

A governance analysis of Soufriere Marine Management Area, Saint Lucia: previously effective but increasingly challenged by driving forces

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Abstract

This paper employs the Marine Protected Area Governance (MPAG) analysis framework to explore the effectiveness of governance of Soufriere Marine Management Area (SMMA), Saint Lucia in fulfilling its objectives. The SMMA has been established for 22 years and although initially heralded as a success at resolving user conflicts and conserving biodiversity, drivers and conflicts in the area have since changed, and there are concerns that the self-sufficient SMMA has not adapted to these changes. Contemporary driving forces include a growing tourism industry and climate change. The SMMA is struggling to tackle these issues due to poor law enforcement, a weak legal system and a lack of political will. Although the SMMA on paper adopts a co-management governance approach, results from the analysis suggest the government remains highly influential. Financial constraint is also a huge challenge for the SMMA and, unable to provide benefits to the community, socioeconomic objectives are being undermined. The future focus should be on improving the financial situation by raising funds through ensuring all user fees are being collected. An equal ratio of government members to non-government stakeholders on the Board would help to re-engage the co-management approach, aiding the SMMA in again achieving its conservation objectives.

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1. Introduction

1.1 Background

The Caribbean and Latin America have the highest biodiversity of all the world's regions but combined pressures from development, growing coastal populations and tourism are depleting biodiversity and degrading coral reefs [1]. Increases in the frequency and severity of mass bleaching events due to hurricane damage and decreases in water quality meant that coral cover began declining throughout much of the Caribbean in the early 1980s, and it has since been estimated that it has decreased by as much as 10% in the last three decades [2]. MPAs can buffer against threats from climate change, therefore the number of designated MPAs in the Caribbean Basin has increased since the 1980s [3]. There are currently 100's of MPAs in the region but concerns are emerging over how effectively these MPAs are being managed in order to mitigate these impacts and preserve biodiversity [4, 5].

This study will concentrate on the governance of the Soufrière Marine Management Area (SMMA) in Saint Lucia. The picturesque town of Soufrière is situated on the southwest coast of Saint Lucia. Prior to the designation of the SMMA, there were user conflicts between fishers, tourists and yachters over the use of the marine space, resulting in the degradation of the marine environment. The establishment of the SMMA in 1994 aimed for conflict-resolution and preservation of the marine environment through demarcation of areas to specific users. This MPA makes for an interesting case study as it was the first of its kind in Saint Lucia to adopt a zonation system. Further, the SMMA has been established for 22 years, and was one of the first reported MPAs to report spillover effects as a result of a designated demarcation system [6], therefore it seems prudent to investigate how effectively this MPA is now achieving its conservation and social objectives.

This study aims to assess the governance approach taken by the SMMA, and to analyse the effectiveness of the SMMA, through examining its objectives and identifying the conflicts and drivers which are preventing the MPA from increasing its effectiveness, using Jones's 2014 MPAG framework.

1.2 Methodology

This paper is based on the author's MSc dissertation, which employed the MPAG framework, which has been used in over 50 case studies worldwide, to analyse the SMMA's governance. The MPAG framework was chosen because it allows for systematic analysis of governance effectiveness. The SMMA on the South West Coast of Saint Lucia was selected because it has been established for 22 years and has been deemed a 'success story' by various studies (Sanderson & Koester, 2000; Roberts et al., 2001; CBD, 2014) due to its adoption of a demarcation system (Figure Y) and co-management approaches to overcome user conflicts. Whilst many studies have been previously conducted on the SMMA, there have been none on its governance. To obtain the data, 3 methods

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were employed: document analysis, semi-structured interviews and ethnographic observations. Research ethics conducted were in-line with UCL policy, to ensure the research conformed with general ethical principles.

Primary qualitative research was compiled by conducting semi-structured interviews, which are characteristic of ordered but flexible questioning (Hay, 2010: 110). This method was selected because the conversational and informal tone, coupled with the anonymity of the interviews, allowed for open, in-depth responses from the interviewee, as opposed to ambiguous, terse responses often found through the use of questionnaires [32]. As such, semi-structured interviews have been identified as an ideal technique for exploring unguarded attitudes, values and beliefs of participants [33]; and obtaining unguarded opinions was essential for this study in order to gain valid, unshielded information on the SMMA. For this reason, focus groups were not used as these are known for being unable to provide an appropriate level of anonymity for participants to be willing to share certain views that may be deemed controversial (Longhurst, 2003). It was important to travel to St Lucia to conduct interviews as face-to-face interviews help to build up a rapport with participants, making co-operation more likely, and there is evidence to suggest that the quality of data produced from face-to-face, semi-structured interviews tends to be superior to that obtained by other methods, such as focus groups and questionnaires (Burton, 2000).

A total of 28 interviews were then conducted over a period of 5 weeks between May-June 2017. Interviews lasted between 25 and 80 min in duration and each interview was held face-to-face. Stakeholders were selected to be interviewed were chosen on the basis of their experience and potential knowledge of the SMMA. To begin with, stakeholders were recommended through a gatekeeper, who was a member of SMMA staff. This in turn led to a 'snowballing' effect, or 'on-site recruiting' method, where one interviewee helps to recruit another interviewee (Valentine, 2005:117). Due to the relatively small size of Soufrière, there is a climate of 'everybody knows everybody'; therefore this method was particularly effective for recruiting other stakeholders.

