BUILDING EFFECTIVENESS IN
MULTI-STATE DISASTER MANAGEMENT SYSTEMS:
THE CASE OF THE CARIBBEAN DISASTER AND
EMERGENCY RESPONSE AGENCY

A Dissertation in
Public Administration
by
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ABSTRACT

Each year thousands of people die in natural and man-made disasters because organizations in charge of mitigating the disasters are unable to effectively handle them. Building effective disaster management organizations is a complicated and challenging undertaking. A good understanding of the multiple dimensions of disaster response and mitigation and their interrelationships is needed to build effective systems. This is particularly true in the case of the Caribbean region’s Caribbean Disaster and Emergency Response Agency (CDERA). CDERA is a network entity comprised of the disaster management organizations of sixteen independent small-island developing nations with economies that are not diverse with a geography that predisposes them to natural hazards.

This dissertation presents the results of an empirical research on the effects of organizational form, organizational capacity, and organizational learning on the effectiveness of CDERA in its responses to disasters. The case study methodology was used to collect and interpret the information about CDERA’s response and the factors affecting its effectiveness in two recent natural disasters: Hurricanes Ivan and Dean. The data were collected from twenty six interviews and archival information to answer the questions about organizational form, organizational capacity, and organizational learning. The model applied in this research project was developed on the basis of the general literature on disaster management and the literature on the U.S. Federal Emergency Management Agency. This holistic approach utilized in this dissertation, is an important contribution to the literature on disaster management. This conceptualization differs from other approaches used to examine disaster management agencies and their deficiencies. Other approaches have examined the input variables in isolation and that resulted in a thwarted view of the organizational complexities of disaster management systems.
thereby limiting our understanding of how to fix the problems encountered in such systems. The
dissertation adds to the knowledge base on how to build organizational effectiveness. The
analyses of interviews and archival information show that the complexities usually faced by
disaster management organizations are further compounded in the CDERA environment. It is
known that disaster response and mitigation require complex organizations. Hybrids of network
and bureaucratic forms are necessary to properly plan for and respond to disasters. In addition,
The CDERA case shows that the positions of its national affiliates in government bureaucracies
are very important for them to have proper access to resources. It is known that organizational
capacity is an important prerequisite for effectiveness in disaster management entities. The
findings of this study show that some specific capacity variables, such as technology, human
resources, and technical expertise, are more important than others. The findings indicate that a
set of organizational capacity variables that were not anticipated in the original model of this
dissertation are also important. These variables are managing for results, integration and
alignment of mission, vision and practice, transportation management, and business continuity
(including succession management). Organizational learning constitutes an important feedback
loop. It helps to regulate the system by highlighting the gaps in capacity in particular.

The findings of the case study reaffirms that disaster management systems operate in
complex environments, that the events these systems handle are unpredictable and complex, and
that the systems must be equipped with proper resources and expertise to prevent these disasters
from escalating rapidly.

Further studies are needed to determine whether each variable investigated and found to
be important in this study is also important for other disaster management organizations. . This
would involve an examination of other disaster management systems around the globe to
uncover whether the same variables are significant predictors of effectiveness, or if there are other variables of importance.
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DEDICATION

To my Son Gabriel
You were my biggest motivation. I love you.
CHAPTER 1 INTRODUCTION

This dissertation study is focused on the factors affecting the performance of the Caribbean Disaster and Emergency Response Agency (CDERA), the agency tasked with preparing for and responding to disasters in the Caribbean. I used a single case study methodology to answer questions concerning building effectiveness in CDERA. In this introductory chapter I provide a background to the research; establish the basis for the research topic, purpose, and research questions; provide a history of disasters and disaster management in the Caribbean; and provide a history of the study organization, CDERA.

In my discussions, I will use the U.S. Federal Emergency Management Agency (FEMA) as a frame of comparison. The studies on FEMA show how complex disaster management is and how difficult it is to build effectiveness in disaster management agencies. My reading of the literature on FEMA allowed me to derive the important factors of effectiveness in disaster mitigation and management, which I applied in my study of CDERA. These studies also show that single-attribute analyses are inadequate in understanding effectiveness; rather multiple factors must be analyzed together. This was the understanding behind the multiple-variable model I propose later in this chapter.

My study on the Caribbean and CDERA shows that not only that disaster management is complex, but also that recurring disasters stymie economic development and thus it is important to make disaster management agencies effective. It also demonstrates why it is difficult to do so, particularly in the Caribbean context. The region
consists of multiple, islands that are hazard prone. Because of the geographic,
demographic, and economic context of the Caribbean, CDERA faces additional
challenges that increase the complexity of the disaster management environment.

In the following sections, I will propose a group of research questions based on
the literature on FEMA and my initial investigation of the context of CDERA. I will also
elaborate on the environmental and historical contexts of disaster management in the
Caribbean region to set stage for the discussions of the methodology and findings of my
empirical research in the following chapters.

BACKGROUND AND CONTEXT FOR THE DISSERTATION TOPIC

Need for Effectiveness in Disaster Management Organizations
The world’s climate is changing at an alarming rate (Elsner, 2006; Weart, 2009;
NASA, n.d.). In addition, the arms race, terrorism, environmental pollution and the quest
for energy have increased the potential for technological and natural hazards. Hazards,
natural or man-made, can and often have catastrophic impacts on people’s lives and
properties, physical infrastructures of societies, and the natural environment. Frequent
and intense natural hazards kill or displace thousands of people and cause millions of
dollars in property damage on each impact. According to the United Nations
Environmental program (UNEP) there has been approximately 2,500 disasters in the
world since the year 2000 that have resulted in millions of people losing their lives
(United Nations Environmental Program [UNEP], n.d.). To stem these devastating
impacts, we need to find ways to build effective disaster management systems so to
prepare for, mitigate, respond to, and recover from disasters. Disasters are not only
unpredictable, but their impacts are also complex and difficult to understand in all their
dimensions and as a result difficult to manage. While it is very difficult to prepare for or mitigate disasters because of these complexities, it is still possible to manage their impact. Accordingly, disaster management organizations and systems must necessarily be complex to be effective. Understanding this, it is imperative that we try our best to improve organizations and systems to comprehensively manage hazards and their impacts, and that is what this dissertation is about.

This dissertation seeks to address ways to reduce loss of life, infrastructure, and property by examining what factors can lead to effectiveness in disaster management agencies. Globally there is increasing need for countries and communities to build and sustain disaster management capabilities because of escalating intensities of impacts from natural and man-made hazards. Ensuring effectiveness in these organizations is critical to the preservation of social and economic systems and infrastructure.

In conceptualizing this dissertation, I aimed to develop a systems framework that would help us understand disaster management organizations and make them effective. The brief overview of FEMA’s experience in the following paragraphs highlights the complex nature of disaster management systems.

Since its inception in 1979, the U.S. Federal Emergency Management Agency (FEMA), the federal agency tasked with comprehensive emergency management, has struggled to achieve effectiveness in disaster preparation and mitigation. The agency had a series of failures in fulfilling its mandate, including its failures to respond successfully to Hurricane Hugo in 1989, Hurricane Andrew in 1992, the Florida Hurricanes in 2004, and Hurricane Katrina in 2005 (Waugh & Streib, 2006).
Many attempts have been made by the United States Congress and Presidents to improve the performance of FEMA, but most of these efforts were inadequate. The efforts to fix FEMA have largely been piecemeal. The authorities did not apply a holistic approach trying to fix the problems at FEMA. They did not place emphasis on examining the multiple levels of interconnections and relationships or the importance of learning in understanding FEMA’s performance. They focused on mandate and capacity issues at the expense of understanding the importance of organizational form and learning and knowledge management.

For example, in the early 1980s, President Reagan reorganized the FEMA and gave it a renewed civil defense mandate focusing on emergency operations, thinking this would cause the agency to be more focused and this would improve its performance. With this new mandate, the agency would not only handle flood and fire prevention programs and disaster response, but would also lead the efforts in warning against a nuclear attack and evacuating people after disasters occurred (Roberts, 2006). The president broadened FEMA’s mandate without improving its authority. By 1992, Congress gave serious consideration to dismantling FEMA. A Government Accounting Office report even questioned whether FEMA was able to respond to catastrophic disasters, citing its consistently poor performance in previous disasters (Stylves, 1994; May, 2006).

Despite these negative assessments of FEMA’s capabilities and performance, President Clinton believed that an agency like FEMA was beneficial to the nation’s security and reorganized it under a new director: James Lee Witt, an experienced emergency management expert (Wamsley & Schroeder, 1996). President Clinton
elevated the status of the agency to the executive level and granted it more authority and enabled it to access more resources (Wamsley & Schroeder). During the period of Lee Witt’s tenure, 1993-2001, FEMA was seen as successful by many accounts (Roberts, 2006; PBS, 2005; Murray, 2001; Wamsley & Schroeder). The agency responded well to the Mississippi Basin flooding, the Northridge earthquake in California, and the September 11 attacks in New York in 2001 (Roberts, 2006).

After the September 11 terrorist attacks, President G.W. Bush’s administration took FEMA in a new direction. The Bush administration reorganized FEMA by subordinating it a larger organization, the Department of Homeland Security (DHS), which was devoted to security and terrorism preparedness. The change made FEMA accountable to the DHS Secretary (Roberts, 2006), not directly to the president, as it previously had been under Lee Witt. In addition, the DHS’s broader terrorism mandate complicated FEMA’s role and sapped it of its resources. The legislation creating the DHS scattered FEMA’s functions and programs throughout agencies within the DHS (Roberts, 2006; Waugh & Streib, 2006). So debilitating were the new changes on FEMA’s capacity that by the time of the 2004 Florida hurricanes, FEMA’s response was seen as a huge failure. FEMA was seen as ill equipped to take on the challenges that a major disaster presented. Moreover, FEMA’s failures in response to Hurricane Katrina a year later displayed major gaps between preparation and response capacity (Roberts, 2006). Hurricane Katrina is seen as one of the worst disasters in America’s history and FEMA’s inability to respond to it has been criticized (Congressional Research Service [CRS], 2006).
A systematic assessment of FEMA by the U.S. Congress after Hurricane Katrina highlighted the deficits in leadership, key organizational capacity, and functional capabilities within FEMA, as well as problems in procurement and oversight. In addition, the Congressional Research Service found that FEMA needed more flexibility in handling its tasks and that it was necessary to provide more regional input to FEMA’s regional offices and better coordination mechanisms for them (CRS, 2006). However, Congress did not change the organizational form of FEMA; the agency is still hierarchically structured and located within the Department of Homeland Security.

FEMA’s experience demonstrates the complex nature of disaster management organization and underlies the need to address all of most of the important attributes together in order to establish the right balance for effectiveness. FEMA is similar to CDERA, because the two experience many common hazards, but there are notable differences as well. CDERA faces additional challenges from higher hazards risks, demographic and economic challenges that intensify the disaster management obstacles for the Caribbean.

It is said that the Caribbean region is one of the most hazard prone regions in the world (Trotz, 2002; Collymore, 1993; Miller, 2006). The Caribbean Disaster Management Project Update (2001) reports over 150 natural disasters in the Caribbean region since the early 1900s; hurricanes have been the most frequent, but earthquakes and volcanoes have caused the most loss of life. During the late 1970s and the 1980s, five hurricanes—David (1979), Frederick (1979), and Allen (1980) in Dominica; Gilbert in Jamaica (1988); and Hugo in Antigua, Montserrat, and St. Kitts and Nevis (1989)—devastated the Caribbean region and overwhelmed each territory’s efforts at disaster
response and relief (Poncelet, 1997). In recent history, the region has been heavily impacted by Hurricane Ivan in 2004; Hurricane Katrina in 2005; Hurricane Dean in 2007 plus multiple flooding and landslides in-between (Caribbean Disaster & Emergency Response Agency, 2009a [disaster database])

With dramatic changes in climate as a result of global warming, the region’s exposure to natural hazards is expected to intensify. The region is home to approximately 40 million people, many living in low-lying coastal areas. In the area of disaster management, the Caribbean is unique because it relies on a single regional disaster management entity to prepare for, mitigate, respond to and recover from all disasters. This single entity services a number of small island states with limited resources, relatively small populations, and with economies dependent on agriculture and tourism which are vulnerable to many natural hazards. Consideration of these factors means that the disaster management entity in the Caribbean faces greater than normal challenges to its effectiveness.

Although disaster and the risks associated with them are unpredictable and complex, we can mitigate the risks that can triggers disasters and prepare for them, this dissertation examines how to build effectiveness in the Caribbean region disaster management entity –the Caribbean Disaster and Emergency Response Agency (CDERA). The agency has a history of failing to adequately prepare for, mitigate and respond to disasters.
The Caribbean Region—Hazard Risks and Other Economic Vulnerabilities

The Caribbean region is comprised of multiple islands designated by the United Nations as small island developing states because of their small populations and socio-economic status. According to the United Nations Intergovernmental Panel on Climate Change report (IPCC) (Watson, Zinyoweru, & Moss, 2000), the majority of the world's small island states are concentrated in four tropical regions: the tropical Pacific Ocean, Indian Ocean, the Caribbean Sea, and off the coast of West Africa in the Atlantic Ocean (Watson, Zinyoweru, & Moss). The IPCC report also notes that a few small islands are found outside these areas, -for example, Malta and Cyprus, which are located in the Mediterranean Sea. Small island states share some characteristics: They have small land areas and high population densities, they are located predominantly in tropical and subtropical regions of the Caribbean Sea and the Indian and Pacific Oceans, and most islands have distinct seasonal patterns of rainfall and temperature that cause them to be subject to devastating tropical cyclones (Watson, Zinyoweru, & Moss, 2000).

In the Caribbean, the impacts of natural disasters have had serious negative consequences on national incomes (Commonwealth Secretariat/WB Joint Task Force Report, 2000). A report by the United Nations Development Program report (2002) found that after the 1995 Caribbean hurricanes “105.2% of the St. Kitts and Nevis economy and 147% of GDP in Anguilla” were lost (p. 8). In addition, a United Nations Economic Commission for Latin America and the Caribbean report notes economic losses of US$5,763 million in 2004 alone from hurricane devastation; US$889 million in Grenada alone (UN ECLAC, 2007). As a result of economic losses in Grenada, that government was not
able to repay in its debts. Moreover, a total of forty two persons were confirmed dead in
the Caribbean as a result of Hurricane. Grenada and Jamaica experienced the highest
death toll with 17 persons each (Environmental News Service [ENS], 2004; International
Federation of Red Cross & Red Crescent, 2004). During the same hurricane, Jamaica saw
an almost complete destruction of its agriculture sector, especially evident in the
complete wipeout of the banana industry. A total of 8% of that country’s GDP was lost
due to the impact of Hurricane Ivan (Economic Commission of Latin America and the
Caribbean, UNDP & Planning Institute of Jamaica, 2004). These disasters slowed the
economic developmental activities and doomed the small island states in the Caribbean to
perpetual poverty (Jones, Bisek & Ornstein, 2001; Economic Commission for Latin
America and the Caribbean, United Nations Development Program & Planning Institute
of Jamaica, 2004).

The region faces other vulnerabilities. The multiplicity of the languages of the
peoples of the region (English, French, and Spanish) make coordinating the disaster
management efforts in the region more difficult and the limited diversity in their
economic bases (they often rely on tourism and agriculture) does not provide the
governments in the region with the resources they need to prepare for and mitigate
disasters. External shocks, such as a slump in the global economy, make it even more
difficult for these countries to mobilize necessary economic resources for disaster
preparedness and mitigation. Further, the countries of the Caribbean lie in close
proximity to North America, making them vulnerable also to the impacts of technological
and other man-made hazards including terrorist attacks, oil spills and hazardous materials
accidents. For instance the island of St. Lucia suffered significant damage to its coastal
ecosystems from the 1995 oil spill from the MV Flinder, a shipping vessel belonging to the American company Mobil Oil (CDERA, 2009a). As a result of these vulnerabilities it is imperative that the region has the organizational capacity to effectively ensure the region succeed at disaster management.

**Purpose**
The purpose of this dissertation is to find out what factors contribute to the effectiveness of CDERA in prevention of and preparedness for, mitigation of, response to, and recovery from hazards. These four functions together (prevention and preparedness, mitigation, response, and recovery) are collectively known as comprehensive disaster management (CDM) (Jones, Bisek & Ornstein, 2001; CDERA, 2007). I will attempt to find the best way to theorize about the interactions of these factors and their influences on effectiveness. In particular, I will focus on how organizational form, organizational capacity, and organizational learning influence effectiveness.

Understanding the factors influencing the effectiveness of CDERA is not only important for the islands in the Caribbean region, but also for other regions with similar geographic and economic conditions, such as the Asia-Pacific and Indian Ocean regions. The problem of how to reduce the risks of disasters through building effectiveness in disaster management agencies is also important to international aid agencies and development institutions such as the United Nations (UN), the World Bank, The International Monetary Fund (IMF), United States Agency for International Development (USAID), The European Union and Commission (EU and EC), the Canadian International Development Agency (CIDA), and others that work in vulnerable regions.
around the globe. Leaders at the World Conference on Disaster Risk Reduction in 2005 recognized that small island states face higher vulnerability, because they are prone to disasters and have few resources to dedicate to comprehensive disaster management (CDM), and disasters in one region have impact in others (World Conference on Disaster Risk Reduction Report, 2005).

The topic of this dissertation is important because its findings will show the central role of structure, capacity and learning considerations in the performance of disaster management entities, and will help the islands in the region to better manage the socio-economic impacts of disasters in support of the region’s goal of sustainable development.

**Research Questions**

Based on my readings of the emergency and disaster management literature and the foregoing discussion and in line with the purpose of this dissertation, I formulated the following research questions.

1. What roles do organization form and organizational capacity play in the effectiveness of CDERA’s disaster planning, response, recovery, and mitigation efforts?

Organizational form and organizational capacity emerged as the key variables in explaining the effectiveness of emergency management organizations in my reading of the literature. I then formulated the following four more specific questions.

   a. To what extent does organizational form determine the effectiveness of CDERA?
b. What specific organizational form is suitable for improving CDERA’s effectiveness?

c. To what extent does organizational capacity determine the effectiveness of CDERA?

d. What specific organizational capacity variables are most influential on CDERA’s effectiveness?

2. What role does organizational learning play in the evolutions of CDERA’s organizational form and organizational capacity?

The literature suggests that organizations, including emergency management organizations, learn from their collective experiences and change their organizational forms accordingly. Also their organizational capacities may be influenced by this organizational learning.

THE CARIBBEAN REGION

Overview

To more fully grasp the significance and complexities of ensuring effective disaster management systems, we need to put the issue in the geographical, political, social, and economic contexts of the study region. The Caribbean region comprises over 7,000 islands, islets, reefs, and cays of which some 28 of these islands are inhabited (Pearson Education, 2009). The region lies approximately 90 miles southeast of the Gulf of Mexico and North America, east of Central America, and north of South America (Richardson, 1998). The Caribbean region spreads out over 1,538.5 miles in a broad arc from the Bahamas in the north, to Guyana and Suriname in the south, to Belize in the
west and Barbados and the windward Antilles in the South-east (Pearson Education, 2009). Within this spread is an arc of the Lesser Antilles running from St. Martin in the North to Grenada in the south. This arc lies along an intersection of two crustal plates resulting in a series of volcanic islands from Seba and Guyana through the Windward and Leeward islands. Along this arc there are frequent earthquakes, seismic tremors and shocks (Richardson, 1998).
Among the Caribbean countries, a group of sixteen former British Colonies and British Overseas Territories formed the Caribbean Community (CARICOM). These Sixteen are Antigua and Barbuda, Bahamas, Barbados, Belize and Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname and Trinidad and Tobago.

Figure 1 illustrates the region being discussed and the spread of the islands being serviced by CDERA in the Caribbean Sea (highlighted with blue). Larger Caribbean countries like Cuba, Dominican Republic and Haiti are not members of CDERA simply because they are not members of the Caribbean Community Agreement that establishes
CDERA in the first place. Haiti is now an associate member of CARICOM and CDERA and is in discussion with CDERA to become a member. Spanish speaking CUBA, is not a part of CARICOM, nor is Puerto Rico, which falls under the jurisdiction of the Federal Emergency Management Agency of the American Government. Although Cuba and Puerto Rico are not official members of CDERA, they routinely participate and collaborate in disaster management conferences and on initiatives of common interests with CDERA members.

To gain a broader perspective on the nature and impact of natural disasters that affect the CDERA participating member states, it is important to understand the climate, demography, and economy of the region.

**Climate**

The climate of the Caribbean is moderated by north-easterly winds blowing from the Azores high of the North Central Atlantic to the west, toward the Caribbean, called the Trade Winds (Richardson, 1998). The Trade Winds cause the temperature in the region to hover between 80 and 96 degrees Fahrenheit year round (Richardson, 1998). The Trade Winds are laden with atmospheric moisture, which is conducive to hurricanes and tropical storms during the wet season, June to October (Oliver, 2005; Richardson, 1998). During the dry season, the trade winds are more stable. In late June and during July when the Atlantic high pressure cells begin to move south, this generates complex atmospheric systems off Africa’s West Coast resulting in low pressure storms that move westward; they sometimes develop into hurricanes (Richardson, 1998). Predicting the trajectories of these storms are not an exact science and, because of other compounding
influences such as poor economic and settlement patterns. As a result of the winds and the physical geography of the area, the Caribbean region is one of the most hazard-prone regions in the world (Trotz, 2002; Collymore, 1993; International Strategy for Disaster Reduction [ISDR], 2005).

Table 1 gives a summary of demographic and economic issues of CDERA participating states.
Table 1: Profile of CDERA Participating Member States

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<td>Antigua &amp; Barbuda</td>
<td>84,522</td>
<td>$14,928</td>
<td>Tourism</td>
</tr>
<tr>
<td>Bahamas</td>
<td>320,665</td>
<td>$22,156</td>
<td>Tourism, Finance</td>
</tr>
<tr>
<td>Barbados</td>
<td>281,968</td>
<td>$13,355</td>
<td>Tourism, Infomatics, off-shore finance</td>
</tr>
<tr>
<td>Belize</td>
<td>301,270</td>
<td>$7,800</td>
<td>Agriculture</td>
</tr>
<tr>
<td>Dominica</td>
<td>72,514</td>
<td>$5,081</td>
<td>Agriculture; fishing; Eco-tourism,</td>
</tr>
<tr>
<td>Grenada</td>
<td>90,434</td>
<td>$6,005</td>
<td>Tourism; Spices</td>
</tr>
<tr>
<td>Guyana</td>
<td>770,794</td>
<td>$1,479</td>
<td>Agriculture; Forestry; Fishing; Mining</td>
</tr>
<tr>
<td>Haiti</td>
<td>8,924,553</td>
<td>$791</td>
<td>Agriculture</td>
</tr>
<tr>
<td>Jamaica</td>
<td>3.2 M</td>
<td>$5,335</td>
<td>Tourism; Distribution; Manufacturing; Agriculture; Mining</td>
</tr>
<tr>
<td>Montserrat</td>
<td>5,079</td>
<td>$3,400</td>
<td>Tourism (disrupted by volcanic eruption 1995 that continues intermittently)</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>159,585</td>
<td>$6,032</td>
<td>Tourism; Agriculture; Manufacturing</td>
</tr>
<tr>
<td>St. Kitts &amp; Nevis</td>
<td>39,817</td>
<td>$10,483</td>
<td>Tourism; Offshore finance</td>
</tr>
<tr>
<td>St. Vincent &amp; the Grenadines</td>
<td>118,432</td>
<td>$5,615</td>
<td>Agriculture; some Tourism</td>
</tr>
<tr>
<td>Trinidad &amp; Tobago</td>
<td>1,231,323</td>
<td>$19,012</td>
<td>Petroleum; Manufacturing (excl. petroleum), Agriculture, Tourism</td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td>24,041</td>
<td>$38,500</td>
<td>Tourism; Offshore finance</td>
</tr>
<tr>
<td>Anguilla</td>
<td>14,108</td>
<td>$8,800</td>
<td>Agriculture; Commerce; Services</td>
</tr>
<tr>
<td>Turks &amp; Caicos Islands</td>
<td>22,352</td>
<td>$11,500</td>
<td>Tourism; Offshore Finance; Fishing</td>
</tr>
</tbody>
</table>

Note. Compiled from the CIA World Factbook (2008), and the International Monetary Fund (2008) using 2008 figures
Demographics

Populations of the countries making up CDERA are typically small with only two countries with more than one million people; Trinidad and Tobago with just over one million people and Jamaica with just over three million (see Table 1). The total population of the English speaking Caribbean countries, from which most of CDERA’s members are drawn, is less than eight million (Central Intelligence Agency, 2008). The population figures cited in Table 1 are important for two reasons. First, the small size and spread of the islands make them vulnerable to natural hazards. Second, the disproportionate out migration of expertise from the region results in limited human resources pool on the islands, from which the CDERA could draw the manpower and expertise it needs.

The migration rates among CDERA membership are alarming. Most of the countries face a brain drain because of the lack of opportunities for finding employment or because of inadequate remuneration for those who choose to stay there. According to Mishra (2006), Caribbean countries have lost 10-40 percent of their labor force due to out-migration. This figure comprises more than 70 percent of the labor force with more than 12 years of completed schooling (Mishra, 2006). The brain drain from the region is largely responsible for CDERA’s human resources and knowledge retention problems and limits the rescue pool that CDERA can draw on.

A United Nations Development Program Report (2002) indicates that the majority of the population in the region lives in coastal areas, which are susceptible to destruction by natural hazards. The economies and populations, natural resources, and physical
infrastructure are increasingly at risk because populations are also spread over multiple islands. This is the case particularly for the Bahamas, St. Kitts & Nevis, St. Vincent, and the Grenadines. This makes preparation, mitigation, and response costs excessive and often inefficient because there are small numbers of people spread over relatively large areas. The Bahamas for instance has just over 320,600 people spread over three of the 700 islands that comprise it.

The population spread among CDERA members and the high rates of out-migration from the region makes it more important for CDERA members to cooperate on disaster management and almost an imperative for CDERA to be effective in strategically organizing around disaster mitigation and response.

**Economy of Region Sets Up a Vicious Cycle of Disaster from Hazard Impacts**

Like other small island states in the Asia and Pacific regions and the Indian Ocean, those in the Caribbean face many obstacles to sustainable development including recurring disasters from natural hazards, which have historically stymied economic development in the Caribbean. The problem is often like a vicious cycle–small incomes lead to less preparation which in turn leads to more vulnerability, which itself leads to small income. For example, as Table 1 shows, the per capita GDP of the region varies widely, from Haiti with less than US$1,000 per capita to the British Virgin Islands with almost US$40,000; most of the countries lie in the range of US$ 5,000 and US$9,000 per capita. The relatively low and widely varying per capita incomes mean that there are varying levels of affordability and support for disaster management in the region and disproportionate levels of social and economic dislocation when there is a disaster. Places
like the Bahamas, the British Virgin Islands and Trinidad are better able to mitigate the
effects of hazards and respond to and recover from their impacts, because of their
relatively high rates of GDP per capita, whereas others, like Guyana and Haiti are less
able to do so. Economic situation is a critical factor because it influences the availability
of resources to support disaster management as well as the degree of damage and
response resources needed.

In addition, as Table 1 shows, the islands of the Caribbean are heavily dependent
on only three sectors for economic sustenance—agriculture, fisheries, and tourism.
These industries are highly vulnerable to natural and man-made hazards that frequently
affect the region. One impact could wipe out the entire economy of many Caribbean
countries. For example, Hurricane Ivan, which is discussed in detail later, completely
destroyed the economic base of Grenada in 2004 and almost wiped out the Jamaican
banana industry.

**Vulnerabilities and Failures**

The combination of all the vulnerabilities noted in the preceding paragraphs
means that CDERA operates in a macro-environmental context where there are many
factors to take into consideration in building effectiveness. This helps us understand why
the CDERA system is plagued with failures and why CDERA needs to be effective. The
environmental issues and vulnerabilities to which the Caribbean is exposed (geography,
economy, and population spread in coastal areas) impose additional challenges to
CDERA members.
So significant are the environmental vulnerabilities to the region that the 1994 UN Global Conference on the Sustainable Development of Small Island Developing States was dedicated to stemming them. This conference resulted in the *Barbados Plan of Action* (1994), which drafted “a blueprint for sustainable development of Small Island Developing States [SIDS]” (United Nations Development Program [UNDP], 2002, p. 4) and was a tremendous boost to the work of CDERA (A. Mullings, personal communication, May 15, 2008). In line with the Barbados Plan of Action, the Joint Commonwealth/World Bank follow-up report in 2004 “highlighted four main areas of challenge and opportunity: tackling volatility, vulnerability, and natural disasters; strengthening capacity; addressing issues of transition to the changing global trade regime; and managing new opportunities and challenges from globalization” (p. 3). It is on the area of natural disasters that this dissertation focuses.

**A BRIEF OVERVIEW OF DISASTERS IN THE CARIBBEAN REGION**

Throughout CDERA’s history hurricanes have had major impacts on the region in the forms of loss of life and property because of their frequency, but in recent history earthquakes and volcanic eruptions have been responsible for the greatest loss of life of all the hazards (Tomblin, 1984 cited in Collymore, 1993; Douglas, 1992). Although the case studies I conducted for this dissertation mainly focus on hurricanes, the history and impact of other disasters in the region must not be overlooked, because they represent significant hazard risks. The experiences gained from these events add to the knowledge capital of the region and therefore has the potential to help to build effectiveness in CDERA. According to Collymore (1993), no city in the region has been spared the
impact of at least one of these hazards since beginning of the information collection about natural hazards and their impacts 200 years ago. This section focuses on the historical impacts of hurricanes, volcanoes, and earthquakes on the islands of the Caribbean.

**Hurricanes**

Many islands have suffered numerous impacts over the last 200 years, with the region facing increasing frequency of impacts in recent times. Direct impact by hazards is not necessary for significant damage among Caribbean countries. Floods from rains associated with hurricanes have wreaked significant damage.

