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AN INVESTIGATION OF THE RESILIENCE CONCEPT IN DISASTER RISK MANAGEMENT – A CASE STUDY FROM THE BRITISH VIRGIN ISLANDS IN THE CONTEXT OF HURRICANE IRMA

The picture was taken in Carrot Bay, Tortola, British Virgin Islands, September 2018 (own source)

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USGCRP	U.S. Global Change Research Program
CERT	Community Emergency Response Team
UNDDR	United Nations for Disaster Risk Reduction
CCA	Climate Change Adaptation
DRM	Disaster Risk Management
PPD	Presidential Policy Directive
SES	Social-Ecological Systems
SIDS	Small Island Developing States
BVI	British Virgin Islands
CDEMA	Caribbean Disaster Emergency Management Agency
EMAP	Emergency Management Accreditation Program
BOTC	British Overseas Territories Citizen
UK	United Kingdom
ODA	Official Development Assistance
RDA	Recovery and Development Agency
UNICEF	United Nations International Children´s Emergency Fund
DDM	Department of Disaster Management
OECD	Organisation for Economic Co-operation and Development
BBC	British Broadcasting Corporation
NHC	National Hurricane Center
VISAR	Virgin Island Search and Rescue
ADRA	Adventist Development and Relief Agency
NGO	Non-Governmental Organization
PPT	File format used by Microsoft PowerPoint presentation
PDF	Portable Document Format
VHF	Very high frequency radio
NEOC	National Emergency Operation Center

Executive Summary

As a response to the current dramatically changing climate and devastating disaster impacts, the global community promotes an integrative approach that incorporates the fields of climate change adaptation, disaster risk management, and sustainable development. Within this realm, resilience has been increasingly called upon over the last decade, notably since the adoption of the Hyogo Framework for Action 2005 – 2015 as a global guideline on how to engage with disasters. Resilience is mainly understood as a set of capacities that allows a system to overcome the impacts of a disturbance. Hence, unlike many other concepts in the field that mainly focus on risks, hazards, and vulnerabilities, resilience emphasizes the abilities of communities to cope with disasters. As such, the concept is predominantly perceived as a positive approach and a desirable development pathway.

The recent discourse on resilience in disaster studies, however, is characterized through multiple, at times conflicting interpretations that stem from diverse disciplines, such as physics and engineering science, ecology, or psychology. Consequently, there are different understandings of the capacities of a resilient system. A resilient system can be stable and withstand disturbances. A resilient system can get damaged, but then quickly recover. A resilient system can also learn from and adapt to disturbances, or a resilient system can change fundamentally after a disturbance. As such, the concept has been criticized for being too vague and causing confusion. The challenges become particularly apparent for those who engage with the concept in practice.

In order to contribute to the growing attempts of scholars to operationalize resilience, this case-study from the British Virgin Islands aims to investigate the role that the concept played in the disaster risk management in the context of Hurricane Irma in September 2017. The study draws on the qualitative and quantitative data that the author collected during his field research in the country from August 2018 to December 2018, which is integrated into a mixed-methods design.

In the first instance, the study examines the most significant challenges, best practices, and solutions for improvement to present a holistic picture of the disaster risk management context. The findings show that the biggest challenges have been the rigid immigration and labor laws, the housing situation, violence in terms of looting and robbery, the collapse of basic infrastructure, and most notably, a lack of communication and information exchange. Best practices, among others, could be identified within public-private partnerships, the integration of traditional knowledge, external assistance, and the rapid adjustment of laws and policies. Identified areas and solutions for improvement include decentralized desalination plans, a better understanding and awareness of insurance processes, portable telecommunication systems, a return to simplicity, reshaped Community Emergency Response Teams (CERT) activities, as well as more profound and contextualized capacity building.

In a second step, disaster resilience is discussed based on the previously identified information of the overall context. The findings reveal that resilience plays a vital, however, not entirely positive role. The capacities that can be attributed to the resilience concept enabled certain components of the system not only to overcome the impacts of the hurricane but also to bounce forward to an improved status quo.

However, the disaster risk management process also revealed weaknesses that can be linked to inadequate application of resilience measures. The weaknesses can also be attributed to the increasing number of conceptualizations on how to respond to unknown and unprecedented risks, which causes confusion and often exceeds knowledge as well as capacities to engage with resilience more deeply. In the BVI, this problem becomes most apparent during the rebuilding process, where funded resilience initiatives rebuild the public and governmental infrastructure, and private households and businesses are not able to follow the pace and struggle to move forward. The promotion of the concept as a shiny future goal and desirable development path, hence, is problematic. If not applied carefully, undesirable properties of the system might as well be reinforced through resilience initiatives and eventually cause marginalization and exacerbated inequalities.

Ultimately the study presents a reshaped conceptualization of the Community Emergency Response Teams (CERT) that have been fostered by the government in recent years. The reshaped concept attempts to tackle precisely those challenges that have been identified as most relevant during and after Hurricane Irma in order to place resilience measures where they are most effective. Most notably, the conceptualization aims to improve the communication and information exchange while connecting communities with crucial stakeholders, not only in the response phase but also during mitigation, preparedness, and recovery times

1 Introduction

Natural hazards pose a considerable risk towards the lives and livelihoods of people in the Caribbean (USGCRP, 2018, p. 840) and hamper the development goals of the region. The International Panel on Climate Change (IPCC, 2014, 2018) described the Caribbean as one of the most vulnerable regions worldwide towards climate change and disaster impacts. The record-breaking 2017 Atlantic Hurricane Season, with the second strongest hurricane that ever made landfall in the Atlantic, and three other major hurricanes (Jose, Maria, and Harvey) in a period of only three weeks, has left many Caribbean nations in devastation. With increasing evidence that climate change impacts in the region will lead to more extreme weather events, disaster risk management (DRM) become becomes a crucial aspect of human security. In recent years best practices for disaster risk management have increasingly drawn on the inherent interconnections with the fields of climate change adaptation (CCA) and sustainable development. As such, an integrative approach to address multiple risks to human development is currently promoted by international and local stakeholders.

Over the last years, disaster research emphasized how affected communities, regions, or nations cope with the impacts of disasters while having limited resources and capacities. In this context, the resilience concept has gained increased attention. Commonly used to express the ability to return quickly to a previous and good point, resilience comes from the Latin word *resilio*, meaning "to jump back" (Klein et al., 2003, p. 3). Translated into the disaster context, resilience is attributed to diverse meanings and conceptualizations (see, e.g., Badahur et al., 2010; Manyena et al., 2019; Mochizuki et al., 2018) that can generally be summarized as a set of capacities that help a system to overcome disturbances.

The aim of this case study is to investigate the role that resilience plays in DRM in the British Virgin Islands (BVI) in the context of Hurricane Irma in September 2017. For this investigation, a mixed-methods approach will be used. The data material for this study has been collected during the field research in the British Virgin Islands from August 2018 to December 2018. Three research questions have been identified to capture the overall aim and to present a holistic picture of disaster resilience in the BVI. In order to facilitate readability, the research questions are formulated without the specific context. However, they will all be addressed within the context of Hurricane Irma in the BVI. Consequently, the research questions are the following:

1. Which have been the main challenges for disaster risk management?
2. What has been identified as best practices and solutions for improvement in disaster risk management?
3. Which role plays resilience in disaster risk management?

Research question one and two aim to set the contextual frame in which resilience operates. Both build the basis for the third research question. While questions one and two have a more descriptive design, the third question leaves space for discussion. Hence, research questions one and two will be answered in the findings chapter. The discussion chapter, eventually, will engage with the role of resilience in disaster risk management, exemplified through the challenges, best practices, and solutions for improvement.

To reach the overall aim, every chapter intends to reach individual objectives. The theory section of this study presents and examines contemporary discussions and findings from the disaster resilience literature. The theory section furthermore introduces the BVI and provides information on Hurricane Irma. In the methodology chapter, the research design will be elaborated. Furthermore, the section explains and justifies the data collection, the data presentation, and the data analysis. In the findings section, the results of the research questions number one and two will be presented. The discussion will compare the findings from the BVI with the literature, value, and criticize the resilience concept. In particular, the discussion engages with the question to what extent the country was able to move forward after the disaster. Moreover, the question of whether spontaneous or deliberate resilience capacities have been used in this context will be addressed. Furthermore, a reshaped conceptualization of the existing Community Emergency Response Teams (CERT) will be presented, which aims to increase disaster resilience in the BVI. The section ends with a few concluding thoughts, limitations of the study, recommendations for disaster risk management in the BVI, and future work on the topic. In the conclusion, the outcomes of those objectives will be summarized.

2 Literature Review

This section starts by addressing the term disaster, the history of disaster risk management, and the disaster management cycle to present the frame in which the thesis operates. The second part of this chapter focuses on disaster resilience. After elaborating on the origin of the resilience concept, the section continues by presenting conceptualizations and definitions. The section examines the achievements of the current debate and looks at topics that need further clarification or have not been addressed enough. In the last part of the chapter, the disaster risk context for the case study is presented. This is done through a regional perspective (Caribbean disaster risk), a local perspective (introduction to the British Virgin Islands), and a thematic perspective (information about Hurricane Irma).

2.1 Disaster Resilience

2.1.1 Introduction to Disaster Studies

Defining Disaster

In order to define disaster, it is important to look at the events that can potentially cause a disaster. In disaster literature, those events are called hazards. Hazards can broadly be divided into two types, depending on their origin: natural hazards and anthropogenic (also human-induced) hazards. The United Nations for Disaster Risk Reduction (UNDDR, 2017) acknowledges that also combinations exist, so-called socio-natural hazards such as environmental degradation and climate change. A hurricane is a natural hazard since it is "predominantly associated with a natural process and phenomena" (UNDRR, 2017) and can cause a disaster like it did in the BVI. While the hazard is natural, a disaster is not natural. This understanding has been emphasized by the social section of the academic community for decades (Wisner, 2004; Mascarenhas and Wisner, 2012; Chmutina and Von Meding, 2019).

Even though the term 'natural disaster' that is commonly utilized to describe a disaster that is caused by natural phenomena, per definition, disaster refers to social dimensions. The UNDRR (2017) provides a commonly accepted definition of disaster that supports this argumentation:

> "*A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.*

> *Annotations: The effect of the disaster can be immediate and localized, but is often widespread and could last for a long period of time. The effect may test or exceed the capacity of a community or society to cope using its own resources, and therefore may require assistance from external sources, which could include neighboring jurisdictions, or those at the national or international levels.*"

The definition highlights that hazardous events can turn into a disaster due to human activities rather than as an act of nature. Accordingly, Mascarenhas and Wisner (2004) argue that disasters are a matter of power and social justice issues. Chmutina and Von Meding (2019, p. 283-284) point at "(…) poor urban planning, increasing socioeconomic inequalities, nonexistent or poorly regulated policies, and lack of proactive adaptation and mitigation to avoid detection" that turn hazardous events into a disaster. Those structural deficits are commonly understood as vulnerabilities within disaster literature. Accordingly, what triggers a disaster is a hazard that meets a particularly vulnerable society or community.

However, the UNDRR (2017) definition reveals another crucial factor, that determines what becomes a disaster and what not. That is capacities. According to the attached annotation – but also commonly used in disaster practice as a catchy and memorable definition (among others within DDM and Team Rubicon) – a disaster occurs when the impacts of the hazard event exceed the capacities of a community (see, e.g., O`Brien et al., 2010, p. 505). It means that even though a natural hazard hits an exposed and vulnerable community, that community has the potential to overcome a disaster, minimize its impacts through its capacities. Capacity building, thus, is a crucial component of disaster resilience.

History of Disaster Risk Management

Defining disasters has led to various debates and studies about different phases of a disaster. Studies go back to the 1930s (Neal, 1997), where scholars and practitioners tried to build categories (type, magnitude, impact) to understand disasters better and to improve their response to disaster events. In the period from the 1930s – 1970s, the first theoretical foundations of disaster activities occurred. The approaches mainly focused on a post-disaster response (Coetzee and van Niekerk, 2012, p. 1). Wisner et al. (2004) state that the attitude to primarily focus on disaster response changed in the 1970s, where an increased number of disaster-related deaths and economic damage caught the attention of decision-makers and scholars. The urge to rethink the strategy of post-disaster response resulted in further conceptualization of disaster management activities and put risk reduction on the agendas, a strategy to minimize disaster loses before disasters strike. As such, the term disaster risk management (DRM) became prominent.

Pre-disaster planning and preparation seemed to be a necessary component to complement traditional disaster management thinking, as Lewis et al. (1976) indicate. Through increased research on the integration of theoretical and practical work, new mechanisms evolved. One of them was the Disaster Management Cycle. According to the Disaster Management Cycle, pre-disaster planning has the potential to reduce the efforts and resources that are being put into response operations and, thus, make disaster management more efficient. The understanding of disaster management as a circular process promotes interconnected pre-disaster and post-disaster activities and interprets them as mutually supportive. A collection of disaster management activities is presented by Kelman (2011). Pre-disaster activities comprise prevention, planning, mitigation, preparedness, and risk reduction. Post-disaster activities incorporate response, relief, reconstruction, and recovery. The Disaster Management Cycle has been interpreted and constructed by several scholars in various ways over the last 40 years. As a result, different conceptualizations evolved, with variations in the number of disaster phases (see, e.g., Baired et al., 1975; Alexander, 2002; Khan and Khan, 2008).

Partly, all these variations in the conceptualization result from the essence and the origin of disaster management as a multidisciplinary field, with various forms of access, views, and approaches. Consequently, a certain degree of confusion within the academic community has been ascertained. Several scholars have highlighted that applicability poses a challenge. Among others, Balamir (2005), Lewis (1999), van Niekerk (2007), Wisner et al. (2004) criticized the cycle model for being "culturally biased, unrealistic, or unhelpful for a long-term view," as Kelman (2011, p. 2) points out. The critique is that the cycle presents disasters as a not interchangeable component that must always occur. The overarching goal of disaster management, however, should be to reduce disaster risk and therefore move away from disasters as a focal point. In practice, this idea means that once a disaster happened in a particular place, the following hazards should have minimized impacts and should not lead to a second disaster (Kelman, 2011).

Despite the critique, the cycle provides a common framework for DRM operations. Moreover, the cycle underlines that DRM is not a separate entity or activity but should be thought of as incorporated into a broader picture of climate change adaptation (CCA) and sustainable development. Internationally promoted and practiced, an integrated approach of DRM, CCA, and sustainable development constitutes the current human response global development challenges, such as poverty reduction and climate change.

2.1.2 A Roadmap for Resilience in Disaster Studies

The Origin of the Resilience Concept

Historically, the resilience concept has been applied in several disciplines, with its origin still being contested (Alexander, 2013; Aldunce et al., 2014; Badahur et al., 2010; Manyena, 2006; Moser, 2008).

Some authors argue that the concept has emerged in ancient history in mathematics and physics (Bodin and Wiman, 2004), others argue that it has its origin in psychology and psychiatry (Waller, 2001), and again other see the roots of the concept in ecology research (Folke, 2006; Moser, 2008). In mathematics and physics, resilience describes the ability of a material to resist or bend without breaking and the speed at which it returns to equilibrium after a disruption (Bodin and Wiman, 2004; Norris et al., 2008).

In psychology and psychiatry, the use of the concept can be traced back to the work of Norman Garmezy, Emmy Werner and Ruth Smith in the 1940s (Waller, 2001; Johnson and Wielchelt, 2004), who conducted studies of children at risk of psychopathological disorders due to traumatic stressors, such as inter-parental conflicts, divorce, parental mental illness, and poverty. In those studies, terms like 'resilience,' 'stress-resistance,' and 'invulnerability' emerged (Manyena, 2006, p. 434). Originated from those studies, the concept started to spread across the social sciences, and research extended from individuals to communities and societies (Norris et al., 2008).

Within ecology, resilience gained attention in the 1960s and 1970s, notably through Holling's (1973) contribution *Resilience and Stability of Ecological Systems*. In his seminal work, Holling defines resilience as a property of a system and the ability of a system "to absorb changes of state variables, driving variables and parameters and still persist" (p. 17). He furthermore argues that resilience and stability are "two distinct properties" (p. 17) and that ecological systems can be very resilient, but at the same time, very unstable. Moreover, the paper paved the way for the conceptualization of coupled social-ecological systems (SES), as Gunderson and Folke (2005) highlight. Within SES, the mutually influencing linkages between ecosystems and human societies are acknowledged, and system thinking is promoted (Fazey, 2007). As such, Adger et al. (2005, p. 1036) describe resilience as "the capacity of linked social-ecological systems to absorb recurrent disturbances such as hurricanes or floods so as to retain essential structures, processes, and feedbacks." The diverse history of the concept shapes the current understanding of resilience in disaster research.

Resilience and its Role in Disaster Research

Over the last decades, the resilience concept gained widespread attention in the disaster literature. Even though resilience thinking was not embraced in the field until the end of the twentieth century, the relevance of the concept is constantly increasing since then. The growing attention is documented by the steady increase of published journal articles on resilience in the fields of emergency and disaster management, as, for example, examined for local governments in the United States (Demiroz and Haase, 2019), the local level (Change et al., 2018), and the international level (Windsor et al., 2019). The rapid multiplication of articles can partly be attributed to the terrorist attacks of the 11th of September 2001 and following adaptations in policies and national laws, both within the United States

and on a global level. For example, the Presidential Policy Directive/PPD-8 or the National Preparedness Plan and National Security Strategy of the United States´ Department of Homeland Security (Demiroz and Haase, 2019).

A second event that fostered resilience thinking was the Indian Ocean tsunami in 2004. In the following years, resilience gained further attention through its dominant role within the Hyogo Framework for Action 2005 – 2015 and its follow-up model, the Sendai Framework for Disaster Risk Reduction 2015 – 2030. Nowadays, the concept appears frequently in journal articles, policy guidelines, and strategic plans related to disaster risk and disaster management. To Seville (2008, abstract), resilience appears even up to the point where "everywhere you turn, the word resilience just keeps cropping up (…) it seems that resilience is being presented far and wide as a shining goal for the future". Despite the potential that resilience seems to open up, the concept is accused of being vague, and both scholars and practitioners do not weary of pointing at the broad and sometimes blurry definitions. The following critiques highlight this issue:

> "*As references to resilience have continued to increase, so too have criticism that the concept may be inappropriate, imprecise, or 'glittery.*"' (Norris et al., 2008, p. 127-128)

> "*Today, the use of the term 'resilience' has become polysemous and fashionable, with the potential that its true meaning may be lost.*" (Manyena, 2014, p. 2)

Currently, a variety of disaster resilience interpretations and conceptualizations exist. For example, Badahur et al. (2010) provide 16 conceptualizations, Brand and Jax (2007) present ten resilience concepts and Twigg (2007) outlines 167 characteristics of resilient communities, as Manyena (2014) highlights. More recent composite of disaster resilience conceptualizations, measurement frameworks, and definitions can be found in Manyena et al. (2019) and Mochizuki et al. (2018).

How resilience is approached depends on various aspects. Among others, on the area of disaster management (e.g., development politics, ecosystem restoration, physical infrastructure) and on the different administrative levels that can range from individuals to global systems. As examples serve the global focus on food security, national governments that focus on critical infrastructures, such as water and energy, and local initiatives that focus on climate change adaptation (Weichselgartner and Kelman, 2015, p. 251). Resilience is a crucial component in all those programs, yet with different characteristics and meanings. Even though those examples only show a small piece of the broad field of resilience applications and research, they represent the perspectives of different resilience pathways that will be explained in a bit.

A significant amount of current research efforts, thus, emphasizes concept development and clarification. While much is yet to be discussed, the debate moved forward in recent years and there tend to be a consensus about some of the central issues (Cutter, 2016; Demiroz and Haase, 2019; Mochizuki et al., 2018, Matyas and Pelling, 2014; Manyena, 2014), that will be elaborated in the following section.

Resilience Pathways

One part of the academic community has yielded an understanding of resilience as a static outcome. Mainly scholars from engineering and infrastructure science belong to that group of researchers. They understand resilience as the capacity to resist (Demiroz and Haase, 2019). Also, some ecologists and social scientists can be attributed to this group of research. They understand resilience as the capacity to absorb (e.g., Holling, 1973). Moreover, parts of the psychological research promote this resilience understanding and refer to it as the ability to cope (Demiroz and Haase, 2019; Matyas and Pelling, 2014). Resilience in the static interpretation is understood as a preferably quick return to a status-quo. This research sphere contributed concepts such as 'resistance' and 'robustness' to the resilience debate, as Maytas and Pelling (2014, p. 2) note.

Resilience within this notion is often measured through the '4R´s', as they are commonly known in disaster literature: 'robustness', the physical strength of components, 'redundancy', the substitutability of components, 'resourcefulness', the ability to mobilize resources, and 'rapidity', the ability to quickly return to the pre-disturbance condition (Bruneau and Reinhorn, 2006; Renschler et al., 2010; Liao, 2012; Mochizuki et al., 2018). Static interpretations nowadays tend to be perceived as the early definitions of resilience. In recent years resilience views shifted towards more dynamic and process-oriented ways of thinking (Matyas and Pelling, 2014). While a static interpretation of resilience may not adequately comprise the dynamics and interconnectedness of a system, it should be acknowledged that static interpretations are not outdated. Instead, they refer to individual spheres or niches of disaster risk management.

The social-ecological resilience thinking goes beyond the idea of simply returning to the pre-disturbance condition and strives for change, preferably an improvement of the pre-disturbance conditions. This notion interprets resilience as the capacity to learn, reorganize, adapt, or even transform (refers to the systematic and structural change of a community or society) after a disturbance and thus to bounce forward (Manyena et al., 2011). Matyas and Pelling (2014, p. 4) even argue that after "having learned from experience, it will never actually be possible to bounce back to the same position." The authors refer to both social and political dimensions and point out that the new condition does not necessarily have to be an improved one. However, social learning, whether it is for individuals, groups of people, or political institutions, is an inevitable process and an important resilience component.

Resilience thinking within this line brought up concepts such as 'adaptive capacity' and 'transformability' (see, e.g., Pelling, 2010; Chapin et al., 2010; Folke et al., 2010). Carpenter and Brock (2008, abstract) define adaptive capacity as "the ability of a living system, such as a social-ecological system, to adjust responses to changing internal demands and external drivers." Transformability is the "ability of a system to modify fundamentally," as Mochizuki et al. (2018, p. 365) argue. Chapin et al. (2010, p. 241) add that this fundamental change results in "different controls

over system properties, new ways of making a living and often changes in scales of crucial feedbacks." As such, the socio-ecological thinking of resilience explores to what extent disasters serve as windows of opportunities and as a catalyst for change.

Both the static outcome-oriented and dynamic process-oriented resilience interpretations have their place in disaster research and practice. They both contribute to the resilience level of a system. Nevertheless, only focusing on static and outcome-oriented resilience reinforces a reactive (rather than proactive) response to disasters as Matyas and Pelling (2014, p. 4) claim. McEntire et al. (2002) argue that this perspective additionally strengthens the use of traditional disaster management practices, such as an emphasis on response rather than disaster risk reduction. A solely focus on dynamic, process-oriented resilience, however, could lead to "unhelpfully abstracted" policies and development goals (Matyas and Pelling, 2014, p. 4). Moreover, a constantly redefining and reshaping of a community could probably undermine the value of long-term planning, for example, political posts or significant development projects. It is therefore argued that the most effective way to reduce disaster risk, needs to acknowledge both variants and their opportunities.

The attributes that can be identified from static outcome-oriented and dynamic process-oriented resilience definitions have let to further conceptualizations. Matyas and Pelling (2014) differentiate between resistance, incremental adjustment, and transformation. However, there are other terms that describe the same distinction, such as transformability instead of transformation (Mochizuki et al., 2018), or adaptation and adaptability instead of incremental adjustment (Walker et al., 2004, Folke et al., 2010, Pelling, 2010, Pelling et al., 2015). Manyena et al. (2019, p. 7) even identify five "indicative resilience capacities," which are preventive, anticipative, absorptive, adaptive, and transformative. However, a closer look at the different resilience phases the authors elaborate on (p. 3-7), reveals that all of the capacities they identify can be attributed to the threefold division that other authors present.

While resistance is attributed to the static resilience understanding, the process-oriented notion is divided into a gradual or incremental (incremental adjustment) and radical (transformation) pathway. While it is debatable if resistance, adaptation, or transformation are separate and independent concepts in the field of disaster risk management, resilience is inherently linked to all of them due to its definition as a capacity, whether it is the capacity to adsorb (resist), adapt, or transform. The following table elaborates on resistance, incremental adjustment, and transformation in three case scenarios and highlights the advantages and disadvantages of each path.

