Exploring Ecosystems in Union Island: A Case Study of Ecosystem-based Management and Sustainable Livelihoods in Ashton Lagoon

By

Cassidy Walker

Submitted in partial fulfillment of the requirements for the degree
of
Master of Marine Management

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Abstract: In 1994, Ashton Lagoon in St. Vincent and the Grenadines was the site of a 300-berth marina development. After a year of construction, the development was abandoned, leaving the community of Union Island to clean up the ecological and economic losses. The construction left a causeway through Ashton Lagoon to nearby Frigate Island, which left coral reefs, seagrass beds, and mangroves to suffer as water flow became heavily restricted. Through the work of Sustainable Grenadines Inc. (SusGren), the restoration of Ashton Lagoon has already begun, and this case study will be used for the next phase of the Ashton Lagoon Restoration Project. Based on community interviews and a review of literature, recommendations for next steps in this restoration project will be developed using ecosystem-based management and sustainable livelihoods as a framework. Based on initial findings and interview feedback, the development of small-scale eco-tourism activities like kayaking, bird watching, nature walks, and community environmental monitoring programs can help to bolster local pride in the area and promote livelihood opportunities for local community members while preserving ecological integrity. Legally enforcing the previous designation of Ashton Lagoon as a Conservation Area will also strengthen the restoration efforts and allow for any development of Ashton Lagoon to be regulated and sustainable. This case study will demonstrate the ecological, social, and economic importance of Ashton Lagoon and the need for legal protection of this area from future harmful development in order to allow for sustainable use of the area.

Keywords: ecosystem-based management, ecotourism, sustainable livelihood, Marine Protected Area, sustainable development, community engagement, St. Vincent and the Grenadines

List of Abbreviations

ALRP – Ashton Lagoon Restoration Project

CBET – Community-Based Ecotourism

CCCCC – Caribbean Community Climate Change Centre

CERMES – Centre for Resource Management and Environmental Studies

EIA – Environmental Impact Assessment

EBA – Ecosystem-based Adaptation

EBM – Ecosystem-based Management

IUCN – International Union for Conservation of Nature

MAPERSC - Marine Affairs Program Ethics Review Standing Committee

NGO – Non-Government Organization

NMBCA – Neotropical Migratory Bird Conservation Act

MPA – Marine Protected Area

MSP – Marine Spatial Planning

OECS – Organization of Eastern Caribbean States

SIDS – Small Island Developing States

SIOBMPA – Sandy Island/Oyster Bed Marine Protected Area

SusGren – Sustainable Grenadines Inc.

SVG – St. Vincent and the Grenadines

TCMP – Tobago Cays Marine Park

UPMCA – Union-Palm Island Marine Conservation Area

WTTC – World Travel & Tourism Council

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Chapter 1 – Introduction

Oceans and coasts provide vast benefits to people around the world. From fisheries providing food and livelihoods for communities, to the recreational activities that generate tourism opportunities, oceans are important to people across the globe (Arkema et al., 2015). People are disproportionately dependent on coasts for resources, living space, and economic development, and managing these spaces and their ecosystem services is becoming increasingly challenging (Weinstein et al., 2007). Ecosystems around the world are at threat due to human development activities and anthropogenic-induced climate change (Geyer et al., 2011; Javeline et al., 2013; Mahmoud & Gan, 2018; Queirós et al., 2016; Reside et al., 2018). The Caribbean region hosts a variety of important ecosystems, including coral reefs, mangrove forests, and seagrass beds. The Caribbean region is also facing many threats to these ecosystems due to climate change and human impacts (European Commission, 2016). Ashton Lagoon, located in Union Island in St. Vincent and the Grenadines (SVG) (Figure 1) is an important coastal ecosystem that has suffered as a result of a failed development project (Mills, 2001). SVG encompasses a large area of marine ecosystems and is located in the Caribbean Sea Large Marine Ecosystem (LME) which contains many diverse and biologically productive ecosystems like coral reefs, seagrass beds, and mangrove forests (Fanning, Mahon, & Mcconney, 2009).

Ashton Lagoon, located on the south coast of Union Island, SVG contains many ecologically significant habitats such as coral reefs, seagrass beds, and mangroves which help to mitigate climate change effects like sea level rise, coastal erosion, and storm surge (Feller et al., 2017; Villanoy et al., 2012). Coastal systems like Ashton Lagoon play an especially important ecological role as a biodiversity hotspot, nursery area, and refuge for many marine species and are one of the most productive ecosystems in the world (Basset et al., 2006; Conde et al., 2015; Esteves et al., 2008). This ecosystem was heavily degraded during a marina construction in the mid-1990s and is being restored with hopes of sustainable development projects in the future. Balancing the necessity for communities to meet their basic needs through livelihood opportunities while maintaining sustainable use of resources is becoming increasingly challenging. Small island developing states (SIDS) like SVG face inherent challenges including a narrow base for economic activities and a high vulnerability to climate change impacts and natural disasters (SVG-MFEP, 2013). Tourism accounts for a large part of SVG's economy and is a rapidly growing sector throughout the Caribbean (SVG Tourism Authorty, 2017). However,

there may be a gap between the expectations of international tourists and the services that local communities or businesses can supply, especially in small countries like SVG (Barrowclough, 2007). Ashton Lagoon has been historically important ecologically, culturally, and economically for the people of Union Island. Restoration of Ashton Lagoon has been a goal of the Union Island community for many years and considering the next steps towards sustainable development has become a priority (Gradinaru, 2014). Multi-level and multi-scale communication and management planning for solving the challenges facing Ashton Lagoon requires an effective participatory framework (Baldwin, Oxenford, & Mahon, 2013). The potential for initiatives like small-scale community driven ecotourism around Ashton Lagoon could help to bridge this gap by providing livelihood opportunities to local communities without compromising ecological integrity of this system. Strengthening local decision-making capacity and governance through co-management can improve the environmental understanding and attitudes of the stakeholders around Ashton Lagoon (Sorenson, 2008).

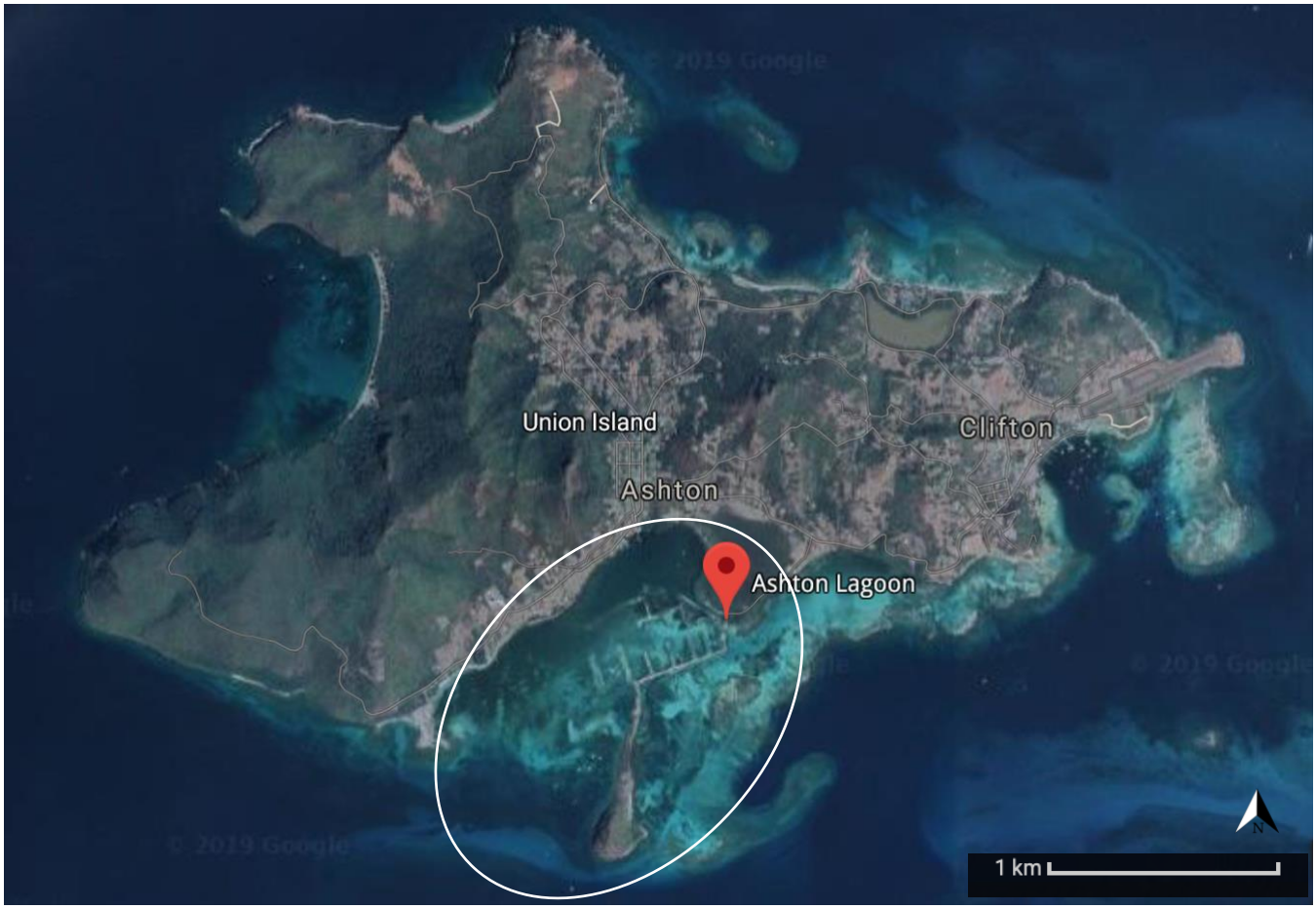

Figure 1: Map showing Union Island and Ashton Lagoon (Google Maps, 2019)

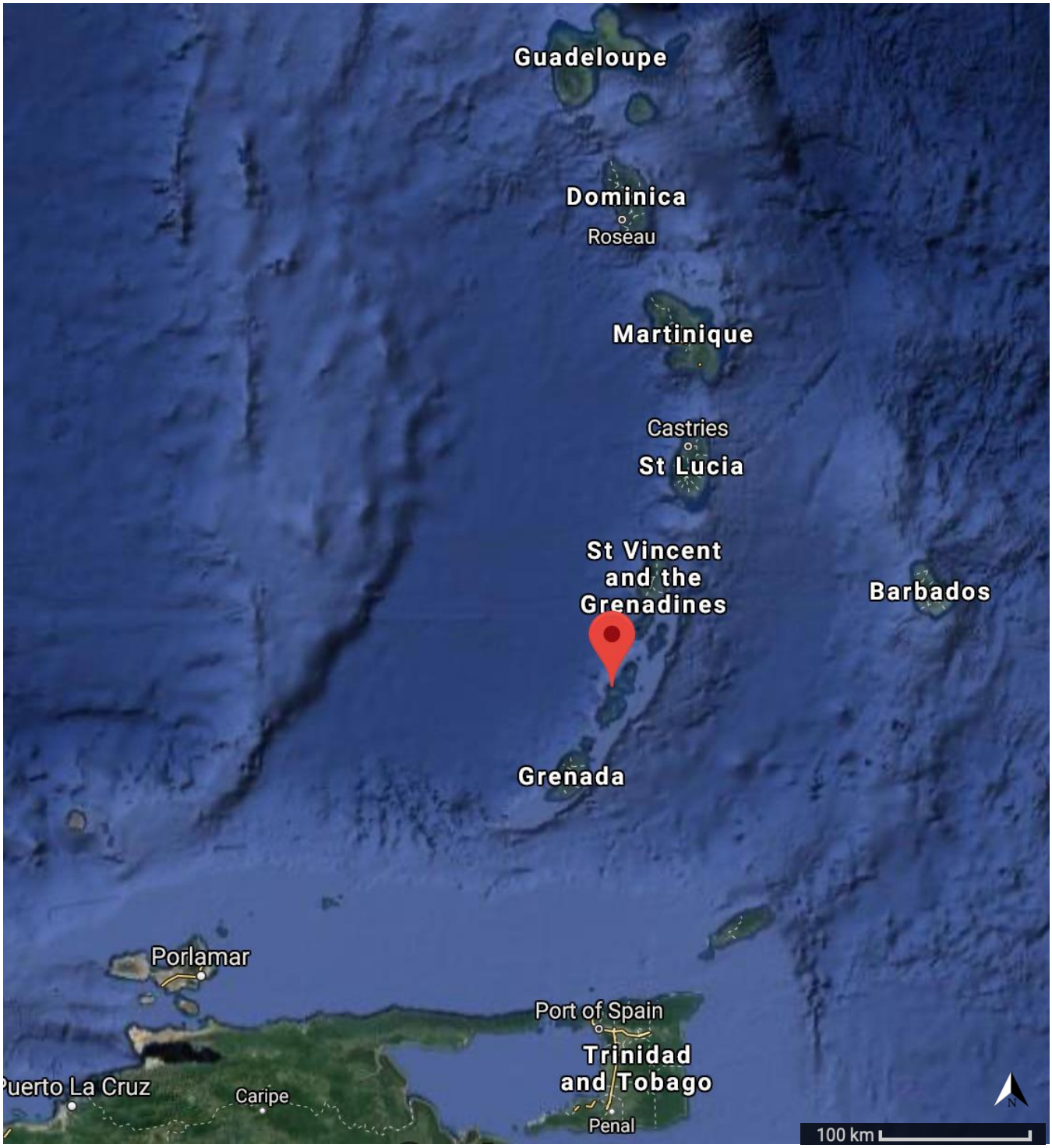

Figure 2: Map of the Eastern Caribbean highlighting the location of Union Island, St. Vincent and the Grenadines (Google Maps, 2019).

1.1 Ecological, Cultural, and Economic Importance of Coastal Lagoons

Coastal ecosystems and lagoons are widely recognized as one of the most biologically productive ecosystems in the world (Chapman, 2012; Conde et al., 2015; de Wit, 2011; Pérez-Ruzafa & Marcos, 2012). These marine-to-freshwater transitional ecosystems provide habitat for a diverse range of benthic species, marine vegetation, and juvenile macro and micro fauna through supporting salt marshes, seagrass beds, and mangrove forests (Conde et al., 2015; Lamptey, 2011). In the Atlantic, seagrass beds are a common feature of soft-substrate lagoons, with eelgrass (*Zostera marina)* being the most dominant species in the northern Atlantic and turtle grass (*Thalassia testudinum)* being the most dominant species in the Gulf of Mexico and the Caribbean. In Ashton Lagoon, turtle grass plays an important role in influencing the stability and shape of the shoreline, maintaining consistent dissolved oxygen levels, and filtering suspended matter (Anthony et al., 2009; Bertness, 2007; Nixon, 1995).

Back reef lagoons, like the one adjacent to Ashton Lagoon and Frigate Island, and the ecosystems they support are valued highly by many societies. Many scientists and philosophers still debate over whether natural systems like lagoons possess their own intrinsic value outside of the value that they provide to humans (Anthony et al., 2009; Rolston, 1994; Williams, 1994). It is difficult to quantify the cultural value of spaces like coastal lagoons, though tacit values that are unspoken like the enjoyment of scenery, sounds of birds and waves, and other sensory experiences are still important to consider (Naukkarinen, 1998). Cultural activities and traditions like food, music, values, identity, and history are often influenced by nature (Roseland, 2012). In some cases, unmanaged developments to facilitate the enjoyment of natural features like coral reefs that attract tourists has also led to their degradation (Price & Price, 1994a).

Not only are coastal lagoons important for the ecological and cultural value they provide, but the livelihoods provided by the ecosystems services of these lagoons is critical to many communities. Defining ecosystem services using monetary valuation allows for society to translate the importance of an ecosystem into monetary terms that can be better understood by all stakeholders (Brito et al., 2012). However, by valuing ecosystems like coastal lagoons based solely on the economic goods and services they provide to humans, natural resource decisions may be made to favour human economies over biodiversity conservation and protection of ecosystem services in the long-term. The rich biodiversity of coastal lagoons supports not only ecological communities, but also allows for economic systems to

develop and flourish (Newton et al., 2018). Quantifying the economic value of ecosystem services in coastal lagoons can be difficult, especially in small islands where these transactions are not always monitored. The main services provided by coastal lagoons include food provisioning (mainly fish and seafood), climate regulation, flood protection, oxygen production, fertility, recreation, aquaculture, transportation and (eco)tourism attractions (Newton et al., 20128; Solidoro et al., 2010; Lopes and Videira, 2013). As a subsistence fishing island, the daily life and employment of many residents of Union Island is integrally related to utilizing the marine resources that lie in and around Ashton Lagoon (Price & Price, 1994a). The ecosystem services provided by lagoon ecosystems can have multiple direct and indirect benefits to communities, including cultural heritage that translates to economic value. For example, the cultural value of Venice Lagoon reaches 12 million Euros per square kilometre (Newton et al., 2018). While the cultural value of Ashton Lagoon to the people of Union Island has not been monetarily quantified, it has been part of the island's history and identity for many years (Cousins, 2018).