While the entire region in general is predisposed to the impacts of hazards, Jamaica, Dominica, and St. Lucia have experienced more severe impacts than others. Since 1802, when disaster records were first collected, Jamaica has had at least 10 major hurricane impacts and frequent flooding, including the ones in 1979, 1984, 1985, 1986, 1988, 2000, 2003, 2004, 2005, 2007 (Collymore, 1993; Trotz, 2002). These frequent hurricanes and flooding events caused major destruction to the social and economic infrastructure in Caribbean countries – roads, bridges, agriculture, community centers, hospitals and so on. The 1986 flooding in Jamaica is typical of the havoc they can wreak. The Planning Institute of Jamaica (1987) estimated that some 17,000 acres of crops were destroyed, several roads were damaged or blocked and over 40,000 people were directly affected. Total damage including loss to agricultural sector was estimated at US$48 Million. Two years later, in 1988, Jamaica was again impacted, this time by Hurricane Gilbert. Some 810,000 persons were affected, including several deaths that were directly associated with Gilbert. Losses ran over US$1 billion, the agricultural sector was
obliterated and over 60% of the country was impacted (Trotz, 2002). The spending by the government to recover from these impacts eroded the national income base and slowed economic development: Instead of moving forward, the same infrastructure were fixed or replaced over and over again.

Dominica was affected in 1979 by Hurricane David, which seriously damaged 50% of Dominica’s housing stock; two thirds of the island’s population of 80,000 were left homeless (Economic Commission for Latin America & the Caribbean, United Nations Development Program & Planning Institute of Jamaica, 2004). In 1980, the 75-105 mph winds of Hurricane Allen whipped St. Lucia causing displacements of close to 10,000 people and 90% of its main agricultural produce- banana- was destroyed. Total damage was estimated at US$87Million (Trotz, 2002).

In 1989, Hurricane Hugo caused severe damage to Montserrat, St. Kitts and Nevis, Antigua and Barbuda, and the British Virgin Islands resulting in significant economic damages to the productive sectors and infrastructure (Collymore, 1993; Trotz 2002). About 33, 800 people were impacted and the damage ran over US$3 billion (Trotz, 2002). In 2004, Hurricane Ivan impacted Grenada destroying almost 90% of the housing stock and 80% of the island’s economic base, which was comprised primarily of harvesting spices and tourism (Organization of Eastern Caribbean States [OECS], 2004). Losses exceeded the country’s GDP for that year thereby making the government unable to repay its national debt for that year (OECS, 2004). The hurricane went on to cause severe damage to Jamaica. Hurricane Ivan’s impact on the Caribbean will be discussed in detail later in chapter four.
Volcanic Eruptions

There are five active volcanoes distributed across the Caribbean Basin, the most active being on the islands of St. Vincent and Montserrat in the Eastern Caribbean. St. Vincent’s Soufriere erupted twice in 1812 and once in 1902. The 1902 eruption lasted over a year and resulted in about 1,600 deaths and extensive damage to the agricultural sector of that island (CDERA, 2009b). The estimated economic cost of the 1902 eruption in base year 2000 dollars was US$200 million (Seismic Research Unit, UWI, 2000). In 1979, St. Vincent’s Soufriere again erupted. This time there were no deaths reported, but the economic loss was estimated at US$100,000,000 in base year 2000 dollars (University of the West Indies, 2008). On May 8, 1902 Mt. Pelée in Martinique erupted destroying the town of St. Pierre and killing about 28,000 inhabitants in the process (CDERA, 2009b). The economic cost in base year 2000 dollars was about US$1,000,000,000 (University of the West Indies, 2008).

Montserrat’s Soufriere Hills Volcano erupted for the first time in recorded history on July 17, 1995 and in the following two years the eruptions got progressively worse (CDERA, 2009). In 1997, the Soufriere Hills volcano had a major eruption resulting in some 20 deaths and leaving most of the island uninhabitable. The 1997 eruption destroyed the capital, Plymouth, and forced over two thirds of the island’s population to flee abroad (University of the West Indies, 2008). Complete economic destruction is reported with losses estimated at base year 2000 dollars prices over US$500,000,000 (University of the West Indies, 2008). The volcano continues to be active and is causing much of the southern part of the country to be isolated. As recently as July 29, 2008, the volcano caused a dome collapse partially (Seismic Research Unit, UWI, 2008), which
resulted in house burnings in Richmond Hill, falling rocks in Salem, and partial evacuations in Isle Bay, Old Towne, Olveston, and Salem (University of the West Indies, 2008).

**Earthquakes**

Almost the entire Caribbean region sits on rift systems where some of earth’s tectonic plates are separating and a new crust is being created. Sometimes in the process of separating the boundary of the plates grind against each other causing earthquakes (CDERA, 2009b). As a result, the Caribbean region is a very active eruption zone, which is prone to earthquakes. Earthquake disasters occurred in Jamaica in 1692 and 1907. The earthquake in 1692 killed over 4,000 people and impacted about 62% of the island’s population (Collymore, 1993). The Dominican Republic was impacted in 1691, 1751, and 1946 causing major losses to property each time. In 1751, all the houses in Azua were destroyed in an earthquake; the town had been previously ruined in the 1691 earthquake (Collymore, 1993). Haiti was impacted in 1751 and Port-au-Prince suffered huge losses. In 1770 Port-au- Prince was again destroyed. In 1942 the city of Port de Paix was destroyed and 200 people lost their lives. In 1843 over 25% of Trinidad’s population (5,000 people), was wiped out as a result of earthquake destruction (Collymore, 1993).

I cited just a few examples of the damage that have resulted from the primary natural hazards in the Caribbean region (Collymore, McDonald & Brown, 1993). These examples can help us understand the intensity of the disaster management problems facing the region and challenges facing the governments and CDERA. Throughout the region neither social practices nor governmental action have caused a counter balance to
natural hazards. Instead social practices have worked in tandem with natural hazards to result in disasters. For instance, coffee production on the Blue Mountains of Jamaica has led to a decimation of the forest cover. During the rainy season large swaths of soil become unstable in the rains, resulting in flooding (Collymore, McDonald & Brown, 1993).

**Need for a Coordinated Disaster Response and Management System**

Prior to the 1970s, the concept of comprehensive disaster management was not widely known in the region; the efforts of the governments were concentrated on post-disaster relief and capital development projects after the various destructions (Caribbean Disaster Mitigation Project [CDMP], 1997). Also each government responded to their own disasters separately. Even when there were regional agreements about implementing preparedness and response planning, these agreements were not implemented in the individual countries because many governments did not ensure their implementation (Jones, Bisek, & Ornstein, 2001, p. 5). The need for a more systematic and integrative approach to disaster management became apparent over time in the region. The Caribbean Disaster and Emergency Response Agency (CDERA) was the response of the island governments in the region to this need.

**THE CARIBBEAN DISASTER AND EMERGENCY RESPONSE AGENCY**

The Caribbean Disaster and Emergency Response Agency (CDERA), was established as the region’s disaster management mechanism by an agreement of the CARICOM in 1991. The CDERA mechanism has been guided and coordinated by its
Coordinating Unit (CU). Under the guidance of CU, the focus of CDERA has evolved from response and response planning in the 1990s to comprehensive disaster management (CDM) in 2001 and to enhanced CDM strategy and framework in 2007. These changes in strategy took place with the purpose of improving the effectiveness of the CDERA mechanism.

**CDERA: A Brief History of Caribbean Region Disaster Management & Response Initiatives**

The origin of CDERA can be traced back to the development of the Pan Caribbean Disaster Planning and Prevention Project (PCDPPP) that began in July 1984. This 10-year project was formed after several severe events ravaged the region and overwhelmed the capacities of the countries to cope (Singh, 2002). Around the same time a discussion about how to more effectively help countries cope with the impact of disasters was taking place at the international level among multilateral and bilateral donors (A. Mullings, personal communication, May 15, 2008; Trotz, 2002). In the Caribbean, donors were repeatedly called upon to provide funding assistance for response and restoration of the same infrastructure after each disaster. This situation was not sustainable.

The Pan Caribbean Disaster Planning Project (PCDPP) was formed through sponsorships by the United States Agency for International Development (USAID), the Canadian International Development Agency, the Government of the Netherlands, the United Nations Disaster Relief Organization (UNDRO), and other participating countries and territories (Trotz, 2002; Caribbean Disaster Mitigation Project, 1997). The PCDPPP jointly developed and/or implemented disaster mitigation and technical assistance
programs with regional organizations including the Seismic Research Unit of the University of West Indies', the Caribbean News Agency, The Caribbean Council of Engineering Organizations, the Caribbean Telecommunications Union, the Jamaica Office of Disaster Preparedness, the Barbados Central Emergency Relief Organization, CARICOM, OAS, and other UN agencies (Caribbean Disaster Mitigation Project, 1997; Caribbean International Development Agency[CIDA], 1985, A. Mullings, personal communication, May 15, 2008).

The PCDPP project lacked institutional commitment by its participants and involvement of broader civil society. The project focused on response to disasters and left voids in the other areas of disaster management (Collymore, 1998). CDERA was formed in September 1991, five months after the PCDPPP ended, because the heads of governments saw the urgent need to have a mechanism to replace the PCDPPP in the region.

**Composition of CDERA**

CDERA is an inter-governmental and regional disaster management organization comprised of sixteen participating Caribbean member states, all of which are members or associate members of the Caribbean Community (CARICOM) and a coordinating unit (CU), which is an organ of CARICOM located in Barbados. The CDERA CU coordinates disaster management activities in the region in conjunction with participating member states and regional and international allies. The sixteen CDERA members are Barbados, Jamaica, St. Lucia, St. Vincent and the Grenadines, Antigua & Barbuda, Montserrat, Anguilla, Turks & Caicos, the Bahamas, British Virgin Islands, Trinidad and
Tobago, Dominica, Grenada, Belize, St. Kitts & Nevis, and Guyana. Haiti and the Cayman Islands are in discussions to acquire membership to CDERA (Caribbean Community, n.d.); A. Mullings, personal communication, May 15, 2008).

The Caribbean Community and Common Market (CARICOM) was established by the Treaty of Chaguaramas, which was initially signed by former colonies of Great Britain (Barbados, Jamaica, Guyana and Trinidad & Tobago) and came into effect on August 1, 1973. Between the years 1973 and 1983, additional eight Caribbean countries joined CARICOM. The Bahamas became the 13th member state of the Community on July 4, 1983, but not a member of the Common Market (Caribbean Community, 2009a). There are nineteen institutions (including CDERA) of CARICOM and five associate institutions that implement different aspects of CARICOM’s objectives—improve living standards, promote full employment, expand trade and economic relations and promote social, and cultural and economic development (CARICOM, 2009b). The CARICOM Secretariat is the principal administrative organ of CARICOM. It coordinates the work of the several offices and directorates of CARICOM and drafts the program of work and budget for the Secretariat (CARICOM, 2009c).

**Goals of CDERA**

CDERA was designed to provide “neighborhood support” to build each state’s capacity for responding to events and to provide national assistance in response to impacted participating member states (J. Collymore, personal communication, May 26, 2008). This neighborhood support philosophy is based on a fundamental element of human practice: Your next door neighbor would be your first point of support if you
cannot deal with the emergency yourself (J. Collymore, personal communication May 26, 2008). The philosophy was guided by lessons from several disasters in the 1970s and 1980s, where: (1) the overwhelming commitments of the governments of the region to support affected states did not lead to effective results because of the absence of a mechanism to coordinate and deliver the support; (2) certain common standards needed to be embraced if the shared responsibility and common commitment to support the countries were to be met; and (3) the region needed to have a link between regional and international partners since all the participating member states were developing territories with very limited resources (J. Collymore, personal communication, May 26, 2008).

The CDERA mechanism was designed to be a mutual aid arrangement where countries would pool their resources to respond if any member country experienced a disaster (J. Collymore, personal communication, May 26, 2008). CDERA is one of the specialized agencies of CARICOM and falls under the Council for Trade and Economic development (COTED), one of CARICOM’s seven protocols (Jones, Bisek & Ornstein, 2001). The CDERA Coordinating Unit (CU) leads the disaster management effort in the Caribbean.

Jeremy Collymore, the Regional Coordinator of CDERA, outlines its objectives (J. Collymore, personal communication, May 26, 2008):

1. To make an immediate and coordinated response to a disastrous event by providing emergency relief to an affected participating state, on request;
2. To secure and collate reliable and comprehensive information on the extent to which a participating state is affected by a disaster and channel it to interested governmental and non-governmental organizations;

3. To mobilize and coordinate the supply and delivery of disaster relief from governmental, inter-governmental, and non-governmental organizations;

4. To mitigate or eliminate, as far as possible, the immediate consequences of natural disasters in participating states; and

5. To establish, enhance, and maintain, on a sustainable basis, adequate disaster response capabilities among participating states.

These objectives are the guiding principles for comprehensive disaster management (CDM). The CDM objectives specify CDERA’s role in preparation, mitigation, and response; they also indicate the critical role that information, resources support, and governmental involvement play in the achievement of CDERA’s goal of comprehensive disaster management. The objectives also form the basis for evaluating CDERA’s effectiveness.

Over time, the commitment of CDERA participating member state governments to pooling resources proved sporadic, tardy, and unreliable (A. Mullings, personal communication, May 15, 2008; J. Collymore, personal communication, May 26, 2008; R. Jackson, personal communication May 16, 2008; E. Riley, personal communication May 27, 2008). In addition, because of their overreliance on CDERA, many of the individual participating member states did not develop their own national expertise, thus weakening the CDERA system.
Organization of CDERA

Figure 2 presents the organizational chart of CDERA. As outlined on the CDERA Website (http://www.cdera.org), CDERA’s organization comprises the National Disaster Organizations (NDOs) of each participating member state, the Coordinating Unit/Secretariat, Board of Directors and the Council of Ministers. The sixteen participating member states of CDERA are termed “NDOs” and represent the central policy and strategy implementation organization of the CDERA system.

Figure 2: The Organizational Structure of CDERA.

Note: Compiled from personal communications done during May and early June of 2008, and augmented with information found at the CDERA Website (2008)
The CDERA Website states that each state’s NDO is a government-designated organization with the responsibility for that country’s national disaster management efforts. Each NDO has its own partners, systems of operations, governance framework, and protocols. There is no standardization in the organizational titles, or structures of the NDOs; they vary from country to country.

The CDERA Coordinating Unit (CU) has been headed by the same Coordinator since its inception in 1991. The CDERA Coordinator is responsible for executing the directives of the CDERA Council of Ministers and carrying out its day-to-day directives (Caribbean Community, n.d.).

The heads of the NDOs comprise the CDERA Board of Directors, which is the group that works out the implementation and operational planning for CDERA once the CDERA council decides on what policy the Agency should pursue. The CDERA Board of Directors meets annually in one of the CDERA member states on a rotation basis. The Coordinator of the CDERA CU chairs the CDERA Board of Directors. The Council of Ministers is the supreme policy making body and is comprised of the Heads of Government of the participating member states. The Council meets annually at which time CDERA’s work program and administrative budget are reviewed and other major policy decisions are made (Caribbean Community, n.d.). The sitting elected chair of the CARICOM Secretariat also chairs the CDERA Council. This job held on a rotation basis depending on who is the current elected chair of the CARICOM Secretariat (Caribbean Community, n.d).
The organizational structure presented in Figure 2 is deceptive. It may give the impression that CDERA has a very flat organizational structure with very few levels. This is only partly true. Within and around CDERA there is a complex web of relations through which it has to navigate to get things done and fulfill its mandate. To fully understand CDERA’s organization, we must look at its relationships with private sector bodies, specialized non-governmental agencies, regional and international entities and agreements for which memoranda of understanding (MOU) are signed and declarations are made. Without its many strategic linkages via MOUs, relationships with private sector bodies, specialized non-governmental agencies, or regional and international entities CDERA would be hard pressed to deliver on its goal of comprehensive disaster management. Memoranda of understanding enable CDERA to access resources, including funding and technology. This is the reason why CDERA has, since its inception, pursued a policy of strategic collaboration with national, regional, and international organizations. The purpose of this approach is to leverage limited resources by collaborating with organizations that have similar interests and are willing to avail their technical expertise to CDERA (J. Collymore, personal communication, May 26, 2008). These collaborations have proved to be an integral part of CDERA’s delivery system and vital to CDERA’s operation and performance.

CDERA depends on collaborative strategic initiatives and memoranda of understanding to achieve its mandate of comprehensive disaster management. A good working definition of MOUs is provided by the United States Workforce Investment Act Commission (2001): MOUs are means of agreement between two or more agencies, bureaus, or departments clearly outlining the roles and responsibilities of each party to
the agreement. Table 2 provides a sampling of MOUs signed by CDERA over the years and their fit with the Enhanced Comprehensive Disaster Management Strategy.

**Table 2: A Sample of Memoranda of Understanding Signed by CDERA and Their Fit with the CDERA Enhanced CDM Strategy**

<table>
<thead>
<tr>
<th>MOU Partner</th>
<th>MOU Purpose</th>
<th>Fit with Priority Areas of the Enhanced CDM Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDERA and First Caribbean International Bank May 25, 2003</td>
<td>Funding to improve regional capability to respond to natural and other hazards – bring together key response agencies to support effective response; training and certification of builders &amp; artisans.</td>
<td>Priority area #4</td>
</tr>
<tr>
<td>CDERA – Caribbean Electric Utilities Services Corporation (CARILEC) April 21, 2004</td>
<td>Coordinate disaster and Emergency management operations &amp; provide immediate relief – conduct training, implement community level disaster management programs; integrate CARILEC fully into national and regional emergency management programs</td>
<td>Priority area #4</td>
</tr>
<tr>
<td>CDERA- University of the West Indies April 2, 2009</td>
<td>Strengthen acquisition, management and dissemination of CDM knowledge</td>
<td>Priority area #2</td>
</tr>
<tr>
<td>CDERA- World Food Program (May 21, 2007)</td>
<td>Provide logistics intervention in emergencies; warehouse management; and emergency management food security</td>
<td>Priority area #1</td>
</tr>
<tr>
<td>CDERA – Caribbean Catastrophic Risk Insurance Fund (August 19, 2009)</td>
<td>Strengthen the regions resilience to disasters through development of strategies to mitigate physical, &amp; socio-economic impact of natural hazards</td>
<td>Priority area #1</td>
</tr>
</tbody>
</table>

Note: Compiled from Collymore (2007) during remarks made in a speech on CDERA’s signing of an MOU with the World Food Program

In Table 2 it is apparent that CDERA’s memoranda of understanding have facilitated the delivery of services that concentrate on the comprehensive disaster management phases. In fact, the MOUs fit neatly into one of the four priority areas of
CDERA’s enhanced CDM strategy: institutional capacity building, knowledge management, sector mainstreaming of disaster risk reduction and building community resilience (Collymore 2007). The four priority outcomes are:

1. Enhance institutional support for CDM Program implementation at national and regional levels.

2. Establish an effective mechanism and program for management of comprehensive disaster management knowledge.

3. Mainstream Disaster Risk Management at national levels and incorporate it into key sectors of national economies (including tourism, health and agriculture).

4. Enhance community resilience in CDERA states/territories to mitigate and respond to the adverse effects of climate change and disasters.

Memoranda of understanding, then, are a strategic means of acquiring resources and other assistance to deliver on CDERA’s mandate in the region.

Within the CDERA system, there are two primary functions around which all other components are framed. These are coordination and operations.

**Coordination of CDERA Activities**

The coordination function of CDERA CU covers both response and the disaster management capacity development initiatives. The regional Coordinating Unit (CU) operates through regional focal points. In the event that a country or countries are impacted and the impact surpasses the response capacity of the country or the sub-regional focal points to respond, the CU will coordinate activities based on the formal requests it receives from impacted governments (CDERA, 2009c). There is a set of protocols that need to be followed for CU to receive requests and initiate action. Once
As part of its disaster management capacity development activities, The CDERA CU crafts model documents for use in participating member states. Examples of those model documents are: Disaster Legislation, Disaster Mitigation Policy, Disaster Mitigation Plan, Flood Contingency Plan, Integrated Relief Program, Emergency Housing Policy, Donations Management Policy, Disaster Information Kit for Media, Guidelines for Emergency Operations Centers in the Caribbean, Preparedness Checklist for Schools, and Community Disaster Preparedness Manual. These documents have been developed through collaboration with technical experts and stakeholders in the Caribbean and other regions of the world (CDERA Tools & Products, 2008). The documents have helped bring about change in the way disaster response and relief operations were conducted in the Caribbean. They have also influenced the institutionalization of the systems and mechanisms for disaster planning and response in CDERA member states (CDERA Tools & Products, 2008).

As part of its coordinating role, the CDERA CU is assisted by two regional mechanisms: the Regional Response Mechanism (RRM), which is a series of facilities and orders that allows CDERA CU to activate coordinated response efforts in impacted member states; and the Regional Security System (RSS) to maintain law and order in impacted member states.
The CDERA CU utilizes the Regional Response Mechanism (RRM) to coordinate responses to disasters. As shown in Figure 3 the RRM is a framework that consists of the Regional Coordination Plan, Response Teams, Memoranda of Understanding, Standard Operating Procedures, Agreements and Acts, the CARICOM Disaster Relief Unit, the Regional Telecommunications Plan, the Eastern Caribbean Donor Group, and the North Western Caribbean Donor Group. These elements are brought together by CDERA and activated when a member state is impacted beyond its capacity to cope in order to achieve timely and effective response (CDERA, 2004). The RRM is executed by the CDERA CU on behalf of member states (Grosvenor, 2007).

Figure 3 CDERA’s Regional Response Mechanism.

Note: Adapted from a presentation by Andria Grovesnor, CDERA’s Technical Manager at the Caribbean Comprehensive Disaster Management Conference in Barbados on December 2, 2007.
The Regional Response Mechanism uses established systems and procedures to facilitate response coordination among CDERA participating member states, and also works with regional and international agencies during disaster response (CDERA Response, 2008).

The Regional Security System (RSS) is an international agreement established in 1982 because of a need for collective defense and security in the Eastern Caribbean. Four members of the Organization of Eastern Caribbean States—Antigua and Barbuda, Dominica, St. Lucia, and St. Vincent & the Grenadines—signed a MOU with Barbados to provide “mutual assistance on request” (Regional Security System, 2008). The focus of the RSS is to ensure stability and well-being of the Eastern Caribbean region so that that region of the Caribbean can achieve social and economic development and to maintain the principles of democracy, liberty of the individual and the rule of law (Regional Security System, 2008).

The Regional Security System assists CDERA in disaster response by activating a special body known as the CARICOM Disaster Relief Unit (CDRU). The CDRU consists of national defense and police forces—not a part of the RSS but working in tandem with it through CDERA to minimize the peace and security impacts of disasters (Regional Security System, 2008). Whenever a member state is threatened by a disaster, the CDRU is placed on standby by CDERA CU and will be ready for immediate deployment, if states request assistance (CDERA Response, 2008). The CDRU primarily assists affected states by maintaining law and order, managing relief supplies, and providing personnel to repair critical lifeline facilities such as roadways and hospitals.
The members of the Regional Security System (RSS) are Antigua and Barbuda, Dominica, St. Lucia, St. Vincent and the Grenadines, Barbados, St. Kitts and Nevis, and Grenada. The RSS also promotes cooperation among all CARICOM member states in the prevention and interdiction of illegal drugs, national emergencies, immigration control, maritime policing duties, and natural and other disasters (Regional Security System, 2008). Since its inception, the RSS has provided policing and security response to the USA intervention in Grenada in 1982 by placing police and military personnel from around the region to maintain peace and civility. The RSS has also been activated during Hurricane Hugo in 1989; an attempted coup in Trinidad and Tobago in 1990; a prison uprising in St. Kitts and Nevis in 1994; Hurricanes Luis and Marilyn in Antigua and St. Kitts and Nevis in 1995; Hurricane Georges in St. Kitts and Nevis in 1998; and Hurricane Ivan in Grenada in 2004 (Regional Security System, 2008). The RSS also conducts an annual practice exercise called “Tradewinds,” which is done in conjunction with the USA, UK, and Caribbean security forces to test the capability of the forces to work together (Regional Security System, 2008).

The CU also administers projects at the country and regional levels and coordinates the Regional Security System (RSS) and regional specialized technical agencies that respond to events. In this regard, the CU also undertakes operational activities. However, it should be noted that the true level of operations take place at the sub-regional level.
Sub-Regional and National Focal Points and Communities

At the operational level are sub-regional focal points, national focal points, and communities. There are four sub-regional focal points within the CDERA mechanism—Jamaica, Trinidad, Barbados, and Antigua (see Figure 4) (Williams, 2006; CDERA, 2009d).

Figure 4 CDERA Sub-regional focal points and the grouping of participating member states located in each sub-regional focal point.

Note: Adapted from CDERA (2009b).

The sub-regional focal points are the pulse of CDERA’s operational mechanism. Countries are organized in groups of three to five, and the country with the most developed infrastructure—the best telecommunication system, the most advanced emergency system, the largest body of support professionals, and [There is something
missing here]–is designated as the focal point for that sub-region. Figure 4 lists the countries under each focal point. The countries in each sub-regional focal point are expected to provide immediate assistance to each other in case of a disaster, before the CDERA CU is approached for response coordination on a larger scale.

Sub-regional focal points provide mentoring for participating member states within the sub-region as well. These focal points have regional warehousing infrastructure and they coordinate responses to countries impacted by an event without the entire CDERA having to be involved (CDERA Response, 2008). The philosophy behind sub-regional focal points is “decentralization in a neighborhood partnership process” (J. Collymore, personal communication, May 26, 2008). If there is an emergency in Montserrat, such as the 1997 volcanic eruption, then the response operations would be managed out of Antigua and Barbuda sub-regional focal point for Montserrat. If the situation is dire and overwhelms the focal point’s ability to contain it, then the CDERA CU will mount a larger response effort via the Regional Response Mechanism (P. Mullin, personal communication, May 19, 2008).

**Deficiencies and Weaknesses of the CDERA System**

The agreement establishing CDERA requires that member states (CDERA, 2004, p. 5.1):

- Establish National Emergency Relief Organizations with adequate support;
- Establish Planning Groups with defined roles and responsibilities;
Develop loss reduction mechanisms informed by damage assessment systems and procedures; and

Maintain a state of readiness through development of plans and procedures.

Each of CDERA’s participating member states has a National Disaster Office (NDO) headed by the National Disaster Coordinator (NDC). At the national level of the CDERA system, NDOs are the focal points for that country’s disaster mechanism. This mechanism includes not only the national disaster office, but national planning committees made up of public, private sector organizations and NGOs, information sources, and media needed for coordination of resources and expertise in disaster management and information dissemination. The Agreement establishing CDERA requires that the governments of participating member states dedicate resources to building disaster management efforts in their respective territories. But the level of commitments by the governments of the member states and the level of empowerment of the National Disaster Coordinators by the governments do not meet the requirements of the agreement.

For instance the “level of organization and effectiveness of disaster management capacity varies [widely] from state to state” (Jones, Bisek & Ornstein 2001, p. 13; CDERA 2006). The 2001 audit of the CDERA assessed several areas of the system, including institutional capacity, disaster planning, and organizational positioning issues. The results of the audit highlighted several areas in which efficiency and effectiveness needed to be improved. Two separate audits done five years apart (Jones, Bisek &
Ornstein, 2001, and CDERA, 2006) found that the area of staffing was particularly troubling. Only two countries of the 16 CDERA member states had more than six full-time professional staff (Jamaica with 28 and Belize with seven) and five countries had only one (Jones, Bisek & Ornstein, 2001). In 2006 when the 2007-2012 CDM Strategy and Program Framework was being prepared, the researchers found that institutional development and capacity building were inadequate at the national level (CDERA 2006). The 2007-2012 Framework recommended the building of strong decentralized national organizations as a major factor in improving CDERA’s effectiveness. At the time of this research (2008) the national disaster offices remained strongly centralized but had relationships with many organizations within and outside of government. Compounding these institutional issues were critical capacity issues including critical shortage of financial and technical resources to build adequate capacity for disaster risk management and disaster risk reduction at the national level (CDERA, 2006).

In addition, the national disaster coordinators (NDCs) do not have disaster management backgrounds. Most have backgrounds in communications and education and some have backgrounds in science; very few of them have strategic management skills (Jones, Bisek & Ornstein, 2001). NDOs generally “lack expertise in program and proposal development, mitigation planning and advocacy” (Jones, Bisek & Ornstein, 2001, p. 15). They also need capacity development in resource planning, and policy development as a priority. Some NDCs have gone to the United Kingdom, Canada and the USA for training in disaster management; others have gone on secondments, i.e., employees within the CDERA system have gone on loan to the Federal Emergency Management Agency (FEMA) to observe operations there and improve their technical
capabilities. In addition, many have participated in training and simulation exercises and other professional exchanges with the United States Southern Command in Florida. All National Disaster Coordinators have gone through the United States Agency for International Development/Office of Foreign Disaster Assistance (USAID/OFDA) management program (Jones, Bisek & Ornstein, 2001). However, in-depth and systematic training in disaster management is lacking in the region. CDERA has plans in place to redress this issue (H. Prince, personal communication, May 21, 2008).

National Disaster Offices (NDOs) are usually not placed in high positions in the governmental bureaucracies of the member states. Of the sixteen members of CDERA, only nine have located their NDOs in top decision-making levels. In the British territories (BVI, Anguilla, and Montserrat), NDOs are located in the Offices of the Prime Minister, which is a cabinet level office or with the Governor. The others are located in various line ministries such as Works, Water, and Housing; Home Affairs/Labor, Foreign Affairs and National Security; or Civil Defense (Jones, Bisek, & Ornstein, 2001; CDERA 2006; W. Sweet, personal communication, May 20, 2008; J. Thomas, personal communication, May 21, 2008). This is an important point to consider because low placement of an NDO in the government hierarchy can frustrate the process of proper disaster management. Many NDOs, for example those in Grenada and Dominica, are so low down on the decision-making hierarchy that they have great difficulty addressing resources and other capacity issues.