Stakeholders interviewed were fishers, government officials, SMMA staff (including the current manager and ex-staff members) and other users such as dive school operators. After all interviews were conducted, the interviewees were arranged into codes to maintain anonymity, according to the role they play within the SMMA. The semi-structured interviews took an approach which has been identified as 'observer-as-participant' in the sense that each interview were one-off brief encounters (Gold, 1958); although there was potential to contact most participants again if necessary. Indeed, participants were emailed the interview reports to verify that their views had been captured correctly.

Ethnographic observations were made throughout the field study to support the etic themes identified in the document analysis, and the emerging emic themes from the semi-structured interviews. The goal of ethnographic observation is to gain an unguarded perspective of the 'real way of life' by breaking away from the inevitable formality of interviews and 'being part of the

spontaneity of everyday interactions' (Kearns, 2001). Ethnographic observations were obtained through the attendance of SMMA meetings including the Annual General Meeting (AGM), a meeting on local water quality and the monthly board meeting, with relevant notes taken and recorded into the fieldwork diary. Observations were also made by joining the SMMA rangers on their evening patrols at least biweekly to gain an insight into how well enforced rules and regulations were and how rangers interacted with other resource users; in this case primarily yachtsmen. Whereas the semi-structured interviews provided an 'observer-as-participant' approach, spending time with the rangers allowed for a 'participant-as-observer' approach (Gold, 1958), which enabled a rapport to be built and enhanced cooperation in the field. Further, notes were written in the fieldwork diary on informal conversations with stakeholders that added to information acquired in interviews.

Further details on the rationale and methodology of the MPAG analysis framework are outlined in the accompanying discussion paper, along with discussions of other case studies in this special section.

