An Ethnographic Analysis on the Effects of the Closure of HOVENSA Oil Refinery on the Commercial Fishing Community on St. Croix, U.S.V.I.

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AN ETHNOGRAPHIC ANALYSIS ON THE EFFECTS OF THE CLOSURE OF HOVENSA OIL REFINERY ON THE COMMERCIAL FISHING COMMUNITY ON ST. CROIX, U.S.V.I.

By
Samantha J. Feingold

A THESIS

Submitted to the Faculty of the University of Miami in partial fulfillment of the requirements for the degree of Master of Science

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the requirements for the degree of
Master of Science

AN ETHNOGRAPHIC ANALYSIS ON THE EFFECTS OF THE CLOSURE
OF HOVENSA OIL REFINERY ON THE COMMERCIAL FISHING
COMMUNITY ON ST. CROIX, U.S.V.I.

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This study is an ethnographic analysis on the effects of the closure of HOVENSA oil refinery on the commercial fishing community on St. Croix, U.S.V.I. It adds to the literature on resilience of fishing communities on how a major corporation can impact a fishery. The study used an ethnographic analysis that included a Rapid Impact and Vulnerability Assessment (RIVA), which evaluated the socio-economic outcomes and consequences of the closure on the fishing community and the fishermen's livelihood strategies. To assess whether the commercial fishing community will be resilient in the future if the economic decline remains or worsens, social, financial and human capital assets were weighed and evaluated to determine if they promoted or weakened the community's resilience. The results of the study showed that there are three major outcomes of the closure: a large out-migration, high energy bills, and high unemployment. These outcomes greatly impacted the commercial fishermen and resulted in various livelihood strategies. The commercial fishing community is not resilient as
recovery, meaning it will not maintain the existing functioning as it did prior to the closure if the weakened economy persists. It may demonstrate transformational resilience, meaning it will adapt to its new environment. In this way the fishing community may evolve into a consolidated community of innovative fishermen.
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Chapter 1

Introduction

HOVENSA oil refinery on St. Croix of the United States Virgin Islands (U.S.V.I) abruptly announced it was closing its operations on January 18, 2012, effectively shutting down three weeks later. The closure was a result of various setbacks including a $1.3 billion loss due to a decline in demand for petroleum products and the low prices of natural gas (HOVENSA, 2012). As a consequence, 1,200 HOVENSA employees and 950 subcontractors were laid off. HOVENSA is a private company owned by Petroleos de Venezuela and Hess Corp. For years HOVENSA was the largest oil refinery in North America. Up until the 2nd Quarter of 2012 it was the largest private employer in the U.S.V.I. In the sequential quarters it quickly dropped to the 10th largest, the 21st largest and today it is no longer on the list of large employers in the U.S.V.I (U.S.V.I Department of Labor, 2013). As a direct consequence of HOVENSA’s closing St. Croix’s unemployment rate reached 17.8% in January 2013, up from 9.8% in 2011 and higher than at any time since HOVENSA opened (Department of Labor, 2014). An estimated $580 million shortfall in economic output has been directly associated with HOVENSA’s closing. In 2012 the Federal government granted $7.8 million to the territory as a National Emergency Grant in an effort to re-train workers who lost their jobs due to HOVENSA’s closing and to assist them in acquiring a new job (Department of Economic Research, 2013). Still today, 14.5% of Crucians who are in the labor force are unemployed (Department of Labor, 2014).
As seen in many economic crises, as unemployment rates escalate social conditions deteriorate (Chowdhury et al, 2013). HOVENSA employed some of the highest paid workers on the island, supporting the island’s local businesses (Glassdoor, 2014). Additionally, HOVENSA gave scholarships to children to attend private schools on the island and trained high school graduates to work at the refinery. The island does not have a large tourist industry like its main sister islands, St. Thomas and St. John. The island’s economy was centered on HOVENSA, supplemented with tourism, and various other manufacturing businesses like aluminum and rum. HOVENSA, in many ways was the economic engine for the island.

Although not large, St. Croix’s commercial fishing industry is historically rich. There are approximately 140 registered, active commercial fishers, most of whom are in their fifties (DPNR, 2013). For most of the fishermen, fishing accounts for over half of their income (Kojis and Quinn, 2011). With HOVENSA’s closing fishermen are also feeling the island’s economic decline. Due to unemployment and emigration, restaurants are seeing fewer customers. Some restaurants have closed. It is anticipated that fishermen will see less business from restaurants in addition to independent buyers. Furthermore, there are other consequences resulting from the refinery’s closure that are impacting the fishery, including increased utility and fuel costs.
Chapter 2

Objectives

The objective of my thesis is to investigate the socioeconomic consequences resulting from the closure of HOVENSA oil refinery. The study will investigate whether the Crucian fishing community has the necessary capital assets (social, financial and human) to be resilient to this economic shock. Capital assets are the social, financial, physical, natural and human components of a community that determine whether the community can maintain a livelihood and be resilient. Assessing the Crucian fisheries capital assets will determine whether it has the necessary and adequate capital assets to be resilient in the face of the stressor, the closure of the refinery. The island has seen its share of stressors; from major hurricanes, a long pause of tourism after the September 11, 2001 terrorist attacks, and the global recession that began in August 2007. Fishermen feel added pressure due to federal and territorial regulations that resulted in protected areas, gear bans, and trip limits. Additionally there is confusion of regulations due to a lack of consistency between federal and territorial management. There is limited literature on the resilience of small-scale fisheries in the face of a stressor outside of natural disasters, global market fluctuations or local fishery regulation change. The oil refinery on St. Croix had been the largest employer on the island since its founding fifty years ago. Since HOVENSA’s closure is a still a developing and dynamic issue on the island, this research explores whether the commercial fishery has the essential capital assets that would support a resilient community. The study accounts for fishermen’s social and economic concerns. It
is intended to be the first in a series of assessments that monitors economic conditions on island, focusing on the fishing community. Because HOVENS A’s closure has impacted the entire island drastically, many stakeholders in the fishery have acknowledged the importance of this type of research.
Chapter 3

Literature Review

3.1 Resilience

In the face or the wake of a disturbance, be it a natural disaster, regulatory change, or economic stress, in order for a community to maintain its culture and structure, the community must exhibit resilience. Historically, resilience is a term used by engineers, psychologists and ecologists (Maguire and Cartwright, 2008). Ecologically, the term is defined as “an ecosystem’s ability to absorb and adapt to change and maintain its existing state of functioning” (Holling, 1973). The ecological term is used to assess an ecosystem’s ability to adapt in the face of a natural or human made hazard.

Today resilience has socio-economic significance as well, adding to the ecological meaning: the ability of people to organize themselves (Maguire and Cartwright, 2008). Resilience is defined by Bunce et al (2009) as “the amount of change a system can take while keeping the same function/structure; the extent of a system’s ability to self-organize; and an ability to build and increase the capacity for learning and adaption”. A resilient community is able to respond to changes or stress in a positive way, while maintaining its core functions. Social resilience is a dynamic term, incorporating economic, political, spatial, institutional, and social dimensions (Adger, 2000).

Fowler and Etchegary (2008) attribute successful social and politically functional communities (and thus more immune to change) to the following attributes: 1) Residents are meaningfully engaged in social events 2) Mutual trust
between community and its leaders to act fairly and obey the law. 3) Authorities are perceived to be honest and committed to equality, and 4) General social and political structure is horizontal, not hierarchical. It can be said that communities that possess these attributes are resilient.

According to Maquire and Cartwright (2008), resilience can be seen as recovery or transformational. Resilience as recovery is deterministic; a community either is or is not resilient. Resilience as recovery accounts for inherent characteristics of a community that enable it to be resilient (or not) in face of a stressor. This definition addresses a community as resilient if it returns to the pre-existing state. This form of resilience does not account for the dynamic nature of communities and of change, which gives it its “black or white” basis.

Transformation resilience, conversely, is a way of framing resilience that comprehends the complexity of communities and change. Transformational resilience allows for a community to adapt to a new state that is sustainable in its new environment. It allows for creativity, innovation, renewal and re-organization (Folke, 2006). This form of resilience can demonstrate how a community can adapt positively to change. Rather than seeing change as a “stressor”, it accepts change as inevitable (Maquire and Cartwright, 2008). It shines a positive light on change, acknowledging its potential to enhance the community, focusing on the community’s adaptive capacities and resources that enable it to be resilient, as opposed to its vulnerabilities. As Maquire and Cartwright state of transformational resilience (2008):

It is here that the difference between social resilience and ecological resilience becomes clear. Social resilience recognizes the powerful capacity of people to learn from their experiences and to consciously incorporate this learning into their interactions with the social and physical environment. This view of resilience is important because it acknowledges that people themselves are able to shape the ‘trajectory of change’ (Herreria et al. 2006)

As an example, a community in Canada that once depended on fishing was fortunate to have the good leadership and resources to become successful in other economic areas—demonstrating transformational resilience. When the Canadian codfish fishery was closed down in 1994, Fowler and Etchergary (2008) assessed the resilience of two fishing towns in Newfoundland and Labrador affected by the closure. One of the towns developed the Atlantic Groundfish Strategy, which was a $1.9 billion dollar initiative composed of active programing that promoted skills and training, adult education and development and employment opportunities and counseling. The other town did not have good leadership and as a result was unable to recover economically. Their social services were cut, which led to poorer medical care and less comfort spending money socializing. For these reasons there was an increase in out-migration that resulted in the feeling that the community had given up. In the prosperous town, however, it is important to recognize that “the community’s” resilience depends on which community you are focused on. As a town, the community was able to get back on its feet and succeed in other occupations. The fishing community component of the town however died down as a consequence, and with it their generations long livelihood, culture, purpose and identity. Although the town as a whole was able to demonstrate transformational resilience, due to its vulnerability
to regulation reform and attachment to their occupation, the fishing community was not resilient at all.

In resilience studies, the vulnerability of a community is often assessed. Vulnerability is a function of the “degree to which an exposure unit [households, human groups, ecosystems, and communities] is susceptible to harm due to exposure to a perturbation or stress, and the ability (or lack thereof) of the exposure unit to cope, recover, or fundamentally adapt.” (Kasperson et al. 2001). Both vulnerability and resilience concern a community’s response to stress or perturbations. Vulnerability not only accounts for how a community will recover in the aftermath of a disruption (like resilience) but also accounts for whether the community will be exposed to the disruption at all. The core concept of vulnerability is disaster risk, focusing on exposure, sensitivity, coping and adaptive capacity. Vulnerability studies are actor-oriented, whereas resilience studies are system-oriented, getting an overall picture. Most literature that covers vulnerabilities to fishing communities focus on stressors such as natural disasters, climate change and regulatory change.

Marshall et al. (2007) state that a community that is particularly dependent on a resource is often more vulnerable. They can exhibit social dependency in the form of attachment to occupation, place, business size and approach. This study focuses on an island’s dependency on a large cooperation and the benefits it shared with the community. The closure of the corporation induces a vulnerable island community. More specifically, this study focuses on how fishermen, who are dependent on their occupation, and the economic stability of their external
community, have become vulnerable to the closure of the large, dynamic and socially present cooperation and its resulting outcomes. Additionally, communities, like fisheries, can be financially dependent, which can limit their flexibility for innovation, risk taking, investment and enforcement. This dependency increases vulnerability.

3.2 Small Islands

St. Croix is a small island in the US Virgin Island territory, in the Caribbean Sea. Small islands are commonly very vulnerable. According to Briguglio (1995), nine out of ten most vulnerable countries are small island states. He states that the most common “disadvantages” (or vulnerabilities) of small islands include their: small size, remoteness and insularity, disaster proneness and environmental fragility. Their small size creates various handicaps that equate to vulnerabilities. A lot of the problems that stem from an island’s size result in issues that can make an island weak politically and economically. This is largely due to their limited technological capacity, natural resources, consumer demand, and professional capacity. They can be reliant on imports, have high infrastructure prices and higher prices of goods due to limitations on import and an inability to affect prices due to limited trade. This makes them dependent on external markets. Due to their dependency on outside markets, small islands are often very vulnerable to external economic shocks (Read, 2010). Today St. Croix is suffering from a vulnerability caused by its dependency on an internal market that was majorly controlled externally, by owners abroad. Additionally, the small
population does not support domestic competition, which we will see in the Crucian fishery, especially as the population decreases (Briguglio, 1995).

Due to many of these island realities, among others, it is hard to live on an island for extended periods of time. Small islands generally have small populations and rapid population fluctuations (Newton, 2014), which results in a weak source of human capital. As a consequence of many of the above disadvantages, there is a lack of migration in and out of small islands. Many poor native islanders do not migrate off the island as a result of lack of information, poverty, and health problems (Newton, 2014). Simultaneously, there is a lack of migration to islands due to various factors such as: lack of elite education, inadequate medical care, expensive goods and lack of resources.

What sometimes reinforces this problem is a business’ inability to offer competitive salaries because they have limited markets and assets themselves. For these reasons there is high turnover, which creates for an inefficient professional environment affecting business. This is significant to this study because non-locals outside of HOVENSA (or spouses of HOVENSA workers) were not able to make a good living so when the economy deteriorated, many in this sector had to leave the island. Additionally, the high salaries of the HOVENSA workers on St. Croix were unusual for the island, so when they lost them, it forced them to leave the island to maintain their family’s lifestyle. What is also common on small islands is that members of the community are often related which creates bias, patronage and inefficiency in the professional and political arenas (Briguglio,
Although small communities can create efficient decision making and action, these biases can also be counterproductive.

Small islands are particularly vulnerable to climate change, as natural disasters worsen and coastal resources are harmed due to sea level rise and temperature fluctuations (Sem, 2007). The Caribbean has seen many debilitating hurricanes that have hindered the economy for years. In 2013 the Caribbean tourism industry contributed 14% to the total GDP (WTTC, 2014). In 1989 Hurricane Hugo led to a 10% drop in employment across the islands, which took four to six months to reverse. The devastation on St. Croix was far beyond numbers and induced a feeling around the island that St. Croix is always very vulnerable. Hurricane Marilyn hit in 1995, causing a less severe drop in employment (2.5%), but also took six months to reverse. It could be speculated that due to the universal understanding of impending hurricanes, infrastructure and development never reach their full potential, and in many cases possibly never fully recover before another natural disaster hits. This proved true to St. Croix, which had not fully recovered from hurricane Marilyn, before the September 11 terrorist attacks strained the island’s tourist industry. And then the island was hit by the 2008 global recession. Today the island’s economy suffers from the closure of HOVENS A. Aside from the economy, St. Croix will continue to see its share of vulnerabilities due to climate change.
3.3 Capital Assets

Adaptive capacity is a term frequently associated with resilience and vulnerability. It accounts for the community’s ability to adapt in the face of a vulnerability, which would determine whether it is resilient or not. Brooks (2003) defines it as “the ability or capability of a system to modify or change its characteristics of behavior to cope better with actual or anticipated stresses.”

Adaption refers to actions that are taken to reduce vulnerabilities and increase resilience, and adaptive capacity is the ability to execute these initiatives (Maguire and Cartwright, 2008). A resilient community exhibits flexibility and creativity in order to develop alternative ways of reaching objectives. In this way it can translate its resources and adaptive capacity into the changes needed to survive and grow, therefore demonstrating resilience (Maguire and Cartwright, 2008).

Like adaptive capacity, the capital assets in socio-ecological systems are factors when assessing the resilience of a community. They are assets of which are owned, controlled, claimed or in some other means accessed by households (Allison and Horemans, 2006). Ellis (2000) defines a livelihood as “the assets (social, financial, physical, human and natural) the activities, and the access to these mediated by institutions and social relations that together determine the living gained by the individual or household. Capital assets and especially the lack of capital assets are important indicators or metrics to evaluate whether a community will demonstrate resilience in the face of a stressor. Evaluating a fishing community’s capital assets can determine how it will respond to common stressors like natural hazards or fishing regulations. The Sustainable Livelihoods
Approach (SLA) uses capital assets as one component of its framework at evaluating how to improve the livelihoods of an impoverished rural community (Kleih et al. 2003), or more specifically a small-scale fishery (Allison and Ellis, 2001; Ferrol-Schulte et al. 2013). Like this study, the SLA puts people’s social and economic activities at the center of analysis, addresses management that transcends sectorial boundaries (fisheries, tourism, economy, human services, politics), makes micro and macro links (from fishermen’s behavior to management to government policy and funding), and makes recommendations that build on the communities strengths, among other principals (Allison and Horemans, 2006). The SLA uses the following five assets: social, financial, human, natural and physical.

Social capital refers to prevailing organizations including networks, norms and social trust that facilitate coordination and cooperation for mutual benefit (Bunce et al, 2009; Allison and Ellis, 2001). This can include leadership, governance, and social services. A community with social capital will be engaged in local events, have support from its leaders, have a mutual trust to act fairly and obey the law, and the authorities will be honest and committed to the law. Trust and transparency in governance is critical to a secure fishing community. Without it compliance and cooperation will be strained (Berkes and Jolly, 2001). Social capital is weaved throughout the other sources of capital. As Hall-Arber et al. explain social capital “is key to the flow of other forms of capital, as well as central to the dynamics of governance and resource utilization” (2001). Grace-Mccaskey (2012) reiterates this concept. She states, “Social capital is a
mechanism and a process that allows fishers to exchange information, goods and services in a system charged with symbolism and cultural values in a Natural Resource Community.”