CDERA seems committed to revising its strategic focus in order to address the weaknesses and deficiencies highlighted in audits and practice.
CDERA Today

Changes in Strategic Orientation and Name

CDERA’s strategic orientation has evolved over time; its strategic focus has expanded from disaster mitigation to comprehensive disaster management (CDM). Earlier in its history CDERA’s mandate was centered on response and mitigation, as per the CARICOM COTED Agreement; later the agency found itself, through necessity, getting increasingly involved in all phases of the disaster management cycle—preparedness, mitigation, response, and recovery activities—and had to expand its scope. Consequently CDERA made a strategic shift from coordinating emergency response activities to focusing on comprehensive disaster management (CDM) in 2001. As noted earlier, “CDM involves all actions required to ensure that a country/jurisdiction has a capability to deal with all types of hazards, and all phases of the disaster management cycle by coordinating the wide-ranging action and utilizing all necessary resources” (CDERA ADMatrix, 2001; Collymore, 2006). It is a proactive approach to managing disaster risks. comprehensive disaster management focuses on all hazards and on all sectors of society (CDERA CDM 2008a).

Comprehensive Disaster Management efforts involve many stakeholders not only the NDOs. They also involve public and private sectors, regional sector partners, donors and response mechanisms, all segments of civil society, and the general public working together to reduce the risks and losses from natural, technological and other man-made hazards, and the effects of climate change (CDERA, 2008a).
Part of the CDERA CDM strategy is to focus on integrating vulnerability assessment and risk reduction into development planning and management (CDERA, 2001). Before the institution of CDM, this integration was not a focus for CDERA. This shift in focus is an appropriate strategy because of CDERA’s emphasis on viewing disaster risk reduction as part of the regional developmental agenda of “sustainable development.” This emphasis lies in stark contrast to the early days of CDERA when disaster response and mitigation focused only on hurricanes (Trotz, 2001) and was not tied to any broader national or regional agenda. The CDM strategy was seen as a “roadmap for building resilience to hazards within CDERA participating states” (CDERA Comprehensive Disaster Management [CDM], 2008a, p. 1). Under the 2001 version of CDM, a number of initiatives and activities were conducted, with no indication of specific results for each of these. This “version” of CDM was not conceived with the objective of measuring results or monitoring progress. Upon an assessment of the 2001 CDM strategy and in line with global and regional disaster management agenda CDERA devised a new approach to implementing its CDM strategy by incorporating ways to monitor delivery and measure success (J. Collymore, personal communication, May 26, 2008; International Strategy for Disaster Reduction [ISDR], 2007).

In 2006, the CDM strategy was enhanced using a results-based programming approach and labeled “Enhanced CDM” (CDERA Comprehensive Disaster Management, 2008). The Enhanced CDM was expected to facilitate harmonization among key development partners and institutions and embrace “the latest regional and international thinking on, and approaches to, disaster management” (CDERA Comprehensive Disaster Management, 2008b, p. 1). The strategy is closely aligned to regional and international
agreements. Regionally, the enhanced CDM strategy and Framework is aligned to the Caribbean Community Regional Framework 2005-2015 that has as its principles, better quality of life for all, integrated development planning, preparation for climate change, integrated disaster management (OECS, n.d.). The enhanced CDM strategy and framework is also aligned to the Caribbean Single Market and Economy (CSME), and the Organization of Eastern Caribbean States’ St. Georges Declaration of Principles for Environmental Sustainability (CDERA News, 2008c). The enhanced comprehensive disaster management strategy is also strongly influenced by the Barbados Program of Action of 1992 and the Kingston Declaration of 1989 (revised 2005). These two documents promoted sustainable development and the development of a machinery for coordinated emergency relief in the Caribbean region. Internationally, the enhanced CDM strategy is aligned with the *Hyogo Framework of Action 2005-2015* and is significantly influenced by the United Nations Millennium Development Goals (CDERA News, 2008c).

At the time of the writing of this dissertation, CDERA was in the process of changing its name to the Caribbean Disaster and Emergency Management agency (CDEMA) to reflect its emphasis on disaster management for all hazards and all phases of the comprehensive disaster management cycle and risk reduction and away from focusing on response (Riley, 2008; Collymore, 2008) This name change seems to be in line with the international disaster management movement that focuses on disaster risk reduction and sustainable development. By aligning its name and mission with the global disaster management agenda, CDERA will be able to commandeer more resources including technical assistance and finances to execute its regional mandate.
Shifting Output Delivery from Programs to Projects

Since 2007, the CDERA work plan has been heavily funded through project monies granted by international aid agencies (J. Collymore, personal communication, May 26, 2008). This means that CDERA can leverage its relationship with international aid agencies to deliver its mandate, instead of depending on the governments of participating member states for funding that was tardy at best. With this new project-driven approach CDERA began to develop projects that would build on different aspects of its enhanced comprehensive disaster management and ultimately get more accomplished.

Role of International Aid Agencies and Agreements in CDERA’s Disaster Reduction Operations

Agreements with international aid agencies play a central role in CDERA’s strategic direction and resource access. International aid agencies fund projects and provide grant monies for specific programs and facilitate technical assistance, and post-recovery support and technology, and allow access to best practices (Williams, 2006). As such, understanding of the range of these agreements is important to understanding CDERA’s context. Some of these agreements that influence the strategy and operations of CDERA are summarized below.


The Hyogo Framework for Action is a global agreement spearheaded by the United Nations with the objective of “building the Resilience of Nations and Communities to Disasters” (International Strategy for Disaster Reduction [ISDR], 2005,
The Framework signed in Hyogo, Japan in 2005 promotes a strategic and systematic approach to reducing vulnerabilities and risks to hazards (International Strategy for Disaster Reduction).

The Hyogo Framework is so fundamental for CDERA that its new round of projects under the 2005-2012 Enhanced Comprehensive Disaster Management Strategy and Framework fits into several of Hyogo’s five priority action areas. By aligning its 2005-2012 enhanced CDM strategy and Framework to this global disaster risk reduction objective, CDERA has positioned itself to access resources including technical expertise and funding.

The International Decade for Natural Disaster Reduction (1990-1999) and its Successor

Perhaps as important as the Hyogo Framework for Action for CDERA is the International Decade for Natural Disaster Reduction (1990-1999), which stemmed from global concerns for natural disasters and helped to shape and push the concept of comprehensive disaster management in the Caribbean (Trotz, 2002; A. Mullings, personal communication, May 15, 2008). The International Decade for Natural Disaster Reduction caused the world to focus on the impact of climate change on small island states and so significantly boosted CDERA’s resourcing and positioning strategies.

During the decade of the 1990s also, there was focus on the effects of climate change on small island developing states within the international aid community. At the Small Island Developing States (SIDS) Conference in Barbados in 1994, global climate change was seen as a major environmental issue that could pose dire consequences for
SIDs and low lying coastal countries (Trotz, 2002). At the 10th Intergovernmental Negotiating Committee meeting of the Climate Change Convention (1994) it was agreed that SIDS had to adapt to climate change by making short-, medium-, and long-terms strategies and consider their important social and economic implications (Trotz, 2002). It was through this line of reasoning that comprehensive disaster management gained renewed emphasis. One outcome of the 1994 conference was development and implementation of the *Caribbean Planning for Adaptation to Global Climate Change Project* (CPACCP) 1997-2001.

The CPACCP was developed and implemented in twelve [Eastern] Caribbean countries (Trotz, 2002). The project was funded by the Global Environmental Fund; it was implemented by the World Bank and executed by the Organization of American States (Trotz, 2002). The project sought to assist national governments to strengthen regional capacity for monitoring and analyzing sea level dynamics, identify those areas particularly vulnerable to adverse effects of climate change and sea level rise, and develop an integrated management and planning framework for cost effective responses and adaptation. In addition, the CPACCP promoted the enhancement of regional and national capabilities through strengthening disaster management institutions and human resource development (Caribbean Community, 2009a).

The Barbados conference also highlighted the need for a successor arrangement to the United Nations International Decade for Natural Disaster Reduction, which was coming to an end in 1999, five years later. The successor arrangement to the *International Decade for Natural Disaster Reduction* was the *International Strategy for Disaster Reduction* (ISDR). This strategy was created in the year 2000 was designed to
manage risks “through the introduction of risk reduction [strategies] into sustainable development” (Trotz, 2002, p. 189). The goal of the ISDR is to “enable all societies to become resilient to natural hazards and related technological and environmental disasters in order to reduce environmental, human, economic and social losses” (International Strategy for Disaster Reduction, 2008). This strategy aims to fill the gaps remaining from the International Decade for Natural Disaster Reduction ((International Strategy for Disaster Reduction, 2008).

The preceding section was presented to highlight the heavy reliance that CDERA has on international agreements and programs. CDERA utilizes international conferences and agreements to gather insights and guidance and to access to funding. International knowledge and best practices are used to inform regional and local activities and to position programmatic undertakings so as to receive funding for their undertaking.

**Funding CDERA**

The area of access to funding is especially pertinent for CDERA, because 90% of projects are funded by international donors and one has to talk to donors in the language they understand in order to get funding (J. Collymore, personal communication, May 26, 2008; E. Riley, personal communication, May 27, 2008). Take, for example, the Paris Declaration endorsed by global leaders on March 2, 2005. The Paris Declaration is an international agreement to which over one hundred governments adhere (Organization for Economic Co-operation and Development [OECD], 2005). The ministers of these governments committed their countries to continue to increase efforts in funds harmonization, policy alignment, and managing for results with a set of monitorable
actions and indicators (OECD, 2005). In 2006 CDERA announced its enhanced comprehensive disaster management mandate. This way CDERA would officially pursue all phases of the disaster management cycle and measure outcomes for results so that progress can be assessed. The Paris Declaration is one of the global agreements that led to CDERA’s strategy to set monitorable actions and measure for results (Aid Harmonization, 2005).

It is important to note that CDERA’s organizational issues, which are one of the foci of this dissertation, are complicated by CDERA’s need and quest for resources. Each participating member state contributes to CDERA’s administrative costs and its regional Emergency Assistance Fund. Each state’s contribution is determined using an assessment scale based on its size and level of development. However, some of the members do not pay their dues or are behind in payments. As a result, the agency is often strapped for cash and has to find creative ways to fund its initiatives. Its donors fill the funding gaps. Approximately 90% of CDERA’s programming budget is provided by international donors and private sector organizations provide (J. Collymore, personal communication, May 26, 2008). This translates into over 60% of the CDERA CU staff being paid by donor funds through projects (J. Collymore, personal communication, May 26, 2008).

**Summary**

CDERA has evolved to an organization focused on managing all aspects of disasters, from prevention and preparation to disaster recovery. Since its inception in 1991 it has had mixed results in disaster response; over time it has changed its mandate and evolved to become effective. Geography, climate, and economic conditions together
posed multiple risks to successful disaster management, while at the same time presenting many organizational challenges for CDERA to effectively reduce the impacts of disasters on member states. The challenges include lack of resources and funding and inappropriate national organizations to complement the regional coordinating units. All of these together require the coordination of disparate players and collaboration with a wide network of regional collaborators.

CDERA must navigate all the challenges to be effective in delivering comprehensive disaster management results. It has to manage the intricate organizational requirements necessary to be able to respond to the complexities of disaster management in a complicated environment. This research seeks to answer these questions.
CHAPTER 2 CONCEPTUAL MODEL AND THEORETICAL FRAMEWORK

Figure 5 below displays the conceptual model guiding this dissertation. I developed the model from my readings of the disaster management literature, particularly the literature on the Federal Emergency Management Agency (FEMA) in the USA. After a summary of the components of the model is presented and discussed, I will discuss the literature in detail.

Figure 5. Conceptual Model Guiding This Research
INTENT OF THE MODEL

Figure 5 presents an input-process-output model. Organizational form and organizational capacity are the inputs. They influence organizational effectiveness through organizational processes and performance systems. Effectiveness is the outcome and is assumed to be contingent on the input and process variables. Organizational learning is the feedback loop that can modify organizational form and capacity because it serves to regulate the system.

VARIABLE SELECTION FOR THE MODEL

In this section, I will provide a preview of the variables I used in the model and a brief justification for their uses in the model. More detailed discussions on each will come in the following sections.

There is limited scholarly literature available on CDERA. As a result, the model presented here is heavily influenced by the general literature on disaster management, especially the literature on the Federal Emergency Management Agency (FEMA). FEMA is one of the world’s largest emergency management agencies and its area of operations (the U.S.) is in close proximity to the Caribbean. Also, there is close relations between FEMA and CDERA, as my discussions in the following chapters will show, and thus it is conceivable that the FEMA literature is relevant for CDERA.

Input Variables

I derived the input variables in the conceptual model from the literature on FEMA, particularly the writings on its performance during Hurricanes Andrew and
Katrina and the general literature on FEMA during the James Lee Witt era. More specifically, when FEMA failed, during Hurricanes Andrew and Katrina, research pointed to shortcomings in the areas that are listed as input variables in my model. The literature on the James Lee Witt era suggests that the same variables were responsible for FEMA’s successes.

For example, Roberts (2006) found that during the Hurricane Andrew disaster not only did FEMA lack sufficient resources to take on the many tasks that were required of it, but the agency also lacked in-house disaster management expertise, leadership with disaster management expertise, and so on. Roberts found that the same factors were absent during the Katrina disaster and that they were the factors leading to Lee Witt’s success. A Committee on Homeland Security and Government Affairs Special Report prepared after Robert’s study also came up with very similar findings. In addition, the Committee on Homeland Security and Government Affairs, the Government Accountability Office (2005), and the National Academy of Public Administration earlier (1993) found poor planning and communication breakdown at an intergovernmental level; the former study found this to be true within the Department of Homeland Security. In the model I used for my research I conceptualized communication as a process variable: The communication process must be managed if it is to lead to a successful disaster response operation. The academic literature on FEMA seems to be congealing around the need for FEMA to be more flexible in its organizational form to be able to cope with events that are unpredictable (for example, see Waugh & Streib, 2006; Takeda & Helms, 2006; May, 2006). May argues that FEMA’s current structure might be a limiting factor for the agency, while Takeda and Helms suggest that bureaucratic
structures are designed for rational reactions and therefore not suited for highly irrational and chaotic circumstances. They argue that networks are better suited for disaster situations. Yet, being a government agency, FEMA is structured bureaucratically; it uses centralized planning and is guided by deliberateness, rules and routines, and checks and balances.

It is my opinion that bureaucratic structures may not always be suitable for organizations handling non-routine events, but they do present advantages when preparing for and handling disasters. For instance, bureaucracies are good at coordination and control and will work to keep the response and planning networks intact between disasters. They also keep the system focused on preparedness, mitigation, response, and recovery objectives while other network members pursue their core business objectives that might not be disaster management.

The literature on network and bureaucratic forms indicate that actually these two are not necessarily mutually exclusive forms, as I discuss later. There are bureaucracies within networks and network relations within bureaucracies. An organization may be more or less bureaucratic and more or less networked. Therefore, in my model I conceptualized organizational from as a variable with networks and bureaucracy as the two ends of a continuum.

An important input variable that I initially considered for my model but decided not to include in it is politics. Politics is important in every organization and one can cite many examples of how it influences the operations of organizations. This is especially true for agencies like FEMA and CDERA. However, I did not include politics as an
input variable, because it would be very difficult to make generalizations about it, unless I had designed a comparative study of several emergency management organizations around the world that would have specifically focused on the politics affecting them. It would also require a complex conceptualization of what I mean by politics, which would be based on political science literature. I did not intend to do that, because it would force me to redirect my dissertation. Instead, I conceptualized politics as a contextual variable. I will cite examples of the influence of politics on CDERA in the following chapters, as they are relevant, but will focus my attention on the variables in the conceptual model and try to disentangle their effects from those of politics.

To give a preview of my discussions of politics as a contextual variable, I can cite the political characteristics of FEMA and CDERA here. In the case of FEMA, the role of politics is obvious. It is a government agency that was created by the political representatives of the people and is heavily influenced by government appropriations and the members of these appropriations committees who use FEMA funds as revenue sources for their constituencies, which in turn boost their images with their constituencies. As such, it is often in their best interest to have a political appointee run FEMA. When politicians declare disasters, they secure resources and finances for their constituencies; this way they are seen as working on their behalf (Roberts, 2006) and increase their chances to get re-elected. It is not surprising then that the agency has been seen as the “dumping ground” for political appointees without the requisite experience and training in disaster management (Roberts; NAPA, 1993; Bowsher, 1993). This pervasive use of political appointees is considered in the literature to be a big reason for the organization’s diminished capacity.
In the case of CDERA politics is also important, especially at the national level (R. Jackson, personal communication, May 12, 2008; C. Herbert & P. Peets, personal communication, May 20, 2008). In the participating member states NDOs are located within their respective government bureaucracies that are controlled by elected officials. Before 2005, when disaster management gained greater visibility in the region, NDOs were seen as dumping grounds for poor performers within the civil service (A. Mullings, personal communication, May 15, 2009; P. Mullin, Personal communication, May 19, 2008. Should a star emerge, they were rewarded by being shuffled to a more prominent government agency, leaving an experience void within the NDO (P. Mullin, personal communication May 19 2008). Because greater emphasis is being placed on comprehensive disaster management now, there is a move, spearheaded by CDERA, to professionalize disaster management. An increasing number of courses are offered at the University of the West Indies (Jamaica & Trinidad) and community colleges, like the Clavity Scott Community College in the British Virgin Islands.

**Process Variables**

The process variables are necessary to transform inputs into effectiveness. Effectiveness is the result of the adequacy of inputs, but it is also determined by how inputs are used by the leaders and members of organizations. In this dissertation, process variables are the management systems and processes put in place by organizational leaders and relied upon by them to convert inputs into outputs or outcomes. One can see in Figure 5 that the process variable *communication management* is needed to process information in projects and that technology, people or other resources are needed for success and logistics management is needed to support response. As I will discuss later,
these process variables were not the focus of my empirical research for this dissertation, however. This was because it would have taken more time to investigate their functioning.

**Feedback Loop: Organizational Learning**

The feedback loop in Figure 5 is organizational learning. Systems can be improved and be made to remain competitive by a continuous process of learning and feedback. All the components of this model and all the dimensions of these components are influenced by learning. Learning provides an opportunity for system improvements and by extension improvement in effectiveness.

The feedback loop of organizational learning is inspired by the systems approach. The environment in which disaster management systems operate is very complex and unpredictable. In the Caribbean, for instance, although it is well known that the islands are vulnerable to a number of hazards, it is not unpredictable whether there will be multi-island strikes or multiple hazard impacts during the same time frame; also the impact, scope, and intensity of a particular impact is unpredictable. Organizational learning does not remove unpredictability, but it can help reduce its effects. Disaster management organizations conceivably can learn from past disasters and may be able to adjust their organizational forms and capacities to prepare for future disasters. To what extent this happens is a question I wanted to find out in my research.

**Outcome Variable**

The outcome variable in my conceptual model is effectiveness. It is necessary to bear in mind at the outset that there is no single definition of effectiveness. Management
experts Harrison and Shirom (1999), for instance, caution that the definition of effectiveness is contextual rather than universal. I will define what I mean by effectiveness later in this chapter.

**THE CONCEPTUAL MODEL AS A WHOLE**

An important consideration in this model is that the input variables are intricately linked and must be examined together, unlike some of the previous studies that analyzed them separately. In general, the academic literature on FEMA presents a piecemeal approach to assessing organizational effectiveness problems; this creates a deficient understanding of how the agency functions, and should function, in complex disaster response environments. For instance, the organizational capacity variable in Figure 5 is considered an important input variable for organizational effectiveness by previous researchers (Cigler, 2006; Ingraham, Joyce & Donahue, 2005; Roberts, 2006; CRS, 2006; Franks, 1999), but focusing on organization capacity in isolation without assessing organizational form and learning is incomplete. The CRS (2006) report after the Katrina debacle pointed out the need for a more systematic approach to fixing the effectiveness problems at FEMA. The report suggests that Congress focused solely on building the capacity of FEMA; the implication is that organizational form and learning were neglected. Waugh and Streib (2006) and organization researchers Takeda and Helms (2006) focus on collaboration, capacity, and networks, without examining the impact of learning or the positive impacts of bureaucracy in disasters. Such an isolated understanding is likely to stymie our understanding of how to build effectiveness in disaster management entities.
Needless to say, much more work must be done to comprehend the conflation of organizational form, organizational capacity, and organizational learning and their combined impact on effectiveness in disaster management. The model presented in Figure 5 is merely a proposal to begin thinking about these combined effects. The research I present in the following chapters will provide some answers to the questions that the model brings up.

DEFINITION OF THE CONCEPTS IN THE MODEL

Organizational Form

Organizational form depends on the outcome that the leaders of an organization hope to achieve. It is backbone of decision-making and other processes (organizationstructure.net, 2008). There is an agreement among a group of researchers that the network organizational form is the most appropriate form for handling disasters (e.g., Takeda & Helms, 2006; Waugh & Streib, 2006; Roberts, 2006). However, I propose that in order to be effective, disaster agencies such as CDERA should maintain some configuration of both the bureaucratic and the network form. It is not uncommon for bureaucracy and network to co-exist within the same organization, even in public organizations (Mintzberg, 1979; Perrow, 1993; Considine & Lewis, 1999; O’Toole & Meier, 2004; Jesserand, Teo & Clegg, 2006).

It is better, therefore, to think of a particular organizational form as a hybrid of the network and bureaucratic forms. In my study I attempted to find out which specific configuration was most effective in the case of CDERA. To do that, I developed the conceptualizations in Table 3. Table 3 shows the key attributes of networks and
bureaucracies that I culled from the literature on bureaucracy and networks (Clegg, 2006; Morgan, 1997, Mintzberg, 1979, Olsen, 2005, Bozeman, 2000, Longford, 1986; Takeda & Helms, 2006). The attributes in the table are the ones that I will compare under organizational form to assess how each affects CDERA’s effectiveness.

Table 3: Measures Used to Assess the Presence of Network versus Bureaucracy

<table>
<thead>
<tr>
<th>Networks</th>
<th>Bureaucracy</th>
<th>Measure to Assess Networks v. Bureaucracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispersed decision making</td>
<td>Centralized, top-down</td>
<td>Dispersed vs. centralized decision-making</td>
</tr>
<tr>
<td>Intra-organizational communications is highly horizontal</td>
<td>Intra-organizational communications is mostly vertical</td>
<td>Horizontal vs. vertical communications</td>
</tr>
<tr>
<td>Resource Pool shared with external entities</td>
<td>Resource pool owned and controlled by organization</td>
<td>Shared vs. owned resources</td>
</tr>
<tr>
<td>Information sharing with external agencies</td>
<td>Need to know basis of sharing, managed dissemination</td>
<td>Free information sharing vs. need to know sharing</td>
</tr>
<tr>
<td>Continuity – organizational memory - Low</td>
<td>Continuity – organizational memory - High</td>
<td>Low vs. high organizational memory, continuity</td>
</tr>
</tbody>
</table>

Note: Depending on the combination of characteristics by CDERA and its component parts, it is determined to be either network, bureaucracy or a combination of the two. The characteristics used to determine network or bureaucracy is taken from the organization literature on bureaucracy (Perrow, 1993; Morgan, 1997; Hales, 2000; Jesserand, Teo & Clegg, 2006) and networks (e.g. Koppenjan & Klijn, 2003)

The measures I used to assess whether an organizational form is a network or bureaucracy are presented in Table 3; these can be lumped together under four broad headings for discussion: dispersed versus centralized decision-making, horizontal versus vertical communication, shared versus owned resources, free information sharing versus “need-to-know” (restricted) information sharing. The combination of all these classifications together dictates how bureaucratic or how networked the organization is.
The premise of this dissertation is that organizations are not completely bureaucratic or networked, but they are more or less bureaucratic or networked. To what extent each organization is networked or bureaucratic can be determined by identifying its characteristics and matching them with the ones in Table 3.

Dispersed versus centralized decision-making is operationalized as whether it tends to be more dispersed throughout different levels of the agency or tends to be concentrated at the top. The former would indicate a more networked organization. More structured and hierarchical reporting and the number of persons making decisions on critical issues at various organizational levels including types of resources needed are questions that got to the heart of this bureaucracy vs. network issue.

Horizontal versus vertical communication patterns is operationalized as frequency of contacts with senior officials within the CDERA system. For instance, if a technical personnel from a CDERA participating member states can pick up the telephone and call senior CDERA CU personnel if needed, this is an indication of horizontal rather than vertical decision making. If personnel from participating member states cannot call senior CU personnel, but have to go through their bosses all the way up, this is vertical communication and the organization is more bureaucratic than networked.

Shared versus owned resources is implicit. One of the reasons why organizations join networked arrangements is to access resources or to accomplish shared goals. Bureaucracies tend to hold all or most of their own resources, although this might be inefficient.
Free information sharing versus “need-to-know” information sharing is specifically examined by assessing whether these resources, knowledge, and information are provided routinely at different organizational levels and among organizations or whether they are provided on a “need to know” basis. If resources, knowledge and information are restricted, then it is likely that the agency is more hierarchical than collaborative. Bureaucracies are known to be good at retaining knowledge and information; they efficiently collate and store information because of their centralized processes. Bureaucracies, then, have high organizational memory. Networks, because of their decentralized nature and dissipative structures display low organizational memory.

Networks also generally have low rates of continuity because they tend to be goal driven. Once the goal is accomplished, the network arrangement might be dissolved. Bureaucracies are more permanent structures and their rate of continuity is higher. Depending on the combinations of characteristics found in Table 3 above, an organization is determined to be more bureaucratic or more networked.

Addressing these issues helped me to find out to what extent CDERA is bureaucratic and to what extent it is networked. The strength and importance of relationships will be determined by the frequency of collaboration between and during disasters and whether the resources received are critical to CDERA’s operation and success. Organizational memory helps with recollection of what was done in a previous similar disaster and what worked, what did not work and general incorporation of lessons learned. This in turn assists with response, timeliness of the response operations and strategies used for recovery efforts and so on. When I find the answer to these questions, I can begin to piece together the particular configurations of bureaucratic and networked
relationships within and around CDERA. These findings will be compared for each
disaster and also compared throughout organizational history.

Organizational Capacity

Organizational capacity is an important variable in my research because as
Ingraham, Joyce and Donahue (2003) stress, capacity is a platform for performance, a
precursor to organizational effectiveness. This is true of disaster organizations as well.
Disasters are seen as results partly of insufficient organizational capacity. For this
research, organizational capacity can be defined as the ability to access resources, talents,
and equipment, with the purpose of offering disaster relief. It also involves the
organization and management of resources and responsibilities to deal with all aspects of
emergencies, particularly preparedness, mitigation, response, and rehabilitation. I will
measure capacity in broad categories: (1) leadership and staffing; and (2) other resources
and capabilities, including finances, technology, technical assistance, physical resources,
and partners. I propose that the presence or absence of these components will determine
how effective the organization will be in achieving its goals.

Leadership and staffing are major components of organizational capacity.
Pertinent issues here are whether or not organizational leadership and staff understand the
organization’s mission and whether they have disaster management knowledge, skills,
and experience. May (2006) and Roberts, (2006) suggested that the number of vacant
senior positions in FEMA and its regional offices, and the length of vacancies are causes
for concern, not only because they highlight deficiencies in the capacity of the system,
but also because they might be highlighting deficiencies in other areas such as staff motivation and organizational culture.

In the context of emergency management, many needed resources are housed outside of the lead disaster management organization (e.g., CDERA) for practical reasons. Disasters are occasional, unpredicted events that might occur at varying intervals ranging from months to decades or even centuries. As a result, rather than maintaining resources in-house with large down times, the resources are accessed when needed from agencies that use these resources as part of their ongoing core businesses. So, in this research, resources accessed outside the lead disaster agency are seen as part of its capacity. In addition, community capacity is seen as an important part of the disaster agencies’ capacity. Community capacity is important because communities that are capable of helping themselves will be able to reduce loss of life, property, and general risks. Partners are extremely important when assessing organizational effectiveness of CDERA, as I discussed in the introduction. Partners like international aid agencies and regional partners like the Pan-American Health Organization (PAHO) provide financial and technical resources, including human resources, to CDERA. Community stakeholders are also important for CDERA. If community expectations or requirements are in sync with what disaster agencies are willing and able to provide, then the perception of effectiveness is usually good. Managing stakeholders’ perception of performance is an important process variable to consider because it influences general public perception of organizational effectiveness.
Organizational Learning

In this research I adopted Senge’s (1990) definition of organizational learning. Senge defines the “learning organization” as one with an embedded philosophy for anticipating, reacting, and responding to change, complexity, and uncertainty. He distinguishes between two main types of learning: adaptive learning, or “single-loop learning,” and generative learning, or “double-loop learning.” Adaptive learning is a precursor to generative learning. It focuses on current, short term problem solving at the expense of critical assessment of what lead to the current results in the first place. Without this understanding, improvements are incremental. Generative or double-loop learning focuses on redefining problems and questioning common sense thinking on them. To be successful, Senge argues, organizations must focus on generative learning because it is based on self questioning and ultimately leads to large scale improvement or transformations.

Organizational learning may be defined as encoding inferences from history into routines that guide behavior (Levitt & March, 1988). “Organizational learning occurs when members of the organization act as agents for the organization, responding to changes in the internal and external environments of the organization by detecting and correcting errors in organizational theory in use, and embedding the results of their inquiry in private images and shared maps of organization” (Argyris & Schön, 1978, p. 23)

Learning comes from many sources. In any disaster, there are intended and unintended consequences from which disaster management organizations learn. Many of the small islands in the Caribbean are poor; so their governments struggle to find
resources to boost the capacities of disaster agencies and promote improvements in them. CDERA uses simulation exercises within the disaster agency and with communities as tools of learning. These exercises play out scenarios that could ensue from major vulnerabilities and establish how agencies and communities might respond to avert major loss of lives and property. Simulations and drills test systems and procedures for adequacy, they provide practice for actors, and also provide a way to align actions and needs of stakeholders and the organization.