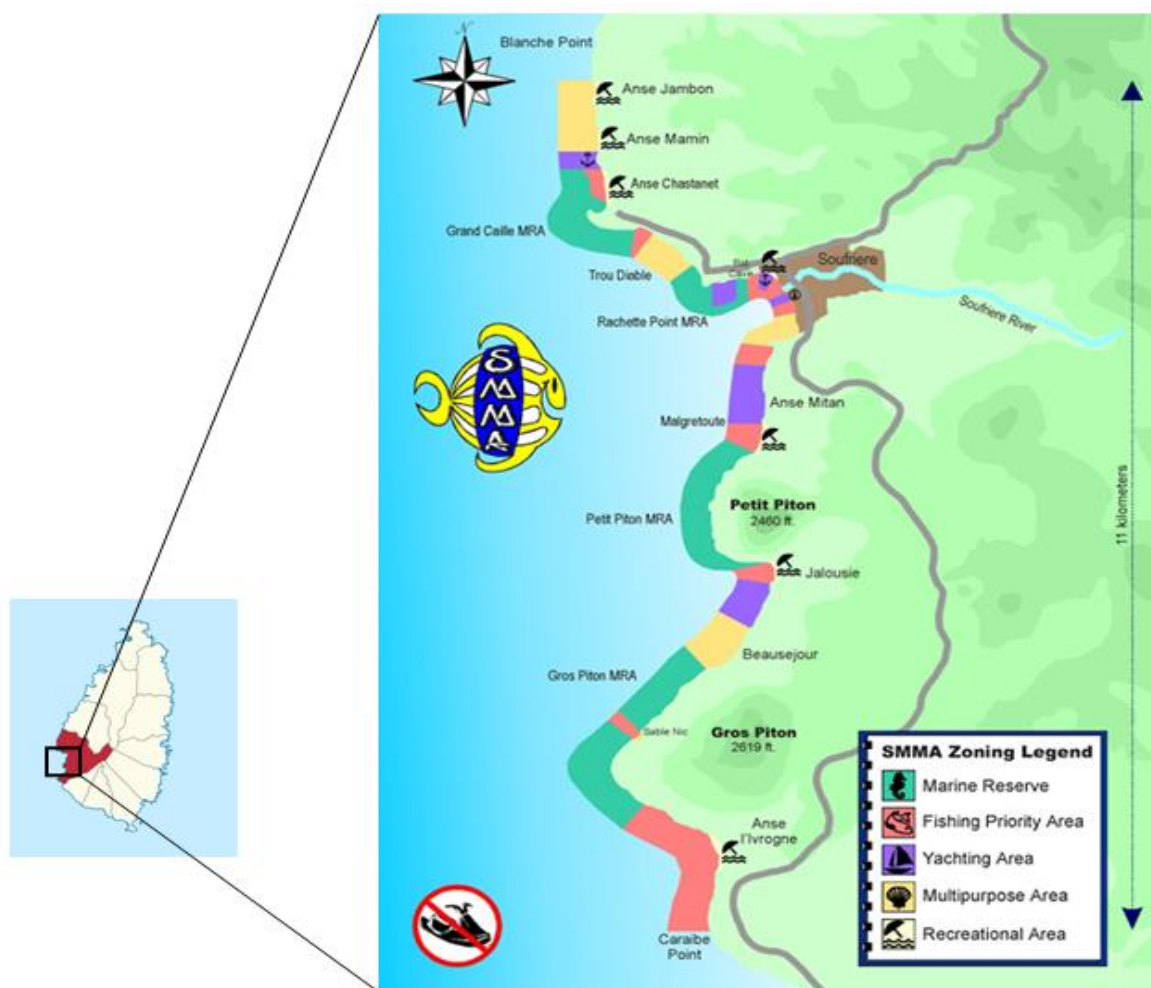
2. Context

The Caribbean island of Saint Lucia is part of the chain of the Windward Islands located in the Lesser Antilles. The country has an economy that is extremely vulnerable to external macroeconomic shocks, as well as being susceptible to natural disasters, characteristics which are typical of Small Island Developing States (SIDSs). In 2010, Hurricane Tomas struck the island causing widespread damage, costing Saint Lucia an estimated USD \$336 million [8]. The 2001 terrorist attacks in the USA caused an initial decline in tourism on the island which was then exacerbated by the global financial crisis of 2008, with some airlines subsequently ending routes to the island [9]. Today, tourism is recovering and is the main source of jobs and income for Saint Lucia. Whilst the agriculture sector and fishing sector contribute 2.9% and 0.8% respectively to Gross Domestic Product (GDP), the tourism industry accounts for 65% of GDP [9, 10]. Agriculture and fishing respectively employ 12.9% and 1.9% of the total population whilst tourism employs 59.6% [11]. Saint Lucia has a total population of around 160,000 people, with the vast majority living on the coast, yet the number of people involved in the fishing industry has been decreasing as people instead choose to make 'quicker money' from tourism associated with the coastal environment [8]. The GDP per capita is \$12,000 (114th 228 countries, 2016), which is indicative of the relatively low economic wealth of Saint Lucians and is similar to that of other islands in the Lesser Antilles [10]. Saint Lucia has a Human Development Index (HDI) of 0.735, which is slightly higher than the nearby islands of Saint Vincent and Dominica, which stand at 0.722 and 0.726, respectively [11]. The island has an unemployment rate of 21.4% and a state capacity of 0.56, with the former being higher than average for the Caribbean region and the latter lower than that of Saint Lucia's neighbour Dominica [10]. These metrics indicate that Saint Lucia's economy is weaker than those of neighbouring islands and there is less capacity for state steer of public and private sectors [12].

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Soufrière is the westernmost town of Saint Lucia and has some of the highest poverty rates in the country [8]. The unemployment rate in the district is 23.8%, relatively high compared to the national rate of 21.4%. Moreover, 42.9% of residents in Soufrière live below the poverty line, once again considerably high relative to the national average rate of 30.4% (ibid).

Saint Lucia’s West coast is the most biologically diverse region of the island and consequently, Soufrière residents rely heavily on the marine environment for employment [13]. The area is one of outstanding natural beauty and includes the eponymous Pitons, which are a designated World Heritage Site (WHS). Thus, Soufrière attracts thousands of tourists each year. In attempts to manage user conflicts and preserve marine biodiversity, the SMMA was formally established in 1994. The SMMA extends 11km along the coastline and is approximately 110km² in size, encompassing the Pitons [6]. As is common with Caribbean MPAs, the SMMA is divided into five zones: marine reserves, fishing priority areas, yacht mooring areas, recreational areas and multipurpose areas [14, Figure 1].



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Figure 1. Location of the SMMA within Saint Lucia, and its demarcation system. Source: www.SMMA.org.lc

3. Objectives

The 2001 SMMA Agreement [30] was signed by 11 governmental and non-governmental stakeholders, and states the following three objectives that need to be fulfilled in order to make the SMMA effective:

Conservation	Operational
Conserve the coastal and marine resource base of Soufrière	Manage the conflicts that may occur among uses and users of the coastal and marine resources in Soufrière
	Enhance the equitable economic, social and cultural benefits generated from the sustainable use of the coastal and marine resources of Soufrière at the local and national levels

Soufrière’s fishing industry is dependent upon diverse and sustained fish stocks, with a particular need for a plentiful supply of reef fishes to preserve traditional in-shore fishing techniques [8]. These needs are reflected in the SMMA objectives’ emphasis on the necessity to conserve the marine resource base of Soufrière, which is primarily reef habitat (ibid). In 2014, Jones identified MPA objectives that most MPAs tend to strive towards. The SMMA’s objective to conserve the marine resource base is consistent with Jones’ MPA objectives ‘to restore and conserve marine ecosystems’ and ‘maintain traditional uses’ [12]. The SMMA objectives also align with Jones’ objectives to ‘restore marine ecosystems’, and to ‘control the impacts of tourism and recreation’, the latter through the SMMA’s third objective to manage user conflicts.

4. Drivers & Conflicts

4.1 Tourism and Coastal Development

In Soufrière, between 1991 and 2012 the percentage of residents employed by tourism rose from 15.6% to 29.9% [10]. Although the SMMA has worked well to resolve past user conflicts between locals and tourists, visitor numbers are much higher today than when the SMMA was first established 23 years ago. Presently, the coral reefs within the SMMA are being degraded by high numbers of snorkelers and divers who visit daily, some of whom are inexperienced and damage coral by bumping into and standing on it. There are no carrying capacity restrictions on snorkelers and divers and consequently the carrying capacities of most reefs could be argued to be being exceeded. Further, there is a belief within the community that the government and the SMMA hold a preference for needs of tourists over the needs of the locals. According to the SMMA agreement, fishing priority areas are ‘for the purpose of maintaining and sustaining fishing activities, which take priority over any other use of the area.’ Despite this, there have been accounts of yachts anchoring

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in the fishing priority areas without permission, meaning that fishers cannot cast their nets because either the fish have been scared away by the yacht or the yachtsmen are diving down to spear the fish, usually without a license. Tensions appear to be growing due to the increasing number of tourists and there is a growing belief that the SMMA is more lenient towards tourists than the locals, and that 'the government and the SMMA are not in the fishermen's favour'. If this growing consensus within the community is not rectified, tensions will amass to user conflicts between tourists and locals, which will ultimately undermine the SMMA's objective to manage user conflicts in the marine resource base.