Financial capital is access to money, which enables a community to diversify its livelihoods and maintain healthy lifestyles. Human capital refers to good health, individual knowledge, skills and competence, which promotes personal, social and economic well-being (Bunce et al, 2009; Allison and Ellis, 2001). It also refers to population in a community, staffing for human resources. Natural capital is the quality and quantity of natural resources and ecosystems and the community’s access to them. Physical capital is the community’s infrastructure and technology that enable them to make a living.

An indicator within financial capital is “occupational multiplicity” (Berkes and Jolly, 2001) or sometimes referred to as “livelihood diversification” (Goulden et al., 2013). When fishermen have occupational alternatives or “occupational multiplicity”, a fishing community is more likely to survive in the face of economic, natural or regulatory obstacles. The artisanal fishing community in the Solomon Islands, for example, was greatly dependent on the bech-de-mar (sea cucumber) industry (Chistensen, 2011). It had introduced a cash market to the community that was solely trade based, and as a result new commodities became available to them. When a ban of bech-de-mar was enacted, some were able to adapt by harvesting coconut for the dried coconut market. In time, when the bech-de-mar market re-opened on a schedule of every two years, these fishers were able to exploit both trades. This proved profitable and sustainable for them. This
is an example of how “occupational multiplicity” can be an effective way of maintaining transformational resilience. When fishing is tight for a multitude of possible reasons, having the opportunity to rely on an alternative occupation proves valuable.

Goulden et al. (2013) studied two lake communities’ social assets and livelihood diversification in order to identify their relationship to resilience. They found that households with higher levels of assets and more diverse livelihoods are in general more resilient to multiple stressors. Their study used social capital as the umbrella term that includes financial, human, physical and human assets. This study will use the five distinct forms of capital to account for the fishing community’s resilience, while accounting for the interconnection between each asset, and the factors that may limit the communities access to them.

3.4 St. Croix, U.S.V.I.

3.4.1 Site Description

St. Croix is a small island in the Caribbean. It is the largest island of the United States Virgin Islands, St. Thomas being the second largest. St. John is the smallest. The island is about 84 square miles, 28 miles long and 7 miles wide (218 square kilometers; 45 kilometers; 11 kilometers, respectively). Figure 3.1 shows the location of the major infrastructure on the island of St. Croix.
Figure 3.1 St. Croix and the island’s major infrastructure.

St. Croix is 1131 miles (1820 kilometers) southeast of Miami and 1678 miles (2700 kilometers) south of New York City. St. Croix is located 65 miles (105 kilometers) southeast of Puerto Rico and 40 miles (64 kilometers) south of St. Thomas and St. John. The U.S.V.I.s are an archipelago that are a part of the Lesser Antilles islands, which include the British Virgin Islands, Antigua, Barbados, Grenada, St. Lucia, St. Martin, Trinidad and Tobago (among others). This group of islands is an arch that runs from Puerto Rico to Venezuela.

St. Croix’s eastern most point, Point Udall is the most eastern point of land of the United States. The island’s rich geological nature makes for a very diverse ecosystem, ranging from a sub-tropical rainforest on the western side to
arid clusters of cactus on the eastern side. Although it has volcanic origin, most of the island is flat, accommodating an agricultural industry for centuries. Although the rainy season is short (from September through November), the island is particularly vulnerable to hurricanes, most recently devastated by hurricanes Hugo in 1989 and Marilyn in 1995 (Valdes-Pizzini et al, 2010). In the last fifty years St. Croix has been subjected to 12 major hurricanes. Earthquakes, droughts, floods and even tsunamis occasionally impact the island as well. The marine environment is diverse, home to coral reefs, salt ponds, algal plains and mangrove forests.

Throughout the 70 miles (113 kilometers) of coastline there are many beaches supporting a spectrum of recreational activities (U.S.V.I DPNR, 2005). Separating St. Croix from Puerto Rico is the Puerto Rico trench, which is 28,000 feet deep (8,400 meters), the deepest part of the Atlantic Ocean (Grace-Mccaskey, 2012 and Ortiz, 2013). Most of the U.S.V.Is are on the UVI insular shelf, located in the northern U.S.V.Is (St. Thomas and St. John). St. Croix is on a separate shelf that is 65 feet (20 meters) deep and expands 77 square meters (200 square kilometers). It has a drop off that reaches 13,450 feet (4,100 meters). Most of the St. Croix shelf is within the 3 nautical miles territorial jurisdiction, the closest end point of the shelf being as close to 100 meters from shore, in the northwestern part of the island (Kojis and Quinn, 2006 and Ortiz, 2013). The drop off attracts all sizes of animals from sharks and sea turtles, to wahoo and tuna, and consequentially is a popular location to fish and scuba dive. St. Croix’s shallower
shelf limits the fishery to a smaller harvesting area for reef fish than the surrounding islands, but also implies that their pelagic fishery is closer to shore.

The deeper and wider shelf in St. Thomas allows for cruise and freight ships to easily dock at their port town, Charlotte Amalie. St. Thomas is a known tourist attraction, in 2014 scheduled to host in its busy season 71 ships per month, whereas St. Croix is scheduled to welcome 10 per month in its busiest months (VInow, 2014). Although St. Thomas is a significantly smaller island (31.24 square miles), its population is about a thousand people more than St. Croix at 51,634 residents. St. John is the smallest of the three and frequented by visitors desiring a quieter stay and day visitors that come from St. Thomas. In 2012, St. Thomas and St. John had over 2.3 million tourists (more than half arriving on cruise ships rather than by plane), whereas, St. Croix had 274.5 thousand (Bureau of Economic Research, 2014). Instead of being a bustling tourist destination, St. Croix has maintained an industrial economy since the 1960s. It was built upon sugar mill money and later welcomed rum distilleries, the aluminum industry, and the HOVENSA oil refinery.

The US Virgin Islands are US territories, under federal and territorial law. Residents of the U.S.V.Is are citizens of the United States, and although they are not permitted to vote in federal elections, a non-voting delegate to Congress represents them in the federal arena. An elected governor leads the territorial government along with fifteen elected senators.

According to the 2010 US Census Bureau, 50,601 people reside on St. Croix. The demographics of the island are complex and diverse (See Figure 3.2). Less
than half of both the U.S.V.I and Crucian population are native Virgin Islanders (46.6%). The concept of a native Virgin Islander is difficult as well because a significant percentage of the population are Puerto Ricans that came to the island in the 1940s after the US Navy expropriated Vieques, an island off of eastern Puerto Rico. Before this immigration, the Crucian population comprised of approximately 75-80% black natives, ancestors of the slave trade. The question remains as to whether those Puerto Ricans who immigrated are now considered native.

Figure 3.2 Percentages of Crucian Ethnicities (Percentages from US Census Bureau, 2010)

Today those that identify themselves as Puerto Rican are 13.8% of the population, West Indians (natives of other Caribbean islands) is 28%, and white Continentals are 11.6% and are often seen as outsiders, working in the tourist
industry. There are a small percentage of people that are native whites that are decedents of the Danish and other European plantocracy from the colonial period. Black natives and Puerto Ricans became amiable with one another swiftly because they were both US citizens, and the immigration of Puerto Ricans to St. Croix was not new; they had been immigrating to the island for hundreds of years, refugees of the colonial occupation on Puerto Rico. West Indians are still a somewhat distinct ethnic group. The Crucians believe the West Indians have immigrated—often without benefit of legal entry, to take “Crucian jobs” and to get the benefits of social services (Grace-Mccaskey, 2012; Roopnarine, 2008). In addition to this rich history of immigration, there is also a constant out-migration of native Crucians due to lack of job opportunities, cyclical instability, high costs of living, and inadequate and inefficient social services (Roopnarine, 2008).

The US Virgin Islands have lower income levels then most of the Continental US. In 2008 the estimated median income of households in the U.S.V.I was $35,711, which was considerably lower than they median income in the US of $50,112. About 11% of households live on less than $10,000 per year, compared to 7% for the US as a whole. About half of U.S.V.I households lived on less than $35,000 per year, compared to a third of all households in the US (U.S.V.I Bureau of Economic Research, 2010; See Figure 3.3).
3.4.2 History of St. Croix

The pre-colonial population on St. Croix was a mixture of indigenous groups, thought to be from the lowland region of the Orinoco River of what is now Venezuela and Colombia. These were the Ciboney and Igneri, and later the Arawaks and the Caribs. They were reliant on their marine environment for sustenance, handcrafting their fishing gear, like fishing hooks made from conch shells. Prior to colonization the Arawaks called the island “Ay Ay”. During Colombus’ first voyage in 1492 he named the islands he encountered the West Indies. He named St. Croix, Santa Cruz. Although they tried, his men never won battles with the indigenous on St. Croix (Grace-Mccaskey, 2012; Valdés-Pizzini et al., 2010).
The colonials brought with them new skills and technologies and also new diseases that the natives were not immune to, which in time accidently aided the colonials’ effort at eliminating the indigenous population all together. Eventually the French won the island for a period of time renaming the island Sainte Croix. They established the first successful colony based on producing cotton, sugar cane and tobacco. In 1697, due to droughts, hurricanes and insufficient trade, St. Croix was again abandoned. In 1733 the Danish bought the island with a goal of expanding their agriculture production. They had already colonized St. Thomas, and St. John had proved to be too mountainous for cultivation. Saint Croix (the Danish dropped the E) was ideal for agriculture, because its terrain is mostly flat. The Danish called the three islands the Danish West Indies (DWI). At this time the number of slaves imported from Africa increased drastically, to support and increase sugar cane production. This was important for St. Thomas because it promoted trade for the Danish and encouraged the use of the islands most important physical resource: its deep and easily navigable harbor. By 1812 St. Croix was one of the largest sugar cane producers in the West Indies, exporting over 46 million pounds (Dookhan, 1994 and Grace-Mccaskey, 2012).

The slave population was primarily from West Africa and greatly outnumbered the white population that was primarily from England and Ireland. The Danish settled on St. Thomas. In 1803 whites represented 6.5% of the island’s population (Dookhan, 1994). When the slaves were finally emancipated in the Danish West Indies in 1848, much of the agricultural industry diminished. Most sugar mills closed due to the combination of lack of laborers (when the
slaves were freed most of them immigrated off island), an increase in demand for beet sugar, and a labors’ riot called the 1878 Fireburn that left most plantations destroyed. The economic decline caused by the collapse of the sugar industry coupled with various natural disasters, caused the DWIs to become a drain on the Danish economy. The United States had showed interest in the islands for decades primarily due to the value of St. Thomas’ harbor, and presumably the potential for the other two islands to become tourist destinations. Finally in 1917 the US purchased the islands for $25 million from Denmark and they renamed the group of islands the United States Virgin Islands (U.S.V.Is). The United States had already purchased Puerto Rico in 1898.

When the US bought the islands there was hope that the US would revitalize the economy. Instead they used it mostly as a naval base located on St. Thomas. The military improved the social services offered on the island to secure the military, but the economy was still left unsupported. Sugar plantations were still closing and the Prohibition Act of 1921 halted the rum industry that was fueled by the sugar mills. Major hurricanes further battered this weakened economy. The island hit its biggest economic decline when the West India Sugar Plantation went bankrupt and shut down its central factory along with 47 plantations at the 1920s (Grace-Mccaskey, 2012). This left over 1,000 people unemployed and caused a major emigration off the island, leaving the island with 15.5% less people in 1930 compared to 1917 (from 22,000 to 26,000 people). This is the closest parallel in St. Croix’s history to the current economic struggle caused by HOVENSA’s closure.
After visiting the U.S.V.I in 1931, President Herbert Hoover called the islands the “effective poorhouse” of the US. He created a Homestead Program on the island, distributing land to Black and Hispanic small farmers. Unfortunately due to drought and faltering support by the government, this operation failed as well and many owners had to abandon their farms (Tyson, 1991 and Grace-Mccaskey, 2012). The Organic Act of 1936 eliminated the property and farm requirements for voting, and the revised Organic Act of 1954 allowed non-English speakers and illiterate citizens to vote, which was very important as many Spanish speakers came from Puerto Rico and particularly from Vieques after the US expropriation in the 1940s. The initial version of this Organic Act also introduced the concept of senators to the territorial government (Grace-Mccaskey, 2012).

The St. Croix economy finally turned around in the sixties with the introduction of tourism and manufacturing to the island. Tourism increased when the U.S.V.Is were promoted as “America’s Paradise”; St. Thomas became a frequented cruise ship stop, PanAm jets started flying to the U.S.V.I, and much of St. John was declared a National Park (Grace-Mccaskey, 2012). Still, there have been various interruptions in the progression of the tourism industry on the U.S.V.Is, including: the Fountain Valley Murders in 1972, Hurricanes Hugo and Marilyn in 1989 and 1995, respectively, and the September 11, 2001 terrorist attacks. Fortunately, the trend has shown that a year after a stressor, tourism returns.
Today, the tourism industry continues to grow. In 1990 the territories saw over 1.8 million visitors, 194,500 thousand of them coming to St. Croix. In 2012 the U.S.V.Is saw 2.6 million visitors, 274,500 coming to St. Croix (Bureau of Economic Research, 2014). This is a 46% and 30% increase in 22 years, respectively. As stated previously, St. Thomas has the larger tourism industry due to its deep and wide port. More than half of the tourists that come to St. Thomas are cruise ship visitors (Bureau of Economic Research, 2014). St. Croix does not have any chain hotels or resorts and has a relatively small shopping district in Christiansted. When cruise ships arrive in Fredricksted portable shopping kiosks open to welcome them and sometimes buses transport the tourists to historic Christiansted because it’s livelier and better equipped for tourism.

In addition to the oil industry that has provided the island its largest private employer for almost half a century (and which will be discussed in much greater depth later), the island also is home to a large rum industry. Virgin Islands Rum Industries Limited (VIRIL) a corporation that owns what is now called Crucian Rum has been a major business on the island since the early 2000s. In 2012 Diageo, PLC built a large capacity distillery for its Captain Morgan business. In 2012 rum exports to the US were over 62.5 million proof gallons, earning the U.S.V.I government $193.2 million in excise taxes (Bureau of Economic Research, 2014). Harvey Alumina did business on the island but closed in 2001 due to decline in demand.
3.5 Fisheries

3.5.1 Federal Management

The Magnuson-Stevens Fishery Conservation and Management Act (MFCMA) or the Magnuson-Stevens Act (MSA), most recently amended in 2006, was made into legislature in order to manage the United States fisheries, originally composed in 1976 along with other environmentally focused legislature written that decade. Its aim is to “prevent overfishing, rebuild overfished stocks, ensure conservation, facilitate long-term protection of essential fish habitats, and to realize the full potential of the Nation’s fishery resources” (NOAA, 2006). The MSA created Regional Fishery Management Councils, who are responsible for drafting Fishery Management Plans (FMPs). Within the MSA are 10 National Standards which are the policy objectives to be used in crafting FMPs. National Standard 1 (NS 1) mandates that fisheries should be managed to achieve optimum yield, meaning that harvest should be set at levels that will most benefit the nation, while considering social, economic and ecological factors (NOAA, 2006).

Of importance in this thesis is National Standard 8 (NS8), which requires FMPs to consider community, acknowledging that the fishing community is an integral component of the fishery, and its participants’ economic and social stability should be accounted for in fishery management. The definition of community will be discussed later on.

NS 8 has inspired various innovative management tools to protect the livelihoods of fishermen and to assure them access and a voice in the management process. In both large commercial and small artisanal fisheries, fisher
participation is essential to maintain a prosperous and sustainable fishery, both socio-economically and ecologically. Successful fishery management uses bottom up management, fishermen participation from the initial planning stages, co-management, and transparency (Kaplan and McCay, 2004). This promotes trust and a feeling of ownership of the fishery by the fishermen. In turn, cooperation and compliance follow, it is hoped.

NS 8 requires RFMCs to consider the socio-economics of regulation on fishing communities and fishermen. As stated previously, there is much literature that establishes how a fishery regulation (being a closure, quota, prohibition of gear) impacts a community’s economic and social well-being. Regulation reform most always comes with social consequences. This is a reality that comes with restricting a multi-generational tradition and compromising the manner of which fishermen are able to maintain their livelihood, snowballing into a series of social dilemmas.

3.5.2 Artisanal Fishing

Fishermen on small islands often practice artisanal fishing, sometimes interchanged with the term small-scale fishing (SSF). Although the MSA does not target small islands as their primary focus, NS 8 is especially important in this type of fishery, since island communities are so small and often very vulnerable. Artisanal fishing denotes a wide spectrum of “small-scale” fishing, seen globally on every coast. It is often defined as fishing using small boats (4 meters to usually no more than 18 meters; Bernal et al. 1998). Artisanal fishers use low level gear
and technology which is often homemade. Artisanal fishing gear often includes: gillnets, beach seines, cast nets, hook and line for bottom fishing and trolling, lobster traps, fish traps, bottom trawlers for shrimp, diving for conch and lobster, and spears (Heyman et al. 2012). Due to small boat sizes and limited technology, they often fish inshore waters to avoid danger. Catches are intended for family sustenance or small-scale, local sale. Commercial, artisanal fishers sell to local markets and restaurants and occasionally for higher valued catches, exported through small-scale middle men. Ninety-five percent of artisanal fishers and workers involved in processing and sale are living in undeveloped countries (Allison and Ellis, 2001).