Staff and community involvement in simulation exercises provides a basis for continuity in terms of whom to contact, what happened the last time this type and level of disaster occurred, and what to do when. When communities are involved in activities like simulation exercises, they acquire valuable knowledge and build the capacity and help communities to become resilient. Other important sources of organizational learning in the Caribbean are seminars, conferences, and training programs. These are often sponsored by international aid agencies, like the United States Agency for International Development and the Canadian International Development Agency, not governments.

There are different assumptions about organizational learning. One common assumption is that learning will improve performance (see, for example, Dill, 1965; Fiol & Lyles, 1985; Barney, 1991; Vera & Crossan, 2004). Fiol & Lyles, (1985) and Vera and Crossan (2004) point out that effective learning and relevant knowledge may lead to positive performance. Another important assumption is that organizational learning influences organizational structure (Simon, 1969). A centralized mechanistic structure tends to reinforce past behaviors and could lead to cognitive overload on both the organization in general and on individuals working within the organization. An organic,
more decentralized structure tends to allow shifts of beliefs and actions and thus facilitates more learning (Fiol & Lyles, 1985). Learning is a very important component of the model, because it helps organizations regulate themselves to meet the challenges of their environments.

**Process Variables**

The following are key organizational process variables I used when studying CDERA’s effectiveness: communications management, collaboration management, logistics management, and community capacity building. These were deemed as major areas of failure during Hurricane Ivan, and have been cited again and again in the literature among the main areas of failing with FEMA. Experts in the field see communications infrastructure as an essential component of disaster management and specifically focus on interoperability (Comfort, 2002). The concept of interoperability used to refer to the failures in the nationwide system emergency responders systems to interconnect in case of a disaster. For example, the deaths of many firefighters during the response to the September 11 attacks in New York City occurred as a result of the failures of communication systems. I will examine the communication systems of CDERA within this context.

**Effectiveness**

There is a wide range of definitions and measures of organizational effectiveness in the literature (Harrison & Shirom, 1999). The basic point to remember when choosing effectiveness criteria for studying an organization is that they should be appropriate for the entity under study. Effectiveness may be defined in general as performance (positive
or negative results or outcome), particularly as it is viewed by important stakeholders and constituencies. Specifically the definition relates to how the organization under study has performed to reach its strategic objective(s). In comprehensive disaster management, the objectives can be defined in the areas of planning, mitigation, response, and recovery. Performance depends on access to resources, the ability to adapt to circumstances, innovativeness of the organizational members. How the organization’s stakeholders and constituents judge their performance is also crucially important.

Because effectiveness is multidimensional (Bouckaert, 1992), a direct measurement of it is not easy; often multiple measures are required to assess it. It is very common to use proxy measures of effectiveness. For instance, in their work on public sector productivity in municipal government, Ridley (1927) and Epstein (1992) focused on proxy variables such as timeliness, citizens’ perception of the adequacy of services, and intended and unintended consequences of municipal operation. Their focus on citizens/customers seems appropriate because the ultimate reason for public services is their effects or consequences on citizens and taxpayers as users of these services.

I used proxy measures of effectiveness. These are not the only measures of effectiveness when handling disasters, but in the literature they are cited as the most important. The proxy measures of effectiveness were: stakeholder satisfaction, operational efficiency, resilient communities, resource productivity, incorporated lessons learned and budget maximization.

The level of stakeholder satisfaction is an important measure of effectiveness as Schneider (1995) found in her research on major disasters in the USA prior to 1995.
Schneider notes that the perception of the success or failure of a disaster organization is contingent on the public’s expectations about what the organization should be doing during a disaster, as well its actual performance. As such, stakeholder satisfaction is deemed a critical measure of effectiveness in this research.

**Community Resilience**

According to Twigg (2007) community resilience can be understood as capacity to absorb stress or destructive forces through resistance or adaptation; capacity to manage, or maintain certain basic functions and structures, during disastrous events; or capacity to recover or ‘bounce back’ after an event. For this dissertation, resilient communities are those communities that have the capacity to absorb stress or destructive forces through resistance or adaptation, and the recover or ‘bounce back’ after an event.

Twiggs (2007) stresses that while we strive to build the ‘disaster-resilient community’, we should remember that the concept is an ideal. More practically, he suggests that we focus on putting greater emphasis on what communities can do for themselves and how to strengthen their capacities to respond, if we want to build resilient communities, rather than concentrating on their vulnerability to disaster or their needs in an emergency.

**THEORETICAL FRAMEWORK AND LITERATURE REVIEW**

**Organizations as Open Systems**

The model guiding this dissertation utilizes the systems approach to understanding organizations in terms of inputs, processes, and outcomes and a feedback
loop. I conceptualize CDERA in this systems framework. In the systems approach an organization is understood as an “entity or whole in which the parts, although distinguishable are interdependent” (Skyttner, 2007, p. 50). The parts, by virtue of being in the system display certain characteristics, while the whole, because of the inclusion of the parts, has some characteristics that none of the parts individually possess (Skyttner, 2007).

An open system is defined as a “system in exchange of matter with its environment, presenting import and export, building-up and breaking-down of its material components” (von Bertalanffy, 1988, p. 4). Open systems, then, “build on the principle that organizations, like organisms, are open to their environment and must achieve appropriate relationship to the environment to survive” (Morgan, 1997, p. 39). Based on the works of von Bertalanffy (1955), Boulding (1956), Litterer (1969), Churchman (1971), Bowler (1981), and others, Skyttner (2007) describes the properties of open systems. These properties include interrelationship and interdependence of objects, goal seeking, transformation, input and output, hierarchy, entrophy, differentiation, equifinality, and multifinality (pp. 50-54).

Entities and their attributes are interrelated and interdependent, each relying on the other to achieve the goals of the system. In the case of CDERA, this interrelationship and interdependence can be seen in the interactions between the CDERA CU, the sub-regional focal points, and the national disaster organizations. The interrelated components all work to achieve the regional goal of sustainable development through disaster risk reduction. Within the system, there is transformation of inputs into outputs. Skyttner
(2007) notes that in open systems inputs are taken from the environment as needed and inputted into the system. Within any system there is some amount of disorder or randomness (entropy). Left unregulated, all living things will tend to disorder; so regulation is important to systems. The interrelated components of the system must be regulated so that the system can attain its goal. Regulation allows for the deviations in the system to be pin-pointed and corrected. As such, feedback, within some limits, is a requisite for effective control of open systems, because it allows for regulation of the system given its operating environment (Skyttner).

Systems are complex wholes made up of smaller sub-systems. Scott (2002) points out that "all systems are characterized by an assemblage or combination of parts whose relations make them interdependent" (p. 77). As one moves from mechanical to organic and social systems, the interactions between parts in the system become more complex and variable. Within each system there is differentiation, because specialized units perform specialized functions. Within the CDERA system the CU performs a regional coordinating role in planning for and responding to disasters, the sub-regional focal point perform response operations at a sub-regional level not requiring the coordination of the entire system, and the national disaster offices perform operational activities at the national level in individual countries. Open systems have multiple and equally valid ways of achieving the same objective from different initial conditions (convergence), or they can obtain a different and mutually exclusive objective (divergence) (Skyttner, 2007; Katz & Hahn, 1966)
In an open system, the notion of openness is used to stress the fact that there are key relationships between the environment and the internal functioning of the system itself (Morgan, 1997, p. 40). Both the environment and the system are seen as being involved in mutual interaction and mutual dependence. Open systems try to sustain themselves by incorporating outside energy, information or matter into their functioning (Skyttner, 2007; Katz & Kahn, 1966). The law of requisite variety states that in order to effectively cope with the challenges posed by the environment, the system’s internal regulatory mechanism must be as diverse as the environment it must deal with (Morgan, 1997, p. 11). In essence, the system must evolve as the environment does. In order to do so, the system must participate in a cyclical process of “variation, selection, and retention of the selected characteristics” (Morgan, 1997, p. 11). As it participates in this process of variation, selection and retention, the organization must be able to sense changes in its task and contextual environment and make operational and strategic changes accordingly.

Many theories of organization utilize the open systems perspective (Bastedo, 2007). Some of the more prominent theories that build on systems thinking are institutional theory, resource dependence theory, and contingency theory. Morgan (1997) for instance, points out that the notion that organizations are open systems that must organize so as to meet the requirements of the environment is articulated under the rubric of “contingency theory” (p. 43).

The main ideas behind contingency theory, as initially articulated by Burns and Stalker in the 1960s, are that there is no one best way of organizing; the appropriate form depends on the task environment, and different approaches to management may be
necessary to respond to different tasks in the same organization. Moreover, different types of organizations are needed to effectively respond to different types of environments. Burns and Stalker (1961) showed in their research on a variety of industries that when environmental changes are the norm, flexible types of organizations and management are required. Stable environments employing routine and well understood technologies required more rigid or mechanistic organizational forms. Burns and Stalker (1961) emphasize that successful matching of organization to environment depends on the ability of top managers to interpret the conditions facing the firm and to take the appropriate courses of action.

Lawrence and Lorsch’s (1967) contingency theory articulates the methods of matching organizational strategies, structures, and technology with the demands of the environment. They observe that there needs to be a higher degree of differentiation for those organizations operating in uncertain and turbulent environments than those in environments that are less complex and more stable”. With this notion come several key questions posed by organizational development research. These questions include: (1) How can an organization systematically achieve a good “fit” with its environment, (2) How can it ensure that internal relations are balanced and appropriate, and (3) What does this mean in operational terms? (Morgan, 1997, p. 56). In answering these questions, one must consider whether the environment is simple and stable or complex and turbulent. In addition, we must consider what strategies are being employed to assess existing and future environments and how to fix the organizational shortcomings (competition or collaboration). Further, what kind of people are employed, what kind of technology is being used, and if there are deficiencies in human resources and technology, is the
organization willing and able to fix the deficiencies. Hence, organizational leaders must have foresight and they must be able to sense environmental conditions and adapt through contingency planning.

Framing the conceptual design for this research in terms of open systems allows for a better starting point for deriving an answer to the research questions – What are the relative roles organization form and organizational capacity play in the effectiveness of CDERA’s disaster planning, response, recovery, and mitigation efforts? What role does learning play in CDERA’s choice of organizational form and organizational capacity components for effectiveness?

**Organizational Form and Comprehensive Disaster Management**

An important theoretical issue that will be addressed in this dissertation is, how organizational form impact organizational effectiveness. Organizational form or structure is the formal framework by which job tasks are divided, grouped, and coordinated (Robins & Coulter, 2002). Organizational form refers to the manner in which an organization is configured (roles, responsibilities, functions, authority) to achieve its goals/ends (Goodsell, 1994). It is generally accepted in the literature that a more stable environment requires a more mechanical structure (Perrow, 1993; Morgan, 1997; Hales, 2000; Jesserand, Teo, & Clegg, 2006), while more complex environment requires a more organic structure that is highly adaptive and a network form of organization for success (Koppenjan & Klijn, 2004; Morgan, 1997).

When we talk about a bureaucracy we mean an organization with specified attributes: “graded hierarchy, formal rules, specialized tasks, written files, assigned stated
rules requiring expert knowledge” (Goodsell, 1994, p. 5). These characteristics are associated with certain patterns of behavior: “rigidity, proceduralism, resistance to change, empire building, concentration of power, and oppressive control of employees” (p. 5). Networks are defined as “stable patterns of social relations between two or more actors which form around policy problems” or to achieve a certain goal (Koppenjan & Klijn, 2004, pp. 69-70).

An inherent issue for CDERA is that its national disaster offices (NDOs) were originally designed and function as bureaucracies, but at the same time, partly because of the fragmented nature of the CDERA systems and partly because of the need for great flexibility and agility to effectively respond to and mitigate non-routine events, CDERA often has to operate non-bureaucratically. Disasters are non-routine, because they are “unpredictable” or at best “partially predictable” events. Because hazards are unpredictable they require nimbleness for timely and appropriate response. Nimbleness requires an organizational form that allows for several things: proper coordination across multiple organizations, a variety of pre-determined interconnected relationships, and prior simulated strategies for effective resource mobilization. In the area of disaster management being nimble helps the lead organization to save property and lives. Structural flexibility and flexibility in response are facilitated by networks in that networks allow organizations to build a variety of relationships, systems and strategies that will allow its agility in response to its environment and also facilitate quick decision-making ability as the need arises. In a disaster, structural flexibility will allow the agency to keep people alive, provide medical teams, food and water supply, transportation, rescue teams, housing and so on (Cigler, 2006). Pre-determined interconnected
relationships and prior simulated strategies bolster the organizational capacity to properly respond in the event of a disaster.

At the same time, because of their command and control systems, bureaucracies are good at coordinating people and other resources efficiently, fast, and with impartiality (Olsen, 2005; Bozeman, 2000; Longford, 1986; Takeda & Helms, 2006). There are clear norms and rules, division of labor and specialization, and thoroughness in record keeping that allow for accuracy. Rule–based organizing does not always end up with rigidity and inflexibility. Rules may foster change and behavioral flexibility.

Olsen (2005) questions the notion that bureaucracies are obsolete. Success in a bureaucracy relies on the organization’s ability to follow formal rules, norms and ethical codes. This depends in large measure of the organizational leader’s ability to give direction and the constant availability of resources. Bureaucracies are rational tools for executing political decisions and their structures determine what authority and resources can be used how, when, where (Olsen). Olsen is not alone in making a case for bureaucracy. For instance, Rhodes (1994) and Davis and Rhodes (2000) predict a return to bureaucracy and Peters (1999, pp. 104–5) sees a possible return to Weber’s organizational archetypes as a tool for comparative purposes. Suleiman (2003) as well as Pollitt and Bouckaert (2004) provide a strong defense for bureaucracy as a practical construct that is very much alive. “[T]he idea of a single, and now totally obsolete, ancient regime is as implausible as the suggestion that there is now a global recipe which will reliably ‘reinvent’ governments” Pollitt and Bouckaert argue (p. 63).
While bureaucracies seem to be making a comeback, Perrow (1972) views them as a trade-off between efficiency and flexibility: Too much bureaucracy leads to inflexibility, unwieldy and stifling the very activity it set out to enhance; too little and efficiency is lost as the organization spins out of control. Bozeman (2002) sees other trade-offs as we try to balance the bureaucracy and coordination with individual freedom. Most organizational tasks are interdependent, rather than independent. As such, coordination becomes important. But with coordination comes control, which invariably pits organizational interest and individual interests against each other (Bozeman, 2002). According to Bozeman (2002), within the bureaucracy, individuals are called to “limit their discretion, constrain their use of resources, and submit to hierarchical controls in order that the organization might have the coordination and controls necessary to achieve a collective purpose” (p. 27). Bureaucracies have been unpopular in many quarters because they are seen as constraining on people inside and outside of the bureaucracy: Organizational controls subordinate individual interests to organizational interests and standardization limits differentiation between clients/customers.

Goldsmith and Eggers (2004) see other negatives in bureaucracy, especially in its traditional form. They argue that the traditional bureaucracy is not only expensive and confusing, but is not set up to work with other organizations. According to Goldsmith and Eggers, we need to break with the habit of viewing agencies as systems in which top officials direct workers to accomplish the missions. Goldsmith and Eggers think that the solutions to the country's most important problems cannot be solved inside a bureaucracy, “vertical thinking [cannot] solve horizontal problems” (p. 1). The heyday of top-down bureaucracy has faded and governance by network has emerged, the authors contend.
Government has become ever more reliant on its network-based partnerships (horizontal thinking) to deliver services to citizens (Kettl, 2002; Goldsmith & Eggers, 2004). This is true, because not only is it cheaper to provide services through these partnerships (e.g., through outsourcing), but government is faced with an increasingly difficult challenge of solving complex horizontal problems with vertical solutions. Advantages to the government's reliance on networks are that they give the government far more flexibility and the ability to generate public value through services tailored to satisfy citizens, according to Goldsmith and Eggers (2004). They call for scaling down bureaucracy, while we scale up networks. In doing so, Goldsmith and Eggers argue, we need a different kind of government employee, one that can tackle unconventional problems, conduct risk assessments and so on.

CDERA appears to sit in a very precarious position on the bureaucracy and network organization dimension. It is caught in a situation where it is bureaucratically structured at the national level, but must rely on network arrangements to undertake its functions and attain its goals. At the national level, the disaster offices are part of the government bureaucracy because it is not economically profitable for private sector companies to carry out disaster management activities. However, no single agency has the capacity to undertake the range of activities needed to reduce disaster risks and respond to disasters. Having some network arrangement is required both at the national and regional level of CDERA. At the national level there is a web of government agencies, private sector companies and non-governmental organizations that must work with the lead disaster management agency to prepare for, mitigate and respond to disasters.
At the regional level, CDERA works with a web of regional, international, and specialist national agencies to fulfill its mandate. In addition, CDERA has farmed out much of its work, especially in the area of mitigation, information systems, and project development because it is severely short staffed (personal communication Riley, May 2009). This problem is not uncommon in disaster management agencies. In June 2006, Pleasant Mann, a sixteen year veteran of Federal Emergency Management Agency in the USA and head of the employees union, wrote to Congress about diminished morale and eroded emergency management capability (Rood, 2005). In addition, William Waugh, emergency management expert from Georgia State University and leading scholar on the subject of disaster management noted that the rise of the ‘consultant culture’ has not served emergency management well (Elliston, 2005). Moreover, the affinity of politicians to appoint leaders of FEMA with no emergency management experience served to further diminish staff morale between 1979 and 1993 and 1996 and 2007 (Public Broadcasting Service [PBS] Frontline, 2005).

Co-Existence of Bureaucracies and Networks

Although we tend to talk about organizations as being either a network or a bureaucracy the co-existence of the bureaucratic and network organizational forms together is not uncommon or new for government agencies, particularly the ones in the United States. There is a large body of literature that presents organizations on a continuum possessing varying levels of bureaucracy and network arrangements at the same time. Many scholars see organizations as complex systems that are composed of bureaucratic and networked relationships (Perrow, 1993; Pollitt & Bouckaert, 2004; Höpfl, 2006; Hales, 2000; Jesserand, Teo & Cleg, 2006; O’Toole & Meier, 2004;
Considine & Lewis, 1999). Meier and O’Toole (2003) for example, point out that “actors in networks are often located in bureaucracies that are connected to other organizations outside their lines of formal authority” (p. 690). Agranoff and McGuire (2001), substantiate this argument. They note that managing across governments and across organizations has become the rule, rather than the exception in public administration and management. Yet it is still often difficult to envision network organizations within the government context, because government is known for its hierarchical organizations and slow pace of change and networks are almost diametrical opposite. They are seen as flat, flexible and agile. Moreover, scholars have questioned adherence to the principles of accountability and responsiveness in networks, which are the hallmark of the American bureaucracy.

In recent decades, network governance theorists have pointed to and conceptualized the non-bureaucratic aspects of the mainly bureaucratic organizations and their inter-organizational relations. Some network governance theorists, organizational theorists, and public management scholars (Mintzberg, 1979; Perrow, 1993; Jesserand, Teo, Cleg, 2006; O’Toole & Meier, 2004; Considine & Lewis, 1999) argue that the bureaucratic and network characteristics of organizations should be seen as a continuum: Some organizations are more bureaucratic and others are more networked. They also suggest that networks exist within bureaucracies, and vice versa.

Since Max Weber’s initial comprehensive conceptualizations of bureaucracies in the early 1900s, these organizational forms are seen as structures that are created to process routine tasks. Bureaucracies, if properly set up and managed, can be very effective and efficient in accomplishing routine tasks. However, more often than not, the
tasks of bureaucratic organizations are non-routine and their task environments are complex. CDERA’s task environment is a primary example of this. As Weber pointed out and many scholars have demonstrated since then, the bureaucratic form of organization rarely exists in its pure form; instead organizations are more or less bureaucratic.

In the 1970s, Henry Mintzberg identified five organizational configurations to show that effective organizations depend on a cohesive set of relations between structure, age, size, environment and technology which are integrated based on complexity, turbulence and differentiation of the operating environment. Mintzberg (1979) derived five different types of organizations: machine bureaucracy, the divisional organizational form, professional bureaucracy, simple structure, and adhocracy. Both machine and divisional forms thrive in environments where tasks are simple and stable; their very centralized systems make them slow and inefficient when responding to change. These structural configurations are efficient for organizations that are production or efficiency driven. Professional bureaucracy modifies the principle of central control present in machine bureaucracy, and allows for a diffusion of autonomy. This form of bureaucracy is especially appropriate where tasks are relatively complicated, but conditions are stable (Morgan, 1997). “This type of organization has been effective structure for universities, hospitals, and other professional organizations where people with key skills and abilities need a large measure of autonomy and discretion to be effective in their work.” (Morgan, p. 51)

Simple structure and adhocracy are best suited to unstable environmental conditions. The tasks of simple organizations are not too complex and these organizations are run in a highly centralized manner. But because tasks are relatively simple, the
organization can respond quickly. Adhocracies are temporary in nature such as project or virtual teams that come together to perform a task and then disappear once the task is completed. The variety of species as articulated by Mintzberg (1979) is limited in its conceptualization of organizational form in that the forms proposed are mutually exclusive based on complexity of task and operating environment.

A more refined line of reasoning was developed later by Perrow (1993) and others. The argument is that the degree and form of bureaucracy vary, possibly along a continuum based on task complexity and macro-environmental conditions. Perrow argues that nearly all large, complex organizations in the USA can be termed bureaucracies, “though the degree and forms of bureaucratization vary” (p. 3). The ideal form of bureaucracy is almost never realized because: (1) outside influences on organizations can never be eliminated; (2) often, rapid changes outside the organization disrupt the basis of efficiency – stable tasks and stable division of labor; and (3) average persons, not super humans work in organizations (p. 3). Organizations display partial rationality not full rationality as the pure bureaucratic form proposes. The ideal bureaucratic form, then, is a construct, not a reality (Perrow).

Höpfl (2006) too suggests that, for Weber, the ideal type of bureaucracy was a construct based on historical analyses, but it did not directly mirror what was happening in organizations. He proposes that Weber’s main claim was that bureaucracy was based primarily on hierarchical arrangements within organizations. However, to Hopfl, bureaucracy may be conceptualized in non-hierarchical ways. Hopfl notes that since the term bureaucracy is inherently not specific, and is compatible with many different
organizational arrangements, then the latest arrangement, “post-bureaucracy” is just another variant of the bureaucratic form (p. 12).

Hales (2000, pp. 9 - 11) found that many networks, which we conceive of as having loose organizational arrangements, in fact maintain hierarchical controls, the central pillar of bureaucracy. According to Hales, “new” forms of organizations are actually “reduced forms of bureaucracy” or what he terms “bureaucracy –lite” (p. 10). Moreover, the fact that there is not one bureaucracy, but variations within systems of bureaucratic controls has been demonstrated by many (Hales). Both networks and bureaucracy deal with complexity. However, bureaucracies are effective in handling complexity that is of a routine nature, whereas networks, because of their loose structural arrangements and inherent flexibilities, are good for complex non-routine tasks. Like networks, bureaucracies display signs of being dynamical systems (Jesserand, Teo, & Clegg, 2006). In the public sector, there are differences in bureaucratic organizational types, some promote central planning, some promote competition, and others promote building alliances among agencies. Jesserand, Teo and Clegg show that while the ideal type of bureaucracy is almost non-existent, the hybrid type is alive, and in fact is likely to be the norm.

Jesserand, Teo and Clegg (2006) also note that the modern bureaucracy is being reformulated and is taking on a post-bureaucratic hybrid form, a form that synthesizes the Weberian ideal-type conceptualization with democratic principles. In their conceptualization, human resource arrangements are the main important factor that distinguishes modern bureaucracies from their post bureaucratic hybrid. Whereas in the structured, rationalized modern bureaucratic form human resources are caught up in an
iron cage of rules and regimens, in the post-bureaucratic hybrid form they are liberated.

In the post-bureaucratic hybrid form of organization cross-cutting links between members are important because the links allow organizational learning to be optimized thereby leading to a more flexible and innovative organization. The post-bureaucratic organization is not free from its progenitor the ideal-type of bureaucracy, but combines those rationalization mechanisms with new principles of network and democracy.

The combination of old and new allows for greater flexibility, responsiveness and employee input. Bureaucracies are important, because they cut down on duplication, overlap, gaps in delivery, which are essential if one wants to build capacity for service (Longford, 1986). These very points are potential short comings of networks, because they can be fragmented and as such can lead to duplication and delivery gaps. In addition, bureaucracies are very useful in determining priorities in a coherent way, a trait that might be difficult to achieve in a network setting because there are so many disparate actors and power centers. Further, bureaucracies tend to foster consistency, in that there are rules and routines that foster organizational memory of how a particular task was done in the past. This is a trait that is not readily available in networks, particularly in government agencies where networks tend to be loosely coupled because of turf protection and the general political nature of government organizations. That said, bureaucracies tend to be rigid, a weakness that networks have capitalized on. Those who organize networks and those theorizing about them see rigidity as a weakness in the bureaucratic organizational structure and have built a structure based on flexibility. Flexibility is deemed a major strength of networks because it makes the organization more nimble and adaptive. This flexibility applies not only to structure, but also to
organizational processes and relationships. In short, bureaucracies and networks tend to build different capacities; what network scholars see as weaknesses with bureaucratic organizations, they work on building as strengths in the network type organization.

I propose that a combination of network and traditional bureaucracy is necessary for disaster management entities because they handle non-routine events and they are complex in nature. Kiefer and Montjoy (2006) find, for example, that in disaster management, networks are necessary, but they are often insufficient. They are useful for uncovering problems, but they typically depend on other organizations for implementation; they lack central authority and responsibilities are diffused throughout the networks. Success in disaster management requires a central authority for functions such as planning, reporting, monitoring, resource mobilization and policy action. Choi (2008) recommends centralizing planning and decentralize execution if disaster management agencies are to be effective. In other words, at any phase of the Comprehensive Disaster Management cycle there will be opportunities to utilize both network and bureaucracy, but in different combinations: One phase might need more bureaucratic control than diffused responsibility and agility, and so on.

Arguably, the bureaucratic organizational form (particularly its hierarchical command and control structure) is necessary to coordinate organizational resources that can then be mobilized effectively when fulfilling the routine organization’s tasks and also for controlling response. Considine and Lewis (1999), for example, talk about the characteristic method of control and coordination in some bureaucracies. In these bureaucracies there are distinctive routines such as, method of supervision, planning, specialization, disciplined intervention that make their method of delivery effective.
However, effectiveness is conditioned on the nature of the task. Bureaucracies are most effective when handling routine tasks or events that require centralized coordination. They also provide a structure for professionalization of a cadre of personnel necessary to support the organization’s goal, facilitate a particular organizational culture and build professional leadership in the organization. These points will be discussed later under organizational capacity.

**Disasters and Their Links to Organizational Capacity**

The United Nations International Strategy for Disaster Reduction (ISDR) Secretariat, whose mission it is to promote methods, information, and research to build disaster resilient communities, provides the following definition of a disaster: “A disaster is an event [that occurs] from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.” (International Strategy for Disaster Reduction, 2009) Effectiveness in disaster management relies on shoring up organizational capacity and working as quickly as possible to minimize conditions of vulnerability that could result in a loss of life and property. Mitigating and responding to disasters or disaster management involves the organization and management of resources and responsibilities for dealing with all aspects of emergencies, in particularly preparedness, response and rehabilitation (International Strategy for Disaster Reduction, 2009) and other organizational capabilities to plan for and respond to emergency requirements.

Organizational capacity is a central concept in this dissertation because a disaster is seen as the result of a combination of vulnerability and insufficient capacity or
measures to reduce the potential negative consequences of a disaster or risk. The International Strategy for Disaster Risk Reduction defines capacity as “[t]he combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals” (International Strategy for Disaster Reduction, 2009). Capacity may include infrastructures, institutions, or societal coping abilities, as well as human knowledge, skills and collective attributes such as social relationships, leadership and management (International Strategy for Disaster Reduction, 2009). Capacity is an antecedent to performance (Ingraham, Joyce & Donahue, 2005).

Cigler (2006) points out that it is our response to “hazards” (vulnerabilities) that makes them “disasters.” In effect, a hazard merely predisposes us to vulnerabilities. The impact of these vulnerabilities could become a disaster if there is insufficient capacity in the area of impact to reduce their potential negative consequences. The combination of efforts to mitigate the effects of disasters, prepare for them, respond to them and recover from them is lumped under the general heading of “disaster management” or “emergency management” (International Strategy for Disaster Reduction, 2009). Building organizational capacity, then, is central to effective disaster management. Building capacity at CDERA has been an elusive goal since the agency’s inception in 1991. For this study, I used a hybrid conceptualization of capacity. I borrowed from Ingraham, Joyce and Donahue (2003) and the International Strategy for Disaster Reduction (ISDR) definitions as a starting point for my definition of capacity building.

Organizational capacity is the “intrinsic ability to marshal, develop, direct, and control its financial, human, physical, and information resources” to achieve a particular
result or goal (Ingraham, Joyce & Donahue, 2003, p. 15). Ingraham, Joyce and Donahue, propose that capacity is a platform for performance. It is a measure of positive or negative potential to obtain the desired results and policy outcomes in that it links resources, management and results (p.2). In the case of government agencies, key capacities include human resource management, and management systems that can result in the organization achieving its goals and political context. Governments and their managers cannot do what citizens and elected officials ask if they lack the fundamental ability or capacity to deliver (p.3). Management is an important antecedent for programmatic outputs and policy outcomes. Likewise, the political context of management can either facilitate or hinder results depending on how importantly political leaders view the issue to be addressed. In this research, politics was treated as an intervening variable and was not specifically treated as a study variable in the dissertation.

