafari Movement
- Local businesses (shops, restaurants, boat and repair yards)
- SVGHTA and accommodation sector

3.5 Policy and management framework

It is well recognised that the success of protected areas depends on the existence of a strong legal basis which includes coordination between legislation and agencies, enforcement of regulations, management protocols and clearly defined roles and responsibilities of all stakeholders. There are over forty (40) pieces of legislation that govern aspects of the SCMCA marine space, yet much of the existing legislation is outdated and thus fails to address the new challenges facing the environment (Gaudin 2014). With the exception of the Maritime Action Plan (2005), the draft Marine Tourism Policy and the draft Fisheries and Aquaculture Policy (2013), St Vincent and the Grenadines lacks an overarching policy framework to deal with the development and management of marine resources (SVG MARAD 2014). Notwithstanding this, SVG has adopted a Protected Areas System Plan (2010-2014) for both the marine and terrestrial environment despite the lack of a land use policy, national physical plan, or integrated environmental management plans formally in place (Gaudin 2014). Once approved by Cabinet the National Ocean Policy (NOP) will fill this shortcoming by providing direction for the integrated management of the nation's coastal marine space and resources by establishing a policy and legal for sustainable ecosystem-based management. It is therefore essential that the NOP (2015) and other supporting policies be formally adopted and implemented to support protected areas management in SVG. For example, considering the on-going expansion of coastal and marine-based tourism, policies and management developed should ensure that tourism activities aligned with other relevant sectors in an integrated and sustainable manner. Accordingly the National Tourism Policy presently being updated will include a Marine Tourism Policy component to regulate the operations of vessels, develop tourism sites with significant biodiversity and cultural and historical heritage, as well as the comanagement of recreational activities by strengthening capacity building through the development of infrastructure and marketing programmes (CATS 2014). Without this type of integrated national commitment from all sectors and stakeholders, effective management of protected areas such as the proposed SCMMA will be challenging.

The following is a list of key legislations, policies and plans that presently guide marine management in SVG.

Legislation

- Central Water and Sewerage Act (1978)
- Environmental Health Services Act (1991)
- Environmental Impact Assessment Regulations (Draft, 2009)
- Fisheries Act (1986)
- Fisheries Regulations (1987)

- Fishing Processing Regulations (2001)
- Forestry Act (1945)
- High Seas Fishing Act (2001)
- Maritime Areas Act (1983)
- National Parks Act (2002)
- Public Health Act (1977)
- Town and Country Planning Act (1992)
- Waste Management Act (2000)
- Wildlife Protection Act (1987)

National Policy and Plans

- Economic and Social Development Plan (2013-2025)
- Environmental Management Strategy (2004-2006)
- Fisheries and Aquaculture Policy (2013)
 - Fisheries Management Plan (Draft, 2005)
 - Conch Management Plan (Draft, 2008)
 - Lionfish Response Plan (Draft, 2012)
- Ocean Policy and Action Plan (Draft, 2014)
- Parks and Protected Areas Plan (2010-2014)
 - TCMP Management Plan (2007-2009)
- Physical Development Plan (2001-2021)
- Marine Tourism Policy (Draft)

3.6 SCMMA initiatives taken

In recent years a number of ecological and socio-economic studies have been conducted for the south coast of St. Vincent. In 2011 an assessment of the management capacity of SVG MPAs was executed to review the existing information and identify gaps in MPA management capacity (Pena 2013). Needs for the SCMCA in terms of training, funding and technical assistance required to establish a successful MPA were identified. From 2010 to 2012 by the United National Development Program (UNDP) conducted an economic valuation of the south coast MPA. An economic valuation of marine and terrestrial habitats and a willingness-to-pay study were completed to assist in national development planning (Christie and Teelucksingh 2012).

In 2012 the GoSVG received a grant to develop a management plan for the SCMCA. The aim was to develop effective management plans and administrative structures, educate relevant stakeholders, and collaborate with the NPRBA Systems plan and management objectives of the Fisheries Division. Unfortunately this project was not implemented (Gaudin 2014).

In 2013 under the CATS Component 2 Project, a stakeholder analysis was to be carried out for the SCMCA yet this project only determined that the park had not commenced operation (Gaudin 2014). Socio-

economic (SocMon) studies were also carried out in 2013 through the UWI's Centre for Resource Management and Environmental Studies (CERMES), under funding of the United States Fish and Wildlife Foundation (NFWF) (Pena 2013). This also included a participatory mapping exercise of the SocMon parameters to create a number of corresponding spatial socio-economic GIS datasets (Wood 2013). Both of these projects also strengthened the capacity for effective MPA management by not only creating social and economic data but simultaneously training various GoSVG agencies in the execution of SocMon site assessments (Gaudin 2014).

In 2014 a training exercise involving 25 persons from 10 agencies was undertaken to inventory and rapidly assess the coastal marine resources of the SCMCA (Baldwin 2014b). Field surveys of ecological and socio-economic parameters together with mapping exercises of coastal marine habitats, resources and space-uses patterns were created (and updated in this project) for use in the development of the marine multi-use zoning design and the determination of an appropriate management plan for the proposed SCMMA.

In 2014 under the CATS Component 2 Project, the proposed marine management area for the south east coast underwent an initial management planning process that provides a draft framework for the potential management for the marine park (Murray 2014). Nevertheless the development of the boundaries for the new marine park (SCMMA) were not clearly defined in this draft management plan. Moreover the landward boundaries of the park were not established and as a result regulating LBS of pollution into the SCMMA has proven difficult (Gaudin 2014).

A review of the key components of the draft management plan (Murray 2014) relevant to the development of the zoning design and moorings plan are provided in the following section.

Vision for the South Coast Marine Park

To develop and promote the ecology of the South Coast Marine Park resulting in sustained, long-term environmental integrity and functionality that supports economic and social partnerships and benefits, promotes social equity and strengthens the management structure of the South Coast Marine Management Area

To do this the objectives of the SCMMA will be to:

- Minimize negative pressures in order to protect, enhance and restore the coastal and marine ecosystems;
- Generate sustainable social and economic benefits for all stakeholders in the SCMMA;
- Provide recreational services which are compatible with the SCMMA values and rules;
- Institutionalize a co-management framework to develop and manage the various resources of the SCMMA in equitable and sustainable manner for the benefit of all stakeholders.

From 2014 to 2015, SusGren Inc. established a monitoring framework for the network of Grenadine Marine Protected Areas (MPAs) which includes the proposed SCMMA. This monitoring framework identifies management targets for monitoring and evaluation of the effectiveness of these MPAs (SusGren 2015). The drafted framework for the monitoring of MPAs focuses on three main categories: ecological or the effective protection of natural resources; socio-economic and mechanisms for stakeholder engagement; and the efficient and effective coordination of administration. Table 2 summarises the indicators, targets and successes of the developed monitoring profile for the SCMMA (SusGren 2015).

Table 2: Summary of profile for SCMMA (SUSGREN 2015)

| Indicator | Target | Success | Comments |
|--|------------------------------|---------|---|
| Reef Ecosystem | | | |
| Live Coral Cover | No net decrease | - | Annual monitoring baseline set in 2014 |
| Diseased/Bleached Coral Cover | No net decrease | - | Annual monitoring baseline yet to be established |
| Biomass of Herbivorous Fish Species | Increase | - | Annual monitoring baseline set in 2014 |
| Abundance of <i>Diadema</i> sp | >1/ m ² | Yes | <i>Diadema</i> abundance was 0.48 individuals per m ² |
| Biomass of Commercially Important fish species | Increase | - | Annual monitoring baseline set in 2014 |
| Change in the Extent of Mangroves | No decrease | - | Baseline set in 2014 (1.32 Ha) |
| Biodiversity | | | |
| Sea Turtles | Existence of a program | No | No sea turtle program |
| Queen Conch | Existence of a program | No | No conch monitoring program |
| Sea Birds | Existence of a program | No | No sea bird program |
| Water Quality | | | |
| Temperature | | Yes | NPRB Water Quality Program |
| Turbidity | Establish baseline | Yes | NPRB Water Quality Program |
| Fecal Bacteria/ Coliform | E.coli levels | Yes | Baseline established in 2014 |
| Compliance | Ranger presence and log book | No | Only coastal (terrestrial) patrol and site visits. One ranger and visits are ad hoc. |
| Stakeholder Participation | | | |
| Consultation Meetings | >3 | Yes | Three consultation meetings |
| Active Partnerships | >=2 | Yes | 9 partners; public and private sector |
| Volunteer Cleanups | 1-3 | Yes | Two volunteer cleanups |
| Lionfish Capture Events | At least 1 | Yes | Fisherman's Month- Lionfish Derby |
| Education and Communications | | | |
| Number of Communications Efforts | At least three | Yes | Social Media, two outreach programs |

| Indicator | Target | Success | Comments |
|--|--------------|---------|--|
| Number of Education Programs | At least one | No | None. |
| Stakeholder Perception | Positive | No | People are hesitant and somewhat reluctant to working together |
| Efficient and Effective MPA Coordination and Administration | | | |
| Long term Monitoring Site | At least one | Yes | Three permanent monitoring sites are established |
| Adaptive Management Efforts | 1-1 | No | Management efforts not monitored 2014-2015 |