The Food and Agriculture Organization (FAO) defines artisanal fishing as:

Traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital and energy, relatively small fishing vessels (if any), making short fishing trips close to shore, mainly for local consumption. In practice, definition varies between countries, e.g. from gleaning or a one-man canoe in poor developing countries, to more than 20-m. trawlers, seiners, or long-liners in developed ones. Artisanal fisheries can be subsistence or commercial fisheries, providing for local consumption or export. They are sometimes referred to as small-scale fisheries (SSF; FAO 2012).

Ninety percent of global fishers are artisanal (FAO 2012). From a conservation view the ubiquity of artisanal fishing over industrial fishing is beneficial in regards to the scale of gear: they use shorter long-lines, smaller gillnets, as well as smaller trawls and dredges than industrial fishermen. Artisanal fishers also spearfish, collect sea cucumbers by hand, or practice “hookah diving” (Scuba-free diving, using only a long tube that extends to a float at the surface) and crabbing with a five gallon bucket (Toklu et al. 1999).
Unlike industrial fishing, artisanal fishing frequently does not target a single species of fish in immense quantities. Instead, artisanal fishers are more like opportunists, fishing for what is available at any given time across the fishing grounds that their technical capacity permits. This is especially true when fishing for reef fish. For this reason, they are less likely to threaten an entire fish population and instead fish in a manner of “balanced exploitation” (Lloret et al. 2012). They fish across species, which can help prevent exhausting any specific species. This pattern may be less present with invertebrates such as sea cucumbers, lobsters and crabs. When there is a market for these types of seafood, fishermen will often exclusively harvest them. This is because they require specialized gear, and these invertebrates can be quite lucrative. Important taxonomic fish families can also be harmed due to their tendency to live in the same habitat. For example, parrotfish are significant because they eat the algae on coral that enable it to grow more effectively. This family of fish is threatened on St. Croix because they live in the reefs.

For a small-scale industry, artisanal fishing is very efficient. The catch of all artisanal fishers globally is substantial. Even though their equipment is not large industrial scale, millions of fishermen efficiently harvesting seafood has a consequential impact on the health of the oceans. For this reason encouraging positive change at this level of fishing as well as industrial fishing is of paramount importance to the future of our oceans.

Artisanal fisheries are often operating illegally, are unregulated and unreported. This triple trouble is termed: Illegal, Unregulated, and Unreported
(IUU; FAO 2012). This is a direct consequence of poorly implemented and managed fishery departments--common in undeveloped nations. Undeveloped nations have limited capacity to enforce national regulations or guidelines promoted by international organizations (Dubois et al. 2012). Observer programs are almost impossible due to artisanal fishers being widely dispersed, because they are often unregistered, or management capacity is lacking (Moore et al. 2010). Limited capacity primarily stems from lack of funds. Lack of funding limits a nation’s capacity to manage fishery grounds. Without funding, governments lack the ability to employ the appropriate people to write legislation, to serve as rangers to monitor fishing grounds, and to buy and maintain boats and other necessary materials. Consequentially, fishermen are either unaware of existing regulations or are free to fish without following rules being penalized. There are a lack of educational pamphlets, seminars, and outreach. As an example of failure of enforcement and outreach, 74% of Senegalese fishermen have not heard of Code de la Peche, their National fisheries legislation (Dubois et al. 2012). Dynamite fishing, sometimes called blast fishing has not been eliminated in Tanzania due to “weak capacity in local government for planning, reporting and financial management” as well as a lack of understanding on the importance of the ocean’s resources. This lack of awareness creates a fishing culture that does not feel the consequence of its practices and allows for the opportunity of often illegal fishing practices such as dynamite fishing, shark finning, sea turtle poaching and fishing in protected zones.
Additional consequences of a lack of fisheries management are that artisanal fisheries are data poor and responsible for a lot of bycatch—the unintended catch. The nature of IUU fishing implies that the protection of endangered or threatened species is neglected. Targeted catch as well as bycatch is unreported. As a result of being data poor, assessing the global population status of at risk fish, marine mammals and sea turtles is very difficult. Due to a lack of data collection on harvests by artisanal fisheries, global fisheries data is also incomplete (Moore et al. 2010).

Bycatch is an enormously contentious issue regarding artisanal fisheries. Sea turtles, marine birds, whales, seals, and many species of fish are commonly caught as bycatch. Baited gillnets catch the most bycatch of the different artisanal gears used, followed by seine nets and longlining (Moore et al. 2010). A study of the Mediterranean reported that about 132,000 sea turtles are caught in gillnets annually as bycatch, and of those approximately 44,000 are fatalities. Although a percentage is hard to calculate due to incomplete artisanal data, the majority of these catches are artisanal (Casale et al. 2011). According to Alava, et al. (2012), in Ecuador, approximately 15 to 33 whales per year are caught in gillnets. Gillnets were banned in the U.S.V.Is in 2008.

Other than ecological problems, artisanal fishermen are increasingly presented with social conflicts as well. Fishermen will participate in unsafe fishing styles in the pursuit of a prized income, for example, hookah diving, entering unsafe waters or scuba diving not using the proper percussions (Meltzoff, 2013; Quinn and Kojis, 2012).
For many fishermen, fishing is not only a way of making money it is a lifestyle, a way of life. They grew up watching their fathers fish six days a week, leaving before dawn. Some may have never considered an alternative occupation, or had another opportunity. Routinely, fishermen who are asked whether they would change their occupation, earning a similar income, respond “no”, they would remain in the fishery (Gelrich et al. 2009). Many fishermen very much enjoy their occupation. They find it therapeutic. They enjoy their independence as fishermen and being their own boss. They build bonds with each other and with the ocean, becoming very in tune to its patterns and rhythm. Some find grounding and culture in their livelihood, which has spanned generations. To encourage fishermen to exit a fishery as an attempt at conservation is unreasonable. When managing these fisheries it is vital to have empathy of these circumstances and to respect them.

3.5.3 History of the Crucian Fishery

The history of the Crucian fishery goes back to when the island was inhabited by the Arawaks and Caribs during prehistory. These indigenous groups were skilled fishermen. They equipped their canoes to withstand the strength of the Caribbean Sea. They ate shellfish, crustaceans, reef and pelagic fish. They made their hooks out of bone and shells and used nets that were weighted down with stones. They speared manatees, monk seals and sea turtles. Sea turtle meat and eggs were considered a delicacy and the wealthy beachfront property owners made pens to keep live turtles and fish for fresh consumption. All classes of
people ate land crabs, and it was said that the beaches often looked red rather than white because they were so abundant (Haagensen and Highfield, 1995). Caribbean lobsters were plentiful. They were caught using flamboys (torches) to find them and they were then caught by hand. Other fish of all shapes and colors were so abundant that they were caught by hand and seen at the local fish markets (Haagensen and Highfield, 1995; Grace-Mccaskey, 2012; Valdés-Pizzini et al, 2010). Crucians of all ethnicities and classes consumed all types of fish and seafood. That is in sharp contrast to the current consumptions patterns. Today white continentals look down upon the Puerto Ricans, blacks and West Indians who eat reef fish (Grace-Mccaskey, 2012; Valdés-Pizzini et al, 2010).

During the slave times the most favored and trusted slaves were allowed to fish (Price, 1966). This was seen as a good position for slaves because on their off days they could use their learned skills to make a small profit at the local market (Lawaetz, 1991, Grace-Mccaskey, 2012; Valdés-Pizzini et al, 2010). Starting in the colonial era a lot of salted fish was imported from New England. This import market was an iconic move to the emerging global economy and occurred because Europeans of the time were very fond of cod fish (Kurlansky, 1998, Grace-Mccaskey, 2012). Salt fish still remains a local cuisine, but today is primarily made on the islands.

During the 19th century, fish markets in Christiansted and Fredricksted were social centers. As Henry Morton, a reverend from Philadelphia described them, “a bargaining place, social club and town meeting rolled into one, the fish market was the center of village life each morning when the sound of the conch
shell horn signaled that the boats were bringing in the catch” (Selskab and St. Croix Landmarks Society, 1975, Grace-Mccaskey, 2012).

Freed slaves and other non-white Europeans would engage in endeavors in addition to fishing. They exhibited occupational multiplicity which as Valdes-Pizzini, et al. (2010) stated “made them more resilient to boom and bust processes, and changes in key economic activities that tend to dominate the rural landscape, such as the production of agricultural commodities for the work market’ (2010). This strategy continues to be used in the Crucian fishery (Grace-Mccaskey, 2012).

Since 1917, when the first commercial fishery census was conducted, fishermen were using gear similar to what they use today. They used fish pots, hand lines and various types of netting. Mostly they fished inshore in small boats. There were a total of 103 commercially registered fishermen, all whom were black, as opposed to on St. Thomas, where all the fishermen were French (Bureau of the Census, 1918, Grace-Mccaskey, 2012; Valdés-Pizzini et al, 2010). In 1932 Fiedler and Jarvis stated that although the Crucian fishing grounds are smaller than those of St. Thomas due to a smaller shelf, Cruzans fish more intensively.

Fishermen used multiple gear types in one single day of fishing, which made it difficult to collect data on the fishery. Additionally, it was difficult to gather information from the fishermen who never kept records of their sales or catches. Multiple fishermen would fish from the same boat but sell their catches separately (Bureau of the Census, 1918; Grace-Mccaskey, 2012; Valdés-Pizzini et al, 2010).
These habits, created many decades, if not centuries ago, are still common today among Crucian fishermen.

Fish were sold either on boats or at markets. In 1932 women did most of the selling and were paid 15 cents for every dollar of fish sold. Fish were sold by the weight: 10 cents per pound for “frying or breakfast fish”, 12 cents for larger “boiling fish”, and 14 cents for “baking fish”. All fish was sold locally, and no fish was exported to other islands or to the continental US. If the days catch was not sold fresh, the fish was salted and sold for 10 cents per pound. In 1930, 300,000 pounds of fish were imported, mainly salted and smoked groundfish or herring (Fielder and Jarvis, 1932; Grace-Mccaskey, 2012; Valdés-Pizzini et al., 2010). Equipment was all handmade and made in or around the fish market, unlike today where most equipment is bought online (Williams, 2004).

Many of the traditional foods that were eaten back in the 1930s are still eaten today. Not only saltfish, but kallaloo and fungi, which came from Western Africa, were supplemented with either fresh fish or saltfish. Stewed conch and lobster were also popular dishes. Brata was and remains a custom in the Crucian fishery. It is the act of giving a little over the amount of goods purchased. For example, if a person bought two pounds of a certain type of fish, the fisher might give the customer an extra half-pound of that fish or another. Also, fishermen would give fish, lobster or conch away freely, which is significant because it implies how abundant they were. When tourism increased, lobster was no longer brata or bait; it was then a marketable item, sold for 25 cents per pound (Grace-Mccaskey, 2012; Valdés-Pizzini et al., 2010).
As time went on, the fishery remained very consistent and reliable. Fishermen continued to use small-scale, multiple gear, multi-species strategies, even as larger commercial fisheries were developing in the continental coastal regions. Landings increased, but never to an industrial scale. By 1968 fishermen were hauling 6.6 pounds of fish from every fish pot (their then most widely used gear), totaling about 4,770 pounds of fish per year per fisher. By 1968 the average price for fish had increased to 50 cents (Swingle et al., 1970, Grace-Mccaskey, 2012; Valdés-Pizzini et al., 2010). Ironically, Swingle et al. (1970) made the recommendation that in order to increase the seafood market on St. Croix, more modern fishing techniques should be implemented (like trawling, long lining and purse seining). Others felt threatened by the development of the island due to tourism and the industrial businesses, and recommended using larger boats in order to reach the more productive areas that were further from the islands (Brownell, 1972). The use of ice was also recommended to preserve the fish longer. These recommendations were never implemented due to the local tendency to resist change, lack of interest from the fishermen and government, and lack of funding by the government (Swingle et al. 1970).

Lastly, the fishery tended to exhibit a lack of cohesiveness as most often fishermen working independently and communication was limited. This theme of social cohesion will be discussed later in this paper. Although into the sixties the number of registered fishermen remained level, fishing grounds were said to be less productive and the trap catches smaller (Grace-Mccaskey, 2012; Valdes-Pizzini, et al., 2010). This is an effect of overfishing, but it is also often blamed
on the development of the manufacturing industry and its impact on the fisheries. The dredging by Harvey Alumina and the oil refinery were hot topics, and remain sensitive issues to the older fishermen today.

3.5.4 Today’s Crucian Fishery

St. Croix’s fishery remains an artisanal fleet, running on small amounts of capital and energy. They are multi-gear, multi-species and small-scale. Most boats are within 16 to 25 feet (Kojis and Quinn, 2011). They engage in short trips in territorial waters that are usually between four and eight hours, and fish and/or trap mainly for local consumption (Kojis and Quinn, 2011; De Silva, 2007). They are a small community of about 140 registered and active commercial fishermen, working from 16 different landing sites (DPNR, 2013; Koji and Quinn, 2011). There are three main piers that are most commonly used: Altoona Lagoon, Mollasses Pier and Frederiksted Pier.

The Crucian fishery exists on commercial, recreational and subsistence levels. The recreational fishery exists either as a part of the tourism sector, or as a personal family or cultural activity on the weekends. Subsistence fishing also exists on St. Croix, supplementing the household income, and for managers is considered either as part of the recreational or commercial sector. Only the recreational fishery requires its members to be registered and have licenses.

According to the MSA a fishing community is “a community which is substantially dependent on or substantially engaged in the harvest or processing of fishing resources to meet social and economic needs, and includes fishing
operators, and crew and United States fish processors that are based in such a community”. As Valdés-Pizzini et al. discuss a fishing community can either be place-based or network based. A placed-based community is a fishing community that is location specific, whether the center is a dock, boat ramp, fishing house, or fish market, with the fishermen residing close by. Or a fishing community can be network based, meaning it is based on a network of people that share knowledge of the fishery and work in the fishery in some capacity (Valdés-Pizzini et al, 2010). In either circumstance, it is important to recognize that although the fishing community maybe limited to a location or group of people, a fishermen’s community is much larger due to occupational multiplicity.

St. Croix’s fishery has been most commonly regarded as a network-based fishery due to its lack of central location, while maintaining a cultural and knowledge based connection among the fishermen and their helpers. Before La Reine Fish Market closed, it might have been argued that La Reine created a place-based community, but today only a few fishermen use the space to sell their products. Stoffle et al have argued that the island as a whole can be seen as a fishing community because almost 100% of the industry occurs on the island and is sourced from the island (Stoffle et al. 2009).

In the past St. Croix had a fishing center at Gallows Bay, which remains a landing site, but does not house the fishing industry as it once did. Real estate development and tourism displaced and dispersed the island fishermen. They were forced to settle wherever they found cheaper housing (Grace-Mccaskey, 2012). Today fishermen live throughout the island and store their gear in locked
up trucks that their boats are trailered to. Although the Gallows Bay community is not home to a large number of active fishermen, it has a rich history of generations of fishing. On Saturdays the community gathers there, eating, drinking and socializing, as the select few fishermen sell their catch.

The 2011 Census of Marine Commercial Fishers in the U.S.V.I by Kojis and Quinn found that since 2003 the numbers of fishermen on St. Croix has declined by 46 people. They are now .27% of the total population of the island, down from .3% in 2003, and 1.8% in 1930 (Kojis and Quinn, 2011). The island’s population has declined since 2003 by over 4,000 people, which could modestly account for the decline in commercial fishermen (Bureau of Economic Research, 2014).

Valdés-Pizzini et al. (2010) explain that although the fishery is such a small portion of the island’s economy and the island’s population, it is still a core identity of the Crucian population, regardless of ethnic origin. They state, “the historical roots of fishing in St. Croix link many groups in a sequence of nodes and networks of fishers that involve households, clients, ethnic groups, restaurants, businesses and visitors throughout the island and the region.”

Due to immigration from other Caribbean islands, the fishery is composed of an ethnically diverse population, a microcosm of the island as a whole (Figure 3.4). In St. Croix, ethnically, Hispanics are over half of the fishing population (52%), followed by West Indians (20.3%) and Crucians (14.2%). The rest are small groups of British decent, European (not French, like St. Thomas), Continental, African American or Other (Kojis and Quinn, 2011). The majority of
fishermen whom identified as Hispanic were either themselves or their families from Puerto Rico and more specifically, Vieques. Racially, commercial fishermen are mostly black (65.2%), and the rest are mixed (16.9%), white (15.7%) or other (2.2%).

![Ethnicity of the Crucian Fishery](image)

Figure 3.4 The percentages of each ethnicity in the Crucian fishery
(Percentages from Kojis and Quinn, 2011)

The average age of the commercial fishermen on St. Croix is 54 years, the highest percentage of fishermen being in the age range of 61-70 years (which is significantly older than the range in St. Thomas, which is between 51-60). The average fishing experience is 23.6 years (Kojis and Quinn, 2011).

The education levels of Crucian fishermen are highly varied. The largest portion has completed high school (27.7%), followed by those who completed junior high school (24.5%), those who went to high school but did not graduate
(18.7%) and those who completed elementary school (16.8%). Few went to college (7.7%), completed college (3.2%), or had no at all (1.3%).

Koji and Quinn (2011) found that 41% of Crucian fishermen were fishing commercially full-time (>36 hours per week) and the same percentage stated that 100% of their income comes from fishing. In 2014, Crosson and Armentrout found that 75% of fishermen declared they were full-time fishermen, but they did not delineate what defines to work full-time or part-time and did not interview the entire commercial fishery. This demonstrates that a large portion of the fishery (59%) in St. Croix is demonstrating occupational multiplicity, as it has historically.