While Ingraham, Joyce and Donahue (2005) focus on the organizational aspect of capacity building, the United National International Strategy for Disaster Reduction focuses on communities and societal infrastructure as key capacity elements for disaster reduction. For them, capacity building involves efforts aimed at developing human skills or societal infrastructures within a community or organization needed to reduce the level of risk. Capacity building also includes development of institutional, financial, political and other resources, such as technology at different levels and sectors of the society. My conceptualization of capacity focuses on its organizational aspects as does Ingraham, Joyce and Donahue, but the conceptualization also involves wider stakeholders such as international aid agencies without whom CDERA could not undertake the number and
scope of comprehensive disaster management activities that it has, and communities
whom CDERA must help to become resilient and to bounce back as best as possible, and
within the shortest possible time after a disaster.

Jurie (2000) concurs with the International Strategy for Disaster Reduction’s
conceptualization of involving wider stakeholders and societal infrastructure when
assessing organizational performance. He cautions that “no longer is it deemed adequate-
or appropriate- to simply focus upon the technical aspects of administration to get
results” (Jurie, 2000, p. 265). Jurie notes that when we assess an organization’s
effectiveness, we must also consider its ability to attain its goal and its relations with
society. The wider society provides key capacity elements needed to improve or build
performance.

The concepts capacity and capability are often confused, but the two are quite
“capability provides the means to accomplish one or more tasks under specific conditions
and to specific performance standards through proper planning, organization, equipment,
training, exercises, and personnel” (p. 1). Capabilities in emergency management
includes knowledge skills, establishing plans, structures and arrangements to engage the
normal endeavors of government, voluntary and private agencies in a comprehensive and
coordinated way to respond to the whole spectrum of emergency needs (International
Strategy for Disaster Reduction). Capacity is a combination of all the capabilities
(strengths and resources) available within a community, society or organization that can
reduce the level of risk, or the effects of a disaster (International Strategy for Disaster
Reduction, 2009). Capacity may include physical, institutional, social or economic
means as well as skilled personal or collective attributes such as leadership and management. Increased capabilities bolster organizational capacity to respond to disasters.

Franks (1999) contrasts capacity and capability, and in doing so examines three components of capacity building: increasing capability, the operating environment, and institutional development. These three elements have become well accepted in the international development community when discussing water resources. Capacity depends on capabilities, resources and institutional framework, while capabilities depend on the knowledge, skills and attitudes of individuals, separately or as a group, and their competence to undertake the responsibilities assigned to them” (Franks, 1999, p. 52).

Regarding increasing capability, disaster management entities must endeavor to comprehensively build the knowledge, skills and attitude of individuals to mitigate, prepare and respond to all types of disasters. The knowledge and skills needed might not all be contained within the disaster management organization itself; they might be housed in many organizations and accessed as needed based on arrangements and relationships developed by these agencies. From the standpoint of natural disasters this argument makes sense. Natural disasters are sporadic events, because they are sporadic and vary in impact it is inconceivable that all the capacities needed to deal with them will all be housed in one location. Government agencies that provide disaster management services use public funds to provide these services in the public interest. Government must therefore be efficient in spending in their fiduciary capacity. Housing huge stocks of equipment and technology that might only be used irregularly is not efficient and might not be wise investments because of extended downtimes. Forming network relationships
with organizations whose business it is to provide services using the specific equipment is a more strategic option. This consideration is particularly important in developing states, like those in the Caribbean, where there are limited resources and competing and intense interests that are more immediate than disaster management.

The environment within which the organization operates is seen by Franks as one of the components of capacity building. For him, an enabling environment is a facilitative policy and legislative framework. This policy or legislative framework could be viewed in terms of location within the wider governmental context, the general perception of the good or service being provided, or the historical perception of the value of the good or service being provided. In the Caribbean most of the national disaster management organizations are located low in the government hierarchy and cannot access adequate resources.

Organizations survive over time and provide a valued service to at least some elements in society. Institutional development, the last of Frank’s capacity building triad, includes community participation. This point is very pertinent to disaster management. Giving communities the skills to mitigate the impacts of disasters, prepare for their arrival and rally to help neighbors and communities when a disaster hits is a plus in the disaster management context. After a disaster, those communities that are resilient are the ones that can help themselves, saving lives and property in the process.

Organizational capacity and learning are intricately linked. Learning allows an organization to spot the gaps in its capacity and work to fill these gaps based on the lessons learned. According to Franks (1999), “organizations need to develop an
institutional strategy based on their ability to learn.” (p. 57) It makes no sense to try to implement an innovative learning strategy if the organizational infrastructure and culture cannot support the learning innovation.

In the case of disaster management, the organization must carry out its routine events while strategically planning for the contingencies associated with non-routine ones and do them at the best cost possible. In the case of CDERA, part of its capacity building efforts, then, must build relationships with external agencies and groups that can be tapped for resources as needed. It would be counter intuitive for CDERA to try to retain all anticipated capabilities and resources in house since disaster are sporadic and the mandate of comprehensive disaster management is wide, and also multidimensional.

**Important Factors to Consider in Building Capacity**

Organizational capacity is particularly important consideration for CDERA, whose mission is to mobilize resources rapidly, effectively, and efficiently to respond to disasters. How can organizational capacity be created to achieve a particular goal? This is an important issue that several scholars have addressed in the literature on NGO management, economic development, community development, and organizational theory, and more recently in public administration (e.g., Franks, 1999; Honadle, 1981, 1982; Hondale & Rosengard, 1983; Grindle & Hilderbrand 1995; Ingraham, Joyce & Donahue, 2003; Robinson, Farmer, Riley, Elliott & Eyles, 2007). A review of some of this literature shows that there is no single universal definition of capacity or capacity building. Leading scholars have cautioned that definitions of the concept are largely derived from situational contexts.
Honadle (1981) stresses that “capacity building is not the application of a particular approach to every management problem in any context” (p. 575). Robinson, Farmer, Riley, Elliott & Eyles, (2007) concur. Capacity is context-driven; it depends on the activity to be accomplished. As Honadle (1981) notes, there are some general common characteristics of capable organizations. Capable public organizations have the ability to anticipate and influence change; make informed, intelligent decisions about policy, and develop programs to implement policy; attract and absorb resources; manage resources; and evaluate current activities to guide future actions. Capacity building relies on certain organizational requirements. For instance, there must be benchmarks or indicators in place to assess capacity or the lack of it, the organization’s ability to forge linkages with other organizations; implemented processes for problem solving; coordination among disparate functions; and mechanisms for institutional learning (p. 579). Leadership is the basis on which capacity development rests (Anderson, Raine, Plotnikoff, Cook, Barrett & Smith, 2008; Ingraham, Joyce & Donahue, 2003). Leaders set the people and resources to the right problem at the right time. Capacity building also includes activities such as creating communication networks, organizational culture, shared professional norms, and opportunities for success. In their research in six developing countries, Grindle and Hilderbrand (1995) found that the organizational action environment was a key factor in addressing capacity building needs. This action environment included strong organizational cultures, good management practice, and effective communication networks, not only rules and regulations or by procedures and pay scales. The researchers also found that what really mattered in terms of individual performance was not training in specific skills per se, but “opportunities for meaningful
work, shared professional norms, teamwork and promotion based on performance” (p. 441). The authors found in their research that often those attempting to build organizational capacity focused on the wrong variables (usually hard, measurable ones) and experienced limited results in terms of performance improvement.

Grindle and Hilderbrand (1995) also suggest that it might not be necessary to retain all the capacities needed by the organization in-house. It might be more cost-effective and expedient to tap into other organizations for the critical capacities if and when needed. This they argue might be a better approach to capacity building, especially in financially strapped organizations.

**Why Network Organizational Form is Needed**

If we take the concept of capacity as integral to organizational effectiveness, it could be argued that network forms are necessary for CDERA. However, while network arrangements are important in the case of CDERA, particularly for resource access, there are potentially bad sides to network arrangements and they must be managed, if CDERA wants to achieve its goals.

On the one hand, because of the non-hierarchical nature of networked relationships, it may not be easy for a member of the network such as CDERA to develop capacity because it lacks the power to command and control other organizations. On the other hand, a powerful member of the network may be able to work with network members to expand their inter-organizational capacity to fulfill their tasks. Network governance theorists like Kickert, Klijn & Koppenjan (1999) point out that not all members of networks are equally powerful and that governmental members wield more
power in setting up and maintaining network relationships compared to private sector organizations or nongovernmental organizations. Also, as O’Toole and Meier (2004) suggest, networks are not neutral producers, but “network managers respond to the stronger and more politically powerful elements of their surrounding” (p. 681) such as a powerful network member.

Having said this, however, conflicts can be managed. In the case of disaster management, where outside resources and partnerships are needed to augment internal resources and capabilities, systems and processes can be developed to manage potential conflicts. CDERA has learned to preemptively manage potential conflicts through developing and signing memoranda of understanding and other agreements discussed earlier.

Organizational Learning

Organizational learning is about creating and building capacity (Anderson, Raine, Plotnikoff, Cook, Barrett & Smith, 2008). Anderson and his colleagues note that learning organizations are those that can take effective actions to expand their institutional capacity. In this dissertation I have adopted Senge’s (1990) definition of organizational learning that he adapted largely from the work of Argyris and Schön (1974, 1978), the empirical research findings of Argyris (1974, 1982, 1990), and the work of Schön on “reflection-in-action” (1983). From their conceptions of organizational learning Senge constructs his own notion of what learning should entail. He did not focus on the individual level, as these scholars had done, but on the systems and structural levels (Smith, 2001). Senge (1990) reasoned that together, individuals create organizational learning systems.
For Senge (1990), learning is change. Senge (1990, 1994) defines the learning organization as one with an embedded philosophy for anticipating, reacting and responding to change, complexity and uncertainty. He distinguishes between two main types of learning: adaptive learning, or “single-loop learning,” and generative learning, or “double-loop learning.” Adaptive learning is a precursor to generative learning. It focuses on current, short term problem solving at the expense of critical assessment of what lead to the current results in the first place. Without this understanding, improvements are incremental. Generative or double-loop learning on the other hand focuses on redefining problems and questioning common sense thinking on them. To be successful, Senge argues, organizations must focus on generative learning because it is based on self questioning and ultimately leads to large scale improvement or transformations.

“Organizational learning occurs when members of the organization act as agents for the organization, responding to changes in the internal and external environments of the organization by detecting and correcting errors in organizational theory in use,¹ and embedding the results of their inquiry in private images and shared maps of organization” (Argyris & Schön, 1978, p. 23). This detection and or correction of errors can take place in a couple of ways either through varying existing strategies or finding new ones to achieve its goals taking into account the existing governing variables –single-loop

¹ Theory-in-use refers to an organization’s implicit and explicit understanding of how things are done. Each organizational member constructs his own theory-in-use and continually works to add elements to construct to image of the whole theory. This learning is then embedded into the organizational memory (Argyris & Schön, 1978).
learning or through scrutinizing the governing variables and shifting the ways strategies and consequences are framed – double-loop learning (Argyris & Schön, 1974).

Generative learners create their own problems and solve them through activities like brainstorming and team-teaching, construct mental models, and generate sub-problems and sub-goals and strategies for achieving larger tasks (Wimberg & Hollins, 2002). Generative learning requires active engagement in learning and integration of new and old knowledge (Wimberg & Hollins). It emphasizes continuous experimentation and feedback in an on-going examination of the very way the organization is defining and solving problems (Argyris & Schon, 1978). Are they questioning the governing variables? This is to say, are they continually enhancing the organization’s capacity to create what the organization wants to create? Generative learning is an approach to organizational learning that encourages experimentation, risk taking, openness and system-wide thinking (Wimberg & Hollins).

Generative learning is more than information retrieval. It relates to the cognitive processes involved with building relationships between concepts and planning for action. In this case action might be deeper understanding, exploring more deeply or transferring information into knowledge possibly through complex means such as analysis and summations of other learning (Wittrock, 1992). Generative or double-loop learning focuses on redefining problems and questioning common sense thinking on them. To be successful, Senge (1991) argues, organizations must focus on generative learning because it is based on self questioning and ultimately leads to large scale improvement or transformations.
There is no conclusive finding that shows a link between learning and organizational performance, but there is general appreciation of the relevance of organizational learning for organizational competitiveness (see Sinkula, Baker & Noordewier, 1997; Stein & Smith, 2009). While Sinkula, Baker & Noordewier (1997) suggest that we cannot categorically prove that learning impacts performance, Stein and Smith (2009) found some correlation between learning and performance. They found, for example, that when a company integrates information from internal and external sources into its operating systems, this improves performance. In the educational arena, Goodman and Beenen (2008) found that learning contracts can serve as diagnostic tools in education and show how these contracts can help improve management education overall. Learning that is effective and knowledge that is relevant may lead to positive performance (Fiol & Lyles, 1985; Vera and Crossan, 2003). In the long run, Sinkula, Baker, & Noordewier (1997) note, the success of learning activities should be addressed by performance measures. There are different definitions of organizational learning. According to Fiol and Lyles (1985), in all these definitions the assumption that learning will improve performance is pervasive.

Simon and others suggest that structure and learning are related in a circular manner: Structure is an outcome of learning, but it also determines learning processes (Simon, 1969; Fiol & Lyles, 1985). A centralized mechanistic structure tends to reinforce past behaviors, while an organic, more decentralized structure tends to allow shifts of beliefs and actions and facilitates greater learning because there is a reduction of the cognitive overload on the individual (Fiol & Lyles, 1985).
This dissertation utilizes the systems approach to assess effectiveness in disaster management mechanisms and places heavy emphasis on feedback and adaptation through learning. As such, the assumption that learning plays a major role in the effectiveness of these mechanisms was built into the model that guides this dissertation.

Because of the importance of knowledge to effectiveness in disaster management agencies, especially those in the Caribbean with limited resources and a wide spread of separate islands, it is important for disaster management operations to function at the regional level not only in networks as previously described, but in intuitive networks.

**CHAPTER SUMMARY**

The preceding section laid out my theoretical framework for this dissertation and examined the relevant literature to elaborate on the framework, particularly addressing issues of organizational capacity, organizational form, and organizational learning. I used an input-process-output model to assess how certain components interact to derive effectiveness at CDERA. Organizational form and organizational capacity are the inputs. They influence organizational effectiveness through organizational processes and performance systems. Effectiveness is the outcome and is assumed to be contingent on the input and process variables. Organizational learning is the feedback loop that can modify organizational form and capacity.

Organizational capacity is conceptualized as a combination of intra-organizational and inter-organizational factors. From a review of the capacity building literature presented above, I am proposing that the intra-organizational factors include consistent and clear mandate for the organization, effective leadership, human resources with prior
disaster management experience, financing, collaborators/stakeholders, technical expertise, and technological and communication capabilities for emergency response and coordination. The inter-organizational factors are capabilities and resources that come from strategic linkages with other agencies (national, regional, international). CDERA derives its capacity from its linkages with other organizations and stakeholders.

The organizational form arrangements being proposed in this dissertation are not typical of what the general disaster management literature proposes as the ideal for complex operating environments. In the general literature on disaster management, the network organization is the preferred form, or even the ideal form. I propose a hybrid-type organizational form, with network and bureaucracy complementing one another to build a system that can perform in a complex environment.

Because of the heavy emphasis on learning in my conceptual model, effectiveness for CDERA rests in large measure on its ability to learn from past experiences, or through its promotion of learning opportunities. From these, CDERA gains insights and reorients its mission, objectives, and strategies for effectiveness. Learning is an important component of the model guiding this dissertation: thanks to the feedback CDERA receives, it can adapt to its complex operating environment and work to build effectiveness into its overall system.
CHAPTER 3 METHODS

For this dissertation, I utilized the case study methodology to examine factors that result in the effectiveness of CDERA, the disaster management system in the Caribbean. In this case study I examined particular aspects of CDERA’s organizational form and capacity to make historical performance comparisons of the system. The centerpiece of my analysis rests on the examination of CDERA’s effectiveness in two particular disasters in its history: Hurricanes Ivan and Dean. As I explained in the introduction, my research focused on how organizational form, organizational capacity and organizational learning influenced the effectiveness of CDERA. I present a description of the methods I used in my research in the following section. I begin with the limitation of the methodology used.

LIMITATIONS OF THE PROPOSED RESEARCH STRATEGY

I relied on the single case study methodology. The single case study methodology is well known and used extensively (Yin, 2009). This method is effective when rich qualitative data is needed to understand a new or little studied phenomenon and get a holistic picture of the phenomenon or to understand a complex issue, such as the one I studied for this dissertation (Tellis, 1997). Case studies are often used in areas like law, medicine, education, business, and government, where the use of quantitative techniques tends to hide some of the important information the researcher wants to find (Yin, 2009). Case studies use multiple sources of data and they are designed to bring out as much
details as possible from the viewpoints of the participants than other methods (Tellis, 1997).

The case study methodology has limitations. The primary deficiency of case studies that is expressed in the research literature with some frequency is their inability to facilitate generalizations to larger populations. This may create validity problems (Tellis, 1997). This limitation can be overcome by interviewing or observing multiple respondents to verify the information about a single case. For this purpose triangulation protocols can be used; they are used to ensure accuracy and bring out alternative explanations of a particular phenomenon and thus to ensure the validity of the research findings (Stake, 1995).

In my research I used multiple methods to verify and validate information I present in the following chapters. These methods include peer debriefing, member checking, and using an external evaluator. I will discuss these in some detail later in this chapter.

RESEARCH STRATEGY

Scope and General Approach

Because it was not practically possible to study in detail the entire history of CDERA for this research, I limited my scope to an examination of the specific aspects of the organization’s history in two distinct disasters and made historical comparisons based on them. The two disasters that I focused on are Hurricane Ivan, which devastated six islands in the Caribbean between September 7 and 14, 2004 and resulted in 65 deaths and
over 19 billion US dollars in damage (International Federation of Red Cross and Red Crescent, 2004), and Hurricane Dean, which resulted in 41 deaths and an estimated 3 billion US dollars in damage (CDERA, 2007). Using these two disasters as the bases for analysis I examined the areas of major successes and failures in CDERA to assess how organizational form and capacity affected their effectiveness.

I took the following steps in conducting my research:

1. Selection of variables and their measures (indicators), as outlined in my research model in the introduction;
2. Defining the research questions;
3. Selecting the specific periods for study in CDERA’s history and determining data gathering and analysis techniques;
4. Identifying sources of information: interviews and archival documents to obtain the necessary information;
5. Contacting the members and affiliates of the organization (CDERA) and gaining cooperation and access;
6. Collecting data in the field (interviews and obtaining archival data);
7. Analyzing and interpreting the information collected;
8. Writing up the results and other chapters of the dissertation.

ANSWERING RESEARCH QUESTIONS

Once again, my research questions were as follows.
1. What relative roles do organization form and organizational capacity play in the effectiveness of CDERA’s disaster planning, response, recovery, and mitigation efforts?

Organizational form and organizational capacity emerged as the key variables in explaining the effectiveness of disaster management organizations in my reading of the literature. The following four more specific questions were formulated.

   a. To what extent does organizational form determine the effectiveness of CDERA?
   
   b. What specific organizational form is suitable for improving CDERA’s effectiveness?
   
   c. To what extent does organizational capacity determine the effectiveness of CDERA?
   
   d. What specific organizational capacity variables are most influential on CDERA’s effectiveness?

2. What role does organizational learning play in the evolutions of CDERA’s organizational form and organizational capacity?

The literature suggests that organizations, including emergency management organizations, learn from their collective experiences and change their organizational forms accordingly. Also their organizational capacities may be influenced by this organizational learning and organizational form.

To answer these questions I collected information through interviews and studying archival materials. In the interviews, I used a series of open-ended questions
based on my research questions. I used open-ended questions, because, although they can be time consuming to administer and evaluate, they have the advantage of offering a wide range of responses that capture what people are thinking in their answers (Yin, 1994).

Appendix I contains the interview question matrix with a detailed list of the questions asked, the interviewees targeted for each question, and the date of each interview.

To help answer the research questions 1a and 1b, I wanted to gauge whether CDERA is more bureaucratic or more networked. I asked interview questions including:

- In your opinion, is CDERA a network or a bureaucracy?
- Why do you say so?
- How often do the NDOs connect with the CDERA CU, other NDOs?
- What about?
- Are the levels of contacts the same in-between disasters and during a disaster?
- In your office, who decides on important matters concerning your work-e.g. how resources are used?

To understand “to what extent does organizational capacity determine the effectiveness of CDERA?” and, “What specific organizational capacity variables are most influential on CDERA’s effectiveness?” (questions 1c & 1d), I asked interview questions including:

- How would you describe the capacity of CDERA to respond to disasters in terms of human resources, technology, leadership, finances?
- Tell me about CDERA’s capacity gaps.
- What efforts are being made to bridge these gaps?
DRAFT

- How does the CDERA CU support your national office?
- What are the weakest and strongest areas of CDERA’s capacity at the regional and national levels?

I validated the interview responses to these questions using archival information to cross-check data collected with historical information on CDERA.

To help answer the research question “What role does organizational learning play in the evolutions of CDERA’s organizational form and organizational capacity?” (Question #2), I asked the interview questions including:

- Do you think CDERA has learned from its past experiences?
- How does CDERA learn from its past experiences?
- What does CDERA learn?
- How does CDERA apply its learning?

In addition to the questions listed above, I asked a question that would help to cross-check information I gathered from the answers. This additional question was, “Describe your ideal CDERA”. The answer to this question also served to highlight gaps in capacity.

During the interviews I also took notes to record my impressions, which I thought would be useful in interpreting the answers. I made notes of stories told during the interviews and cited parts of some of them in the following chapters. I recorded the information in an electronic file on my home computer for cross referencing and information checks during final dissertation write-up.
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DATA GATHERING

For the interviews, I first identified a list of persons who were members of the organization (CDERA) I especially tried to find persons who worked at CDERA during the two disasters I selected for my study and those who were closely associated with the organization (i.e., stakeholders). I interviewed the coordinator of CDERA CU, its Program Director, CDERA CU deputy coordinator and two project staff. I also interviewed heads of eight national disaster offices (Jamaica, St. Lucia, Antigua, St. Vincent & the Grenadines, Montserrat, Barbados, British Virgin Island, the Bahamas, and St. Kitts & Nevis), a professor of the University of the West Indies, and three representatives of international aid agencies that were associated with CDERA (USAID, CIDA, and UNDP) (see Appendix A for complete list). I conducted the interviews between May and June of 2008 and made a follow-up clarification visit to Barbados between December 8 and 12 in 2008, during the Annual International Comprehensive Disaster Management Conference, where I also presented a paper.

In order to ensure consistency and reliability of the data I gathered during interviews, I adopted the following protocol suggested by Creswell (2003, pp. 183-188):

1. The questionnaire included a heading, opening statements, the key research questions, probes to follow key questions, space for recording interviewer’s comments, and space to record reflective notes.

2. I made audio recordings of all interviews electronically and took handwritten notes in the event that the equipment failed or I needed to cross-check later. I transcribed all oral recordings manually.
3. I also recorded information from archival documents and visual materials and used notations to separate material into primary and secondary information.

I was the sole interviewer during data gathering. I augmented the interviews with archival organizational information, information in newspapers, and information available at relevant websites on the Internet. The written documents included the published and unpublished reports on CDERA and CDERA archival documents; newspaper articles (Washington Post and USA Today); websites of CDERA, ReliefWeb, Red Cross, Caribbean News, and The Daily Gleaner (Jamaica).

**SAMPLING PLAN**

I relied on two strategies to secure interviews. First, I drew interviewees from among CDERA employees or past employees who worked at the regional coordinating unit in Barbados. I also contacted key stakeholders from international aid agencies and academia several of whom I had met at CDERA conferences. Second, I employed a snowball sampling technique: I contacted persons of interest and asked them about additional relevant contacts. In total I conducted 26 in-depth interviews.

A limitation of the snowball sampling technique is that it lacks representativeness since interviewees are not randomly selected (Babbie, 2006); as such this method raises concerns about issues of validity and reliability. To check and improve validity, I evaluated each interviewee’s history with CDERA by verifying with those who had worked with the organization as consultants, employees, and donors and those who had studied the organization.
DESCRIPTION OF RESEARCH SETTINGS

To make the process of interviewing as stress-free and convenient as possible for interviewees, I left the selection of research setting solely to the interviewees; many of them they selected their offices, but others wished to be interviewed at other locations. I conducted the interviews on a one-on-one basis, which allowed me more control over the questioning and allowed for openness on the part of interviewees.

I was granted access to the CDERA Board Meeting held between May 20 and 23 in 2008 in Antigua, West Indies. In attendance were all the CDERA national disaster office coordinators, aid agency representatives, government officials, and scholars with interest in disaster management. The CDERA coordinator introduced me to members present and asked that I be allowed to schedule interviews. The participants were gracious in allowing me to schedule interviews at 11:00 pm or at 6:00 am so as to allow me to complete my interviews in the short time available. From Antigua, I moved to Barbados and interviewed the members of the CDERA CU core and project staff and aid agency representatives.

RELIABILITY AND VALIDITY

The term reliability is defined in a limited way in case studies: to test for consistent patterns or themes if several researchers are used (Creswell, 2003). In this research the primary reliability strategy was to use multiple indicators of the same construct. For instance, there are two indicators of organizational form: dispersed versus centralized authority and level of collaboration in terms of information and resource exchange. I combined these indicators into an overall measure of organizational form:
either a network or a bureaucracy or some combination of the two. According to Neuman (2006), “[m]ultiple indicators let a researcher take measurements from a wider range of the content of a conceptual definition” (p. 191). Multiple indicators reduce the likelihood of the same systematic error being repeated, so they are usually more stable.

Validity refers to the information being presented is authentic or credible. The question is, does the information collected present a fair, honest and balanced representation of the phenomenon being studied from the viewpoint of the researcher, participants, and readers (Neuman, 2006, pp. 194-198; Creswell, 2003, pp. 195-197). The primary validation strategies used in this research to ensure credibility of my findings are:

- **Peer debriefing**: I contacted Mr. Collymore, CDERA coordinator with expertise in the area of disaster management, who reviewed and asked questions about the study during research stage;

- I also clarify the bias I bring to the study as a form of self-reflection at the end of my discussions.

**DATA ANALYSIS**

I conducted data analysis in three stages. Table 4 describes the stages in which I conducted my data analyses and other activities. In stage 1 I organized, transcribed tape recorded interviews including field notes, and stored them in a folder on my computer. Next I read through my collected information to obtain a general sense of what I have collected and its meaning and overall depth. In addition, I coded the data using an open coding method. Open coding involves “naming and categorization of phenomena through
close examination of data” (Babbie, 2006, p. 366). I broke down data into discrete parts, closely examined them, compared them for similarities and differences, and asked questions about the phenomena as reflected in the data.

Table 4: The model used to guide data analysis for this dissertation

<table>
<thead>
<tr>
<th>Description of Stages</th>
<th>Activities in Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td></td>
</tr>
<tr>
<td>Organize and code the data</td>
<td>Data transcription, organization, storage</td>
</tr>
<tr>
<td></td>
<td>Data verification, validation Data Coding</td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td></td>
</tr>
<tr>
<td>look for patterns in the data</td>
<td>Data Analysis – Identification of themes, patterns</td>
</tr>
<tr>
<td>Review by selected interviewees, etc</td>
<td></td>
</tr>
<tr>
<td><strong>Stages 3</strong></td>
<td></td>
</tr>
<tr>
<td>compare the findings, refine my effectiveness model and propose an agenda for change in my conclusion and recommendations</td>
<td>Data Interpretation – build model, make recommendation and conclusions</td>
</tr>
</tbody>
</table>

At stage 2 I looked for patterns in the data (i.e., interrelationships among variables) (Babbie, 2006, p. 366). Finding patterns allowed me to develop descriptions and thematic analysis from which I could then present the information in tables, graphs, and figures. I identified patterns in the information I had collected manually; I could do so, because there were only 26 interviews. I was able to use responses from all 26 interviews to ask comparative questions, find relationships between variables, research themes and topics, and even graphically present information.
In stage 3, I interpreted the data to identify the relationships between variables and find out if there were other potential important variables that I had included in my conceptualization. I then compared the findings with past literature and my conceptual design, raised questions. Based on these, I refined my effectiveness model and proposed an agenda for change in my conclusion and recommendations.

STRATEGIES TO ENSURE HUMAN SUBJECTS PROTECTION

The information I collected has been and will be is kept in strict confidence. I have kept taped data in a locked filing cabinet accessible only to me. I have kept written data in a locked cabinet in the basement of my home and will not share them with others outside my dissertation committee.

I collected sensitive information divulged about CDERA by interviewees that they do not want reported. The information informed my analysis, but I will uphold my obligation to respect the needs, rights, and desires of interviewees have been. I have employed the following safeguards and will continue doing so: (1) I disclosed the research objectives both verbally and in writing, including information of how the data will be used, to interviewees; (2) I received written permission to proceed with interviews. The final decision regarding how to use the information rests with interviewees.

In addition, I applied to the Institutional Review Board of Pennsylvania State University for an approval of my research procedures. That application explained the procedures and safeguards used in this research to prevent abuse of subjects and included
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an Informed Consent form for Social Science Research (see Appendix B). In the research I complied with those safeguards.

QUALITATIVE NARRATIVE

In my writing of the results, I used direct wording where possible and intertwined quotations with interpretation to provide an accurate account of what interviewees said. I also used the narrative outcomes of interviews and compared them with theories and the general literature on disaster management. This is in line with strategies recommended by researchers to present qualitative information as objectively and completely as possible (Babbie, 2006; Creswell, 2003). This process helped me to refine my conceptual design and make a more informed set of conclusions.
CHAPTER 4 CASES: HURRICANES IVAN AND DEAN

As noted earlier, I studied two distinct disasters in CDERA’s history to identify and analyze important changes in performance that provided the basis for more definitive conclusions. The two disasters were Hurricane Ivan (2004) and Hurricane Dean (2007). A description of these significant events and CDERA’s changes in response to them follow.