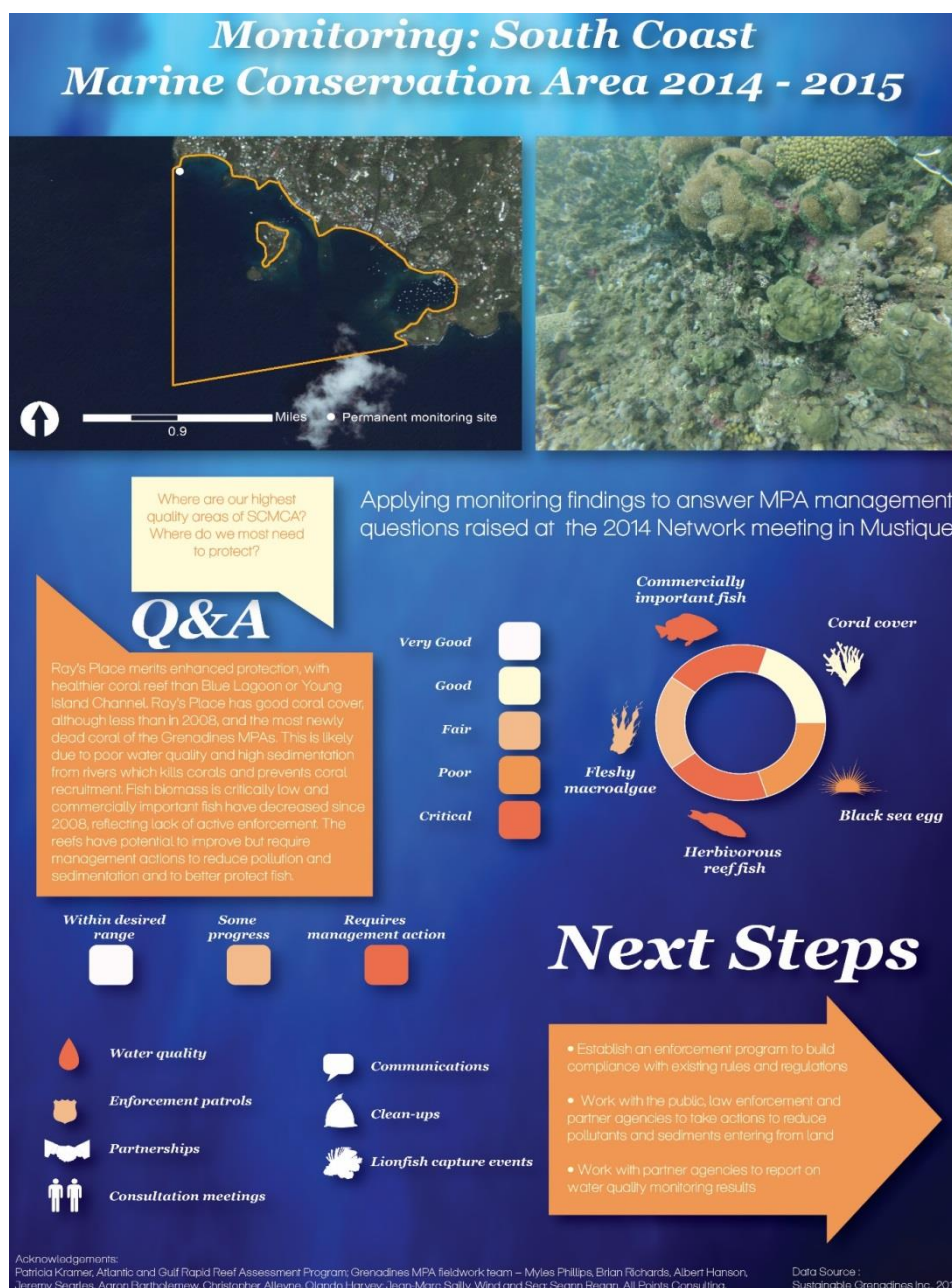


Figure 6: Monitoring of the South Coast Marine Conservation Area

In 2015 a Strategic Action Plan (SAP) was drafted to provide country specific recommendations to enhance the management effectiveness of the SCMMA (Andrade 2015). The SAP sets out to provide a framework to support roles and responsibilities of management areas in SVG by improving the legal framework, institutional arrangements and clear roles and responsibilities for management (Andrade 2015).

3.6.1.1 Recommendations for governance of the SCMMA

Historically a top down sectoral approach has been applied to the management of coastal and marine resources in St. Vincent and the Grenadines. Furthermore marine management has not been integrated amongst and between all relevant sectors and stakeholders and has resulted in an overall degradation of coastal marine resources thereby supporting a need for an ecosystem approach to governance (Baldwin et al. 2013). St. Vincent and the Grenadines is signatory to many international regional multilateral agreements which encourage an ecosystem approach to management (Baldwin 2012). Likewise a core strategy of the National Economic and Social Development Plan (2013-2015) is 'the implementation of marine management areas to promote positive social, economic and ecological changes through the effective utilisation and management'. In recent years the Government of St. Vincent and the Grenadines (GoSVG) has made significant strides in the development of an ecosystem-based co-management approach and has shown thus far to be effective (Hoggarth 2007, Baldwin 2012, Baldwin et al. 2013, SusGren 2015).

It is recommended that the legal framework of the park be revised, a simple and effective 'ridge to reef' or ecosystem-based management plan (and corresponding enforcement strategy) is devised, and an effective communication strategy be implemented for the SCMCA to support the successfully upgrade of the SCMCA into a functional marine park and management area (SCMMA) (Baldwin 2014b, Gaudin 2014, Andrade 2015). The government must be lobbied to adopt the National Ocean Policy and take action to protect resources and livelihoods by implementing supporting policies and amending legislations where required.

Education and training must be carried out to ensure that stakeholders, on-the ground managers and personnel can clearly understand the role they are to play and are capable of handling their day-to-day obligations as well as assist with ecological and socio-economic monitoring required for effective management (SusGren 2015). All financial operations and practices should also be full accountable and transparent in regards to the management of the marine park to gain acceptance and be effective. Without the complete establishment of concept, design, operations and sustainability, the SCMMA will face recurring problems and will not succeed as an effective marine park (Gaudin 2014).

Thus the operational model proposed for the management of the SCMMA is developed based on the structure of the Tobago Cays Marine Park (TCMP) and will integrate the lessons learnt from the TCMP experience and seek to incorporate improvements (Murray 2014). Figure 7 outlines the financing, governance and management system proposed for the SCMMA in the Zero Draft Management Plan (2014).

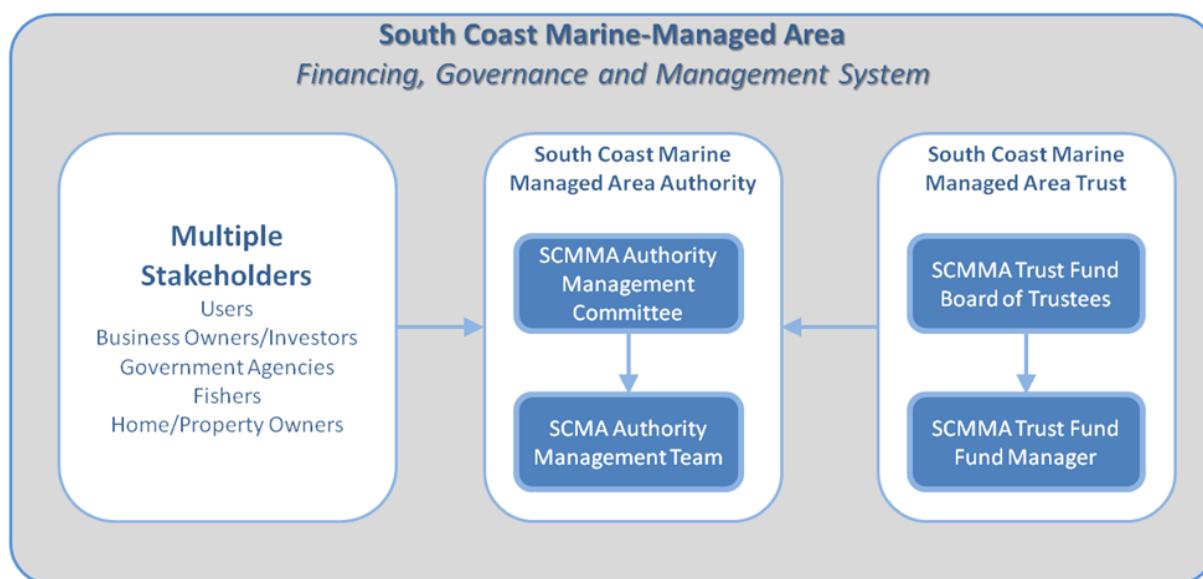


Figure 7: SCMMA management model (MURRAY 2014)

According to Murray (2014), revenue generation and funding for the SCMMA can be derived from a variety of sources. It has been recommended that a SCMMA trust fund be established in which all finances would be overseen by a Board of Trustees. Ideally, this Board would consist of multi-sectoral members from both the public and private sectors with knowledge of financing and investments as well as environmental, conservation and protected area issues. The SCMMA Board should be independent entity that is transparent with the finances in which independent auditing is conducted (Murray 2014). Possible sources of identified funding includes:

- Donor funds: Develop projects to be submitted to international NGOs, multilateral and bilateral organizations like TNC, GEF, FAO, DFID, JAICA and GIZ. Additional, efforts will be made to solicit research grants.
- Park service fees: The park will host a diversity of users that can be used to generate revenue (i.e. marine park entry, license and research fees)
- Government subvention: Government's commitment will be sought for a determined annual subvention for the functioning and management of the SCMMA
- Establishment of a trust fund: In order to leverage additional revenue and make it sustainable in the long term a conservation trust fund will be established. In this case, it would be the SCMMA trust fund with an endowment component initially set up from fund from donor agencies.
- Donations: A donation drive will be held to encourage local, regional and international individuals and businesses to make donations towards the upkeep of the area.
- Fund raising activities: The SCMMA should develop and undertake annual fund raising events.

Stakeholders can and should play an effective role in the governance of the SCMMA by assisting with essential management responsibilities thereby reducing the cost of effective management. Some examples include: hotels marketing the SCMMA to guests and collecting user fees and pledges; Police, Coast Guard and marine park wardens jointly patrolling and enforcing regulations; fisher folk and marine operators assisting with the control of invasive species and habitat and resource monitoring, Chamber of Industry

and Commerce and the Tourism Authority marketing and generating funds for park management; and the participation of local schools and other academic institutions in the conduction of research and promotion of public awareness and education (Murray 2014).

3.7 Priority Issues

For the effective implementation of the SCMMA it will be necessary to manage the south eastern coast and its resources in a manner which ensures the stability and sustainability of the stakeholders and residents in the area, while also improving supporting economic activities such as tourism, agriculture and fishing. This may prove to be a challenge as the location of the SCMMA as it also hosts the greatest concentration of tourism and coastal activities in St. Vincent and is greatly affected by solid waste and sewage disposal from both land-based and marine sources of pollution (including bilge and wastewater from yachts), physical damage from anchors and diving, unregulated coastal development, invasive species, climate change and unsustainable fishing practices (Kilgo and Edwards 2010, Baldwin 2014b, CATS 2014). Concurrently boosting supplementary economic activities and alternative livelihoods should be a priority and incorporated within the management planning process for effective implementation and social acceptance.

3.7.1 Threats to the SCMMA

The SCMMA is faced by a number of pressures which have adversely affected its' potential to provide important ecosystem services (Andrade 2015). Declining health and biodiversity of the coastal marine ecosystem due to increasing eutrophication has resulted from insufficient solid, liquid and sewage waste disposal. Pollution is placing significant stress on the coastal and marine environment as well as has serious health implications for the surrounding communities (Figure 8) (Kilgo and Edwards 2010, Gaudin 2014). Furthermore inappropriate coastal development practices such as unplanned ad-hoc development, removal of coastal vegetation, poor road and site management practices during construction also pose a threat to protected areas (Gardner 2009). Beach attrition is a major threat to the SCMMA over the past 20 years and has resulted in the steady decline in the width of beaches and increasing amount of erosion are seen (Kilgo and Edwards 2010, White 2012, CCCRA 2012). A number of unregulated activities threaten the environment as well. For example individuals who have installed and privately manage mooring buoys have also contributed to detrimental effects on the marine ecosystem (Gaudin 2014). The lack of regulation of the mooring systems presently installed have resulted in the destruction of coral and seagrass habitat as well as the loss of a potential revenue source by the GoSVG to manage the SCMMA (Fairhead and Baldwin 2015).