In St. Croix line fishing is the most common recorded method of fishing, followed by diving (scuba or free), and then trap fishing. Most line fishing is hand line fishing. Trap fishing was very popular before the 1990s, but when Florida banned net fishing, commercial net gear businesses started marketing their products to the U.S.V.Is which made net fishing become very popular until its ban in 2008. Today net fishing is only 10.5% of the total reported gear types used in the Crucian fishery. Line if fishing is used by 88.9% of fishermen, whereas traps are used by 37.5% (Kojis and Quinn, 2011)

Crucian fishermen often target multiple species, simultaneously. Only 13% of fishermen fished for only one species, whereas 27% fished for two species, and the rest fished for three or more. Those that fished for one species were most likely lobsterman. Sixty-seven percent of fishermen owned one boat, 11% no boats, and the rest owned more than one boat.
Commercial fishermen fish for two different markets: local consumers and the tourist restaurants. The locals eat the reef fish or what they call *pot fish* (parrotfish, triggerfish, surgeon fish as well as some smaller grouper species). The tourist restaurants might occasionally offer pot fish, but more frequently will serve pelagic species, like tuna, mahi or wahoo. Conch and lobster are eaten by both sectors, although conch is mostly enjoyed by locals and lobsters is mostly served in tourist restaurants. The most commonly eaten species by non-continental locals are parrotfish which are locally called *bluefish*.

In the Kojis and Quinn’s 2011 census, Crucian fishermen were asked to rate how they value each fishery. The most valued fisheries were the reef fish, the spiny lobster, queen conch and deepwater (open ocean) pelagic fish. Coastal pelagic, deepwater snapper, and baitfish (called ballyhoo) are also targeted but to a lesser extent (Kojis and Quinn, 2011). Trap or pot fishing targets either reef fish or lobster. Hand line fishermen target pelagic fish.

In 2002 the then Director of Environmental Enforcement developed La Reine Fish Market which was designed to attract the public to buy fish at a centralized place, throughout the week. It is located in the middle of the island, on one of the major roads, called Centerline Road. The structure is a U shaped pavilion sectioned off by partitions that allow fishermen their own table space. Due to a lack of cleanliness the market closed in 2007 (Grace-Mccaskey, 2012). The drains were not properly kept clean and open, resulting in a health hazard. There were also complaints that a lot of drugs were being used while at the market, and ill people were scaling fish. Today the fishermen do not set up in the
pavilion. Instead they sell in wooden huts they have built that are in front of the pavilion. The market is most busy on Saturdays when the most fishermen come (full time as well as part time fishermen), along with their helpers and family members. Adjacent to the fish market is a farmers market that is open only on Saturdays, which attracts a crowd as well. Since La Reine fish market closed, some fishermen have found other sites to sell fish, most often on the side of a popular road. Others have clients that they call prior to or following their trip, and will meet them at their house or restaurant.

3.5.4 (a) Fishery Management Structure

St. Croix’s fishery is managed both federally and territorially by the Caribbean Fishery Management Council (CFMC) and the U.S.V.I Department of Planning and Natural Resources (DPNR), respectively. The CFMC is responsible for the management of marine resources in the Exclusive Economic Zone in the U.S.V.Is (3 to 200 nautical miles), as well as Puerto Rico (9-200 nautical miles). They have developed FMPs for the regionally important species such as the spiny lobster, queen conch, and reef fish. The reef fish FMP includes minimum size limits for parrotfish, as well as closures for snapper and grouper. Currently in the U.S. Caribbean there are five species or units considered overfished: parrotfish, Grouper Unit 1 (Nassau Grouper), Grouper Until 4 (tiger, yellowfin, red, misty, and yellowedge grouper), Snapper Unit 1 (black, blackfin, silk and vermillion snapper), and queen conch. Midnight parrot fish and Goliath groupers are prohibited to harvest altogether.
Additionally, the CFMC enacted Annual Catch Limits (ACLs) in 2010, for those species under a FMP (CFMC and NOAA, 2010). FMPs are written by the CFMC with the support of NOAA’s Southeast Regional Office and the Southeast Regional Science Center staff. Public meetings are conducted in order for stakeholders to voice their concerns regarding proposed amendments to FMPs. The CFMC recommends regulations to the NMFS but the Secretary of Commerce ultimately approves them. Officials from the US Coast Guard and DPNR enforces federal and territorial management.

Currently, there are scoping meetings in Puerto Rico and the U.S.V.Is to discuss the concept of eliminating FMPs for various species, and instead having each island have its own FMP. The scoping meetings are a way of having all stakeholders participate in this discussion. Separate FMPs for each island would acknowledge the differences among the islands ecologically, biologically, socially and economically (CFMC, 2014).

The U.S.V.I DPNR is responsible for environmental monitoring and enforcement within the territorial seas (from the high tide mark out to 3 nautical miles to sea). In many ways the U.S.V.I DPNR holds more power on St. Croix than the CFMC because the majority of Crucian fishermen fish in territorial waters. There are eleven divisions within the U.S.V.I DPNR and two of them are responsible for fishery management: the Department of Fish and Wildlife (DFW) and the Department of Environmental Enforcement (DEE). The DFW is responsible for “monitoring, assessing and implementing public awareness to help and safeguard fish and wildlife.” It monitors both commercial and recreational
fisheries and provides management advice to the DPNR Commissioner. The DPNR regulations are detailed in the Virgin Island Rules and Regulations (VIRR), which are enacted by the executive branch. Both the executive branch as well as the legislative branch enacts laws.

The DEE is responsible for law enforcement of all natural resources, including enforcing the VIRRs, whereas laws are enforced by the U.S.V.I Police Department. Unfortunately, the DEE is understaffed and underfunded, which results in minimal monitoring and enforcement of marine resources and the island’s fisheries. For example, inspections of catch are required, but instead of the inspections being random, they are scheduled at a given time and place due to lack of staff. This results in a very unreliable inspection system (Grace-McCaskey, 2012). This has worsened in the last couple of years, which will be thoroughly discussed later.

The Fishery Advisory Council (FAC) is a group of 14 members that represent a diverse group of stakeholders including both commercial and recreational fishermen, marine scientists, diver operators and government agencies. They meet every month to address issues of concern. The FAC collaborates with the DFW to make recommendations for the territory or region regarding rules and regulations. The Commissioner of the DPNR may issue a public hearing regarding recommendations.
3.5.4 (b) Recently Implemented Fishery Regulations

One of the most significant regulatory changes occurred in 2001 when a moratorium on the issuance of new commercial fishing licenses was enacted by the DPNR. Since then, new fishers have not been able to enter the commercial fishery, although in the last year and a half, transferring became permitted in some instances, although this regulation has not been amended in the Commercial and Recreational Fishermen’s Handbook, which has not been revised since 2012 (DPNR, 2012).

The recreational fishery is largely unmonitored due to a lack of a recreational license program. Additionally, there are no limits to how much fish recreational fishers can catch. Recreational fishermen cannot be “written up” for selling their catch unless the enforcement officer witnesses or has clear evidence that they are selling their catch (Grace-Mccaskey, 2012). NOAA is presently conducting a study on the island to evaluate the size and characteristics of the shoreline recreational fishing.

In 2008 the DPRN enacted a ban on gill and trammel nets in order to reduce the harvesting pressure on parrotfish populations and to mitigate bycatch. Gill and trammel net fishing has been a very effective and lucrative way of harvesting fish. The ban was proposed in 2002 but the lengthy processed lasted until 2008 when the ban was implemented. The Federal government created a buy-out program, giving the DPNR $75,000 to distribute among gill and trammel fishermen (Grace-Mccaskey, 2012). They were given funds in proportion to their annual catches. Today, although gill netting is prohibited, there is speculation that
they are still in use. Additionally, some fishermen that use “modified” gillnets now use what they call “socknetting” (or fish bagging), which as fishermen will describe it is a larger sized mesh, allowing juveniles and small species to escape. Fish are herded into the seine nets by divers. Although the mesh is larger, it still catches a large quantity of fish, including bycatch.

There are various marine protected areas surrounding St. Croix. The biggest, is the federally managed Buck Island Reef National Monument (Karras and Agar, 2009). Originally proclaimed in 1961, President Clinton enlarged the sanctuary to be 18,135 marine acres in 2001. The park encompasses and includes a 175 acre island (Clinton, 2001). The whole area is a no-take protected area. The East End Marine Park (EEMP) is a territorially managed protected area that expands 60 square miles (155.4 square kilometers; See Figure 3.5). The park includes a 5 square mile no-take area (TNC, 2014). Unfortunately due to lack of funding for the DEE, enforcement is lacking, and therefore a breach of the regulations often occurs without penalty.
3.6 HOVENSA Oil Refinery

The closure of large industries can place small communities that depend on them in peril. For example, in Fort Frye, Ohio the Muskingum River Plant, which burns coal, is scheduled to close in 2015. The district estimates that it will lose $1.4 million in annual property tax revenue, which is about 15% of the town’s general fund budget. The general fund budget is used to educate 980 children. This is a huge loss for the surrounding Morgan Country that has an average household income of $36,000, much lower than the State wide average of $48,100 (Columbus Business First, 2013). In addition coal mining “ghost towns” that dot the countryside, often tourist destinations as a result of their history and their “spook factor”. These were towns that were built to serve the coal mining
industry. When the mine closed, most of the population lost their jobs, or the jobs supporting the industry and its workers, and so most left, leaving an abandoned town.

Figure 3.6 HOVENA Oil Refinery on St. Croix (Virgin Island Daily News, 2012).

On the south shore of St. Croix resides 2,000 acres of massive industrial structures, reminiscent to a Dr. Sues illustration (See Figure 3.6 above). It is home to the once largest private employer in the territory, the oil refinery: HOVENSA LLC. Today it is also a ghost town, its few workers roaming the eerily quiet and dusty landscape that once was so active and productive. John Hess of the New York based company, Hess Corp, founded the petroleum refinery in 1965. During its first year it produced 45,000 barrels a day (HOVENSA, 2012). The refinery was initially named Hess Oil Virgin Islands Corp (HOVIC). The original
agreement was a $10 million deal, between Hess Corp and the U.S.V.I government, building the refinery on 400 acres, which was later expanded in phases. In 1998 Petroleos de Venezuela, S.A. (PDVSA) and Hess Corp entered into a 50/50 partnership, renaming the refinery HOVENSA. They remain the owners of the refinery. Because the refinery were built on 65 acres of submerged land, the owners had to lease the land from the U.S.V.I territorial government, which they did for $1 each year in order to bind the legal contract.

The refinery was built on Knauss Lagoon, a once productive and biodiverse estuary and mangrove habitat (Figure 3.7). The dredged sediment was relocated to make a small island close to the refinery, which is sometimes used by locals as a place to barbeque or to enjoy a weekend afternoon. Locals and especially fishermen still regretfully reminisce on how abundant fish and other wildlife were in the lagoon.
In the 1970s HOVENSA was the largest refinery in North America, producing at capacity 650,000 barrels a day (HOVENSA, 2012). Before it downsized its capacity in 2011 it was the second largest refinery in the United States, and the 12th largest in the world, regularly producing 550,000 barrels a day. HOVENSA fueled a large portion of the East coast of the United States.

HOVENSA abruptly announced it was closing its operations on January 18, 2012 and effectively closed down three weeks later. Although to many the closure was a surprise, the refinery had downsized the previous year, hinting that the refinery was not performing as efficiently as the company required. The closure was due to several factors. It lost $1.3 billion loss in the previous three years due largely to a decline in demand for petroleum products and the low prices of natural gas (HOVENSA, 2012). The low price of natural gas in the United States, put HOVENSA, an oil operated refinery, at a competitive disadvantage. (Kase, 2012). HOVENSA is not the only oil refinery to close down
recently. In the last two years over 18 refineries have closed down in the US and Europe (KASE, 2012), including another Hess operated refinery in Port Reading, New Jersey. John Hess in his 2012 Annual Report stated that the corporation is exiting the refining business and will be focusing on exploration (Hess, 2012).

HOVENSA also saw economic pressure due to its own environmental negligence. In addition to groundwater contamination below the facility, the refinery has released vaporized and aerosolized material that reached nearby communities (US EPA, 2013). As a result of these violations to the Clean Air Act the Environmental Protection Agency and HOVENSA entered into a consent decree that fined the company $5.8 million, and required HOVENSA to invest $700 million in new cleaner technology. The Environmental Protection Agency requires that HOVENSA maintain the same clean air and water standards that they require of other refineries, including those that use cleaner natural gas to fuel their refinery. This was unrealistic and financially burdensome because natural gas is a much cleaner energy source and it is not available on St. Croix. It put HOVENSA in a decidedly uncompetitive position, as does the fact that its oil and refined products need to be shipped in and out of the island. HOVENSA remains responsible for these fines and standardization costs.

Unfortunately, there has been no resolution to resolve these issues. Initially the U.S.V.I senators did not support the amendment (detailed below) to the original concession agreement that the governor had presented. The concession agreement was the original agreement between the territorial government and HOVIC (the previous name of the refinery) signed in 1998 to last
until 2022 (Podkul, 2014). On August 7, 2013 the senators vetoed the first amendment for reasons that were primarily political and irrational. The amendment was written to permit the owners of HOVENSA to sell the refinery before their contract was over. HOVENSA then announced, due to the senators’ decision to veto the amendment, HOVENSA would not be able to run their storage facility and therefore would halt its sale of fuel to the island. This would include supplying fuel to the Water and Power Authority, the island’s water and electricity provider. Out of necessity, the government and HOVENSA came to an agreement regarding the storage facility. The amended agreement would permit the refinery to be sold while relieving the company from certain contractual obligations. When it was vetoed there was concern that the U.S.V.I government and HOVENSA would be in litigation for many years, as the refinery rusted to an unusable state.

Fortunately, there was a great uproar from the islanders and many people spoke out to plead with the senators to agree to the amendment, for the future prosperity of the island and territory. On November 4, 2013 the senate voted yes to the amendment, paving way for the sale of refinery. The amendment included (Kossler, 2013):

- HOVENSA should pay $14 million in lieu of property taxes, annually.
- Once the refinery is sold HOENSA will either pay the amount of property taxes that were deferred, plus interest, or 20% of the gross sales of the refinery up to $50 million dollars, whichever is greater.
- If the refinery is not sold by August 15, 2019, HOVENSA will pay the total amount deferred plus interest.
- As long as HOVENSA continues to run an oil storage terminal, it will also continue to supply the island with fuel.
• If the refinery is not sold within one year, the company will open up the Limetree Bay Channel (which is now only for HOVENSA access) to commercial vessels.
• HOVENSA does not object to the government taking control over the nearly $5 million in Supplemental Environmental Project funds, plus interest that HOVENSA has paid as part of its Clean Air Act Consent Decree [which they are still responsible for].

As will be emphasized and expanded upon later in this paper, the island has seen many major changes since the HOVENSA closure. Some of the smaller affects involve the psychological impacts of a major industrial graveyard located on one of the main roads on island. It lowers morale. HOVENSA was also very generous to its island community. It stimulated an economy that would otherwise see less fortunate conditions. HOVENSA sponsored many lower to middle class students through private school. A year and a half after HOVENSA closed, and just weeks before school started again in the fall, two private schools announced they were “merging” due to loss of student registration. HOVENSA sponsored four high school graduates a year through the college of their choosing. They gave (and continue to give) large donations to the University of the Virgin Islands (UVI). HOVENSA developed and ran programs at UVI to train students to become technicians at HOVENSA. It also had training programs for recent high school graduates. HOVENSA was the largest sponsor of public activities on the island; there was no event that didn’t thank HOVENSA for its assistance; everything from softball clubs to women’s groups, animal shelters, 4th of July fireworks and other festivals and charities.

In many ways, the families of the HOVENSA workers in ways saw the harshest side of the closure. Within HOVENSA’s property is a residential area,
developed for HOVENSA workers. This encouraged a deep sense of community that built over the fifty plus years that HOVENSA was operating. The workers’ wives or husbands either worked at HOVENSA or at other places on island, often organizing volunteer groups. Their children grew up on the island, often going to the private schools HOVENSA sponsored, joining local sport teams, clubs and organizations. HOVENSA was an established part of Crucian culture and stimulated the economy in an enormously positive way. When HOVENSA closed, families became separated, high school students had to leave before their senior year, families had to leave a place they called home, and livelihoods were forced to adjust.

On January 30, 2012, a week after HOVENSA announced its closing, Governor John P. de Johngh, Jr stated:

The decision by HOVENSA to close the refinery that for a half-century has been a mainstay of our economy has shaken our community. It has shaken the lives of those who work there, and all of those and their families for whom HOVENSA was the source of their livelihood. It hascompounded the burden on our private sector which has already suffered greatly through this economic downturn. And it has shaken the foundations of the broader community for whom HOVENSA provided so much…Without reliable electricity and water there will be no new businesses. Without reliable electricity and water we will have no economic development, fewer jobs, and lower revenues, all contributing to a downward spiral.