	Resistance	Incremental Adjustment	Transformation
Case 1: Earthquake risk communication in an urban context	Hazard mitigation through reinforcement of structures to protect the existing communication infrastructure	Diversification of early warning communication systems to reach a broader network of actors	A paradigm shift in the control of early-warning systems consisting of political devolution/ decentralisation and a radical shift in ownership of information
Case 2: Facing the threat of community inundation in a coastal floodplain	Hazard mitigation by rein-forcing the existing seawall	Diversification of risk management through risk transfer	A critical reappraisal of the local economy, the possibility of closing (or radically altering) the factory, and community employment structure so as to preserve and regrow the mangrove (potentially as a new source of income)
Case 3: Confronting rainfall shocks in an agrarian household	Strengthening coping capacity by drawing on savings	Building flexibility into the household economy through risk transfer	Reorganising assets and lifestyle by migrating to an urban area
Advantage	Allows for 'business as usual': established stakeholders and institutional regimes are already in place and are supported by capital throughput. Investments are externally visible examples of risk management with built in political advantage	Enables reorganisation without causing major systemic disruption Allows for system flexibility and diversity, supports redundancy, and incrementally can open scope for experiments in decision-making enhancing broader governance objectives	Opens new areas of policy response by going beyond existing systemic forms. Allows deep-rooted causes of risk and vulnerability to be addressed
Disadvantage	In isolation this 'all-or-nothing' strategy can narrow down management options, often to an engineering paradigm, excluding social and economic tools for risk management and so generating	Committed to functional persistence, it does not allow for challenges to the underlying values that give rise to systemic vulnerability.	Can cause significant secondary costs as systems reach new equilibria—costs that may not all be expected If repeated perpetually, can undermine the stability and viability of an economy, environment or society

Table 1: The concepts of resistance, incremental adjustment, and transformation (Matyas and Pelling 2014, p. 10-11)

Following the threefold division, one could argue that resistance is the "non-erosive" capacity of a system, a capacity to cope with shocks in a way that does not increase direct damage. Incremental adjustment can be described as the "non-maladaptive" capacity; that is a medium and long-term anticipatory adjustment that addresses risk drivers of a resilient system. Transformation can be described as a "non-adverse" capacity to change a system fundamentally. (Mochizuki et al., 2018).

Excursus: Resilience, Vulnerability, and Capacity

Resilience and Vulnerability

A central question that scholars have been discussing for many years is the relationship between resilience and vulnerability. The current literature acknowledges overlaps between the two concepts but understands them as two separate ones. As Cutter (2016) argues, communities and social groups can be highly vulnerable, but that does not mean that they lack resilience. She presents the example of the Vietnamese community in New Orleans after Hurricane Katrina. The Vietnamese community was a socially vulnerable group (immigrants, non-English speaking, low income). However, they were very resilient, based on strong social networks that facilitated the quick recovery process (Leong et al., 2007).

Another example is old age. Old age might affect people's ability to evacuate quickly in disasters and, thus, make them vulnerable. However, old age can also be a source of experience, learning processes, and reflexibility and thus facilitate resilience (Matyas and Pelling, 2014). The examples highlight that certain characteristics or attributes of a system can contribute to vulnerability while at the same time being a source of capacity to withstand, cope, or adapt.

Resilience and Capacity

According to Gaillard et al. (2018, p. 863), capacities refer to "the set of diverse knowledge, skills, and resources people can claim, access and resort to in dealing with hazards and disasters." They furthermore state, capacities are both individual and collective resources and can significantly contribute to reduced disaster risk before, while, and after the impact. Resilience is often understood as a capacity, adaptive capacity, or a set of capacities like most of the previously presented resilience definitions document. In fact, 67 (81%) of the 83 resilience definitions that have been identified by Manyena et al. (2019, p. 2) associate resilience with capacities or abilities.

As such, the authors believe resilience is about capacity, as they say. Indeed, there are commonalities: both resilience and capacity emphasize the development and use of community resources, as well as collective action and active community participation, as Magis (2010) highlights. Manyena et al. (2019) add that capacity within DRM refers to endogenous resources (as opposed to exogenous resources) or assets that people possess or access. The main difference between the two concepts, according to Magis (2010), is that resilience refers to a changing condition and exists because of that change, whereas capacities could potentially be built for almost anything. While resilience seeks to strengthen capacities, it goes beyond the "specific resources, plans, and actions that are normally understood as capacities," as Twigg (2015, p. 17) argues.

This study acknowledges that resilience can be enhanced, fostered, strengthened though capacities – often through several interacting capacities. However, resilience is a relative concept, and

no upper limit of resilience exists. That means even the most useful and strongest capacities can only contribute to resilience but not be resilience. In turn, this means that resilience is about capacity, as supported by Manyena et al. (2019), but resilience cannot be a capacity or a set of capacities.

For further notice and clarification, two points should be acknowledged:

Throughout the literature review, it has been striking that several authors use capacity and ability interchangeably (e.g., Manyena et al., 2019) – whether the issue is overlooked purposely or unintended – and do not attempt to point at the differences between the two terms. Although disaster literature generally tends to be very specific and detail-oriented in its wording, common definitions distinguish between the meanings of the two terms. However, the differences become blurry within the field of disaster, where the concepts are applied to humans, ecosystems, and materials at the same time within different systems. Consequently, this study will not draw a clear line between the two terms. Throughout the study, capacity will be used as the prioritized term, and ability will only be used when the context is unambiguous.

(End of Excursus)

On the way to examine what disaster resilience is and what role it plays in disaster risk management, it seems to be useful to summarize a few key aspects that have been identified so far: Resilience has become a trendy concept within DRM over the last decades. The concept´s origin lies within different disciplines that all contribute to the current understanding. Consequently, resilience definitions in disaster studies are diverse, and the concept is applied in many different sectors and contexts. As such, resilience has been criticized for being too vague. The critic has led to increased work on concept development and clarification among scholars that moved forward the debate. Current research finds common ground, notably through the understand that resilience is about capacities, resilience and vulnerability are two distinct concepts and not the opposite of each other, resilience includes both static outcome-oriented thinking (resistance) and dynamic process-oriented thinking with the latter being divided into incremental adjustment (also adaptation) and transformation. (Matyas and Pelling, 2014; Mochizuki et al., 2018).

Besides the progress that the resilience debate made in recent years, there is still much space for discussion. While most discussions circle around the questions of how to frame, assess, and measure resilience, one of the things that became evident throughout the literature review was the challenge of measuring resilience. That is in part due to its nature as a relative concept. The wide-spread application and system approach of resilience furthermore adds to this challenge. In resilient systems, there is a variety of aspects that could potentially be measured, which goes from temporal and spatial aspects (Weichselgartner and Kelman, 2015), over administrative scales and different sectors, up to the interplay of variables and subsystems, that are frequently pervaded by feedback

mechanisms, especially within socio-ecological systems.

Cutter (2016), in this context, highlights that most measurement attempts focus on assessing assets or characteristics of a system. That may include community trust, social capital, governance, infrastructure, livelihoods. However, there is a lack of literature that integrates singular assets or characteristics into a broader perspective that encompass multi-sectoral measurement approaches or system measurement approaches. As a result, the questions of resilience to what (that could be the type of hazard, the intensity, the frequency) and resilience for whom (e.g., particularly vulnerable individuals or households, economic sectors, political agendas, or the whole system) remain untouched, as she points out.

The debate can be traced back to the influential paper of Carpenter et al. (2001). Even though the question they asked was around 20 years ago – *Resilience of what to what?* – It is still very relevant in current literature as the work from Cutter (2016), but also Gaillard and Jigyasu (2016), and Herrera (2017) demonstrate. The question becomes particularly relevant when resilience-building initiatives favor one component of a system while at the same time cause negative implications for another, potentially reducing the resilience of it, or even of the whole system, or a neighboring system (Miller et al., 2010). Especially for practitioners, it is therefore vital to be aware of the interactions between specific and general resilience building. Matyas and Pelling (2014) argue that more research needs to be done on the trade-off effects between different resilience systems and between resilience and other development objectives, such as vulnerability reduction or robustness, and thus add to Cutter´s (2016) claim of measurement frameworks that comprise complex systems.

Another unresolved issue that is raised by Matyas and Pelling (2014) is the question if resilience is a spontaneous or deliberate process/outcome or if it even can be both? Some interpretations (see, e.g., Holling, 1973; Bruneau et al., 2003), mostly traditional conceptions, emphasis the unintentional, unplanned attributes of a resilient system that arise from the interplay of various components. Other conceptions, notably from practitioners in disaster risk management, tend to focus on resilience building and thus pushing a system towards a specific development direction. Those interpretations may use terms such as fostering, strengthening, enhancing, or building resilience or capacities. According to Matyas and Pelling (2014) and Walter and Salt (2006), there is only limited research on how DRM practitioners apply resilience. The context of uncertainty and risk in disaster risk management plays a significant role in this discussion. This issue becomes especially significant within a changing climate where multiple risks influence each other through cascading and feedback effects.

Despite the generally positive connotation of resilience, also undesired resilience systems exist. They are, however, frequently neglected in disaster risk practice, even though the persistence of undesired risk drivers is well documented in the literature (e.g., the vicious cycle of poverty), as Mochizuki et al. (2018) note. Other examples of risk drivers in resilient systems are presented in Mochizuki et al. (2018); Wilkinson (2012); Islam et al. (2014). Mochizuki et al. (2018) argue that

many of the subsystems that drive vulnerability and exposure are, in fact, resilient. For example, some systems (e.g., egalitarian systems) may appear highly resilient but at the same time, face oppression, corruption, unsustainable use of land and natural resources (Manyena et al., 2019). Hence, depending on the perspective, those resilient systems may be undesired and rather need to be broken down than strengthened.

In order to position oneself within this framework of disaster risk strategies, reflexive decision-making in governance structures and institutions is a prerequisite, as Nelson et al. (2007) argue and "risk tolerance within the society is set against competing for resource demands" (Matyas and Pelling, 2014, p. 8). Additionally, monitoring tools for trade-offs and critical thresholds (O`Brien et al., 2012) play an important role in this regard.

Ultimately, none of the pathways (resistance, incremental adjustment, transformation) presents a one fits all solution to reduce disaster risk. In fact, more than one strategy may be promoted in one system or subsystem. While learning from past disasters or neighboring countries may provide useful insights, contextuality is a crucial aspect that needs to be considered in order to reduce disaster risk and secure people effectively. One of the key messages for policymakers that can be identified from the literature is that resilience itself is a neutral concept, and that desirable and undesirable resilience exists within systems (Mochizuki et al., 2018). Nevertheless, resilience is a forward-looking approach that can promote a flexible and dynamic response to hazards that come along with uncertainty and change.

2.2 The Case of the British Virgin Islands – Disaster Risk Contextualized Locally and Regionally

2.2.1 Disaster Risk in the Caribbean

Small Island Developing States (SIDS)[1] in the Caribbean are one of the most disaster-prone regions worldwide. The Caribbean lies in an active seismic area where earthquakes are frequent, and a considerable number of tsunamis occurred since human settlement started. For the BVI, the Puerto Rico Trench presents the most considerable risk in that context (McCann, 1985; Mueller et al., 2010).

[1] As pointed out by the UN-OHRLLS (n.d.) "SIDS tend to confront similar constraints in their sustainable development efforts, such as a narrow resource base depriving them of the benefits of economies of scale; small domestic markets and heavy dependence on a few external and remote markets; high costs for energy, infrastructure, transportation, communication and servicing; long distances from export markets and import resources; low and irregular international traffic volumes; little resilience to natural disasters; growing populations; high volatility of economic growth; limited opportunities for the private sector and a proportionately large reliance of their economies on their public sector; and fragile natural environments". The BVI counts as a SIDS. However, due to the status as a United Kingdom Overseas Territory, it is listed as a Non-EU Member/Associate Member of Regional Commissions (United Nations, n.d.).

Many of the islands once originated from volcanic eruptions, and some of the islands nowadays host active volcanos (e.g., Martinique, Montserrat, Dominica, St. Kitts, Nevis, Guadalupe). In addition to geophysical hazards, the Caribbean is prone to hydrometeorological hazards. Seasonal flooding and drought periods occur frequently. Unlike most other Caribbean islands, the BVI has a dry climate, and significant rainfall events usually only occur associated with major weather systems, such as tropical waves and cyclones that pass by (Island Resources Foundation, 2015, p. 15). Moreover, the BVI has no rivers on any of its islands and only a few groundwater resources. As such, water catchment through cistern and wells has traditionally been a strategy to overcome longer-lasting dry periods.

Additionally, the Caribbean lies in the path of wind disturbances that, driven by trade winds, wander from the west coast of Africa over the Atlantic Ocean. Favorable water and air conditions for storm development expose the region to tropical storms every year between June and December (the official hurricane season for the Atlantic Basin is from the 1st of June until the 30th of November) (National Hurricane Center, n.d.).

Excursus: Hurricanes

Tropical cyclones with maximum sustained winds of 74 mph or higher are called Hurricanes in the North Atlantic (they are called Typhoons in the North Pacific and Cyclones in the South Pacific and the Indian Ocean). Tropical cyclones are classified by the wind speed: tropical depression (maximum sustained winds of 38 mph), tropical storm (39 to 73 mph), hurricane (maximum sustained winds of 74 mph or higher), major hurricane (maximum sustained winds of 111 mph or higher), corresponding to the Saffir-Simpson Hurricane Wind Scale. Despite their generally constant westward movement, the direction in which tropical cyclones wander is influenced by winds in the middle and upper levels of the atmosphere, occasionally causing a change in the westward path (National Hurricane Center, n.d.). Those inconsistent wind systems, and the speed in which storms move, among other factors, present a challenge for hurricane prediction.

(End of excursus)

Despite the already high disaster risk that the Caribbean faces, climate change impacts will increase the risk of disaster. The Caribbean is amongst the regions that worldwide will be the earliest and most severely impacted by the negative consequences of climate change (Nurse et al., 2014; Worldbank, 2010). Predictions show that the negative impacts of climate change will manifest in the Caribbean region, mainly through increased temperature (land and water) and rainfall, sea-level rise, freshwater decline, decreased food security, and coral bleaching (Mycoo, 2017). Those changes will particularly challenge the Caribbean due to its low lying and coastal human settlements, climate-sensitive economic sectors, such as tourism, agriculture, fisheries, and its rich biodiversity (Mycoo, 2017).

While the vulnerabilities to a changing climate for the Caribbean generally have been well-documented in academic literature (see, e.g., Ferdinand et al., 2012; Kelman et al., 2015; Mycoo, 2017; Rhiney, 2015; Pulwarty et al., 2010), until just over a decade ago climate modeling was too coarse and could only produce generalized predictions for the region (Houghton et al., 2001; McClean and Tysban, 2001). The progress made within recent years, through global and regional climate modeling, allows finer-scale climate projections and analysis for small island territories. As a result, the region´s climate change agenda was strengthened, and regional policymakers were able to enhance adaptation strategies. In align with this development, CDEMA, the Caribbean Disaster Emergency Management Agency, established in 2009, began to fully engage with the principles and practices of Comprehensive Disaster Management (CDEMA, 2009).

The Caribbean generally has been moving forward in terms of DRM within the last decade. For the BVI, this is exemplified by the award of the Emergency Management Accreditation Program (EMAP) in 2015 (Government of The Virgin Islands, 2015) and the Tsunami Ready recognition, an initiative from the National Weather Service of the United States (CDEMA, 2014) as well as by the establishment of for Community Emergency Response Teams (CERT). CERT has been developed to enhance local disaster risk management and is based on the assumption that people in the communities are the first to respond to a disaster. (Lionel, 2015, p. 69), particularly, in a small island context where emergency services are limited, and communities are often isolated and cut-off from external assistance for a certain amount of time after a disaster.

In terms of hurricanes, a consensus exists among climate scientists on the growing intensity of storms due to warmer ocean temperatures in the North Atlantic Basin. As such, tropical storms are likely to carry higher wind speeds and more precipitation, as Caldas (2017) explains. Research shows that the likelihood of a hurricane of Irma´s magnitude or greater was 1 in 800 years back in 1990. In contrast, in 2017, the likelihood lowered to 1 in 180 years. By 2090 the likelihood is estimated to be 1 in 60 years (Burnett, 2017; Moritz, 2017). Their research was based on the location of Barbuda, which is approximately 220 miles east of the BVI. While more intense hurricanes can be linked to climate change, diverging interpretations and uncertainty exist on the connection of climate change and the frequency of hurricane and storm development (Bhatia et al., 2019; Kang and Elsner, 2015). However, in comparison to the North Atlantic Basin long-term (1966 – 2009) average number of tropical storms (11 per year), with about six becoming a hurricane, more recent (2000 – 2013) data shows an average of 16 tropical storms annually, with eight of them becoming a hurricane (Center for Climate and Energy Solutions, n.d.).

Despite progress in technology, more detailed data to study the influence of climate change on hurricane development remains a challenge because of the incomplete nature of indicators (Wuebbles et al., 2017) and the complexity of natural processes, that yet need to be understood fully. Climate change impacts and adaptation strategies on small island communities in the Caribbean form the thematical frame of this thesis, as they underline the links between disaster resilience and sustainable

development. However, the effects of Hurricane Irma on the BVI remain a singular case of investigation that is not necessarily linked to changes in the global or regional climate. Thus, references to climate change will only be drawn when they are especially relevant to the research questions.

2.2.2 The British Virgin Islands – An Introduction to the Country

The British Virgin Islands, a United Kingdom Overseas Territory, is an archipelago in the Caribbean Sea consisting of approximately 60 islands from which 15 are inhabited. Four of the islands are considered as the main islands: Tortola, Virgin Gorda, Jost Van Dyke, and Anegada. Tortola, with the capital city Road Town, is the biggest of them and hosts most of the governmental, economic, and public service infrastructure. From around 30.000 inhabitants in the Virgin Islands, approximately 80% live on Tortola.

The two main economic pillars are tourism and the financial sector. Together they account for half of the economic output of the country. Legal and corporate service providers dominate the financial sector on the Virgin Islands but also includes insurances and banks, as well as accounting and insolvency. In terms of tourism, food services, transport, and accommodation are the most important businesses. The Territory has seen a steady increase in the number of visitors from 2000 to 2016, with an annual average growth of 4,9%, while the total visitor expenditure has remained relatively stable over a similar period (Debono et al., 2017). The massive increase of visitors can partly be explained through the inauguration of a new cruise ship pier in April 2015 (Island Resource Foundation, 2015), that enables the BVI to host two cruise ships at the same time. As a result, 1.1 million visitors came to the BVI in 2016, 22% more than the year before. The large cruise ships usually stop every few days in Tortola, and tourists make day trips on the islands. Due to the impacts of Hurricane Irma, cruise ships could not enter the BVI for approximately one year.

Besides the cruise ship tourism, the yacht industry is a strong economic pillar within the tourism sector. The BVI is known as a sailing paradise with its bays, cays, and smooth winds for sailing beginners. Other than that, the economy of the BVI is characterized by its small island nature. As such, the country heavily depends on imported products, mainly from the US mainland but also from Puerto Rico and other larger Caribbean islands. Due to the economic and geographic proximity, the BVI uses the American Dollar as its official currency, which not only facilitates the trade with the United States but also helps the BVI to minimize exchange rate and transaction for the internationally oriented finance sector. (Debono et al., 2017).

The society in the BVI is characterized by diversity, including culture, language, education, and financial opportunities. Among others, this is illustrated by a large number of religious affiliations (20) in the country (Government of The Virgin Islands, 2010). Faith-biased institutions play a

significant role in the daily life of the Virgin Islands and have played an important role in the recovery after Hurricane Irma. Diversity is also found within the ethnic composition of the Territory. More than 60% of the country's population are expatriates, whose residency in the Virgin Islands is bound to a valid work permit.

Most of them from other Caribbean states, among others, Jamaica, the Dominican Republic, Guyana, St. Vincent and the Grenadines, Dominica, Trinidad and Tobago, and Puerto Rico. The Caucasian expat community, mainly consisting of British, Irish, Canadian, South African, US-Americans, build a second cultural group. There is also a relatively large number from people from India and the Philippines that live in the BVI. Yet, there are people from many other countries and world regions that add to the multi-cultural context. A rough overview of the origin of expatriates in the BVI shows the following picture (Figure 3). In 2014, 8, 344 work permits from people all around the world have been issued.

Approximately 1/3 of the population in the BVI are citizens of the British Virgin Islands (BVIslander/British Overseas Territories Citizen (BOTC)). Residents with this status enjoy exclusive legal rights, including the right to vote, to possess land, and to own properties on that land. One can obtain this status through birthright, descent, or marriage, as the constitution states (Civil Registry and Passport Office, 2008). The process, however, is difficult to understand, and many constraints about legal recognition persist. As such, many expatriates who have been living more than 20 years in the BVI and refer to the country their home country are not allowed to vote, nor to own properties, as interview participants have pointed out. This circumstance also means that the vast majority of expatriates in the BVI are tenants. This circumstance became particularly relevant after the hurricane when most buildings were damaged and temporarily uninhabitable.

Generally, the laws and regulations in the BVI, aim to protect the integrity of the small country and its even smaller population (referring to BVIslander/BOTC). That is demonstrated through various aspects, for example, through a law that prohibits regional and international franchise companies in the Territory, in order to protect local businesses. The relationship to the United Kingdom has political and economic implications for the Virgin Islands. They became particularly relevant in the recovery after Hurricane Irma. Most notably, the United Kingdom holds the responsibility to provide stability and security for its Overseas Territories. Responsibilities in this context include emergency response operations, such as a Navy ship that patrols within the Caribbean Sea during the hurricane season to provide humanitarian aid to affected countries. Moreover, the UK transferred police officers, engineers, medical staff, and marines to provide security.

The UK furthermore holds the responsibility to assist with financial support for the recovery process. In the time after Hurricane Irma, efficient financial support posed a challenge because of international regulations. The BVI is classified as a high-income country and thus was not qualified to access the Official Development Assistance (ODA) (Wilkinson, 2018; UNICEF, 2016). Consequently, the way and the amount in which the UK could assist financially was very limited during that

time[2]. The result was the establishment of the Recovery and Development Agency (RDA). The agency is a stipulation that is in place in order to provide the underwriting of $400 million worth of loans for the BVI (Waterfield, 2017, own source). Because the BVI credit rating at the time was insufficient to underwrite the necessary loans to cover the costs of the recovery process, the UK government used its own credit rating to get to the market.

However, the UK government decided to remain responsible for the financial management and the implementation of projects because of the significant loan size. Moreover, previous UK funded development projects in the BVI (e.g., the airport expansion) remained with questions around (Peschardt, 2017, own source). The RDA can, therefore, be understood as an agency that oversees the recovery process of the BVI. The main task of the RDA is to implement the National Recovery and Development Plan. The plan has been established by the BVI Government and the residents. The public consultation process, however, was only very limited, as several interview participants stated, and questions remain about the level of ownership.

2.2.3 Information on Hurricane Irma

Hurricane Irma hit the BVI in the afternoon of Wednesday, 6th September 2017, with maximum sustained wind speeds of 185 miles per hour and wind gusts up to 205 miles per hour. Hurricane Irma became the most powerful storm that has ever made landfall in the Atlantic Basin (recently topped by Hurricane Dorian that made landfall in the Bahamas with similar wind speeds) (Scientific American, 2019). Irma maintained Category 5 status for 37 hours and thus outdated the previous record of Tayfun Haiyan of 24 hours, which is highlighted by Kerry Emanuel in the Foreword of *The Irma Diaries* (Burnett, 2017). The hurricane caused significant damage throughout the whole Territory, which is, among others, documented by the Situation Reports of the Department of Disaster Management (DDM, 2017a; DDM, 2017b; DDM, 2017c).

Hurricane Irma developed on the 30th of August and rapidly intensified to a Category 3 Hurricane within 30 hours, which is very unusual for storms in the eastern Atlantic (National Weather Service, n. d.). After becoming a Category 3, Irma´s intensification paused, and the hurricane fluctuated between Category 2 and 3 intensity for almost four days (1st of September – 4th of September). At the same time, the hurricane moved west-southwestwards due to a high-pressure system. In hindsight, this turn was very relevant for the impact of the storm because it brought the cyclone into an area of higher sea surface temperature and moister atmosphere. It also brought the storm into a position where it could make landfall on parts of the Lesser Antilles.