HURRICANE IVAN: SEPTEMBER 7-15, 2004

CDERA’s response to Hurricane Ivan is very well documented. This documentation includes many newspaper articles, situation reports, UN Economic Commission for Latin America and the Caribbean (UN ECLAC) reports, Organization of Eastern Caribbean States (OECS) report and a thirty-minute documentary funded by Japanese and Canadian governments distributed widely in the region. By all accounts, CDERA’s response to Hurricane Ivan’s impact on Grenada showed huge gaps in its capacity. The Organization of Eastern Caribbean States report (2004) is the most comprehensive of these documents and will be used heavily in the description of CDERA’s response to Hurricane Ivan.

Hurricane Ivan came into the Caribbean as a Category-3 storm on September 7, 2004. By the time it traversed the region between September 7 and 15, 2004, the hurricane had strengthened to a Category-5 storm, packing winds in excess of 150 mph at times (Sullivan, 2004). The hurricane affected several islands: Barbados, Grenada, Jamaica, St. Vincent and the Grenadines, and Trinidad and Tobago. It caused over
US$1.5 billion in property damage and 47 lives were lost; the poor were among the hardest hit in the islands impacted (UN ECLAC, 2007; International Federation of the Red Cross & Red Crescent Societies, November 2004). Table 5 provides a summary of the damage to property and loss of lives wrought by Hurricane Ivan.

Table 5: Impact of Hurricane Ivan on CDERA Participating Member States

<table>
<thead>
<tr>
<th>Country</th>
<th>Estimated Property Damage (US$M)</th>
<th>Lives Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grenada</td>
<td>$895</td>
<td>28</td>
</tr>
<tr>
<td>Jamaica</td>
<td>$593</td>
<td>17</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>$10</td>
<td>-</td>
</tr>
<tr>
<td>Barbados</td>
<td>minimal</td>
<td>-</td>
</tr>
<tr>
<td>St. Vincent</td>
<td>$4</td>
<td>-</td>
</tr>
<tr>
<td>Tobago</td>
<td>minimal</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$1,502</strong></td>
<td><strong>47</strong></td>
</tr>
</tbody>
</table>

*Note: Compiled from the following reports - UN ECLAC, 2004; NEMO St. Lucia, September 7, 2004; International Federation of Red Cross and Red Crescent Societies, November 19, 2007.*

To assess Hurricane Ivan’s impact on the Caribbean, I will focus on the island of Grenada where impact was most severe (see Table 5) and CDERA dedicated many resources to handling the disaster. Grenada, then, provides one of the best means of assessing CDERA’s performance.
Grenada

Hurricane Ivan arrived at Grenada in the South Eastern Caribbean as a category-3 storm gusting up to 115 miles per hour and quickly strengthened to a category-4 storm with wind gusts reaching 145 miles per hour before the storm traversed the island (Organization of Eastern Caribbean States, 2004). The damage to the island was extensive, especially in the southern parishes of St. David, St. Georges, St. Johns, and St. Andrew, where 28 people were killed and over 350 were injured (Economic Commission for Latin America & the Caribbean, 2005a; 2005b). Carriacou and Petit Martinique, Grenada’s sister islands, were severely damaged. A USAID reconstruction report after Hurricane Ivan noted that Grenada was unprepared for the impact of that storm (USAID, 2005 March 31.). In addition to the 28 deaths, the report notes, there were 700 injuries in total, 100% of the population was left without potable water or electricity, 90% of the homes were damaged, and 30% of the houses were destroyed.

Figure 6 shows the path of Hurricane Ivan as it moved through the Caribbean from Grenada. Grenada lies just south of the Caribbean region’s hurricane belt (OECS, 2004). Prior to Hurricane Ivan, the last other major hurricane to impact the island was Janet in 1953 (ECLAC, 2005a), which resulted in extensive damage and over 100 deaths. Because of the long time gap between Janet and Ivan, Grenadians did not expect to experience a direct impact from Ivan, believing once again that they would be spared the wrath of this hurricane, like many in the recent past. As the OECS 2004 report suggests, there were “two generations of Grenadians who have not experienced a disaster of this type” (OECS, 2004, p. vii); they therefore did not know how to prepare for one.
Grenada’s socio-economic situation was another significant factor in the lack of preparedness. Grenada’s GDP is only US$447 million (US$6,005 per capita) and unemployment hovers between 13% and 15% among its population. In the parishes that were hardest hit, many of the residents barely had enough to satisfy their basic needs, let alone find the means to prepare for an event such as Ivan (ECLAC, 2005a). Poverty Assessment Study of 1999 shows that of the 32% of Grenada’s population living in poverty, 75% was living in the parishes hardest hit (OECS, 2004; ECLAC, 2005a).
The Incident Report distributed by CDERA one year after Ivan’s impact records an almost complete destruction of the schools and churches in Grenada’s capital St. Georges. These structures were typically used as evacuation centers; the Police headquarters were also destroyed (CDERA, 2004). Electrical poles were downed in the majority of the country severely impacting electrical distribution and disrupting telecommunications island-wide (OECS, 2004). Grenada’s cellular telephone network was also disrupted, as communications towers shifted out of alignment making communications into and out of the country virtually impossible; consequently the island was cut off from the outside world (OECS, 2004; British Broadcasting Corporation, 2004).

Many gaps in CDERA’s CDM capability were visible in Grenada’s experience. The most visible deficiencies were seen in the areas of preparedness, and response.

**Lapses in Preparation**

Grenada had significant lapses in preparation and this led to the breakdown in its early warning systems and in the island’s mobilization of citizens for evacuation (A. Mullings, personal communication, May 15, 2008). Grenada’s disaster coordinator at the time of Hurricane Ivan noted that multiple factors led to the breakdown in the response system: inadequate emergency planning by, very little knowledge of the roles each stakeholder should play, no integrated relief policy, an inadequate number of technical personnel, and limited understanding of the disaster plan by all groups involved (CDERA, 2005). In addition there was confusion about where the Emergency Operations Center (EOC) would be, who should be there, who would talk to talk to whom, and what
should be the alternate EOC, should the current one be destroyed or services disrupted during the hurricane (CDERA, 2005).

Response Lapses

Many attributed the magnitude of the impact to a lack of proper coordination of the response efforts (CDERA, 2005). For instance there was a lack of an integrated relief policy that could coordinate the disparate pieces of the response efforts (CDERA, 2005). The prevailing relief policies were not known by all parties involved in the relief operations. The head of Grenada’s national disaster office at the time reported in his After Incident Report to CDERA that Grenada’s effort to properly respond to Hurricane Ivan was significantly hampered by a lack of technical personnel; the workload fell on a few people. He noted that the sub-committees, which comprised qualified and technical personnel, were not functioning effectively, and this was one of the main contributors to poor performance (CDERA, 2005). He further noted that during the response efforts, relief supplies that were sent from the disaster agency to communities did not get to all intended beneficiaries because of weaknesses in the community relief distribution structure.

Other weaknesses included insufficient and inadequate search and rescue tools; absence of an evacuation protocol and unclear role definition among the various agencies involved in the response efforts, which caused confusion and delay (CDERA, 2005).

CDERA Coordinating Unit’s Response Mechanism

The Caribbean Disaster Reduction Unit is a special CARICOM body working in tandem with CDERA to maintain law and order, manage relief supplies and provide
personnel to repair critical lifeline facilities (J. Collymore, personal communications, May 26, 2008). There was no pre-positioning of the CDRU. It was deployed on Wednesday September 10, 2004, three days after the hurricane hit Grenada. CDERA’s sub-regional focal point for Grenada in Trinidad and Tobago was actively mobilizing to get supplies into Grenada around this time also. The Emergency Assistance Fund operated jointly by CDERA and the Caribbean Development Bank was mobilized, while the personnel from the Regional Security System were deployed to provide internal security and stem the looting on the island (Organization of Eastern Caribbean States [OECS], 2004). A high-level Caribbean mission from the CARICOM Secretariat arrived on the island on September 10, 2004. The mission consisted of the Secretary General of CARICOM, the Director General of the OECS and the president of the Caribbean Development Bank (OECS, 2004).

Neither the CDERA CU, nor its sub-regional focal points pre-positioned response services for an impact, although one was imminent. The Regional Security System (RSS) was not deployed until three days after Grenada was impacted, by which time citizens were looting stores to get whatever they could to sustain themselves. In fact, multilateral and bilateral donors were in Grenada long before CDERA arrived (A. Mullings, personal communication, May 15, 2008). In addition, the telecommunications technology was so inadequate that the country was cut off from the rest of the world for a while and only after the national EOC was destroyed did they identify an alternative venue from which to mount the national response operations (A. Mullings, personal communication, May 15, 2008; D. Gentles, personal communication, May 21, 2008).
An Assessment of Hurricane Ivan

Hurricane Ivan’s impact on six of the CDERA’s sixteen participating member states tested the region’s ability to cope (CDERA, 2004) and highlighted multiple gaps in its disaster management capacity. The response to Hurricane Ivan was the region’s first coordinated effort to respond to multiple geographic impacts by the same event and caused CDERA to mobilize the Regional Response Mechanism (RRM); it was a failure by all accounts (A. Mullings, personal communication, May 15, 2008; R. Jackson, personal communication, May 16, 2008; J. Collymore, personal communication, May 26, 2008; E. Riley, personal communication, May 27, 2008). CDERA’s response to Ivan’s impact in Grenada remains at the forefront of all stakeholders’ assessment of CDERA’s capacity and underlies their efforts to help the agency.

The inadequacies in preparedness and response are also linked to mitigation; among other things, it increased vulnerability and widened the scope of the damage. The reports on CDERA’s response to Hurricane Ivan did not explicitly identify mitigation issues among the problems cited, but the whole scale destruction within Grenada’s economic sectors including housing, agriculture, tourism and education provide sharp evidence of inadequate mitigation measures. Within the CDM framework, mitigation refers to the lessening or limitation of the adverse impacts of hazards and related disasters. Mitigation measures encompass engineering techniques and hazard-resistant construction as well as improved environmental policies and public awareness (Caribbean Disaster Mitigation Project, 2001).

During Hurricane Ivan, the activation of the Regional Response Mechanism was delayed for several days; once initiated, it was overwhelmed by the scale of the disaster
in Grenada. CDERA’s team arrived in Grenada three days after Ivan’s impact, long after international assistance had arrived. Importantly, many of the impacted countries were not skilled in the preparation of Damage Assessments and Needs Analysis reports and so were not able to tap into CDERA resources until late into the disaster (A. Mullings, personal communication May 15, 2009; R. Jackson, personal communication May 16, 2008).

Three years after Hurricane Ivan, CDERA CU was again called upon to respond to another disaster: Hurricane Dean.

HURRICANE DEAN: AUGUST 11-21, 2007

Hurricane Dean impacted the Caribbean region between August 11, 2007 and August 21, 2007 (CDERA, 2007; Food & Agricultural Organization, 2007). The tropical weather system entered the Eastern Caribbean as a category-2 storm and strengthened to a category-4 storm by the time it made landfall in Jamaica (CDERA 2007). St. Lucia, Dominica, Jamaica, and Belize were affected by the hurricane; Barbados, St. Vincent and the Grenadines, and Grenada were impacted by the high winds from the storm. Seven persons were killed during the storm (CDERA, 2007) and there was an estimated US$ 750 million in property damage as a direct result of Hurricane Dean (Spencer, 2007). Learning lessons from its response to Hurricane Ivan, CDERA quickly initiated the Regional Response Mechanism (RRM) upon learning about the probable path of Hurricane Dean.
Pre-Impact Preparation

The Regional Response Mechanism was placed on standby as early as seventy-two hours before the predicted impact of the hurricane. The National Disaster Committees in the threatened participating member states reviewed their preparedness and response plans and initiated readiness actions; CDERA contacted National Disaster Coordinators and government officials to ascertain their level of preparedness (CDERA, 2007). In addition, both the Eastern and Western Caribbean donor groups convened meetings, and CDERA developed an operational plan for the “worst case scenario” in Jamaica and Belize, where impact was expected to be greatest (CDERA, 2007, p. 2). The Pan American Health Organization pre-deployed in Jamaica, St. Lucia and Dominica so as to more readily assess the public health needs in the impacted states (CDERA, 2007). Further, USAID Office of Foreign Disaster Assistance (OFDA) team was deployed to Jamaica, while an OFDA consultant was resident in Dominica (CDERA, 2007).

The Caribbean Disaster Reduction Unit was also pre-positioned and ready to man Emergency Operations Centers (EOC) if needed. As noted earlier, the Caribbean Disaster Reduction Unit (CDRU) consists of national defense and police forces working in tandem with the Regional Security System (RSS) through CDERA to minimize disaster impacts. Whenever a participating member state is threatened, the CDRU is placed on standby by CDERA and will be ready for immediate deployment, if states request assistance (CDERA, 2008b). The CDRU primarily assists affected states in maintaining law and order, in managing relief supplies, and in providing personnel for repairing critical lifeline facilities (CDERA Response, 2008). Pre-staging response resources is critical to effectiveness in post-disaster operations, especially when human resources are limited. In
addition, integrating civil defense organizations and mechanisms can provide critical human resources during the times when they are most needed.

**Impact**

Jamaica experienced extensive wind damage in its western parishes; 109 communities in twelve of Jamaica’s fourteen parishes were affected. Approximately 2,500 people had to be sheltered in 76 shelters (CDERA, 2007). The Parishes of Clarendon, Kingston, and S. Andrew and St. Catherine were the hardest hit. Approximately 2,600 houses were completely destroyed and another 12,905 houses suffered major damage, especially to their roofs (CDERA, 2007). There was severe wind damage to buildings, utility poles and trees and there were the cause of large numbers of blocked roads (CDERA, 2007).

Belize experienced extensive coastal damage, collapsed buildings and roofs among others. Total damage was estimated at US$53, 975 million of which the agricultural sector accounted for US$42.575 million in damage (CDERA, 2007). According to CDERA reports over 19,000 people had to be evacuated in the districts of Orange Walk, Corozol, Cayo, and Benque; of these Corozol was affected the most in terms of housing damage. In the agriculture sector, the Papaya subsector suffered 95% destruction due to wind damage (CDERA, 2007).

By all accounts Dominica was the hardest hit of the CDERA participating member states (A. Mullings, personal communication, May 15, 2008; R. Jackson, personal communication, May 16, 2008; J. Collymore, personal communication, May 26, 2008; E. Riley, personal communication, May 27, 2008). The total damage was estimated
at about US$500 million; no sector was spared Hurricane Dean’s impact (CDERA, 2007). Dominica experienced wind damage to roofs, flooding, and landslides; it also experienced 95% damage to the banana industry, estimated at US$36.51 million (CDERA, 2007). In the commercial sector 43% of the buildings were completely damaged and 33% partially damaged. Estimated rehabilitation costs in this sector were US$1,965,736.11. There was severe damage to the water infrastructure, roads, bridges and sea ports (CDERA, 2007). Dominica’s Office of Emergency Management was severely damaged and needed urgent repairs (CDERA, 2007).

Post-Impact Response

After Hurricane Dean’s impact, CDERA initiated a Level Two response based on preliminary damage assessments and needs analysis from impacted states (CDERA, 2007). This type of response signifies that the impacted countries are managing the impact at country level. Limited regional technical support is provided upon request by the impacted country. CDERA deployed technical teams to Jamaica and Dominica to provide support and to help with the preparation of Damage Assessment and Needs Analysis Reports. CDERA CU dispatched one technical support representative who had had experience with Hurricane Ivan in Grenada to Jamaica and requested that Montserrat, an NDO with strong technical capabilities dispatch one technical representative to Dominica, to aid the two hardest hit countries (A. Mullings, personal communication, May 15, 2008; R. Jackson, personal communication, May 16, 2008; J. Collymore, personal communication, May 26, 2008; E. Riley, personal communication, May 27, 2008).
The Eastern Caribbean Donor Group, formed after Hurricane Ivan, was able to provide substantial assistance to Dominica during Hurricane Dean (Food & Agricultural Organization, 2007). The Eastern Caribbean Donor Group prepositioned some members of their team in Jamaica to lend assistance in the Northern Caribbean.

An Assessment of Hurricane Dean

A total of seven persons were killed across the region—two in Dominica, one in St. Lucia, and four in Jamaica—compared to the 46 deaths during Hurricane Ivan. Direct damage to property was estimated at US$750 million during Hurricane Dean, compared to US$1.5 billion during Hurricane Ivan. The CDERA’s response mechanism was lauded overall for performing well during Hurricane Dean. The participating member states had put systems in place after Hurricane Ivan and their efforts seemed to be working during Hurricane Dean. CDERA was praised for its response to Hurricane Dean. CDERA’s response to Hurricane Dean indicated an improvement in preparedness, response and mitigation efforts that had been so lacking in Hurricane Ivan, three years earlier.

The greatest contributor to CDERA’s improved performance during Hurricane Dean was lessons learned from Hurricane Ivan. Based on the Hurricane Ivan experience, the CDERA CU implemented and coordinated its preparedness and response systems better this time. The Regional Response Mechanism (RRM) was deployed three days before the impact, regional collaborators such as the Pan American Health Organization (PAHO) were placed on standby in the participating member states expected to be impacted; and donor groups were convened and planned for the “worst case scenario.” Once countries were impacted, CDERA CU deployed assessment teams to assess damage
and write requisite reports to get aid funds and loans flowing, and other technical support persons were dispatched to impacted states.

The CDERA CU also greatly improved its technical capabilities through the programs it implemented in the areas of mitigation and preparedness, and it tripled the number of staff at the CU. The CDERA CU also improved its ICT and other technical capabilities installing early warning systems, risk assessments, and other mitigation and response technology which improved performance. These improvements in technical capabilities, staffing, and technology positively influenced performance during Hurricane Dean compared to Hurricane Ivan.

Yet Hurricane Dean showed weaknesses in the CDERA system at the country level, especially in the area of mitigation capacity issues that is seen in the levels of damage done in the important sectors such as agriculture. It is important to restate that the CDERA CU has no authority to dictate to the individual participating state how they should be structured or positioned, the resources they access, or how they are staffed. The CDERA CU can only advocate with each of the governmental heads or representatives what each participating state should be doing and how. The CDERA CU is in a better position to implement systemic changes at the regional level and then try to influence policy, develop standards, model documents and dialogue at the country level; its success in convincing individual governments is not always certain. The lack of authority over national disaster offices is a disabling factor that negatively impacts performance.

The findings from the cases presented will be woven throughout the findings, discussions and analyses that follow.
CHAPTER 5 FINDINGS AND ANALYSIS - ORGANIZATIONAL FORM

A SUMMARY OF FINDINGS

The findings in this section will help answer the following research question: To what extent does organizational form play a role in effectiveness at CDERA? The important findings are that at the regional level CDERA is a network that is becoming more formalized (bureaucratic), and that at the national level it is essentially bureaucratic but includes some network elements. Findings also show that in its response to Hurricane Dean (2007), CDERA was more formalized than it was when Hurricane Ivan impacted the region (2004) and that it performed better under Hurricane Dean than under Hurricane Ivan. My research also suggests that the positions of NDOs within national bureaucracies might be more important than their organizational forms or CDERA’s overall organizational form in terms of influence in performance. This finding is supported by evidence of better performance, according to respondents, of those NDOs that are placed higher up in their national government bureaucracies than those positioned lower down in them.

CDERA: A BUREAUCRACY OR A NETWORK?

Table 5 below presents the responses of the interviewees to the question, Do you think CDERA is a bureaucracy or network and why? In May and early June 2008, I interviewed 26 persons and asked this question. I told them about the characteristics of networks and bureaucracies and asked them to characterize CDERA based on these characteristics.
Table 6: Perception of the type of organization form displayed by CDERA- Network or a Bureaucracy

<table>
<thead>
<tr>
<th>Perception of (Network or Bureaucracy)</th>
<th>Perceived Bureaucratic Attribute</th>
<th>Impact on Organizational Function &amp; People</th>
<th>Perceived Network Attribute</th>
<th>Impact on Organization function &amp; people</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Mullings – former Deputy Coordinator</td>
<td>Combination as a system in general</td>
<td>Country level</td>
<td>-</td>
<td>At Regional level; Seen during disaster response, funding</td>
</tr>
<tr>
<td>R. Jackson – Dir. Gen. Jamaica, ODPEM</td>
<td>Network</td>
<td>-</td>
<td>-</td>
<td>South-south collaboration at country and regional levels</td>
</tr>
<tr>
<td>J. DuBois –Deputy Director, St Lucia, NEMO</td>
<td>Combination</td>
<td>Need written correspondence to contact CU: Need to go through boss</td>
<td>None stated</td>
<td>On specific issues can call CU for guidance, especially during disasters</td>
</tr>
<tr>
<td>Gentles – Deputy Coordinator CDERA CU</td>
<td>Combination</td>
<td>Lead sector agency liaison with CDERA; funding agency requirements lead to formalized structure</td>
<td>More efficient Very time consuming</td>
<td>agencies can contact CU independent of sector lead – but keeps NDO in the loop</td>
</tr>
<tr>
<td>Winston Suite – Lecturer, UWI</td>
<td>Network</td>
<td>-</td>
<td>-</td>
<td>Resource Access</td>
</tr>
<tr>
<td>Judy Thomas – Director, Barbados - CERO</td>
<td>Combination</td>
<td>Bureaucratic at country level</td>
<td>Frustrating, especially if low down in government bureaucracy</td>
<td>Network important for resource access</td>
</tr>
<tr>
<td>H. Prince-St. Vincent and the Grenadines – Director NEMO</td>
<td>Network</td>
<td>-</td>
<td>-</td>
<td>Network, weak communication between CU and countries</td>
</tr>
<tr>
<td>H. Tuitt – Director- Montserrat DCMA</td>
<td>Network</td>
<td>-</td>
<td>-</td>
<td>Resource mobilization; Country –to-country; country and CU contacts</td>
</tr>
<tr>
<td>S. Dabreo &amp; Z. McLean – Coordinator, BVI -Department of Disaster Management</td>
<td>Combination</td>
<td>Accessing CU assistance during disasters; many NDOs are at low levels in the government bureaucracy</td>
<td>-</td>
<td>CU encourages collaboration but countries are swamped</td>
</tr>
<tr>
<td>C. Herbert, NDC P. Peets – Dep. NDC, St. Kitts and Nevis, NEMA</td>
<td>Network</td>
<td>-</td>
<td>-</td>
<td>Frequent daily e-mails, tele calls; frequent access with outside collaborators.</td>
</tr>
<tr>
<td>J. Collymore – CDERA CU Coordinator</td>
<td>Combination, more network</td>
<td>With increasing staffing and CDM programming CU is becoming more bureaucratic, formalized;</td>
<td>Necessary More efficiency; must be balanced with flexibility</td>
<td>working to balance formalization and flexibility</td>
</tr>
</tbody>
</table>

Note: Compiled from interviews conducted between May 14 and June 4, 2008.
Table 6 shows the majority of interviewees believed CDERA was a network-based organization. Approximately 45% (5 of 11 respondents on the issue) believed that CDERA was an outright network, while 55% believed that the CDERA system contained elements of both network and bureaucracy. Interviewees said that CDERA was a bureaucracy predominantly at the national level, where the national disaster offices were all parts of their government bureaucracies, but at the regional level, the agency was a network. They also noted that CDERA was slowly getting more bureaucratic even at the regional level, as the agency gets bigger in size and scope of operation. Those respondents who thought CDERA was a network believed that this organizational arrangement was good for disaster response because it allowed for flexibility in operation and better access to resources and was good for resource mobilization and communication across multiple stakeholders (A. Mullings, personal communication, May 15, 2008; W. Suite, personal communication, May 20, 2008; H. Prince, personal communication, May 21, 2008; H. Truitt, personal communication, May 19, 2008).

Interviewees who believed that CDERA was a combination of both network and bureaucracy also suggested that bureaucratization was necessary and would allow for improved efficiency, but they called for a balance between bureaucracy and flexibility. Bureaucracy, they cautioned, could be inefficient and frustrating (J. Collymore, personal communication May 26, 2008; J. Thomas, personal communication, May 21, 2008; S. DaBreo & Z. McLean, personal communication, May 15, 2008).

The responses given to my question can be verified with CDERA’s strategic linkages as identified by Jones, Bisek, and Ornstein (2001). These linkages are shown in Figure 7. The figure depicts a network structure. In Figure 7 one can see that CDERA
sits in the center of a complex network of relationships among donors, research and data partners, response partners, regional sector partners, and NGOs. These relationships have been forged by CDERA in an effort to build regional disaster management capacity meant to stave off the effects of disasters and to deliver the objectives of enhanced CDM.

Figure 7: CDERA’s Strategic Linkages

Notes: The arrows show the interconnectivities. The numbers 1 through 6 show the most (1) to least (6) important members of this network. Source: Jones, E., Bisek P. & Ornstein C. (2001, Jun 15). Comprehensive Disaster Management in the Caribbean: Baseline Study.

As a network organization, CDERA has multiple and multi-faceted relationships with others. The CDERA CU is an intergovernmental agency, which means that it accesses the resources of national governments, regional agencies (e.g., CARICOM and Pan-American Health Organization, or the Caribbean Development Bank), and
international aid agencies with which it has cooperative agreements (J. Collymore, personal communication, May 26, 2008). A cooperative agreement is a legal instrument used by parties to enter into a relationship for the principal purpose of assistance (National Council for Public-Private Partnership, n.d.). Cooperative agreements are important for CDERA because of its sweeping mandate and its reliance on economic sector leads to make ready each sector for a hazard impact. The focus on sectors has moved CDERA to more formal relationships and reporting requirements (D. Gentles, personal communication, May 16, 2008). For instance, for the agricultural sector, the lead agency identified is the United Nations Food and Agricultural Organization. The agency organizes the sector to mitigate the impact of hazards in that sector, and liaises with CDERA CU on issues pertinent to agriculture and disaster risk reduction in each CDERA participating member state (D. Gentles, personal communication, May 21, 2008). The Coordination and Harmonization Council is the main engine used to integrate and implement CDM across sectors within and between countries.

**Coordination and Harmonization Council Mechanism**

Upon reflection on recommendations made by key donors for improved efficiency in use of the funds that they give to CDERA, the CDERA CU has created a Comprehensive Disaster Management Coordination and Harmonization Council (CHC). The purpose of this council is to provide guidance on program implementation and to foster governance of the enhanced CDM strategy and framework (Collymore, 2007). The Coordination and Harmonization Council is made up of key development partners, sector leads, participating-member states, private and non-governmental organizations. The CHC helps to explore synergies between developmental partners, regional governments,
private sector, civil society and other comprehensive disaster management (CDM) stakeholders (Collymore, 2007; CDERA, 2008a). The sector liaison brings proposals for the sector on disaster risk reduction. Donors and other stakeholders are the ones who decide on what aspect of CDM related activities they will fund. What this means is that the CDM process in the Caribbean is now more stakeholder driven. With so many stakeholders in the project management cycle some operational problems will make project management difficult. For example, at the inaugural Coordination and Harmonization Council meeting held in February 2008, stakeholders foresaw logistical problems to coordinate all the stakeholders, and problems with sourcing funding to keep the process going (E. Riley, personal communication, May 27, 2008).

The CHC supporting mechanism includes six sub-committees, each coordinating CDM-related activities in various sectors of the economy: agriculture, education, finance, health, tourism and civil society. The Food and Agriculture Organization will lead the agricultural sector, The University of the West Indies will lead the education sector, Pan American Health Organization will lead Health sector, The Caribbean Development Bank will lead Finance sector, and the Caribbean Tourism Organization will lead the tourism sector. Each sub-committee reports to the sector lead, a CHC member with considerable expertise in the field. These sector leads will report to the CDERA Council. CDERA will play a supporting role in each sub-committee through CDERA employees who are termed “internal leads” for the particular sector (E. Riley, personal communication May 27, 2008).

CDERA is seen as a network at the regional level with some bureaucratic attributes by my interviewees, as I mentioned above. They said that they saw the
institutionalization of the CHC as a move towards greater formalization in CDERA. However, they welcomed the move as one that was necessary to ensure greater efficiency as CDERA gets exponentially larger. Bureaucracy is also considered more supportive of the focus on economic sectors and the stringent accounting and reporting requirements of funders (D. Gentles, personal communication, May 21, 2008). Senior CDERA personnel were wary of the need for a balance between bureaucracy and network, expressing “efficiency must be balanced with flexibility” (J. Collymore, personal communication, May 26, 2008).

Although there is a tendency for the CDERA CU to become more formalized, all interviewees expressed an acute understanding that the regional network is ideal for acquisition of resources, disaster response, and collaboration among coordinators across the region. The main impact of the regional network is in the area of disaster response, where the CU as center of the regional disaster management network can bring people and other resources together to improve response; the network is good for resource mobilization, coordination and improved communication (E. Riley, personal communication, May 27, 2008).

That the CDERA CU is becoming more bureaucratic can be seen in its day-to-day operations and in the CDERA CU and national level interaction in-between disasters as well.
Perceived Attributes of Bureaucracy or Network and Their Impacts on the CDERA Organization

The attributes of networks and bureaucracy being discussed here are based on the perceptions of the interviewees of CDERA’s normal day-to-day operations and its operations during disasters (see Table 6). These perceptions are classified under the headings: “during disasters” and “in-between disasters.”

Interviewees pointed out that although the CDERA CU had been envisioned and designed as a network, it was becoming more formalized. They cited four indicators of CDERA becoming more bureaucratic. First, the name change and the correspondent changes in its organizational structure were cited. Figure 8 shows the changes in name to Caribbean Disaster and Emergency Management Agency (CDEMA), which I mentioned earlier in the dissertation, and organizational structure of CDERA with the pending name change.