1.2 Threats to Coastal Lagoons

Reef ecosystems, salt ponds, and mangroves are present throughout the Grenadines, which provide habitats for sea turtle nesting, fish nurseries, and seabird nesting (Baldwin & Mahon, 2014). Two current Marine Protected Areas (MPAs) located along the Grenadine Bank, Tobago Cays Marine Park (TCMP) and Sandy Island/Oyster Bed Marine Protected Area (SIOBMPA), have similar systems of mangroves, salt ponds, seagrass beds, and coral reefs that have been mapped based on resource use and habitat, which has helped to better understand these unique ecosystems and the human-nature interface (Baldwin & Mahon, 2014). Ashton Lagoon has many similarities with these areas and is facing similar threats from human development activities, pollution, and climate change. Ecosystems like these, with so many important trophic interactions, are especially sensitive to local and global anthropogenic impacts and can be used to assess climate change impacts in order to respond to stressors and maintain ecological integrity (Marcos et al., 2019). Most peer-reviewed research publications on climate change predict significant temperature increases and negative effects on biodiversity (Anderegg et al., 2010; Bernstein et al., 2007; Javeline et al. 2013). Eutrophication is also a common problem affecting biodiversity in coastal ecosystems with excess nutrients like phosphorus and nitrogen affecting the composition, trophic structure, size, and biomass patterns of species from algae to large fish (Esteves et al., 2008). Coastal lagoons can be directly or indirectly affected by discharge of organic matter,

nutrients, and chemicals from urban and industrial activities (Brito et al., 2012; Esteves et al., 2008). Sea level rise can also be a challenge for shallow coastal lagoons as the excess water can overwhelm them (Brito et al., 2012). Warming water in shallow lagoons with coral reef ecosystems is also a significant threat (Brito et al., 2012; Esteves et al., 2008; Javeline et al., 2013). Sea level rise and flooding events are one of the major threats to low-lying coastal lagoons based on climate change predictions, which affects local housing, socio-economic activities, and ecosystem services (de Wit, 2011; Lopes et al., 2017). Coastal lagoons are economically valuable and thus their protection and conservation are vital to meeting the needs of society in the present and future (Newton et al., 2018). Interdisciplinary and community-driven conservation strategies like ecosystem-based management and sustainable livelihood developments can be used around the world to protect and conserve lagoon ecosystems and their services (Esteves et al., 2008).

1.3 Ecosystem Based Management and Adaptation

Ecosystem-based management (EBM) has been used in terrestrial environments for many years, but its use in marine ecosystems is still in its early stages in most places (Charles, 2018; Lester et al., 2010). EBM is the process of managing entire ecosystems in order to maintain ecological integrity and sustainability (Slocombe, 1998). It is an integrated approach that recognizes the variety of interactions within an ecosystem and beyond it, including interactions with humans, rather than managing based on single issues, species, or ecosystem services in isolation (NOAA, n.d.). Ecosystem-based adaptation (EBA) to climate change is also rising in popularity, especially in small island states, like many Caribbean countries. Countries in the Caribbean, like SVG, are especially vulnerable to climate change effects like sea level rise, invasive species, changes in rainfall, rising temperatures, ocean acidification, and changes in severity of storms, floods, and droughts (Mercer et al., 2012). Part of this process is integrating local and external knowledge to gain a broad perspective of the issues and how humans and species interact within natural ecosystems (Charles, 2018; Mercer et al., 2012).

Monitoring ecosystems for marine management is needed for effective management, and collaboration with the community, Non-Government Organizations (NGOs), research institutions, and government can help to bridge existing gaps in ecosystem monitoring (Hind et al., 2015). For EBM governance to be effective, a clear legal framework for allocation and use of coastal and marine space

and resources is considered essential (Fanning et al., 2011, Baldwin & Mahon, 2014). EBM and EBA help to promote multi-sectoral approaches to complex problems and multiple geographic scales, integrate flexible management structures for adaptive management, and promote resilient ecosystems through nature-based solutions (Mercer et al., 2012). EBM recognizes the presence and need for a variety of spatial interactions and includes all of these interactions together rather than in isolation (Baldwin & Mahon, 2014). For EBM to be effective and address all of the diverse systems, management approaches should be adaptive and address issues of multiple scales to promote stakeholder participation and multi-sectoral cooperation (Armitage et al., 2008).

EBM and EBA can also be tied to the concept of sustainable livelihoods. There are many interpretations and definitions of sustainable livelihoods, but the most widely used is, "[A livelihood that] can cope with or recover from stress and shocks, maintain and enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation" (Chambers & Conway, 1992). Sustainable livelihoods have been used across the world and widely in the Caribbean in cases of poverty alleviation, marine protected areas/conservation, coastal living, and resource management (Gregoire, 2012). Creating sustainable livelihood opportunities for Union Island can help people better manage the natural resources that their livelihoods depend on from a community level. Approaches like EBM, EBA, and sustainable livelihoods for Ashton Lagoon can be used to maximize benefits to the community, manage trade-offs, integrate external research and local knowledge, and promote a participatory, transparent, framework for Union Island. These frameworks were used as a basis for the supplemental research and case study comparisons for this project.

1.3.1 Marine spatial planning (MSP)

Marine spatial planning (MSP) is the public process of planning, analyzing, and allocating the distribution of activities in a marina area to achieve social, ecological, and economic objectives that have been specified by a political or management process (UNESCO, n.d.). MSP can help countries and regions to implement EBM by navigating the space for biodiversity, conservation, and sustainable economic development within a defined temporal and spatial scale (UNESCO, n.d.). MSP involves implementing a step-by-step approach for the process by the management body. MSP combines approaches like EBM, integrated management, adaptive management, and participatory processes. There is often no end to the MSP process, it is an ongoing way to establish more rational and harmonious use of marine space and resources. This process is highly beneficial for balancing

conservation and development to integrate the human and nature interface. MSP has already been used throughout the Grenadines to engage government and civil society stakeholders from fisheries, transportation, environmental conservation, and tourism and incorporate their knowledge into marine spatial information systems (Badwin & Oxenford, 2014; Baldwin, Mahon, & McConney, 2013). Union Island has been part of this process on a broad scale, so the same process can be applied to Union Island in the context of Ashton Lagoon.

1.4 Management Problem

When a development project like a marina occurs in an ecologically sensitive area, the effects can be long-lasting and severe (Chapman, 2012). In the case of Ashton Lagoon, the failed marine development there has had numerous impacts leading to the need for restoration work. This work, which is still underway, has been a long process with many challenges along the way. Ashton Lagoon is a culturally, economically, and ecologically important coastal lagoon that has experience degradation caused by unsustainable development and is on the long path to recovery. This ecosystem is critical to human and natural systems and deserves to be protected properly. While Ashton Lagoon was initially declared a Conservation Area in 1987, a management plan was never created to ensure that it was protected from harmful developments. Greater protection from human activities and development is required for Ashton Lagoon. Increasing livelihood opportunities in Union Island without compromising critical ecosystems like Ashton Lagoon is a challenging but necessary step for sustainable development. If left to develop without proper marine spatial planning (MSP) or zoning, the pressures of fishing tourism, land-based and marine pollution, etc. can further degrade Ashton Lagoon and threaten the health of ecosystems and the livelihoods of the people of Union Island. The next phase of the Ashton Lagoon Restoration Project (ALRP) potentially involves initiating environmentally sustainable livelihood opportunities to generate employment and economic gains for the people of Union Island and implementing a management plan based on an ecosystem-based approach.

1.5 Research Aims and Objectives

This study aims to assess whether the restoration efforts for Ashton Lagoon have been successful in order to determine the next steps using ecosystem-based management and sustainable livelihoods

principles. This research aims to collect information about the local perceptions of potential challenges and opportunities for managing and developing Ashton Lagoon sustainably. Semi-structured stakeholder interviews are used to obtain the information needed to develop the recommendations for the next phase of Ashton Lagoon. Information on progress thus far, the types of activities that should be permitted, the value that it provides to stakeholders, and whether it should be a legally established Marine Protected Area (MPA) will be sought. These interviews are part of the continuing dialogue between stakeholders and Sustainable Grenadines Inc. (SusGren) in order to involve diverse perspectives and ensure meaningful community involvement in the Ashton Lagoon Restoration Project. This research is meant to inform SusGren and the Government of St. Vincent and the Grenadines for a potential management plan for protection of Ashton Lagoon.

1.5.1 Central Research Question

Has the Ashton Lagoon restoration project been successful thus far in restoring natural habitat and species populations without compromising socio-economic needs? What are the next steps towards improvement and sustainable use of the ecosystem?

1.5.2 Sub-questions

a. What are the potential socio-economic implications of the lagoon restoration?
b. How do we manage the challenges and opportunities?
c. How can community members become more involved in the restoration project for Ashton Lagoon?
d. Has the Ashton Lagoon restoration been successful thus far?

Chapter 2 – Background

2.1 Background Context of Union Island and St. Vincent & The Grenadines

St. Vincent and the Grenadines is a former British colony located in the Lesser Antilles archipelago of the Caribbean Windward Islands (Figure 1 & Figure 2), that became an independent Commonwealth country in 1979 (Price & Price, 1994a). The Grenadine Bank located between St. Vincent and Grenada, is a shallow area that covers almost four thousand square kilometres (Figure 3). Local communities on the islands on the Grenadine Bank rely heavily on fishing for their livelihoods, sometimes having to supplement their income with skilled labour, public sector jobs, tourism, and maritime trade (Afrin, 2016; Baldwin, et al, 2007). There are over twenty islands in the Grenadine Bank, with nine of these islands permanently inhabited. This includes six islands with communities supported by public and private infrastructure (Bequia, Canouan, Mayreau, Union island, Carriacou, and Petite Martinique), two resort islands (Petit St. Vincent and Palm Island), and one private island (Mustique) (Mahon et al., 2004). SVG encompasses the main island of St. Vincent and the Grenadines islands of Bequia, Mustique, Canouan, Mayreau, Palm Island, Petit St. Vincent, and Union Island (SVG-DMA, 2013). The Grenadine islands of Carriacou and Petit Martinique are part of the country of Grenada.

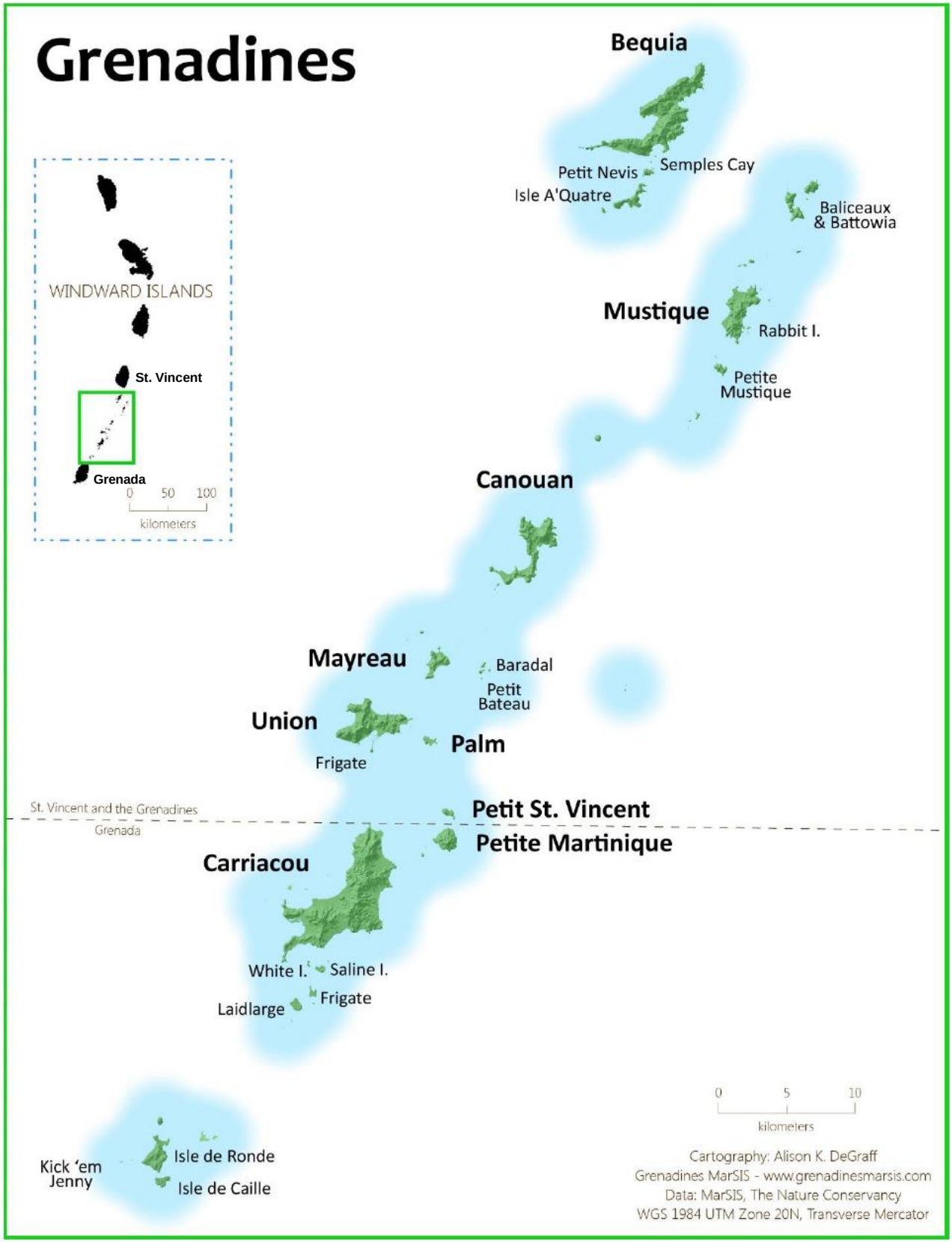

Figure 3: Map of the Grenadine Islands showing the border between SVG and Grenada (DeGraff & Baldwin, 2013).

As of 2002, SVG had a population of approximately 100,000 and more than 90% of these people lived on mainland St. Vincent (SVG-DMA, 2013). As a country, SVG's economy was mostly based on agriculture, but recent years have seen a shift towards an increase in tourism and service-oriented activities (SVG-DMA, 2013). In 2017, employment in the tourism sector, including jobs indirectly supported by travel and tourism, accounted for 21.5% of jobs in SVG with an expectation that it will grow to 30% by 2028 (WTTC, 2018). In 2017, travel and tourism accounted for over 24% of SVG's Gross Domestic Product (GDP) and it is expected to increase to nearly 31% by 2028 (WTTC, 2018). Most of the tourism in SVG is in the Grenadine Islands and involves sailing and water activities like SCUBA diving, snorkeling, and kite surfing. Cultural heritage and ecotourism ventures are more common on mainland St. Vincent (SVG-EU, n.d.). The tourism industry is one of the most rapidly developing industries in the Grenadine Islands, which could have severe implications for a small island like Union with fragile ecosystems, limited resources and capacity (Young-George, Mahon, & Cumberbatch, 2007).

Located on the Grenada Bank, Union Island, is the southernmost populated island in SVG. Union Island is 8.3 square kilometres with a fluctuating population of approximately 2500 people (SVG-TA, 2009). Most of the population of Union Island is located in the villages of Ashton and Clifton (Fig. 4). Due to the unproductive agriculture industry and lack of employment opportunities, the unemployment rate on Union is high, at 18.8% in 2008, resulting in many Unionites moving to other islands or countries in search of work (The World Bank, 2008; Adams, 1979). In the past, Union Island used to be fairly self-sufficient, with a successful farming industry that produced potato, pumpkin, cassava, peas, corn, and okra (Phillimore, 2013). However, today the land of Union Island is dry, partly from the history of free-ranging livestock, so there is less interest in working the land when more money can be made through tourism (Phillimore, 2013).

Ashton Lagoon, which is officially referred to as Ashton Harbour, is an important coastal ecosystem and is one of the largest bays in the Grenadines (Price & Price, 1994b). Ashton Lagoon contains salt ponds, mud flats, coral reefs, and seagrass beds and an adjacent mangrove forest (Sorenson, 2008). This lagoon provides important habitats, spawning area, and nursery grounds to a number of important marine species and migratory birds (Mumby et al., 2004). Ashton Lagoon has played a large part in the social, economic, and ecological systems of the island for many generations. Historically, Ashton Lagoon has been a place for swimming, recreation, socializing, and fishing. Ecologically and economically important species including juvenile lobsters *(Panulirus argus)* , juvenile

barracuda *(Sphyraena*), parrotfishes *(Scaridae*), and conch *(Strombus gigas)* were found in Ashton Lagoon and harvested by subsistence fishers for multiple generations (Price & Price 1994a). In the early 1990s, Ashton Lagoon was still considered to be a relatively pristine coastal lagoon, and one of the last in the Lesser Antilles (Price & Price, 1998). It also contained the five key components of a coastal lagoon and coral reef ecosystem: (1) A stretch of outer reefs extending from Clifton Harbour to Frigate Island that protected the (2) inner lagoon of warm shallow, biologically productive water; (3) large seagrass beds; (4) a salt pond, and (5) mangroves alone the shoreline (Baldwin, 2012; Philimore, 2013).