Today HOVENSA remains un-sold. The rumors are that there are multiple companies interested. Most likely the refinery’s capacity would be downsized since new technology does not require its scale. Instead of employing over 2,000 people it would employee only 1000. A senator that was interviewed during this fieldwork explained that in order for St. Croix to repair its economy, certain
initiatives outside of the refinery should be explored. These include: promoting the Virgin Islands Next Generation Network that provides fast and reliable internet, to computer based companies in order to encourage them to establish themselves on island; a blues festival and a professional sized stadium to increase tourism; and eco-tourism. If the refinery does not re-open its commercial sized port can be used for transshipping—refueling and stocking ships that come from the Panama Canal, which would employ around 500 people.

Fortunately, there are already various factors in place that will help the island’s economy recover. First, WAPA has signed a one-year contract (with available extension terms) with Trafigura to supplement the fuel it receives from HOVENSA. The contract ends September, 2014. With Trafigura, WAPA is saving $5 per barrel compared to what HOVENSA was charging; 20% below the market index (Kossler, 2012). WAPA also recently signed a deal with Tibbar Energy, a biofuel company that produces energy with king-grass, a fast growing and non-invasive plant (Gardner, 2014). Solar farms are also being built around the island in partnership with WAPA. They intend on being independent of fossil fuel use by 60% by 2025.

Additionally, the government has established programs to incentivize businesses to base themselves on island. In addition to several opportunities for property tax credits, the U.S.V.I government and the Economic Development Authority (EDA) created the Economic Development Commission program that offers a spectrum of hefty tax breaks to local corporations (EDA, 2014). The closure of HOVENSA inspired new energy to establish economic momentum on
island. Hopefully, with these new economic stimulators, as well as a positive resolution to the future of the oil refinery, the island’s economy will recover. Until then, it is necessary to explore and evaluate the island communities’ foundational assets to uncover recourses that will-hopefully-enable it to be resilient in this difficult and uncertain time.
Chapter 4

Methods

This paper uses the Basic Classical ethnographic method. Ethnography is a holistic approach to the study of cultural systems, socio-cultural contexts, processes, and meanings. It is a process of discovery, making inferences, and continuing inquiries. It is open-ended, and not a rigid investigator controlled experiment (Whitehead, 2005). It’s key features include: exploring the nature of a particular phenomenon, instead of testing a hypothesis; working primarily with “unstructured data”; investigating a small number of cases (or maybe just one); the analysis includes explicit interpretations of the data and the meanings and functions of human actions; the primary product being in the form of descriptions and explanations (Reeves, et al. 2008). The Basic Classical method includes: “secondary data analysis, fieldwork, observing activities of interest, recording field notes and observations, participating in activities during observations (participant observation) and carrying out various forms of informal and semi-structured ethnographic interviewing” (Whitehead, 2005). This study utilizes all of these methods, including observation and informal, unstructured and semi-structured interviewing. Because the study is based on a very dynamic and interconnected web of interactions and consequences, ethnography is a useful method for this research. It allows for understanding the systemic interactions caused by the closure of HOVENSA. By interviewing a range of people this
research is able to better analyze how the island-wide community, and specifically by the fishermen were affected by the closure.

In order to understand the outcomes and consequences of the refinery’s closure, this study adapted the framework of Tuler et al.’s (2013) Rapid Impact and Vulnerability Assessment Approach (RIVA). This method is favored when financial and/or human resources are limited. This rapid assessment approach allows researchers to rapidly identify and evaluate the key issues affecting the community, highlighting the most important causal pathways, consequences and response actions. It provides a qualitative rather than quantitative understanding of the issue at hand. Assessments like these should be conducted on a consistent and regular basis for monitoring purposes, following the progression of the stressor and community.

The RIVA method was selected for this study because the conditions are constantly changing without having reached a definitive outcome. Will the refinery reopen? Will the economy recover and how? For this reason, the status of the Crucian fishermen’s response to HOVENSA’s closure should be continuously reevaluated.

The RIVA framework identifies a Stressor, Exposure, Outcomes, Consequences, Sensitivities, and Response Actions (or Adaptive Capacity). For a visual understanding of the progression of RIVA, see Figure 4.1. The Stressor is defined as an event or process that shocks the livelihoods of the fishermen. The Exposure is the presence of the Stressor, hazard or vulnerability, defined both spatially and temporarily. Communities, individuals, markets, ecosystems,
populations, economic sectors, belief systems and more can be exposed to a stressor. The Outcome(s) are additional processes or events that occur as a result of the Stressor. The Consequences are the significance of the Outcomes to the individual or community. Often one consequence catalyzes other consequences, i.e., a cascade of consequences, a term which is very important to an event of the proportionate size of HOVENSA’s closure. Sensitivities are similar to capital assets. For this study, they are defined as factors of the social environment that affect the magnitude and likelihood of the Outcomes and Consequences. Instead of using the term Sensitivities the term Capital Assets is used, which in this study includes: social, financial and human assets. Since in this study the Stressor has not affected physical nor natural assets, they will not be assessed. Response Actions are actions made by fishery management, politicians or other leaders that are intended to ameliorate the effects of the Stressor and affect fishermen’s access to their assets. Examples of Response Actions are policies, programs, regulations and institutions that assist the affected community. This study adds another attribute to the RIVA framework: Livelihood Strategies. As a result of the given Consequences, Livelihood Strategies are actions that fishermen take in order to mitigate their financial struggle. In addition, Possible Future Outcomes presents a final speculation of what may occur to the fishing community if status quo ensues.
In addition to describing the socio-economic impacts drawing on the RIVA framework, this study investigates whether the commercial fishing community has the necessary capital assets that will allow it to be resilient if the island-wide economic decline worsens or remains. It study the three capital assets: social, financial and human. All three assets are very interconnected but social and human are often confused for one another. In this study social capital is defined as assets that pertain to the community, whereas human capital is centered on the individual. The indicators that relate to social assets include: governance, social cohesion, social networks, leadership and governance, trust and respect. Financial assets include: occupational multiplicity, available capital, financial support and financial competition. Lastly, human assets include: knowledge, skills and education, population, age, health and interest. Anthropogenic examples or patterns of the indicators are presented in addition to a score that depicts the presence or absence of the indicators in relation to promoting a resilient
community. The scores will be presented in a table. Indicators are given a negative or positive score on a scaling system, depending on whether they promote or weaken resilience in their community. The scoring spectrum offers a qualitative range that goes from: (- -) (- -) (-) to (+) (++) (+++). For example, (--) concludes that the given indicator is the most hindering of a resilient community, whereas, (+++) signifies that the indicator is the most encouraging of a resilient community. Table 4.2 shows what parameters distinguish each score.
### Table 4.1 Resilience Scoring

<table>
<thead>
<tr>
<th>Effect</th>
<th>Distinguishing characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Hinders resilience; limitations, exceptions, interventions likely to reverse capital and enhance resilience</td>
</tr>
<tr>
<td>- -</td>
<td>Hinders resilience; limitations, exceptions, interventions less likely to reverse capital and enhance resilience</td>
</tr>
<tr>
<td>- - -</td>
<td>Hinders resilience; limitations, exceptions, interventions unlikely to reverse capital and enhance resilience</td>
</tr>
<tr>
<td>+</td>
<td>Promotes resilience; limitations, exceptions likely; sustainability unlikely</td>
</tr>
<tr>
<td>+ +</td>
<td>Promotes resilience; limitations, exceptions less likely; sustainability likely</td>
</tr>
<tr>
<td>+ + +</td>
<td>Promotes resilience; limitations, exceptions unlikely; sustainability very likely</td>
</tr>
</tbody>
</table>
Chapter 5

Results

The fieldwork was conducted on island from November 17 to December 24, 2013. In order to assess how HOVENSA’s closure affected the island, and more specifically, the commercial fishing community, informal, unstructured and semi-structured interviews were conducted. This research used secondary analysis by researching newspaper articles (new and old), magazines, pamphlets and flyers. Observational and participatory methods were also utilized, such as: spending many hours at fish markets, boat ramps and restaurants, as well as listening to the radio and going to various public cultural events. Semi-structured interviews were conducted for a variety of stakeholders. In the fishing community, the following stakeholders were interviewed: commercial and recreational fishermen, fishery managers, and restaurant owners—the fishermen’s largest customer base. Social representatives were also interviewed to better understand ways that the wider island community has seen changes and how institutional programs have acted in response. Table 1 details the number of interviewees by stakeholder type.
Table 5.1 Total interviewed for each stakeholder group

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Total: 36</th>
<th>Commercial and Registered: 25</th>
<th>Inactive or Recreational: 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishermen</td>
<td>Total: 20</td>
<td>“Ma and Pa”: 8</td>
<td>13: tourist and mid to high-end</td>
</tr>
<tr>
<td>Restaurants</td>
<td>Total: 13</td>
<td>3 DFW, 2 NOAA, 2 EEMP, 1 DEE, 1 DEP, 1 CFMC, 1 NPS, 1 TNC, 1 SEA</td>
<td></td>
</tr>
<tr>
<td>Environmental Managers</td>
<td>Social Representatives</td>
<td>Chamber of Commerce, Department of Human Services, Department of Labor, the News Daily Archives, St. Croix Source, St. Croix Abis, a senator, Public Utilities Commission, Water and Power Authority, Virgin Islands Port Authority, real estate agents, and various supermarkets</td>
<td></td>
</tr>
</tbody>
</table>

5.1 Rapid Impact And Vulnerability Assessment (RIVA)

To conduct the Rapid Impact Vulnerability Assessment described in the Methods chapter, the information gathered through ethnographic methods was input into the RIVA framework. To see the summarized assessment of the HOVENSIA closure on the commercial fishing community see Figure 5.1.
Figure 5.1 The RIVA flow-chart for HOVENSA’s closure
Stressor And Exposure

In this study the Stressor is the closure of HOVENSA oil refinery. As stated previously, many studies have shown how regulations and natural disasters have negatively affected fishing communities, thus labeled the stressor. This study will demonstrate how the closure of a major corporation, external to the fishery can impact a fishing community on a small island. The Stressor has impacted the entirety of the island, cascading down through most communities and individuals on island. The Exposure is the island as a whole, since the entirety of the island has seen changes due to the closure. Along with tourism and the government, the oil refinery was one of the largest economic engines on the island. Although rum is a large industry on the island, it does not compare to what HOVENSA was. The two local rum companies employ less than 100 people combined, whereas HOVENSA employed over 2,000 people. Until the 2nd Quarter of 2012 HOVENSA was the largest private employer in the U.S.V.I. After the closure it quickly regressed to the 10th largest private employer. The next quarter it sank to the 21st largest. Today they are no longer on the list of large employers in the territory (Department of Labor, 2013).

Before the refinery downsized in 2001, the U.S.V.I government received $160 million each year in taxes from HOVENSA. After downsizing that number was reduced to $69 million. An estimated $580 million shortfall in economic output has been directly associated with HOVENSA closing and $92 million in overall government tax revenues (Eader, 2013).
St. Croix is not the only island in the territory suffering. The US Virgin Islands as a whole can be compared to the economic vulnerability of Detroit and Puerto Rico. Per capita the U.S.V.I owes the federal government $29,965 ($3.44 billion total), whereas Puerto Rico owes $18,788 per capita ($18 billion total) and Detroit, $25,660 per capita ($70 billion total; Bernetia, 2014).

As a result of the closure, 1,200 HOVENSA employees and 950 subcontractors were laid off. Some HOVENSA workers were among the highest paid workers on the island. Around one hundred people still work for HOVENSA, running a storage facility. Due to the island’s vulnerability to hurricanes and the economy of the Continental US, the island was already struggling economically before the closure. HOVENSA’s closure was a tipping point, triggering a social and economic cascade of adverse impacts. As many have stated on island, “HOVENSA’s impact is that of a hurricane, without the hurricane”. Therefore HOVENSA was a major stressor on the island, and the entire community was exposed to its closure. The “exposed” community that this study will focus on primarily is the Crucian commercial fishing community.

**Outcomes**

There are many outcomes that the closure of HOVENSA caused. This paper will focus on the three most significant relevant to the fishing community. The major direct **Outcomes** of the HOVENSA closing are: 1) increase in unemployment 2) a rise in energy rates and 3) a major out-migration. In 2011, 19,832 Crucians were employed (U.S.V.I Bureau of Economic Research, 2014).
According to the Chamber of Commerce on St. Croix, 2,471 people were employed either directly by or as sub-contractors of HOVENSA; 12% of the total jobs in 2011. Since HOVENSA closed, unemployment has doubled. St. Croix’s unemployment rate reached a peak of 17.8% in January 2013 (U.S.V.I Bureau of Economic Research, 2013). Before the closure in January 2012 unemployment was 9.5%. After a large out-migration, unemployment is currently around 14%.

Figure 5.3 shows the change in unemployment since 2008. The unemployment rate does not include the people who left the work force (those that stopped looking for jobs), so the real impact is considerably greater than the unemployment numbers indicate, which is seen in the number of citizens employed. Although unemployment rate has declined since January 2013, employment has also decreased. As of the 2010 census the island’s population was 50,601 people. Average employment was 20,122 in 2012 but it decreased by 7.1% to 18,773 in 2013 and then again by 1.7% to 18,491 in 2014 (the average as of June, 2014). Twenty five percent of the population is below the poverty line and 28.7% are uninsured medically, while the cost of living is 17% higher than the national average (de Jongh, 2012).
Additionally, within the initial concession agreement the government established that HOVENSA would subsidize the U.S.V.I Water and Power Authority (WAPA). Since HOVENSA’s closure WAPA rates have increased by about eight cents, residually and commercially, to 51 cents and 55 cents per kilowatt, respectively (WAPA, 2014). This is the highest in the nation. Even the price per kilowatt in Hawaii is lower at 38 cents (U.S. Energy Information Administration, 2014). This high price is due to what WAPA calls the Levelized Energy Adjustment Clause (LEAC). It is a cost that is in addition to the base rate that accounts for fuel consumption and related costs (old and inefficient technology). The LEAC factor was authorized in 1989. WAPA rates had been increasing prior to HOVENSA’s closure and increased after they closed.
Additionally, HOVENSA was and is under contract to significantly lower their gasoline rack prices for the island that is supposed to be enforced by the Department of Licensing and Consumer Affairs. Unfortunately, for many years this has not been monitored. While this fieldwork was being conducted fuel prices were between $4.00-4.50 per gallon on St. Croix.

Between 8,000 and 10,000 people emigrated off the island since the closure. If 2,500 people lost their jobs, and each of them had a wife and two children, on average, the island roughly lost 10,000 people. Of course this is an exaggeration. Still, others left as well in anticipation of a worsening labor market. To some, the HOVENSA closure was a tipping point. Individuals and families were already frustrated with the struggling economy even before the closure, and/or had “rock fever” and were previously anxious to leave the island. The closure escalated the economic reason to leave and increased anxieties to the point where the attractive characteristics of living on the island were not out-weighing the negative ones, catalyzing a major out-migration. O’Neale’s Trucking and Trailer Transport after the closure saw four or five containers transporting vehicles or households goods per week, up from one per week before the closure (Eader, 2013). Many fishermen’s grown children were among those who left.

As a response of the out-migration, real estate suffered too. Prices declined between 20% and 60% after the closure. Directly after the closure in January there were 284 houses on the market. In June 2012, six months after the closure, there were 350. According to an interviewed real estate agent, this increase was a direct impact of the HOVENSA closure. The same company lost
18 rentals in the first four hours that HOVENSA announced it was closing (Eader, 2013). Many properties were eventually sold to vacationers at sharp discounts. The market has not returned to pre-recession levels, but has returned to pre-closure levels, thanks mostly to second-home buyers who took advantage of the low real estate costs.

According to a real estate agent that focuses on Crucian land sales, land purchases have also seen a drought. The reason for this is that construction is too expensive. Since HOVENSA closed the concrete industry has condensed into a monopoly that charges $200 per yard of concrete (up from $124). In the continental US concrete costs $80 per yard. From 2011 to 2012 when HOVENSA closed, construction jobs decreased by 38% and from 2012 and 2013 they decreased by 35.7% (U.S.V.I Bureau of Economic Research, 2014). Some large parcels of land have been bought in partnership with the Water and Power Authority to construct solar power farms.

**CONSEQUENCES**

There are two major stakeholder groups within the wider fishing community that have experienced major changes due to the stated Outcomes: the restaurants and the fishermen. The three major Outcomes affect the restaurants, which in turn further affect the fishermen. The Consequences of the Outcomes that some of the restaurants feel are: fewer customers, high energy bills and lower profits. The Consequences for the fishermen are: lower profits from fishing, more
time spent selling or trying to sell fish, and reduced income and security due to fewer occupational alternatives. See Table 5.2.