[2] Triggered by the United Kingdom by after the Hurricane Season 2017, in 2018 the OECD agreed on new mechanisms that allow the United Kingdom to provide funding for middle-income Overseas Territories within a period of 36-month after a disaster (Parliament of the United Kingdom, 2019a; Parliament of the United Kingdom, 2019b; BBC, 2018)

On the morning of the 4th of September, the eye of the hurricane got better defined, and the hurricane went through another round of rapid intensification. In the early hours of the 5th of September, Irma was already a powerful Category 5 Hurricane and made the first landfall in Barbuda in the night from the 5th to the 6th of September with its maximum sustained winds of approximately 155knots (178mph). After passing St. Martin at 11.15 am, Irma´s third landfall was on the island of Virgin Gorda (BVI) at 4.30 pm on the 6th of September and shortly afterward on Tortola. (Cangialosi et al., 2018; National Weather Service, n.d.).

As Caldas (2017) points out, the water temperatures in the relevant area were 2.7 °F (1.5 °C) above average (relative to a 1961 – 1990 baseline) in the morning of September 5th, which possibly played a role in the rapid intensification to a Category 5. The rapid intensification of the hurricane from a Category 2/3 into a Category 5 within one and a half days played a significant role in the preparation process. It is also noteworthy that only two days after Irma hit, Category 4 Hurricane Jose approached the Territory and was likely to affect it on Saturday the 8th (in hindsight, Jose changed its path, moved northwards and left the BVI mainly unaffected). However, around two weeks later, another strong Category 5 Hurricane (Maria) moved through the area, with its eye passing the island of St.Croix in the United States Virgin Islands. The hurricane caused slight damage to the BVI.

3 Methodology

The following chapter will present a detailed overview of the methodological approach that was chosen for this research project. Drawing on literature from Mayring (2002) and Hug (2001), the methodological process can be divided into three parts: the data collection, the data processing, and the data analysis. In this study, data collection will be covered separately. Data processing and analysis will be elaborated in connection with the data presentation. This division provides the most suitable structure for this chapter. The chapter will critically engage with the used methods, tools, and procedures and demonstrate why this design has been chosen. The chapter starts with an introduction to the underlying research philosophy of the project and elaborates on the connection between research philosophy, research design, and methods and thus provides the methodological framework for this study.

3.1 Research Design and Philosophy

> "*All research needs a foundation for its inquiry, and inquirers need to be aware of the implicit worldview they bring to their studies.*" (Creswell and Plano Clark, 2007, p. 21)

Researchers come from diverse socio-cultural and academic backgrounds, with different agendas, assumptions, research objectives, and worldviews. It is reasonable to argue that how we – especially as ethnographers – approach a research object is shaped through personal views and mindsets. Kuckartz (2014, p. 43), for example, points at this alignment between the researchers´ worldview and the used methods. Even though he does not fully agree with it, he states that there is a consensus with this assumption among most researchers in the field. The question of how knowledge is generated is in the center of this debate.

Two dominant paradigms, namely deduction, and induction have evolved in the discourse on knowledge generation in academia, referred to as epistemology. Deductive research, also referred to as top-down research, and inherently linked to the idea of post-positivism, draws conclusions from universal laws and rules to explain specific circumstances. Inductive research, also referred to as bottom-up research, and inherently linked to the idea of constructivism, puts observed objectives and phenomena in the center of the study and tries to establish generally applicable rules and laws from those observations. However, it is important to highlight that neither a "pure deduction" nor a "pure induction" exist and that there are research forms in between those two extremes (Kuckartz, 2014, p. 41). Those forms are particularly relevant for this study. The mixed-methods approach evolved out of the debate on either deductive or inductive research with convincing arguments for neither deductive nor inductive research.

Johnson and Onwuegbuzie provide a rather broad definition (2004, p. 17) and describe the mixed methods approach as " […] the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study or set of related studies". Creswell and Plano Clark (2007, p. 21) explain that before designing and conducting mixed methods research, the researcher needs to identify what worldview the study is based on. Therefore, they argue that three preliminary considerations need to be kept in mind: (a) There is a worldview that is best suited for mixed-methods approach, (b) multiple worldviews can be used for mixed methods research and should be justified, (c) worldview and the type of mixed methods design are inherently linked.

In order to get a better understanding of those preliminary considerations, it is helpful to have a closer look at the existing different worldviews. Despite the two predominant philosophical standpoints in academia – post-positivism and constructivism – Creswell and Clark Plano (2007, p. 21) present two more worldviews, which are "advocacy and participatory" and "pragmatism." They point out that all four positions have common elements but take different stances on significant elements. The following table provides an overview of the different worldviews. The table compares the worldviews regarding their views on "the nature of reality (ontology), how we gain knowledge of what we know (epistemology), the role values play in research (axiology), the process of research (methodology), and the language of research (rhetoric)."

Worldview Element	*Postpositivism*	*Constructivism*	*Advocacy and Participatory*	*Pragmatism*
Ontology (What is the nature of reality?)	Singular reality (e.g., researchers reject or fail to reject hypotheses)	Multiple realities (e.g., researchers provide quotes to illustrate different perspectives)	Political reality (e.g., findings are negotiated with participants)	Singular and multiple realities (e.g., researchers test hypotheses and provide multiple perspectives)
Epistemology (What is the relationship between the researcher and that being researched?)	Distance and impartiality (e.g., researchers objectively collect data on instruments)	Closeness (e.g., researchers visit participants at their sites to collect data)	Collaboration (e.g., researchers actively involve participants as collaborators)	Practicality (e.g., researchers collect data by "what works" to address research question)
Axiology (What is the role of values?)	Unbiased (e.g., researchers use checks to eliminate bias)	Biased (e.g., researchers actively talk about their biases and interpretations)	Biased and negotiated (e.g., researchers negotiate with participants about interpretations)	Multiple stances (e.g., researchers include both biased and unbiased perspectives)
Methodology (What is the process of research?)	Deductive (e.g., researchers test an a priori theory)	Inductive (e.g., researchers start with participants' views and build "up" to patterns, theories, and generalizations)	Participatory (e.g., researchers involve participants in all stages of the research and engage in cyclical reviews of results)	Combining (e.g., researchers collect both quantitative and qualitative data and mix them)
Rhetoric (What is the language of research?)	Formal style (e.g., researchers use agreed-on definitions of variables)	Informal style (e.g., researchers write in a literary, informal style)	Advocacy and change (e.g., researchers use language that will help bring about change and advocate for participants)	Formal or informal (e.g., researchers may employ both formal and informal styles of writing)

Table 2: Worldview elements and implications for practice (Creswell and Plano Clark, 2007, p. 24)

Some scholars see mixed methods as a methodology and emphasize the "philosophical framework" and the "fundamental assumptions" (e.g., Tashakkori and Teddlie, 1998). Others emphasize the techniques and methods used for data collection and analysis (e.g., Creswell et al., 2003; Greene, Caraceli and Graham, 1989; Onwuegbuzie and Teddlie, 2003). And again, others refer to mixed methods as a research design focusing on the research plan that links the underlying worldview (methodology) and the used methods (Creswell, 2003; Crotty, 1998). While emphasizing the different views on how methods, design, and worldview are connected, Creswell and Plano Clark (2007, p. 23) take a stand for pragmatism as the worldview that is the closest to mixed methods research. As they explain, pragmatism is a problem-centered and practice-oriented worldview:

> "*The focus is on the consequence of research, on primary importance of the question asked rather than the methods, and multiple methods of data collection inform the problems under study. Thus, it is pluralistic and oriented towards `what works` in practice.*"

As such, the pragmatic worldview is not bound to a deductive or an inductive pathway, as it is the case in post-positivistic and constructivist research. This perspective is one of the main reasons why this approach has been chosen for this study. The freedom of not having to stick to a strict pathway means fewer constraints while implementing the research. It allows the researcher to identify what approach and what measures are most appropriate regarding the research object and the local circumstances in the field. It is an extremely pragmatic and practice-oriented way to conduct research, not only because it allows the combination of quantitative and qualitative methods, but also regarding the timing of data collection and analysis.

Moreover, the mixed-methods approach also allows the researcher to adapt the weighting of the data towards the research goals (Creswell and Plano Clark, 2007, p. 79-84). Eventually, the understanding of mixed methods research as a research design that combines techniques and the underlying research philosophy appears to be the most suitable for this study. Thus, the definition of mixed methods research by Creswell and Plano Clark´s (2007, p. 5) will be used for this research:

> "*Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone*."

With this understanding of mixed methods research in mind, the following section will provide detailed information on the data collection, data processing, and data analysis.

3.2 Data Collection

3.2.1 Interviews

The qualitative part of the research has been carried out through interviews. During the field research in the British Virgin Islands, twelve interviews have been conducted. Interview participants included:

- Four NGO's and Civil Society Organizations: Virgin Island Search and Rescue (VISAR), the Adventist Development and Relief Agency (ADRA), The British Virgin Islands Red Cross, and Team Rubicon;

- Four Governmental Officials from different Ministries, such as the Department of Disaster Management, the Ministry of Education and Culture, and the Ministry of Natural Resources and Labour;
- A representative of the Recovery and Development Agency (RDA);
- Two individual interviews with residents, one of them the general manager of Nanny Cay
- A group interview with three residents of the British Virgin Islands

For most of the interviews, a semi-structured approach has been chosen. Interview dates usually have been set a week or a few days before the interview to incorporate the interviewees' area of expertise into the structure. One interview, however, has been an open discussion with three participants. This discussion resulted from an interview that had been conducted minutes before. Neither proper preparation was possible, nor enough time and motivation on the participants' side were available to structure the interview methodically. This situation, among others, exemplifies the advantages of the the chosen approach. Davies (2012, p. 106) describes semi-structured interviews as the following:

> "*However, in contrast to structured interviews, researchers may alter the wording and order of these questions, perhaps omitting some that seem inappropriate; they may introduce new topics and supplementary questions not included in the list, and respondents are encouraged to expand on a response, or digress, or even go off the participant topic and introduce their own concerns. Most important, their responses are open-ended, in their own words and not restricted to the preconceived notions of the ethnographer."*

This description includes several aspects that have been relevant to this study. A semi-structured design offers various advantages such as clear guidance and a systematic basis for analysis. It also gives the researcher and the participant the freedom to adapt to the interview development, including several aspects like the degree and area of expertise, the dynamics of demeanor and communication, and time management. The most significant benefit for this study has been that some questions (e.g., research questions) have been the same for all participants. However, the answer provided to those questions paved the way for tailored in-depth discussions. The combination of a systematic procedure with a baseline and personalized topics provided the most suitable format for the research purpose.

Interviews, as a tool for qualitative research, usually have the intention to highlight subjective perceptions. This is the value interviews bring to the research objective. The quality of the value that interviews add depends on the way of implementation. Quality criteria for empirical research indicate how thoroughly a method has been implemented and how much value can be expected from that method. Researchers are held accountable for the way research data has been collected. In this sense, it is crucial to ask and answer the following questions: Who has been interviewed? Why has this person been chosen? What relation has the interviewed person to the research object? What is the value this person adds to the research question?

The answer to those questions certainly depends on the overall objective of the research and the research questions. It also depends on the previously elaborated worldview and the research agenda. That could be a research project that takes a stand for a particular target group as it is the case in advocacy and participation-oriented research. It could also be a researcher that goes into the field with a defined hypothesis that needs to be proven or rejected, as it is in post-positivist research. Value-adding focus groups would, hence, have different characteristics depending on the purpose of the study. In this case, the objective is to demonstrate a thorough and holistic understanding of the disaster resilience context. The study will examine challenges, indicate areas of improvement, and investigate the role of the resilience concept, with no preliminary hypothesis and without taking a clear stand for a specific target group. Thus, the interview participants have been selected by the following criteria:

1. The expected value they would add to answer the research questions through general and local knowledge about disaster, disaster risk management, resilience, and Hurricane Irma.

2. Their occupation and the assumed perspective of that institution/organization on the research questions.

3. Residents without an academic background in disasters but with other points of entry and other forms of engagement.

In particular, this means that participants with a professional background and current involvement in disaster risk management have been chosen. Participants have also been selected based on their assumed theoretical understanding and analytical skills. The ability to put their daily work and perceptions into a broader perspective was the main reason for this decision. In this case, background checks on social media platforms, the specific job title, and the organization/institution have been used to identify appropriate interview partners. Moreover, some of the interview partners have been working in the Department of Disaster Management or have been closely connected to it, which allowed meetings before the interview.

In addition to those participants with a professional background, the aim was explicitly to engage with residents that do not have professional carriers in the area of this research project. Two of the participants were chosen because they showed increased interest in the work while informally discussing the topic. Another resident is the general manager of the Marina Resort Nanny Cay, which has been extremely important within the early phase after the impact of Hurricane Irma. Two participants have been working closely with governmental authorities in the weeks after the Hurricane. Moreover, the research focus on challenges and improvement implies and requires a critical assessment of the disaster context in the BVI. Consequently, interview participants with diverse perspectives on the context have been chosen for this study.

Most of the participants received a set of questions and an introduction to the research project, including concepts, some definitions, and the overall objective, before the interview. This measure gave participants the chance to think about how their expertise fits into the bigger picture, to look up

unknown or unclear elements, or to generally rethink if they would like to participate in the interview. Ultimately, it showed the participants that this interview is a significant part of the research and that the interview is going to be well-prepared and conducted with a high degree of professionalism. Special attention was paid to the balance between professionalism and a relaxed atmosphere and attitude, in which it is possible to share critics and challenges, as well as praise and improvement. The describes measures helped to provide high quality and contributed to the objective of adequate and appropriate empirical research.

3.2.2 Surveys

As a counterpart and an additional perspective on the interviews, the quantitative part of the data collection for this research project aims to display two central notions:

1. The view of the general public in the BVI

2. The perspective of members of the Community Emergency Response Teams (CERT).

CERT has been identified as a focal point in this research. The idea was to gather information on CERT from different perspectives, including implementers, volunteers, and beneficiaries. The aim was to get a more comprehensive understanding of CERT. Therefore, two different surveys have been developed. They are named S1 for the general public and S2 for CERT members.

Surveys aim towards representativity for larger target groups. They can provide data in a standardized and systematic way that streamlines and simplifies the analysis. As such, surveys have been identified as the most appropriate method to gather data from those two target groups. In order to ensure the highest level of quality amongst the primary quality criteria (objectivity, reliability, and validity), several steps in the design and the distribution of the surveys have been taken into consideration. Throughout the survey design, data triangulation (Hug and Poschenschick, 2014, p. 97) has been carried out, which means that the questions have been compiled according to data from current literature, observations from a CERT training, personal experiences and discussions with community members and co-workers. The questions have generally been formulated as closed questions with the opportunity to elaborate on the answers.

The mixed form has been chosen because it allowed participants to clarify and elaborate on their responses and to add knowledge that the researcher would not necessarily have thought of. Only predetermined response options would have limited the creation of new knowledge (Steiner and Benesch, 2012, p. 41), which would not align with the overarching research idea of investigation. Moreover, only predetermined response options would push the topic in a specific direction and this direction may be biased. Moreover, the researcher might not fully grasp the complexity of the topic

before the investigation. Predetermined response options could then lead to simplifications and generalizations. The disaster setting in the BVI and the lack of cultural embeddedness add further relevance to this issue. The risk of a limited mindset on the research topic and local circumstances should be kept in mind as a researcher at all times. In summary, an additional response option to elaborate was perceived as the right choice to minimize subjectivity. Standardized response options have been chosen because they provide a solid groundwork for data analysis.

In the survey distribution process, it was a priority to display the diversity of the country´s population while at the same time generate representative results. Objectivity could only be achieved to a certain degree considering that the surveys have only been developed in English language, which means that non-English speakers, such as the Spanish-speaking, French-speaking, or Creole-speaking communities, were excluded. The reason for this choice has been simplicity and consistency in the creation and evaluation process.

However, alternative steps towards the research commitment of high-level objectivity have been taken into consideration. As such, the geographic characteristics of a culturally diverse, multi-island state have been considered. Data has been collected from the four main islands, Tortola, Virgin Gorda, Jost van Dyke, and Anegada, to display different regional perspectives. Several cultural and socio-economic groups have been identified in a mind-map and participated in the surveys.

To limit the influence of the researchers' personal choice when choosing participants, neighbors, the landlord, co-workers, and friends helped to distribute surveys. Because of this approach, the study was able to reach out to diverse participants, which would otherwise not have been possible due to the lack of local knowledge, time, and mobility. An example would be the landlord distributing several surveys at a Jamaican Community Meeting, a co-worker who had a project on school safety and collected data from pupils (14-15 years old), or the friends from one of the expat football clubs that sent the surveys to co-workers.

Another method that aimed to limit subjectivity in the distribution process was the use of different communication channels, such as face-to-face conversations, email lists, and social media. Manfreda and Vehovar (2008, p. 269) highlight that the most often mentioned limitation of online surveys is "coverage error," especially when the study aims to address the general population, as it is the case in one of the two surveys. Coverage error refers to the failure of only covering most people and at the same time, missing out groups with special needs and or unique views on the topic. Even though, the research stay revealed that social media and electronic device usage and literacy is very pronounced in the BVI and perceived as common knowledge, "media-related factors" can have huge impacts on the outcome of the study according to de Leeuw et al. (2008, p. 116):

> "*Media related factors may differ between data collection methods; they may also differ between countries and culture, just as familiarity with surveys in general and with the respondent's role may differ between countries and culture.*"
>
> "*But even within highly computerized societies, there are differences in computer literacy, related to age, sex, education and socio-economic class.*"

To overcome the challenges that de Leeuw et al. (2008) describe with the two statements, the data collection was conducted through various channels, as described before. For the survey that aimed at the general public, approximately 40% of the results come from surveys distributed via face to face conversations, and 60% have been computer-based. The survey for CERT members was sent via a mailing list, which had been compiled by the Department of Disaster Management previously and comprised every CERT member throughout the Territory. As portrayed, the quantitative tools of data collection have been developed with a high level of awareness on both the conceptual standards of survey design and on the channels of communication to ensure empirical research standards during the whole process.

3.3 Data Processing, Analysis, and Presentation

3.3.1 Interviews

After consultation with the participants, all interviews have been recorded and saved as audio files. Some participants have requested to remain anonymous. Throughout the thesis, they will be named as residents, interview participants, or participants. The transcription followed the guidelines of the handbook "Manual (on) Transcription. Transcription Conventions, Software Guides, and Practical Hints for Qualitative Researchers" by Dresing and Pehl (2015). The basic rules for transcription (p. 27-30) have been applied as they provide a clear and simple frame. To better fit the purpose of this research, rule number seven, "Words with a special emphasis are CAPITALIZED" (p. 29), has been excluded. This decision is based on the perception that "special emphasis" is a rather subjective notion, and a clear distinction is hardly possible. As the authors themselves highlight (p. 26), minor changes, and adaptations of the prescribed rules are possible and even desired:

> "*You should decide how and what to transcribe according to your research method, your research expectations, and pragmatic reasons.*"

With this statement in mind, it felt reasonable to start transcribing as soon as the interview was recorded. The idea was to capture the initial thoughts and impressions. However, this approach was only partially feasible. The transcription usually took more time than available between the interviews. As a result, most of the transcription has been completed after the research stay.

In order to analyze the data, this study uses the techniques of qualitative content analysis (Mayring, 2004). For this purpose, a category system was established, with the support of MaxQDA, a tool for qualitative data analysis. The system consists of main categories, subcategories, and sub-subcategories. The main categories were generated deductively and aligned to the research questions. Accordingly, three main categories exist. Those categories are challenges, best practices and improvements, and the role of resilience. All interviews were coded in the first round of reading, using an inductive approach. Moreover, a set of subcategories were generated. Through a mind-mapping process, the category system became more structured, and, in some cases, sub-subcategories were added. In the second round of proof-reading, the previously determined categories have been reviewed, and some minor adaptations have been made.

The data that was generated from the field study will be presented in the findings chapter. However, parts of the data will primarily be used to unfold the main arguments and to answer the third research question, and as such, will be elaborated on in the discussion chapter. This is due to the structure of the thesis, in which research question one (challenges) and two (best practices & improvement) build the groundwork for the discussion on the main research question (the role of resilience). The challenges and best practices and improvements will be presented in the findings section and will lead to the discussion about the role of resilience. The data will be presented in the running text, at times as quotes or interview sections.

3.3.2 Surveys

From the two different surveys, 121 have been returned for the general public (S1) and 33 for CERT members (S2). The number of CERT members at the time of the data collection was 334 (Department of Disaster Management, 2018). This results in a return rate of about 10% for the second survey. The number of the total population at the time of the data collection can only be estimated due to considerable changes in the migration patterns in the time after Hurricane Irma. The United States Central Intelligence Agency (2019) provides a number of 35,802 (July 2018 est.), whereas the World Population Review (2019) only counts 29,577 in 2017, 29,802 in 2018, and 30,030 in 2019. The cover rate of the territories´ population, therefore, lies somewhere between 0,3 and 0,4 %. The results align with the previously defined targets of 10% percent return rate for CERT members, and a minimum of 100 received surveys from the general public. The targets have been defined in consultation with the Department of Disaster Management.

In order to facilitate the data collection and processing and analysis, Survey Monkey was adopted, a tool that is generally used for surveys by the Government of the BVI. The results are presented graphically as bar charts and tables and are attached as appendices. The surveys have been analyzed in the period where the first interview development took place. The idea behind that decision was to get a broader understanding of the social impacts of Hurricane Irma. Consequently, the data from the surveys, especially the data from the survey about the general public, aimed to mark the areas of investigation. The surveys serve as a basis and are less obvious in the findings section. However, their influence on the whole project has been significant since they identified trends, areas of conflict, challenge and trouble, and particular information about CERT.

The survey distribution process also served as a platform for information exchange and contact development. As such, the first contacts with some of the interview partners were established through the surveys. The survey distribution generally helped to establish a network for the research project. Despite the contacts for the interviews, the survey distribution created opportunities to attend meetings with the RDA and VISAR, as well as connections with several stakeholders from the sister islands (Virgin Gorda, Jost van Dyke, Anegada). The survey distribution in the early stage of the research stay offered the chance to engage with residents from the sister islands, which contributed significantly to a holistic picture of the impact on the population.

Presenting the quantitative data within the running text presents a challenge. It is not always possible to integrate and present all the information that could potentially be identified from the surveys. As a solution to this challenge, references will be made in the running text to specific survey questions. How those references will be signalized is presented in the following example:

> "*As such, the experience with CERT has been limited, which manifests in several aspects, such as the integration of CERT into disaster management structures (S2, Q22), the practical experiences of CERT volunteers (S2, Q2, S2, Q10, and partly S2, Q17), and the knowledge about CERT within the communities (S2, Q20; S1, Q1).*" (own source)

The two surveys are referenced as S1 (general) S2 (CERT members), and questions are referenced as Q and the specific question number. For example, question number 17 from the survey for CERT members is referenced as S2, Q17. Question number 12 from the survey on the general public is signalized as S1, Q12.

4 Findings

In this chapter, the findings from the field research will be presented. The chapter is divided into two sections. The first section covers the challenges that comprise topics on policies and laws, security, basic infrastructure, CERT, and communication and information exchange. The other section presents best practices and solutions for improvement, which include policies and laws, security, and basic infrastructure.

4.1 Challenges

4.1.1 Migration & Work & Housing

This section will put emphasis on the legal and political dimensions of the challenges in the time after Hurricane Irma in the BVI. The main accusation is that existing laws and policies are too rigid and inflexible for the disaster context and hamper the recovery process. Three topics raise particular attention, as the data shows. Both survey results and interview participants pointed at immigration, work, and housing. Because all three topics and their policies are connected, they will be presented in one part. As elaborated on in the theory section on the country specifics, a diverse group of expatriates lives in the BVI. However, what all got in common is that they have limited rights. As a result of the housing regulations, most expatriates are tenants.

Hurricane Irma destroyed many of the buildings and tourism infrastructure in the Territory, and many people lost their houses and their jobs. In terms of the houses, it became apparent that many homeowners have not been taken proper preparations to secure their properties. Angela Burnett, for example, told that she was outside at around 2-3 a.m. before the hurricane and saw many places where the homeowner had done “absolutely nothing” to protect their properties. Procedures like sideboards and window protection are usually all too common for regions where hurricanes develop. As she furthermore points out, people had made greater efforts to protect their property when less intense hurricanes approached.

While there are mechanisms in place that financially support landlords with the rebuilding process, the tenants were pretty much left on their own, which has been highlighted by Angela Burnett and Robert Philips. Most expats who live as tenants in the apartments were dependent on their landlords. Most lease contracts did not include a proper regulation about rights and duties in a disaster event, which means that at the end of the day, the laws are with the homeowners, while the tenants are at risk. Even though housing damage affected everybody in the country, the tenants have been the most vulnerable since they depend on the homeowner’s decision.