Due to its economic, ecological, and cultural value, Ashton Lagoon was designated as a Conservation Area in 1987 under the Fisheries Act of 1986 (FAO 1987). This Conservation Area encompassed all of Ashton Lagoon and was part of the Union-Palm Island Marine Conservation Area (UPMCA) (Fig. 3). The UPMCA covers 1359.6 km^2 and encompasses an area on the southeastern shore of Union Island over to Palm Island, including Ashton Lagoon and Frigate Island (UNEP-WCMC, 2018). This Conservation Area falls into the International Union for Conservation of Nature's (IUCN) Protected Area Category VI. This category of IUCN Protected Areas focuses on sustainable use of natural resources while also protecting natural ecosystems (UNEP-WCMC, 2018). In addition to being part of the UPMCA, Frigate Island is also designated as the Frigate Island Wildlife Reserve under the Wildlife Protection Act of 1987, which is a Category IV IUCN Protected Area (SVG-NPRBA, n.d.). An IUCN Category IV is a Habitat/Species Management Area, which focuses on the goals of maintaining, conserving, and restoring species and habitats (UNEP-WCMC, 2018; Dudley, 2008).

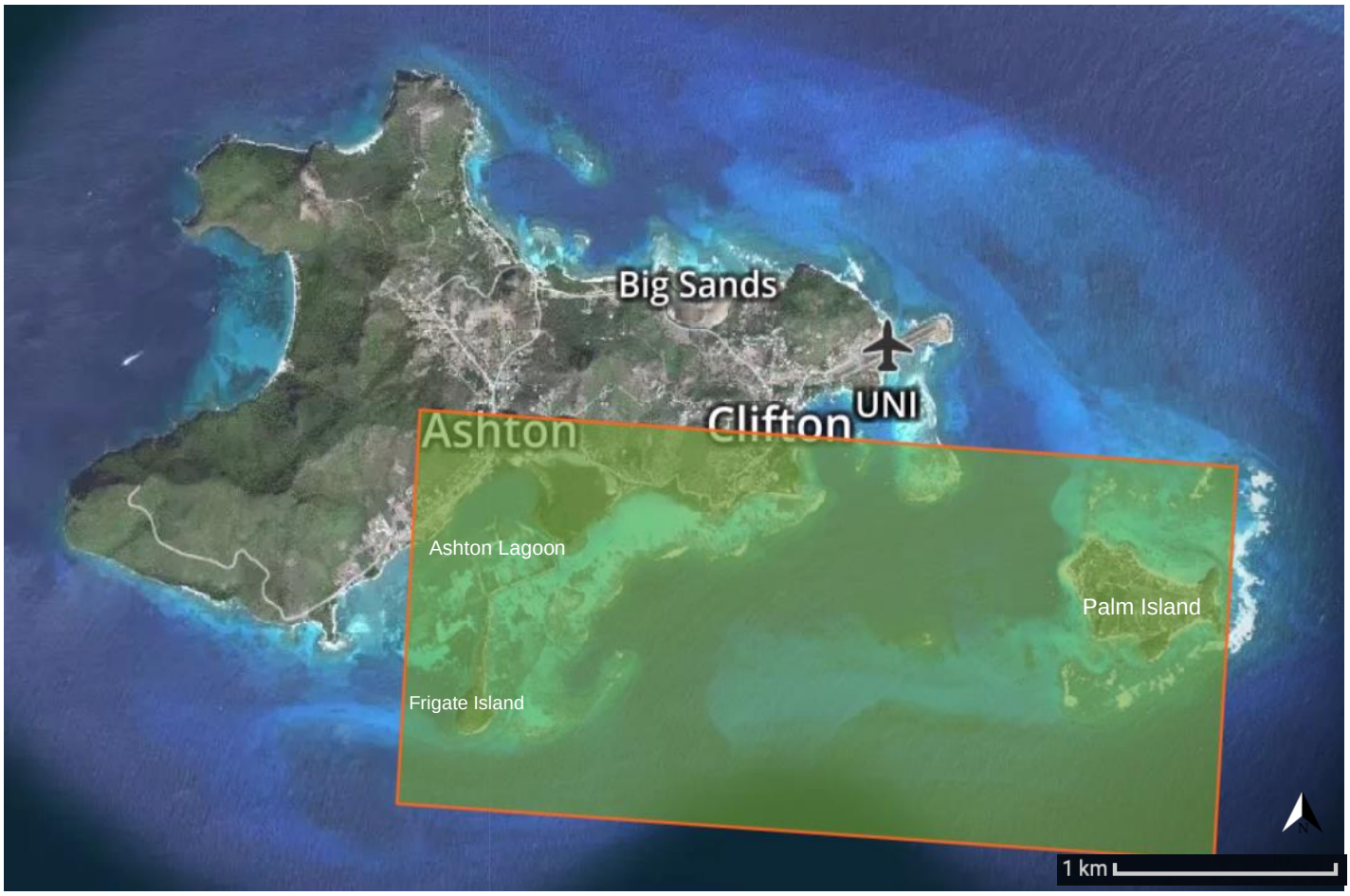

Figure 4: The Union-Palm Island Marina Conservation Area (UPMCA), an IUCN Category VI Protected Area designated under the 1986 Fisheries Protection Act of St. Vincent and the Grenadines (Protected Planet, 2018).

2.3 Ashton Marina Development Project

Until the early 1990s, Ashton Lagoon had been relatively undisturbed. In 1993, a contract for construction was awarded to the Valdetarro Construction company from Italy to build a 300-berth marina, anchorage, condominium complex, hotel, golf course, and recreation centre in and around Ashton Lagoon, despite its status as a Conservation Area (Price & Price, 1994b) refer to Figure 4. This project involved creating a channel by dredging and removing the seagrass beds and patch reefs in large areas of the shallow western side of the lagoon (Price & Price 1994b). According to Price & Price (1998), there were no long-term financial cost-benefit analyses, accessible environmental impact assessments (EIA), or public stakeholder meetings completed prior to the construction permit. This marina development and hotel complex would also cover almost 70 hectares of the land adjacent to the lagoon. The outer reefs were to be infilled to make room for the condominium complex, which would include 20 villas, 80 apartments, and 22 stores (Figure 5). Over 20 hectares of mangroves would have to be cleared to build a golf course in its place. The offshore Frigate Island was also to have been cleared for a park and pavilion (Price & Price 1994b; Sorenson, 2008).

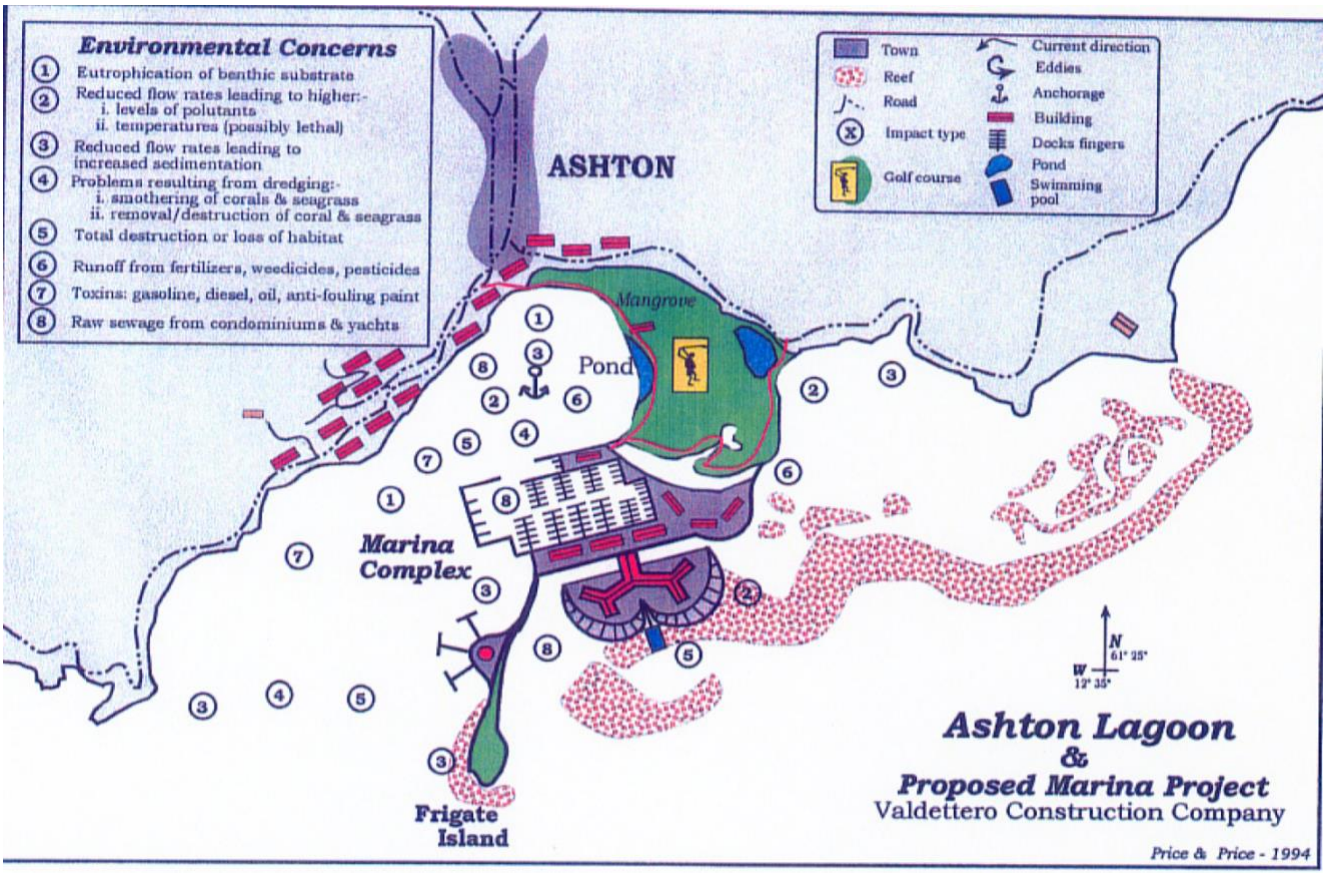

Figure 5: The proposed Ashton Lagoon Marina Project and associated ecological concerns (Price & Price, 1994a).

Community support for the project was mixed, as many believed that the economic gains promised by the development would bring significant benefits to the island, while others were skeptical of the project and concerned about the potential environmental impacts and damage to the cultural community (Price & Price 1994a). An EIA was conducted by Price and Price in 1994 prior to the construction to determine the potential physical, chemical and biological impacts and assess their severity (Price & Price, 1994b). Based on their findings, the original ecosystems would have been severely displaced or destroyed, yet the construction went forward. Ashton Lagoon was initially quite shallow, with some areas barely deeper than one metre, and the ecological impact report determined that the impacts on the seagrass beds and stabilizing substrate would be severe after the dredging occurred (Price & Price, 1994b).

After only a year of construction, Valdetarro Construction declared bankruptcy and abandoned the project amid allegations of money laundering and corruption (Price & Price, 1998). This development that promised to bring positive transformation to Union Island left Ashton Lagoon severely damaged (Price & Price, 1998; Phillimore, 2013). Before the project was abandoned, a causeway connecting Union Island to Frigate Island and a cluster of finger piers was constructed in the lagoon, which blocked the water flow between Union Island and Frigate Island severely reducing the flushing of the now isolated western half of Ashton Harbour. As a result, the current paths were altered, sedimentation occurred on the eastern side of the causeway, and the water on the western side of the causeway became stagnant (Price & Price, 1998). The loss of water circulation prevented wastewater from the town of Ashton from being flushed properly (Phillimore, 2013; Price & Price, 1998). Dredging, sedimentation, and increased temperatures led to the loss of seagrass bed habitats and patch reef systems in the western side, which negatively affected the biodiversity of the lagoon (Price & Price, 1998). Lobster, conch, and finfish populations in the lagoon, which many communities on the island relied on for food and livelihoods were drastically reduced (Gorea & Sammons, 2003). The causeway also blocked boat access between Clifton and Ashton necessitating small boats to go out around Frigate Island where seas are rough and travel times and fuel costs were substantially increased.

Unionites realized quickly that the marina project had resulted in severe environmental impacts to Ashton Lagoon, and the idea for restoring Ashton Lagoon began to slowly grow. Understanding the legislative barriers like land ownership in Ashton Lagoon has also been important because after the construction project, the infrastructure built in the lagoon was owned by the bank, so determining the proper legal authority and processes for restoration activities were recommended (Sorenson, 2008).

Partners like The Nature Conservancy were suggested for this process (Sorenson, 2008). It was recommended early on that removing the causeways and reopening the water circulation through the lagoon was required to see significant changes in the ecosystem (Goreau & Sammons, 2003; Price & Price, 1998). Transplanting seagrass and coral colonies were also recommended to replenish the previous populations (Goreau & Sammons, 2003; Price & Price, 1998). In addition, Goreau & Sammons (2003) recommended that the Government of SVG endorse restoration of Ashton Lagoon through international partners and local NGOs and facilitate community-based management.

2.4 The Ashton Lagoon Restoration Program

The road to restoration for Ashton Lagoon has been long and winding. The first large-scale step in restoring the area was 'Phase I: A Participatory Planning Workshop for the Restoration of Ashton Lagoon'. This was sponsored by the Society for Conservation and Study of Caribbean Birds (now Birds Caribbean) in partnership with the Sustainable Grenadines Project (now SusGren Inc.), AvianEyes Birding Group and the Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies. This project was funded by the Neotropical Migratory Bird Conservation Act (NMBCA) Fund of the United States Fish and Wildlife Service for USD $200,000 during the first phase (Sorenson, 2008) This three-day workshop engaged stakeholders to determine the community vision for the sustainable use of Ashton Lagoon and the necessary steps for achieving this goal (Sorenson, 2008). In total, 37 participants from local NGOs, government, fishers, residents, and business owners participated in the workshop. Based on the common themes that were reached, the actions were sorted into three categories; the environment, public awareness, and governance (Sorenson, 2008). The outcome of this participatory planning workshop was four main objectives as follows (Sorenson, 2008; SusGren, 2012):

1. Restore the natural ecological processes in Ashton Lagoon in order for the ecosystem to once again support biodiversity and provide important ecosystem services
2. Promote appreciation and awareness of the connections between sustainable livelihoods and the environment and the importance of sustainable use of natural resources among stakeholder groups
3. Develop sustainable local tourism and livelihood opportunities for the people of Union
4. Revise legislation and improve decision-making capacity locally
5. Estimate costs for removing construction material and causeways to re-open water flow

6. Water quality assessments for chemical and physical data

The second phase of restoring Ashton Lagoon was titled ‘Phase II: An Interpretive Framework and Management Workshop for the Area’. This phase was funded in 2010 by the NMBCA but SusGren lost the funding due to the delayed approval from the Government of SVG (SusGren, 2016). The Government of SVG did subsequently give SusGren Cabinet approval to restore the ecosystem of Ashton Lagoon in 2015 (SusGren, 2016). In 2017, the KfW German Development Bank awarded funding in the amount of USD $600,000 to SusGren through the Caribbean Community Climate Change Centre (CCCCC) for a project titled ‘Restoring Ashton Lagoon’s Ecosystem to Promote Nature Based Adaptation to Climate Change while Creating Sustainable Livelihoods Opportunities for the People of Union Island’ (SusGren, 2018). This project became more widely known as the Ashton Lagoon Restoration Project (ALRP). The objectives of this project include strengthening the ecological, social, and economic systems of Union Island (SusGren, 2018). Firstly, restoring the lagoon ecosystem, including the mangrove and salt pond habitat, to create a better environment for coral, mangrove, and fishes. Improving bird habitat while improving coastal resilience to climate change were also mentioned. The project also aims to strengthen communities through climate change resilience and long-term adaptive management of Ashton Lagoon while creating sustainable livelihood opportunities. Finally, activities to increase awareness by implementing an effective communication and education program for Ashton Lagoon to help stakeholders learn more about natural resource management and climate change adaptation were planned for this area (SusGren, 2016).

Several activities for the ALRP were also identified to be carried out by community members and SusGren. Firstly, officially opening the causeways to remove the physical barrier and restore water circulation to the lagoon and the maintenance of mangrove islands on the existing finger piers, which happened in 2018 (Figure 6) (SusGren, 2018).The causeway was unofficially opened initially in 2013, but the pedestrian bridges and officially unveiling was not until 2019 (U.S. Embassy, 2019). Boat moorings were installed on the west side of Frigate Island, with plans to charge for their use. In order to restore water flow between the mangroves, salt ponds, and marine environment, there were also plans to install culverts through the road around the mangroves. In addition, three thousand red mangrove seedlings were planted in the inner portion of the lagoon where there was die-off (Figure 6). In order to create sustainable livelihoods for Unionites, there are also plans for training local nature guides and building climate resilient infrastructure like small-scale eco-lodging (SusGren, 2016).