Coastal development has been recognised as key threat to reefs in Saint Lucia [16]. In Soufrière, development is primarily associated with tourism. There are concerns that due to the economic value attached to tourism, the government has a tendency to prioritise tourism over the environment. For example, a few years ago the previous government granted permission for a hotel to be built on Jalousie that wished to import white sand from Guyana. Imported sand is known to have environmental implications because of its differing chemical composition to that of native sand and because it can bury nearby shallow reefs [17]. Divers have reported a greater increase in silt deposition on nearby reefs since the development, although no scientific studies have yet been conducted to confirm this. Some argue that the government needs to consider the long-term impacts of their decisions and that if the environment is not protected now, further degradation to the marine environment will occur through coastal developments, potentially leading to a decline in tourism. Further, silt deposition on coral reefs as a result of coastal hotel developments can lead to reef structure collapse, and a consequent decline in both the number of individual fish and fish species diversity [18]. Therefore, although hotel developments provide jobs for some locals, they can cause economic loss for some fishers, undermining both the conservation and socioeconomic objectives of the SMMA.

4.2 Poverty and a Poor Legal System

Livelihoods in Soufrière are highly reliant on the marine resource base [19]. Poverty impacts conservation because it can drive people to break MPA regulations [20]. Almost half of Soufrière's residents live below the poverty line, and a loss of access to fishing grounds because of SMMA regulations has led to contention within the community [8]. Illegal fishing is a major issue in SMMA, an issue exacerbated by Saint Lucia's relatively poor legal system, which has led to a mentality within the community that illegal fishing carries little punishment. The maximum fine for illegal fishing in Saint Lucia is EC\$5000 (~£1500), but more often than not perpetrators are not caught or just fined between EC\$500 (~£150) and \$1000 (~£300), and even these diminished fines are usually never paid. An MPA's effectiveness can be enhanced through the integration of conservation with the promotion of livelihoods, to decrease poverty rates and counter the illegal crimes which are undermining conservation objectives [21], but at present SMMA risks increasing poverty in some communities.

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4.3 Natural Impacts

Saint Lucia is naturally subject to tropical storms and hurricanes, but extreme weather events are predicted to increase in frequency and severity as a consequence of climate change [8]. The 1994 tropical storm Debbie and Hurricane Lenny in 1999 resulted in a reef mortality of 50% in Soufrière Bay [16]. In 2010, Hurricane Tomas caused sediment outflow, resulting in water pollution and further reef mortality within SMMA. It has been predicted that by 2040 climate change will result in annual coral bleaching events in Saint Lucia [31]. Soufrière has already experienced two large-scale coral bleaching events in 1998 and 2005 that resulted in a total of 43.8% coral mortality, as opposed to just 4.3% in 2006 (ibid). Although the SMMA has so far worked well to conserve coastal fish stocks [6], it has been predicted that ocean warming will cause an upward migration of fish stocks from the Caribbean, with Saint Lucia's catch potential expected to be 10-20% lower by 2050, compared to 2005 levels [22].

Invasive lionfish species *Pterois volitans* and *P. miles* were first recorded in Saint Lucia in October 2011 and have since spread around the island [23]. *P. miles/volitans* are invasive, voracious predators of fish in the Caribbean, resulting in declines in fish populations that have led to disrupted coral reef communities [24]. Efforts have been made by the SMMA to encourage locals to hunt them on 'lionfish derby days' but many remain distrustful of this fish as a source of food, partially due to their venomous spines.

White-band disease caused 3% loss of coral within the SMMA between 1997 and 1998 [16]. The disease is more prevalent in corals in warmer waters as elevated water temperatures cause corals physiological stress, making them more susceptible to disease [25]. Increasing ocean temperatures as a consequence of climate change may cause future outbreaks of the disease to become more common. Likewise, outbreaks of the macroalgae *Sargassum* are predicted to become more frequent as sea temperatures rise. *Sargassum* outbreaks have become an issue throughout the Caribbean, including in Saint Lucia, and can have detrimental impacts to marine life and tourism. The combined effects of all these issues may in future result in a decrease in resilience of coral reefs, undermining the SMMA's conservation objectives.

4.4 Pollution and Water Quality

Poor agricultural practices in Saint Lucia have been identified to be one of the main sources of environmental degradation, with fertilisers and other harmful chemicals often used in excess [13]. After a storm, these chemicals are flushed into rivers and streams which serve as channels to the ocean for anthropogenic pollutants. This can cause marine eutrophication that has both biological and socioeconomic impacts, including coral senescence, elevated ocean pH levels and increased probability of the loss of commercially important marine species [19]. With the frequency of these storms increasing as a consequence of climate change, eutrophication in the SMMA's waters is likely to increase. Water analysis within the SMMA has been conducted, finding elevated levels of

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phosphorus, nitrogen and water-borne pathogens. To further worsen this problem, residents in some parts of Soufrière do not have adequate sanitary access so dispose of all domestic waste in either rivers or directly into the sea.

5. Governance Approach

The governance approach taken by the SMMA is best described as ‘governed by the state with significant decentralisation’ [12]. The SMMA describes itself as ‘a self-sustained, not-for-profit NGO authorised by the government’. Although the government does not provide the SMMA with a subvention (state funding allocation), the state retains a degree of control in the decision-making process, primarily through the presence of government officials on the board, and also because the SMMA manager and the SMMA president are selected by the Department of Fisheries (DOF). It is thereby ensured that the ratio of government to non-government members on the board is in favour of the government, making it more likely for government decisions to override SMMA priorities.