In the aftermath of Irma, many tenants had to leave their homes and moved in with friends, families, or work colleagues. Those who eventually could move back into their apartments had to face even more obstacles. Landlords demanded higher rent once the apartment had been repaired, as Angela Burnett describes. Due to the precarious economic situation with the collapse of the entire tourism industry for almost a year and most businesses being destroyed, higher rents could simply not be paid in many cases. The following statements describe the situation approximately one year after the hurricane:

> "*The crisis we are facing now is the cost of living. It's very, very difficult for anyone to find a one-bedroom apartment under a thousand dollars (…), and the prices are actually increasing. (Small laughing) So, what you are finding is a one-bedroom apartment with six people in it. Well, this isn't moving the country forward. This is going backward."* (Robert Philips)

> "*This puts them in a really vulnerable position. It means that they have to go and try to find maybe somebody else that they can check up with, try to find another apartment which is almost impossible because you deal with a situation where you have negative stock, right?"* (Angela Burnett)

While the housing prices have been increasing after the storm, the opportunities to find work severely decreased, especially for expatriates, as Matthew Waterfield pointed out. For many expats, the rigid labor codes presented a considerable challenge. The first restriction is that expatriates are bond to one particular job, which is stated in the resident's permit. What happened after Irma was that many businesses, especially tourism-related businesses (e.g., Hotels, Restaurants, Bars), got destroyed, had to close for an unknown time, and to dismiss their employees. The second issues were that the policies in the BVI require expatriates to leave the country to apply for another work permit. However, due to the chaos in the weeks after the hurricane and uncertainty about the future economic situation, many felt insecure about the ability to get another job. Robert Philips describes the perception that many in the expat community got:

> *"Okay so the business I work for was destroyed, here is another business that I can go to work for, but I have to leave the island to get another work permit?"*

> *"Also, if I scrape together the money to fly back to the Philippines, do you think I am coming back? Hell, no!"*

The inflexible immigration and labor codes put many expats in a precarious situation. Consequently, the population initially shrank by 1/3. Mainly people from neighboring Caribbean States and families with children left temporarily but came back after a few weeks because school education was a priority for most families. Many other people stayed and, as Angela Burnett describes it, took a gamble in the sense that they hoped for a quick recovery. Another reason was the uncertainty about the abilities to come back and find a job to achieve a resident's permit.

Within the early recovery phase, a large number of construction workers from other countries, mostly from other Caribbean islands and Latin America were brought in to help rebuild the country. The immigration of construction crews raises several central issues in terms of resilience and recovery. Construction crews that were brought into the country from other Caribbean States had no place to stay because of the lack of available houses. It was not unusual for construction crews to live in the actual building that they work on.

Informal conversations with construction workers from Colombia and St. Lucia revealed that it was not necessarily a selection criterion to have an educational background related to construction. If you knew the right people, the impression they got was that as long as you were male and willing to work 6-7 days a week, the BVI offers an excellent opportunity to earn money. Hence, even with a large number of temporarily employed construction workers from outside, there is a limited number of good quality workmanship in the country, which has been pointed out by several interview partners. Without proper knowledge and limited resources building back better remains a challenge.

Another problem for the BVI in terms of building back better, was highlighted by Robert Philips, is a large portion of the population, especially the BVIlander are related to each other. According to him, it is difficult to enforce building codes and policies because family members will not force each other to spend money building codes or to change how the house was built.

Additionally, insurances played an essential role in the rebuilding process and contributed strongly to the economy of the country, which is highlighted by most of the interview participants and some of the survey participants. Nevertheless, insurances also presented a challenge to many residents, especially to those who have not been insured, underinsured, or were not aware of the payout process of the banks. A common notion was also that residents insured their houses but did not think about their businesses, as Jason Penn told in the interview. The insurance payout that was planned to rebuild the house initially had to be used to build back the businesses. While the causes for this may be diverse (e.g., lack of awareness or knowledge, risk, financial pressure), the impacts of Hurricane Irma leave no doubt that proper insurance is crucial and should be improved to make the Territory better prepared for natural hazards.

4.1.2 Security

Various notions and conceptualizations on security exist. Security in this section will only include selected topics that have been highlighted by the data. As such, the picture of security that is presented here does not claim to cover all security concerns that came along with the hurricane.

In the first days after Irma, security issues presented one of the biggest challenges for the people in the Virgin Islands, especially on Tortola. After the storm, many of the damaged buildings and businesses have been uninhabitable, and residents and owners had to leave their properties and personal belongings exposed. Looting and robbery was a result. Groups of masked persons, most of

them men, decided to use the opportunity to make a profit. They rode through the streets on pick-ups, armed with guns and machetes. As Julie Schneider and Miles Sutherland-Pilch describe the situation, the looting caused much damage. While Miles recognizes that "it was a completely desperate situation," and it "almost becomes understandable" for people to steal when they have no food or water for their family Robert had a diverging perspective on the situation and highlights that "there wasn´t a shortage of food anywhere." He furthermore raises the question of why nothing was done against the violence and holds the government and the police accountable for it. As he states, there was "zero leadership" from any of the government authorities. In particular, he was disappointed about the missing anti looting strategy by the police, which apparently did not operate in the immediate aftermath of the storm. This argument is supported by Julie Schneider, who reported that even police officers took advantage of the exposed properties and businesses and participated at the looting.

However, in the days after the impact, it was hardly possible to receive any secure information since most of the information and communication channels collapsed. As a result, rumors began to spread, and particularly in terms of security issues, people got more and more concerned about the situation, as Miles points out. For example, there were rumors about damages at the national prison, a prison break-out of inmates, and the robbery of weapons at the policies stations. Her Majesty's Prison, in fact, was severely impacted with damages on the roof and security fences, resulting in a prison breach by approximately 150 inmates, as documented by Hurricane Irma Situation Report 001 by the Department of Disaster Management (DDM, 2017a).

On the 8th of September, two days after the storm, the Royal Navy arrived. Matthew, who at that time worked in London in close cooperation with the British International Development Aid, pointed out. A first and crucial step to enhance security was a curfew that was imposed as soon as the British Military was able to operate. As Miles Sutherland-Pilch pointed out, at first, the curfew was imposed from six at night to six in the morning. A month later, the curfew was incrementally revised to 11 p.m. to 6 a.m. (Burnett, 2017). In the aftermath of the storm, the British Military played a crucial role in providing security, since the capacities of the Virgin Islands Police Department have not been sufficient and many of their buildings have been destroyed. Additionally, the police on the Virgin Islands received support from the UK police force and other Caribbean countries.

In terms of possible future disaster responses, it became evident that the small island nation is only able to provide very limited security for its residents. The lack of police officers and the misfunctioning of governmental structures presented a massive challenge to security.

4.1.3 Basic Infrastructure

One of the big challenges in the BVI after Hurricane Irma was the collapse of the basic infrastructure, that reached from the complete blackout of the electrical grid, up to the loss of internet connection and

all types of telecommunication. The two following statements from Connie George and Charlie Peschardt point at the scale of damages and some of the challenges that came along with it:

> "*So, we as a Territory, I want to say, had prepared to the magnitude that we knew of. So we would have had a few things in place, we've had our vehicles filled with gas, you would have had a necessary food and can items and so on we would aborted up all doors and windows and put up our hurricane shutters but nobody thought about what could have been a substitute to communication if we did not have our phones, if we did not have the radio, if we did not have any form of internet.*" (Connie George)

> "*People were on their own Gmail, Hotmail accounts for months. So, they didn't/couldn't access any information on the government service, you know. The communication, the technical side, the infrastructure communication all went.*" (Charlie Peschardt)

The challenges that came along with the new situation have been very diverse. Some of them caused immense difficulties, and others only required behavioral changes in daily life, such as eating tinned food or doing homework directly after school with daylight, as Connie George points out. Due to the impacts of the storm, the main Henry Wilfred 'Freddy' Smith Power Station on Tortola was in complete blackout for five days, as even the black start generator was damaged. Moreover, 90% - 95% of the electrical distribution network was destroyed. The first power distribution that came around 1 – 1.5 weeks after Irma was limited to the central business district in Road Town and the nearby Peebles Hospital. (Burnett, 2017). In the time before the power came back to the hospital, the loss of the electrical grid presented serious hindrances because the back-up power systems were not able to generate the power that was needed to keep all crucial functions running (e.g., keeping medication at the right temperature), as Miles described.

Other parts of Territory only partially obtained back power. On the 5th of November, electricity had been restored around 40% on Tortola, 55% on Virgin Gorda, and 85% on Anegada. Jost Van Dyke was still without power at that time. The wipeout affected, among others, the waste disposal and the water treatment. Sewage collection and treatment systems failed, and portable water production, which is to 100% provided through desalination, was severely hampered. The distribution of water was also significantly interrupted because of the limited storage capacities and broken water lines, especially in coastal communities. While water supply challenges were mostly connected to the lack of power, some of the interview participants mentioned challenges regarding the water supply through disaster aid distribution. As Robert Philips and Miles Sutherland-Pilch indicate, expatriates have been denied relief. (Burnett, 2017).

The lack of communication, water, and energy supply caused diverse problems, from the individual and household level up to the national level.

4.1.4 CERT

While CERT itself is perceived as a positive development in the BVI disaster management and could contribute tremendously to more resilient communities, there are a number of challenges that came along with the implementation of quality CERT activities during Hurricane Irma, but also in disaster events. Those challenges have limited the impact of CERT in the disaster response efforts of Hurricane Irma. The CERT model is relatively new to the Caribbean, and particularly in the BVI, it only started two to three years prior to Hurricane Irma, as Alex Jeffrey highlights. As such, the experience with CERT has been limited, which manifests in several aspects, such as the integration of CERT into disaster management structures (S2, Q22), the practical experiences of CERT volunteers (S2, Q2, S2, Q10, and partly S2, Q17), and the knowledge about CERT within the communities (S2, Q20; S1, Q1). Connected to the lack of experience with CERT is the fluctuation of trained people on the island. Migration, for example, poses a challenge to continuous capacity building, as Alex Jeffrey indicates.

Charlie Peschardt points at another challenge that emphasizes the way in which the training is provided. He argues that CERT training needs to be contextualized to the individual capacities of communities. As he describes it, “it is thinking through the extra step, rather than just CERT training being an outcome.” In this context, he also acknowledges that the way of communication is extremely important in emergency response operations, and especially for CERT members. He points out that too often reactive communication takes place, where “you are telling people what has happened, [which is] great but quite often you are in a position where you try to coordinate things [and] you want to understand the wider impact and what might need to happen next.”

While communication and information exchange are certainly important for CERT activities, the area presents a challenge for other parts of the disaster management in the BVI and is, therefore, elaborated in a separate section.

4.1.5 Communication and Information Exchange

Communication and information exchange has been identified as one of the biggest challenges in disaster management after Hurricane Irma. The section cuts across all the other topics that have been highlighted previously. The lack of communication and information is primarily linked to the collapse of communication infrastructure, as described in the section on the basic infrastructure. However, the challenges regarding communication and information are not limited to technical issues, and the findings show that the problem manifests in a variety of actions.

After the storm, very high-frequency radios (VFH´s) and satellite phones became the most important tools of communication, since all radio stations in the BVI were down. Residents used the

VFH´s to connect to the United States Virgin Islands radio stations to get information about anything that was going on in the BVI, as Connie reports. Miles points out that not everybody had an idea of the importance of VFH and satellite phones, and not everybody had access to those forms of communication in the very first days after the impact. For those residents that had satellite phones, the usage of the satellite phones often presented a challenge. Most satellite phones have been on a previously set network, the most popular within the Caribbean region. That popularity usually is an advantage, but not in the 2017 Hurricane Season, as Charlie described. With four major hurricanes passing through the Caribbean in three weeks, many people were trying to reach the same satellite, and the competition caused connection problems. As he argues, people tend to put the VHF´s away after a few tries without luck and assume the VHF´s were not working. However, he and his crew were able to switch the channel and communicate without any problems, because they have been trained in using the satellite phones.

The exchange of crucial information was very limited in the days after the hurricane. With the devastation that Irma caused, many people wanted to leave the country. In the first days after the impact, evacuation from the island presented a challenge. The airport got damaged and was not able to operate. A few days later, in a sudden turn of events, several airplanes started to land. Several countries provided flights for their citizens. However, most of the people on the islands did not know about the flights. They did not know that the airplanes came to evacuate people, because most other airplanes either brought humanitarian aid or have been used for monitoring purposes. Moreover, nobody could tell which countries provided flights at what time as Julie Schneider and other residents pointed out. The lack of communication not only presented a challenge for a coordinated evacuation and proper response. It also took the opportunity from residents to communicate with the outside world or the national government. Nobody knew that they are secure. Especially for those who had family members outside of the country, this has been an enormous challenge and was emotionally very upsetting and disturbing.

Another form of challenge could be observed within the communication process between stakeholders in disaster management. Several references indicate poor knowledge management and information exchange. While some of it can be attributed to the damaged communication infrastructure, others can be linked to personal and organizational deficits. The impression that the interviews convey is that authorities generally were overwhelmed with the scale and magnitude of the impact. Notably, the Department of Disaster Management has been accused of being inefficacious, unprepared, and transmitting insufficient information. Julie, for example, wished more updates on the arrival of the British Navy, as she describes. She pointed out that it was frustrating to work with DDM because the information was not appropriately shared. As a result, VISAR changed from working with the DDM to working with the Marines in the response operation.

Moreover, Miles points to the lack of coordination and communication amongst politicians, primarily through the district representatives. While VISAR had communication problems with the

DDM, Charlie Peschardt takes a stand for DDM and highlights their efforts and the difficulties they faced while coordinating the government structures. Most of the challenges with communication and information exchange relate to the emergency response, but some challenges take place at different stages of the disaster management cycle. For example, Angela Burnett highlights the low appreciation of crucial information on the hurricane strength and inability to accurately interpret that information to prepare accordingly.

In terms of the recovery phase, communication posed a challenge within the consultation process for the National Recovery and Development Plan. The general perception of residents in the BVI was that the National Recover and Development Plan was developed with minimal public consultation and decision making as at least two interview participants and other residents pointed out. Moreover, in the recovery phase, the lack of information on insurance processes presented a huge challenge to many residents, as described in the section on the political and legal frame.

In summary, communication, information exchange, coordination processes presented an enormous challenge before, during, and after Hurricane Irma.

4.2 Best Practices and Improvements

The section on best practices and improvements aims to present an overview of 1). The aspects that worked in disaster management in the BVI 2). Deliver solutions and improvements for some of the disaster management elements that provided a challenge. Most of the presented ideas come from the interview and survey participants and have not been identified by the author. In terms of data quality, it means that the presented findings do not necessarily align with national or international standards and strategies, nor with a comprehensive analysis of improved disaster management in the BVI. The ideas often present singular improvements or solutions to a specific challenge and context. Yet, according to internationally recognized best practices, attempts to improve disaster resilience should include community voices and perspectives. The findings in this section, thus, aim to contribute to community-based ideas to improve disaster management. Unlike most of this section, the considerations regarding CERT mainly come from the author.

4.2.1 Political and Legal Framework

The most significant area of improvement is arguably the quick implementation of adequate immigration and work policies. Many of the residents in the interviews and the surveys recommend more consultation between the Ministries, the Department of Disaster Management, and other

decision-makers in times of disaster. To overcome the difficulties, a realignment of the rigid labor and immigration laws has been one of the priorities for the government. In cooperation with the RDA, the government has been researching how to improve the structures and enable residents more freedom in their decisions, as Matthew Waterfield pointed out. One of the basic ideas behind the new considerations is that a country in a disaster context is much easier to govern if the population is reduced. However, while it is useful to reduce the population in favor of the government temporarily, the needs and desires of the people must not be neglected. Therefore, it is crucial to provide an environment where people have the freedom to decide and the security to come back when the country is economically and politically in better shape, as Angela Burnett describes it.

Another area the country is looking at in terms of improved policies in the handling of insurances. Insurances are a significant part of the resilience package of individuals and the national recovery. A particular focus for financial support is put on the time before the insurance payouts start kicking in, as Jason pointed out. Another focal point is to meet the needs of the financially vulnerable residents and to minimize exacerbated inequalities after a disaster event, as Matthew Waterfield reported.

While improvements for financial support have been addressed relatively quickly by the government, in other areas of the recovery process, residents demonstrate their dissatisfaction with the actions and procedures that have been chosen. Most notably, the consultation process of the National Recovery and Development Plan. Angela Burnett provides one of the explanations for the short and late consultation process. In this context, she points at the problematic of doing recovery planning while being in a disaster period. She argues that the focus of individuals and ministries has been on other struggles, on daily challenges, and resources to provide a proper environment for public consultation were not given at the time. Thus, she proposes that recovery planning needs to be done in non-disaster times. Her thoughts will be addressed in the discussion.

4.2.2 Security

In terms of security, one of the lessons learned was that the limited capacities of police officers and security personnel were not able to protect against looting and other criminal actions, such as the threatening through guns and other weapons. In the first days and weeks after the storm, security could only be properly ensured through external help, most importantly, through the support of the British Navy. However, as argued by Robert Philips, the police could have done more and developed anti-looting plans. The implementation of a curfew was, in the eyes of most residents, a very helpful decision to provide security and to create a sense of security. Moreover, the curfew provided a safe and organized space for disaster management operations. While the curfew was a product of cooperation between the government of the Virgin Islands and the British Military, it remains unclear how much of this decision was part of a previously developed security plan for the Territory. In terms of security, residents demand improved information exchange between them and governmental authorities. Moreover, the strategies to provide security for the very first days after the impact – without external help – is highlighted as a priority for future disaster events.

4.2.3 Basic Infrastructure

One solution against the wipeout of electricity, proposed by the residents from the group interview, were portable telecommunication systems. The idea is that they could be removed when a storm approaches, stored in a safe place, and built up after the storm. As such, it would have been possible to operate a radio station with its own band frequency that people could tune into, possible with a loop that repeats the same information on and on.

Regarding water supply, two best practices are going to be presented. The first one comes from Miles Sutherland-Pilch, who points at the opportunities of desalination plants. Even though desalination is a common technique in the BVI, the islands are only equipped with a few bigger and centralized plants. Those plants have been shut down after the storm due to the lack of electricity. Because of the carefully prepared infrastructure in Nanny Cay, their desalination plants have been the only ones that worked in the first days after the storm. Miles highlights that desalination plants are “a pretty simple set up” that should be installed in each of the communities to facilitate access to water. To ensure that the plants work, even after an intense hurricane like Irma, they need to be adequately secured, and every plant needs to be equipped with a back-up power supply (e.g., individual generators and batteries), as he proposes.

The second form of water supply that proves to be very useful in the aftermath of the storm are traditional rainwater saving systems, so-called cisterns, as Angela Burnett highlights. There are no

rivers and only very few groundwater resources on the islands. The BVI has a very arid climate, as Angela describes. The few groundwater reservoirs were traditionally used for farming, whereas the cisterns were used for household water supply. The most significant benefits that cistern provides are decentralized water reservoirs on a household level and the ability to provide water without power supply.

While cisterns provide households with water all year long, they became particularly relevant in the aftermath of the hurricane, when most other water supplies lacked. Cisterns have been a legal requirement for housing in the BVI for more than 40 years, but in practice, they existed long before, as Angela pointed out. In terms of improved disaster management in the Virgin Islands, it should be acknowledged that the traditional water supply systems have been a crucial resource in times of shortage. Enhanced disaster management strategies, thus, may increasingly promote an environment that ensures cistern functioning. This environment may be through the necessary infrastructural operations, through awareness campaigns on the benefits, or protection and cleaning measures.

Another strategy to enhance disaster management is through public-private partnerships. In the BVI, public-private partnerships generally have been fostered within recent years. While public-private cooperation can be found in all stages of the disaster management cycle, most of them are linked to infrastructure projects as climate change mitigation or as recovery projects after Hurricane Irma, which is the reason why they will be presented in this section. Two examples in that area of disaster management that are highlighted by Charlie Peschardt are the new Flooding Education Center on Virgin Gorda, a collaborative work of the NGO Unite BVI, and the Ministry of Education.

The other examples are solar farms, a project initiated by BVI electricity companies, and private business and house owners. Public-private partnerships can also be found in other areas of disaster management, for example, in the preparedness stage. Jason Penn reports about an application that the Department of Disaster Management developed in cooperation with a local phone and internet provider to keep residents updated on hazards in the Territory.

The most impactful public-private partnerships in terms of disaster management within Hurricane Irma was in Nanny Cay. Nanny Cay is a private tourism resort and marina. After the hurricane, it turned into a central hub for disaster management operations, due to its infrastructure apparatus. The partnership was not bound to one particular institution or organization. Instead, several partnerships between any stakeholder within disaster management could be observed. As Miles, the owner of Nanny Cay, points out the partnerships have been a win-win situation for them and the partners. The interview with Miles Sutherland-Pilch highlights the cooperation between Nanny Cay, the broader disaster management community, and residents of the Territory. The interview shows that the trade-off has been beneficial to all of the involved actors and that disaster management was more effective through the resources that Nanny Cay offered. This partnership has worked well, and for a possible future disaster event, Nanny Cay proved to be an important hub for coordination. Improved disaster management strategies, thus, may include plans and capacity building to prepare and equip

Nanny Cay for its disaster management functions.

Despite the things that worked particularly well in terms of necessary infrastructure, there is still much space for improvement. The collapse of the entire communication infrastructure and the lack of power supply presented a massive challenge to everyone in the Territory and particularly hampered the response and recovery process. When Miles from Nanny Cay was asked what is done in the BVI to be better prepared for a new Irma, his answer shows frustration with the current actions and that basic infrastructure needs to be addressed in the planning for the future. As a solution, he proposes underground cables for communication, energy, and water. While he proposes improvement through technological development, the statement also reveals what has been a common notion among residents, that is that better preparation should have been possible and that residents felt left alone in the time after the impact.

5 Discussion

This case-study uses a mixed-methods approach and draws on the qualitative and quantitative data as well as on the current literature of the field, to answer the research question: what role plays resilience in the disaster management process of Hurricane Irma in the British Virgin Islands?

The literature review reveals a broad understanding of resilience within the field of DRM. While resilience is mainly understood as a set of capacities that allows a system to overcome the impacts of a disturbance, there are different ways to do so. A resilient system can be stable and withstand disturbances; a resilient system can get damaged, but then quickly recover; a resilient system can also learn from and adapt to disturbances, or a resilient system can change fundamentally under the circumstances of a disturbance, disruption, or damage. As such, there tends to be common ground among scholars to understand resilience as an overarching concept that encompasses other conceptualizations, such as resistance, adaptation, and transformation.

The findings from research questions 1 and 2 that have been presented so far identified and examined the challenges, as well as best practices and solutions for improvement. Significant challenges are the rigid immigration and labor laws, the housing situation, security issues, the collapse of basic infrastructure, and most notably, communication and information exchange. Best practices, among others, could be identified within public-private partnerships, the use and strengthened the integration of traditional water-saving practices, innovations in telecommunication (portable stations), the adjustment of laws and policies, and post-disaster plans that are built around simplicity (e.g., signs with information, communication without smart-technology).

The findings can be understood as the groundwork for the third research question that examines the role that resilience plays in disaster management in the BVI before, during, and after Hurricane Irma. In the following discussion chapter, this question will be examined, critically analyzed, and answered.

5.1 The Role of Resilience in the BVI in the Context of Hurricane Irma

Back to Equilibrium or bouncing forward?

Resilience is more than just bouncing back, which has been a common notion in resilience literature since the work of Gunderson and Holling (2002), Berkes et al. (2003), and Folke (2006) within the SES resilience notion. For example, Folke (2006, p. 253) points out that “a lot of work on resilience has focused on the capacity to absorb shocks and still maintain function.” However, he argues that

"there is also another aspect of resilience that concerns the capacity for renewal, re-organization, and development, which has been less in focus but is essential for the sustainability discourse." (2006, p. 253). Moving forward after a disaster is generally perceived as something positive and in comparison, to a pre-disaster condition perceived as favorable, especially from a development point of view. If a resilient system would only return to a pre-disaster condition, then this system would remain vulnerable and continue to operate within structures that led to the disaster in the first place (Lewis and Kelman, 2010, p. 203; Tobin, 1999, p. 16). Consequently, moving forward is promoted in the BVI.