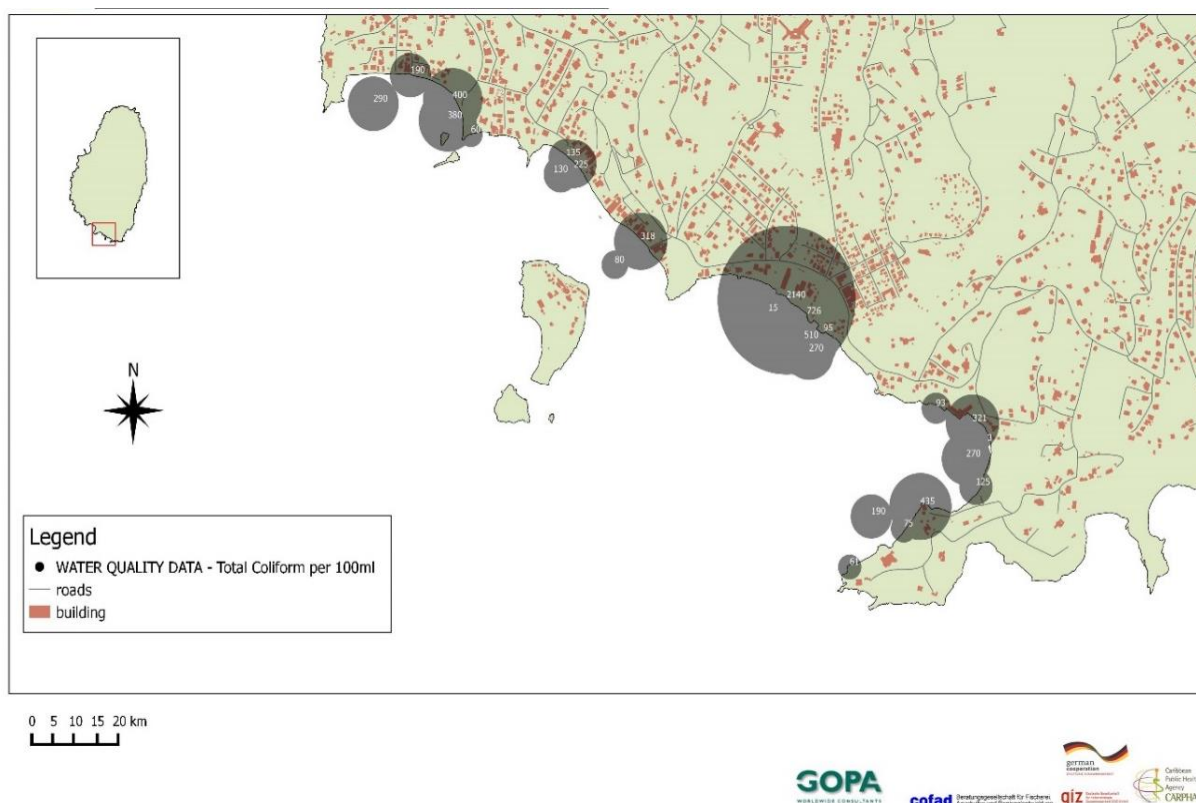


Figure 8: Water quality results of the SCMMA (NPBRA 2014).

The presence of invasive species can also threaten local ecosystems and habitats by reducing the amount of biodiversity in an area. Since 2011 St. Vincent and the Grenadines has been victim of the exponential growth of the lionfish population. Presently there is no formal management plan in place to evaluate the presence and control of this species in protected areas, or in the wider coastal and marine environment of SVG. Similarly over the past two years the invasive seagrass (*Halophila* spp.) has been introduced and has rapidly outcompeted the other previously dominant species of seagrass (*Thalassia* and *Syringodium*) reported to be observed throughout the SCMMA (Kilgo and Edward 2010, Baldwin 2014b). More recently *Sargassum* spp. seaweed has also seen exponential increases in abundance and distribution throughout the Caribbean and has had significant impacts on biodiversity, tourism and fishing activities (GCFI 2015). The effects of invasive species can be detrimental on the health of ecosystems and thus mitigation response plan must be a critical strategy of the SCMMA management plan.

The adverse effects of climate change such as storm surges, flooding, sea level rise and the increases in water temperature also pose a threat to the SCMMA (Smith Warner 2006, White 2012). A recent vulnerability and resilience study analysed the effect of sea level rise on the SCMCA area showed that almost half of the beach area would be lost if a SLR of 0.5 m occurred (Figure 9, CCCRA 2012). If there were to be a 1-2 m rise in sea level, Villa and Canash, and Indian Bay beaches would be lost (Gaudin 2014). Impacts from climate change should be anticipated and mitigation measures planned for within the development of the SCMMA management plan.

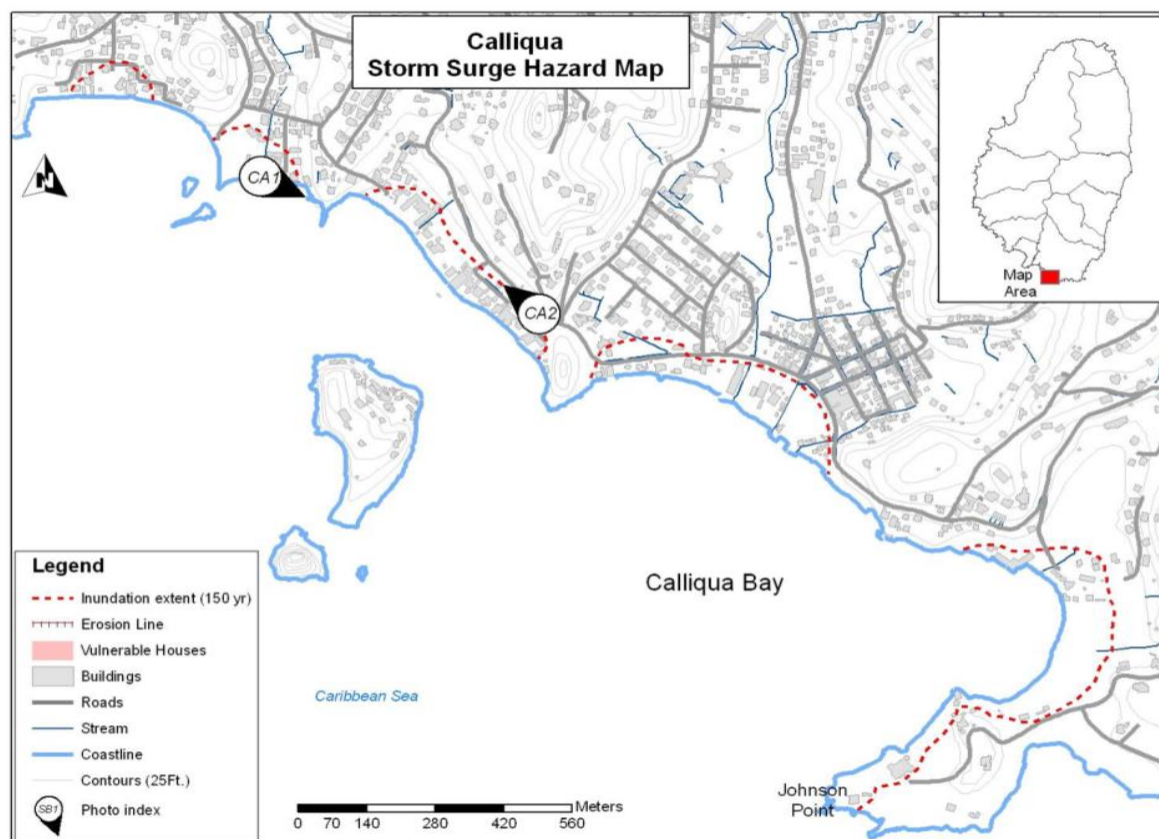


Figure 9: Storm surge hazard map for Calliqua (SMITH WARNER 2006)

Inadequate enforcement is also recognised to pose one of the largest threats to the success of marine protected areas. The presence of inadequate legal frameworks, capacity (manpower, financial resources, transportation, equipment, inconsistent monitoring), institutional coordination (communication between and amongst agencies and stakeholders, inadequate clarity concerning jurisdiction over specific resources, lack of knowledge and information on environmental issues) and other deficiencies (bribery, different interpretation of seriousness of environmental infractions) can contribute to ineffective enforcement and management (Gardner 2009).

3.7.2 Alternative Livelihoods

As a result of a heavy dependence of coastal communities on marine resources and the decline in these resources, there is an urgent need to find alternative livelihoods that are capable of providing reliable support for disadvantaged individuals. It is estimated that many individuals in the surrounding SCMMA survive on a monthly income of less than EC\$2,700 (CATS 2014). As such, the exploration of supporting alternate livelihoods for individuals in the communities surrounding the SCMMA should be a priority. This could be achieved in part through the hiring of community members as marine park wardens, implementing fish aggregating devices (FADs) in adjacent oceanic waters, developing mariculture activities (such as seamoss), the introduction of fish processing and other value-added activities as well as ecotourism (Baldwin 2014b). For the successful development of alternative livelihoods, an assessment of the capacity and needs of the community will be required. Furthermore close collaboration with other on-going initiatives

(i.e. ECMMAN) should be supported including the sharing of information and provision of training to ensure the reduction of duplicating efforts.

Successful development of alternate livelihoods will also hinge on the improvement of the aesthetics of the coastal and marine area of the SCMMA. This includes the widespread marketing of the SCMMA alongside the implementation of increased safety and security measures, reduction of LBS and marine-based sources of pollution and the improvement of waste management in the area and surrounding watersheds. Besides the tourism centres of Villa and Blue Lagoon, the Calliaqua Fisheries Centre and playing field area is a focal point of the surrounding communities and it is recommended that this area be further developed as a central point of the SCMMA. For example, signage as well as improvements to the fish market and adjoining pier, the creation of additional stalls for selling local crafts and agriculture can serve to support livelihoods and thereby increase widespread support from the communities.

3.7.3 Education

The wider Vincentian public will need to be further educated of the importance of the marine park and the wider coastal marine ecosystem including the associated impacts of LBS of pollution and terrestrial developments occurring in the surrounding watersheds. Signage regarding the SCMMA rules and regulations should be installed throughout the area together with the implementation of a number of targeted education campaigns for tourists and nationals alike for an on-going and long-term basis. The identification of community groups and leaders and the continued utilisation of two-way communication channels will also be important to ensure that the community interests are appropriately represented and included where possible in the management of the SCMMA. Open and transparent communication and co-management partnerships will be fundamental to the success of the SCMMA and should be encouraged for all management activities.

4

Field Assessment and Stakeholder Consultation

Field assessments (of the resources, space-uses and moorings) and consultations with key stakeholders were conducted from 20-26th October with local counterpart PIT support and relevant stakeholders (government and non-government, CBOs and marine resource users). Data was collected using interviews, field surveys and participatory resource mapping to verify and/or augment existing information for use in the preparation of the SCMMA zoning design and moorings plan.