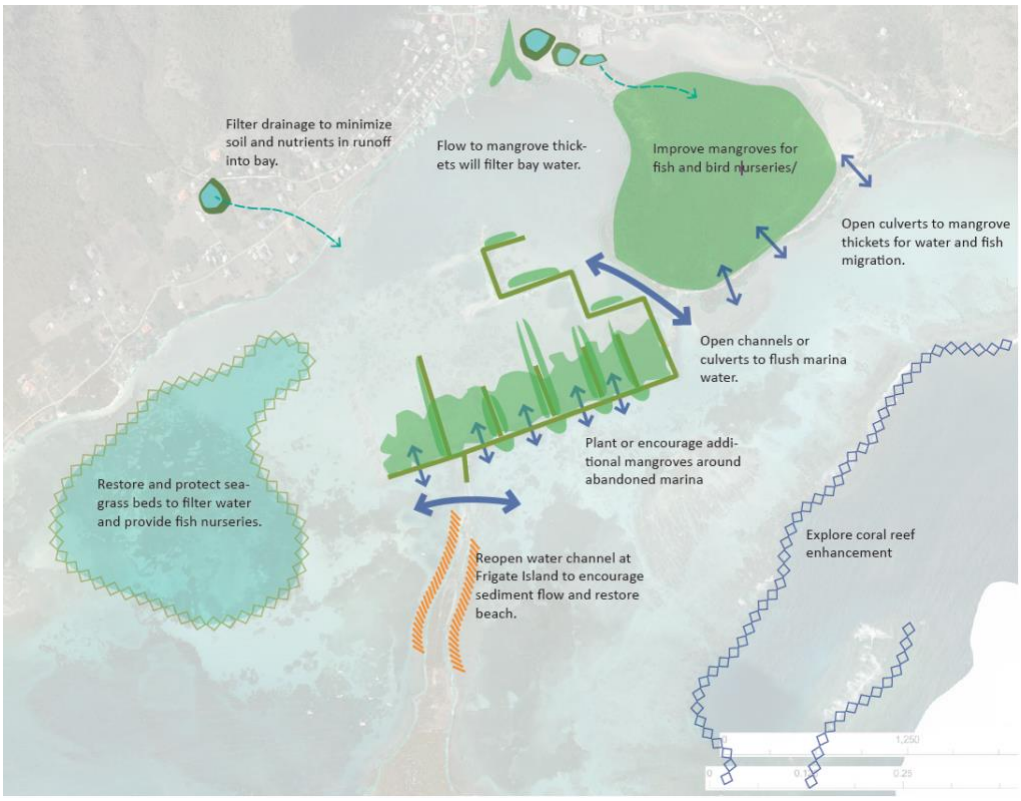

Figure 6: Proposed plans for the restoration of Ashton Lagoon (SusGren, 2012).

Chapter 3 – Methodology

3.1 Semi-Structured Interviews

In partnership with SusGren, key individuals with knowledge or experience of Ashton Lagoon from the community, the government, the tourism industry, and SusGren were identified for semi-structured interviews. Given the timeframe and scope of the research, only a small proportion of

potential stakeholders were interviewed. The purpose of the interviews was to gain insight into the potential challenges and opportunities in the next phase of the Ashton Lagoon Restoration Project. Semi-structured interviews were chosen in order to give participants the opportunity to raise their ideas, concerns, and recommendations for the project.

Interviews were conducted in July and August of 2019 on Union Island, SVG (Appendix B: MAPERSC #2019-07). Initially, thirty participants were contacted. Twenty of them responded and were available for interviews. Of the twenty persons that participated in the study, seventeen of them were conducted in person and three of them were conducted over Skype. The interviews ranged from 32 minutes to 1 hour and 47 minutes. The interviews were recorded and transcribed verbatim for further analysis. Responses were then categorized based on common responses and themes that came up throughout multiple interviews. For the questions that required participants to rate the value of the cultural, ecological, and economic value of Ashton Lagoon from the perspectives of different stakeholder groups, the average and most frequent responses were found. The list of guiding interview questions can be found in Appendix A.

The participants for the interviews included 6 community members who have lived on Union Island for over 25 years, 4 government representatives, 3 representatives of the tourism industry, 4 members of the SusGren board or staff, and 3 community members under the age of 25 that have only known Ashton Lagoon since the Ashton Lagoon Marina Project happened. The 6 community members with a history of Ashton Lagoon, included a schoolteacher, and environmental community leader, a businessman & historian, a local artist, and 2 community members with a history of subsistence fishing in the lagoon. The government industry representatives included 3 staff members from the Tobago Cays Marine Park office on Union Island and a staff member of the St. Vincent National Parks, Rivers, and Beaches Authority. The 3 community members under the age of 25 from Union Island included 3 members of the community monitoring project, one of whom also works for the apiary adjacent to Ashton Lagoon. Additionally, 2 current members of the SusGren staff were interviewed, as well as two current board members of SusGren, one of whom resides on Union Island.

Participants were asked 31 questions about their history with Ashton Lagoon, the types of activities they participate in and would like to see developed, where they would like the Ashton Lagoon Restoration Project to go in the future, and whether they think it should be an MPA. The first category of questions asked participants how long they have lived on Union Island, or for those that did not live

on Union Island, when the first time they visited the island. Participants were then asked to describe Ashton Lagoon before the marina project in 1994, how often they visited the lagoon, and list activities that they saw or participated in during the years preceding the marina development. Participants were then asked whether they anticipated positive, neutral, or negative impacts of the marina project before, during, and after the construction. Following those questions, participants were asked whether they noticed any changes within the lagoon after the construction ended and if so, to describe when and what occurred.

The next section of the interview asked participants to rate the cultural, ecological, and economic value of Ashton Lagoon based on a scale of 1 to 5 where 1 meant no value, 2 meant very little value, 3 meant neutral, 4 meant value, and 5 meant high value. Participants were asked to rate how much they believe that the government, resource users, and community members value the cultural, ecological, and economic nature of Ashton Lagoon. Participants were then asked to rate on the scale of 1 to 5 how much they personally value the cultural, ecological, an economic nature of Ashton Lagoon. These questions were asked in order to better gauge how the participants think each stakeholder group values Ashton Lagoon.

The next questions asked participants how often they visited the lagoon after the construction occurred, but before any of the restoration activities began, whether they have noticed changes in Ashton Lagoon since the restoration began and what kind of activities they participate in when they visit the lagoon. Participants were then asked whether they believe that the restoration of Ashton Lagoon has been successful to date and whether they have been involved in any of the restoration. Participants were also asked whether they think that sustainable livelihoods have been considered in the Ashton Lagoon restoration. These questions are meant to assess the stakeholder perceptions of the restoration project so far, to determine recommendations for the next phase of the project.

Following the discussion of Ashton Lagoon in the present, participants were then asked certain questions about the future of Ashton Lagoon. They were given examples of activities for Ashton Lagoon including kite surfing, boating, picnics, social events, fishing, kayaking, snorkelling, swimming, yachting, and ecotourism and are asked how they would like to see the space around Ashton Lagoon and the types of activities that they think would be appropriate for the space. The next questions ask participants whether they think it is possible to develop the economy and protect natural areas at the same time and whether they feel the same way for Ashton Lagoon. Additionally, participants are asked

to describe any challenges that they think face Ashton Lagoon. The final guiding question of the semi-structured interview asks participants whether they would like to see Ashton Lagoon declared an MPA and the reasoning for their response. Any additional comments or questions from the participant relating to the research were also welcomed at the end of the interview

3.4 Limitations of Research

Since the researcher was positioned as an intern with SusGren at the time of data collection, this may have affected the responses of participants. Considering the fact that SusGren is managing the Ashton Lagoon Restoration Project, participants may have overstated their perception of the value of Ashton Lagoon and provided more "eco-conscious" responses, though confidentiality and objectivity of the researcher were clearly explained. Also, since many of the stakeholders were identified through SusGren and the interviews took place during the slow season when many residents leave the island, the diversity of interviewees may have been lower than if interviews were conducted during the winter when there are more people present on the island. This study is also only analyzing the perceived value of Ashton Lagoon to different stakeholder groups and their opinions about activities that should be included and whether the area should be enforced as a Marine Protected Area (MPA) or equivalent.

Chapter 4 – Results

Of the 20 participants interviewed, there were 6 community members over the age of 30 that were familiar with the area and lived on Union Island before the marina development. An additional 3 community members that were under the age of 30 were interviewed, as they have only known Ashton Lagoon since the marina development occurred. One of these young community members was in charge of the apiary adjacent to Ashton Lagoon. Also, all three of these young community members were also training to become part of the community monitoring program for both Ashton Lagoon and the Grenadine Network of Marine Protected Areas. Additionally, 4 members of the SusGren staff and Board of Directors were interviewed, to provide a knowledge of the process that Ashton Lagoon has undergone throughout the past two decades. Also, since Ashton Lagoon has become an attraction for tourism, 3 members of the tourism industry were interviewed. These tourism representatives included a tourism journalist, a kite surfing company operator, and the manager of a hotel and yacht club in Clifton. Lastly,

4 representatives from government departments were successfully contacted, which included a representative from St. Vincent National Parks, Rivers, and Beaches Authority and 3 staff members from the Tobago Cays Marine Park office located in Clifton. Respondents ranged from living on Union Island for less than two years to more than fifty years, so there was a wide spread of knowledge and perspectives. Of the participants interviewed, 10 lived on Union Island before the 1994 development project and had spent time in Ashton Lagoon. The other 10 participants were either born after 1994, moved to Union Island after the development had already occurred, or were only familiar with Ashton Lagoon at that time through work or travel.

Table 1: List of interview participants

Stakeholder Category	Years lived on Union Island
#1 – Community Member	> 50 years
#2 – Community member	36 years
#3 – Community Member	35 years
#4 – Community Member	> 50 years
#5 – Community Member	32 years
#6 – Community Member	> 50 years
#7 – Community Member (< 30 years old)	20 years
#8 – Community Member (< 30 years old)	22 years
#9 – Community Member (< 30 years old)	15 years
#10 – SusGren Staff	< 2 years (Visited in the past)
#11 – SusGren Staff	7 years
#12 – SusGren Board Member	34 years
#13 – SusGren Board Member	N/A (Visited many times since 1980s)
#14 – Marine Park Staff Member	> 30 years
#15 – Marine Park Staff Member	33 years
#16 – Marine Park Staff Member	37 years
#17 – SVG Parks, Rivers, & Beaches Authority	N/A (Visited in the past)
#18 – Hotel & Yacht Club Manager	23 years
#19 – Kite Surfing Tour Operator	8 years
#20 – Journalist	N/A (Visited many times since 1970s)

4.1 Participant History of Ashton Lagoon

Understanding the history of uses and activities in Ashton Lagoon is critical for developing a management plan for the future use of this area. There were many common themes mentioned by participants when asked to describe Ashton Lagoon before the construction. These themes included a lack of large-scale development, clear water, healthy mangroves, and recreational use of the lagoon (Figure 7). Many participants also used words like 'beautiful' and 'pristine' when describing Ashton Lagoon pre-development. Participants were then asked to describe the activities that they witnessed or participated in in Ashton Lagoon. Common activities mentioned included swimming, boating, fishing, and picnics (Figure 8). These activities were generally done individually or in small groups. When describing fishing activities in the lagoon pre-development, common species mentioned were conch, Caribbean spiny lobster, and barracuda, all for local consumption according to participants. When asked how often they visited the lagoon pre-1994, most participants said that they visited the lagoon on a weekly basis growing up, often on Sundays (Figure 9).

Figure 7: Most common words to describe Ashton Lagoon pre-development.

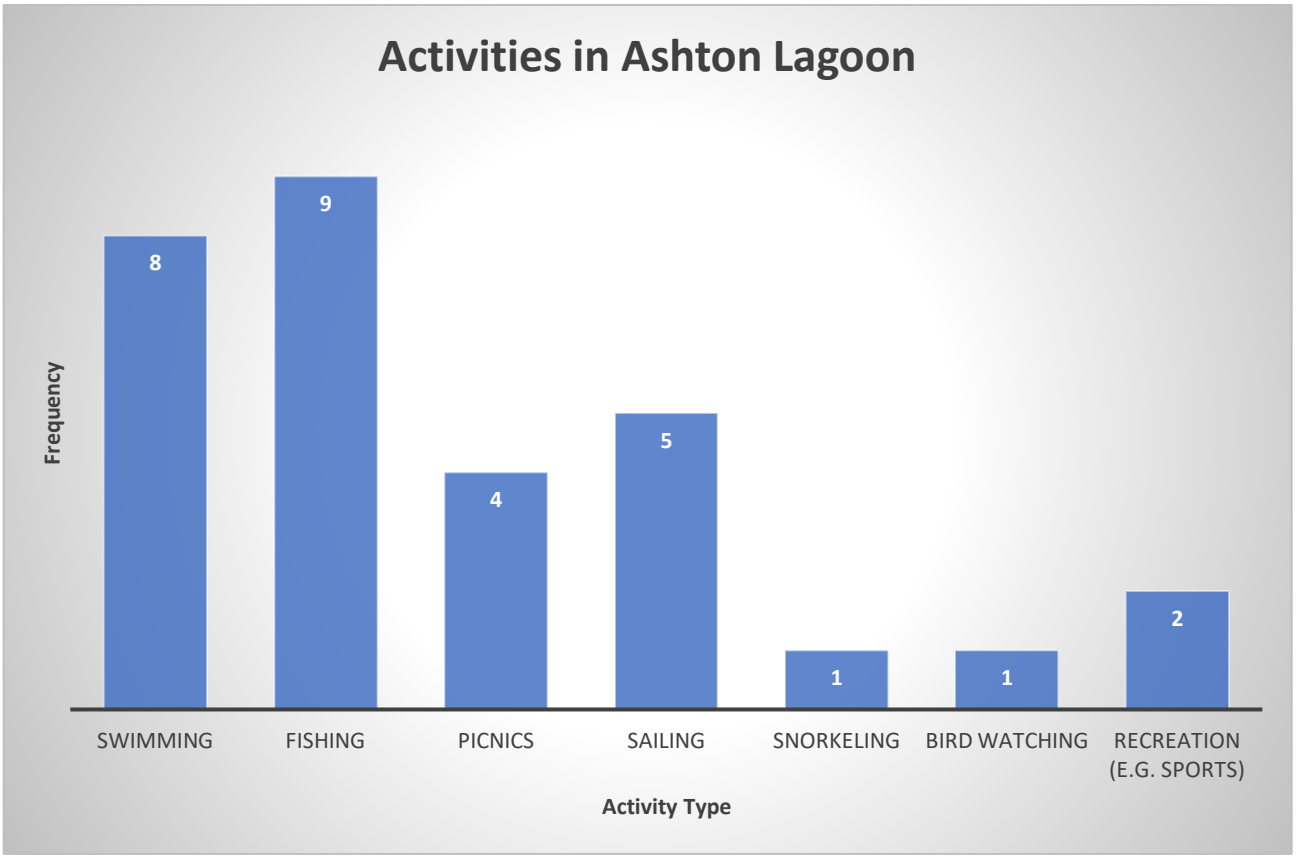

Figure 8: Activities that occurred in Ashton Lagoon pre-1994 as described by participants.

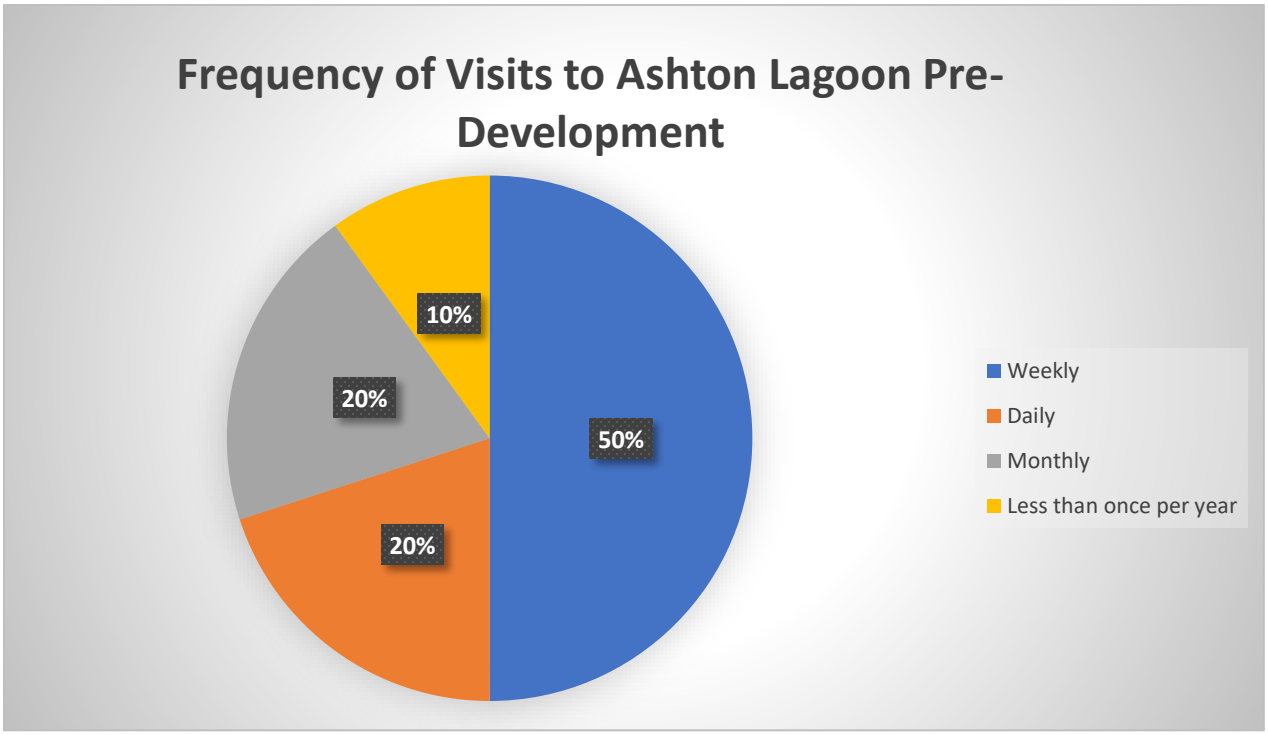

Figure 9: How often participants visited Ashton Lagoon before the 1994 marina development.