One of the most notable forms of renewal and reorganization in the BVI was the rapid adjustment of labor and immigration policies, that turned out to be too inflexible for the dynamic disaster context of a SIDS. One often highlighted characteristic of resilient systems is a particularly quick response to disturbances. In this case, it is not the quick return to equilibrium, as promoted by the engineering resilience approach (Bodin and Wiman, 2004, p. 34) but a prompt adjustment that improves the previous status quo.

Another resilience notion that can be taken from this point is that the government took notice of the residents' concerns, and not only of the belongers but also of the expatriates. This change in policies in favor of expatriates is especially noteworthy since laws in the BVI generally tend to neglect the rights of expatriates. For the most part, the country rigorously tries to protect their small island and 'belonging' population from external intervention. The changes in laws and policies after Hurricane Irma can be interpreted as a sign of care and coming together as a nation on a small and multicultural island.

From a more critical point of view, however, this change of laws can also be interpreted as a confession that the country is not able to run without the high number of expatriates and that this adjustment is primarily built upon the idea that it helps the local business and the belonger to recover faster in case of future disaster. Whether this case is an act of goodwill, a mainly pragmatic decision, or a mix of both, it is reasonable to argue that the quick adaptation of inadequate laws provides a window of opportunities. Nevertheless, the case shows that resilience mechanisms allow the country to move forward after a disaster.

Another area where moving forward becomes apparent is the rebuilding process. Rebuilding is supported financially and technically by several international development agencies, such as the PAHO, WHO, and UKAid. It is applied locally by the means and measures of the RDA and the National Development Plan. Building back better in the BVI is promoted through the SMART initiative, a concept that emphasizes safe, healthy, and green rebuilding (Pan American Health Organization, 2016). In this context, Matthew Waterfield notes that "if we just focus on rebuilding,

then we gonna have a lot of shiny houses and bridges and roads, but if they are not maintained or they are not serving for the purpose for the people that can use them, and we would have failed." The rebuilding process in the BVI aims to include stronger infrastructure and the social components of a society, including, among others, improved accessibility for disabled persons, safer, and environmentally friendly design. Rebuilding in a manner where sustainable development and disaster resilience goals are integral components, without doubt, moves the country forward. An illustrative example of SMART rebuilding in the BVI is the new DDM building, which simultaneously hosts the NEOC. The case will be touched upon in the second part of the chapter.

While SMART rebuilding for some parts of the country, especially for governmental buildings and public facilities, has been getting much attendance and received most of the funding, rebuilding in the communities follows other principles. Improvement is often simply not possible, and even reaching a pre-disaster condition often poses a challenge. This is most notably for households, private properties, and businesses. For those who are not able to rebuild or to rebuild resiliently the reasons are diverse (see, e.g. Wilkinson et al., 2018, p. 3), as highlighted during the findings section: limited financial resources, a limited number of quality construction worker, a lack of knowledge and confusion about what is really required to withstand category five hurricane or the inadequate adoption of building codes (see, e.g. Wilkinson, 2018, p. 4). The statements from Charlie Peschardt and Sharleen DaBreo underline that resilience rebuilding is hardly possible for many in the BVI:

> "*People, right now in the BVI, just want to build. The concept of building back better is not financially viable for them. They just want a roof on their homes, they wanna be able to put windows back in, they wanna get their businesses up and running, and that´s people's initial thought*." (Sharleen DaBreo)

> "And *how do you, if you live in a little village like Carrot Bay or Apple Bay something over in Anegada, how on earth do you go about making your house hurricane prove to a category five standard? Or your hospital, or your fire station? It is very, very, very difficult.*" (Charlie Peschardt)

At the time of the research stay, around one year after the hurricane, many private properties were still uninhabitable, and even if they were, they revealed damages on walls and windows. Applying resilience poses a challenge for many people in the BVI. However, this development is not a BVI specific phenomenon but has also been identified in other Caribbean states, for example, in Antigua and Barbuda, where Gould and Lewis (2018) investigated the recovery process after Hurricane Irma. They point out that "only wealthier residents will be able to afford the infrastructural costs of such resilience measures" (p. 153).

Moreover, the rising housing costs of more resilient houses resulted in displacement for less

affluent residents on the island of Barbuda, as they argue. This development is certainly comparable to the BVI. The SMART rebuilding of more affluent residents and public infrastructure collides with a large number of families that cannot cope with the pace of rebuilding nor of the increasing prices. Consequently, it can be summarized that resilience measures enabled only parts of the country to move forward, whereas others struggle even to reach a pre-disaster condition.

The problematic with imposed top-down resilience-building on a national scale has been addressed by Weichselgartner and Kelman (2015, p. 263). The authors point out that if "produced in a specific science-policy setting with particular institutional arrangements, decontextualized top-down knowledge on resilience offers a severely limited guide to operational practice." Instead, the authors endorse a 'critical resilience' approach that incorporates locality and marginality and results from a co-design between bottom-up and top-down knowledge. In the BVI, the described science-policy setting with institutional arrangement manifests through the SMART initiative, which is a regional approach, which has been applied to other Caribbean nations as well.

However, how properly it was adapted to the local circumstances in the BVI remains questionable. The National Recovery and Development Plan that provides the framework for the SMART rebuilding is a project mainly developed through UK and BVI governmental officials and was heavily criticized for its minimal public consultation process. In terms of the argument from Weichselgartner and Kelman (2015, p. 263), the application of the National Recovery and Development Plan indicates rather an uncritical handling of resilience approaches.

In this context, resilience literature highlights that many undesired components that increase exposure and drive vulnerability structures of a system are also resilient (see, e.g., Mochizuki et al., 2018, p. 375). This means that without careful and strategic planning, resilience initiatives are likely to reinforce structures that increase the risk of disasters, instead of reducing it. Examples of 'undesired resilience characteristics are corruption, a lack of implementation capacity, and the marginalization of the most vulnerable, unsustainable land-use, and unequal power relations, as highlighted by (Mochizuki et al., 2018, p. 379). The resilience application in the BVI conflicts with the premise to include local voices, and knowledge into the decision-making process that is promoted in the resilience literature (see e.g., Weichselgartner and Kelman, 2015, p. 263; Pfefferbaum et al., 2015, p. 103) and by authorities in the BVI (e.g., Sharleen DaBreo and Angela Burnett).

Twigg and Calderone (2019, p. 29) support this perspective, however, point at the interplay of local and national engagement, by pointing out that "successful programming should actively promote accountability and ownership, and systematically ensure that all relevant stakeholders are consulted where possible. This might entail including the perspectives of local stakeholders in monitoring, evaluation, and learning processes by using participatory tools that engage, not only target communities but also the local authorities and national governments."

As a result of the limited public involvement, the National Recovery and Development Plan is a highly controversial topic among the public. It has been accused of being a way to push through

development projects under the umbrella of recovery from Hurricane Irma. One example that is perceived as particularly questionable is the airport extension project. As Angela Burnett points out, the airport extension has been a lingering development project of the government for many years, and eventually, the project showed up in the National Recovery and Development Plan. However, what most of the public expected from the National Recovery and Development Plan, was considerably more financial and technical support for social projects in the communities and private businesses and properties. While combining disaster recovery and development is generally considered as the desired strategy of the disaster-development-nexus thinking, the limited public consultation, and ultimately the decision to include controversial projects into the plan, indicate a hidden agenda. This case exemplifies the mainstreaming of undesirable resilience characteristics in the development process, as pointed out earlier in this study.

As an employee of the government, Angela Burnett confesses that the public consultation process has not been successful and encourages everybody involved in the planning to think about ways of improvement. One point that she raises is that the process was extremely inefficient because it was done during the early recovery phase when residents and governmental authorities have been concerned with various other issues that minimized their capacities to concentrate on the public consultation. She asks the question of why recovery planning took place after the disaster has happened? Her argument in this regard is that it would be much more effective if parts of the recovery planning would take place in non-disaster time. This is mainly because of two reasons. Firstly, people would generally appreciate the planning process and its importance since they are not distracted by the impacts of the disaster. Secondly, planning processes could be much more thoroughly than it is the case after a disaster, where time pressure limits planning processes.

Even though the idea, per se, sound not very innovative, it is not a common practice in disaster management, nor has the topic attracted much interest in the resilience literature. In the BVI, it has not been practiced in recent years. While the limited literature on this topic (Smith and Wenger, 2006; Rubin, 2009; Culp et al., 2011) highlights that pre-disaster long-term recovery is often a neglected component in disaster management, information on the reasons for the lacking implementation are barely discussed. However, the question touches upon the essence of resilience thinking in various ways. Pre-disaster planning, for example, incorporates dealing with uncertainty, change and risk (Bahadur et al. 2010, p. 15), since a pre-designed long-term recovery plan would allow the society to engage with the risk of disasters in a prepared, future-oriented and positive way. Knowing what is coming after the disaster is important, not only from a financial perspective but also for emotional well-being. This point is indicated by the psychological resilience literature that highlights the relevance of psychological and population wellness (Norris et al., 2007, p. 133).

Pre-disaster long-term recovery planning moreover touches upon the resilience characteristic of proactive decision-making, which is attributed to the process-oriented resilience thinking (Matyas and Pelling, 2014, p. 4). As Mochizuki et al. (2018, p. 373) argue, “anticipatory elements of adaptive

and transformative capacities typically are overlooked" in the resilience literature and instead response capacities to crisis and disruptions are emphasized. The findings from the BVI show that anticipatory component of resilience thinking should be stressed and should be interpreted as a way to influence response capacities positively.

The most notable resilience characteristic of pre-disaster long-term recovery planning, however, is the transformative essence, which might also be one of the main reasons why this thinking is not embraced within decision-maker circles. Under the premise that pre-disaster long-term recovery planning would aim towards an improvement of the current status-quo, based on the principles of good governance, it should include public consultation and arguably target to tackle underlying structural vulnerabilities and power relations. Such a transformative approach might be inevitable after a disaster when the need for political changes is proclaimed within the society. However, in times of non-immediate risk and no social unrest, politicians and decision-maker might not expose themselves to this form of reshaping of the countries´ long-term objectives.

This perception aligns with the findings from Wilkinson et al. (2018, p. 1), who argue that participatory planning has been neglected by many of the Caribbean countries affected by Hurricane Irma and Maria and now requires a change in order to become resilient. The negative results of not having done long-term strategic planning for recovery can be seen in the BVI after the hurricane, where local ownership is barely apparent, and rebuilding often results in the same vulnerable conditions as before. For this part of the discussion, it can be summarized that particular resilience capacities allowed the country to move forward. Positive resilience outcome is most notably, through the SMART initiative that has been fostered in the BVI and enables governmental and public structures to rebuild resiliently.

Another moving forward capacity is the quick adjustment of inadequate laws and policies, which should not only be understood as a political and administrative step forward but might also have positive implications for community coherence. Nevertheless, the findings also revealed that resilient mechanisms do not always lead to an overall positive outcome that allows the country to move forward as a whole. Large parts of the society, most notably vulnerable expatriate households, as well as private property and businesses owner, often even struggle to reach a pre-disaster stage of socio-economic well-being. This problem is partly associated with financial reasons, but also to limited resources for rebuilding and the lack of political organization during the response and recovery operations. While resilience is promoted as a shiny future goal and a desirable development path, the realities in the communities indicate that parts of the society are not able to apply the concept in an adventurous way. The lesson that should be learned from this development is linked to the point that has been raised a lot within resilience literature in recent years; that if applied naively or uninformedly, undesired resilience characteristics are likely to be maintained and eventually cause the reinforcement of vulnerable conditions.

Resilience Building between spontaneous and deliberate Capacities

Whether resilience is a spontaneous or deliberate process has been identified as an unresolved issue in the current literature (see, e.g., Matyas and Pelling, 2014, p. 5). As such, this thesis aims to enrich the current debate with information from the BVI on this resilience aspect. One of the crucial characteristics of spontaneous resilience is the capacity to self-organize (see, e.g., Klein et al., 2003, p. 35). Maytas and Pelling (2014, p. 13) describe self-organization as "the capacity to form networks, institutions, organisations, or other social collectives independently from the state or other central authority."

In the aftermath of Hurricane Irma capacity to self-organize became very significant for the people in the BVI. The absence of state authorities, such as the districted representatives, police officers, or the DDM, in the first days and weeks after the impact, caused a situation of uncertainty, and people felt left alone. Interview participants repeatedly pointed at the importance of information exchange, that was severely hampered through the collapse of most communication systems. As such, residents highlighted the need to go back to simplicity, as noted in the following statement:

> "*So, if you actually had a board that you could change. Not an electronic board but some that you could actually letter on, whatever, and if you had those at major places, the information would be transferred easily. So, if you had a major board at Rightway (a big supermarket) and say 'this is happening today' then people could transfer that information to other people and you wouldn't need social network, you wouldn't need electricity, you wouldn't need everything to inform people of what is actually going on.*" (Residents)

The interviews revealed that a central place for consistent updates was missing, or at least was not provided through any governmental structures. The findings from the BVI show that information exchange in the first days after the impact was mainly provided from informal networks that developed spontaneously, for example, in Nanny Cay. As Julie pointed out, information exchange often happened coincidentally while "it literally was just whoever you ran into (…)" to receive information. The meetings that were held in Nanny Cay every afternoon, initially mainly included neighbors, friends, and colleagues. However, VISAR members have also been attending the meetings from the beginning. This circumstance can partly be attributed to the special context of the BVI with close networks within the British expat and marine community. VISAR that reportedly had troubles to connect with the DDM during the first period of disaster response got quickly into the informally set

meetings and switched from an originally governmental affiliation to a rather self-organized agenda. As Julie Schneider points out:

> "*What happened after Irma was just organic, is just everyone went into survival mode and how can we help, and what can we do, and what resources do we have? How we share those resources?*"

Driven by what works in practice, VISAR adapted to the prevailing chaotic conditions, self-organized their response to Hurricane Irma, and cooperated with other stakeholders, notably the marines that were based in Nanny Cay as well. The findings match with the statement from George and Stark (2016, p. 592), who highlight "that self-organising community networks can deliver spontaneous and adaptive crisis management outcomes that are beyond the abilities of the state."

While the results from this study indicate a general lack of governmental functionality and organized response efforts in the initial stage, there is no clear evidence that the change from working with DDM to working with the marines has resulted in more positive outcomes for disaster management and disaster resilience, than it would have without switching. However, it is understandable that people or organizations, as in this case, who have the resources to contribute to response activities feel the desire to engage, especially when governmental authorities are not reachable, or do not provide a clear strategy. Spontaneous self-organization and pro-social actions have long been identified in literature as typical behavior for people in a disaster context (see, e.g., Stalling and Quarantelli, 1985; Drabek and McEntire, 2003) and can be understood as forms of resilience that infuse resources and lead to creativity in disaster response actions, as Renschler et al. (2010, p. 21) points out. This case demonstrates that spontaneous elements of resilience have been used by individuals, as well as organizations, in response to Hurricane Irma.

A second area where the question on spontaneous or deliberate resilience became evident was the rebuilding of governmental and public buildings. A particular illustrative case presents the new DDM and NEOC building that has been mentioned before briefly. Local news in the BVI reported that Sharleen DaBreo, Director of the DDM, pointed out for years that the old DDM building was not able to withstand a strong storm, which proved evidence during Irma. Funding, however, was not available until the financial assistance after Hurricane Irma brought up new opportunities (The BVI Beacon, 2018). The case raises the question of why it was not a number one priority for the BVI to have a stable operations center for disaster management?

In order to be prepared for Irma, the buildings should have been strengthened or rebuilt before the storm. The buildings should have been resistant in order to make the system resilient. The financial capacities have been limited before the disaster (Wilkinson et al., 2018, p. 3; Charlie Peschardt, own source), but nevertheless, it is reasonable to assume that stakeholders within the BVI expected assistance (financial and technical) after a possible disaster. The fact that the dilapidated buildings have not been fixed – whether this has been a decision or caused by constraints – ultimately made the

country resilient. Funding and other resources, whether international aid or private donations, mainly became available because of the devastating impact.

With prior repaired and strengthened buildings, the impact would certainly not have been as catastrophic as it was. One question that evolves from this argumentation is whether development is only possible for financially limited countries through a disaster? However, a discussion about this topic is outside of the scope of this study. Nevertheless, this case is an example of how resilience can manifest on a national scale; that is giving up resistance, expecting a disaster with and associated money inflow, rebuilding more resistantly with assistance (more resistantly than it would have been possible without assistance), reaching an improved status quo. To assume that there could be an active decision behind the development in the BVI, would argue for a deliberate resilience. Assuming that Irma was an unexpected event, would argue that hidden capacities became accessible through a spontaneous event. As Matyas and Pelling (2014, p. 5) point out, "in the former conception, resilience is not something that is pursued or fostered, but an unplanned [sic!] or unintentional attribute that arises from the complex interactions of system components."

Other interpretations of resilience, however, promote to handle risk in a way that planning should address uncertainty (see, e.g., Bahadur et al., 2010, p. 15). Badahur et al. (2010, p. 15) point at the Survival and Recovery Approach that stresses a need for "flexibility at an individual, organizational, and systemic level, with each level able to respond and contribute to each situation, and to respond to shifting and unpredictable circumstance" (Rockefeller Foundation, 2009, p. 2). In relation to the BVI, it is reasonable to argue that the social and institutional learning process from previous disaster events and other disaster contexts (e.g., neighboring states) provided the government and decision-maker with sufficient knowledge to make a deliberate decision, a decision to take the risk while assuming that financial assistance would be accessible. This knowledge is certainly not similar to deliberate planning per se but can be assumed to be a pre-stage of planning with risk.

In a broader context, the discussion on spontaneous resilience and deliberate resilience mirrors the debate on community-centered bottom-up approaches and state-centered top-down approaches. Disaster management literature over the last decades increasingly promotes community-centered approaches, such as community resilience, to move away from traditional command and control systems, that "were largely centralised, defence-orientated" and "proved [to be] incapable of dealing with modern risks and the crises they incubated", as George and Stark (2016, p. 592) note. As such, communities are empowered to build their own capacities to overcome disaster events, and individuals, as well as neighborhoods, are expected to have a certain level of self-responsibility. The statements from Sharleen DaBreo indicate this understanding is also integrated into the disaster management activities in the BVI:

> "*People need to develop that level of resiliency within themselves. They have a responsibility to do things that will help them to bounce back, or to help them to withstand the impacts of the*

> *hazards (…) And there are many things that they can do: they can get involved in trainings, they can understand the hazards and learn more about them, they can be better informed about what they can do, and they can look at how their practices are impacting or having positive or negative effect on the ability of the country to prepare.* "

However, while this approach leaves wanted space for self-organizing networks within, governmental support remains a crucial component of disaster management, as the findings from the BVI show. Residents that have been interviewed blame government authorities for not stepping up in a crisis, whether it was the police that did not stop the looting, the district representatives that did not organize meetings, or the lacking communication and organization with and from DDM. Anger is of the resident is demonstrated in the following statements:

> *"Honestly, I can't tell you why not every district representative has a meeting every evening where people could come to share information. But there was none of that.*" (Miles Sutherland-Pilch)

> "*The government was just frozen, paralyzed. There was zero leadership.*" (Robert Philips)

Ideally, deliberate resilience components and spontaneous actions should mutually influence each other in a positive way, so that disaster resilience increases. George and Stark (2016, p. 592), for example, argue that "post-crisis recovery efforts become more profound when public participation co-exists alongside government intervention." However, what the case of Hurricane Irma in the BVI showed, is that the opportunities for governmental intervention have been very limited. The hurricane affected the whole Territory, which tremendously hampered the national capacity to operate, as Charlie Peschardt notes:

> "*I have never been anywhere where the entire country has been absolutely overwhelmed. Normally you go somewhere, and an area might be affected, but it is not the entire nation's capability and capacity that has been overwhelmed. But here, lost the ambulances, lost fire engines, lost the police stations, lost the police vehicles. Back to your communication question, lost all their mobile phone masts, lost all the radio masts.*"

The statement underlines that the intensity of the hazard and the small island context play an essential role in the way that governmental structures can operate. Hurricane Irma showed that even if deliberate strategies were part of the initial plan for response and recovery, it was hardly possible to induce those strategies. Kelman et al. (2011, p. 74) underline this point by highlighting that "dealing with 100% of a population, of a country, and infrastructure affected by a disaster presents its own challenges". In the BVI, those challenges manifested in the ability of the government to respond and to organize the recovery. As Angela Burnett points out, capacity building as a form of deliberate resilience is only possible to a certain degree for a small island like the BVI:

> "*So, it is not feasible for a small island context to have on hand all of the resources that you will need to recover. Because it is just not economically feasible. So, you will always perhaps be in this position where you will have to bring in the manpower that is necessary to do it. Now, I think what we could learn from this experience is how do we better manage that process. So, how can we make sure that we get.*"

Her statement shows that deliberate resilience on the BVI largely depends on external assistance, which, on the one hand, illustrates the importance of pre-disaster planning in order to act fast after the impact. One the other hand, it also illustrates that some components of resilience planning lay outside of the direct control of the countries' authorities. It is likely that the lack of direct control is accompanied by uncertainty, modifications of previously set plans, and spontaneous reactions to those changes. As such, the government and decision-makers in the BVI, partly rely on their ability to provide resilience spontaneously. Nevertheless, even though small island nations face a general resource scarcity, decision-makers should not neglect their responsibility for thorough, deliberate resilience planning. This case underlines that the context of a particular place is a determining factor in the way in which resilience operates (e.g., Kelman et al., 2015; Gaillard, 2010). The small island context of the BVI hampers comprehensive deliberate planning and consequently leads to more spontaneous actions.

For the disaster management efforts in the BVI, it can be summarized that self-organization, as a spontaneous act, grows with a lack of information, uncertainty, and frustration with governmental authorities. The presented examples indicate that spontaneous resilience increases when deliberate structures are missing, not accessible, or realizable. Deliberate planning is also a crucial component of resilience but largely depends on the capacities and resources available. In the BVI, those resources are limited due to the small island context, which makes the country depend on external assistance and susceptible to changes in the original plans. As such, governmental approaches to resilience need to incorporate both spontaneous and deliberate actions. It is also important to mention that the question of whether resilience is more spontaneous or deliberate depends on the stage of disaster management. For example, spontaneous activities in disaster management often appear in the response phase, where chaos dominates the scene, and immediate action is required. Moreover, the capacities of national authorities in the response phase are generally limited due to the impact.

The findings from the BVI indicate that both forms are applied. However, the case study does not provide information on whether one of the two resilient components is more important for disaster management than the other.

Reshaping CERT

Throughout the whole research stay, the question of effectively communicating and information exchange was very present, especially the communication between residents and decision-makers. As described previously, the challenges regarding communication have been diverse and can be observed in all the focus areas. While the findings show a clear need for improvement, the thoughts and ideas from the residents on how to improve mainly include singular and isolated topics. For example, how to inform residents properly on the insurance process, how to exchange information in the early days of a disaster if communication infrastructure fails, and how to communicate and organize public consultation processes. The findings and experiences of the research stay also reveal that there may not be a broader and systematic approach to improved communication and information exchange that encompasses different spheres of the society and multisectoral partnerships in the BVI.

The CERT initiative, fostered by the government, presents an attempt to connect community needs to the overall disaster management strategies of the Territory. One argumentation of this thesis is that CERT provides capacities that, if used more efficiently, can contribute to overcoming some of the most significant communication challenges. CERT has a considerable potential to promote disaster resilience in the BVI. Not only in the immediate response phase, as the name indicates, but also in other phases of the disaster cycle, such as Mitigation, Preparedness, and Recovery, and ultimately could contribute positively to individual empowerment (S2, Q28), and social coherence within the multicultural communities of the country, as indicated through the data material (S1, Q11, Q12, Q13, Q15; S2, Q14, Q23). Nevertheless, the existing challenges regarding CERT, as examined previously, need to be addressed and minimized in order to make any attempts to process possible.