Although governed by the state, the significant decentralisation to the SMMA as an NGO has allowed for a co-management approach to evolve. In 1988 the DOF joined forces with two NGOs, the Soufrière Regional Development Foundation (SRDF) and the Caribbean Natural Resources Institute (CANARI), to ameliorate user conflicts. It was decided a co-management approach should be adopted in order to empower local people through maintaining their rights and needs whilst also allowing the state a degree of steer to achieve the SMMA’s conservation objectives. The DOF, SRDF and CANARI encouraged local users to share their knowledge and opinions, and many Soufrière fishers helped in the demarcation of areas for fishing priority. Between 1992 and 1993 there was a series of meetings involving a diverse range of governmental and non-governmental actors. These meetings resulted in defining the demarcation system for resolving user conflicts and conserving marine resources in order to prevent a ‘tragedy of the commons’ situation, which was approved by a Cabinet of Minister in 1994 [20].

In 1997 the establishment of a Stakeholder Committee comprised of both government and non-governmental bodies reinforced the idea of the SMMA as an MPA with a co-management approach to governance. Further, the Cabinet of Ministers approved new by-laws of the SMMA, which stated the new institutional basis for the management of marine resources, with these by-laws created under the provisions of the Fisheries Act Number 10 of 1984, to establish the Local Fisheries Management Authority and define its responsibility (ibid). Thus, despite management being significantly decentralised to the SMMA with the creation of new by-laws, it still has to adhere to the Fisheries Act, and in this sense remains partially governed by the state.

6. Effectiveness

The SMMA has performed well to achieve its goal to ‘conserve the marine resource base of Soufrière’. Users of the area report increases in fish stocks and thereby catch-per-unit-effort since the implementation of the no-take marine reserves, and research has confirmed these spillover

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effects with fish biomass tripling within the reserves and doubling in the adjacent fishing priority areas [6, Figure 2]. Despite this success, illegal fishing remains a huge problem within the SMMA, which suggests that the marine reserves may not be fulfilling their full potential. Several contributing factors have resulted in illegal fishing becoming an issue, including a lack of law enforcement. Only 1 ranger out of 9 has the powers of arrest, and the Marine Police's nearest base is in Castries, 8.3 nautical miles from Soufrière. Rangers conduct three patrols per day at regular times, therefore people know when to go fishing in the reserves. There are only three patrols per day because fuel is expensive and the boat is very small, lacking in protection from extreme weather. There are no night-time patrols due to financial constraints. Although employing people from Soufrière to work for the SMMA is a socioeconomic benefit of the MPA, the small community atmosphere where 'everyone knows everyone' can make it awkward for rangers to confront those committing crimes from their own community.

Further, the weak legal system in Saint Lucia means that the punishments for illegal fishing are not severe enough to serve as a deterrent. If caught illegally fishing for the first or second time, a perpetrator is issued a verbal warning by a ranger. Only when caught a third time are they supposedly then arrested and fined, although the lack of official documents involved in the process when caught the first or second time mean that often people are caught several times by differing rangers before prosecution is pursued. One member of staff has worked at the SMMA for six years and has seen only three fishermen fined for illegally fishing: a minute number given the amount of illegal fishing that occurs within reserves. The lack of deterrence combined with the issue of poverty discussed in section 4.3 results makes it more likely for people to fish in the abundant reserves. Despite fish stocks increasing, a lack of law enforcement and aid from the marine police may be resulting in the reserves not fulfilling their full potential. Research is needed to establish whether the reserves are still as effective as they were when studies were conducted by Roberts *et al.* [6] in 2001.

The SMMA has successfully managed the user conflicts between yachters, tourists and fishers. However, there are now new emerging conflicts between the SMMA, fishers and the 'boat boys'. The 'boat boys' work within the bay and help those on yachts to moor and are available to help them to plan their trips, but they often allegedly misappropriate the SMMA's mooring fees for themselves, as well as driving at dangerous speeds around the bay.

Theoretically, as discussed in Section 4.4, the SMMA takes a co-management approach, in which top-down and bottom-up approaches are combined [12]. However, the aforementioned concerns over the composition of the SMMA board in terms of government influence go further in that some believe the SMMA in practice has very little influence over the government and the MPA takes a top-down approach to governance, despite not receiving funding from the government, making it a lose-lose situation for the SMMA. It has been suggested that the board meetings are 'all talk, no action', with the government being insouciant towards the ideas of the SMMA. There is considered

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to be a lack of political willingness from the DOF to address environmental concerns, believed by some to be because of the government’s preferential treatment towards the tourism industry.

The SMMA is supposed to be a non-profit organisation, yet at present the state has a strong influence over it, despite not providing any funding. Financial constraints are a huge problem and are restricting the SMMA’s ability to provide benefits to the community through educational programmes in local schools, thus undermining its socioeconomic objective. Steps have been taken towards the recovery of fish stocks but illegal fishing remains an issue and concerns remain about the impacts of tourism. Therefore, the SMMA has been assigned an effectiveness score of 2, indicating that some impacts have been partly addressed (overfishing and illegal fishing) but some impacts, such as those from increasing tourism, have not yet been addressed) [12].

7. Incentives

Table 1 lists the incentives which currently being used to address conflicts and support the governance approach (Y), and which incentives can be strengthened to improve governance effectiveness (Y*).