Table 5.2 Consequences

<table>
<thead>
<tr>
<th>Fishermen</th>
<th>Restaurants</th>
</tr>
</thead>
<tbody>
<tr>
<td>High electricity bills</td>
<td>Less demand</td>
</tr>
<tr>
<td>• Paying between $300-700 per month on their electricity bills.</td>
<td>• Fewer customers for both local and tourist restaurants.</td>
</tr>
<tr>
<td>• One fishermen who has a larger fish cleaning and storing operation spends $2000 per month</td>
<td>• Local restaurant owners seemed to be more worried.</td>
</tr>
<tr>
<td>High fuel prices</td>
<td>High energy prices</td>
</tr>
<tr>
<td>• Fishermen are spending between $80-110 on gas each trip (Crosset and Armentrou, 2014).</td>
<td>• “Ma and Pa” restaurants are spending $2000 per month on WAPA bills</td>
</tr>
<tr>
<td>Less demand, selling less fish</td>
<td>Loss of profit</td>
</tr>
<tr>
<td>• Every fisherman mentioned selling fish as being the hardest part of the fishery.</td>
<td>• Both tourist and local restaurants have lost 30-40% of their profit.</td>
</tr>
<tr>
<td>• “I have had this cooler of fish for three days.”</td>
<td>• Loss of profit due to loss of demand and high energy prices</td>
</tr>
<tr>
<td>• “Before HOVENSA closed at this time of day, my fish would already be gone. It would take me two hours and it would all be gone. These days sometimes I still have fish at the end of the day.”</td>
<td>• Not saving any money anymore, not losing money but on the verge.</td>
</tr>
<tr>
<td>• Some fishermen who mention that they give away more fish.</td>
<td>• “Tipping point” of an already struggling business.</td>
</tr>
<tr>
<td>• “Before it was slow, now it is slower”</td>
<td></td>
</tr>
<tr>
<td>Less profit</td>
<td></td>
</tr>
<tr>
<td>• 30-40% less profit</td>
<td></td>
</tr>
<tr>
<td>• HOVENSA workers were some of the fishermen's biggest clients, spending $40-50 on a whole fish.</td>
<td></td>
</tr>
<tr>
<td>• If people were spending $100 per week, now they are spending $20 per week.</td>
<td></td>
</tr>
<tr>
<td>• One fisherman said “I would sell up to 350 pounds of lobster on Fridays in the busy season, and this week I have sold 40 lbs and I don't have any more orders”</td>
<td></td>
</tr>
<tr>
<td>Fewer alternative jobs</td>
<td></td>
</tr>
<tr>
<td>• Largest contractor on island closed (HOVENSA). One individual was looking to work four more years to receive social security.</td>
<td></td>
</tr>
<tr>
<td>• Government has major deficit and cannot fund construction work as it used to.</td>
<td></td>
</tr>
<tr>
<td>• Three concrete businesses consolidated into one, and it became very expensive ($200 per cubic yard)</td>
<td></td>
</tr>
</tbody>
</table>
For restaurants, unemployment and out-migration have decreased demand and lowered their revenue. Both tourist and local restaurants say they have lost 30-40% of their profit since the closure (about 20% each year since 2012). The increase in energy rates has escalated their expenses. Restaurants are not able to withstand the decline in revenue paired with the increase in expense rates, like their electricity bills. Their astronomical WAPA bills can be as high as $2,000 per month, for the smaller businesses and $3,000 for the larger local restaurants. Most small restaurants do not have air conditioning and keep their lights off. Many locals complained that WAPA was not reading their meters, but instead making estimations. They thought this because their bills were inconsistent and did not reflect the usage of their appliances each month. One fisherman’s explained that when his mother left for the US for three months, turning off all of her appliances besides her refrigerator, she still had monthly WAPA bills for over $300. While the fieldwork was being conducted, a small grocery store that used to sell fish closed down. They had been using their own generators for three months. A produce store had to close because their WAPA bills were $18,000 per month.

Fishermen are also feeling the consequences of high energy rates. Fishermen who live very minimally, the majority without air conditioning or heated water, are paying between $300-700 per month. One prolific fisherman who uses his house to store and clean a lot of fish pays around $2000 each month.

Fishermen generally spend between $80 and $110 for gas each trip, sometimes over $500 per week (Crosson and Armentrout and pers. comm., 2014).
One fisherman explained he spends $300 on gas per trip, which for him equates to $900 a week. High fuel prices were one of fishermen’s major complaints.

Fishermen are seeing difficulty selling their catch. Before the closure 30% of fishermen sold their catch to restaurants (Kojis and Quinn, 2011). Losses experienced by restaurants, are also fishermen’s losses. Restaurant owners repeated how they feel fresh fish is more available today. They are constantly receiving calls from fishermen asking if would like to buy fish. Fishermen consistently stated how they have lost 30 to 40% of their income since HOVENSA closed down and how they now spend more time selling their catch. In the last fishery census in 2010 7.3% of fishermen thought selling fish was one of the most difficult problems in the fishery (Kojis and Quinn, 2011). During this fieldwork, most every interviewed fisherman stated that this was presently the most difficult problem in the fishery they face. One fisherman explained that customers who used to spend $100 on fish every week are now spending $20 each week. One fisherman mentioned he has been trying to sell his cooler of fish for three days. They remark that instead of having two or three coolers of fish, they now only have one cooler to sell. At the markets on Saturday they would say, “before HOVENSA closed, at this time of day, my fish would already be gone. It would take one to two hours, and it would all be gone. Today sometimes I still have fish at the end of the day”. As can be seen in Figure 5.3 HOVENSA was very close to La Reine fish market (HOVENSA is the main development in the image). This made the market very accessible for the refinery’s employees. Selling lobster and conch is especially difficult because they are the more
expensive products at $7 for conch and $8 for lobster, per pound. HOVENSA employees purchased these expensive products more than the rest of the locals, especially during the holidays. One fisherman who harvests lobster explained that before HOVENSA closed down he would sell at least 100 pounds of lobster a day. On Fridays, he would sell up to 350 pounds of lobster a day in the busy season. This week, he explained, he has only sold 40 pounds and doesn’t have any other orders for the week. Before HOVENSA closed, customers would fight over who would get their lobster. They say, “Before it was slow, now it is slower”.

Figure 5.3 The proximity between La Reine Fish market and HOVENSA. La Reine Fish Market was very close in proximity to HOVENSA (Source: Google Maps)
Additionally, due to the economic decline island-wide occupational alternatives are harder to come by. Many of the fishermen interviewed talked about how they did contract work for HOVENSA during some point of their life and felt they had the option of working there again if they needed to. For example, one fisherman needed a few more years of organized work before he could be eligible for social security. He planned on reaching that by working as a contractor for HOVENSA. Today contract work is very limited. HOVENSA, the island’s largest provider of contract work is closed. When the University of the Virgin Islands is working on a construction job, some fishermen will try to land a job, but these jobs are also few and far between. As stated previously construction jobs decreased by over 35% between 2012 and 2013 (U.S.V.I Bureau of Economic Research, 2014). Some perform welding or landscaping services for an income, but this is also scarce. Unfortunately, not only did HOVENSA’s closure limit the amount of contract work available, but also the out-migration that resulted after the closure, consolidated other industries, such as the concrete industry. Prior to the closure, there were three concrete companies on island Today, there is only one, which has created monopoly prices on concrete, further stifling job creation. Additionally because many people left the island and because the government lost a large portion of its revenue, funding for construction projects is limited.
Livelihood Strategies

In response to these Consequences, fishermen have adapted certain Livelihood Strategies in order to ameliorate their financial struggles, including exporting their landings, adapting on a family level, and adopting innovative business ideas. Restaurants are substituting imported fish for fresh fish, buying less fish, reducing costs and some are closing down. See Table 5.3.
### Table 5.3 Livelihood Strategies

<table>
<thead>
<tr>
<th>Fishermen</th>
<th>Restaurant Owners</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fishermen emigrating off-island</strong></td>
<td><strong>Substituting fresh fish for imported fish</strong></td>
</tr>
<tr>
<td>- “I gave my license to my son but he left island with his family.”</td>
<td>- Pollock from Quality Foods (QF) costs $3.93 per pound</td>
</tr>
<tr>
<td>- “I fished with my sons but they pursued a welding degree off island.”</td>
<td>- Shrimp from QF costs $14.59 for 2 lbs.</td>
</tr>
<tr>
<td><strong>More time spent selling fish</strong></td>
<td><strong>Buying less fish</strong></td>
</tr>
<tr>
<td>- Spending more of the day at the market.</td>
<td>- I used to buy 500 lbs per week, and now I buy 300 lbs per week (busy restaurant that serves both locals and tourists).</td>
</tr>
<tr>
<td>- Restaurants notice how available it is.</td>
<td>- If I bought forty lbs of fish every two days, now I am buying that much once a week.</td>
</tr>
<tr>
<td>- “I get calls all of the time! Fish is more available these days.”</td>
<td><strong>Reducing costs</strong></td>
</tr>
<tr>
<td>- Many fishermen credit their customers who can’t pay for fish at the time.</td>
<td>- Lights are often off</td>
</tr>
<tr>
<td>- Continuing to give “gratis”</td>
<td>- Being sure to cook only the necessary amount</td>
</tr>
<tr>
<td><strong>Less fishing effort</strong></td>
<td><strong>Changing menu items</strong></td>
</tr>
<tr>
<td>- Instead of three coolers, they have one.</td>
<td>- Reducing staff “I used to have a cook, but now I work alone”</td>
</tr>
<tr>
<td>- Instead of fishing 5-6 times per week, they fish 3-4 times per week.</td>
<td><strong>Reducing costs</strong></td>
</tr>
<tr>
<td><strong>Trying to diversify their income, but jobs are hard to find.</strong></td>
<td><strong>Closing down</strong></td>
</tr>
<tr>
<td>- Contract work at University of the Virgin Islands</td>
<td>- Both “ma and pa” and tourist restaurants are struggling. Lost 30-40% of income.</td>
</tr>
<tr>
<td>- 2 fishermen have started working for the East End Marine Park and NOAA</td>
<td>- At a “tipping point”. Some were already struggling and this has made it worse (sick of the work, tired and ready to retire, afraid of the crime in the area, or struggling financially already)</td>
</tr>
<tr>
<td><strong>Exporting lobster and conch to STT, PR, and BVIs</strong></td>
<td><strong>Exporting lobster and conch to STT, PR, and BVIs</strong></td>
</tr>
<tr>
<td>- STT has a major tourism industry and fishermen there do not dive.</td>
<td>- STT has a major tourism industry and fishermen there do not dive.</td>
</tr>
<tr>
<td>- One fishermen buys conch from other fishermen for $4/lb and sells it to Puerto Rico for $5 per pound, trying to export 3000 lbs every two weeks.</td>
<td>- One fishermen buys conch from other fishermen for $4/lb and sells it to Puerto Rico for $5 per pound, trying to export 3000 lbs every two weeks.</td>
</tr>
<tr>
<td>- Some do not harvest their lobster until they have enough to ship it (usually 200 lbs).</td>
<td><strong>Trying to reduce expenditures in the household</strong></td>
</tr>
<tr>
<td><strong>Trying to reduce expenditures in the household</strong></td>
<td>- Moving in with their family</td>
</tr>
<tr>
<td>- Splitting rent and other bills (WAPA)</td>
<td>- Splitting rent and other bills (WAPA)</td>
</tr>
<tr>
<td>- Moving into cheaper apartments</td>
<td>- Taking fewer vacations, shopping less</td>
</tr>
<tr>
<td>- Taking fewer vacations, shopping less</td>
<td>- Being conscious of their transportation routes (car and boat)</td>
</tr>
<tr>
<td>- Putting off or on hold unnecessary expenses, like home renovations, mid-stream.</td>
<td>- Putting off or on hold unnecessary expenses, like home renovations, mid-stream.</td>
</tr>
<tr>
<td>- Working hard to catch up for lost fishing hours (fishermen who sell to restaurants)</td>
<td>- Working hard to catch up for lost fishing hours (fishermen who sell to restaurants)</td>
</tr>
<tr>
<td><strong>Pursuing business ventures</strong></td>
<td>- Buying gas efficient engines with the money that earn from selling a boat they do not use often.</td>
</tr>
<tr>
<td>- Saving up for gas efficient engines</td>
<td>- Saving up for gas efficient engines</td>
</tr>
<tr>
<td>- Renting out a boat in exchange for half of the other fishermen’s revenue. This reduces his gas use and decreases the time he spends fishing.</td>
<td>- Renting out a boat in exchange for half of the other fishermen’s revenue. This reduces his gas use and decreases the time he spends fishing.</td>
</tr>
<tr>
<td>- Selling a plate of fried fish and Johnny Cakes in addition to fresh fish on the side of the road for $5 a plate.</td>
<td>- Selling a plate of fried fish and Johnny Cakes in addition to fresh fish on the side of the road for $5 a plate.</td>
</tr>
<tr>
<td>- Vacuum sealer machine to sell fish that lasts.</td>
<td>- Vacuum sealer machine to sell fish that lasts.</td>
</tr>
<tr>
<td>- Tempted by the drug trade</td>
<td>- Tempted by the drug trade</td>
</tr>
</tbody>
</table>
Some fishermen are emigrating off-island. One fishermen mentioned how he used to have a license but he transferred it to his son, who then left island with his family. Another fishermen mentioned that he used to be a very productive fisherman because he fished with his two sons. After the closure they left island to pursue a welding degree. Today his fishing is less productive because he cannot handle what it requires physically without his sons.

Fishermen are spending more time selling their fish. As mentioned, instead of selling for a few hours in the morning, they might have to be at the market all day. They have to make a greater effort to sell their fish. Additionally, due to the decline in demand, some fishermen often fish one or two days less than they used to. Instead of fishing five or six times a week, they fish three to four times a week. One fisherman explained that he must go out three times a week, even if it does not always make economic sense in order to maintain his customer relationships. Meaning, if one day he does not have a lot of orders, he will go out just to please that one customer, in order to maintain their patronage.

Fishermen are exporting lobster and conch off island, either to St. Thomas, Puerto Rico or the British Virgin Islands. St. Thomas has a large demand for these products because of its tourist industry and because fishermen from St. Thomas do not dive, reducing their reef, lobster and conch catch. Because there is lack of demand for lobster and conch on St. Croix, the fishermen have worked together to ship large quantities of product off island. For example, one Crucian fisherman buys conch from other fishermen on St. Croix and brings it with his own boat to Puerto Rico. Because fishermen are struggling to sell their conch for
$7 per pound on St. Croix, they settle with selling it for $4 per pound to get rid of it, and the middleman fisherman who transports it off island will sell it for $5 per pound making a dollar per pound gross profit, before expenses like gasoline. This fisherman tries to sell 3,000 pounds every two weeks. Lobster fishermen have business relationships with other fishermen on St. Thomas, where the tourism industry is much more present. Because they cannot sell lobster easily on island, they do not harvest all of their lobster until they have enough to ship away.

Some fishermen are moving in with family members to reduce their rent and household expenditures, including their WAPA bills. Other fishermen reduce their household spending by taking fewer vacations, shopping less, and being conscious of the routes they take in their cars and boats, in order to reduce their gas use. One fisherman mentioned he put on hold the renovations of his house, mid-stream. Another sold his largest boat and bought a gas efficient engine, and others were saving up to do so. One fishermen bitterly explained that he is thinking he might have to enter the drug trade even though he has been clean his whole life. Obviously, this is the least constructive example of adaptive behaviors, but it is a real example of what stressed people consider and do when they believe no other viable options exist for them.

Some fishermen have tried innovative business strategies. For example, one fisherman who owns four boats, which is very unusual for a Crucian fisherman, started renting out one of his boats to another fishermen for an equal share of his profits. The owner of the boat no longer has to pay for gas for that boat and makes money off of work he himself is not spending time doing.
Another group of fishermen who work together now sell fried fish and Johnny cakes on the side of the road in addition to fresh fish. They sell each plate for $5. They said they were making more money on the food plates than the fresh fish. This system is effective until the rainy season when they cannot light a fire and people do not want to eat outside. Some fishermen mention “crediting” fish to their close customers; if they cannot pay this week, they will pay next week. Another fisherman is experimenting with a vacuum sealer machine that would allow him to sell vacuum-sealed fish that his customers can freeze and store easily. Because these fishermen are struggling to sell their fish, they are coming up with ways to set themselves apart from other fishermen.

Still, fishermen have not changed their methods of fishing, where they fish, what they fish for, the gear they use or the prices they charge. They are comfortable with their fishing methods and don’t see much use in changing them, especially since doing so would be costly and risky and many of the fishermen are older and do not want to experiment.

Additionally, restaurants that used to sell fresh local fish are now importing frozen fish to cut costs. This is true for both upscale and inexpensive restaurants. Upscale restaurants sell shrimp, salmon, and shellfish that they import from the continental US. They can buy them in bulk at cheap prices. For example, frozen shrimp from Quality Foods is $14.59 for a two-pound bag. That two-pound bag goes a lot further than two pounds of mahi for $14. Mahi, wahoo and tuna are usually sold by the pound for seven dollars and restaurants usually buy the whole fish. One upscale restaurant owner said he tried to sell local wahoo but could not
earn a profit on it unless he sold it for $30 or more, which is generally too expensive for a Crucian customer. One larger restaurant frequented by both tourists and locals explained that they used to buy 500 pounds of fish per week and now buys 300 pounds per week. Another said their restaurant was buying every two days, now they are buying every five days. One owner explained, “If we bought forty pounds of fish every other day before, now we get forty pounds once a week”. Inexpensive restaurants are buying imported pollock or tilapia in order to cut costs. Frozen pollock from Quality Foods can be purchased for $3.93 per pound. These “Ma and Pa” restaurants cannot make profits from selling local fish. Their customers do not want to pay for it. One restaurant that does serve local fish trades with a friend for the food they serve. Even the supermarkets are importing more fish, rather than buying local fish. Fishermen are required to have a permit to sell to the local supermarkets. Only one fisherman interviewed sold to supermarkets. He sells his pot fish for $4/lb, which is one to two dollars less than at the market, but it is worthwhile because he is able to sell all of his leftover fish that he was not able to sell at the market.