The broadening of CERT activates is not the exclusive idea of the author, nor a BVI specific perspective. The idea has been promoted within the Caribbean disaster management community, notably through the work of CDEMA which is, for example, underlined by Lionel (2015, p. 72) arguing that "opportunities should be taken for CERT members to become active in their communities outside of emergency response." Until now, CERT activities are primarily disaster response-oriented. CERT volunteers learn about topics such as "fires safety, disaster medical operations, light search and rescue, and team organization" (Lionel, 2015, p. 69). Moreover, CDEMA's CERT training sessions emphasize teamwork, problem-solving and map-reading, and leadership, as Lionel (2015, p. 69) points out. In the BVI, CERT courses are a bit shorter but mainly include the same, as Charlie Peschardt notes:

> "*It is kind of a formalized system in the USA. It's a good course, five days, it is an excellent introduction to disaster response, as far as I am concerned. I think it gives some good basic skills in terms of Search & Find, or Search & Rescue particularly, First-Aid, a bit on awareness on psycho-social health as well, Damage Assessment, Impact Assessments and hopefully or normally includes something around where you fit into the wider picture as well*

> *and a bit of instant management*. (…) *The CERT course is a 35 hours course, right? Four days Monday to Friday for a week normally. That the standard. BVI, for reasons described, availability of people, they have a slightly abbreviated course, I have seen the abbreviated course elsewhere as well.*"

After adopting the CERT approach a few years ago and the establishment of CERT groups in the communities, the DDM toyed with the ideas of a more integrative approach towards community participation in disaster management. As a result, Campus CERT was established, a way to integrate teachers and especially the youth. Within this process, CERT was integrated into public education programs and public awareness programs. Today schedules increasingly focus on climate change, on environmental risks, greening life, while the Territory fosters the implementation of SMART schools. This comprehensive approach forwards disaster risk management is promoted as international best practice and is particularly well-established by CDEMA for the Caribbean region (CDEMA, 2014). As such, the BVI already has promising structures and approaches to comprehensive CERT initiatives in place. However, the existing conceptualizations do not necessarily fit the purpose of improving communication and information exchange in disaster management, at least not the specific challenges that have been identified in the context of Hurricane Irma. Hence, the following conceptualization of CERT aims to incorporate solutions for those challenges.

The research shows that CERT could be much more productive in reducing the impacts of disasters when it is positioned as an information exchange and community organizing group, rather than solely being a response group that focuses on operative actions. The argumentation with this is that a sound basis of partnership, participation, ownership, and recognition is crucial for the outcome of the CERT initiative. This notion matches with the statement from Lionel (2015, p. 69), who notes that "pre-disaster planning, preparedness, and citizen involvement – as embodied in the CERT programme – are critical to decreasing the immediate and long-term impact of disasters."

Light search and rescue and the medical treatment of wounded persons, as it is taught in the CERT courses in the BVI, are certainly useful training and particularly relevant for isolated communities. The medical knowledge of CERT members might also relieve emergency service and allow them to focus on the most relevant cases, which can be crucial considering the limited number of professional paramedics and ambulance vehicles on the smaller and less populated islands of the BVI, but also on Tortola. However, the findings indicate that CERT actions within this field of response do not have the most significant impact on resilience in disaster management. The survey results also state that the CERT training contents often remain without application in real emergencies. As such, around 40% of the persons have never actually used their CERT skills in real-life events (S2, Q10). Around 60% of the CERT members have not been involved in the response (S2, Q8), and if they have been involved, it was often in the form of debris and road clearance and relief distribution (S2, Q9).

Hence, CERT needs to be integrated differently into pre-disaster planning and organization, as it is the case. The following two examples explain how CERT resources can be integrated and implemented in order to build resilience more effectively.

The first example relates to the emergency response, yet, to the time after the initial search and rescue and medical treatment, which depending on the disaster type and time of the day, might be a few hours later or on the next day. CERT resources could be used to establish meetings for information exchange. As identified previously, after Hurricane Irma, those meetings mainly resulted from spontaneous actions, and information exchange took place rather accidentally.

Hence, many residents did not know about the meetings. Due to the geographical and social proximity, CERT members could initially organize meetings at a central place and make sure a high percentage of community members take part in it. This could be possible through walks around the neighborhoods or previously distributed flyer with a set place and time, or with boards at central places in the communities, as underlined by some interview partners.

Moreover, previously planned meetings by CERT could increase the quality and quantity of information, since CERT should have the opportunity to consult with DDM about the latest updates on emergency response operations. As such, CERT groups and DDM established strategies together about what exactly to do in a major disaster event. CERT members could get individual or small group tasks to cover a wide range of useful information in disaster response. For example, water supply, security, road clearance equipment, shelter, evacuation, contact with government, safe lists/contact to family members outside of the country, and try to gather as much reliable information about those topics every day to present them at the meetings. Ideally, the presentation of useful information on the meetings would lead to an increased sense of security, increased participation of community members, and a structured organization within the neighborhood to tackle the challenges that come along with the impact.

In terms of the outcomes that CERT presents for resilience building, the thoughts from Charlie Peschardt that "it is thinking through the extra step, rather than just CERT training being an outcome," describe best how this conceptualization interprets CERT. CERT should be understood as a connecting element between DRM decision-makers and the community that creates new channels of communication and information flow. As Charlie Peschardt describes, every community needs to have a slightly different response because every community has a different context. That context is determined, for example, through the accessibility of governmental structures such as hospitals, police, fire station, or schools, or the geographical conditions that may cause disasters or hamper response, such as roads being unpassable, ghuts[3], areas at risk of flooding and landslides. The mapping for response and recovery activities should also include particularly vulnerable households and

[3] Ghut is the local term for a drainage channel. Areas close to ghuts are at particular risk of flooding, especially if debris, plastic, or other materials accumulate in the channels and block the water flow. Hurricane preparedness in the BVI generally includes ghut clearance. However, the combination of strong winds and heavy rains frequently cause flooding in ghut areas (see, e.g., Virgin Islands News Online, 2019).

individuals who require the most attention. While this type of mapping seems to be a considerable amount of work, the CERT volunteers have advantageous capacities to address that kind of information. Firstly, they live in communities and have profound knowledge of the location, about families, and the potential risks. Secondly, the CERT initiative can build on the support of the government, in particular on the DDM. That support might be technical, but it also includes a form of political support. CERT is considered and promoted as a crucial part of the national disaster management strategy and, as such, can receive NGO assistance (e.g., survey development and distribution, implementation of public consultation process), equipment, and training from the DDM and other partners.

The second example shows how CERT groups could engage with the community in non-disaster times. The argument is linked to the previously discussed topic of pre-disaster response and recovery planning to be advantageous for resilience outcomes. In this context, CERT can play a mediating and information exchange role and could, for example, organize a more suitable frame for public consultation processes. Moreover, CERT groups could be able to get into the communities and talk to families about "hot topics" in disaster risk management and how it relates to them. For example, the importance of disaster insurance, as well as the processes and problems that come along with it.

While it is reasonable to argue that CERT volunteers might not be experts in the insurance business, the main reason of those talks would be to raise awareness, to put a topic on the table that is not always of highest concern but, as Charlie Peschardt points out, is a very important component of the resilience package. With that in mind, it could and should be an aim for CERT members to engage with DDM on insurance business and policies. Through the consultation, it might be possible to invite an expert on disaster insurance to the BVI and to organize a public consultation meeting. This could be combined with public awareness campaigns. In this context, Angela Burnett argues that "people […] cannot be resilient unless they have the information to be resilient". Consequently, especially residents that are not well informed have limited resources or are particularly vulnerable (e.g., retired, illiterate, non-native speaker) should be encouraged to join the meetings and get individual information.

This understanding of CERT draws on several concepts that are currently perceived as best practices in DRM and development studies. Among others, the concept also highlights the importance of integrating the community approaches with other administrative levels and different sectors of disaster management, such as the integration of energy firms, insurance companies for public consultation, and civil society organizations for social support.

While CERT emphasizes community-based approaches, such as participation and ownership, the initiative enables households to prepare more effectively for disaster and is likely to contribute to community cohesion. It also aims to relieve limited national capacities in emergency response. The CERT program illustrates the importance of vertical integration, the interplay of the regional, national, and local, as well as horizontal integration, the interplay of different actors in different sectors (e.g.,

government, non-governmental organizations, local businesses, insurance companies, civil society organizations, volunteers, community members), in disaster management. Hence, one argumentation of this study is to highlight the strengths of CERT more efficiently through a reshaping, most notably the ability to connect community and decision-makers.

Concluding Thoughts

The findings from the literature present a vague picture of resilience. Among scholars in the field of disaster studies, the prevailing interpretation of resilience is a broad concept that encompasses various disaster concepts, such as resistance, adaptation, and transformation (Twigg, 2007, p. 6; Mochizuki, 2018, p. 379). However, conceptualization from less comprehensive disciplines than disaster risk management (e.g., engineering, ecology, psychology) yielded a narrower understanding and limit resilience to the capacity of bouncing back to a pre-disaster condition, occasionally separating the concept from resistance, adaptation, and transformation (see, e.g., Holling, 1973; Bruneau et al., 2003). As such, multiple, and at times competing, resilience definitions exist (Demiroz and Haase, 2019, p. 320), which poses a dilemma for those who engage with the concept.

While a resilient system is most accurately captured through a broad understanding of the concept (the capacity to resist, bounce back, adapt, move forward, transform, etc.), the individual components and subsections often require a particular approach or evolve from a particular capacity (e.g., stability/resistance is beneficial for infrastructure, but rigid immigration and labor laws are disadvantageous). This ambiguity has implications for disaster management in the BVI. Residents seem to be increasingly confused and frustrated with the concept and become "turned-off" and "disinterested" by the "overwhelming concept" (Sharleen DaBreo, own source) because it becomes more and more difficult for them to grasp what is required to protect lives and livelihoods. This confusion is expressed illustratively Sharleen DaBreo in the following interview section with:

> *P: Build back better is going to take a long time, and government is going to have to have the resources to give to the people, to help them, to do the add on. And you can´t say to people "you have to build back better, so wait, because we need to inspect your roof and your designs need to be better (…) So, it is a real challenge in trying to build back better, build with resiliency, and then still try to understand what can I do for my community to make it more resistant.*
>
> *I: So, as I understand, sometimes it is neither one of those things. It is neither being resistant, nor resilient if the money or financial resources fail. Then it is more like: I adapt to that point where I can live with it.*
>
> *P: Yeah, then it is probably adaptation. You are correct. So, there are all these terms that are thrown out now, and people have to figure out as a community individual what can you afford*

> *to do right now. You can´t afford to do nothing. You just can´t. You have to protect yourself because these storms are gonna come again. So, do you adapt, do you become resilient, do you build back better, or do you become resistant? The environment seems to be more and more complicated. People simply want to know what do I need to do to protect myself when the next system comes. The answer to that, in this day and age, is very complicated.*

While the hazardous situation increases in complexity (e.g., cascading effects, feedback loops, multiplication of other risks and bottlenecks), intensity, and frequency through a changing climate, the increasing number of terms, definitions, and conceptualizations on how to respond, is likely to exceed knowledge, and/or capacities to engage with resilience in a deeper way.

In addition to the previously mentioned concepts (resistance, incremental adjustment, adaptation, transformation), there are other prominent concepts, such as future-oriented and sustainability thinking, that contribute to a complex environment in the disaster-development-nexus. In particular, sustainability tends to conflict with resilience in certain areas. Especially in its bouncing back interpretation, resilience might not aim towards the same objective as sustainability. That is due to the difference in handling resources. Sustainability promotes resource-friendly and long-term use, while in the narrower resilience understanding, the most important objective is to come back in a preferably quick way, with arguably less appreciation for the type of resource and the way it is used. Moreover, rebuilding to a point where failure, damage, and collapse is already assumed, can be interpreted as a waste of resources, which is the opposite of what sustainability promotes. A deeper analysis of the points of confrontation between the two concepts goes beyond this study but could contribute to clarify conceptual ambiguity. The study from Marchese et al. (2018, p. 1278), among others, presents a vague notion of the relationship between the two concepts while concluding that some concepts see resilience as a component of sustainability, others see sustainability as a component of resilience, and again others emphasize the separate objectives.

While the complexity of the resilience concept and the resulting confusion has been addressed much within this study, the positive characteristics of resilience thinking, and resilience implementation have been evident as well in the BVI. A lot of the disaster management activities that allowed the BVI to prepare, adapt, recovery, and move forward in the context of Hurricane Irma can be attributed to the resilience concept. Frankly, the broader the concept is understood, the more positive disaster management activities can be ascribed to resilience. Hence, the reshaping of laws in housing, labor, and immigration policy, in combination with the re-organization of governmental authorities, might only be understood as a resilience attribute if adaptation is included in the conception. Yet, even in the narrowest understanding of resilience as a solely ‘bounce back to status quo’ ability, there are resilience activities that contributed positively to DRM. As such, the imposed curfew, community cleaning, or external relief supply all had the primary goal of providing stability and returning to a pre-disaster stage, without a clear agenda to move the country forward.

In order to close the gap between the advantageous outcomes of resilience and the harmful outcome if not applied appropriately, decision-makers play a significant role. Disaster management practitioners have a great sphere of influence with access to all stakeholders. They furthermore have crucial information on hazards and impacts, and a certain form of solidarity with the affected people; at least the experiences from the field research indicate this perception. The positive connotation of resilience and the promotion of the concept in international best practices, however, puts disaster management practitioners in a precarious situation. On the one hand, resilience-building projects attract international donors, and financial support is a welcome invitation for governments that struggle with depth and limited resources.

On the other hand, decision-makers are interested in reducing inequalities to maintain social cohesion and reduce the risk of unrest and conflicts. As such, it should be in the interest of decision-makers to carefully examine how resilience is going to be applied locally and promote an environment that leaves nobody behind. Moving forward after a disaster, thus, requires a holistic resilience approach. Hence, it can be summarized that resilience' role in DRM depends on the interpretation of the concept. While the positive role of the concept could be identified within the DRM process in the BVI, resilience outcomes are not fundamentally beneficial. If not implemented adequately, resilience initiatives are likely to reinforce structures that increase the risk of disaster, rather than reduce them.

5.2 Limitations, Recommendations, and Future Work

Limitations of the Study

The field research was conducted in the Hurricane Season 2018 between August and December. One reason for this particular period was to experience how the country prepares for hurricanes and to experience how local communities and the governmental structures work in the immediate aftermath of a disaster. The initial idea was to take the information from Hurricane Irma as a baseline and build the research around the data from the 2018 Hurricane Season to examine improvements.

Since the 2018 Hurricane Season was very quiet for the BVI and no storm approached the Territory, the author was not able to experience the preparation (the very last preparation a few days before impact) and disaster response operations. Those experiences could have contributed to an improved overall understanding of a disaster context and could have yielded more in-depth knowledge about the topic. As a result, the study draws on data that has been collected around one year after Hurricane Irma, and the research focus shifted from a solely response-oriented study, towards a broader focus on disaster resilience. In terms of the interviews and surveys, the year between the event

and the data collection could have led to unprecise and forgotten information. As such, the study is limited due to the time between the event and the data collection.

Another limitation is the type of data that has been discussed. Only written documents, books, and journal articles have been examined during the study, and the vast majority of the literature has been in English language. In terms of the surveys, only residents that were capable of English language and literacy have been able to participate. The Spanish-speaking, French-speaking, and Creole-speaking (and others) population on the BVI mainly has been excluded from participation. The exclusion could be particularly relevant because expatriates and non-native speakers have been identified as especially vulnerable groups. The reason for this decision has been explained in the methodology chapter.

Recommendations

The recommendations from this study emphasize some strategies to improve disaster risk management in the BVI. As such, it is vital for the BVI governmental authorities but also the BVIlander to further engage with the expatriate community to provide an environment where everybody who lives in the country feels wanted and secure. Frankly, this is not a one-sided process that only held the 'belonging' population responsible for social cohesion. However, the power imbalance and the fact that the national well-being largely depends on expatriates should encourage everybody to work together. The adaptation of rigid work, labor, and housing laws can be understood as a step in the right direction.

Moreover, an environment should be established where the use of cisterns is promoted. The traditional water-saving practice proved to be a beneficial and reliable resilience resource in the aftermath of the storm, where 'new' technology and power-depend water supply lacked. The strategy to cistern use would draw on capacity building for maintenance and functioning, as well as a comprehensive and decentralized use with the aim that every household/house has its own water supply. Decentralized salination plants, as proposed in the interviews, might also help in this regard. Their effectiveness depends on similar features (capacity building for maintenance and functioning). Public-private partnerships, as well as other multi-sectoral partnerships, have been strengthened in the BVI within recent years. Those partnerships demonstrated their value during Hurricane Irma (e.g., Nanny Cay as an emergency response hub, the flooding education center on Virgin Gorda, the hazard identification application) and should be fostered in order to generate positive synergy effects for disaster risk management.

Ultimately, one of the most notable recommendations that evolved from this study is that resilience initiatives are not inherently positive. Resilience needs to be implemented carefully, include marginalized households, and aim towards cohesion and equal development paths.

Future Work

Irma was the first very strong Hurricane that hit the Territory of the BVI since Hurricane Hugo in 1989. As such, there has been only a very limited social and institutional memory of those superstorms and their impacts. However, it is argued that social and institutional learning have significant value for disaster risk management (Berkes, 2007, p. 287). Future investigations on the BVI, therefore, might address how social and institutional learning has been established after Hurricane Irma and how it affects disaster resilience.

A large portion of scientific work focuses on 'the vulnerable,' or 'the poor,' and the people most affected by a disaster. While it is important to hear the choices of the unheard, the last decades of development cooperation, yielded a large body of empirical evidence about what the needs, capacities, and conditions of vulnerable people are. The success of implementing adequate response, however, remained expandable. As a result of this study, the author proposes that in order to strengthen resilience effectively, more emphasis should be put on the constraints, responsibilities of decision-makers in disaster management practice. The argument is that decision-makers have the relevant information to be resilient and as such, play a crucial role in transferring empirical research and other relevant information into something that people in the communities can work with. For example, everybody that worked with disaster knew about the insurance process and how they work, but for the general public, it was the new ground. Or, Team Rubicon and the Marina industry knew about how to operate with VHF´s because of their military, marine background, but most of the public did not. Future work should, therefore, concentrate on marking the frame in which decision-makers should engage with communities and residents, to provide a guideline of responsibilities and actions that could help to be more resilient as a whole society.

The study briefly touched upon the relationship between resilience and sustainability. The argument in this study is that resilience and sustainability might not have the harmonious interaction, that was presumed by the author, and that could be interpreted from the current international use of both concepts as a connected approach to human development (see, e.g., UNECE, 2019; United Nations, 2015). As such, the author proposes that future work might review the relationship critically.

Another thought from the author cycles around the perspective of research in disaster literature. Most research engages with disaster resilience through western lenses. The large proportion of new empirical material from western perspectives ultimately leads to a manifestation and reinforcement of those perspectives in literature. Hence, a lot of the best practices currently applied in disaster research and development cooperation are built on western concepts, such as participation and community

involvement (inclusion). Yet, most of the disaster affected areas are in regions that are not necessarily in the stage of development where those concepts can be applied without raising further social and political conflicts and are probably even detrimental for resilience building. Since it remains a challenge to implement non-western literature on a broad scale (e.g., due to language issues, or accessibility, or the quality of academic writing skills that are required for journal articles), it should at least be a responsibility for future work to focus increasingly on potential conflicts that occur due to the inappropriate application of western practices.

6 Conclusion

Hurricane Irma left the British Virgin Islands in devastation. The 6th of September 2017 demonstrated how vulnerable the Caribbean region, and in particular small island states, are to the impacts of increasingly intensifying storms. Despite the enormous challenges after the hurricane, the country was able to cope with the immediate impacts and to initiate the subsequent recovery process. Resilience has become a prominent concept to engage with disaster impacts, because it emphasizes the capacities that communities and nations have to cope with disasters, unlike many other concepts in the field that mainly focus on risks, hazards, and vulnerabilities.

However, the literature review reveals a broad understanding of resilience in the field of disaster risk management, which in parts results from the diverse origin of the concept, as well as the multi-sectoral essence of disaster risk management itself. While resilience is mainly understood as a set of capacities that allows a system to overcome the impacts of a disturbance, there are different ways to do so. A resilient system can be stable and resist disturbances. A resilient system can get damaged, but then quickly recover. A resilient system can also learn from and adapt to disturbances, or a resilient system can change fundamentally under the circumstances of a disturbance, disruption, or damage. The transition, however, is not always clear, and subsystems within a broader system can perform in different ways and at a different pace. As such, various resilience definitions and conceptualization currently exist, at times, with competing meanings. However, there tends to be common ground among scholars to understand resilience as a system approach and as an overarching concept, encompassing other conceptualizations, such as resistance, adaptation, and transformation.

The primary aim of this thesis was to investigate the role that resilience plays in the disaster management of Hurricane Irma in the British Virgin Islands. The results from the case study show that resilience plays a significant, however, not entirely positive role.

Both spontaneous and deliberate resilience capacities enabled the country to overcome the impacts of the disaster and to move forward. This is demonstrated, among others, through self-organization in the absence of governmental response, the quick adaptation of inadequate immigration and labor policies, the SMART rebuilding initiative, the use of traditional water-saving systems, and the establishment of public-private-partnerships illustrate the positive implications of resilience thinking in the British Virgin Islands.

Applying the resilience concept in the BVI also brings forward negative aspects. In this context, the findings from the British Virgin Islands match with the criticism of the literature; that is that the promotion of the concept as a shiny future goal and desirable development path is problematic since undesirable properties of the system might as well be reinforced through resilience initiatives. In the BVI, this problem becomes most apparent during the rebuilding process, where funded resilience

initiatives rebuild the public and governmental infrastructure, while private households and businesses are not capable of following the pace and struggling to move forward and even struggle to reach a pre-disaster condition. This problem can partly be attributed to the inadequate application of resilience measures, such as a lack of communication and information exchange, limited public consultation, or insufficient capacity building that hampered emergency response and recovery. However, it can also be attributed to the increasing number of terms, definitions, and conceptualizations on how to respond to unknown and unprecedented risks that cause confusion and exceed knowledge as well as capacities to engage with resilience in a more profound way.

Hence, one central argument of the study is that resilience initiatives need to be implemented in a manner that includes vulnerable households and communities, instead of pushing forward resilient recovery for some parts of the country only. If not applied carefully, resilience is not the positive development path, that it is connotated with but, eventually, a cause of marginalization and exacerbated inequalities.

In order to engage with imprudent resilience application, the study ultimately presents a reshaped form of the CERT initiative that tackles precisely those challenges that have been predominant in the disaster risk management of Hurricane Irma. Most notably, the conceptualization improves the communication and information exchange while connecting communities with decision-makers, not only in the response phase but also during mitigation and preparedness processes. The argumentation is that comprehensive disaster risk management needs to incorporate community voices and decisions in non-disaster times in order to adequately raise awareness, and plan for long-term recovery after possible future disaster events.