Table 1. List of incentives currently applied by the SMMA, and those in need of strengthening to improve effectiveness

Incentive Type	Used	How/Why
Economic 3. Reducing the leakage of benefits	Y*	Residents from Soufrière are given priority over residents from other towns when it comes to employment at the SMMA itself and for other jobs in the marine basin, such as dive operators. While this reduces the leakage of benefits from the community, there have been some reports of fishermen from other parts of the island illegally fishing in the SMMA, avoiding punishment by using the excuse that they were unaware of the MPA and its regulations. Some income to the SMMA is allegedly lost due to misappropriation of user fees by ‘boat boys’.
4. Promoting profitable and sustainable fishing and tourism	Y*	The SMMA has been designed in such a way that the fishing priority areas are adjacent to the designated marine reserves, thus maximising catch rates through spillover effects. Spillover effects occur a few years after a marine reserve designation, as fish stocks within the reserve build-up and individuals move into adjacent areas. There is potential for the SMMA to take advantage of the high levels of tourism. For example, user fees from snorkelers could be used to relieve the financial strain on the SMMA. Increased funds will ameliorate the SMMA’s ability to enforce the law and thus decrease illegal fishing.

5. Promoting green marketing	Y	For the SMMA to increase its profit from the user fees, it promotes its affinity with the Pitons, a World Heritage Site, in order to increase the number of divers and snorkelers to the area and thus collect more user fees. These user fees contribute to the general upkeep of the SMMA, including boat fuel and staff salaries, increasing the SMMA's ability to monitor the marine environment.
6. Promoting diversified and supplementary livelihoods	Y	For those fishers whose techniques are no longer viable, the preservation of the marine resource base by the SMMA has managed and enhanced tourism in the area. This has resulted in the creation of alternative livelihoods, including boat boys and water taxis, counteracting the loss of fishing grounds for certain individuals.
7. Providing compensation	Y	When the SMMA was first established, the government and the SMMA provided fishermen with an EC\$400 (~£120) subvention each month, as compensation for loss of access to fishing grounds. This compensation has since stopped as the spillover effects are providing fishermen with greater catches respective to pre-SMMA establishment.
8. Reinvesting MPA income in the local community	N*	There is no reinvestment of MPA income in facilities for the local community. The absence of these community advantages undermines the SMMA's potential to achieve its socioeconomic objectives. It is hoped that the new license monitoring will create more revenue for the SMMA, in the absence of a government subvention.
9. Provision of state funding	N*	The state does not provide the SMMA with a subvention, despite the government retaining a degree of control in the decision-making process (largely through the presence of government officials on the board, and also because the SMMA manager and the SMMA president are selected by the DOF).
10. Provision of NGO, private sector and user fee funding	Y	As well as user fees, the SMMA obtains funds through the provision of NGO funding. Projects with the Global Environment Facility (GEF) funded for a new boat engine, dive equipment for the rangers and boat fuels, allowing the SMMA to fulfil their objectives more effectively.

Interpretative 11. Raising awareness	Y*	There is a lack of both community and nationwide awareness of the SMMA. The SMMA used to employ a PR representative and used to frequently educate a variety of local groups, including school children and fishers, about the SMMA's work; due to financial constraints this no longer happens. Where funds can be raised, more PR and education around the island on the SMMA would serve well to rectify issues within the area, for example with the previously mentioned issue of fishers from other communities being unaware of the SMMA
12. Promoting recognition of benefits	Y*	There is a need to strengthen the SMMA's promotion of the benefits it provides within the area. This would increase the respect locals have for the SMMA and move away from the consensus that the SMMA is just a 'tax collector', perhaps in turn making it less likely for rules to be broken.
13. Promoting recognition of regulations and restrictions	Y*	A lack of awareness of the rules and regulations is increasing the amount of illegal activity within the area and is allowing for perpetrators to make excuses when they are caught. This links to a lack of awareness within the community and nationwide on the SMMA.
Knowledge 14. Promoting collective learning	Y	Local knowledge was employed when the designation of the zones were being decided, with fishermen going out with scientists to give their recommendations on appropriate places to place marine reserves and fishing priority areas. Recently, a coral nursery was built in the SMMA and fishers were consulted by scientists working on the project for the SMMA on where best to place the nursery so that staghorn coral (<i>Acropora cervicornis</i>) densities could be restored without disturbing fishing practices.
16. Independent advice and arbitration	Y	Projects such as the coral nursery have been conducted by scientists independent of the SMMA in order to gain unbiased results. For example, British scientists conducted a study on whether the marine reserves in the SMMA had any effect on the fish stock densities within the reserves and in the adjacent areas (Roberts <i>et al.</i> 2001).
Legal 17. Hierarchical obligations	Y*	The SMMA has hierarchical obligations to the laws of the Fisheries Act, with article 8 of the SMMA agreement stating 'ultimate authority rests with the Minister of Agriculture.' Despite Saint Lucia being a signatory to the CBD (FAO, 2015), the SMMA has not aligned any of their policies to these targets.
18. Capacity for enforcement	Y*	It is difficult to adhere to legal framework due to a deficiency in human and financial resources, plus a lack of political will. As the majority of SMMA rangers do not have powers of arrest, they rely on the marine police for enforcement, but the marine police have their own human resource issues and are based elsewhere on the island. This has resulted