4.2 Expectations of the Ashton Lagoon Marina Project

To gain a better understanding of the community knowledge and perspectives of Ashton Lagoon the marina construction project, participants were asked about their knowledge and feelings toward the marina project before, during, and after the construction. Of the 11 participants living on Union Island and/or familiar with Ashton Lagoon before the development, 7 said that they knew some limited information about the development and 4 said that they knew sufficient details about the proposed marina before construction began. The 4 participants that were fully aware of the project were all involved in the community meetings before the construction began. Of the 9 participants that were younger than the marina project or did not live on Union Island at the time, 6 participants knew some details of the project and the other 3 knew very little or nothing about the marina project.

Participants with a long history on Union Island were also asked about whether they anticipated positive, neutral, or negative effects of the marina project and whether these opinions changed during and/or after the construction. When these 11 participants were asked about whether they expected positive, neutral, or negative effects of the project before the construction began, 7 participants responded with 'positive', 3 participants answered 'neutral', and only 1 participant answered 'negative' (Figure 10). In responding to this question, many participants mentioned the excitement felt by people on the island about the potential for economic opportunities and improved livelihoods. 3 participants did mention environmental or social concerns, though they expressed that the economic gains were prioritized. One community member, who was against the marina project from the beginning, said, "Development brings destruction," when asked about their initial feelings of the project before the construction began. Once the construction began, community members expected the project to continue to fruition, so expectations remained similar, with one community member changing their response to neutral and one SusGren board member changing theirs to negative (Figure 10). When the construction was abandoned, every single participant that was asked this question had changed their expectations of the project to negative, though some said it took time for the fact that it had been abandoned to fully set it. One participant, that initially had positive expectations of the project, said, "[After the construction failed] it took a few years to sink in, but once it did it felt terrible. We were left with the mess to clean up." The participants all seemed to be united in the disappointment that they felt after the construction was abandoned, even before any ecological impacts were fully realized.

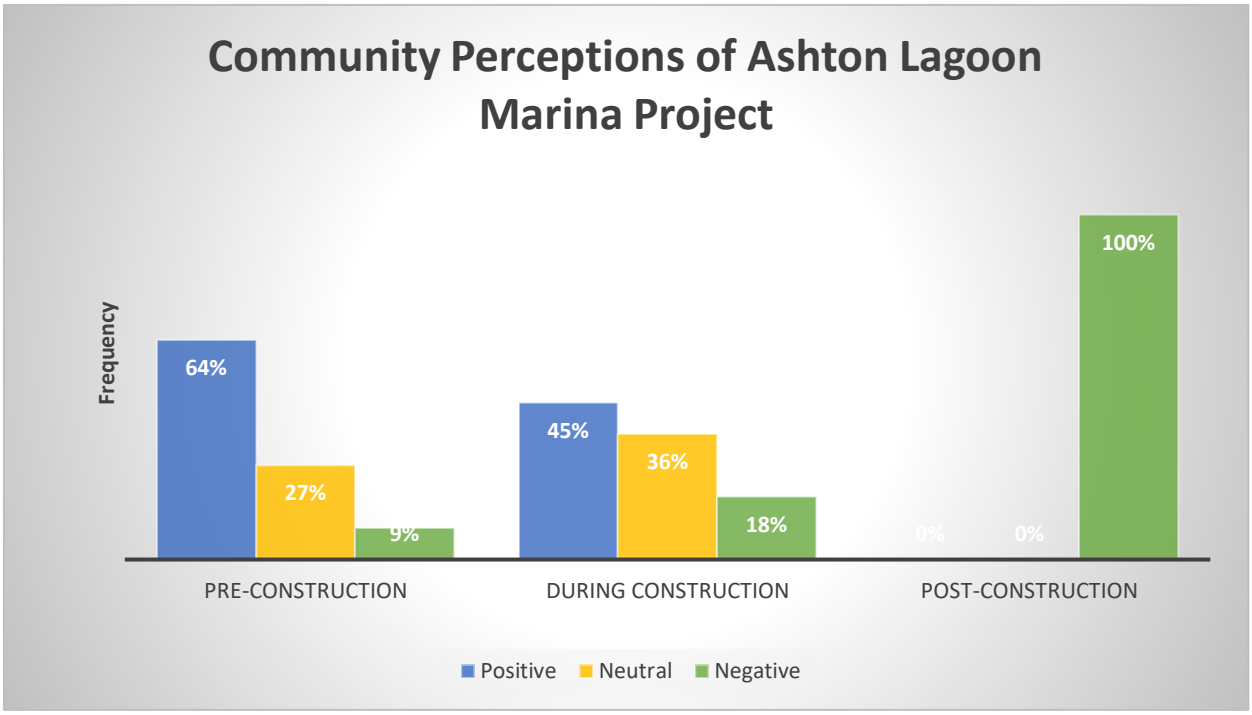

Figure 10: The anticipated and realized effects of the Ashton Lagoon Marina Project before, during, and after construction.

4.3 Aftermath of the Ashton Marina Project

Once participants discussed their expectations and reality of the project, they were asked whether they noticed any ecological changes in the area after the construction, and if so, when they noticed these changes (Figure 11). Though the time frames varied, every respondent mentioned that the water quality was negatively affected, with flow being restricted and leading to stagnant and turbid water in the inner portion of the lagoon that was blocked by the causeway. Many other participants also mentioned seeing less sea life and less mangrove cover. When asked whether their visiting patterns to the lagoon had changed after the construction, all of the participants said that they visited less often than they did before, with some saying that they stopped visiting altogether. Participants described a degraded lagoon with reduced activities like fishing and recreation.

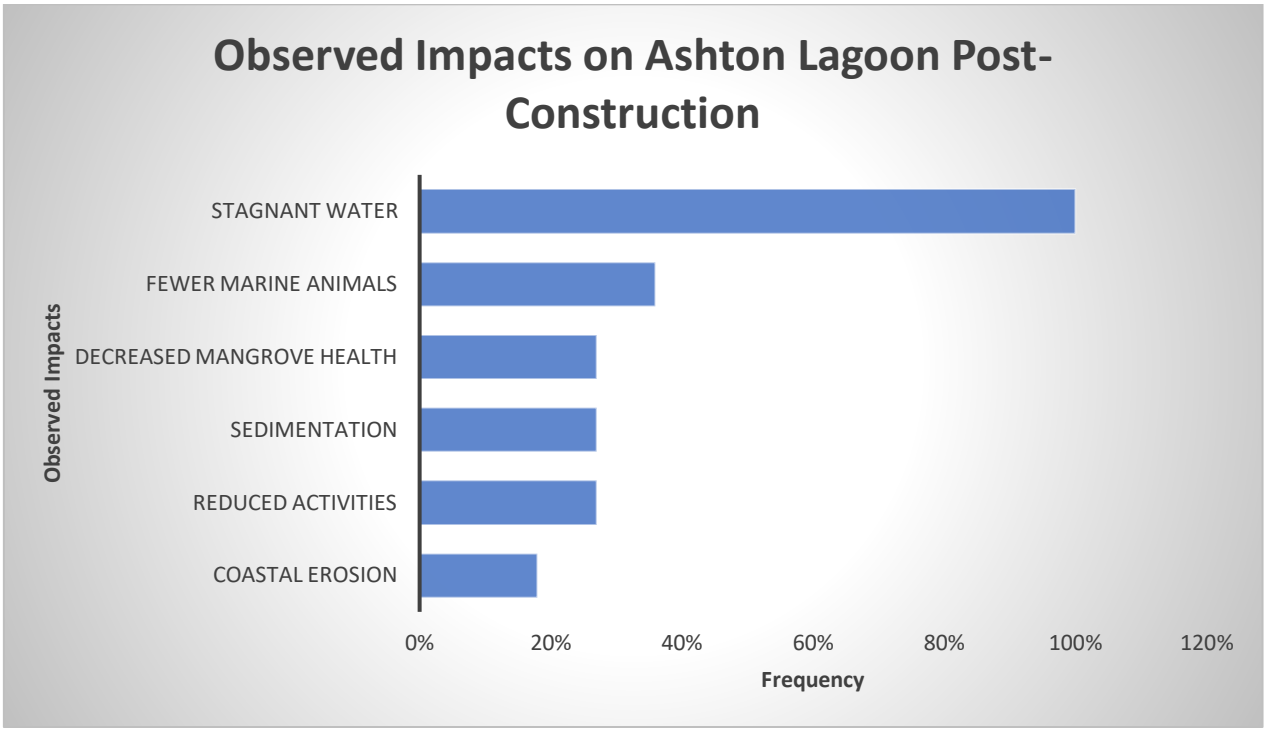

Figure 11: Most frequently used terms to describe Ashton Lagoon after the marina construction was abandoned.

4.4 Participant Perceptions of the Value of Ashton Lagoon

The next section of the interview asked each participant to give a rating between 1 and 5 for how much they think the government, the resource users, and the community members value the cultural, ecological, and economic nature of Ashton Lagoon. They were also asked to rate how much they personally value the cultural, ecological, and economic nature of Ashton Lagoon. An example of one of these questions is: 'On a scale of 1 to 5, how much do you think the government values the cultural nature of Ashton Lagoon?' Cultural value can be assessed through different components like social, symbolic, educational, spiritual, and aesthetic value of a place to an individual or group (Ginsburgh & Throsby, 2013). Ecological value can be defined by the level of benefits that an ecosystem and its components provide to support native lifeforms, which can apply to humans, animals, and any biotic species (Cordell et al., 2005). The last form of valuation that participants were asked about was economic valuation, which assigned a monetary value to an ecosystem or the ecosystem services that it provides or is expected to provide to individuals or societies (Holzman, 2012).

4.4.1 Cultural Value of Ashton Lagoon

The first category that participants were asked to rate was the cultural nature of Ashton Lagoon. The average response for the government of SVG stakeholder category was 2.8, which falls between little value and neutral (Figure 12). The most frequent response to this question was neutral, or 3 out of 5. The resource users and community members had a perceived cultural value of 3.8 and 3.6 respectively, which falls closer to the 4 out of 5 rating of 'value'. The mode for both of these stakeholder groups was 4.

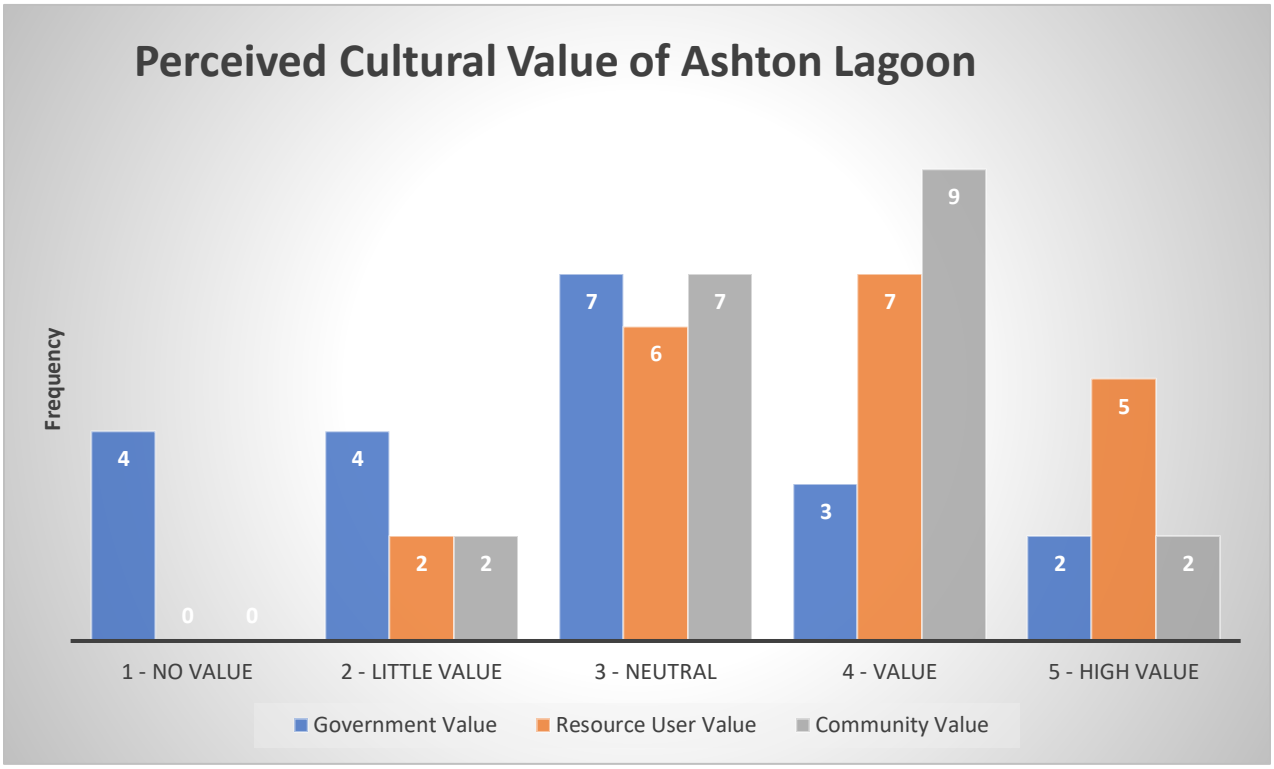

Figure 12: Perceived cultural value of Ashton Lagoon by participants for government, resource users, and community members.

4.4.2 Ecological Value of Ashton Lagoon

The next characteristic that participants were asked to rate was the perceived ecological value of Ashton Lagoon (Figure 13). The perceived ecological value for the government was slightly higher in this category for a mean of 3.2 with a mode of 4. The mean response for the ecological value by resource users was 3.6 with a mode of 3. The perceived ecological value placed on Ashton Lagoon by community members was 3.3. The mode for this stakeholder group was also 3. The frequency

distribution for this category was similar to the perceived cultural value of Ashton Lagoon by stakeholders.

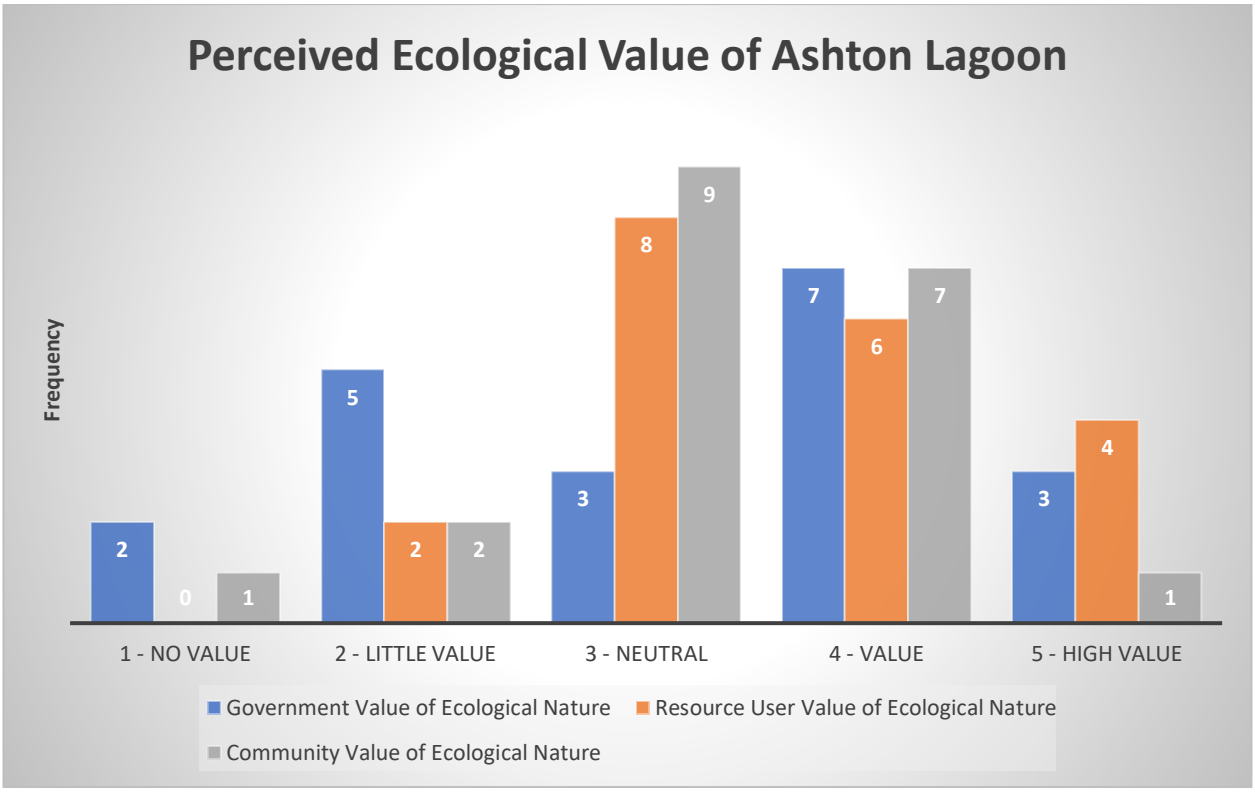

Figure 13: Perceived ecological value of Ashton Lagoon by participants for government, resource users, and community members.