4.1 Stakeholder engagement

Stakeholders were consulted in a variety of ways during the field assessment. Identified coastal and marine resource users and stakeholders included: the PIT and associated agencies, day tours operators, yachting charter companies, fishers, dive operators and beach vendors. A PIT and marine resource user meeting was held at the start of the week to preliminary share the plan of work and solicit participation in field surveys and mapping exercises. Next field surveys and key informant interviews were conducted with marine resource users (SVGHTA, dive shops, moorings and water taxi operators, charter yacht companies) and fishers (CALFICO) to inform these stakeholders of the project objectives as well as to share, review and validate / obtain feedback on existing spatial information. Previously collected information was validated and additional information on socio-demographics, resource (temporal and spatial) use patterns, proposed boundaries and management recommendations as well as a better understanding of environmental practices, issues and perceived threats was collected. At the end of the week a second PIT meeting was convened to share preliminary findings, obtain feedback on information collected and seek additional guidance on the draft zoning design and moorings plan.

4.2 Moorings mapping and assessment

All visibly present mooring systems and many that were not visible (i.e. sunken/destroyed due to contact with vessels or lack of maintenance) were located using local resources and information (i.e. Charlie Tango) and inspected and assessed within the SCMP. Over 200 mooring inspections were conducted in-water (using SCUBA) and included a physical assessment of the condition and its various components (i.e. buoys, ropes, shackles, chain and anchoring systems) of each mooring, depth, and a GPS location (point) were collected for each. The suitability of the various mooring designs (as dictated by its specific location, prevailing sea conditions, the nature of the seabed on/in which the anchoring system has been placed) and the intended use of the mooring (i.e. dive and charter vessels, private yachts, fishers), vessel size limitations in regards to safety and the environmental implications of the materials used were also assessed. Further

to the physical inspection of each mooring system, an assessment of the available 'swing room' between moorings and transportation channels dictating user limitations were incorporated. A detailed summary of the field surveys and the results of the existing mooring systems assessment and implementation recommendations are provided in the supplementary 'SCMMA Moorings Plan' report (Fairhead and Baldwin 2015).

The 'Halas' principles of mooring design (PADI 2005) were applied to the evaluation of and recommendations for the developed moorings plan (Fairhead and Baldwin 2015). Halas principles have been widely used and tested since the early 1980s with more than 1,000 Halas-type mooring systems are in use globally and within a number of marine protected areas (PADI 2005). The application of the Halas principles use environmentally-sound practices and result in the development of mooring designs and materials used that result in strong, locally-fabricated, inexpensive (installation and maintenance). A phased system of implementation of the moorings plan has been developed to allow for the incremental upgrading and implementation of a regulated moorings system for the SCMP in a cost-effective and environmentally sustainable manner.

5 Spatial data collection and creation

A number of preexisting spatial datasets were collected and reviewed as well as new data created for use in the development of the SCMMA zoning and moorings plan. The following list provides the pre-existing GIS dataset projects reviewed (shown by author and year).

- CATS 2 Regional MMA GIS Database (SVG CATS 2014)
- Grenadines Marine Resource and Space-use Information System (MarSIS) (Baldwin 2012)
- Marine Habitat Map for St Vincent and the Grenadines (ECMMAN - Purkis 2015)
- Spatial SocMon for the South Coast Marine Conservation Area (Wood 2013)
- South Coast Rapid Assessment and Inventory (Baldwin 2014)
- At the Waters Edge (AWE) Project (The Nature Conservancy 2011)

5.1 Geodatabase production

All spatial information was collected and created where possible and organised into a geodatabase to create GIS data (in both ArcGIS shapefile and Google Earth (.kml) formats). Table 3 provides a metadata table of all spatial data collected and created for the SCMMA listed by category, feature name, geometry (type), attributes, geoprocessing applied and data source.

Marine habitat, resource and space-use field assessments together with key informant interviews were integrated using GIS to better understand, validate and update information on the abundance and distribution of space-uses of marine resource users in the SCMMA. Spatial information was analysed to support the development of an equitable and balanced SCMMA zoning design and moorings plan. Spatial information on coastal and marine resources (breeding and nursery grounds, turtle and bird nesting area), space-uses / livelihood areas, marine park boundaries, moorings (existing and future potential), opportunities and areas of threat (sedimentation plumes, dumping, erosion, flooding, dredging, sand mining, mangrove cutting) and other perceived community problems and areas of high space use / conflict were identified.

Table 3: SCMMA metadata listed by category, feature, geometry, attributes, geoprocessing and data source

| Metadata table of marine spatial data | | | | | |
|---------------------------------------|------------------------------------|----------|-------------------------------------|---|----------------------------------|
| Category | Feature | Geometry | Attributes | Geoprocessing | Data Source(s) |
| Marine Resources | Marine habitats (2014) | Polygon | Habitat type, extent | None | Baldwin 2014 |
| | Marine habitats (2015) | Polygon | Habitat type, extent | None | Purkis 2015 |
| | Mangroves | Polygon | Species, extent | None | Baldwin 2014 |
| | Beaches | Polygon | Name, extent | None | Wood 2013 |
| | Birds | Point | Location | None | Baldwin 2014 |
| | Sea turtle nesting | Point | Name, species, monitoring | None | Baldwin 2014 |
| | Historical sites | Point | Name, type, infrastructure | Mapping exercises | Baldwin 2015 |
| Marine Resource Users | Dive shops | Point | Name, contact information | Digitised from imagery | Baldwin 2014 |
| | Day tour operator | Point | Name, contact information | Digitised from imagery | Baldwin 2014 |
| | Waternoxis | Point | Name, contact information | Mapping exercises | Baldwin 2014 |
| | Fishers (landing site) | Point | Name, number of fishers & vessels | Digitised from imagery | Baldwin 2015, Fisheries Division |
| | Yacht charter | Point | Name, contact information | Digitised from imagery | Baldwin 2015 |
| Space Use | Swimming | Polygon | Type of usage, area | None | Wood 2013 |
| | Snorkel / Dive | Polygon | Name, level use, highlights | Mapping exercises | Baldwin 2015 |
| | Baitfishing | Polygon | Extent | Mapping exercises | Baldwin 2015 |
| | Spearfishing | Polygon | Extent | None | Wood 2013 |
| | Handline | Polygon | Type of impact, level of impact | None | Wood 2013 |
| | Dive sites | Point | Name, level, usage | Mapping exercises | Baldwin 2015 |
| | Anchorage | Polygon | Name, type, level of use | Digitised from imagery & GPS points of moorings | BING Satellite Imagery |
| | Sailing Passage | Line | Extent | Mapping exercises | Baldwin 2015 |
| | Shipwrecks | Point | Depth, year, type vessel | Mapping exercises | Baldwin 2015 |
| | Vending | Point | Number of vendors, services, | Mapping exercises | Baldwin 2015 |
| | Haul out | Point | Name, services | Digitised from imagery | Baldwin 2014 |
| Infrastructure | Jetties | Line | Extent | Digitised from imagery | Baldwin 2015 |
| | Navigational | Point | None | Digitised from imagery | Baldwin 2015 |
| | Hotel | Point | Name | None | Wood 2013 |
| | Marina | Point | Name, contact information, services | Digitised from imagery | Baldwin 2015 |
| | Fish market | Point | Name, services | Digitised from imagery | Baldwin 2014 |
| | Cables | Line | None | Digitised from imagery | Baldwin 2015 |
| | Moorings | Point | Owner, type, GPS location | GPS points from field surveys | Baldwin 2015 |
| | Roads | Line | None | None | Physical Planning Unit |
| Threats | LBS pollution | Point | Type of pollution | None | Baldwin 2014 |
| | Sand mining | Line | Name of area | Mapping exercises | Baldwin 2015 |
| Jurisdictional | SCMCA (designated) | Polygon | Extent | None | Fisheries Division |
| | South Coast Marine Park (proposed) | Polygon | Extent | GPS points from field surveys | Baldwin 2015 |
| | SCMMA Coastal Buffer | Polygon | Extent | Centerline of main road digitised from imagery | Baldwin 2015 |
| | SCMMA Boundary (proposed) | Line | Extent | Merge of SCMP and Coastal Buffer features | Baldwin 2015 |
| | SCMMA watershed boundary | Polygon | Extent | Digitised from imagery, DEM, hillshade | Baldwin 2015 |
| | Shoreline buffer | Polygon | Extent | Buffer (10 m) from coastline | Baldwin 2015 |
| Transportation buffer | Polygon | Extent | Digitised from imagery | Baldwin 2015 | |

5.2 Mapping products

The development of an appropriate and feasible zoning design requires the identification and mapping of existing habitats, resources and users of the coastal marine environment based on existing data together with feedback from the PIT and key stakeholders. Spatial analyses and composite maps of the SCMMA were produced (marine habitats, critical coastal and marine resources, space-use patterns and areas of threat or issues) to visualise and support understanding of the spatial information collected, ensure a balance between the ecological and socio-economic considerations are appropriately incorporated in the zoning plan, as well as to build ownership in the planning of the SCMMA.

The following maps were produced for the SCMMA:

- Existing South Coast Marine Conservation Area (SCMCA) boundaries and the proposed changed to the South Coast Marine Management Area (SCMMA) boundaries
- Coastal marine habitats
- Coastal marine resources
- Coastal marine users, space-uses and existing moorings
- Coastal marine infrastructure
- Coastal marine threats