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		in a lack of communication between them and the SMMA rangers, as well as producing a weak capacity for enforcement. The lack of law enforcement suggests that although there may be a top-down system in place, instead of the theoretical co-management approach, the SMMA is not gaining the advantages of state control for law enforcement, an advantage associated with top-down approaches, implying that the government is insouciant towards law enforcement within the area despite retaining a strong influence over SMMA decisions.
19. Penalties for deterrence	Y*	Penalties for deterrence are lacking, as mentioned previously, offenders are very rarely fined and when they are it is usually at a reduced amount and paying is seldom followed through.
20. Protection from incoming users	Y*	A license for locals to fish within the SMMA is administered by the DOF, which has proven difficult for the rangers to police, exacerbating levels of illegal fishing, particularly by incoming fishermen from neighbouring areas.
21. Attaching conditions to use and property rights, decentralisation, etc	N*	Non-governmental board members are responsible for management of specific areas of the SMMA. For example, the president of the Water Taxi Association was interviewed and expressed a need for the Water Taxi Association and, thus the SMMA, to have more influence on decisions. Whereas they may be able to control usage and logistics to some extent, the government will make the final decision, despite not financially supporting the SMMA. Further, these non-governmental board members stated that the government will always decide to take the option which favours the tourism industry, regardless of the effects or needs of the local community. Due to this, attaching SMMA conditions to property rights granted to non-governmental board members would benefit the local community. Certain activities would include the right for fishers to harvest within the SMMA, with the enforced condition that they do not fish in the NTZs.
22. Cross-jurisdictional coordination	Y*	There is little communication with neighbouring MPAs. Likewise, the difficulty in contacting the marine police is exacerbating the underlying problems associated with illegal fishing.

23. Clear and consistent legal definitions	Y	Stakeholders are legally bound by the 2001 SMMA agreement which states the MPA's objectives with lucidity, and that signatories are obliged to adhere to the laws of the Fisheries Act.
24. Clarity concerning jurisdictional limitations	Y*	There is a lack of clarity surrounding the SMMA's jurisdictional limitations, with rangers claiming that 'people expect the SMMA to do everything now', a belief heightened by the lack of marine police in the Soufriere area.
Participative 27. Rules for participation	Y	Article 2 of the SMMA Agreement declares that 'the process of development must give all citizens an opportunity to participate fully in making and implementing decisions.' There are monthly SMMA Board meetings, involving all of the signatories to the SMMA Agreement, who must have a valid excuse if they are unable to attend, and there are rules for participation laid out in the SMMA Agreement.
28. Establishing collaborative platforms	Y	Under the new management, SMMA board meetings have changed from quarterly to monthly in the hope that the 'all talk, no action' problem will be rectified, and ideas can actually be followed through. SMMA meetings would benefit from views of non-signatory stakeholders being included. Fishermen perceive the SMMA to be a 'money making business for those who are deeply involved with it'. Allowing stakeholders to be directly involved with the meetings may help to change these negative perceptions. This could be achieved either through direct attendance or through separate meetings held by each party with their relevant community members.
31. Decentralising responsibilities	Y*	Responsibilities have been decentralised, and each signatory is responsible for the individual management authority for areas and sectors under their jurisdiction (I-21). This includes actors from the Yacht Association, who monitor and charter yachts within the SMMA, but are responsible for informing their customers about the restrictions on where they can moor. Likewise, the Fishers Association is responsible for organising regular meetings with the fishers in the area and reinforcing the rules on where they can fish within the SMMA; although these rules are currently commonly broken. Decentralisation of responsibilities and lack of compliance has led to disjointed board meetings, which have been described as 'all talk, no action.'
32. Peer enforcement	Y	The inclusion of fishers in the demarcation process and the benefits from the zonation to the fishers gained the SMMA a level of respect so that now local fishermen said they would report illegal fishing if they see it
34. Building linkages between relevant authorities and user representatives	Y*	The SMMA Committee is comprised of government officials and non-governmental parties. However, the government members outnumber the user representatives making it more difficult for the local users to have their voice heard and build linkages with government officials.

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35. Building on local customs	Y	The SMMA has helped to maintain local customs: by conserving the coastal fish stocks and permitting traditional, artisanal methods of fishing, the SMMA has helped preserve such methods and traditional ways of life.
36. Potential to influence higher institutional levels	Y	There is a potential to influence higher institutional levels (for example, the Department of Fisheries) and ideas established during meetings are often presented to cabinet members

8. Cross-cutting themes

8.1 Role of leadership

The SMMA manager is selected by the government and changes every two years. As incumbents select the manager, there is potential for the chosen individual to be biased towards certain political beliefs, which in turn can influence the decisions made by the SMMA. The current manager was due to leave in September 2017, despite receiving wide praise for improving the management of the SMMA. Having a manager that is respected by the rangers will encourage the staff to do their jobs to the best of their abilities, consequentially fulfilling the conservation objectives more effectively. A respected manager will also have a greater ability to influence people, something that is essential if the SMMA is to begin to influence government decisions. Although sometimes refreshing management is beneficial for an institution, in the case of SMMA, where an effective manager is widely recognised and respected, removing them after two years may be doing more harm than good.

8.2 Role of NGOs

A member of the Soufrière Regional Development Foundation (SRDF) is on the SMMA Board, this being an NGO that is focused on the cultural and social development in Soufrière. Therefore, the SRDF being a member on the Board can influence the SMMA's decisions towards the interests of the community and local users, aiding the SMMA in achieving its socioeconomic objectives. Promoting the interests of local users is particularly important in countries that have a relatively weak history of public participation, which includes the Caribbean region, where weak participation by stakeholders is largely inherited from the authoritarian regimes of the colonial era [26, 27].