4.2.3 Economic Value of Ashton Lagoon

The economic value of Ashton Lagoon was the next characteristic for the participants to rate. Participants rated the government value for the cultural nature of Ashton Lagoon to be an average of 3.2 out of 5, or neutral value (Figure 14). The mean economic value for resource users estimated by participants was 3.6, between neutral and value on the scale. The mean economic value estimated for community members was 3.3. The most frequent response for all stakeholder groups was 3 in this category, for neutral.

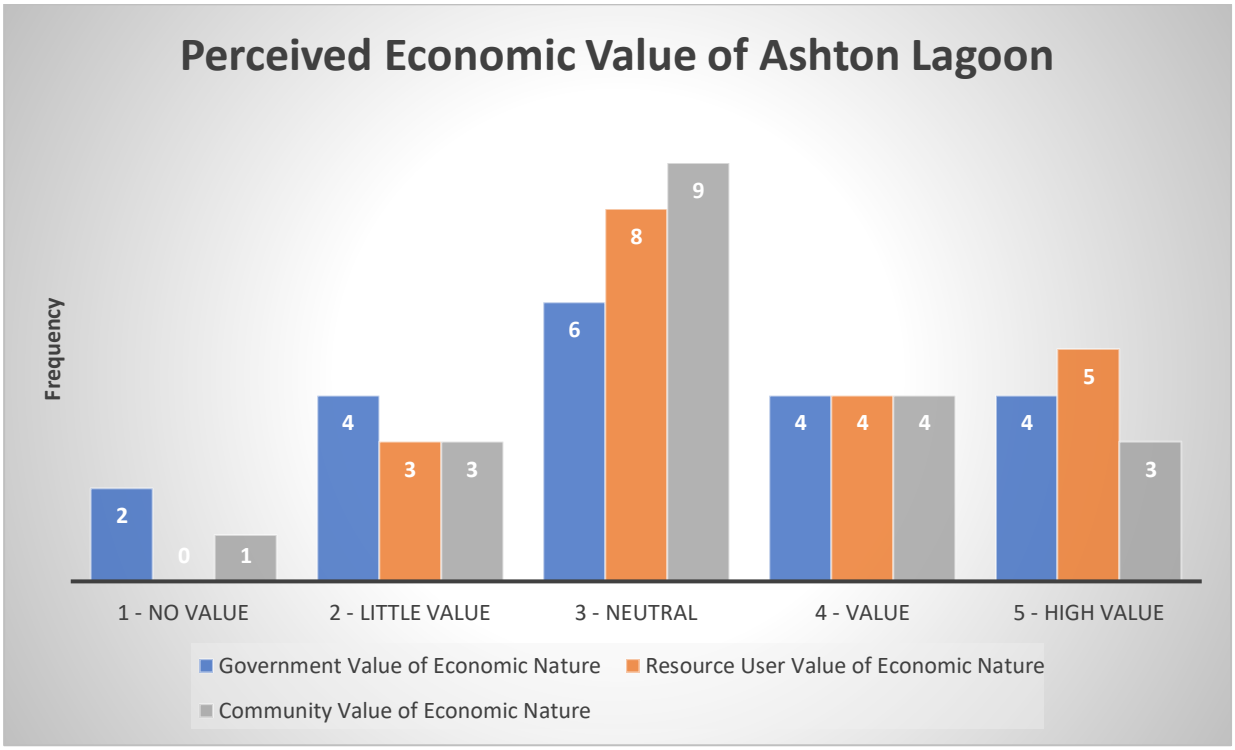

Figure 14: Perceived economic value of Ashton Lagoon by participants for government, resource users, and community members.

4.4.4 Personal Value of Ashton Lagoon

The final category that participants were asked to rate on the value scale of 1 to 5 was their own personal value of the cultural, ecological, and economic nature of Ashton Lagoon. For this category, participants rated their own value of these three factors much higher than that of their perceived value for other stakeholders. The mean personal cultural value of Ashton Lagoon was 4.4, with a mode of 5 (Figure 15). For the ecological value that participants personally assign to Ashton Lagoon, the mean response was 4.5 and the mode was also 5. Finally, the mean economic value of Ashton Lagoon for participants was also 4.5 and again, the most frequent response was 5.

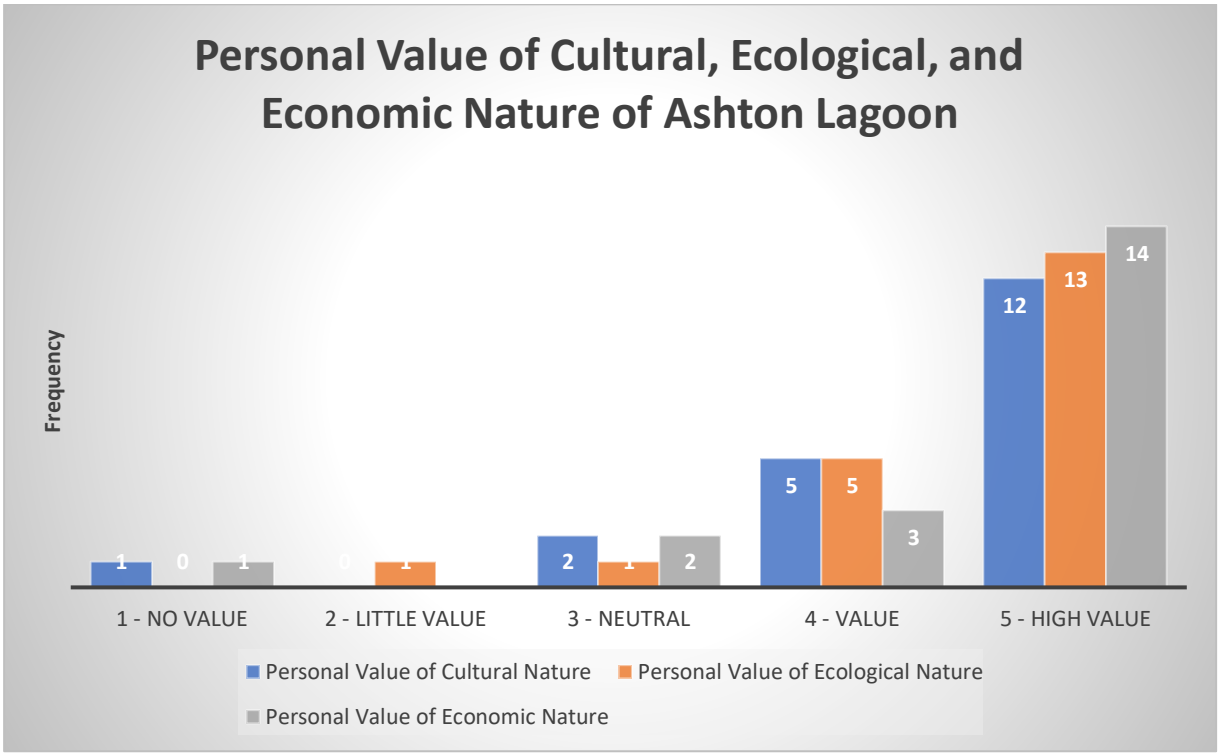

Figure 15: Participants' personal rating of cultural, ecological, and economic value of Ashton Lagoon.

4.5 Ashton Lagoon Post-Restoration Activities

4.5.1 Community Response to the ALRP

Since the ALRP has just completed its second phase, participants were also asked about whether they believe that the restoration project has been successful to date. When asked, 18 out of the total 20 participants responded positively that they believe the ALRP has been successful thus far, though they all mentioned that there is still room for improvement. An improvement in the water quality was the most common answer change that participants have noticed since the restoration began, followed by an increase in birds and marine life in the lagoon (Figure 16).

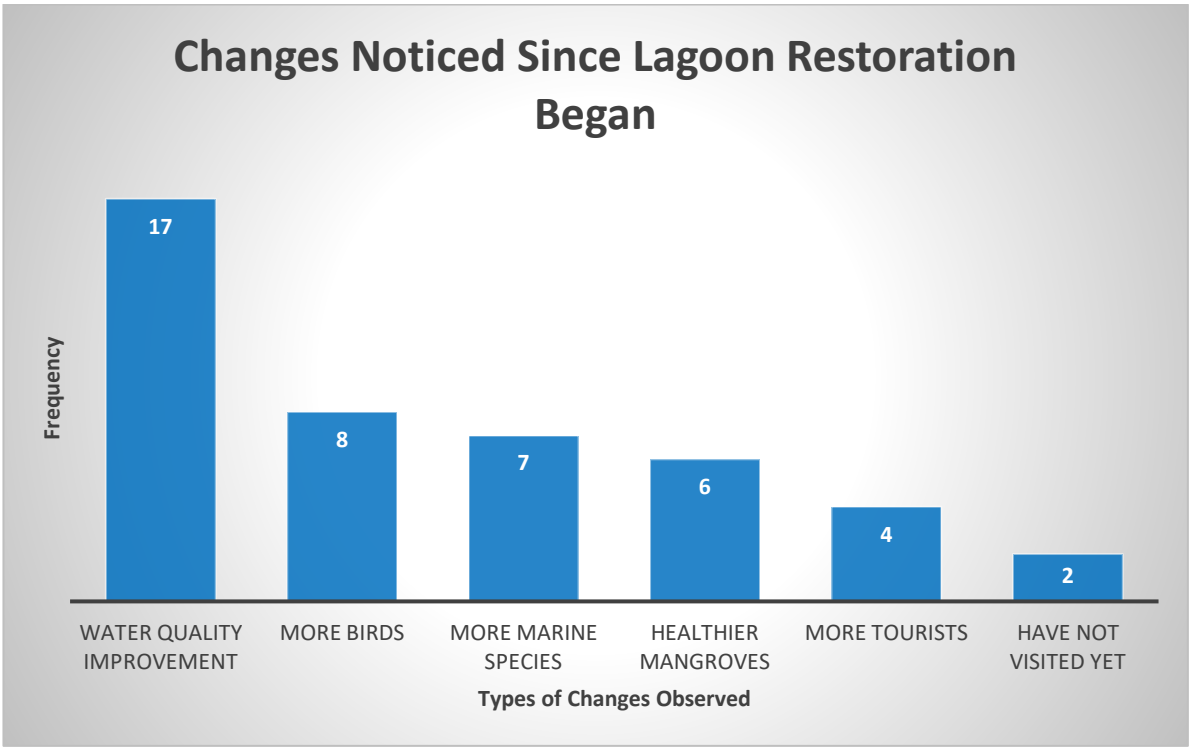

Figure 16: Most frequently mentioned changes observed in Ashton Lagoon since the ALRP began.

4.5.2 Sustainable Livelihoods

Participants were then asked whether they believed that sustainable livelihoods have been a part of the ALRP. Of 20 participants, 16 believed that sustainable livelihood opportunities have been considered, but there is still more progress to be made. Of the 20 participants, 13 had been involved in the ALRP either directly or indirectly, through activities like community clean-ups, surveys, mapping projects, fish identification, water quality testing, or providing support to SusGren. Participants were then asked about how frequently they visit Ashton Lagoon and whether they visit more often since the ALRP started. Most participants say that they have visited Ashton Lagoon more often since the restoration began than they did before. Most participants said that they visit the lagoon at least once per month, with many visiting the lagoon on a weekly basis. Activities like swimming, nature walks, and bird watching were the most common activities that participants mentioned when visiting the lagoon.

4.6 Ashton Lagoon Moving Forward

4.6.1 Challenges for Ashton Lagoon Moving Forward

Understanding community perspectives of the ALRP and involving stakeholders in the process can help to address challenges and develop steps forward for the continued restoration of this important area. When asked what they believed are the biggest challenges for the restoration of Ashton Lagoon, community engagement and stakeholder involvement was the most common response, followed by funding/financing (Figure 17). Other notable challenges included balancing development and conservation, community capacity, management/enforcement, legislation, littering, and climate change. One young community member discussing the involvement of foreign entities and the top-down governance approach in SVG saying, “The Grenadine people feel left behind by the government. We want to be more involved.” Some community members even suggested charging a small fee to enter to lagoon that would go towards further restoration and maintenance of the area.

Figure 17: Future potential challenges for Ashton Lagoon mentioned by participants.

The final question of the interview process asked participants whether they would like to see Ashton Lagoon declared a Marine Protected Area. Of the 20 participants, the majority said that they would like to see Ashton Lagoon as an MPA (Figure 18). One participant responded, “Yes, it belongs to

the community and it should be protected for the future of the community." Answers for the types of activities that should be permitted in the potential MPA varied, with some participants stating that monitored fishing should be allowed while other participants would like to see the area as a no-take MPA. The most frequent comment, regardless of whether the participant wants to see an MPA or not, was that they would like to see more community involvement throughout the management process and restoration of Ashton Lagoon.

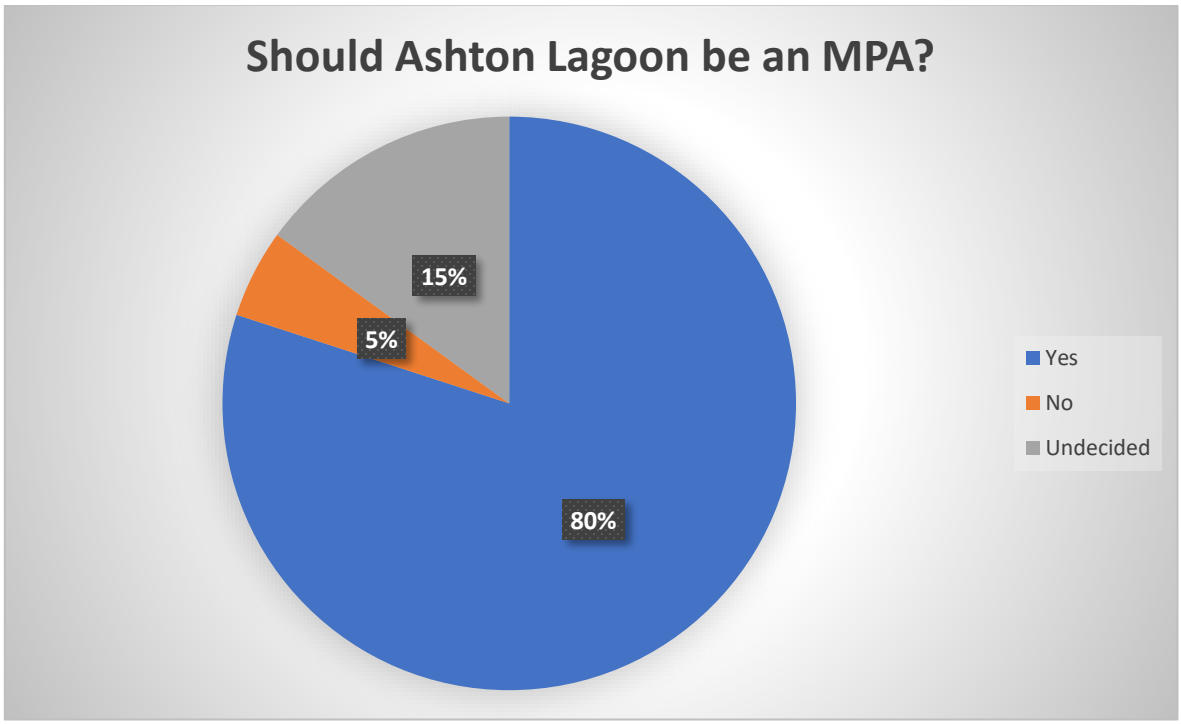

Figure 18: Participant responses of whether they would like to see Ashton Lagoon declared an MPA (or equivalent).

4.6.2 Recommended Activities for Ashton Lagoon

Participants also gave suggestions for the types of activities that they think would be appropriate for Ashton Lagoon moving forward, which included swimming, snorkeling, SCUBA diving, small scale eco-lodging, bird watching, guided nature walks, educational events, camping, and even weddings (Figure 19). When asked about types of activities that participants believed were inappropriate for Ashton Lagoon, examples included speed boating, burning, smoking, or misusing the bridges by running or jumping off them. Some community members even suggested charging a small fee to enter to lagoon that would go towards further restoration and maintenance of the area. One community member

said, “All nature tours should have guides, with a user fee. This would provide more livelihood opportunities for locals too.”