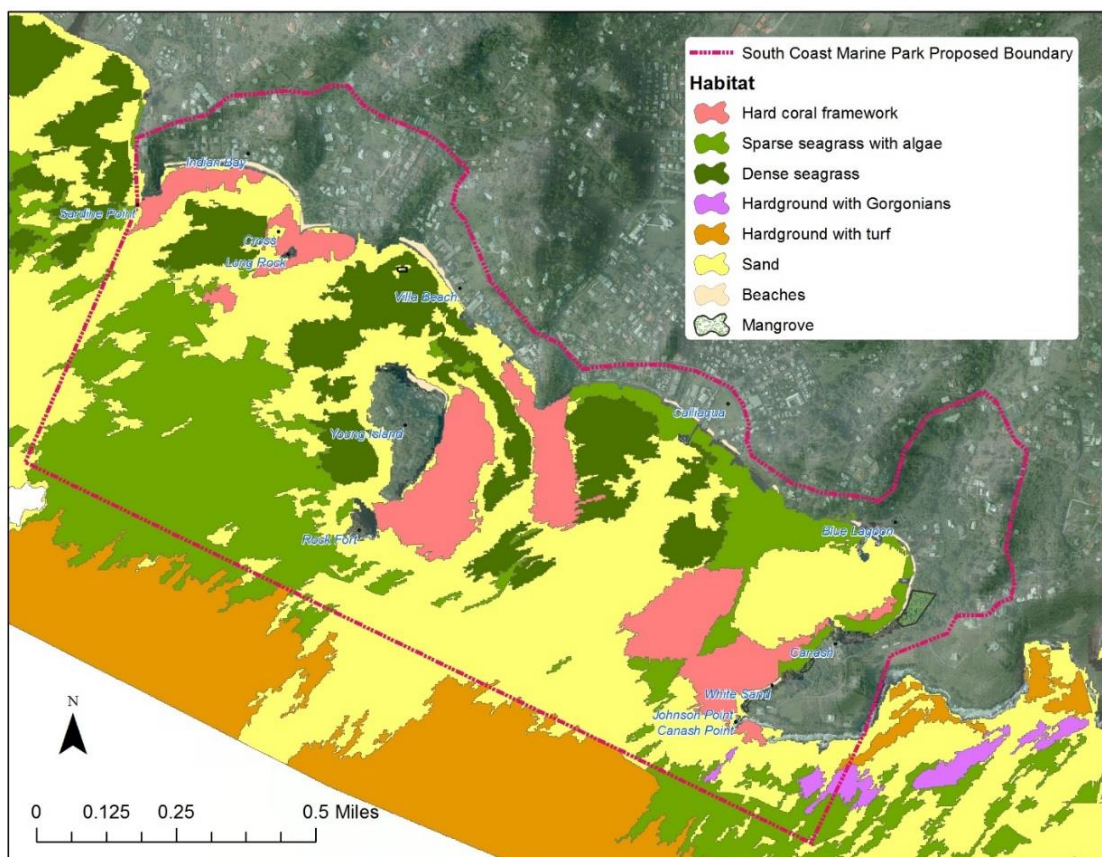


Figure 10: Marine habitat map of the SCMMA.



Figure 11: Marine resource users of the SCMMA

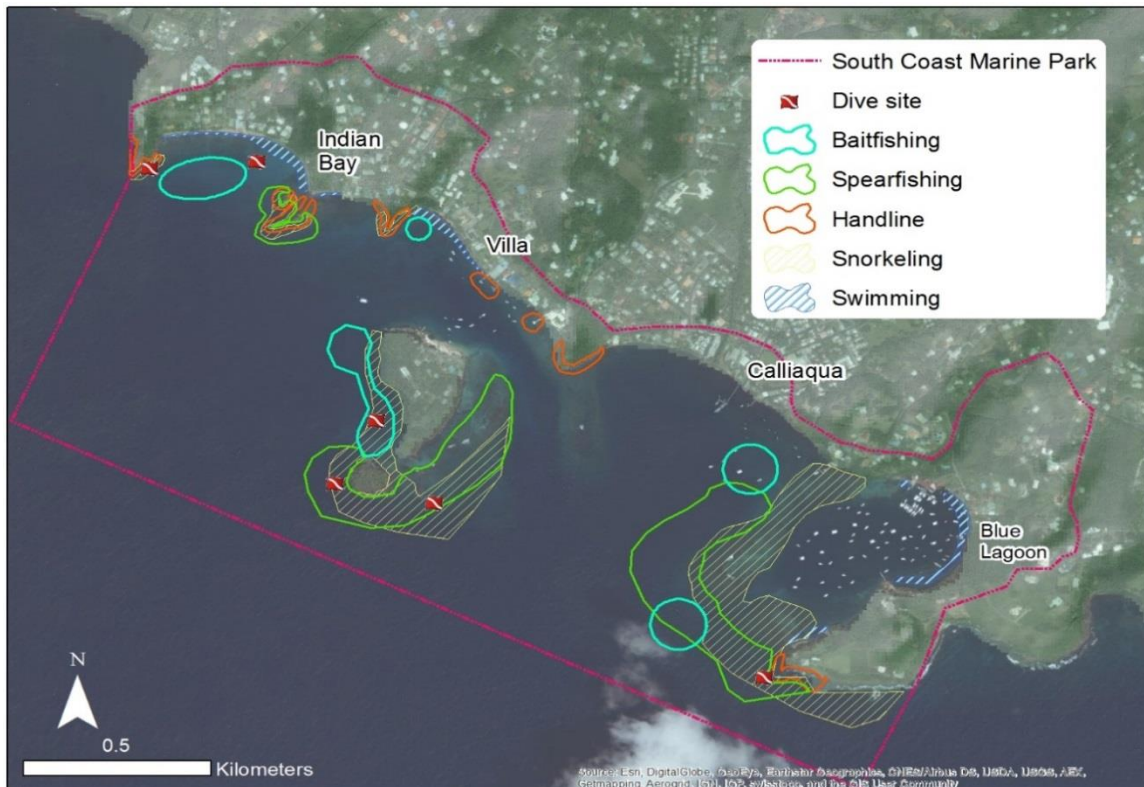


Figure 12: Map of existing uses of the SCMMA

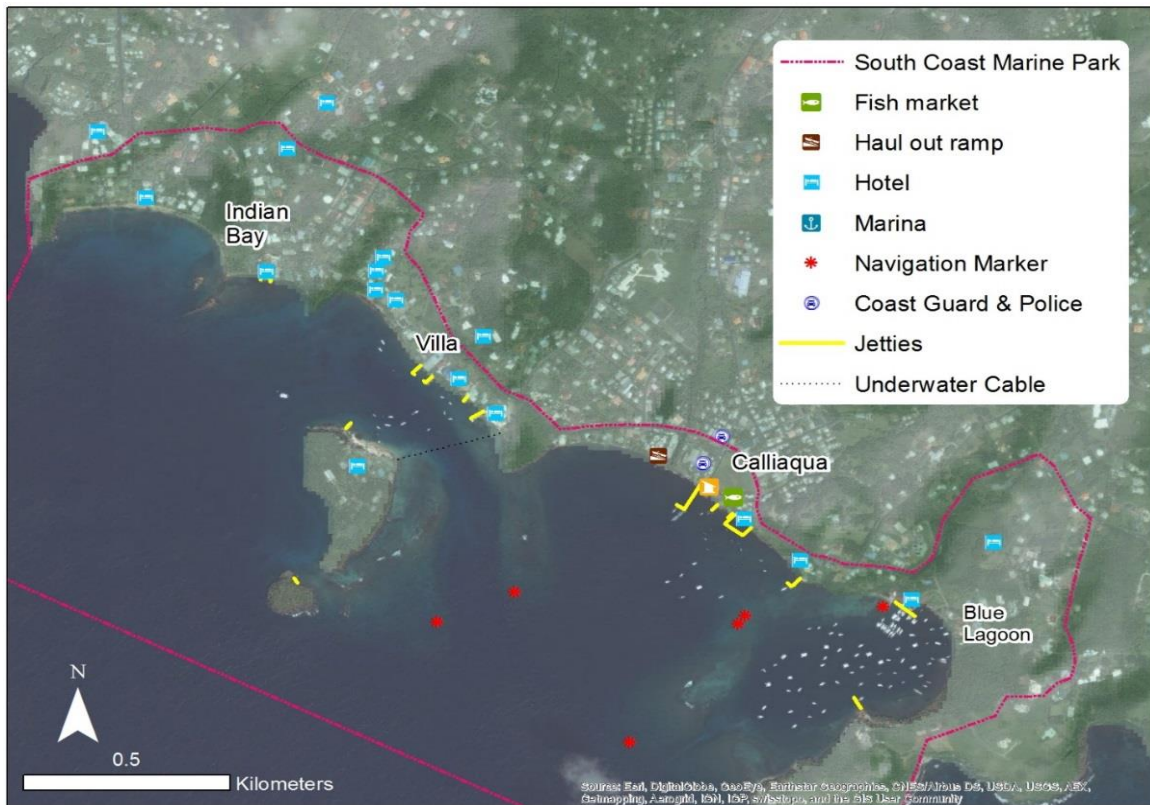


Figure 14: Coastal infrastructure map of the SCMMA

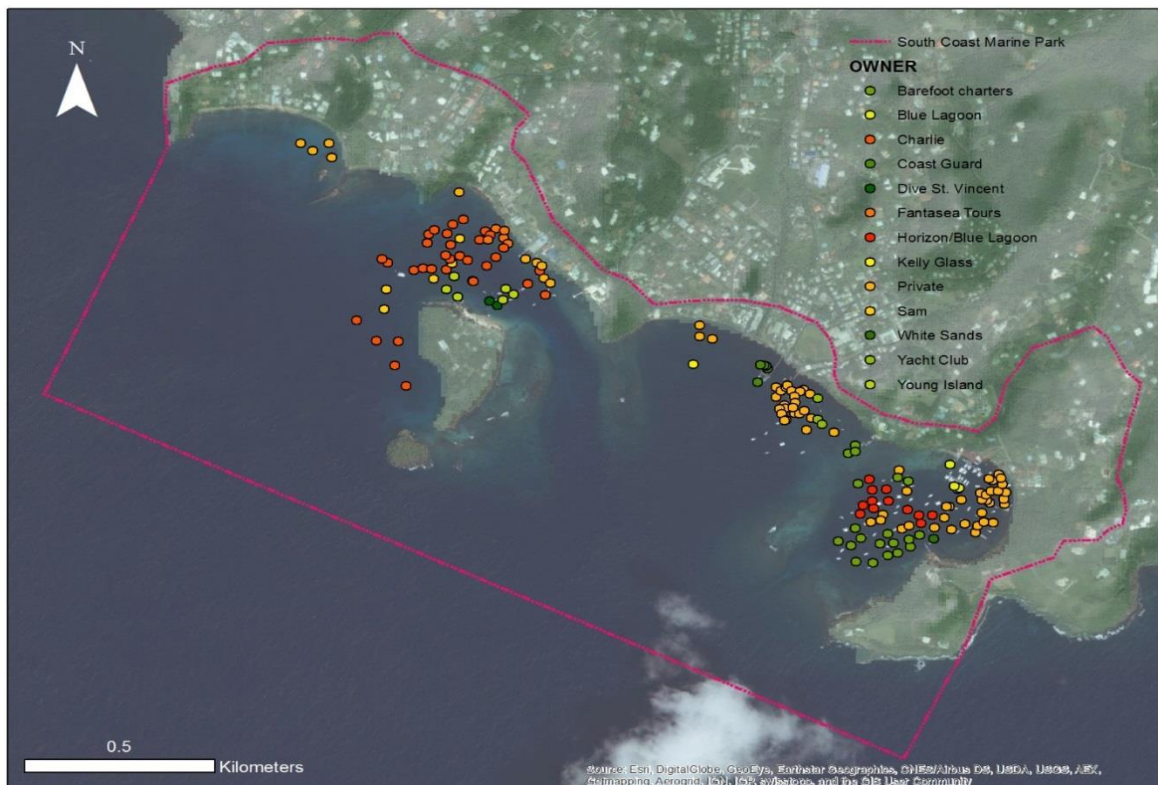


Figure 13: Map of the moorings existing in the SCMMA during the September 2015 field surveys



Figure 15: Map of some of the identified threats in the SCMMA

Although a large amount of baseline data is now readily available there still remains a few data gaps that should be filled to ensure there is comprehensive understanding and management of the SCMMA. Some of the themes that require additional baseline data include geomorphology, hydro-geographic patterns, species abundance and health, tourism and accommodation statistics (Marchesi 2014).