![Image](image_url)

**Figure 8:** Organizational Structures under the Names of CDERA and CDEMA

Note: Presented by the CDERA CU coordinator Mr. J. Collymore on June 18, 2009 to familiarize collaborators and stakeholders with them before the effective date of change on September 1,
2009. Note that the CDERA Board under the new organization serves as a Technical Advisory Committee. The Management Committee of Council (MCC) is a new addition to the organization.

Figure 8 shows that the main differences between the two organizations in that there is now a Management Committee of Council (MCC) and that the Board will be called a Technical Advisory Committee (TAC). There are also new reporting relationships and new positions in the various levels of operation.

The MCC provides oversight to CDEMA and is made up of Sub-Regional Focal Points, Chair of the Technical Advisory Committee, and the Executive Director of CDERA (Collymore, 2009). The Technical Advisory Committee now has a chairman, which did not exist under CDERA. This chairman is a member of the MMC (Collymore, 2009). In addition, the CDEMA Coordinator will appoint a deputy coordinator from the MCC. The MCC, then, is set to play a central role in the new organization to strengthen governance and improve integration (Collymore, 2009).

Two of my interviewees cited the rapid increases in the number of staff members (an increase from 10 core full-time staff to over 40 in the last two years) as the second indication that CDERA has become more bureaucratic (E. Riley, personal communication, May 27, 2008; J. Collymore, personal communication, May 27, 2008). The third indication was the current enhanced comprehensive disaster management programming, with its focus on all hazards and all phases of the disaster management cycle and measuring results require more integration, more sectors and organizations involvement and closer reporting and supervision (D. Gentles, personal communication, May 21, 2008; J. Collymore, personal communication May 26, 2008). The fourth indication was the stricter funding requirements of international aid agencies upon whom
CDERA relies; they began requiring more detailed reports for funded projects (D. Gentles, personal communication, May 21, 2008; J. Collymore, personal communication, May 26, 2008). This is an additional layer of accountability that CDERA has to grapple with.

**National Level**

Unlike at the regional level where the CDERA CU is structured as a network with bureaucratic tendencies, at the level of the NDOs (national level), CDERA is seen as a bureaucracy with some network relationships. There are various national disaster planning committees, and specialized national agencies, international aid agencies such as the Red Cross and international aid agencies located within the individual countries. At the national level, national disaster coordinators are frustrated by the bureaucratic nature of NDOs (J. Thomas, personal communication, May 21, 2008). Reasons noted for this by 56% of interviewees are that national disaster offices are located very low down in their government structure. These low-level positions deny them of many of the resources they need, including staffing, funding, adequate physical structure and a visible and powerful champion for comprehensive disaster management. The fact that many national disaster offices are located low down the government bureaucracy was noted in the *2007-2012 CDM Strategy and Program Framework* (CDERA, 2006). This document recommends the building of strong decentralized national organizations as a major factor in improving CDERA’s effectiveness (CDERA, 2006). Compounding these institutional issues, the report found, are critical capacity issues including critical shortage of financial and technical resources to build adequate capacity at the national level for disaster risk.
management and disaster risk reduction continued to be a drag on CDERA (CDERA, 2006).

All the NDO representatives I interviewed lamented on the low statuses of their offices. Two representatives from St. Kitts and Nevis summed up the situation; what they said can be paraphrased as: “disaster coordinators have immense responsibility but no authority” (C. Herbert & P. Peets, personal communication, May 20, 2008). The St. Kitts and Nevis representatives suggest that national disaster offices should be located at no less than a Permanent Secretary level, which is a decision-making level in government (C. Herbert & P. Peets, personal communication, May 20, 2008). This would give the disaster offices more access to resources, important contacts with key government decision makers, and greater decision making autonomy. The national disasters coordinators have been lobbying for this, but it has not been met with the political approval to this date (C. Herbert & P. Peets, personal communication, May 20, 2008).

**DISPERSED VERSUS CENTRALIZED DECISION-MAKING**

**Decision-making at the CDERA CU**

The day-to-day operations of the CDERA CU clarify decision-making at the CDERA CU. The following description of typical CDERA CU meetings and decision makers at these meetings by the Deputy Coordinator of CDERA CU clarify multiple levels of involvement by internal and external stakeholders. This provides support for the argument that CDERA is generally tending towards more bureaucratization at the regional level.
The CU has a management team that is comprised of managers for the key areas of focus for delivery of the enhanced CDM strategy-preparedness, mitigation, response, recovery. The management team meets to “review policies and programs recommended by the CDERA Board and approved by the CDERA Council, map out the program of work, and examine the issues that could hurt implementation” (E. Riley, personal communication, May 27, 2008).

In addition to management team meetings, there are program management meetings chaired by the Director of Programs (E. Riley, personal communication, May 27, 2008). These meetings bring together all the program managers to examine implementation and operational issues in terms of meeting the goals, and project schedules. The program managers are responsible for overseeing all technical programming at the agency across all the technical areas; managers report to the Director of Programs (E. Riley, personal communication, May 27, 2008). The Director of Programs renders strategic guidance to the program teams and ensures that all the projects and programs are integrated with the general organizational mandate (E. Riley, personal communication, May 27, 2008). She guides work plan development and monitoring and evaluation and also has direct responsibility for some aspect of partnership management between the CDERA CU and international aid agencies and other key partners such as the university of the West Indies, Pan American Health Organization or International Association of Red Cross and Red Crescent (E. Riley, personal communication, May 27, 2008). The Director of programs reports to the CDERA coordinator.
There are also meetings held by special thematic groups that provide guidance to project implementation around the themes: mitigation policy and planning, hazard mapping and vulnerability assessment, and safer buildings (CDERA, 2009e). The function of the thematic groups include providing CDERA with expert policy and technical advice relating to the development, application and sustainability of project activities in the region; providing a forum for developing and renewing policies, practices and procedures for hazard mitigation; and building synergies and cooperation mechanisms with related projects and programs throughout the region (CDERA 2009b). The Special Thematic Groups meet and discuss sector issues in the context of disaster risk reduction. In addition to thematic group meetings there are staff meetings, twice or three times per year, and then there are unit meetings at regular intervals (E. Riley, personal communication May 27, 2008).

The heads of all these groups meet periodically with the CDERA coordinator, Mr. Collymore, to report on their progress in terms of meeting CDM objectives. In those meetings they also strategize on the direction the organization should take and on forging strategic linkages with organization that will help them to achieve CDERA’s mandate. The CDERA CU coordinator is the ultimate decision maker at the CDERA CU, in charge of operational decision-making. He reports to the CDERA Council and plans a program of action with the CDERA Board. These various levels of meetings and decision-modes highlight the increased bureaucratization of the CDERA CU, although conceived as a network. Consultation patterns between CU and NDOs support this observation.
Consultation Patterns Between CDERA CU and NDOs - Horizontal Versus Vertical Communications

The consultation patterns between CDERA CU and NDOs during disasters are more vertical than they are in-between disasters. During disasters, there are more formalized processes that must be adhered to by impacted territories to trigger the CDERA response mechanism described in chapter one. During disasters it is the prime minister who declares a disaster, with consultation from the national disaster coordinator and the national disaster committee. The prime minister formally petitions the CDERA CU for assistance and, based on this, the CDERA response mechanism is activated. Once the response mechanism is activated, it is the national disaster coordinator who works to coordinate activities at the national level and works in tandem with the CDERA CU to stabilize the disaster situation at the national level always keeping the prime minister and various ministers in-charge of the line ministries involved in disaster operations. The CDERA CU coordinates the international and regional support to impacted countries.

Between disasters, the relationships between participating member states and the CDERA CU are quasi-horizontal. Participating member state senior officers can contact CDERA directly for information and assistance (S. DaBrea & Z. McLean, personal communication, May 20, 2008). National disaster office staff at levels below the national disaster coordinator (NDC) must seek their boss’s approval before directly contacting the CDERA CU (M. Edwards, personal communication, May 16, 2008; J. DuBois, personal communication, May 19, 2008). For instance, the St. Lucia representative noted that there were structured and formal relationships between the CDERA CU and national offices in-between disasters. Issues are dealt with through formal written correspondence/letters,
proposals, and so on. Most of the contacts with CDERA CU are done through the
director, not the deputy director, unless the director is absent (J. DuBois, personal
communication, May 19, 2008). To ask for specific bits of information and guidance on
particular CDERA mandates, the deputy director of the NDO can and do call directly to
the CDERA CU deputy coordinator and program managers (J. DuBois, personal
communication, May 19, 2008). Board meetings and other CDERA CU sponsored
gatherings such as the annual conferences facilitate interactions and relationships
between national coordinators and other organizational representatives and the CDERA
CU staff (R. Jackson, personal communication, May 16, 2008).

Generally, national representatives who want to contact the CDERA CU do so
through the national disaster offices of the participating member states. However this
does not prevent specialized agencies country representatives (e.g., Pan American Health
Organization, Food and Agriculture Organization of the United Nations) from contacting
CDERA directly, after discussions with the national disaster office of their need to do so
(D. Gentles, personal communication, May 21, 2008). These agencies are also on the
national disaster committees of their respective countries and so are able to interact with
CDERA CU representatives at these venues.

**Decision-Making at the National Level**

The national disaster offices are organs of the state and are bureaucratic.
However, they do display some network relations, particularly in the areas of response
and planning. Decision-making at the national level are vertical. By that I mean the
decision maker is the minister in charge of disaster management, who then must report to
the prime minister, who is ultimately responsible for issues of national security and general welfare. All the CDERA national offices are part of national government bureaucracies of the participating member states. Of the sixteen NDOs, I found only nine are located in a top decision-making office, as I mentioned earlier in this dissertation; this group of NDOs are located in the Office of the Prime Minister, which is a cabinet level office, or in the office of the Governor in the case of British overseas territories (BVI, Anguilla, and Montserrat). The other NDOs are located in various line ministries such as Works, Water and Housing, Home Affairs/Labor and National Security or Civil Defense (Jones, Bisek & Ornstein, 2001).

This is an important point to consider because the NDOs’ position in the national government hierarchy either allows or denies access to resources. High level positions demonstrate the importance of disaster management to national governments and because of that resources are made available so that the agency can achieve its mandate. The reverse is also true. Many NDOs are so low down on the decision-making spectrum that they have great difficulty addressing resources and other capacity issues. The Dominica and Grenada NDOs are cases in point.

**Shared versus Owned Resources**

Generally the CDERA system is resource deficient. Resources in CDERA are dispersed throughout the CDERA system. The CDERA CU houses key technology such as communications in house. CDERA CU also house more donor funding and important technical expertise in response coordination, and access to a large pool of regional and international resources that are leveraged in response operations. The CU’s security
response and coordination mechanism is housed in the Regional Security System (J. Collymore, personal communication, May 26, 2008). Large scale simulation and training expertise is housed in agencies such as the US Southern Command. It is expedient to have resources housed in other agencies whose objectives require that they house these resources for several reasons. One, CDERA does not possess the financial means to access these resources because of its general economic context. Two, there are often large intervals between disasters and as a result large down-times in-between disasters. As such, owning all needed resources is not a good business practice –it is inefficient.

NDO house important mitigation technology, and temporary shelter facilities throughout many government agencies that form national disaster committees. For example, the department of works own heavy equipment and other response resources, University of the West Indies own mitigation infrastructure such as earthquake monitoring and mapping and the transportation ministry own pools of transportation equipment. However, most of CDERA participating member states are resource strapped and so depend on other CDERA members for resources and from international aid agencies and other countries outside the region for needed resources (R. Jackson, personal communication, May 16, 2008). This argument is discussed in detail in the chapter on Capacity.

**Free Information Sharing Versus Need-To-Know Information Sharing**

There is not a general statement that can capture information sharing across the CDERA system. Information sharing varies between and within the different levels of CDERA and between the regional and national levels. The flow of information between
the national and regional levels of CDERA shows free flowing information facilitated by a number of information exchanges tools. Since the start of the year 2000 CDERA CU has been documenting information including – various models, technical reports, decisions made at Board meetings, The CU has an online database of disasters, the documentation center can be accessed online. The decisions made by the CDERA council are relayed back to national disaster offices by the national disaster coordinator.

Within the CDERA CU itself, my observation during my research visit was that while general information about what CDERA does, and who to go to for specific information is available, there was an information disconnect between senior staff and junior staff about why certain things are done, how their work fit within CDERA’s overall mandate and general strategy issues. While the senior staff were familiar with the inner workings and the overall mission, junior staff were not. Junior staffers are like “worker ants” just doing their job and depending on senior staff for guidance and to make decisions affecting their work.

A similar situation obtained at the national level, which is highly bureaucratic, even though the offices are typically small. The level of information sharing varied from one NDO to the next depending on management style. For example, in offices like Jamaica there is a sense of subordination among junior staff, while in offices like St. Kitts and Nevis and the British Virgin Island there was more collegiality among staff. This might also be due to level of employment or perceived professionalism of staff by senior organizational members, which in turn impacted the willingness to share information.
High Versus Low Organizational Memory, Continuity

CDERA system has problems with organizational memory because the system is plagued by high attrition rates at both the regional and national levels of the CDERA system. The literature on organizations suggests that bureaucracy is better at storing information than networks are, and are more permanent. Bureaucracies are known to be good at retaining knowledge and information; they efficiently collate and store information because of their centralized processes. Bureaucracies, then, have high organizational memory. Networks, because of their decentralized nature and dissipative structures display low organizational memory.

Networks also generally have low rates of continuity because they tend to be goal driven. Once the goal is accomplished, the network arrangement might be dissolved. Bureaucracies are more permanent structures and their rate of continuity is higher. However, findings suggest that the regional level of the CDERA CU, which is a network, does a better job at collecting, documenting and storing information and knowledge than the national level does. This is because the regional level has better infrastructure to better manage the information capture process than the national level does. This issue is discussed in-depth in the chapter on organization learning.

DISCUSSION AND ANALYSIS

To What Extent Does Organizational Form Play a Role in CDERA’s Effectiveness?

Based on the foregoing discussions, I posit that organizational form does play a role in influencing the effectiveness of CDERA in important ways. Organizational form
affects the outcome that the organization seeks to achieve by impacting how it functions. Organizational form acts as a backbone and support for decision-making and other organizational processes (Organizationstructure.net, 2008). The NDOs that constitute CDERA have been configured as bureaucracies, even though the nature of their functions requires a more dynamic organizational structure. CDERA’s NDOs are not like government agencies that are built to handle routine tasks; they must handle tasks that are non-routine and complex in nature: disasters. While the NDOs can benefit from bureaucratic features such as command and control structures, they must be guided by a different logic than other organizations, because they are required to handle both routine and non-routine tasks. The organizational structure must facilitate agility of action, resource mobilization, coordination of resources, business continuity, mechanisms for institutional learning, and innovation to facilitate effectiveness.

We know that organizational form does matter in important ways when it comes to disaster management, but what might the optimal organization form for CDERA CU and its NDOs look like? How do we design each NDO to perform effectively? To answer these questions, several considerations must be made and constraints considered based on the goals of the enhanced CDM strategy and framework, which drives CDERA’s mandate.

THE GOALS AND PURPOSE OF ENHANCED CDM

A comprehensive disaster management system must consider policies, authorities, concept of operations, legal constraints, responsibilities, and emergency functions to be performed (DavisLogic, 2005). Mitigation and risk reduction are important components
of the disaster management cycle because they are geared toward preemptive action to minimize risks including damage and loss of lives from hazards. Mitigation measures involve sustained structural and non-structural action to reduce or eliminate long-term risks to people and property from the effects of natural and technological hazards (M. Edwards, personal communication, May 16, 2008). It involves building and structural engineering, regulation and codes in these areas, properly locating human settlement, and so on. Preparedness is preparing for response to disasters before they occur including training, exercises, and logistics. Response includes actions involved in responding to a disaster, and recovery is the process of returning things to normal after a disaster strikes.

My understanding of the role of disaster management agencies and the requirements of enhanced CDM leads me to conclude that there must be functional organizational areas and mechanisms in place as part of the bureaucracy to focus on each of these activities (mitigation, preparedness, response, and recovery operations) well in advance of a disaster and to integrate and operationalize the elements of CDM at the national level. There must also be networks to coordinate and integrate policies, standards and procedures during all stages of the disaster risk management cycle. Thus I propose that a combined organizational type consisting of both network and bureaucracy may offer solutions.

The functional part of the overall organization would identify areas and populations exposed to natural and man-made hazards and determine vulnerability, coordinate network of multidisciplinary actions for mitigation, prevention and preparation and response; mainstream mitigation measures, sensitize, train and inform people involved in the different stages of the disaster management cycle and to keep the
public informed. The functional areas of the NDOs would also form the core of a network; this node coordinates activities in preparation for a disaster and coordinates a team once a disaster occurs. These activities would involve multi-disciplinary teams from various sectors in government, private as well as economic subsectors, with varied expertise in mitigation, prevention and preparedness, response, recovery.

In the area of disaster prevention and preparedness National Disaster Coordinators must coordinate a multi-disciplinary, multi-agency team that will plan for evacuations, safety relocations, sheltering people and pets, transportation, contra flow of traffic, getting food and emergency aid to people affected, information, education, material provision, information management including a system of shared resources and media management. Preparedness coordinator should be assigned from the best suited member/members of the network to lead this effort.

In the area of response it is important to have a coordinator for international aid (timing, how aid delivered, to whom) to mobilize existing operational and logistics infrastructure and coordinate the various actors. This response team must have authority to act in critical situations and have the ability to call on other bodies and mechanisms if the needs arise. Information exchange is necessary for successful response given number of actors involved. Information exchange gives all players a panoramic view of situation on the ground, that they would not normally be privy to and thereby ensuring better response.

In the area of recovery technical and financial resources from governmental and international sources must be available and properly managed. Ooft and Jones (2006)
cautions us about the challenges of keeping teams in place once the critical activity of
response is over, because much of the visible and urgent tasks are over and deliberate
action is now required to restore the disaster areas to normalcy. Returning a community
to normalcy requires medium and long term planning that can be undertaken by different
working groups covering all the tasks needed. The bureaucratic part of the disaster
management mechanism is ideal for the long haul, when a number of routine events must
be conducted to restore normalcy. Recovery is a critical job for the bureaucracy that not
only involves planning, but reporting as well.

The network form of organization is also very relevant for integrating policies,
standards, and procedures during all phases of comprehensive disaster management
discussed above. However, the network must be coordinated for efficiency and
effectiveness. Therefore, to pull all the pieces and all the stakeholders of comprehensive
disaster management together there needs to be proper and efficient mechanisms in place
to manage them. Collaborative management mechanisms may be used for this.

“Collaborative Management is a concept that describes the process of facilitating
and operating in multi-organizational arrangements to solve problems that cannot be
solved, or solved easily by single organizations” (Agranoff & McGuire, 2003, p. 4).
Much of the work concerning comprehensive disaster management, especially response
involves collaboration between networks of actors. Collaborative decisions are typically
more effective because they take into account multiple perspectives and so networks can
more easily innovate to solve problems (Agranoff & McGuire 2003). Collaborative
management is done through networks, which are heavily interdependent and lack of
formal authority (O’Toole, 1997b). Further, not all organizations in the network are
routinely working towards the same goal. There are organizations in the network that are not necessarily working to achieve comprehensive disaster management, even though they indirectly contribute to this goal. So, while networks are excellent structures to deal with unpredictability in the operating environment and to facilitate resource access, not all members of the network have the same commitment to the goal of the chief disaster management organization, and none of the actors can force the other to do anything towards goal attainment. The commitment of the network members will vary depending of the nature of the problem to be solved and the resources needed (Axelrod, 1984; Comfort, 2005; Cigler, 2006). These are some of the reasons why the bureaucratic part of the organization structure is important for disaster management entities.

Kiefer and Montjoy (2006) find that in disaster management, networks are necessary, but they are often insufficient. They are useful for uncovering problems, but they typically depend on other organizations for implementation – they lack central authority and responsibilities are diffused throughout the networks. Yet, success in disaster risk management needs a central authority for functions such as reporting, monitoring, resource mobilization and policy action. Frequent exercises and wide publication of results can limit the disadvantages of a lack of centralized authority (Comfort 2005). These exercises test plans and capacity

*Degrees of Speed and Actions Required for the Comprehensive Disaster Management Cycle*

Many of the problems in disaster management are often unpredictable (Keifer & Montjoy, 2006). While mitigation, preparedness, and recovery require deliberateness, intensive planning and preparation, response usually requires quick, decisive, and
coordinated action. As Comfort (2002a) notes, these “extreme events demand resources and skills from a wider range of organizations than those in the immediately affected areas” (p. 30). In addition, thorough preparation is essential but difficult. Often preparation is impossible because of the scope of impacts and resource availability. These activities must be integrated throughout the disaster risk management system to ensure effectiveness; the results of planning and mitigation must be implemented for response to be successful. Plans are only as effective as the work of the implementing agencies that make them, but they too face constraints. To properly prepare for a disaster requires funds that are often unavailable and the movement of resources from tangible to often intangible initiatives that implementing agencies must accomplish. Very often, then, gaps in capacity might not be evident until a test is conducted - usually during the hazard impact (Keifer & Montjoy 2006).

**Funding and Other Scarce Resource Needs**

CDERA NDOs are a group of disaster management agencies that are situated in developing countries, where there are limited resources to undertake the necessary developmental initiatives. Typically while disaster management is considered important, it has to compete with more pressing issues of health care, debt servicing, education, infrastructure, and the like. These are more tangible and continuous events and needs. A disaster might occur or it might not in a given year or for several consecutive years. As such, often there are very little funds set aside for disaster risk management, and agencies have to scramble for resources in the event of a disaster; they are usually reactive, rather than proactive, which limits their effectiveness.
ORGANIZING FRAMEWORK NECESSARY TO BUILD EFFECTIVE NATIONAL DISASTER ORGANIZATIONS

Based on the foregoing considerations, as well as my findings on organizational form and the information I presented on Hurricanes Ivan and Dean, I will next consider what organizational arrangement might be best at the national level, given the CDERA context. Figure 9 presents the NDO organizing framework I propose.

Figure 9 shows the national disaster office as the central disaster office that facilitates the integration of activities and resources necessary for proper comprehensive disaster management from policy direction at the upper level to strategy support at the lower level.

Figure 9: Proposed National Organization Framework for Facilitating Effectiveness in CDM

Note: The framework is developed from the research findings on impact of organization form and position on performance of the CDERA system.
Policy Formulation and Integration

Policy formulation and implementation requires high level collaboration between government departments and other state and non-state actors. These collaborative efforts should be coordinated and managed by the NDO through a designated officer: “a national CDM Officer.” To ensure success in attaining the goals of CDM, policy integration must be built into different levels of the national disaster management system to ensure standards, procedures are implemented and monitoring and reporting are properly conducted. In addition, integration requires that all the components necessary for effectiveness must be integrated and aligned to the organizational goal. The lack of structural integration has remained a persistent issue for CDERA. The fact that the CDERA CU has no standing in how national disaster offices are operated accounts is a major cause for concern.

Figure 9 show possibilities for integration at CDERA participating member states. We can briefly assess the various levels of operation of the national disaster management system and then see how the roles would be integrated. In terms of policy direction, at the highest level of the national disaster management system, the Head of State with input from the national disaster coordinator and other CDM officer gives disaster risk reduction policy direction. The national disaster coordinator and the CDM Officer are high-level officials that have the ears of the Head of State and are able to see the full national picture of what is needed because they have the full range of information about the system. These high level officials, then, are able to set priorities for the national system and integrate learning and champion the cause of disaster risk management in
their respective countries. Strategic information collection, management and integration, and dissemination are essential and will be located at the policy integration level.

Below the chief decision-maker is the chief National Disaster coordinator, who would connect policy negotiation function and operations function. Operations should involve both state and non-state actors responsible for routine activities involved with mitigation and planning, as well as response and recovery.

CDM objectives are reflected in and supported at the national level by sector policies geared towards sustainable development. Policy formulation and integration facilitates inter-sectoral economic optimization and access to funding; supporting regulations and legislation because all persons are kept informed of when is needed, where the duplications and redundancies are, and how best to utilize resources. Policy Implementation/Strategy Integration involves synergistic inter-sector strategies like integrated CDM; financing and budget; sector strategies and plans that support CDM objectives. Strategy Implementation considers that CDM standards are integral parts of sector plans and operation. NDOs facilitate compliance supported by regulations for all the different players in the national sub-system. Operations/Strategy Support covers all the phases of the CDM cycle in all the sectors. Each sector has plans that integrate into the national CDM plan through the NDO. The NDOs also facilitates, planning, monitoring and reporting and data consolidation training between community, sector and national levels of operation. Every critical agency might have a disaster manager or focal point that liaise with the NDO on a frequently, prescribed basis for proper planning, mitigation and risk reduction.
Positioning NDOs for Effectiveness

Having first focused on practical aspects of policy attributes, mitigation, and response requirements from the vantage of the NDOs, we must address the issues of positioning of NDOs as well as accountability and compliance by other agencies (e.g. National Works Agency in individual countries) in the NDO system. As stated before, many of the NDOs are so low down on their national government hierarchy, that they cannot adequately access or direct the resources they need to build their capacity to achieve effectiveness. In addition, they are so far removed from key decision makers, that the heads of these NDOs rarely have a say in decisions that concern them, nor do they have authority to dictate the outcome of other agencies in the national disaster risk reduction system.

Trying to address the issue of positioning is a strategic endeavor and must be tied into larger developmental objectives such as the regional quest for sustainable development generally and achieving the results of the enhanced comprehensive disaster management strategy and framework more specifically. To reiterate, enhanced CDM 2007-2012 lists four priority outcome areas: enhanced institutional support for CDM program implementation at the national and regional level; effective mechanisms and programs for management and sharing of CDM Knowledge to be utilized especially for decision-making; mainstreaming disaster risk management in the key sectors of national economies; and enhanced community resilience to mitigate and respond to the adverse effects of climate change. The National Disaster Organizations are key partners in the achievement of these results, but they must be properly positioned.
A cabinet level position or other high positioned office with access to powerful
decision-maker such as the Head of State would be appropriate. The British Virgin
Islands (BVI) and Montserratian models come to mind. These offices are located in the
office of the Governor, who champions the cause of disaster risk management in these
territories, and ensures that the offices are properly staffed, and that the agencies are
autonomous enough, to be able to learn and innovate on their own. For instance, during
my interview with the National Disaster Director of the BVI, I found that the BVI
National Disaster Coordinator examines best practices from disaster risk management
agencies from around the globe; many of their plans are patterned off the South Africa
model. The agency also brings in sector leaders to strategize and develop plans for the
integration of disaster management in their respective sectors. On the political level,
politicians have given BVI NDO more authority to plan and to act, but require that results
be reported to Cabinet. For instance, government mandated to conduct a national
simulation exercise yearly, the results are sent to Cabinet. In addition, the BVI office uses
a grading tool assesses the state of readiness of each sector’s first response mechanism,
and then a score is assigned. This score tells you what is happening and the needs to
focus on for improvement.

CHAPTER SUMMARY
In this chapter we have discussed whether and how organizational form impact
effectiveness at CDERA. After examining the information collected I deduce that in the
CDERA context, organization form matters in important ways for CDERA effectiveness.
The network organizational form is good for response and planning, while the
bureaucratic features are good for preparedness, mitigation and response. CDERA’s mandate is to prepare for, mitigate, and respond to all hazards and focus on all phases from mitigation to response and recovery. I argue based on my findings that CDERA, an organization that handles and plans for non-routine events, must have a hybrid structure of a combination of network and bureaucracy to be effective. The degree of network or bureaucracy could not be specified from this research. Direct specification of network or bureaucracy needs computer modeling and derivation of organizational metrics to get at an answer, which is outside the scope of this research.

By itself, organizational form does not sufficiently predict effectiveness in the CDERA context. Better effectiveness can be achieved with a hybrid organizational form. It also depends on a better integration and alignment of the national and regional levels of CDERA and positioning of national disaster offices at higher levels in the national government bureaucracies. All these should be considered simultaneously. Effectiveness in the CDERA context is also contingent on available organizational capabilities and resources. I will examine these issues in the next chapter.
CHAPTER 6 FINDINGS AND ANALYSIS—ORGANIZATIONAL CAPACITY

What organizational capacity variables have been most influential on CDERA’s effectiveness? The following chapter is dedicated to answering this question based on the findings from my interviews and study of archival records and technical documents and reports. Based on my conceptual design (Figure 5), I will examine the components of capacity: leadership and staffing, financial resources, technical expertise, technology, and physical resources. My interviews reminded me that there were other components of capacity that should be considered in the CDERA context, but I did not include in my conceptual model. These additional components are integration and alignment and management for results. The increased emphasis on enhanced comprehensive disaster management (enhanced CDM) by CDERA in recent years made these two necessary components, as I discuss below. Organizational capacity depends very much on context. In the context of disaster management, organizational capacity is a combination of all the strengths and resources that can reduce the level of risk or the effects of a disaster and that are available not only within the organization, but also within related communities and society in general or organization (International Strategy for Disaster Reduction, 2009). I examine each of the capacity components noted in the conceptual model in the following sections.
FINDINGS ON THE CAPACITY COMPONENTS OF THE CONCEPTUAL MODEL

Leadership

Ingramah, Joyce and Donahue (2005) proffer that sound leadership contributes to management effectiveness in two important ways: “It influences each management system independently by setting priorities and influencing certain activities; and it marshals these systems to operate as elements of a coherent and cohesive administrative framework” (p. 17). The authors note that the notion of vision is important because it frames the organization’s mission and the consequent goals and objectives. Leadership then is important to attain the organization’s goal(s) in the context in which organization operates. To properly assess the importance of leadership in CDERA we must view it in the contexts of the CU and the NDOs—the two different levels of operation that are integrated at the Board level within the CDERA system.