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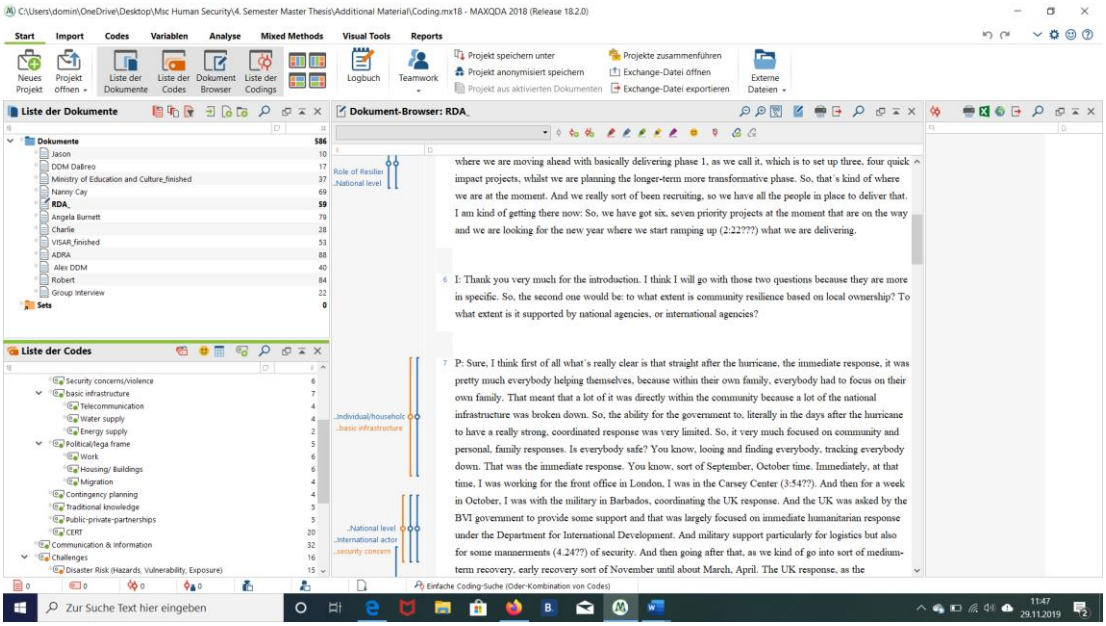
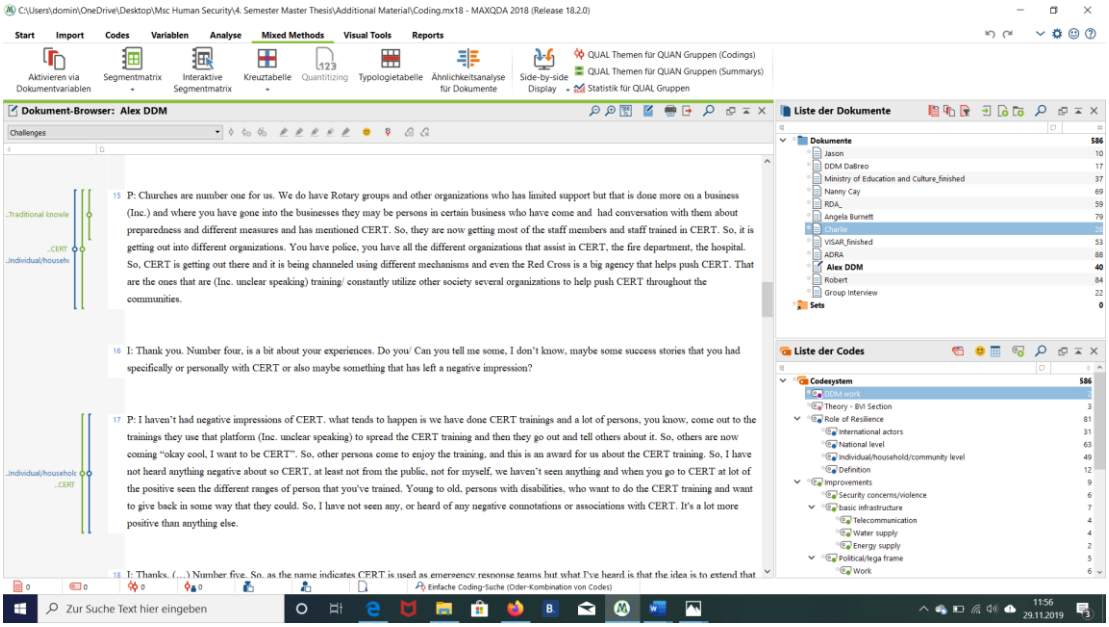
Appendices

Appendix I – Qualitative Data Analysis

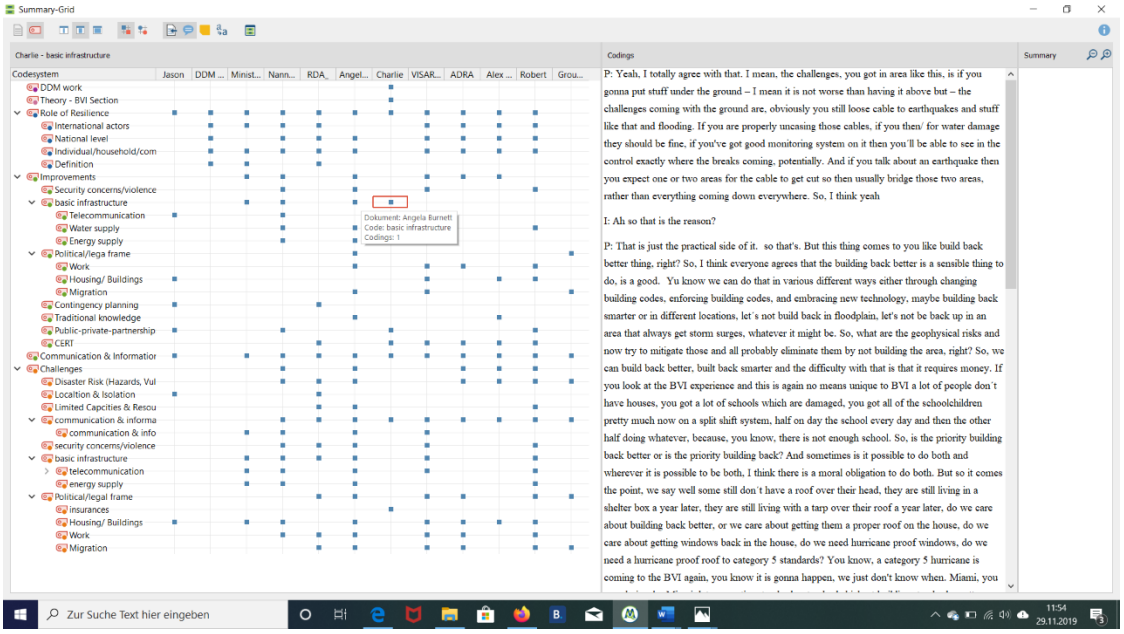
Content Analysis: Coding, and Category Development (1)



Content Analysis: Coding, and Category Development (2)



Content Analysis: Graphical Analysis, Summary Grid



Appendix II – Summary of relevant interview sequences

Sharleen DaBreo, Director, Department of Disaster Management

P: If you are talking about community resilience, you are talking about the ability and the capacity for a community to quickly overcome challenges or difficulties that they face as a result of the impact of hazards. Your question to me is: To what extent is community resilience based on local ownership and to what extent is community resilience supported by the national agenda and international actors. So, you have a three-part question there. If you are talking about community resiliency based on local ownership: people need to develop that level of resiliency within themselves, they have a responsibility to do things that will help them to bounce back or to help them to withstand the impacts of the hazards. Now, the whole concept of resiliency is a word that is becoming very generalized, that is thrown around a lot, there is even now the discussion about weather systems should be resilient, or they should be resistant. Some systems, you want them to be resistant, so they don't collapse, but they are able to withstand impacts. When you are talking about resiliency, that doesn't mean that you are not going to have failure, it's just it is not going to the point where it's going to be detrimental.

(…)

P: I don't think/ I think people are having a challenge in understanding what does resilience mean. How do you get/become resilient for a hurricane like Irma and Maria that the winds are off the charts? There is no textbook that defines the characteristics of these superstorms. These are storms that there is an unknown, there is not this institutional memory, there is not this historical trend of these things happening. So, people don't know what needs to be done to withstand or to protect themselves from these types of events. So, the unknown is scary. The unknown is uncomfortable. So, speaking the language of resilience, the way that we are using it – we are using it in so many different ways – I think at some point in time, people become turned off. People become disinterested because they feel that it is an overwhelming concept to them because these events are becoming so intense. And the destruction is becoming so difficult for them to understand.

When you talk about resistance – which is the point we were getting at before – resistance is the ability not to be affected by something. So, you want to have, for instance, communication systems to the point where even if they get hit, they are not going to topple down. When you are resilient, you can get hit, you can fall, but it is saying that you are giving yourself an ability to get up again. You need to have some portions of your infrastructure, that even if they get hit, they are not breaking, they are withstanding, they are pushing back on that force. That force is not taking them down. So, what I am saying is that: do we continue to think about resiliency, because resiliency has a/ there is a cost implication because you can't strengthen systems to the point where they will never fail. What it is saying is, if it fails have something to be able to help it to recover. But do you plan that way, and if you plan that way, you are always going to have to have a lot of resources, financially, physically, emotionally. You gonna have to have built up in a bank sitting there, waiting for this impact. Or do you strengthen some of your physical systems to the point where they will not collapse? You plan and design, and you construct for the super, super, super event. That's going to take upfront cost that countries may not have.

So, it is good to talk about resilience, it's good to talk about building back better, but the concept is not well researched. Because people need to understand: what does it mean to build back better in the Caribbean, for storms that no one has ever experienced in history before until now? People, right now in the BVI, just want to build. The concept of building back better is not financially viable for them. They just want a roof on their homes, they wanna be able to put windows back in, they wanna get their businesses up and running, and that's people's initial thought. Build back better is going to take a long time, and government is going to have to have the resources to give to the people, to help them, to do the add on. And you can't say to people “you have to build back better, so wait, because we need to inspect your roof and you designs need to be better.”

You gonna have to have a lot of money to inject in there to say to people “we gonna give you the help to strengthen your roof, strengthen this, to do this, too that,” that doesn't take (inc.) when you get hit by these superstorms, because people just simply want to get some roof over their head. So, it is a real challenge in trying to build back better, build with resiliency, and then still try to understand what can I do for my community to make it more resistant.

I: So, as I understand, sometimes it is neither one of those things. It is neither being resistant, nor resilient if the money or financial resources fail. Then it is more like: I adapt to that point where I can live with it.

P: Yeah, then it is probably adaptation. You are correct. So, there are all these terms that are thrown out now, and people have to figure out as a community individual what can you afford to do right now. You can't afford to do nothing. You just can't. You have to protect yourself because these storms are gonna come again. So, do you adapt, do you become resilient, do you build back better, or do you become resistant? The environment seems to be more and more complicated. People simply want to know: what do I need to do to protect myself when the next system comes. The answer to that, in this day and age, is very complicated.

Robert Phillips, Resident

P: (…) However, it also doesn't have any resources, doesn't have the resources that you have in a larger country, and that was very obvious that there was zero government response to the disaster in the first few days. There were no police out. There were no Armed Forces. There were no other what the Brits/ you know when they finally came and landed. There was no government agency. There were no elected officials standing up saying 'okay' and organizing work. It just didn't happen. The government was just frozen, paralyzed. There was zero leadership. Disaster Management who or what is Disaster Management? It is a bunch of people in a little building up the hill that got destroyed, so what were they going to do? Organize what? (…) So the response – and I am actually very disappointed that the police don't have an anti-looting schedule – every police officer should be tasked to a place to go as soon as they can get out of their house and go there and prevent the looting. So much of the BVI was damaged from looting. A lot of boats were fine except people broke into them, took everything, and then left them open to the rain. Buildings. The grocery stores, you know, why do they have to break into them. There wasn't a shortage of food anywhere. And why would they break into jewelry stores (soft laughing), why would they break into that. And where was the police, were was the government. And then when relief started coming in (…), the one thing that was really sad was the local's treatment of the expat community, in particular, the down islanders. They were denied relief. They were told when they would go to get the little bits that they needed "no, no, locals only," and so that attitude was probably the saddest part of the experience. Cause these people were here before, working, they are working in all the menial jobs that the Islanders don't want, won't take. And then they were treated that way. It was just disgusting.
(…)

P: We are talking about the Haitians, the people from Dominican Republic, the Filipinos, the Guyanese, any of the down islanders, the Caribbean peoples who were not BVIlanders. They were being denied the relief that was sent in by other countries, other people, other charitable organizations. The BVI Islanders were taking everything and not giving it to the people who actually needed it the most. Government officials, there were two ministers that were seen taking generators. They had generators at their own houses. (…) This was/ anyway if it hadn't been for the British government sending in the Marines, if it hadn't been for the Governor stepping up and starting to organize things, we'd still be in chaos.

(…)

P: Well, the attitude of the locals can be summed up by the immigration policy. You have belongers and not-belongers. You know, which isn't that uncommon because I was a registered alien in the US (soft laughing) for 20 years, but the non-

belongers are treated as second-class citizens, certainly in the relief that was sent, and they were giving, not even non-preferential treatment, in many cases, they were simply denied. And it's always been the attitude here, and part of it is because the indigenous population – I can't say indigenous – but the local population is less than 50%. The country cannot, the territory cannot function without the expat population. They are the ones doing the menial jobs (…) in a lot of cases. When I am talking about the Islander expat community, you know, there are a lot of businesses owned by white expats, a lot of businesses owned by non-white expats but/ and I believe if it wasn't for those businesses who kept their employees employed, because a lot of the locals just said "sorry, we're closed" and their employees were left fend for themselves. And these are the people that are probably making 150$ a week, how to they fend for themselves when they don't have any income (…). And we kept we get all of our employees working throughout the recovery, we were finally back open for business the second week of November, but we kept all of them open cleaning up because they needed that income, they could not survive without it. And so, it/ the country and its recovery is dependent on everybody working together, and that wasn't happening.

(…)

P: For the population after Irma shrank by one third. Anybody with kids had to leave the island because there were no schools open and they weren't going to be open, so and a lot of the expats, the poorer expats had to leave as well because they had no income and no way in which to earn anything, so which actually was then detrimental to the recovery because a lot of these people were/ would have been the construction workers, so then everybody had to bring in construction workers (laughing). Instead of looking after those that we already had, a lot of them had to leave, and then we had to bring more. (…) So, it was real/ it is very shortsighted on the part of Immigration and Labor, that they don't streamline their processes to make it possible for people to change jobs. “Okay so the business I work for was destroyed, here is another business that I can go to work for, but I have to leave the island to get another work permit?” also “if I scrape together the money to fly back to the Philippines, do you think I am coming back? Hell, no!” It's just/ it is so shortsighted. It's their way that they are trying to keep a lock on everything (…) instead of just being open about it. So, and a lot of the locals have suffered because it's their properties and they haven't been fixed. You know (…).

(…)

P: We see a lot of the people, a lot of them certainly in the expat community everybody rebuilding their house, rebuilding their businesses to a much higher standard. The issue always is that it is a very small country, everybody is related at some level, and it is very hard for the government to push or to enforce better building codes. How do you tell your mother, father, grandfather, cousin, nephew whatever that “no you can´t do that, you must do it like this?” It just doesn't happen. It doesn't work. So, passing the ordinance of that planning for roofs didn't result in any of buildings build any differently than the owner wanted to.

Angela Burnett, Environmental Officer, Ministry of Natural Resources, Labour and Immigration

P: So, when I think about community resilience and how it is enabled in the BVI, and you are considering mitigation, preparedness, response, and recovery, right? For me, there are a number of layers. The first one is appropriate information. So, people, I think, cannot be resilient unless they have the information to be resilient. So, I´ll give some examples of that. Everybody knew we were expecting a category 5 hurricane. There were some uncertainty on whether we would have a direct hit or not. One of the things that personally surprised me how we all received the same data, the same information, but people processed and reacted to that information in so many different ways. Like myself and a few other colleagues I knew, we were

freaking out from the beginning, because we had a very clear – even though nobody had experienced that intensity of a hurricane – we had some clear foresight to what the potential impact of that would have been, whereas other people took it very lightly, you know, had no idea that it would result in that level of devastation. And what can really be described as catastrophic damage. So, I think, in general, the majority of the public had no meaningful appreciation of the scale of impact that they could have reasonably expected from this hurricane.

I think what helps to facilitate that sort of lack of appreciation was the fact that most people that went through Hurricane Irma have been gone through Hurricane Hugo in 19 – when was that – 98. And Hurricane Hugo was a very strong category 4. However, I think in the scheme of things, certainly in comparison to Irma, the impacts from Hugo – compared to Irma – were minimal, right? So, life was able to bounce back within a matter of a few weeks. You know, losing a roof was the exception, as opposed to the rule in Hurricane Hugo. So, I think people looked at that and said okay "that´s a strong cat 4, we are expecting a cat 5, and sort of assume that there is linearity with impacts and did not expect and didn't appreciate that the impact really from a category 5 what was a cat 4 is an exponential impact as opposed to a linear one.

So, what I found absolutely surprising was, you know, I was out until it was about, I don´t know, maybe 2-3 am before the morning of the hurricane, just trying to do anything possible to secure various family properties and even driving home at about 3 am in the morning before the hurricane hit, looking around and seeing so many properties where owners had done absolutely nothing to secure the properties. When I say nothing, you know they haven´t put up any sort of sideboard, protection on their windows. The properties just had been totally unprepared. And it didn´t match with. You know it didn´t match with the warnings that we were getting and the event that we were excepting. In fact, even previously, when we have had lower intensity hurricanes approaching, people, I think, have made greater efforts to prepare. So, I didn´t know if it was some sense of, you know, we had so many misses in recent years, that they felt "Yeah you know it´s just going to miss again" that they don´t want to expend the effort and energy to prepare and also the notice from how quickly it intensified from a cat 3 to cat 4, 5 sorry, was very short. I think it was within a 24-hour period. And that´s quite unusual, you know, hurricanes don´t usually intensify that rapidly, it would normally stay for a cat 3 for a few days and then a cat 4 for a few days before it intensifies any further.

So, all coming back to this point, I think knowledge and information and understanding is an important part of resilience because if you don´t know what you are reasonably up against, you will not prepare accordingly. Even though we had data here that were saying we are getting a cat 5, I don´t think people interpreted that appropriately, you know, meaning that they understand, sorry (coughing) they didn´t understand and appreciate what the impacts of a category 5 really are and what catastrophic damage really means. I don´t know if you appreciate the point I am trying to make.

(…)

P: Cisterns are actually very traditional practice. So, long before they were legislated – in fact it is not a legal requirement, I can´t tell you when that dates to but it at least dates back to 1979, which is the year of the/ is it 79 or 69, in an event/ we some current building guidelines that are in place, I think it is 79 and those requirements mandate that each home, each residence must have a cistern. But long before that, it was really legislating and existing practice. So, because we have such a dry climate – we don´t have any rivers, we don´t really have vast groundwater resources, although we do have some – the cistern was traditionally the way in which people would be able, you know, to capture, store, and access fresh drinking water and water to just operate the home. I think groundwater traditionally was more used for farming operations and so for. But in terms of household use, it was the cistern. And this is actually a pretty unique practice in the Caribbean. It is one of those adaptation measures, I think, BVI has honed pretty well and that we need to think about sharing such exporting with islands in the region. And that´s really because BVI – I think other islands that you might see cisterns are, maybe Anguilla, possibly, but there are not many islands in the Caribbean that have Cisterns – and that´s precise because most islands in the Caribbean are relatively wet, compared to two BVI. So, they have rivers, and that´s, that means a source of water supply. So, it has really developed of the arid nature of our climate, historically, and sort of the natural need.

(…)

P: Exactly. So, I think maybe the lesson learned out of all of this because you are right, and I think many people felt that way in that post-disaster period where resources are limited, including housing recourses, right. You need some breaking room. It would be almost – even if temporarily – a reduced population, so you have a reduced number to manage, right? Just when you think about all the things that come along with a higher population: schools, right? We had such heavy strain on schools because it was lost, health services, all the services that you have to provide for the population. If you could have temporarily reduce the population, in particular, those who are not employed, because this created other challenges, you know, potential crime issues and so for, if you are here and not working you can´t support yourself then you basically become sort of in a dependency type of situation, right? So, how do you create, I think the lesson learned is, how do you create policies, have policies in place that are clear and known, so that people have a sense of security that if a disaster strikes and I have lost all real ties, I don´t have a home, I don't have a job, then it is okay for me to leave for some time and have confidence that when things are better as things recover I will be able to come back again. Because I think it is better if people have the freedom to leave and come back than struggle to maintain that level of population through a disaster period.

(…)

P: One example that comes to mind for controversy in the plan is the airport extension project, right? This was a lingering development plan that there was some controversy around, and then it shows up in the recovery and development plan, right? And again, there became a controversial matter. So, I think BVI, we did make an attempt to look at recovery and development planning, certainly an attempt was made, certainly that attempt involved some public consultation whether or not we got that right, just based on the public reaction to the process tells me that we need to improve in terms of the process right. Of course, this was an unprecedented event. It was a very challenging time in which we tried to do a kind of planning during a disaster environment, right?

And the other thing is that there is also clearly the pressure of time, right? By its nature and essence the consultation process would have to be short, so I don´t know if I have the immediate recipe how you improve that approach but I think if people are going to feel positive and optimistic and hopeful about the future and continue to stay and invest into their community then I think it is critical that people are involved in the recovery planning process and that they feel very much a part of, right? Now, maybe one suggestion, and maybe my tone is a bit theoretical perhaps, but one suggestion I would have is: why wait for after the disaster planning your recovery, right?

So, if we now know we experienced a category 5 event, and we understand now, we don´t have to know the specifics, but we understand generally the type of damage or impact that could come from a category 5 event right, why can´t we start planning from now the types of changes we would like to implement if we would to have another event with that scale damage. By that I mean, what if our electricity would be wiped out 95% again, are we going to rebuild it in the same way? Or are we going to take the opportunity to take a smart grid? And are we going to take the opportunity to transfer to solar energy or other forms of renewable energy, right? If we were to lose, again maybe 95% of our critical infrastructure coastal tourism infrastructure, are we going to rebuild those things in that same footprint or are going to try to step those things back. I think we can make some decisions now, during the period where we are not in a disaster or in an environment where we don´t have that pressure of time. Sit down and make some strategic decisions as a community. If we were to face those catastrophic damage again, what is the vision for a new future, you know? How do we want to reinvent ourselves if given the opportunity again? So, I think part of the solution is not waiting until the disaster strike because that's a terrible time to plan, why not plan before the disaster event comes, right?

And again, I think, if I were other islands in the Caribbean I were looking at BVI and Dominica and try to learn from us to plan now, you know if this was supposed to happen in my country in St. Lucia, Antigua, whatever, how would we want to rebuild. Would we like to rebuild/ like building code, for example, there is a new revise 2015 building code that has not been

adapted as yet by many islands. But why not adapt this code now? If an event would have happened in these islands next year, what it means is that the code is in place and it can be triggered if a building is damaged beyond a certain point in the rebuilding process, it has to be rebuilt to this new code. So, there are many examples of how we can make decisions way advanced of an event happening that we have already decided, strategically, this is how we want to rebuild.

Julie Schneider, Operations Manager, Virgin Islands Search, and Rescue (VISAR)

P: Looking back at Irma the biggest challenge was communication and I think/ like we are speaking about Nanny Cay, we would go down at five o´clock every day and they had someone that had been in town and someone at the airport and we were getting updates on whether because we knew that Jose was coming then Maria was coming. We had no communication. That´s still what was happening if you were down in Nanny Cay. We were getting updated what governments were flying in planes to bring people out. If you are American or from the UK and if we hadn´t those meetings, we wouldn´t have had any idea that that was happening. Because you would see the planes coming in, but you didn't know what they were there for. So, it's the communication and getting the word out to all the different communities what's going on

(…)

P: I think if we gonna use Irma as, you know, as a starting point how we gonna base ourselves for the future in order for everyone to feel secure the next time around – that were you asking? – We would wanna know that DDM are on point, they have a plan in action, they know what they are doing. We know as the community, where they are going to be, and how we can reach them and what their back up plan is and, you know, make us feel secure that if it´s a CAT 5, that within 24 hours the Marines will be here. That that ship, that is in the waters for Hurricane protection/ where is it, how far is it gonna be, how long does it take them to get here, where are they going to be? Just make us feel really secure, that they are on top of it and that once the storm is over that, they are going to pick up their job and keep pushing through for the bigger good of the BVI. We just need to feel secure and know that we´ll be able to have communication, and the grocery stores will be open, that, you know, the basic necessities are going to be there.

(…)

P: A lot of people left, I myself left six weeks later and was off-Island for a couple of months and then came back. The vibe that we were getting if you weren´t necessary to rebuilding then leave. Because you are taking more recourses away from people that can help rebuild. So, when we left our house we were renting, construction crews moved in so that they had a place to stay so that they could help rebuild. You know, if there is two less people and a dog, they have two less people to bring food in, they can bring less dog food in, there is just less pressure to rebuild. But I think right after everyone got through the holiday push, that´s when a lot of people came back and financial services wanted to get their kids go to school in came in, and then they slowly started to come back again. A lot of people that left, that one´s that wanted to come back, they are all here. And the ones that couldn´t rebuild or were too traumatized, because there are a lot of people like that left Island, that are not coming back. And that´s understandable. Everyone had their own story. So, some have been really traumatized, they had come back to, and now they are gonna work remotely, so it´s affected everyone differently and it was necessary, I think, right after the storm for some people to leave

(…)

P: Yeah. There are definitely different rights If you are born here. I have friends they are in their 30s and 40s, that were born here but they are holding an American passport, they have different rights than their children who were born here but also have a passport. You have to be here for a certain amount of time before you are giving BVI citizenship and all the stuff.

There is a very clear line between you are born, and you are on a work permit, and you are an expat. I have been here for 20 years on and off, and I haven´t been here long enough to apply for work permit examinations or residency but, you know, every year you have to go through the work permit process, and you are not able to buy property or buy land or you can only rent and hope that you get a good landlord that treats you right (soft laugh). You always hear the horror stories of, you know, you got into a traffic accident and you kind of lost your mouth and you went off on someone and out of sudden your work permit is declined or you have to go in on every six month instead of every year. So, there are always those – I don´t know if there are urban legends – but always that fear that you know that you are not a resident, you are not a belonger, and anytime you can be kicked out. So, you just always have to be on your best behavior (laugh). It´s a/, but you know what, I am really happy to do that because I don´t want to be in America. So, that´s part of it. I know that I am giving up that luxury of being a belonger, being a passport holder. And I can´t vote, so I don´t really have a stay in the political system. Which is unfortunate, but that is just how it is. I still voted home, but you/ it is very different voice that you are spoken too depending on what category you are falling to.