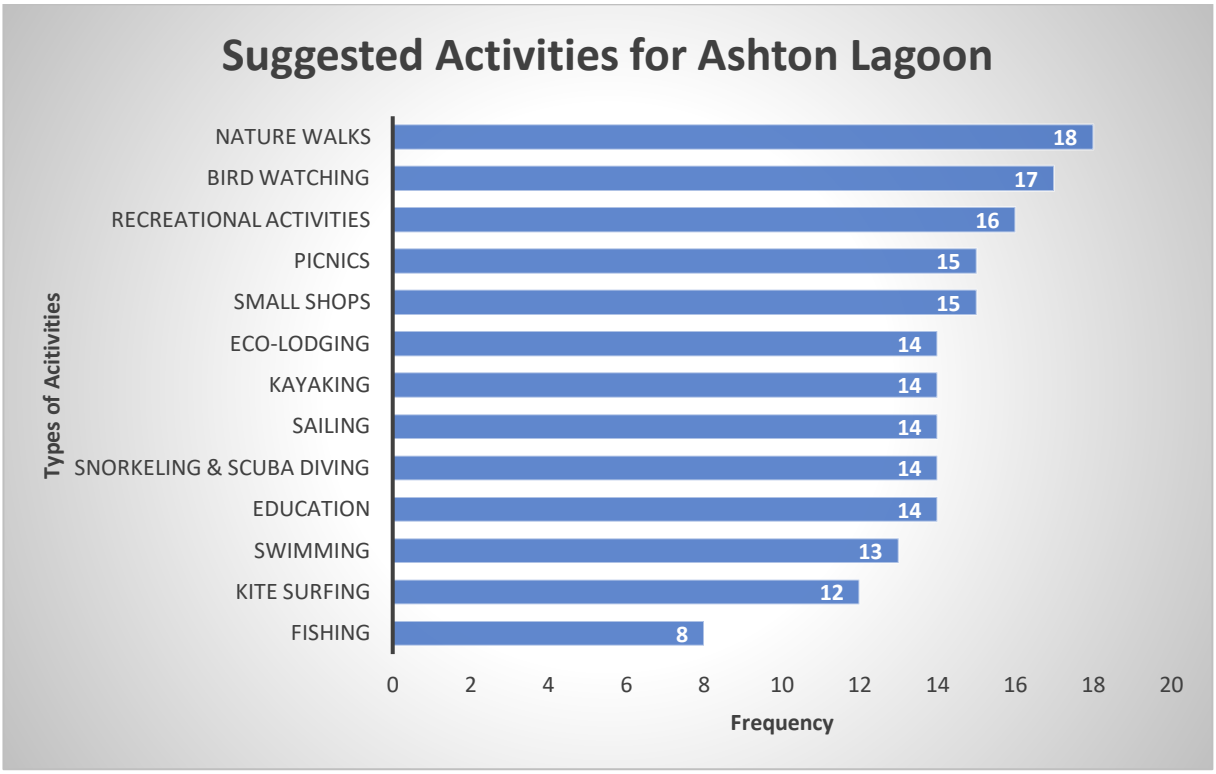

Figure 19: The most frequent responses for activities that participants would like to see in Ashton Lagoon.

4.7 Key Issues Identified

Five key issues were derived from the stakeholders in the qualitative semi-structured interviews. Participants had the chance to voice any concerns or comments that they had in relation to the Ashton Lagoon Restoration Project for the present and future of the project outside of the guiding questions that they were asked. These key issues provide the guiding criteria for recommendations moving forward for the Ashton Lagoon Restoration Project.

The first issue identified by stakeholders to be addressed in the next phase of the ALRP is balancing the development and conservation of the lagoon and surrounding area. When participants were asked whether they think it is possible to develop the economy and protect natural areas at the same time, 19 out of 20 participants said yes. When asked whether the same was true about Ashton

Lagoon, the answers were the same. The key issue identified during the discussion of this question was finding a balance between development and conservation activities to ensure that one does not undermine the other. In response to this question, one community member said, "Development does not have to equal destruction, and Ashton Lagoon can be the model for it."

The potential for Ashton Lagoon to be a designated Protected Area is a key concern identified by many stakeholders (Figure 18, as it will affect the types of activities and zoning for development and conservation projects. Specific concerns for this issue also include community participation in the MPA planning process, the category of protection, management, and enforcement.

The process of community capacity building was addressed by participants in relation to management capacity, creating sustainable livelihoods, and driving the restoration and sustainable development of Ashton Lagoon. Community capacity can apply to many sectors, including fisheries, tourism, transportation, and development. Based on interview feedback, it is an important consideration for the next phase of the ALRP.

As an NGO, SusGren is currently the main managing body for the ALRP, but participants mentioned that government, community, and industry all need to be better integrated in the process. Without legislation, Ashton Lagoon cannot be enforced as a Marine Protected Area. Community and industry members also stated that they want a more informed and involved role in the decision-making process moving forward. Vertical and horizontal integration of stakeholders was then identified as a key issue to address in the next phase of the ALRP.

When discussing the challenges facing Ashton Lagoon moving forward, 5 participants mentioned concerns about climate change affecting the lagoon during the restoration process. Protecting and adapting to climate change impacts in Ashton Lagoon and Union Island was discussed by interview participants as an important objective for a sustainable future of the project and was a key theme from the stakeholder interviews.

Chapter 5 – Discussion

Based on the semi-structured interview results, next steps for the Ashton Lagoon Restoration Project were researched based on the main concerns of balancing development and conservation for the area, declaring Ashton Lagoon an MPA, and community capacity, and stakeholder engagement. Based on these concerns, recommendations were developed for the next phase of the ALRP.

5.1 Development and Conservation for Ashton Lagoon

5.1.1 Ecotourism Development for Ashton Lagoon

Balancing conservation of nature and economic development has been a challenge for human societies for thousands of years. In the 21st century, this balance is becoming increasingly difficult as standards of living and populations rise globally (Weinstein et al., 2007; Zhang, 2015). Economic development has vast potential to improve the livelihoods of millions of people around the world, but it can also erode healthy ecosystems and undermine ecosystem services (Zhang, 2015). Finding the balance between conservation of Ashton Lagoon and development for the livelihoods of the people of Union Island was one of the most highly mentioned challenges by participants for the future of Ashton Lagoon (Figure 17.Sustainable tourism development aims to address more than just economic and environmental concerns, but also navigate issues of power and equity within the society and tourism industry (Crick, 1989; Urry, 1990). The activities suggested for Ashton Lagoon by participants were mostly nature focused, like nature walks, bird watching, and snorkeling, so incorporating nature-focused activities with an element of cost can help to bring more opportunities for the people of Union Island to participate in livelihood activities that are economically valuable with limited ecological impacts. Introducing activities like kayaking, snorkel & SCUBA tours, guided bird and nature walks, and other light recreational activities can attract nature-oriented tourists. The Caribbean islands are known for the sun, sand, and sea, but the negative environmental impacts of resort-based tourism can be mitigated through alternative and nature-based tourism activities (Weaver, 1993). Since Union Island lacks the expansive white sand beaches and is unsuited to large resort developments, eco-tourism can be used to diversify this island from other resort-based destinations. Snorkeling and SCUBA diving are highly

profitable and draw large numbers of tourists, though they depend on healthy ecosystems to attract these tourists (Jaafar & Maideen, 2012).

Developing ecotourism opportunities in Union Island should be a community-based endeavour. Incorporating stakeholders and engaging community members was a key theme in the semi-structured interviews, and community-based ecotourism is an opportunity for the community to become more involved in the restoration of Ashton Lagoon and influence the future direction. Staff members at SusGren also expressed interest in developing eco-lodging around Ashton Lagoon with a small capacity to house tourists during their stay on Union Island, as there are currently limited accommodations outside of Clifton. A small lodging development like this would be better suited to Ashton Lagoon, as tourists do not need an excessive 'Miami Beach' resort type in a an ecologically vulnerable area (Adams, 1979). Ecotourism development and eco-lodging on Union Island can also attract more domestic tourism. Domestic tourism spending in SVG accounted for 17.3% of travel and tourism GDP in the country in 2017 and traveling domestically between islands can be fast and inexpensive compared to international travel (WTTC, 2018). Community-based ecotourism can help Union Island bridge the gap between conservation and protection of natural resources and improve community involvement, management, and livelihood opportunities (Masud et al., 2017). Integration and collaboration of community members, businesses, NGOs, and development agencies can be effective tools for implementing CBET (Bramwell & Lane, 2000). CBET allows for communities to drive the development and management of tourism activities to keep the benefits within the community (Stone, 2015).

5.1.2 Ecosystem Conservation for Ashton Lagoon

Plastic waste is pervasive in marine environments and impacts entire ecosystems including species as small as plankton and as large as whales (Lachmann et al., 2017). In Ashton Lagoon, where there are currently no garbage bins, plastic bottles and wrappers litter the area. A community member and a member of the SusGren staff each mentioned that plastic pollution and littering is a problem in Ashton Lagoon. Installing garbage bins in Ashton Lagoon can help to alleviate this problem but educating tourists and locals about the dangers of plastic pollution in marine environments is also important. One community member said, "[People] need to understand the long-term linkages of their actions like littering." Union Island does have solid waste management facilities and garbage collection on the island (Central Water & Sewage Authority), so Ashton Lagoon could be incorporated into this

collection as well. Reducing plastic waste would be the next step forward as the project progresses. Initiatives to reduce single-use plastics have become more popular in recent years, and the United Nations has launched a global campaign to eliminate major sources of marine plastic litter by 2023 (UNEP, 2018). SVG, like other small island developing states, is disproportionately exposed to high concentrations of plastic pollution relative to their own consumption and population (Lachmann et al., 2017). While sustainable development projects for Ashton Lagoon can bring economic opportunities to Union Island, protecting the natural environment of Ashton Lagoon is important for attracting tourists into the future. Educating community members and tourists about the dangers of plastic pollution and providing proper disposal containers for waste in Ashton Lagoon can help to keep the shoreline and water free from plastic waste.

5.2 Ashton Lagoon as a Protected Area

5.2.1 Declaration and Enforcement

As stated above, 80% of the participants interviewed were in support of Ashton Lagoon being declared a Marine Protected Area. There are six official types of MPAs according to the IUCN, so determining the most appropriate type of legislation is important and should be done in collaboration with stakeholders and experts. Given the close proximity of Union Island to the communities of Ashton and Jerome Village, it is likely that a Category 1a Strict Nature Reserve or Category 1b Wilderness Area (IUCN, 2019) would be inappropriate as the area is highly influenced by human activities. A Category V Protected Landscape/Seascape or Category VI Protected area with sustainable use of natural resources may be more appropriate legislative options for Ashton Lagoon and the surrounding shoreline area. A Category V accounts for the interaction of people and nature over time and the ecological, biological, cultural, and scenic value of the area and seeks to protect the integrity of these interactions, which could be applied to the history of Ashton Lagoon. An alternative option to declaring the area an MPA would be for Ashton Lagoon to be included in the UNESCO Man and the Biosphere (MAB) Programme as a World Biosphere Reserve. This program aims to bridge the gap between natural and social sciences for conservation and sustainable use of resources to improve the relationship and connection between people and their environment (UNESCO, 2017). If Ashton Lagoon were to become a World Biosphere Reserve, the Government of SVG would also have support from UNESCO.

The ALRP is currently being managed by SusGren, though they have no authority to enforce rules and regulations for the area. If Ashton Lagoon were to be declared an MPA, this would need to be done through government action. This would also require an official management plan and a management body to enforce the regulations. Management plans are an essential tool for balancing the recreational, industrial, educational, and scientific activities of development and conservation, especially in protected areas (Robledano et al., 2018). A management plan for Ashton Lagoon can better ensure compatibility of cultural and natural heritage in protected areas (Robledano et al. 2018). A management authority should also be developed, as the capacity for SusGren to enforce the legal protection of Ashton Lagoon is limited. Community involvement the management of Ashton Lagoon can help to ensure that the conservation and development plans for the area are in line with the values of the people of Union Island. CBET activities are often run by one or more defined communities or through joint partnerships with the private sector (Rozemeijer, 2001). If Ashton Lagoon were designated an MPA, the management plan, management authority, goals, and objective must all be clearly defined with tangible goals to work towards. Ensuring that the community, civil society, government, and resource users are integrated throughout the entire process will help to ensure success of the project. As one TCMP staff member said in their interview, "Declaring an MPA will only work if the legislation is enforced." SusGren has done an exemplary job in managing the restoration of Ashton Lagoon thus far and with an established management authority, SusGren can have support to strengthen and improve their capacity in the area. Determining who will be enforcing the legislation and who will be managing the ecotourism activities in the area is critical. Managers can collaborate with organizations like the Union Island Nature Adventure Tours or potentially partner with tour agencies from other islands or countries.

5.2.2 Zoning and Monitoring

If Ashton Lagoon were declared an MPA, this would involve specified zoning for certain activities in order to mitigate conflict and maximize benefits. Activities like kite surfing, yacht anchorage, swimming, snorkelling, kayaking, motor boating, fishing, should have specified areas where these activities can be done. Some community members mentioned in the interviews that they wanted to see fishing in Ashton Lagoon (Figure 19), but 3 of them only wanted to see this outside of the inner lagoon, towards Frigate Island, in order to protect the nursery habitats. It would also be important for safety to ensure that activities like motor boating are not occurring in areas where people are swimming or snorkeling. The type of MPA or other applicable protection may also influence the types of activities and where they are permitted (Dudley, 2008). Coastal setbacks and buffer zones for certain activities

and infrastructure development can be established to protect people, property, and the environment (Sealey et al., 2014). A helpful tool for determining the activity zoning of the area could be a public participatory geographic information system (PPGIS), which would involve stakeholders in the mapping of activities for the area. GIS has already been using for MSP mapping in the TCMP and SIOBMPA, and indeed for the whole Grenadines, so its application for Ashton Lagoon could be used to map coastal marine resources and human activities to minimize user conflicts (Baldwin & Mahon, 2014).

Especially in an area like an MPA or World Biosphere Reserve, it is important to consider the environmental, social, and economic pressures in order to not exceed the carrying capacity of the place. As CBET is developed in Ashton Lagoon, the number of visitors will likely increase in tandem with tourism activities, which must be monitored to limit ecological, social, or economic degradation from these pressure (Armano, Roysid, & Nuzula, 2004). Establishing baselines and target parameters for monitored indicators can ensure that any observed ecological changes are responded to quickly and effectively. SusGren has already started to create a community monitoring program within Union Island and throughout the Grenadines, which could be an opportunity for regular ecological monitoring in the lagoon (SusGren, 2018). This program has trained local community members in skills like SCUBA diving and water quality testing. The program currently provides community members a monthly stipend for monitoring activities, which could be continued for the monitoring of the lagoon as ecotourism activities are developed. These stipends could be supported with funds raised from moorings along the shore of Frigate Island. There is currently no charge for the moorings, however SusGren does plan to implement some type of charge, whether it is a set fee or by donation (SusGren, 2018). Regardless of what types of activities and developments are planned for Ashton Lagoon, continued monitoring for ecological, social, and economic impacts will be essential to the success of the community-based initiative.

5.2.3 Climate Change Adaptation and Long-Term Management

Caribbean SIDS are especially vulnerable to climate change impacts like sea level rise, ocean acidification, increased temperatures, invasive species, rainfall changes, and storms (Mercer et al., 2012). Ecosystem-based management and adaptation are becoming increasingly popular strategies to mitigate these effects. As ecosystems adapt and respond to climate change, it is important that long-term ecosystem management is a key consideration. Community members have seen Ashton Lagoon change drastically over the span of the marina construction project followed by the restoration project. For any

developments to be sustainable, multi-sectoral approaches that implement adaptive management measures are essential. The Caribbean Community Climate Change Centre (CCCCC) is a regional initiative in the Caribbean to combat climate change impacts and has worked closely with SusGren and the ALRP (SusGren, 2016). This collaboration is helpful in places like Union Island where climate change mitigation and adaptation have been mentioned as concerns. By working with external partners, information and communication technology can be used for community climate change monitoring to ensure that the management system can monitor and adapt appropriately (Eakin et al., 2014).

5.3 Community Capacity

5.3.1 Infrastructure Capacity

When striving to find the balance between development and conservation, existing economic, natural, and human capacity of the area must also be considered. Union Island would have difficulty developing the tourism economy without appropriate infrastructure development. While ecotourism can help to boost Union Island's economy and provide livelihood opportunities to community members, infrastructure for services like freshwater supply are required for the increased human pressures. Union Island has limited freshwater, so the pressure that tourism development may place on the potable water supply could be an initial barrier. Peak tourism season and Union Island's dry season coincide, so water supply is limited or unpredictable (Peters, 2015). The water normally collected through rainwater harvesting during the rainy season on Union Island (Approximately May to November) is meant to supply the island for the duration of the dry season (approximately December to April) (Cousins, 2018). When individual catchments of fresh water have emptied, there are two government catchments available, and once these are exhausted, water is transported from St. Vincent. If the number of people using this resource on Union Island suddenly increases through tourism development, additional stress may be placed on this system, which could affect accessibility for some users. Desalination plants and wastewater reuse are becoming more common, so infrastructure investment in these initiatives can help to alleviate this concern (Lopez, 2014). However, the initial costs of wastewater reuse projects and desalination plants is high, though the costs could be balanced over time through successful tourism ventures (Peters, 2015). To solve their similar water problems, Bequia, a neighbouring island in the Grenadines, has built a desalination plant that provides enough water for approximately 1000 residents. To power this desalination plant, they have also installed a photovoltaic system located on the roof of

the airport, to power their desalination plant (Lopez, 2014). Surplus electrical energy is sold to the island's power grid to allow for expansion and reduce the production, maintenance, and operating costs of the plant. For the CBET activities developed in Ashton Lagoon to be successful, they must align with the supply capacity of goods and services that Union Island can provide.