6 Zoning Design

Zoning is commonly applied in marine protected areas required to deliver multiple objectives (Agardy 2010). Therefore a zoning design is used to manage different activities in a marine park and separates potentially conflicting uses, while maintaining the biodiversity and sustainable utilisation of resources. The goals of multiple-use zoning are that it serves to: protect biodiversity; ensure continued existence of unique species and habitats; safeguard threatened species; support sustainable livelihood and use; and protects important recreational, cultural, educational and scientific values. Thus an appropriate and equitable zoning design supported by public education, compliance, surveillance and monitoring programs for the SCMMA will play a critical role in the successful management of the proposed marine park. The SCMMA zoning design will also take into consideration the on-going LBS and marine pollution and resource degradation issues to increase the functionality of the ecosystem.

The objectives of the zoning design for the SCMMA (set out in the Management Plan) are to:

- Allow for the regeneration of degraded benthic communities and/or over-exploited populations of fish and other marine vertebrates and invertebrates;
- Provide protection to species of special concern (e.g. vulnerable, threatened, endangered, migratory species or over-exploited species of high commercial value);
- Protect the habitats which are critical to the survival of species of special concern (e.g. breeding, nesting, nursery, feeding and roosting grounds); and
- Eliminate or minimize incompatible uses and conflicts between resource users.

6.1 South Coast Marine Management Area (SCMMA)

The SCMMA and corresponding management plan will seek to address any identified activities or issues that affect the resources within the boundary of the marine park (whether the activity originates inside or outside the designated area). This includes the integration of land management practices, land-use planning processes, and development control processes within the coastal areas and surrounding watershed. The boundaries of the designated SCMCA (comprising a total area of 260.49 ha) were evaluated in relation to ecosystem (or ecological) boundaries, existing marine activities and livelihoods, known threats, public safety, compatible use, and potential future development in the area. The determination of new boundaries for the SCMMA were developed not only provide protection for biodiversity and preserve the function of ecosystem goods and services, but also aim to be socially-acceptable and feasible in terms of management activities.

The proposed geographical extent of the South Coast Marine Management Area (SCMMA) comprises a total area of 1,130 hectares, and includes three larger management areas (Figure 14):

- The coastal waters comprising the South Coast Marine Park (SCMP) (19% of SCMMA);
- The adjacent coastal lands that surrounding the SCMP (6% of SCMMA); and
- The wider drainage catchment area (encompassing the entire watershed that drains into the SCMP) (75% of SCMMA).

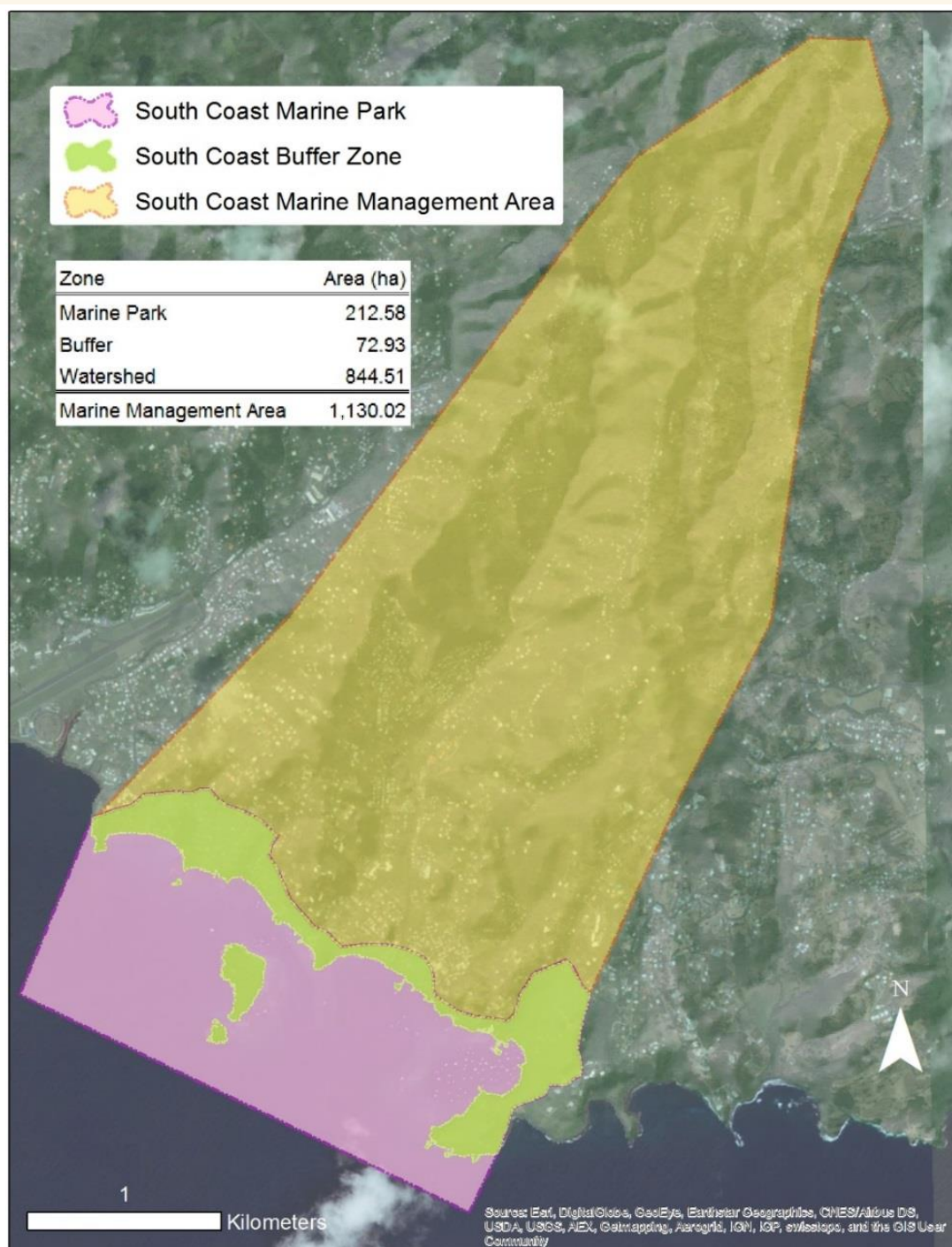


Figure 16: The proposed south coast marine management area (SCMMA)

6.1.1 South Coast Marine Park (SCMP)

The coastal marine resources within the SCMP are critical in terms of their biodiversity value and contribution to livelihood and the local economy as well as the national development process. To achieve the objectives of the SCMMA, and develop an ecologically-balanced and sustainable south coast marine ecosystem that can support viable commercial and economic activities and meet the recreational needs of residents, visitors and other stakeholders requires the establishment of coordinated and intensive management interventions (Murray 2014).

Therefore the boundaries of the SCMP (Figure 15) were revised to incorporate the natural ecological boundaries whereby the southern boundary was aligned along the coastal shelf drop-off (at approximately 35 m depth contour), thereby excluding two fishing areas of importance (e.g. a ship wreck off Villa/Sardine Point actively used and an offshore fishing bank locally called 'Police Station') that is located within the southern extent of the designated SCMCA. To incorporate management feasibility for the SCMMA, the eastern boundary was not extended to incorporate the Brighton mangrove ecosystem, but only slightly extended eastward to allow for the inclusion a unique coral reef ecosystem (comprising of a large abundance and diversity of sponges, soft corals and along a drop-off or 'wall reef' comprising a hard coral framework reef where many large pelagics were seen).

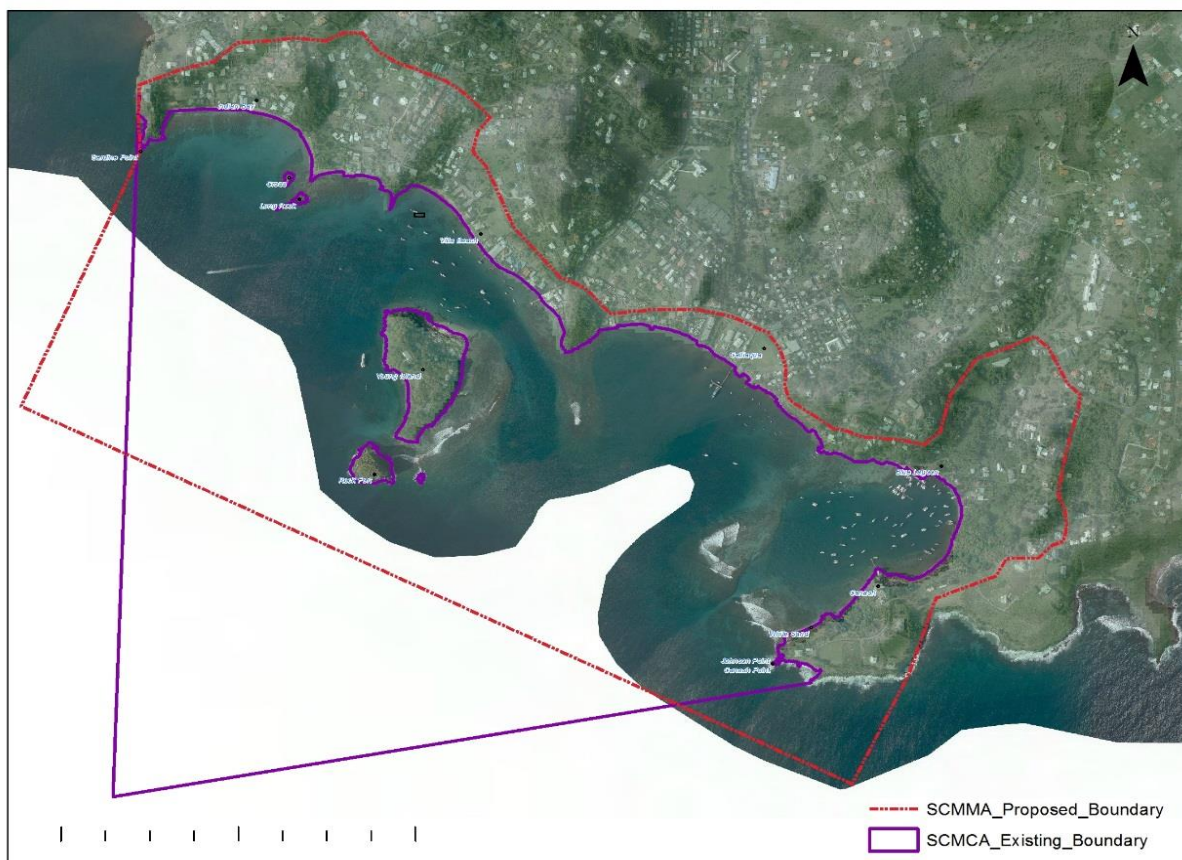


Figure 17: Map of the existing SCMCA and proposed changes for the SCMMA boundaries

6.1.2 Coastal Buffer Zone

Activities on coastal lands adjacent to the marine park may have direct and indirect negative impacts on the coastal marine ecosystem and resources. Thus a 'Coastal Buffer Zone' comprising the terrestrial areas of Young Island, Fort Duvernette, Dove Island, Dike Island and the adjacent coastal terrestrial areas using the main road as the boundary (comprising a total area of 72.93 ha). This Coastal Buffer Zone will be designated to allow for the inclusion of increased and integrated management of coastal development and land-use practices to ensure that human activities on land that are in conflict with the objectives of the SCMMA and negatively affect the marine park. Moreover the 'natural beauty' of the area to which the SCMMA contributes is contained not only in specific ecosystems (such as the wetlands, coral reefs and beaches), but also in the landscapes formed by the juxtaposition of the visible features of the land (e.g. landforms and flora and fauna), weather conditions, and elements of the built environment. Maintenance of the seascape's scenic beauty must be ensured through corresponding development planning and control processes. Thus the SCMMA management plan should include strategies to influence development processes and land-based pollution that is occurring within the coastal buffer zone.