Charlie Peschardt, Caribbean Program Manager, Team Rubicon

P: You obviously have heard of the Recovery and Development Agency which got very mixed reception from politicians, from the public and that the RDA Recovery and Development Agency is a UK government stipulation that is in place in order for the government, the UK government, to provide the underwriting of $400 million worth of loans so that BVI government can go out get money from the market, from banks and we have the private lenders to be able to rebuild the infrastructure here. A lot of the RDA projects, you know, end up being semi-public because RDA is representing the government and implementing the BVI government and incrementing the BVI government's plan so public sector buildings but also there goes private contractors to get that work done, and there will also be some new projects that are pretty much holy privately held and this in the public interest, but it's not necessarily public infrastructure is getting built. You see that part. The reason why that agency had to be implemented, in other places it might not have to exist, some it will for sure, the reason why the UK government stipulation place is because, one the reason for the loan underwriting is that the BVI government doesn't have a good credit rating, their financial reputation is not particularly brilliant, it is the EU they have gotten on the grey list, potentially gonna put them on a blacklist soon, there is a major focus of government to make sure that doesn't happen, and that's, you know, that´s positive. The government, the BVI government, has been moving towards that. But as is it, they can't go out to the market and get these loans to rebuild so the UK is saying “alright, you are overseas territory, were are responsible for you, to a degree, for a safety, security point of view so we will use our credit rating to go and underwrite those loans but your deal is that you need to not be implementing the financial management of this through standard government channels” because there are unfortunately a few projects that happen over the last few years with a lot of questions around". I don´t make any judgment or comment on that, but – part of them, I know the details – but that is the perception that is out there. (…).

(…)

P: In BVI, as I said, as elsewhere, it is an abbreviated course, it runs about three hours a night and five nights a week as the introduction. Now, that´s great. Anything is always better than nothing. But the questions is what output are people looking for. This is a general comment now. It is not about BVI specifically, although they clearly bleed into that. And what output are people looking for? What is the assumption that the CERT team is going to do? I am in conversations with a couple other island states at the moment about delivering some CERT training for them, and they are interested in communities being able to identify people to be trained in brighten themselves with the Disaster Management Plan. Training a number of people to then be able to look after themselves, as best they can for the first 96 hours or so after a disaster. Four days.

Now, depending on the circumstances, you got no water for four days, you are not in good shape by the end of that four days, and some of the more vulnerable people in the community could, well, die. You then have to say, when the planning assumptions is for days the training needs to incorporate equipping people to have water access, so that might be we going to stop and buy water in advance or might be we will put yourselves or have donated to us some saltwater filtration system or water collection system. It is thinking through the extra step, rather than just CERT training being an outcome and then how it gets disintegrated more widely because I would make an assumption that there are going to be communities out there where there is not any government infrastructure, so there is not a school, not a clinic, there's not a police station, there is not a fire station.

Similarly, there will still be communities out there where all of those things or some of those things. Now, that means that each community needs to have slightly different tailored response because if you're completely isolated from the government world then you are gonna have to be much more detailed in our planning and much more thorough in your training and if you've got, or likely to have government response around you then your training suddenly shifts focus a little bit a new you might still be doing the same sorts of things. But then what remains the same, but the how starts changing. Big thing, always big thing doesn't matter if there is a war or a disaster, an emergency response, or a single traffic collision or a terrorist bombing on a subway or whatever, every single time much without exception the lessons identified processed from the drawn together after a debrief will involve communication being a problem.

And that might be technical, so it might be the radios didn't work, the mobile phones didn't work, the satellite phones didn't work, or it might "I didn't understand what someone was telling." The means of communication or the content of the communication. "When someone said this to me, I thought they meant something different, and therefore, actions changed if I understood what they were telling me something different, and that would help the response." Communication is always a challenge, and there is also like the degree of forward-thinking that sits behind that communication. If your communication is only reactive, so you are telling people what has happened, that´s great but quite often if you are in a position where you try to coordinate things you want to understand the wider impact and what might need to happen next, and I find that there are certain places around the world were – and that could be in the UK in a small village or it could be on an island in the Caribbean or somewhere in Africa, or somewhere in Asia, it doesn´t matter, everywhere, there will be occasions were people really good at communication but I can't talk to each other because they don't have no means to do so because mobile phone was down, or all they are not very good at effective communication and they don't think about the „so what".

(…)

P: So, I was gonna lead the Caribbean Response and have HQ from here, so we were at the same time taking the loads off from our headquarters in the UK, and for various reasons that wasn't viable, once I got on the ground. So, I end up leading the BVI element, and so I went out to see Sharleen (Referring to Sharleen DaBreo, Director of the Department of Disaster Management), and the first thing I was asking her was "What´s the situation? What do you need? I know roughly what is going on, but what is it that you need?" She was able to tell me and then she was connecting different people around government that she thought we might be able to help and they´d expressed the needs, so I was going out speak to them and then I have come back to Sharleen and said "these people have asked for this, but these people have asked for that, and so-and-so has asked for something else" I was like "I can´t do all of them, I can do that or can do part of that, or part of that, but I can't do everything. How do you want me to prioritize this?"

I: And the things were specifically?

P: There was basically schools, school recovery, so fixing schools. Indeed, we ended upconvert the, behind Rightway (referring to a local supermarket) in town. There is the club, the old building where Elmore Stoutt High School is now. That was just an empty warehouse, and so we worked with the school maintenance team over 48 hours to put all the shell work inside to create 27 classrooms. We didn't finish that all, but we got the stuck worked up to create walls and so. But, you

know, it is not a permanent learning facility, don't get me wrong, but it was better than nothing what they had, and the Minister of Education was very, very, very keen that we'd support that project, so we did. He was very thankful and, our guys really enjoyed doing it as well. It was great. The kids were able to get back. The high school kids were able to get back to school within a month. It was pretty good. That was one.

We started then working with a part of public waste, Waste Management, to help them with community cleanups. And then, I think the other one was, again, the same department may be and here cleaning up community graveyards. So, I went to Sharleen and said look "I can tell, I can decide but think it is better if you can decide and then if you feel the same." So, she said „Okay, I can decide, and I can go and tell all those people I've asked you to do support Ministry of Education", "Great". Sums it up. That was straight forward. It was easy face-to-face communication, I was able to speak to the people that had request for me face-to-face, that was all very straight forward, and that bit was good. What I found was the NEOC, obviously run by Sharleen for DDM, it was quite rusty, it seemed to be – before I was here – it seemed to be. In fact, when I arrived, it was still people running out of the hospital before they returned to the house? And it seemed to have the right people in it. It seemed to have permanent secretaries from ministries. From UNICEF, you know, from CDEMA, from Caribbean Disaster Response Unit, from British Military, from DFID, from the Foreign Commonwealth Office, and a few other agencies as well – I am sure – in there. And so, there was/ the mechanisms have been there for effective communication and effective coordination. There were a lot of people kicking around, but it didn´t seem so – it basically felt, and this is not scientific proof – what I felt was though ministries were of now doing the right thing, and they weren't necessarily being coordinated through the NEOC.

The challenge, as I work with different government departments here now – talking about the challenges they had during Irma and what they need to think about when they are planning – people, was one of the biggest problems. They haven´t got enough people. It is a relatively small population, a relatively small number of people in government compared to the population size of the territory. Still quite people government but compared to that and a lot of people had their own houses that were destroyed, they had elderly relatives, they had children that were dependent. So, they were unable to come to work always, and so a lot of people would not work, and even though there weren´t enough people. So, what really was needed was needed people for the department to say, "we won´t do anything for three weeks, nothing will stop." If they were impacted, anybody, if we don't work for three weeks, you have my staff, and then those staffs get mixed up. "Right, you are a 25 years-old strong male you can go and work for Public Works or for Department of Waste Management," "who are you? You are a 55-year-old lady with a disability you clearly can't wield a chainsaw, but what you can do is administration. So that´s your day job now: Administration. You can work in administration for this department and help them." Or you could move the workforce around, but it seemed that DDM weren´t helped by this sort of splitting of people. They went back to their ministries, running all over for the ministries. So, you lose then the communication. You lose the coordination abilities. It becomes quite frustrating for people

Matthew Waterfield, Deputy Director of Planning, Recovery and Development Agency

P: Sure, I think, first of all, what's really clear is that straight after the hurricane, the immediate response, it was pretty much everybody helping themselves, because, within their own family, everybody had to focus on their own family. That meant that a lot of it was directly within the community because a lot of the national infrastructure was broken down. So, the ability for the government to, literally, in the days after the hurricane to have a really strong, coordinated response was very limited. So, it very much focused on community and personal, family responses. Is everybody safe? You know, looing and finding everybody, tracking everybody down. That was the immediate response. You know, sort of September, October time. Immediately, at that time, I was working for the front office in London, I was in the Carsey Center.

And then for a week in October, I was with the military in Barbados, coordinating the UK response. And the UK was asked by the BVI government to provide some support, and that was largely focused on immediate humanitarian response under the Department for International Development. And military support, particularly for logistics but also for some management of security. And then going after that, as we kind of go into sort of medium-term recovery, early recovery sort of November until about March, April. The UK response, as the government was now sort of up and running, you know, a few days it was challenging for the government, but straight after that, it was all about supporting the government under invitation on the BVI government to help. So that was a (inc.). It was about 18 Millon dollars' worth of recovery program support, which helps get electricity get back up and running, some repairs to prison, provision of some police officers to help booster the local police force.

Then, I would say, also what was happening at the same time, you know, early part of the year sort of February, March, in the recovery, as the private sector was getting their insurance payments, they started rebuilding houses, hotels, boats. That was a really big push from the private sector. Now into the long-term recovery now. And that is really focused on how the community government sector, civil society, everybody come out together. In partnership, under the leadership of the government, because the government sets the priories under the Recovery and Development Plan and everybody else is supporting that.

So, just to give an example of how we talk about community engagement for a number of our projects. Also, if we are looking at sort of voluntary contributions in two various projects. And I think here in the BVI the unique thing if you look at it from a community resilience point of view is, a lot of that community resilience in the early days or even now, most of the civil society here is focused on the church. So, a lot of the community responses here were focused around people deciding to do things when they are in church on Sunday and deciding to do things together. A more broader civil society is just very much focused on church. So, a lot of that sort of community action comes from the church, I would say. But there was also, in the early days, very mixed responses, you know, communities and people just self-organizing. You know, from the expatriate's communities and BVI communities, all that live in the same area sort of came together to organize food and how they respond, and you know just working together, particularly as the government was reestablishing its capabilities. In terms of the national agenda, it is really reflected in the RDP because that is what the government, through consultation with the communities, decided are the priorities. Then endorsed by the house of assembly and then published. That's kind of the national agenda. Anything internationally is aligned to that. For example, the UK has provided some small grant funding and also a loan guaranty for 100 million dollars, and this is for the BVI government to be able to borrow money to fund the recovery. So, it's all about supporting the government as requested by the government.

The unusual situation here is that the Recovery and Development Agency, part of our role, is to reach out internationally but also to high net worth individuals here and others that are willing to contribute to funding and support the recovery and development. So, we are looking at RDP. There is a budget of about 520 million dollars for this, and we would have quite a lot more, but if the government loans are contributing maybe 200, we have to help the government, and we have to raise directly (inc.) house? To remain the amount of money to contribute to that. And it's a unique position for the BVI that you have that potential to access.

Other investments or grants or other opportunities, particularly, you know, we are confronting climate change, you know, stronger, smarter, greener, better, is the objective and particularly on the greener, there is a lot of international funding sources and loans and different opportunities to raise money. As the BVI is a model for how you face climate change, the threat of climate change in terms of increased frequency or intensity of future hurricanes. So, yeah, in every, you know, different phases, I think, the sort of national and international play different roles in different times and I think this is in terms of the response, in terms of future resilience and future disasters that's really what we think of is stronger. It's about are there people, are there structures, are there telecommunications, are they strong enough to withstand another Irma? And that, you know, is a key objective for the plan. Yeah, I guess that covers most things. Is there anything else you want to follow up on that?

(…)

P: Towards the second question about physical rebuilding against the more intangible for us, this is critical, and I think for the government, it is critical. If we just focus on rebuilding, then we gonna have a lot of shiny houses and bridges and roads, but if they are not maintained or they are not serving the purpose for the people that can use them, and we would have failed. It is about really investing in capacity building. So, we are developing a strategy for capacity building for the first quarter of next year. We have a specific regulation. A secondary law on how to deal with capacity building. And for us, for me, that is my particular focus. So the structure, as we have in planning and operation is, people have focused on infrastructure, and we have people focused on what we are calling human development, which covers, you know, if we gonna rebuild a school well you need to know to how to develop stronger, smarter, greener, better education. It is not just by having a shiny school. It is about looking at all aspects of education and recreation and thinking about the functionality of the building and how you can build capacity of the teachers and the curriculum. It is looking right across the board because this is a real opportunity to make a big, giant step in development.

Yeah, looking at vulnerability before disasters and then the existing inequalities and vulnerabilities exacerbated by disasters, I think, is very relevant and particularly for sections of the community that are reliant on work permits. So, people that have come here, particularly across the region for a particular job. One of the real challenges we faced was that if they are bond to a hotel and that hotel got smashed. Their ability to find another job was quite impeded because of the labor codes here. So, one of the things we are looking at is how do we ensure a more flexible labor market so that in terms of response, people can/ we can have a more flexible response to the labor market, which is very heavily regulated. So, that the people that are dependent on a job have the ability to find an income.

Miles Sutherland-Pilch, Resident and General Manager of Nanny Cay

I: Thank you. You already told me about what Nanny Cay was/ what they were doing, what kind of player they were. Could you please sum that up in a few sentences?

P: Just, due to our infrastructure that we have been working on for years – it was a pulling when we bought Nanny Cay at the end of 2000 and had been in receivership for 10 years – it was suddenly something we had to spend the money on. It was always boring money, as far as I was concerned, but not anymore. It proofed evidence. So really the work we have done on having two 750 kilowatt generators on side, each with a 2000 gallon tank underground, high voltage distribution, fuel tanks for the marina, we had 8000 gallons of diesel, 3000 gallons of gasoline, and then also with the restaurants we had a lot of food that we have on hand anyway. We had two restaurants here and drinks.

And then we also had a water maker, capable of making drinking water. Desalination, so it takes water from the sea and turns it into drinking water. That infrastructure was fantastic, and then it went on to then we were making ice, and to be honest, even the hospital was coming down for drinking water; every day, they came down and filled up probably about 25 gallons. And then also to get ice. They didn't have enough power, so the ice I was giving them was actually keeping some of the medication at the right temperature. They were very pleased with that. Communication was very difficult, but my genius IT guy managed to patch trough a connection from town. We did have some limited internet here. All of these things really helped us after the storm and then that was the reason why we had the first 18 of the royal marines based out of here because we had access to the water through some of our undamaged docks and had some boats in the water that they could use and then we had accommodation with power, water, communication, and security, which they did add to but there were very few places that had that in Tortola at that time.

Then we became an important area for both evacuations that were happening from out here, either through two different helicopters or by boat. And also aid coming in here as well. That we could then distribute to the wider community. One of the best things that we did was run water to the main road, and people were able to get drinking water and cooking water, which was crucial. We were very lucky and even things like the chandlery, the marine store we have here, has a lot of batteries, solar panels, generators, we had the Yamaha place with motorbikes, they were very useful. We also had the big (inc.) company based down here so we could start clearing the way down to the pit where we put the boats out to the water. We could start preparing some of the vital boats that were needed in the recovery, as well. Like VISAR was one, that boat was damaged. We were able to hold it up, gotta repair it, back in the water, and even give them fuel. We were just running accounts. The Red Cross came in here, basing out of Nanny Cay.

So, all these things, great people doing amazing things, but they actually need a base to work out of and then, and that's what we were for a lot of people. Somewhere. And it was even for our staff during that day that comes down. The could A). just work, take their mind off things, they could bring a laptop or something, charge it up with the power we were making with our generators. Every lunch we had the café open, and we were just doing a big hot meal for anyone that was in Nanny Cay. God serves. Really for our staff to come down. Got their mind taken off be keeping busy, charge something they could bring home to have light with at home, and get a meal. It was very useful to them as well. Not just emergency services based out of here, but yeah/ and the community that is already based in here, even our staff was very grateful.

I: Thank you. With all that you are saying, I am thinking about how it really brings something for the resilience of the island if private organizations or private, let's say resorts are there and are providing some help. So, it is a good, kind of a good, connection of private entities working with government and NGO's. How important would you think are those private resources?

P: It's a good point, and for example, I already had a discussion with customs (the Ministry of Customs) and the marine police. Both want to store one of their vessels in our boatyard, if any approach of a named storm. Again, that gives us an immediate response from the police or customs with fast boats as well. You realize they don't really have any other options. This will be good, and I love working with government in that aspect even down to say the cellphone/ one of the cellphone companies here. We had three different operators on the cellphone tower that were rated to 180 mph, but not one was standing in the territory after the storm. This new one is rated to 220 (mph), but still, we are keeping the backup power on Nanny Cay, so if something did happen, we actually have another backup, so we are working there with another private sector to make sure it helps us, it helps them. It's amazing how we can trade off each other. By doing things like that, I said, what we created, then we got the royal marines out of here, and that was very valuable for us, just from a security standpoint. It's a win-win, a symbiotic relationship with government, and we are just very pleased to add to their resources. But it was things, immediately after the storm like a (inc.) from BVI Electric, he went/ I give him about five of these 2000 Dollar batteries to get his generator started. I was then approached if a helicopter came and took one of our generators just for 24 hours, would I be okay with that? That was going a bit far (small laugh), but it was great to be able to help the community after the storm.

(…)

P: Sorry (saying something but not into the microphone). Here/ Things that went well the outside help that we got, namely, there were a lot of marines and royal engineers and the police it just gave that complete sense of security which a lot of people felt really nervous about before and the curfew that went it, the people could not be out at night. I thought it was excellent and gave a change to Disaster Management (talking about the Department of Disaster Management) to carry on clearing the roads and whatever else. So that was/ I was very concerned about lack of/going on to the things that were a challenge to me were the lack of water was almost criminal because I do believe that plans should be speck very easily that could withstand an Irma, for example, a containerized version. But security was actually one of our biggest challenges.

Again, until we got the marines here, it was a huge concern here at Nanny Cay because we did have/ we had got power, we had got water, and we had over 400 boats that hadn't been looted. And the thing about boats in the territory, they were very useful after the storm, they often had a small generator, a jerry can, or a fuel tank, a generator even, water. That's why a lot of these things were looted earlier. And they might have had even tin goods. So, that's why I was so worried about the looting. With all the boats that we had here. I couldn't even let boat owners, even private boat owners in to see their boat, I would not even allow that because I didn't want people to believe that Nanny Cay with fuel and a generator and some food/ just making us more of a target. Security and water are the things that need to be done better in the future.

I: You have earlier been talking about even looting with some weapons, and can you say a bit more about the security situation, also about this – I forgot the word – but the time that you could not go outside.

P: Curfew. Yeah again, because there was no real news, what did you believe, I mean there was nothing. So, we were meeting at 5 o'clock every evening to share our experiences, to share real information because that's all we had to go on but, hence, it was a real concern about security. We heard the prison, for example, had been blown down, everyone had gone out. I gather quite a few people came back the next day because it was better inside the prison than out (soft laugh), but we also heard that the robbed the police station of all the arms. We also know that there is a lot of guns on Tortola, so it was a real concern when we didn't have any arms here, and we felt we are becoming more of a target. And it was a completely desperate situation. You don't know how someone is going to react when they haven't had food or water for their family. It becomes desperate and almost understandable if those are the items you are looking for.

But, again, the curfew which was set as soon as the marines where here, at first it was six at night to six in the morning, no one could be out on the road, made it more comfortable to certainly sleep at night. We weren't let out any traffic in and out of Nanny Cay we couldn't because there was a big catamaran sitting on the road. But, yeah, we were concerned. So, certainly, on the first day, on the 7th of September, I wasn't actually at Nanny Cay. I couldn't get out from Cane Garden Bay. But there was a lot of looting, a lot of damage caused on that first day by, some were opportunists, and others were concerned people looking after themselves, but there were people with weapons here on the first day looking to loot.

(…)

P: Just talking about our vulnerability to different natural disasters. We are very lucky here in Nanny Cay, if we get a very heavy rain, we only have to deal with the rain that falls on top of us. Because it is pretty flat, the runoff it doesn't erode so much, being so flat. It is pretty (inc.), made up from a very sandy material. It drains very easily. And as I say, but a lot of places are susceptible to flooding and heavy rain, and that's definitely a problem on Tortola and needs to be addressed. We are fortunate on that one. Earthquakes, we are generally not too affected. It gets a bit scary when you see all the boats out of the water in the board yard shaking around, and you can hear the rigging going. Also, in the marina, in a big earthquake, we have piles, metal tubes that hold the docs in place, and you can see the ripples coming out from the piles. Generally, we are okay with the earthquakes we experienced. Having said that, if it came with a tsunami, we are not well prepared for a tsunami and cannot hear a siren.

I: Sorry?

P: We do not have a siren. A beacon that makes noise in the event of a tsunami. I did speak with Disaster Management (referring to the governmental Department). I offered a place to host it, so point back at the community in Sea Cows Bay. Power to it. I would do all the installation by the unit. Unfortunately, they couldn't do that before the storm. I haven't spoken to them since. But we would love to host a unit, and I don't think it is up to me to spend 15.000-20.000 Dollars to the unit. I feel that is a government cost, I was just happy to house it here to help the community. Because firing back, the noise is going back towards the hillside must be better than/ I think we are at a good location to host it.

I: Okay, interesting. Because I have been to a tsunami siren installation in Anegada and I see all the work. They are going to every island. So, Tortola has some but not in the spot that would help you, or?

P: Right. There are not in the spot that would help me. There is one in town and one in East End, maybe even West End, I don't know Cane Garden Bay. But I was offering everything to buy the unit, and I hope one day we will get one.

I: I hope so too. One of the things that came out of my survey research was communication, and organization was a big problem. And I know that communication and organization is a really big topic, and everybody maybe understands something else from it. So, I would like to know what do you personally understand from communication problems?

P: There was absolutely no contact from government, from anyone from any authority for weeks and weeks and weeks. The first meeting we had was probably a month afterward. We heard from the premier in Sea Cows Bay at the community center. Before that, I saw no one in authority, which is upholding (inc.). I mean, we did have someone from the Tourist Board an NGO, do you all it, right? He came to see if we had any guests here. He then quickly said, “I need ice, I need ice more than anything” and then took the ice for his drink. Very, very disappointing response.

But having said that, communication was very difficult because there weren't signals. We, being in the marine industry, knew the importance of VHF's – very high-frequency radio – that's what we are used to communicate in boats. I have had to use it before in emergency situations, and that's how we were communicating within Nanny Cay. It was how I communicated to Nanny Cay from up the hill, initially. It's how people from West End were getting hold of us to relay their concerns from West End. I am very pleased to see these packs went out. That they have VHF radios in them. But why wasn't they in place first? Are they looking at a proper – and I believe they are – station to be able to broadcast on that. I believe this is what we have to do in the future. After Hurricane Hugo, that's what they were using. Cell phones have taken over in the 20th century.

I: Okay, thank you very much. When you talked about no communication with the government, what would have been the things that you expected that the government would do and especially also the Department of Disaster Management?

P: Well, A). do see how we are but then pass on information on what was being done. I might have been things we were able to help with. For example, we were making too much water. I had to turn the plant off, I could have been giving out water. I was trying to tell anyone I saw “send,” this was after we got the road open, “send me a water truck and I fill it up for free, you can take it to the communities,” but there wasn't that open channel. When I was getting very concerned about security, I had to go to town, I was banging on every door and on the hospital, I eventually found someone, and they said “yes, our biggest problem is security as well.” But again, there was no, with different storms coming – we had Maria barreling down on us – there should have been ways to at least get some information out or have, even we had notice boards around here, where people could post information. Anyone knowing about planes or how to get to Canada, or what about this, or what about this? Just have a central area where even if there were meetings every day. Honestly, I can't tell you why not every district representative has a meeting every evening where people could come to share information. But there was none of that. Admittedly, there were a lot of people that were in a bad situation as well, but also/ I was going off on a different/, but yeah, okay. (distracted by his phone).

What was fantastic was to see that a lot of people were stepping up and at that time wanted to do as much as they can, but there was no vehicle to do it to such. Again, it should be someone like a district representative organizing the cleanups where people could help. It helped people to be busy, to be involved, and to be part of something bigger. And I think that kind of local response in the communities would be very important.