They are trying to cut costs in various ways as well. The lights are off even when the restaurant is open. In addition to imported fish, they have tried to change their menu to make it more profitable. Some have cut down on wait staff. One Ma and Pa restaurant owner said she used to employ a cook, but decided to do it herself in order to not only cut costs but also be very careful with how much food she is cooking in order to avoid wasting food.
Many of the restaurants that are thinking of closing are also at a “tipping point”. A few of the interviewed restaurant owners are older and explained that they are tired of running their businesses. One restaurant that has served West Indian food for over 44 years is on its last legs. The owner had become sick before HOVENSA’s closure and decided to close after lunch instead of staying open for dinner as the restaurant used to do. After the closure they decided not to re-open for dinner, even though the owner is well again. One owner explained they are literally not making the second batch of food as they used to. The owner of this restaurant and the owners of similar “Ma and Pa” restaurants separately remarked that they would decide whether they would close in the next year. An owner of an upscale, tourist restaurant explained that he is tired of owning his restaurant, which he has owned for fourteen years. The economic decline caused by the closure has increased his interest in selling, which he intends to do this year. His business, he explained is still making a profit because a large portion of his customers are tourists, although business is still down by approximately 20% since the closure. In order to not loose money these restaurants are actively closing or are contemplating it.

**Capital Assets And Response Actions**

The capital assets and response actions of the RIVA framework are guiding factors in the community that affect how fishermen respond to the stressor. The capital assets will be discussed in detail in the proceeding section of this paper. Unfortunately, the response actions of the leaders of both the island
community and fishing community are limited. The Economic Development Authority, as stated previously, created incentives for new companies to establish themselves on island (tax breaks) and is promoting the newly available VI Next Generation Network that provides fast and reliable broadband internet to the island. In 2012 the Federal government granted $7.8 million to the territory as a National Emergency Grant in effort to train workers who lost their jobs due to HOVENSA closing and to assist them in acquiring new jobs, on or off the island (Department of Economic Research, 2013).

The Port Authority is negotiating with airlines to create direct flights from more cities and is encouraging more cruise ships arrivals on island. The Department of Human Resources expanded their Supplemental Nutrition Assistance Program to a larger group of benefactors, which will be detailed in the next section. WAPA partnered with clean energy businesses in pursuit to reduce their rates. Solar farms are being built throughout the island in order to reach a 60% reduction on fossil fuel dependence by 2025. WAPA has partnered with Toshiba International Corporation, Lanco Virign Islands and Sun Edison, which together their farms have the capacity to create 22 MW of solar energy. Additionally, by the end of the first quarter of 2015 they will have completed converting their machinery from oil run to propane to produce electricity (St. Croix Source, 2014). Lastly, the territorial government is trying vigorously to sell the refinery in hopes to re-open it, employing islanders and re-stimulating the economy.
Unfortunately, the degree of support from the leaders of the fishing community is sparser. One manager of the fishery has been taking initiatives to restore the culture of the fishing community. For example, Don’t Stop Talking Fish, a festival that took place in June 2014, celebrated the territory’s fishing culture. In addition, a special edition in a local magazine called Fuete y Verguilla, introduced the stories of several local fishermen. Besides for this person’s initiatives, fishery management is greatly lacking financial capacity in order to assist its community, which will be explained next.

5.2 Capital Assets

In addition to this cascading flow of interactions and affects, there are foundational capital assets that influence how the fishermen are impacted by the closure. This study focuses on: social, financial and human capital assets. Here each indicator is weighed as previously described, in order to assess their likelihood of stimulating a resilient fishing community.
Social Capital

Table 5.4 Social Assets

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>PATTERN</th>
<th>EFFECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Cohesion</td>
<td>Fragmentation, no centrality</td>
<td>- -</td>
</tr>
<tr>
<td></td>
<td>Some animosity between fishermen due to awareness of illegal practices</td>
<td>- -</td>
</tr>
<tr>
<td></td>
<td>Loyalty among friends and family</td>
<td>+ +</td>
</tr>
<tr>
<td>Social Networks</td>
<td>Little to no participation in fishing organizations</td>
<td>- -</td>
</tr>
<tr>
<td>Governance and</td>
<td>No commercial fishermen in FAC</td>
<td>- -</td>
</tr>
<tr>
<td>Leadership</td>
<td>No leaders that communicate between fishing groups</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Lacking funds and therefore capacity</td>
<td>- -</td>
</tr>
<tr>
<td></td>
<td>Lack of presence of DFW</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Federal fishery liaison is productive and present in the fishing</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>community</td>
<td></td>
</tr>
<tr>
<td>Trust and Respect</td>
<td>Lack of trust between fishermen and the DPNR</td>
<td>- -</td>
</tr>
<tr>
<td></td>
<td>Lack of trust of DPNR and territorial government</td>
<td>- -</td>
</tr>
<tr>
<td></td>
<td>Lack of thorough data and inability to enforce regulations creates lack</td>
<td>- -</td>
</tr>
<tr>
<td></td>
<td>of respect for DPNR staff and their regulations</td>
<td></td>
</tr>
</tbody>
</table>

Rankings indicate (+ + +, ++, +, -, - -, - - -): Patterns that are most beneficial to the individual fisherman and fishing community to the least beneficial. Blue lettering implies that the Pattern is interacting directly with fishery management, which may then affect fishermen.
The four major social indicators analyzed in this study are: social cohesion, social networks, governance and leadership, and trust (see Table 5.4). Most patterns in the Crucian fishing community demonstrate social attributes that are not encouraging of a resilient community. There is little social cohesion in the Crucian fishery. In the U.S.V.Is the fisheries are very fragmented, meaning there is not a lot of interaction and communication between groups of fishermen (Ortiz, 2013). There are many small groups of fishermen who work together but the communication between these groups is lacking. There is no sense of centrality, which means there is no major leader within the fishery. Seeing little to no interaction between fishermen at La Reine fish market every Saturday reinforced this. They fish with the same small group of people and sell with the same group of people with little discussion between groups. In addition, there is some noticeable animosity in the way they talk about each other and the mere fact that they don’t interact week after week. There is a slight hint of enmity between the west and east side of the island as well. Few fishermen who are from the east fish out west, because they are afraid of getting their belongings stolen, like their car tires or batteries, which happened to one interviewed fishermen. A boat and other gear were stolen from an older fisherman that was worth over $25,000. For this reason he is unable to fish. Although the records from the U.S.V.I Police Department do not show an increase in crime, police officers say that they have seen more, especially domestic assault. There is also a greater sense of competition and greed. If a fisherman’s engine breaks down, it is likely that another fisherman will immediately solicit his clients.
Conversely, small groups of fishermen that work together are loyal to one another. These groups are often family. For instance, if one of their boats capsizes, the rest will help find it and bring it to land. If the boat is unfixable, he will be welcomed to their boats to fish. Within these small groups there is a lot of laughter and story telling. These small social circles exhibit strong social cohesion. Unfortunately, not only does this not extend throughout the fishery, but some young fishermen who were children of these fishermen who worked together so well, left the island post-closure.

A possible significant cause of this lack of social cohesion is the lack of confidence in fishing organizations that reinforce social networks. In 2010, approximately 96% of commercial fishermen were not in any fishing organization (Kojis and Quinn, 2011). The only one that was used was the Fishing Advisory Council, which recommends regulation changes to the Commissioner of the DPNR. At the time of this study, there were no commercial fishermen in the FAC. The last commercial fisherman had stepped down from his placement in the FAC just before this research began, because he felt fishermen did not trust him because he was a member. They think the FAC is going to implement regulations that are going to compromise their livelihood. For that reason they were stealing his traps. He also believed the FAC was ineffective and unproductive. This lack of social organization and lack of trust for one another creates a socially unsupported and un-cohesive community.

Leadership in the fishing community is sparse. Recently there have been some initiatives organized by the local NOAA Southeast Regional Office and
NOAA’s Coral Reef Conservation Program among others, to energize and celebrate the local fishing community. For example, Don’t Stop Talking Fish, a festival that took place in June 2014, celebrated the territory’s fishing culture. In addition, a special edition in a local magazine called Fuete y Verguilla, introduced the stories of several local fishermen.

Unfortunately, the leadership that does remain in the fishery is outweighed by the conscious lack of it. The role of the fisherman who stepped down from the FAC was to be the spokesperson for the commercial fishermen. He was to give insight and inform the discussions on fishing regulations and initiatives from the commercial fishermen’s perspective, sharing their knowledge and opinions. For this reason the commercial fishery is lacking an individual who represents the fishermen in important discussions that affect the policies that direct their livelihood. This specific individual, during this research, is the one person who spoke to more than one group of fishermen and has been known for being a good leader within the fishery in the past. Even he feels pressure from the negativity that taints the community in regards to management and competition.

Leadership in fishery management is less effective than the DPNR staff wish it to be. The territorial government does not fund the Department of Fish and Wildlife (DFW) and Department of Environmental Enforcement (DEE). This speaks for how the U.S.V.I politicians value their commercial fishery (and their environment, for that matter). These departments do not have the funds needed to work at full capacity. The DEE in St. Thomas has no running boat. The DEE and DFW employees on St. Croix are given $20 gas coupons, instead of 30 gallons
gas coupons as they received in the past. This limits what they do and puts significant limitations on enforcement. Even when enforcement is told of an illegal incident, they do not have the personnel or funds to find and penalize the individual. During this research never once was there any talk of or evidence of a DEE officer at the boat ramps or on the water penalizing a fisherman.

Supposedly, their protocol for monitoring is to schedule a time and place to meet the fishermen—a strategy that is poorly conceived and even more poorly executed. There are stories of occasions that sea turtles have been caught (a Federal crime), and the perpetrators caught, which prosecutions were annulled due to politics and logistics on island. The rangers that work for the East End Marine Park that includes a no-take zone do not have the authority to write fines. This is because the DPRN does not have its own attorneys that are willing to work on such cases or to develop regulations for the pay the DPNR is able to provide. Again, it is not a priority of the territorial government. Some fishermen complained that there is no presence of the DPNR at La Reine fish market as there used to be and that the higher ups are less invested in the success and well-being of the fishermen. This lack of presence creates a community void of trust.

These patterns of lack of capacity and presence, both partially caused by lack of funding, cultivate a cynical fishing community that does not trust its leaders. Fishermen do not trust fishery management because they recognize they do not have the full data they need to make accurate conclusions and thus effective and necessary management. Not only are the fishermen wary of fishery management, but also of their territorial politicians whom they speak of scornfully
because they feel they are corrupt. There were rumors that they spent money meant for the territory on renovating their houses. The restaurant owners were also frustrated with the territory for doing major construction on a main street during the tourist season. The Senator interviewed stated that the HOVENSA amendment to the Concession Agreement was originally vetoed because various senators wanted to make trouble for the Governor. The police force is also believed to be corrupt. The fishermen whose boat was stolen knew who stole it and told the police, who did nothing because the group of people who stole it also threatens them. Without strong leadership in a community, the community will always be unstable rather than resilient in the face of adversity.
## Financial Capital

### Table 5.5 Financial Assets

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>PATTERN</th>
<th>EFFECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCCUPATIONAL ALTERNATIVES</td>
<td>High unemployment</td>
<td>- -</td>
</tr>
<tr>
<td></td>
<td>Occupational alternatives are limited</td>
<td>-</td>
</tr>
<tr>
<td>AVAILABLE CAPITAL</td>
<td>Territorial government does not support DFW</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Grants are inconsistent</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Wives sometimes do not work</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sometimes family aid is available, either from off island or locally</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Profit is inconsistent: expenses and revenue fluctuate week by week</td>
<td>-</td>
</tr>
<tr>
<td>FINANCIAL SUPPORT</td>
<td>SNAP</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Loans, credit, insurance programs are unavailable</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Financial Advice unavailable</td>
<td>-</td>
</tr>
<tr>
<td>FINANCIAL COMPETITION</td>
<td>Importing fish and other proteins is cheaper</td>
<td>- -</td>
</tr>
<tr>
<td></td>
<td>Locals will always want fresh fish</td>
<td>+</td>
</tr>
</tbody>
</table>

Rankings indicate (+ + +, ++, +, -, -, -, - - -): Patterns that are most beneficial to the individual fisherman and fishing community to the least beneficial. Blue lettering implies that the Pattern is interacting directly with fishery management, which may then affect fishermen.
The major financial indicators analyzed in this study are: occupational alternatives, available capital, financial support, and financial competition (See Table 5.5). Prior to HOVENSA’s closure the economic environment on island was unstable. Still, the refinery’s employees played a pivotal role in the economy, which supported the fishing community. As stated earlier, occupational alternatives became less available after HOVENSA’s closure due to economic decline, which consolidated the market, while HOVENSA’s closure directly caused fewer contract jobs to be available. Additionally, because fishermen do not have a robust educational background, their job opportunities and their salaries, are further limited.

Fishermen’s available capital is inconsistent. Profit fluctuates with the tourist season, changing fuel prices, and customer demand. Every week their profit will vary, depending on their fishing expenses (like fuel costs or equipment repair) and of course, the current demand for fish. Their WAPA bills further affect their economic situation. Some fishermen’s wives do not work and have lived most of their life taking care of their children. Luckily, sometimes families are able to assist, whether by remittances from the mainland US or in some other capacity. For example, when a fisherman leaves the island to visit his family, the family may pay for his airfare. Another fisherman has a family member who owns a mechanic shop and allows him to sell his fish outside of it, which is an open space in a busy and central location. One fisherman’s father worked for HOVENSA and did very well financially and is able to help when needed.
Some fishermen are very limited financially. One Gallows Bay fisherman, who fishes every Monday, Wednesday and Saturday mornings earns just enough to get by. He lives with his son who installs air conditioning for a living, in an apartment that as he explained is too expensive ($1,000 a month, which includes electricity), so they are looking for another apartment. He also has a boat stored on land that needs to be fixed. When he was asked why he doesn’t fix it, he replied, “my friends say they will help me but they never do.” It did not seem like a priority for a fisherman of his age and relatively small customer demand. Additionally, his consumption of alcohol most likely does not motivate him.

In addition to the fishermen themselves, fishery management is also limited in financial capital. Instead of being funded by the territory, they are funded by the federal government. The DFW is funded by grants that come from NMFS, CFMC and USFW. NMFS and the Coast Guard fund the DEE. Unfortunately the grants are unreliable and sometimes their applications are not submitted in a timely manner due to organizational and procedural issues. For this reason, there is a lack of funding within these two departments, and therefore, a lack of capacity. They should have 12 people working in the Department of Fish and Wildlife but instead they only have six. The DPNR Commissioner justified the smaller working group by explaining the extra money will be used for other projects, which were never initiated. Employees that have been working on an entry-level salary have not been promoted or given raises in years, even though they are doing work meant for multiple employees and have been given more responsibilities. Even the salary of the Director of Environmental Enforcement
did not change after he was promoted to Director. Additionally, the DPNR and higher territorial management do not trust its employees. They make them log in their hours in three different manners to ensure an accurate total. They work on an hourly wage instead of on salary and they do not earn overtime. DEE officers get paid $10,000 less than police officers, so there is less incentive to want to be a DEE officer and less respect in holding the position, decreasing professional morale and motivation.

There are no programs that assist fishermen in need of financial aid. If they need a new engine, they may work with their family to gather the money, but no such organization is in place to assist them. They do not have a leader or professional to advise them on financial matters. For example, most do not file taxes returns or pay taxes and therefore will not receive social security. If they did report their taxes, they would most likely get a refund in addition to social security. Additionally as a commercial fisherman you must have a commercial license as well as a business license from the Department of Licenses and Consumer Affairs (DPNR, 2012). If they have the business license they are able to receive tax-free benefits. Neither this license nor the associated tax benefits was mentioned during the interviews of this fieldwork. Island wide social programs are available such as the Supplemental Nutrition Assistance Program (SNAP). SNAP has seen increases in users since the closure. Since 2011, at least 2,500 more people are receiving SNAP, and 1,364 more households than before the closure. In 2013, 15,260 people received SNAP; this is more than 30% of the population of St. Croix. If 10,000 people have truly left the island it is closer to
40% of the island (SNAP, 2014). Unfortunately, the fishermen interviewed said receiving Food Stamps is political and you need to know someone to be awarded them. Others mentioned they earn too much for them to be qualified and even if they were qualified, the process of getting it is too intrusive and complicated that it would not be worth it. Again, an advisor or leader would be very helpful here. Some gas stations give a 5% discount to fishermen, but fishermen only use it if it is convenient because traveling to get a 5% discount can be onerous.

As stated previously, importing fish is more economical than fresh fish, which is reducing demand for fresh fish, especially in a local economy reeling from the HOVENS A closure. Crucians have to be much more careful with their money. Yet, fishermen are very stubborn about lowering their prices and have kept them at the same levels even though they are having a hard time selling. They do this to account for higher gas prices. Still, local cuisine is often centered on fresh fish. Salt fish, fish balls, and fried fish are common dishes that are made with local fish. The cultural focus on local fish buoys the market for Crucian fishermen.