5.3.2 Social & Cultural Capacity

The social and cultural capacity of a community includes the networks, interactions, and normally accepted standards for society (Roseland, 2012). Since Union Island is small in area and population, the social and cultural capacity of the island is small in comparison to other places. Since the island is so small and relatively far from other islands, the social systems are very strong (Adams, 1979). Clifton is currently the tourism hub for Union Island, so the potential for tourism-fuelled conflict between Ashton and Clifton if Ashton Lagoon develops CBET must also be considered. It is important that any future developments do not undermine the current social and cultural systems of the island. The zoning of activities is also important for social and cultural capacity, because ineffective MPA zoning could fail to address the needs of the community and lead to negative attitudes towards environmental conservation and sustainable development (Das & Chatterjee, 2015).

5.4 Integration of Stakeholders

Based on the results, the meaningful integration of stakeholders was important to many of the participants of the interviews (Figure 17. Community engagement and involvement is important throughout environmental restoration and management processes, especially in small islands (UNWTO, 2014). Common challenges to developing the tourism sector of SIDS often include limited connectivity, vulnerable natural environments, susceptibility to climate change damage, financial limitations, and ineffective community engagement (UNWTO, 2014). Interview participants recommended that more meaningful engagement of all stakeholders and more transparency be pursued throughout the process. A community member said in their interview, "Sustainable development has to be community driven and allow for [people] to continue doing what's important." Developing sustainable projects in Ashton Lagoon should therefore be community driven from the ground up. Initiatives like community-based ecotourism (CBET) have been successful in other regions in sensitive ecosystems, allowing for economic development without undermining conservation objectives. CBET has already been highly

prosperous in a series of MPAs in Malaysia (Masud et al., 2016). CBET is centered around the concept that community members are the protectors and managers of the natural resources and ecosystems and allows them to be the acting experts in the cultural, environmental, and socio-economic development and conservation activities. Over the last two decades, international development has made a gradual but considerable shift from government and donor-led programs to more community driven and participatory approaches like CBET (Moreno, Noguchi, & Harder, 2017). Developing a CBET program within Ashton Lagoon and across Union Island can help to bridge the existing gap between top-down management that currently governs protected areas in favour of a process driven by local people. This process can also help to address comments like those made during the semi-structured interviews about the Grenadine people being more involved in governance and management of their own ecosystems. If the people of Union Island are involved in the process and feel a sense of belonging then it is more likely they will take action to care for the environment and the long-term benefits will be improved (Philimore, 2013).

Addressing gaps in environmental awareness and knowledge can also be assisted by CBET (Wanga et al., 2013). By meaningfully involving community members, government, industry, and other stakeholders in the development of ecotourism activities in Ashton Lagoon, the link between individual's environmental knowledge and attitudes can be strengthened (Wanga et al., 2013). Training local nature guides for activities like bird watching, kayak tours, guided SCUBA dives, etc. using sustainable practices, Ashton Lagoon can be protected while sustainable livelihood opportunities are increased for the people of Union Island. Implementing community-based initiatives like these can also protect the social and cultural capital of Union Island from being eroded like other places with fast-growing and unregulated tourism endeavours (Jones, 2005). The empowerment of communities in ecotourism developments is extremely complex and must be designed, planned, and implemented very carefully, especially when there are diverse stakeholders involved (Stone, 2015). In order for biodiversity conservation and community livelihoods objectives to be met, the context of the place and people are absolutely necessary considerations in the process (Stone, 2015). In order for ecotourism to be environmentally and socio-economically sustainable in the long-term, it must prioritize the conservation of the environment, promote the welfare of the local community, and include place-based education and interpretation (Whelan, 2013). Although only a small percentage of stakeholders were interviewed for this study, it is clear that stakeholder integration throughout the restoration process is essential for community acceptance and overall success.

Education and awareness are a critical part of building local capacity and engaging community members and tourists in the restoration and development process of a place like Ashton Lagoon. Sharing information through a transparent management process and the ecotourism industry can be part of stimulating participants for filling roles in the ALRP process and ecotourism activities (Shakeela et al., 2011). In developing the infrastructure for ecotourism in Ashton Lagoon, providing training sessions and workshops to increase local awareness and of challenges facing Ashton Lagoon can also help to provide livelihood opportunities and increase awareness of global environmental issues. This could potentially lead to a positive relationship between ecological understanding and employment opportunities in the tourism sector, bettering sustainable livelihood opportunities for the people of Union Island.

Table 2: List of Recommendations for the next phase of the ALRP

1. Integrate stakeholders in ALRP process
2. Establish a management body for Ashton Lagoon (with stakeholders from all sectors)
3. Determine appropriate legislation to protect Ashton Lagoon from unmanaged development (MPA or other)
4. Continue ecological restoration and clean-up of Ashton Lagoon by removing garbage and construction material
5. Develop and improve local infrastructure capacity to prepare for ecotourism development
6. Determine proper activity and use zoning for the lagoon and surrounding area
7. Train local guides for implementation of ecotourism activities
8. Continue focus on restoration efforts and monitoring → community monitoring program
9. Continue developing sustainable livelihood opportunities based on tourism demand and community capacity
10. Continue ecological, social, and economic monitoring based on EBM, EBA, CBET, and MSP principles for long-term success

Chapter 6 – Conclusion

Based on the perspectives and feedback from Union Island residents, ecological restoration and ecotourism developments have the potential to create a socially, culturally, economically, and environmentally beneficial system for Ashton Lagoon. The history of unmanaged development left community members with a healthy skepticism of large-scale developments on their small island and gave them an opportunity for more responsible and sustainable projects in the future. The restoration of Ashton Lagoon has been a complex and lengthy process but has seen success in restoring the important ecological processes and increasing environmental awareness. The process has been a learning opportunity for locals that can be shared with tourists through community-driven activities that respect the history and culture of Union Island. This process can create a healthy relationship between community members and tourists to share common goals for local and global environmental conservation. By implementing a comprehensive management plan based on EBM and MSP, Ashton Lagoon and Union Island can work towards developing sustainable tourism activities while strengthening the community capital, economy and ecological integrity of the island.

Based on the research and semi-structured interviews of this study, Unionites are aware of the challenges that face their community and ecosystems in an era of global development and climate change impacts. Future research in this area could focus on developing the management plan and determining the appropriate legislation for protection and development based on stakeholder input. Feasibility studies for certain activities and project can be undertaken depending on the results of further comprehensive stakeholder engagement and extended market research can be done for developing the tourism industry in the area. Promoting Union Island as a domestic and international travel destination can illuminate further areas for development of sustainable tourism within the Grenadines. There is still further research to be done on the use of ecotourism in conjunction with ecological restoration and conservation, and this information can be used to inform other areas within the Caribbean or the world. Finally, Ashton Lagoon could further benefit from continued studies once ecotourism activities have been implemented to determine what is successful and what could be further improved, rather than just using stakeholder predictions. Through the continued restoration, implementation, monitoring, and evaluation of development and conservation activities in Ashton Lagoon, the area can be used as an example of sustainable economic development in partnership with effective environmental management.

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Appendices

Appendix A

Proposed Interview

Questions Ecosystem restoration in Union Island's Ashton

Lagoon

[Read consent document to participant prior to starting the interview, see Appendix C1 & C2 for details depending on whether it is a verbal over the phone or written consent in person]

[Read the following to participants]: For today's interview, I will be asking you open-ended questions. Due to this format, the exact wording may differ slightly from the questions that were originally provided to you. Sometimes I will use other short questions to ensure I fully understand what you said, or I may ask a follow-up question if I need more explanation or clarification *("Why do you think that is…? Or "Please tell me more about that…").*

For the purpose of this interview, a "Marine Protected Area" is defined as an area of ocean, lagoon, estuary, or lake that is legally mandated and managed to conserve and protect ecologically important areas by restricting or limiting certain activities. A "sustainable livelihood" is defined as a livelihood that can cope with and recover from stresses while maintaining or improving its opportunities both now and in the future without compromising the natural resources that it relies on.

[Begin interview and ask participant the following questions]:

Guiding Questions (If participant has known Ashton Lagoon since before the 1994 Construction):

1. How long have you lived on Union Island?

2. Can you tell me what Ashton Lagoon looked like before the marina project on 1994?
3. What kind of activities took place there?
4. Did you visit Ashton Lagoon before construction took place?
    a. If so, how often?
5. What did you know about the proposed marina?
6. Before the construction, did you anticipate positive, neutral, or negative impacts of the project? (e.g. economic, social, ecological, etc.)
7. Did this change at all once the construction began? Did you still anticipate positive, neutral, or negative impacts of any kind?
8. After the construction ended, did you see positive, neutral, or negative impacts of any kind?
9. After the construction, did you notice any ecological changes?
    a. If so, how much longer after construction did these changes occur?
10. Did you visit Ashton Lagoon after the construction occurred (before restoration)?
    a. If so, how often?
11. Have you noticed changes since the Ashton Lagoon restoration project began?
    a. If so, please describe any possible changes (e.g. positive, neutral, or negative).

[**Read to participant]:** For questions 12 to 23, we're going to use a scale of 1 to 5 where 1 means no value, 2 mean little value, 3 means neutral value, 4 means value, and 5 means highly value.

12. On a scale of 1 to 5, do you think government values the cultural nature of Ashton Lagoon?
13. On the same scale of 1 to 5, how much do you think resource users value the cultural nature of Ashton Lagoon?
14. On the same scale of 1 to 5, how much do you think community members value the cultural nature of Ashton Lagoon?
15. On the same scale of 1 to 5, how much do you think the government values the ecological nature of Ashton Lagoon?
16. On the same scale of 1 to 5, how much do you think the resource users values the ecological nature of Ashton Lagoon?
17. On the same scale of 1 to 5, how much do you think the community values the ecological nature of Ashton Lagoon?
18. On the same scale of 1 to 5, how much do you think the government values the economic nature of Ashton Lagoon?
19. On the same scale of 1 to 5, how much do you think the resource users value the economic nature of Ashton Lagoon?
20. On the same scale of 1 to 5, how much do you think the community members value the economic nature of Ashton Lagoon?
21. On the same scale of 1 to 5, how much do you value the cultural nature of Ashton Lagoon?
22. On the same scale of 1 to 5, how much do you value the ecological nature of Ashton Lagoon?
23. On the same scale of 1 to 5, how much do you value the economic nature of Ashton Lagoon?
24. Have you been involved in any of the Ashton Lagoon restoration?
25. How often do you visit Ashton Lagoon since the restoration began?
    a. What activities do you participate in?
        - E.g. fishing, swimming, picnics, motor boating, kite surfing,
26. Do you feel that the restoration efforts have been successful so far? Why/Why not?
27. Do you feel that sustainable livelihoods have been considered in the restoration?
28. How would you like to see the space around Ashton Lagoon used?
    a. Examples include recreation (picnics, social), kite surfing, motor boating, fishing,

swimming, yachting, or eco-tourism. Any other suggestions are welcome.

29. Do you think you can protect natural areas and develop the economy at the same time? Do you feel the same way for Ashton Lagoon?
    a. If so, what type of conservation and development activities will you like to see for Ashton Lagoon and the surrounding area?
30. Would you like to see the area declared as a Marine Protected Area?
    a. Why or why not?

Guiding Questions (If participant is younger or moved to Union Island post 1994 development)

1. What do you know about the previous Ashton Lagoon 1994 marina development project?
2. What kind of activities have you noticed occur in Ashton Lagoon?
3. Did you visit Ashton Lagoon before the restoration began?
    a. If so, how often?
4. Have you noticed changes since the Ashton Lagoon restoration project began?
    a. If so, please describe any possible changes (e.g. positive, neutral, or negative).

[**Read to participant]:** For questions 5 to 18, we're going to use a scale of 1 to 5 where 1 means no value, 2 mean little value, 3 means neutral value, 4 means value, and 5 means highly value.

5. On a scale of 1 to 5, do you think government values the cultural nature of Ashton Lagoon?
6. On the same scale of 1 to 5, how much do you think resource users value the cultural nature of Ashton Lagoon?
7. On the same scale of 1 to 5, how much do you think community members value the cultural nature of Ashton Lagoon?
8. On the same scale of 1 to 5, how much do you think the government values the ecological nature of Ashton Lagoon?
9. On the same scale of 1 to 5, how much do you think the resource users values the ecological nature of Ashton Lagoon?
10. On the same scale of 1 to 5, how much do you think the community values the ecological nature of Ashton Lagoon?
11. On the same scale of 1 to 5, how much do you think the government values the economic nature of Ashton Lagoon?
12. On the same scale of 1 to 5, how much do you think the resource users value the economic nature of Ashton Lagoon?
13. On the same scale of 1 to 5, how much do you think the community members value the economic nature of Ashton Lagoon?
14. On the same scale of 1 to 5, how much do you value the cultural nature of Ashton Lagoon?
15. On the same scale of 1 to 5, how much do you value the ecological nature of Ashton Lagoon?
16. On the same scale of 1 to 5, how much do you value the economic nature of Ashton Lagoon?
17. Have you been involved in any of the Ashton Lagoon restoration?
18. How often do you visit Ashton Lagoon since the restoration began?
    a. What activities do you participate in?
        - E.g. fishing, swimming, picnics, motor boating, kite surfing,
19. Do you feel that the restoration efforts have been successful so far? Why/Why not?
20. Do you feel that sustainable livelihoods have been considered in the restoration?
21. How would you like to see the space around Ashton Lagoon used?
    a. Examples include recreation (picnics, social), kite surfing, motor boating, fishing, swimming, yachting. Any other suggestions are welcome.
22. Do you think you can protect natural areas and develop the economy at the same time? Do you feel the same way for Ashton Lagoon?
    a. If so, what type of conservation and development activities will you like to see for Ashton Lagoon and the surrounding area?
23. Would you like to see the area declared as a Marine Protected Area? Why or why not?

[Thank participant for time and knowledge/experience they shared]

Thank you very much for taking the time to speak with me today. I greatly appreciate your contribution to my research in this area and the results will be available in January of 2020.

Marine Affairs Program
DALHOUSIE UNIVERSITY

Marine Affairs Program Ethics Review Standing Committee
Letter of Approval

July 11, 2019

Dear Cassidy,

MAPERSC #: MAP2019-07
Project Title: Exploring Ecosystems in Union Island: A case study for ecosystem-based management and sustainable livelihood restoration in Ashton Lagoon

Effective date: July 11, 2019
Expiry date: July 10, 2020

The Marine Affairs Program Ethics Review Standing Committee has reviewed your application for research involving humans and found the proposed research to be in accordance with the Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans. This approval will be in effect until the date indicated above. This approval is subject to the conditions listed below which constitute your on-going responsibilities with respect to the ethical conduct of this research.

Sincerely,

Jerry Bannister, Chair

Post MAPERSC Approval: On-going Responsibilities of Researchers

After receiving ethical approval for the conduct of research involving humans, there are several ongoing responsibilities that researchers must meet to remain in compliance with University and Tri-Council policies.

1. Additional Research Ethics approval

Prior to conducting any research, researchers must ensure that all required research ethics approvals are secured (in addition to this one). This includes, but is not limited to, securing appropriate research ethics approvals from: other institutions with whom the PI is affiliated; the research institutions of research team members; the institution at which participants may be recruited or from which data may be collected.

2. Reporting adverse events

Any significant adverse events experienced by research participants must be reported in writing to Marine Affairs Program Ethics Review Standing Committee within 24 hours of their occurrence. Examples of what might be considered "significant" include: an emotional breakdown of a participant during an interview, a negative physical reaction by a participant (e.g. fainting, nausea, unexpected pain, allergic reaction), report by a participant of some sort of negative repercussion from their participation (e.g. reaction of spouse or employer) or complaint by a participant with respect to their participation. The above list is indicative but not all-inclusive. The written report must include details of the adverse event and actions taken by the researcher in response to the incident.

3. Seeking approval for protocol / consent form changes

Prior to implementing any changes to your research plan, whether to the protocol or consent form, researchers must submit a description of the proposed changes to the Marine Affairs Program Ethics Review Standing Committee for review and approval.

4. Submitting final reports

When the researcher is confident that no further data collection or participant contact will be required, a Final Report (template attached) must be submitted to Marine Affairs Program Ethics Review Standing Committee. After review and approval of the Final Report, the ethics file will be closed.

5. Retaining records in a secure manner

According to the application, researchers must ensure that both during and after the research project, data is securely retained and/or disposed of in such a manner as to comply with confidentiality provisions specified in the protocol and consent forms. This may involve destruction of the data, or continued arrangements for secure storage. Casual storage of old data is not acceptable.

It is the Principal Investigator's responsibility to keep a copy of the MAPERSC approval letters. This can be important to demonstrate that research was undertaken with Board approval.

Please note that the Marine Affairs Program Ethics Review Standing Committee will securely store your project file for 5 years after the study closure date at which point the file records may be permanently destroyed.

6. Current contact information and university affiliation

The Principal Investigator must inform the Marine Affairs Program Ethics Review Standing Committee of any changes to contact information for the PI (and supervisor, if appropriate), especially the electronic mail address, for the duration of the MAPERSC approval. The PI must inform Marine Affairs Program Ethics Review Standing Committee if there is a termination or interruption of his or her affiliation with Dalhousie University.

7. Legal Counsel

The Principal Investigator agrees to comply with all legislative and regulatory requirements that apply to the project. The Principal Investigator agrees to notify the University Legal Counsel office in the event that he or she receives a notice of non-compliance, complaint or other proceeding relating to such requirements.

8. Supervision of students

Faculty must ensure that students conducting research under their supervision are aware of their responsibilities as described above, and have adequate support to conduct their research in a safe and ethical manner.