6.1.3 Watershed Catchment Management Area

Activities within the larger Calliaqua catchment (Figure 14) may generate waste, sedimentation, and other forms of pollution that are transported into the marine park by way of watercourses. The 'Watershed Catchment Management Area' will be designated to support an ecosystem approach to management of the marine park and should seek to identify the inputs and sources of LBS pollution and devise strategies to mitigate negative impacts to the marine park. A water catchment management plan will be needed to address and propose actions to improve land management practices within the wider Calliaqua Watershed Catchment Management Area.

6.2 South Coast Marine Park Zoning Design

Consideration for the protection of the coastal marine ecosystem and resources as well as the various existing users, activities and infrastructure was used to guide the development of the SCMP zoning design (Figure 16). This was accomplished through the use of both scientific information and spatial analyses together with stakeholder consultations and feedback (i.e. PIT meetings, previous studies, interviews, mapping exercises, meetings with marine resource users, fishers and the surrounding communities) (Figure 17).

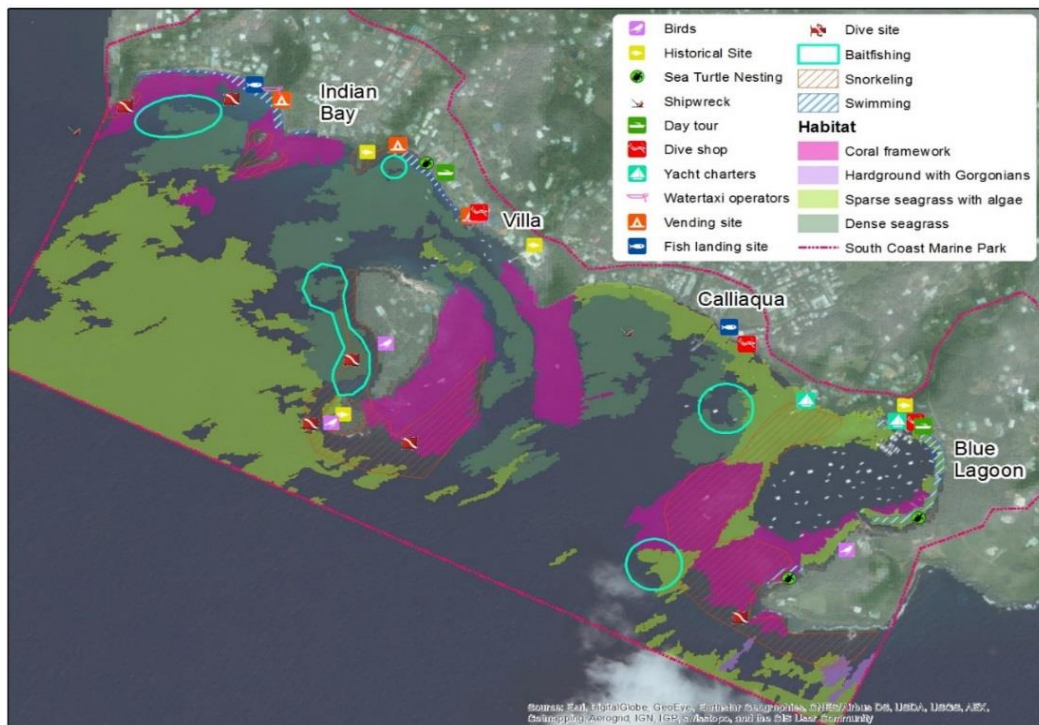


Figure 18: Composite map of marine habitat, resources and space users of the SCMMA

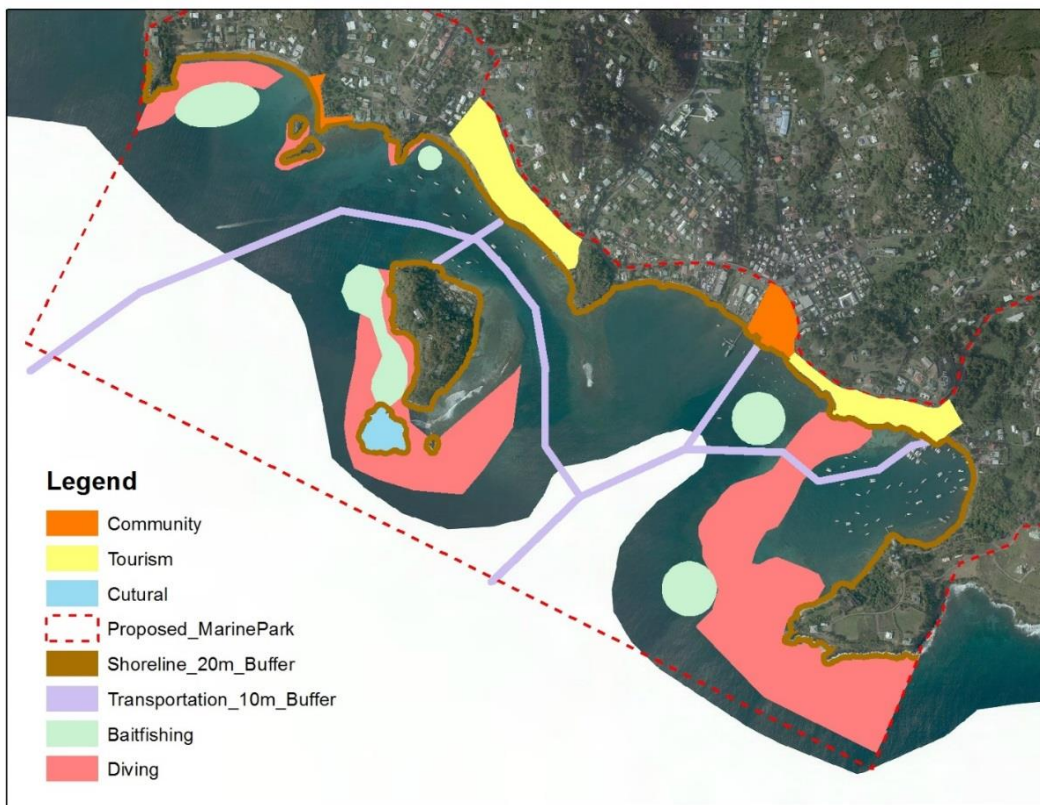


Figure 19: Spatial considerations for multiple uses occurring in the SCMP.

To support both the implementation of the SCMP as a multiple-use marine park and the management of the wider coastal area within the wider SCMMA, a number of general rules and regulations should be applied. To manage the marine area more effectively, the coastal area has been further divided into five sub-zones to allow for protection of critical biodiversity areas, the coastal marine ecosystem and livelihoods as well as to address conflict amongst and between users and support the effective management of the SCMMA.

The objectives along with proposed rules and regulations for each of the three larger management areas and smaller marine sub-zones are briefly described below.

6.2.1 South Coast Marine Park (SCMP) - General Use Regulations

The SCMP and Buffer Zone will provide for conservation while still allowing a wide range of activities to occur.

- Park entry fees (tourists, diving, research, filming)
- No wake zone (or speed limit less than 5 knots)* - *mandated under the Power Craft Act (1990)*
- No damage, dredging or removal of flora and fauna
- No littering or discharging of waste (with the phased implementation of holding tanks and septic systems in the future)
- Invasive species management (particularly allowing for the removal of lionfish)
- No mooring or anchoring (unless as designated within the transportation zone)
- No motorised watersports (jet-skiing & waterskiing)
- No cruise ships and live-aboard dive vessels
- Prohibition / restriction of fishing activities: Essentially a no-take marine park; with limited fishing under permit.
 - Limited allowance (< 10 licenses) for specially licensed fishers (elder fishers - over age 65) to allow line fishing using nonmechanised (or less than 10 hp) row boats within the SCMP (General Use Zone); under permit by the Fisheries Division.
- All SCUBA divers must be accompanied by a local certified diver who is licensed by the SCMP.
- Marine-based livelihoods operating in the SCMP must be licensed (i.e. moorings, day tours, water taxi operators, dive shops, dive guides)
- Shore-based livelihoods (i.e. vendors, other tourism operators) must be licensed (and will only occur within specially designated areas to be determined).
- Beach BBQs and picnics only allowed in designated areas (i.e. Rock Fort, Indian Bay, Villa)
- No camping on uninhabited cays

6.2.2 Buffer Zone and Catchment Watershed Management Area - Regulations

- Additional restrictions should be further developed in the management plan and enacted to ensure the integrity of the SCMP ecosystem. Preliminary recommendations include plans for:
 - Designated vending areas (Indian Bay, Villa Beach, Calliaqua, Blue Lagoon)
 - Restriction of coastal vegetation removal (both sand and mangroves)
 - Coastal development regulations and setbacks
 - LBS and marine based sewage/waste water management

6.2.3 South Coast Marine Park – Zone and Regulations

It is recommended that the SCMP be further divided into four distinct use zones (e.g. multiple-use, conservation priority, transportation/access, baitfishing) (Figure 18). Table 4 also provides a summary of the corresponding type, function, selection criteria and general regulations for each recommended SCMP zone.

The following lists each of the four SCMP sub-zones and outlines the general areas and associated regulations identified for each use.