Unfortunately, financially fishermen do not have many programs and financial resources to lean on. They are confined to the inconsistent profits they make fishing without the wisdom of financial advisors or the support of a program that can help in times of need. Instead, they rely mainly on themselves, and sometimes on their family and close friends. Basically, Crucian fishermen are on their own financially, with little if any outside support or advice. It is the very paradigm of subsistence fishermen, while their motive is to make a living.
## Human Capital

Table 5.6 Human Assets

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>PATTERN</th>
<th>EFFECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNOWLEDGE, SKILLS, EDUCATION</td>
<td>Well-honed fishing knowledge and skills</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Education level is low</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Training in alternative occupations is limited, many full-time fishermen</td>
<td>-</td>
</tr>
<tr>
<td>POPULATION</td>
<td>Island-wide out-migration</td>
<td>--</td>
</tr>
<tr>
<td>AGE</td>
<td>Older population; license moratorium</td>
<td>-</td>
</tr>
<tr>
<td>HEALTH</td>
<td>Generally well-fit</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Hospital is failing</td>
<td>- -</td>
</tr>
<tr>
<td></td>
<td>Some decompression sickness issues</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Some alcoholism and drugs</td>
<td>-</td>
</tr>
<tr>
<td>INTEREST</td>
<td>Younger helpers work less hard</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>More interest if moratorium is lifted</td>
<td>+/-</td>
</tr>
<tr>
<td></td>
<td>Morale is low: frustrated with lack of business, deters new interest</td>
<td>-</td>
</tr>
</tbody>
</table>

Rankings indicate (+ + +, ++, +, -, - -, - - -): Patterns that are most beneficial to the individual fisherman and fishing community to the least beneficial. Blue lettering implies that the Pattern is interacting directly with fishery management, which may then affect fishermen.
The major human indicators analyzed in this study are: knowledge, skills and education; population; age; health; and interest (See Table 5.6). Crucian fishermen have been fishing for most of their lives. Often times their fathers are or were also fishermen and they started assisting their fathers on and off the ocean as children. One fisherman was 11 years old when he got a fishing license; of course rules were a lot more flexible when he was young, thirty years ago. Much of the community started fishing during or after they graduated high school. Although limiting in some ways, these years of experience have aided their competence in the trade. They know their industry. They are skilled and knowledgeable of the behavior of their targeted species, the weather and ocean. They know their environment, the ecosystem and habitats that they work in. They have been living on the island for all of or for much of their lives and know its intricacies and its surrounding shoreline, benthic habitats and ocean patterns. Many are skilled hand liners, bringing in large pelagic fish with their bare hands.

Their degree of formal education is less comprehensive. Their training in other professions is also limited since about 75% are full-time fishermen. Many are well-tuned businessmen with acute and innovative minds, but lack the professional experience to develop their own businesses or be qualified for a well-paid position.

As stated previously, there has been a large out-migration on island, depleting the island’s consumer base. A large portion of those who emigrated were skilled, trained and/or highly educated. Many were either continentals or locals that were trained at HOVENS A and had to leave to maintain their lifestyle
once the refinery closed. Others came from the continental US to enjoy island living, but were scared off when the economy dipped further after the closure. Many of those who are left are those that are not well educated and have smaller salaries. This limits capacity for innovation and economic momentum on island. During the holidays those that worked at HOVENSA would pay $40-50 dollars for a whole pelagic fish. Today only small fish are bought whole.

Most fishermen are between 50-61 years old on St. Croix (Kojis and Quinn, 2011). First, their age does not promote an innovative, creative fishery. Older workers tend to like to stick to what they know. Additionally there are three fishermen in Gallows Bay each older than retirement age but continuing to work. Soon they will retire due to the lack of agility that age brings. When that happens, that historic and once culturally rich fishing community will probably become extinct. The license moratorium prevents a growing fishery and in time will create a shrinking fishery. License transfers have been allowed in the last year and half, but the process it requires is too formidable for some of the license holders. Other fishermen like to sit on their license in case they decide to fish again. They use it as a financial asset and safety net. In time, the DPNR will most likely open up the license market so that younger fisherman can join the fishery. Until then, the commercial fishery will slowly shrink.

Generally, fishermen are in good health because their job is physically demanding and requires a lot of physical exertion. Fishermen at the fish market are generally fit and slim. Some have issues with getting decompression sickness or “bends” while diving for conch and lobster, however (Kojis and Quinn, 2012).
There is some alcoholism and drug use. Fredricksted boat ramp is notorious for being a hang out for people that smoke marijuana, although today most of them are not fishing commercially.

The hospital on St. Croix is failing. The John F. Luis Hospital and Medical Center is funded and run by the territorial government. This year the Centers for Medicaid and Medicare revoked their certifications. Fortunately, the territorial government was granted an extension to create and activate improved standards. The hospital’s ineffectiveness is blamed on poor organization and management, as well as lack of funding, which was not improved when the refinery closed. Most fishermen either have health insurance through their wives or do not have health insurance and rely on the emergency room at the hospital. Without a fully functional and funded hospital, the fishermen’s health and safety is jeopardized.

Lastly there is a seemingly lack of interest in fishing in the young fishermen who are “helpers” to the commercial fishermen. They do not work as hard according to the commercial fishermen. Instead of being paid weekly they are paid hourly because they do not stay around to help fix equipment. Instead they are only available for a set period of time. This disinterest may be a result of the negativity of the commercial fishermen and their struggle to make a living or maybe because they are not optimistic that they will be given a commercial license. Since they see how hard it is for their elders to make a living, their motivation and spirits must be dampened. It also could be a consequence of the commercial fishermen’s judgment of their younger counterparts.
Fishermen have a robust level of competence in their trade. Unfortunately, the debilitating combination of the reduction in interest, the aging quality of the fishing community, the lack of market demand due to island-wide population loss (especially of the affluent sector) and some patterns of poor health and limited access to quality healthcare, does not strengthen the continuity of their community.
Chapter 6
Discussion

Through the RIVA framework this study demonstrates a series of outcomes and consequences that the closure of HOVEnSA has precipitated. The closure caused a significant increase in unemployment, increases in fuel prices, as well as a major migration off island. These three outcomes are having a larger impact on the island-wide community that has filtered down to the fishing community. In short, there are less people, less jobs and less money moving around the island. This has had an enormous impact on the restaurants around the island and on fishermen’s income. Due to high electricity prices as well as reduced revenue, restaurants are cutting costs, which include buying less fish or substituting cheaper imported fish for local fresh fish. Consequentially, fishermen are having trouble selling their fish due to this lack of demand and are making a smaller profit. As a response, some fishermen have adapted using several livelihood strategies that have enabled them to survive at least up until this fieldwork was conducted. Fishermen have to spend more time and effort selling their fish. Some are fishing less, giving away more fish, and unintentionally, wasting fish that they cannot sell. Other strategies involve trying to diversity their source of income in a struggling economy—a challenging effort. Others were exporting their catch to the surrounding islands, of which is highly unmonitored. Some are experimenting with other business ideas to help cut their costs or stand
out among the rest of the fishermen. Unfortunately, these initiatives are largely short term, unsustainable solutions. They are not widespread throughout the fishing community; they aid the individual instead of the community. Still, it is important to acknowledge that their methods of fishing, species targeted, fishing grounds, and prices they charge for their catch, have largely not changed. This is most likely due to fishermen’s level of comfort in their practices, more than a testament of their livelihood’s stability.

If the economic situation on St. Croix remains depressed, the future of the fishery will most likely become a consolidated fishing community. People will abandon their life’s work if it does not sustain them. Fishermen and their families will very slowly transition to other means of living and the younger generations will possibly leave the island. If the license moratorium persists, the people leaving the fishery due to age and health will not be replaced, which is a second cause of the likely diminution of the Crucian fishing community. The aging fishery may also make for a less experimental and open-minded fishery, limiting its success. The fishing community will then likely comprise of a small group of innovative fishermen who provide to the local markets and possibly export their products to St. Thomas, Puerto Rico and the British Virgin Islands. These changes, yet functional, distinguish the fishery from what it was before the refinery closed.

The three studied capital assets on island depict a foundation that does not support a fishing community that is resilient as recovery. The community as it is now will not be able to maintain its existing functioning. The combination of a
lack of social, financial and human capital including but not limited to: social cohesiveness, trust and leadership, erratic income streams, financial disincentives, and an aging population that does not replace itself due the license moratorium—creates a fishing community that will not likely support itself well when faced with a stressor for an extended period of time.

Fortunately, the community does not require a lot to sustain itself for the short term, which is why it has remained largely in tact for so long, through multiple major hurricanes and a global recession. Their knowledge of their trade is very strong. Fishermen are handy, improvising individuals and are able to make their equipment and investments last a long time. The constant demand for local fish, even in a diminished market, helps the fishery sustain itself on the short term and in limited capacity.

Still, the lack of trust and leadership between the territorial government, the fishery management and the fishermen will slowly suffocate the fishing community which is further diminished by the lack of financial capacity and a dwindling population in the fishing community caused dually by the license moratorium and fading interest. The fishing community is, however, resilient as transformational—adapting with its changed environment to a different yet functional community. This study argues that if the island economy remains weak or worsens, the commercial fishing community will transform into a smaller group of innovative fishermen. The few strong fishermen who make innovative and wise business decisions will remain. The hurting fishermen may continue to fish but may try to find other means of income for their families. They may decide
it is economical to try to sell their fishing license or stop spending money on gas for fish they struggle to sell. The remaining fishermen will most likely still use artisanal gear but will be able to aggregate and sell fish faster. Each fisherman may own more and perhaps larger boats. The fishermen with multiple boats may employ other fishermen to harvest fish, as selling larger quantities will be necessary to offset shipping and expenses related to preparing fish to export and marketing, if they pursue this route.

What will happen to the fishery is also very dependent on what comes of the license moratorium. If it remains in place, this will accentuate the shrinking of the fishery. If licenses are more commonly transferred, the island-wide fishing effort will most likely increase, because many of the older fishermen are fishing infrequently. Due to the economy, this will increase competition, much to the dismay of the current fishermen who will most likely show animosity to the incomers. The new fishermen will also most likely see less profit than they had wished, especially if gas prices increase. Transferring of licenses will be a slow procedure, in part because managers lack time to work on them, and as an indirect consequence, combating the dilution of fishermen’s profit. If the moratorium if lifted all together, which is unlikely, the market for fish will be further saturated and increasing fishermen’s financial struggle.

From an environmental perspective the shrinking of the community would be welcomed. Fewer businesses could be more easily monitored and scientific studies could be more thorough. Although the recreational subsistence fishery may become larger, which would have to be followed very closely by a permitting
or licensing system, especially if the past commercial fishermen who are technically advanced are fishing recreationally. From a cultural perspective, the island would lose a part of its cultural landscape and identity, if there were many fewer commercial fishermen on island. Instead of seeing boats on trucks heading to and from boat ramps and fishermen selling here and there on the side of the road, they might see larger boats less often and men selling solely at La Reine or to supermarkets. There would be less conversation about fishing and where and from whom to buy fish.

It is important to explain this will not happen quickly. This will be a slow transition as the older fishermen pass away and the children of fishermen move away and pursue other occupations. Without strong social and financial capital this transition is inevitable, especially in a global market where frozen fish is very cheap, and moving off island is more accessible. The lack of support and trust between fishermen and management, which stems from the falsified backing of the territory creates an unappealing industry to enter, even if the occupation is appealing at its core.

Because the community and the cultural value of the fishery are so vital to the island, shrinking and consolidating the commercial fishery would take away a major function that it serves: its cultural presence. This would be a significant loss for the island. For this reason, it could be argued that the commercial fishing community is neither resilient as recovery nor transformational. However, fishing will always be present on the island because the recreational fishery will remain strong, whether for sport, or subsistence. The presence of those fishermen as well
as the few active commercial fishermen, together, will hopefully sustain enough fishing culture to cultivate a fishing community that is resilient as transformational. For the reasons stated above, this paper argues that as the island economy and fishery are functioning and sculpted today, the commercial fishery does not posses the necessary capital assets that would successfully support a fishing community that is resilient as recovery, but will likely support a fishing community that is resilient as transformational. This is not an issue on whether there will be a commercial fishery on St. Croix in the future. It is the question of what it will look like.
Chapter 7

Conclusion and Recommendations

This study was done as a rapid assessment to analyze the major impact on the commercial fishing community resulting from the closure of HOVENSA on St. Croix. It must be disclosed that before this paper was completed Governor de Jongh announced the sale of the refinery by a group that is being developed solely to buy HOVENSA, called Atlantic Basin Refining. It is still in the very preliminary stages and the sale is in no manner final. If it does get bought by Atlantic Basin Refining, it would have to undergo a series of long-term inspections by engineers and investors and would most likely employee 700 people—many fewer than 2,500 as it did under its previous ownership. Assuming that there has been no final resolution to what will happen to HOVENSA, this research is meant to be the first in a series of assessments to be conducted as the island’s economic circumstances evolve. If the refinery does re-open it will be interesting to see how these issues compare as the island community transforms to its foreseeable new economic environment. In either occasion, it will be important to carefully monitor the changes impacting the island as a whole and how fishermen are adapting to those changes. Have fishermen started to change the species they target? Have they changed the gear they use? Have they started fishing in different locations? Has the proportion of part-time to full-time fishermen changed? Are more fishermen working other jobs on island? Have they adjusted their prices? Are there more organized programs available to assist fishermen? Are there more “helpers” in the fishery? Have the governments
funded the various managers and programs designed to assist the fishery and the fishermen? Are they spending more time selling their fish? Have the number and length of their trips per week changed? Has exporting increased? Have facilities for exporting fish been established? Have fishing cooperatives been organized to catch, process and market fish?

An assessment should be done at least every twelve months, using the updated information to make recommendations directed towards the Department of Fish and Wildlife and the Caribbean Fishery Management Council.

As for strengthening the fishery to make it more resilient, programs should be implemented in order to assist the fishermen when they are in need, promoting capacity building. Because the fishery is limited so greatly by the lack of organization and interest of its territorial leaders that is beyond fishery management’s control, it is important to work around the territory. Since the territorial government is lacking capacity and funding at its source, focusing on gaining their financial backing is most likely futile. This work recommends starting a non-governmental organization in order to forgo the complications that arise is accessing funding on the territorial level. It would have to be lead by an individual that the fishermen trust. This organization would be a resource for the fishermen that would provide professional and technical assistance, such as accounting, legal, banking and marketing. It would be a place to be guided on how to apply for loans. It could also provide them with information and recommendations that would encourage sustainable fishing practices, while improving their livelihoods. A community space could be leased and retrofitted as
a fishing center for meetings, education, selling and buying gear, counseling, and organizational activities. Instead of fishermen buying independently online, the organization could buy in bulk and access wholesale prices. And it could also be a space to sell fresh fish. If the fishermen are unsettled by a new or proposed regulation, or want to propose a new one, this could be a space to have fishery wide meetings. It would require a small building and one or two employees that receive their funding from grants from foundations that support local fisheries, like the Fisheries Innovation Fund, Erol Foundation or the Bloomberg or Rockefeller Foundations. Not only could this organization be a community center, encouraging social cohesion, but also it also could give the cultivated leaders of the fishing community that would inevitably form in an environment like this, political strength and financial support. The void of the key assets that the commercial fishery lacks—social cohesion, trust, leadership and financial support—could be filled.

This study investigates the socio-economic impacts of the closure of a large industry on fishing communities, an issue that has not been thoroughly researched in the areas of resiliency and vulnerability. This case study examines how a stressor caused by the closure of a major corporation, external to the fishery, adversely impacted the local commercial fishing community. It examined the extent to which the fishermen were able to adapt to the closure and its impacts, direct and indirect. Additionally, it could be read as an anecdotal piece on how one community on St. Croix has seen struggles and how they have had to adapt as a consequence of the closure of HOVENSA.
This study also illustrated the imperative capital assets necessary to sustain the Crucian fishing community under major stress, discussing the various assets and capacities that the community processes and displays, and others that it is lacking. By weighing the various assets and the dynamic patterns in the community, this study argues that the Crucian commercial fishing community does not represent a strongly resilient community. A natural consequence may well be a long-term transformation, into a smaller, more efficient fishery, with the unfortunate consequence of a dilution of its cultural importance. In the case that the economy improves, the fishermen will gain some financial security, enabling a stronger fishing community. In either case, it is imperative that trust, leadership and social cohesion are re-introduced into the Crucian commercial fishing community, in order to ensure its continuity as a vibrant and economically important part of the cultural value of St. Croix.
Chapter 8

Limitations

A limitation of this study is that it is subjective and on many accounts trusts the perceptions of those interviewed. By interviewing many individuals in each stakeholder group, it is hoped that any misgivings would be noticed. Still, it is possible that each interviewed individual was hearing hot topics in public and personal conversations that created a bias or misinterpreted explanation that they were too spreading. For example, did they read or hear that businesses were down 30-40% and that is why those numbers continuously arose?

As a result of the study being a rapid assessment, it became difficult to re-interview participants in order to ask further questions that might have come up later in the process and while still on island. Furthermore, following up by phone conversation was often unproductive as a result of poor cellular reception, busy fishermen and distinct accents that are muddled by the intrinsic quality of phone conversations.

Additionally, in this study there is no baseline for comparisons. This study was intentionally not quantitative in order to account for the dynamic nature of study that includes many different interactions and feedback from a variety of stakeholders and groups. This research intended to examine how the closure affected the entirety of the commercial fishing community. It did not intend to make statistical analyses when there are so many moving, interrelated components comprising the commercial fishing community, including the
psychological components of the people involved. Instead, this research intended to get a sense of how the fishing community will or will not persevere and to project its dynamic narrative, providing the managers and leaders the current perspective of the fishermen and the actual direct and indirect impacts caused by the closure of HOVENS A oil refinery.
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