In the past, NGOs have worked with the SMMA to conduct ecological surveys on the reefs and have also provided the SMMA with funding to buy equipment for them to achieve their objectives more effectively. Nowadays, NGOs are more focused on the issue of water quality within the area, which will have conservation advantages for the SMMA. However, the SMMA would benefit from once again conducting projects with NGOs on other issues other than water quality which will secure funding, perhaps alleviating some of the financial constraints faced by the MPA.

8.3 Equity Issues

Loss of access to sandy bottom areas as a result of the marine reserves increased competition between hook-and-line fishermen, meaning that some loss of livelihood occurred. However, the SMMA has since managed increasing levels of tourism in the area, consequently opening up new areas of employment such as water taxiing, thus counteracting some of the impacts of the loss of access. It has also sustained traditional fishing methods in the area, maintaining culturally important ways of life. The demarcation system of the SMMA also attempts to minimise equity issues, as opposed to the implementation of an entire no-take zone. Most fishermen interviewed agree with the SMMA, stating that they have seen benefits to the fishing industry since its implementation. The expanding tourism industry threatens to undermine conservation objectives, and negatively impact other users of the SMMA. As mentioned previously (I-28), the SMMA could encourage non-Board member stakeholders to directly participate in their meetings, to provide an opportunity to voice any concerns they may have on the aforementioned expanding tourism industry, as well as to discuss concerns on social justice issues from the implementation of the SMMA rules; although there must be caution to ensure that these inputs do not to undermine the effective achievement of conservation objectives.

9. Conclusions

As anthropogenic activities are increasingly impacting marine ecosystems, it is becoming ever more imperative that MPAs are effectively governed in order to achieve their objectives and are not just 'paper parks.' Governance theorists have over the years debated which governance approach is the most effective but conflicting examples of success and ineffectiveness using similar methods demonstrates that there is no panacea to environmental governance and one size does not fit all [28]. The concept of Co-Evolutionary Hierarchical Governance focuses on a combination of state, market and civil society [12]. Methods to analyse governance effectiveness have also been developed, and this study used Jones' 2014 MPAG framework to assess the effectiveness of an MPA in Saint Lucia [ibid]. Results from this systematic analysis found the SMMA to be a decentralised MPA in theory, adopting a co-managed approach and encouraging user participation in the decision-making process whilst maintaining a degree of state steer. However, in practice, the SMMA's decision-making process is highly influenced by the government, with users expressing concerns that the approach is now too top-down. The SMMA is gaining none of the advantages associated with top-down systems, i.e. they receive no government subvention and there is a strong lack of law enforcement. Consequently, the SMMA is in a lose-lose situation: it adheres to the Fisheries Act, is financially challenged and has little authority. It is an example of the disadvantage associated with co-management approaches, the empowerment of the state leading to the marginalisation of the poor and politically weak [29]. This has led to it being unable to benefit local users so that many view it as a vestigial 'tax collecting' entity within the community.

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Whilst the SMMA has mitigated initial conflicts between tourists, yachtsmen and fishers, 22 years on from its establishment there are new conflicts and issues that the SMMA needs to work to resolve. The tourism industry is now more important in the area, and the government places a priority on this industry because of its economic value, regardless of environmental damage such as decreasing water quality. This prioritisation is characteristic of governments of SIDS, particularly in the Caribbean, but an emphasis needs to be placed on protecting the environment so that the tourism industry can be sustained in the long-term and tourism developers, to whom responsibilities have been decentralised, do not undermine the SMMA's conservation objectives; which could then in turn impact other users, particularly fishers. High poverty levels and a lack of law enforcement within the SMMA are increasing illegal fishing. Poverty levels are accelerating levels of illegal fishing and could be ameliorated if the SMMA was able to provide funding to the community. A lack of law enforcement, partly due to a lack of deterrence, a breakdown in communication between marine police and rangers and close community bonds, is also increasing illegal fishing within the SMMA. Inadequate funding has also led to human resource and equipment issues so that ranger patrols are limited, increasing the levels of illegal fishing in the area which have negatively impacted conservation goals.

All rangers should have the powers of arrest, as the marine police are based so far from Soufrière and some rangers from outside of the Soufrière should be employed. Financial constraints lie at the core of many of the SMMA's issues. The SMMA should seek to work with an international NGO to raise funds, as they have done previously. Working with NGOs to improve the water quality should also be a priority, as this will enhance the SMMA's conservation objectives. The SMMA must also continue with the new scheme where if license holder users do not pay their SMMA fees, they lose their licenses. Once the financial issue is rectified, the SMMA should reinvest its income back into the local community to provide socioeconomic benefits, as well as spending the money on new boat equipment for the rangers so that they can patrol more often. Funding should also be allocated to raising awareness and promoting its benefits of the SMMA, which in turn may increase respect and law enforcement capacity. Monthly board meetings should continue, however an equal ratio of government members to non-government board members should be restored to balance the amount of influence the state and society has in the decision-making process.

The SMMA achieves an effectiveness score of 2, which reflects that it has partly addressed some impacts such as overfishing and illegal fishing, but is yet to address some impacts, such as those associated with increasing tourism. When established in 1994, the SMMA was a success, being amongst the first MPAs to demonstrate spillover benefits [6], though the institutional driving forces have since changed, and the SMMA must focus on adapting its governance and policies to align with these changes to better address conflicts and increase effectiveness, as well as equity.

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