- Transportation zone (20.24 ha)
 - Safe Access: Sailing passage channel (10 m wide) and coastline buffer (20 m)
 - Moorings zone: Indian Bay, Young Island, Villa, Calliaqua, Blue Lagoon
 - Anchoring is not allowed in the SCMP, except in the anchoring zone in Calliaqua
- Multi-use zone (7.39 ha)
 - These are areas of importance for a variety of uses (e.g. fishing, tourism, recreation) and include Indian Bay, Villa Beach, Calliaqua and Blue Lagoon. These areas are important for multiple-uses and recreation in which swimming, diving and line fishing from shore are allowed as long as the general rules of the SCMP are observed.
 - Buoyed swim areas (Indian Bay, Villa Beach)
 - Shore-based hand line fishing permitted (on rocks and jetties/wharfs)
 - Future recreational activities (water trampoline) for consideration in zone
- Conservation zone (43.41 ha)
 - The primary purpose of this area is to protect the integrity of biodiversity, historical and cultural heritage, and to allow fish populations to regenerate. These areas of high ecological value have been set aside for the protection of marine flora and fauna, scientific research and education as well as the enjoyment of diving and snorkeling. Access is managed through the conditions of a permit. Priority conservation areas: include Blue Lagoon (Canash and White Sand); Rock Fort / Young Island; and Indian Bay (Villa / Sardine Point)
 - No extraction or anchoring is allowed in this zone
- Baitfishing zone (6.86 ha)
 - These are areas where a limited extraction of baitfish using a seine net will be allowed as long as baitfishing activities avoid the reef environment and other conflicting activities. Access is managed through the conditions stated in a special permit issued by the Fisheries Division.
 - Five non-conflicting areas are identified: Blue Lagoon (2), Calliaqua (1) and Indian Bay (2)
 - Extraction of baitfish (jacks and robins) using seine net only
 - Permit is restricted to fishers registered in Calliaqua (one seine net is presently in operation).

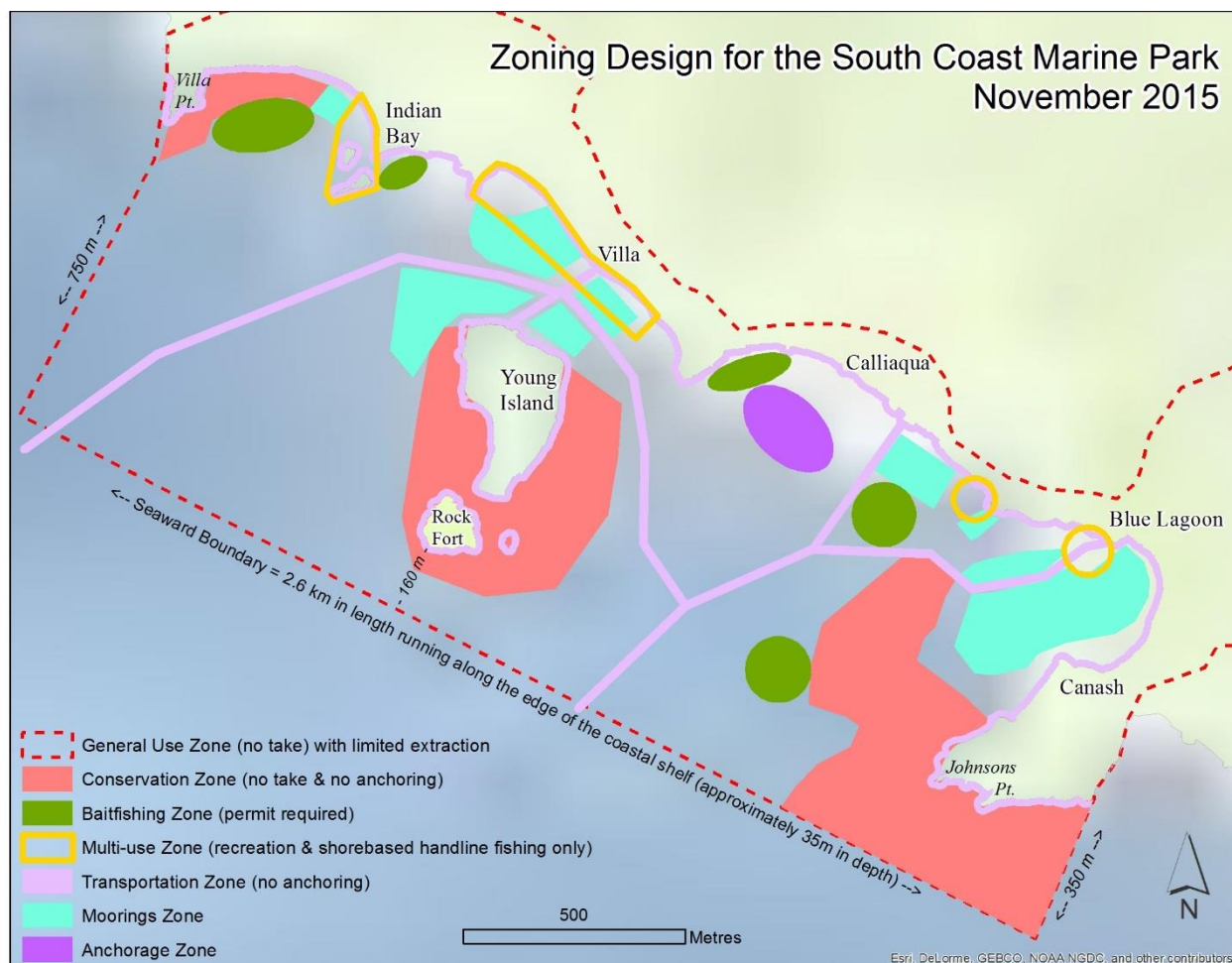


Figure 20: Recommended zoning design for the south coast marine park and SCMMA

Table 4: Zoning criteria for the SCMMA

| Type of zone | Primary function | Selection criteria | Principal regulations |
|----------------|---|---|---|
| General | Sustainable use | Waters of the marine park | Open access Limited extraction |
| Multi-Use | Recreation | Areas of high importance for recreational and cultural value | Open access Limited extraction |
| Conservation | Conservation and protection of biodiversity and sensitive areas | Representative areas of high importance for biodiversity, historical or cultural value | No extraction Managed access |
| Bait fishing | Sustainable use | Areas must not be located on reef habitat or pose conflict with other uses | Limited extraction |
| Transportation | Ensure safety and maintain access Safe passage | Buffer of transportation channels and shorelines Based on suitable habitat and does not conflict with other uses | Open access Use of moorings under permit |

6.2.4 Moorings Plan

Detailed considerations for the installation of moorings within the SCMP will be guided by a corresponding moorings plan developed alongside the Zoning Design (see Fairhead and Baldwin 2015). The moorings plan should be implemented based on the zones outlined in this report (within the allocated transportation zone) and be based on international best practices for MPAs (PADI 2005) to ensure the appropriate quantities, types and installation of mooring systems as well as cost and methods of installation, maintenance and management to reform the existing ad-hoc systems and protect sensitive marine habitats, ensure user safety/navigation and support for sustainable livelihoods and park financing.

7

Endorsement of Zoning Design and Mooring Plan

Previous marine spatial planning efforts have found that stakeholders' needs must carefully accommodate and that MSP is most effective when generated by those who will be involved in the management and enforcement of a plan (Gilliland and Laffoley 2008, Agardy et al. 2012, Baldwin 2012). Particularly in SIDS making scientifically-sound information and management plans available to both managers and stakeholders so that they are better able to make informed decisions has been found to be effective for widespread acceptance (Pomeroy et al. 2014).

Final presentations were made to share and endorse the draft SCMMA Zoning Design and Mooring Plans (28th October) for both the PIT and marine resource users, fishers and community members. These meetings provided an opportunity for stakeholder validation to be obtained and for local feedback to be incorporated into the final zoning design and moorings plans. This step was seen as essential in the subsequent multi-sectoral endorsement of the SCMMA.

8

Next Steps

The goal of a MSP framework is to deliver an ecosystem-approach to managing human activities in the marine environment; yet this requires the successful development and implementation of the multi-use zoning design and associated multi-sectoral management measures. Moving to an integrated and fully implemented SCMMA will take a national concerted joint effort on the part of the SVG government, marine resource users, NGOs, local stakeholders with support by the wider international community. Both the zoning design and moorings plan will be incorporated into the overall SCMMA Management Plan based on the Zero Draft Management Plan (2014) scheduled to be finalised before year-end 2015.

All relevant sectoral agencies, NGOs and stakeholders will need to work together to comply with the management measures identified in the zoning design and set out in the corresponding management plan. Globally and particularly for SIDS, co-management arrangements are a possible governance mechanism shown to support the effective implementation of MSP initiatives (Christie and White 2010). Over the past 10 years a strong foundation for marine management has been built in SVG, including the conduction of a large amount research and production of baseline MPA information both nationally and regionally. The recent development of the National Ocean Policy, management plans for the TCMP and soon the SCMMA, together with support from the Grenadines MPA monitoring network and wide collaboration amongst government agencies, NGOs and the private sector in SVG is commendable. Studies range from a number of ecological, social, and governance assessments, the development of a comprehensive marine resource and space-use GIS and the Grenadines MSP (and soon to include a marine multi-use zoning design for the SCMMA). These marine management efforts on behalf of the GoSVG should be acknowledged and leveraged to keep the MSP process moving forward in the future. As a result of this ancillary work, MSP in SVG has already made much progress to achieving the CCI by incorporation conservation goals with multiple resource use management objectives to provide a foundation for sustainable future development of marine resources.

Likewise over the past 10 years, the PGIS approach has been shown to foster cooperation among the various agencies in SVG. This can be seen in the establishment of the multi-sectoral PIT and involvement of associated marine stakeholders whom participated in this study. Such a collaborative approach is central the goals of MSP as well as the management of the SCMMA. A co-management approach should continue to be applied to further support an interactive marine governance framework for SVG. Despite this foundation, a suite of longer-term activities are required to fully operationalise the SCMMA in this manner. Namely, there will be a need to clearly identify relevant stakeholders and their corresponding roles required for both the various integrated marine policy and co-management frameworks. This also includes legislative reforms to support both the implementation of the zoning design and the drafting of associated regulations to support management. The continued implementation of the SCMMA monitoring plan (SusGren 2015) is necessary to evaluate the efficacy of the management plan. Moreover the development of long-term financing options for protected areas management should be determined and pursued.

Next steps recommended to support the implementation of the SCMMA and the larger MSP initiative include harnessing political will to ensure national commitment and endorsement of the NOP, the approval of the SCMMA management plan and associated marine multi-use zoning design and moorings plan. Presentations to the relevant upper level decision makers responsible for national marine policy and management frameworks should be made to clearly explain the role of MSP and the SCMMA in terms of how they will assist the country in the achievement of international commitments (i.e. CBD, FAOs Code of Conduct), regional commitments (i.e. Caribbean Challenge Initiative, CRFM) and streamline the attainment of national social and development goals. In tandem, investment in strong coordinated public outreach and education materials and programmes to highlight the importance of MSP, the role of protected areas, and the rules and regulations of the SCMMA will need to be undertaken throughout the nation.

9

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