Leadership at the CDERA CU: Experience and Training

The CDERA CU Coordinator is the Agency’s chief administrative officer (CDERA, 2009c). The agreement establishing CDERA outlines the roles of the Coordinator. The Coordinator appoints a Deputy Coordinator, who should have experience in emergency management. The Coordinator establishes the terms and conditions of service of the staff of the Coordinating Unit, subject to the approval of the Board of Directors (CDERA, 2009c). The agreement establishing CDERA calls for someone with practical experience and necessary training in disaster management to be appointed as the Coordinator. The current Coordinator has nearly thirty years of academic and practical disaster management experience; he has served as in this capacity
since CDERA’s inception in 1991 (J. Collymore, personal communication, May 26, 2008; A. Mullings, personal communication, May 15, 2008). He has a Master of Science in Environmental Management and ABD in Environmental Management from Virginia Tech. The Coordinator spoke at a number of international conferences on disaster management and wrote on a number of topics in disaster management (J. Collymore, personal communication, May 26, 2008). He has also done several technical papers on various topics on mitigation planning and on improving the quality of disaster management. These qualifications seem to be in line with the requirements of the Caribbean Community agreement establishing CDERA (the Agreement). As per the Agreement, in performing his duties, the coordinator shall not receive instructions from any participating state governments or use sources external to the agency, thereby establishing the autonomy of the agency (CDERA, 2009c).

Based on the agreement establishing CDERA the CDERA Coordinator appoints the staff of the coordinating unit including a Deputy Coordinator always ensuring “highest standards of competence, efficiency and integrity” (CDERA, 2009c). It is the CDERA Coordinator who controls the terms and conditions of the services of the CDERA staff. The current Coordinator leads a team of four senior managers at the CU, each with at least five years of experience in disaster response and management with technical background in the physical sciences, such as geography, physical planning, and geology (E. Riley, personal communication, May 27, 2008). CDERA’s leadership is diffused among the sixteen national disaster coordinators at the state level who make up the CDERA Board.
Leadership and Vision

It is important for CDERA to have a vision, because it frames the organization’s mission and the consequent goals and objectives. Some of my interviewees said that they saw the Coordinator as visionary in strategically moving the system to focus on prevention and mainstreaming disaster risk reduction and linking its outcomes to the goal of sustainable development in the region (R. Jackson, personal communication, May 16, 2008; C. Herbert & P. Peets, personal communication, May 20, 2008).

The Coordinator realized early that to deliver on the regional goal of sustainable development through disaster risk reduction, CDERA had to do a number of things. First, CDERA had to integrate all aspects of the disaster management cycle and make this integration a goal of the organization; then it had to manage for results (J. Collymore, personal communication, May 26, 2008). Next, CDERA had to be able to attract funding. Since the countries of the region are strapped for cash, CDERA had to be creative in sourcing funding to deliver on its objectives by aligning itself with international agreements. Also, as part of the integration, mission and name had to be aligned. So, a name change has been proposed to realign it to the agency’s new focus on comprehensive disaster management and goes into effect September 1, 2009 (CDERA, 2009f). The organization will soon be called the Caribbean Disaster and Emergency Management Agency (CDEMA), as discussed earlier. CDERA considers the name change necessary. My interviewers noted that it was problematic to formulate and adapt the vision and strategy for of CDERA in part because of the staffing problems throughout the system. The CDERA CU itself is plagued by high attrition rates, not only among rank and file staffers, but also among top managers. For instance, during my interviews I learned that
in the last seven years there have been at least four changes among top managers (E. Riley, personal communication, May 27, 2008; D. Gentles, personal communication, May 21, 2008). The Coordinator, Mr. Collymore, believes that having to constantly grapple with filling vacant positions distracts him from the bigger issues of advocacy, visioning and positioning the agency to receive funding and gain traction in its mandate (J. Collymore, personal communication, May 26, 2008).

**Leadership of NDOs**

Leadership development is needed not only at the top levels of CDERA, but also in the NDOs of the member states (CDERA, 2006; Jones, Bisek & Ornstein, 2001). The National Disaster Coordinators themselves see a serious deficit in leadership capacity at the national level because of the high attrition rates among those who occupy leadership positions (D. Gentles, personal communication, May 21, 2008; J. Thomas, personal communication, May 21, 2008). The problem with attrition among the leadership corps is most serious.

Three key issues were cited by the interviewees as the causes of the shortcoming in staffing the senior levels of national disaster office. One, the agency that does the recruitment, the Public Service Commission is usually very tardy in filling vacancies, taking years at many times to fill necessary positions (P. Mullin, personal communication, May 19, 2008; M. Edwards, personal communication, May 16, 2008). Two, sometimes unqualified candidates are selected, primarily for political reasons, and this results in the recruitment process having to be repeated a short time later to find qualified candidates (P. Mullin, personal communication, May 19, 2008; J. DuBois, personal communication, May 19, 2008). Three, the positions in national disaster offices
are not seen as glamorous as those in the Ministries of Finance, Education, or Foreign Affairs; therefore, qualified candidates are not attracted to them in the first place (P. Mullin, personal communication, May 19, 2008; J. Thomas, personal communication, May 21, 2008).

National Disaster Coordinators often come to their posts without formal disaster management training or experience; they tend to learn on the job or are brought in from other NDOs around the region once trained, leaving leadership gaps in the NDOs they left (H. Prince, personal communication, May 21, 2008; J. Thomas, personal communication, May 21, 2008). The leadership deficit problem lies in the fact that once the National Disaster Coordinators develop their disaster management expertise and attain some national or regional visibility, they are co-opted by other more prestigious positions in government or politics (C. Herbert & P. Peets, personal communication, May 20, 2008; H. Truitt, personal communication, May 19, 2008; P. Mullin, personal communication, May 19, 2008).

The dearth of people in leadership roles is compounded by a system-wide lack of succession planning. Only 25% (four of the 16) of the national disaster offices had any kind of succession plans when I conducted the interviews or studied the archives. The CDERA CU itself did not have a formal succession plan. The leadership deficit in the NDOs is also impacted by the movements of political appointees between agencies when governments change. For those National Disaster Coordinators located high up in the government bureaucracies, for instance the ones in BVI and Bahamas, the end of a governing/election cycle could mean replacement of the entire leadership in their NDOs (E. Arthurs, personal communication, May 19, 2008; P. Mullin, personal communication,
During the time of my interviews (summer of 2008), the Bahamas national disaster coordinator had just been appointed and the Dominica and Turks and Caicos coordinator positions were vacant (J. Thomas, personal communication, May 21, 2008; J. Collymore, personal communication May 26, 2008; E. Riley, personal communication, May 27, 2008). By the time of writing this dissertation (spring and summer of 2009), the Trinidad and Tobago leadership position had become vacant, Montserrat’s National Disaster Coordinator had moved to Turks & Caicos, and a new National Disaster Coordinator was hired for Dominica. These are just a few examples of the fluidity in the leadership positions in disaster management organizations in the Caribbean. Such fluidity leads to a persistent organizational capacity deficit.

An Assessment of Leadership Issues

One can see in the above descriptions that CDERA faces significant challenges in the area of leadership. The leadership problems at both the CU and NDO levels are important; nothing can be accomplished without input and work of national disaster offices and the national disaster coordinators that run these offices. At the national disaster offices there are significant leadership deficiencies that the CDERA CU cannot remedy, because the CU has no standing in the national governments. The national disaster offices are parts of the national government bureaucracies and responsible to them. The relations between the CU and NDOs are based on an agreement that does not allow the CU to exercise authority over the state NDOs, nor does it allow state governments to influence the CU. This arrangement is problematic because it limits the CDERA CU’s influence over its outcome since the CDERA CU/NDO arrangement cannot dictate what happens at the national level. I noted in the beginning of this section,
in reference to Ingraham, Joyce and Donahue (2005), that leadership influences all the components of a management system (e.g., finances and staffing/HR) by setting priorities and influencing certain activities and marshals these components to operate in a coherent and cohesive framework. My findings at the regional level substantiate these claims. However at the national level there remains a leadership gap at CDERA.

The gaps in leadership throughout the CDERA system are also reflected in gaps at the staffing levels. All interviewees reported that the CDERA CU lacks the human resources necessary, particularly the technical competence needed, to support the NDOs of the participating member states. This issue is discussed in some detail below.

**Human Resource Management: Staffing the CDERA CU**

The CDERA CU has a staff complement of 10 core full-time employees, whereas the CDERA CU leadership estimates that at least 40 core full-time employees are needed (E. Riley, personal communication, May 27, 2008; J. Collymore, personal communication, May 26, 2008; P. Mullin, personal communication, May 19, 2008). This lack of human resources has persisted in CDERA since its inception (Jones, Bisek & Ornstein, 2001; CDERA, 2006). The CDERA CU has mitigated this deficiency by developing projects funded by international aid agencies and other foreign developmental partners. Project funding serves a dual role: it finances critical initiatives that contribute to the goal of enhanced CDM; and it brings in needed manpower to help CDERA carry out its mandate (J. Collymore, personal communication, May 26, 2008).

While this use of projects to facilitate delivery of the agency’s objectives provide some relief to the staffing shortage at the CDERA CU, national disaster coordinators see
this as an undesirable solution because projects are terminated at some predefined point leaving gaps in the CDERA delivery system (J. Thomas, Personal Communication, May 21, 2008; E. Riley, personal communication, May 27, 2008).

Staffing shortages plus skills and experience gaps also persist in the national disaster offices. National disaster coordinators report that their offices are staffed by persons not trained in disaster management and that their offices are used largely as the dumping grounds for mediocre civil servants (P. Mullin, personal communication, May 19, 2008; J. Thomas, personal communication, May 21, 2008). The staffing issues are compounded by high attrition rates among employees who eventually developed disaster management expertise via the national disaster offices and CDERA (P. Mullin, personal communication, May 19, 2008). The CDERA CU Coordinator and Acting Coordinator noted that because of the relatively low remunerations they could not compete with other regional civil society agencies that are more visible and resource rich, such as Pan-American Health Organization, Caribbean Development Bank, and the Food and Agriculture Organization (E. Riley, personal communication, May 27, 2008; J. Collymore, personal communication, May 26, 2008). The Acting Deputy Coordinator E. Riley suggested that greater emphasis had to be placed on human resource management strategies that would address these problems in order to stem the high attrition rates (E. Riley, personal communication, May 27, 2008).

**An Assessment of Human Resource Management Issues**

The lack of staff at the national level and staffing gaps in the CDERA CU bring into sharp focus the fear of what would happen in the event of another multi-island disaster, such as Hurricane Ivan. Hurricane Ivan proved that inadequate numbers and the
lack of required skills impacts CDERA’s performance negatively. As a result of Hurricane Ivan, arrangements were made to shore up emergency operational response staffing by using the CARICOM Disaster Reduction Unit (CDRU). It is easier to fill emergency staffing needs than to fill long-term operational needs. In emergency situations personnel from the CDRU could be called out to staff up to four emergency operation centers (EOCs) if needed (J. Collymore, personal communication, May 26, 2008; E. Riley, personal communication, May 27, 2008; E. Arthurs, personal communication, May 24, 2008). The CDRU was deployed during Hurricane Dean. Over a long term period, strategic staff capacity has remained a problem in CDERA. Staffing national disaster offices is even more problematic than staffing the CDERA CU. The current human resource pool in all the sixteen member states remains woefully inadequate.

**Financial Management**

Financial management capacity has to do with how to leverage and utilize scarce financial resources to generate management capabilities and resources and reduce cost (Ingraham, Joyce & Donahue, 2005). Each participating member state contributes to CDERA’s administrative costs and the regional Emergency Assistance Fund (J. Collymore, personal communication, May 26, 2008). However, some countries do not pay over their contributions on time. This delinquency results in the CU being in a constant state of trying to source funding to implement its initiatives.

According to the CARICOM agreement establishing CDERA, member state contributions are determined with the use of an assessment scale designed by the CDERA
Board of Directors and approved by the CDERA Council (J. Collymore, personal communication, May 26, 2008; CDERA, 2009c). As per the Agreement, budget contributions are to be used to defray ordinary expenses needed to operate the entity (CDERA, 2009c). Some member state governments face competing and pressing internal needs, including providing for healthcare and education. As a result, they either do not pay their contributions to CDERA CU or are behind on their payments (R. Jackson, personal communication, May 16, 2008). This means that the CDERA CU is often strapped for cash and has to find creative ways to fund initiatives. Being aware of this situation, CDERA has pursued a strategy of collaboration with national, regional, and international partners since its inception (E. Riley, personal communication, May 27, 2008; D. Gentles, personal communication, May 21, 2008; A. Mullings, personal communication, May 15, 2008). In fact, international aid agencies and private sector organizations provide approximately 90% of CDERA’s programming budget (CDERA 2008). This means that over 60% of the overall CDERA CU staff is paid by donor funds through projects (J. Collymore, personal communication, May 26, 2008).

International aid agencies see the CDERA CU as being able to provide a better return on their investment than individual states are able to (Y. Chakallal, personal communication, May 25, 2008; USAID representative, personal communication, May 21, 2008). The United States Agency for International Development Office for Disaster Assistance (USAID OFDA) Director for Latin America and the Caribbean noted: “When a regional organization like CDERA talks, donors will listen more than when a single country talks about something” (USAID representative, personal communication, May 21, 2008). The CDERA CU is seen as being able to leverage funding to help more people
than a single country can. This means that country-specific needs are subordinated to the
needs of the entire system. Subordinating the country-specific needs to those of the entire
system matters, because, without international assistance, national level disaster
management remains largely an unfunded mandate in many of the CDERA member
states. The entire system suffers as a result, because the relationship between national
level preparation and system-wide outcome is circular. In other words, the system is as
strong as its weakest component.

Because of the heavy donor financial involvement in funding CDERA,
international aid agencies are very influential in the direction the organization takes. For
instance, the Canadian International Development Agency (CIDA) was instrumental in
getting CDERA to institute the enhanced or results-based approach to Comprehensive
disaster management (CDM). The CIDA officer in charge of disaster management and
economic competitiveness noted that before enhanced CDM, many projects were being
funded without concrete evidence of their accomplishments (Y. Chakallal, personal
communication, May 25, 2008). International Aid Agencies are also becoming fatigued
with funding the same efforts over and over (Y. Chakallal, personal communication, May
25, 2008). Currently, in order to reduce such duplications, improve results, and increase
the returns on investments, CDERA is establishing the Coordination and Harmonization
Council, in partnership with international aid agencies and other sector partners. The
heavy reliance on donor funding to carry out the mandate of CDM leaves the CDERA
CU and the member states very vulnerable to external shocks. When the donor country
economies are struggling, CDERA risks losing much of its funding and would be hard
pressed to accomplish its objectives (E. Riley, personal communication, May 27, 2008; J. Collymore, personal communication, May 26, 2008).

At the national level, a few of the CDERA member states have resorted to creative means of generating funding. Jamaica, for instance, rents out emergency relief supplies, like tarpaulin and chairs, to offset some of the operating expenses of its NDO and to generate enough income to undertake projects that strengthen its goal for CDM (R. Jackson, personal communication, May 16, 2008).

In addition, in collaboration with the governments in the Caribbean, the World Bank and other international aid agencies has developed a regional disaster insurance facility to help with the reconstruction efforts once a disaster hits. At the moment, the Caribbean boasts the world’s first regional risk insurance facility: the Caribbean Catastrophe Risk Insurance Facility (CCRIF). The CCRIF was launched in June 2007, at the start of the Atlantic Hurricane Season. The CCRIF is one of the ways the Caribbean region has begun to take a proactive stance against natural disasters (Mottley, 2008). The CCRIF is a parametric insurance facility, registered in the Caribbean for Caribbean governments. It insures governmental risks and is designed to limit the financial impacts of catastrophic hurricanes and earthquakes to Caribbean governments by quickly providing short term liquidity in the event of a disaster (Caribbean Catastrophe Risk Insurance Facility, 2009). In February 2007, at a World Bank hosted donor conference, a total of US$47M was pledged to the CCRIF by Canada, France, UK, the World Bank, and the Caribbean Development Bank (Caribbean Catastrophe Risk Insurance Facility, 2009). By pooling their risk, the governments of CDERA member states have saved approximately 40% since June 2007 on what each government would have paid had they
negotiated individually through commercial insurance markets (Caribbean Catastrophe Risk Insurance Facility, 2009).

Although it is a good start, the CCRIF is still not adequate to reduce financial exposure of the region should a disaster strike. E. Riley, acting Deputy Coordinator of CDERA, would like to see the creation of a national emergency fund in each participating member state so that if the country and the CDERA CU do not have to go begging once a disaster occurs (personal communication, May 27, 2008). Moreover, not only the response budgets of the member states, but also their disaster planning and mitigation budgets must be integrated into national budgets, notes Ms Riley (personal communication, May 27, 2008). Currently different approaches to financing are used to the needs of the different stages of comprehensive disaster management. This means that sometimes some areas of comprehensive disaster management, (particularly mitigation, might be overlooked for more obvious ones, like response to disasters; this makes the objective of effectiveness in disaster management in CDERA elusive.

Given the financial context of CDERA as described above, necessary financial management capabilities must include attracting and managing donor funds, expense reduction where possible, and resource generation by leveraging other resources including network members. It must also include establishing and managing disaster insurance and response funds. Once these are in place, they will have to be integrated and aligned with the regional goals of comprehensive disaster management and integrated into national budgets. Financial management is obviously important; –without financial resources, other necessary capabilities cannot be obtained. In that regard, a key capability
is the ability to design and implement financial strategies that help CDERA to respond effectively to the demands of comprehensive disaster management.

**Information Communication and Technology (ICT) Infrastructure Management**

Information and Communication Technology (ICT) management can be defined as the management of software, information, tools, and related resources that build the ICT infrastructure for an organization’s development and operation (IT Infrastructure Library, 2008). Acquiring and launching ICT is a cross-cutting theme in CDERA’s 2007-2012 CDM Strategy and Programming Framework. As such, ICT is an important part of all CDERA programming. Yet acquiring ICT technologies remains a significant challenge in the region, especially because of high cost of the ICT infrastructure and steps and resources necessary to ensure its reliability (CDERA ICT, 2008). According to A. Cook (personal communication, May 24, 2008) information from the CDERA 2006 audit shows that there is insufficient use and sharing of information technologies both at the regional and national levels of CDERA.

In a 2006 report to the Organization of American States Inter-American Network for Disaster Mitigation in Santa Cruz, Bolivia, a CDERA representative discussed CDERA’s technology issues. The issues included limited or weak ICT infrastructure within NDOs, embryonic common standards for use, limited investment in infrastructure maintenance and upgrading, misalignment between ICT systems and decision-making infrastructure, and infrastructure incompatibility (CDERA, 2006). These deficiencies in technology in CDERA have not significantly changed since 2006 and continue to hamper the organization’s effectiveness, not only in response, but in all phases of the disaster.
management cycle. What transpired during Hurricane Ivan is a classic example of CDERA’s technology deficit and how that impacts performance.

After Hurricane Ivan impacted Grenada in September 2004, a CDERA Field Assessment Report dated September 15, 2004 showed that the slow pace of the relief efforts were due in large part to the “pace of relief operations, the continued lack of effective communications and environmental health issues” (CDERA, 2008c, p. 3). Internal communications was noted as a major challenge limiting contacts between the island’s Emergency Operation Center (EOC) and its emergency relief teams in the field, and between airport and seaport and communication with the public. Abrehart (2004) confirms that in the aftermath of Hurricane Ivan limited communication was available. He notes that at the time of the disaster, the CDERA CU tried to mobilize 100 handheld VHF Short Range Radios, three repeater stations, and 7,000 wind-up radios or solar powered AM/FM radios for general distribution. These are basic necessities for disaster management operations. In addition, Abrehart states that all the radio antennae and communications towers were down on the island. As a result the government of Barbados directed the Caribbean Broadcasting Corporation, located in Barbados to expand its 900 AM service to Grenada so that the general population could learn about what was happening in the country (Abrehart). Radio Tambrin of Tobago on 92.2 FM also broadcasted to Grenada (Abrehart).

In his reflection on the agency’s performance during Hurricane Ivan, Mr. Sylvan McIntyre, then the director of the NDO in Grenada (National Disaster Management Agency in Grenada, or NaDMA), suggests that communications was a major deficiency of his system (CDERA, 2005). For instance Mr. Sylvan McIntyre notes a lack of
communication between key players in disaster response: emergency management services, police, fire, ambulances, government ministers, and service organizations (as reported CDERA, 2005, p. 1). Also, there was no search and rescue equipment. Post Hurricane Ivan, CDERA teamed up with the Canadian International Development Agency (CIDA) to fix some of these technology deficiencies (Y. Chakallal, personal communication, May 25, 2008).

Among the CDERA membership, technological capacity varies widely. The information and communication technology capacities in Antigua, Jamaica, Montserrat, and BVI are ahead of those in other member states. Because of its ongoing volcanic eruptions, Montserrat now has in place the region’s only early warning system, where sirens trigger response broadcast into certain radio stations (H. Truitt, personal communication, May 19, 2008). The island also has in place clock radios that make an alarm if there is an emergency, turn on the radio automatically to inform citizens of the situation, and scroll a message across the screen (H. Truitt, personal communication, May 19, 2008). Montserrat boasts a communications center equipped with VSAT radios for uninterrupted communications and earthquake monitoring. The communications center on the island was built to withstand a category-five hurricane (H. Truitt, personal communication, May 19, 2008). The center has stand-by generators that are linked to the island’s hospital’s two KV8 generators. These technologies were tested on July 7, 2008 in conjunction with the French-Caribbean territories to work out the kinks (H. Truitt, personal communication, May 19, 2008).

R. Jackson, Jamaica’s National Disaster Coordinator, believes that Jamaica is ahead of the other CDERA member states in terms of the technology it has to facilitate
proper handling of disaster (R. Jackson, personal communication, May 16, 2008). The island has a well developed military and police force and technological systems that facilitate advanced telecommunications, earthquake monitoring, hazard mapping, and geographic mapping (GIS) systems located at the University of the West Indies (R. Jackson, personal communication, May 16, 2008). Jamaica has one of the oldest disaster management systems in the regions and so has developed some of the technologies it needs.

The British Overseas Territories (Turks & Caicos Islands, Montserrat, Anguilla, and the British Virgin Islands) benefit from the resources from Britain and so can afford to buy the technologies they need (S. DaBreo & Z. McLean, personal communication, May 20, 2008). The other CDERA participating member states lack resources, because they have to forego many of the technologies needed for more pressing needs. For Instance, St. Kitts and Nevis cannot provide inter-island communications coverage for its two islands of 35,000 people; instead the NDO relies on the very good cellular phone coverage to spread needed news about pending hazard impacts (C. Herbert & P. Peets, personal communication, May 20, 2008). These cellular telephones can be used to send out early warning messages to residents. However, using cell phones to send out emergency messages suffers from a lack of sequencing and integration as the CDERA arrangement with Digicel corporation cellular phone service provider shows (C. Herbert & P. Peets, personal communication, May 20, 2008). Sometimes one message would be going out at the same time another is being received causing the system to be ineffective (C. Herbert & P. Peets, personal communication, May 20, 2008). In addition, it is imperative to integrate communication for special needs individuals into this ICT system.
This integration has not happened to date and the ICT systems in some CDERA participating member states remain inadequate.

The CDERA CU has conducted targeted interventions, mainly using project funds obtained from international aid agencies, to fill the persistent gaps in ICT technology. An example of this is the European Development Fund project that will bridge some of the ICT gaps and push for compatibility across countries (USAID representative, personal communication, May 21, 2008). United States Agency for International Development is also working with CDERA to implement an early warning system in the Region (USAID representative, personal communication, May 21, 2008). In addition, the CDERA/International Development Research Center of Canada ICT project scheduled to start February –October 2008 will identify and test innovative ICT applications that will enhance disaster management effectiveness in the region (CDERA, 2008d). This project will focus on national notification protocols within early warning systems, the application of ICTs for harnessing and sharing communications knowledge, and for collecting and supporting the collection of post impact information (CDERA, 2008d).

In the area of mitigation, CDERA has secured funding from the Japanese and the Canadians to build a number of ICT-based tools to help reduce disaster damage through hazard mapping (Ally, 2004). In the Caribbean Disaster Management (CADM) project, Japanese experts in flood management, community disaster preparedness, and GIS mapping worked with CDERA to develop hazard maps (Ally). The Caribbean Hazard Mitigation Capacity Building Program (CHAMP), funded by the Canadian International Development Agency (CIDA) developed multi-hazard maps for four pilot countries. The maps are then included into a database searchable by country problems. Ally notes that
these maps will then be built into a geographical information system that will include information about infrastructures, water ways, and other topographical features.

In addition to building the technological capabilities of the CDERA member states and the CDERA CU, several of the national disaster coordinators I interviewed expressed doubt that the current ICT staff at the CDERA CU was capable of supporting the CDERA CU mandate (personal communication, May 2008). CDERA now has in place an ICT committee that is studying the need for including GIS technologies in their ITC. The committee suggests that multiple ICT media are needed, not just GIS, as CDERA CU seems to be emphasizing (Ally, 2004). The committee suggests that there is a need for remote sensing capabilities, Ham radios, SAT radios and phones, Cell Broadcasting, Hazard Mapping technology, upgrading early warning systems are also necessary for member states to be effective (Grosvenor, 2002; Ally 2004). Information released by CDERA on February 1, 2008 noted the focus on enhancing the use of information and communications technologies in regional disaster management as a priority for the new CDM Coordination and Harmonization Council (PreventionWeb, 2008).

As CDERA looks to advance its comprehensive disaster management strategy and help to build sustainable development in the region, the importance of the information and communications technology cannot be overemphasized. There needs to be integrated communications platforms across the region. Integrated communications platforms would be good to coordinate response efforts during multi-island impacts, or just to inform the other territories of the destruction in the other territories and how they can help. Important also is the need for a system-wide public media network that would prioritize
disaster broadcast, but would not solely be dedicated to disaster broadcasting thereby leveraging its usefulness. CDERA is heavily dependent on a web-based approach to boost its ICT capacity and is depending on project grants to build its ICT infrastructure. So far a number of these projects have already been funded.

Technology plays an important role in disaster management. However, CDERA’s limited ICT resources are threatening achievement of its comprehensive disaster management goals as Hurricane Ivan clearly showed. Because of the important role that ICT plays in disaster management and given that the region’s stretched resources cannot often extend to acquiring needed technologies, the job of the CDERA CU must include a focus on accessing best practices in technology access and management as well as multiple use technology and propagate these across the region. The objective would be to create a variety of technologies in different locations across the region that can then be integrated and align for effectiveness. For best results, the integration of these technologies should be seamless across the region.

**Physical Resources: Capital Management**

Capital management involves the management of physical plants and infrastructure that support disaster management work. The facilities that house the NDOs in the CDERA member states are small, and many need refurbishing. The building that house some national disaster offices in Grenada, for example, cannot withstand the impact of a category-three hurricane or a moderate earthquake and as such cannot effectively support response efforts. The NDC of Antigua expressed concern that the rented building that houses his office may not be able to withstand a level two or higher
impact (P. Mullin, personal communication, May 19, 2008). During Hurricane Ivan the EOC in Grenada was destroyed and had to be relocated (CDERA, 2005). Around the region, the disaster management offices are often rented spaces and they were not designed to support emergency management operations (P. Mullin, personal communication, May 19, 2008). As such, the buildings do not have facilities needed such as high capacity generators, modified structure to support “all hazards,” or adequate ICT infrastructure. Take the Jamaican national disaster office as an example. Based on my own observation, the NDO in Jamaica is in shoddy condition and cramped for space. The library is insignificant to facilitate research, some documents cannot be found, and the ceiling is falling in at some places, although on the outside the building appears to be sound.

CDERA’s role in this regard is to set certain minimum standards for physical structures to be used around the region. This is important for business continuity during a disaster and effective response. As the coordinator of Antigua’s national disaster office contends in his interview, “we cannot just rent a building without assessment of adequacy for the disaster office” (P. Mullin, personal communication, May 19, 2008).

When assessing physical infrastructure, Ingraham, Joyce and Donahue (2005) caution us to evaluate the mission implications of adequate physical infrastructure. CDERA has received many reminders of the important need to conduct such evaluation exercise, including Hurricane Ivan, but it is yet to systematically address this issue.
Technical Expertise

The term technical expertise is used here to mean the availability of the skills and theoretical knowledge in the area of disaster management and disaster risk reduction. CDERA’s technical expertise capacity involves having a pool of human resources with the expertise necessary to prepare for, mitigate, respond to, and recover from disasters. Part of CDERA’s mandate is to improve the technical capacity of its member states (CDERA, 2005). Currently, much of the technical expertise CDERA needs is lacking for a number of reasons, including the brain drain from CDERA and the countries of the region. CDERA has had to repeatedly rebuild the critical areas of expertise required to function. Much of the technical intervention is done through projects funded by international aid agencies (D. Gentles, personal communication, May 21, 2008). To specifically target improvements in its technical expertise, CDERA offers a number of on-going training activities to NDO staffs, conducts simulation exercises, and collaborates on projects with key stakeholders from which knowledge is transferred back to CDERA. The need to build and keep technical expertise continues to be of pressing concern for CDERA, which finds itself in a place where it cannot compete with other regional bodies with more resources and prominence than CDERA (E. Riley, personal communications, May 27, 2008; P. Mullin, personal communication, May 19, 2008). As a result, CDERA often loses much of its human resources and the expertise that they possess to the more prominent and resource rich organizations (P. Mullin, personal communication, May 19, 2008). Against this background, technical expertise remains CDERA’s Achilles heel when it comes to building its effectiveness.
On-going Training

Many of CDERA employees come to the job without specific disaster management experience or expertise. Further, much of the training in CDERA member states tend to be confined to a few individuals, instead of a broad mass of national staff. Wary of this situation, CDERA conducts continual training in handling of radios, sending and receiving messages, the use of Satellite telephones, how to put together situation reports, working with the media, running an emergency operation center, and project development (E. Arthurs, personal communication, May 24, 2008; H. Truitt, personal communication May 19, 2008). The changes in CDERA’s name and mandate that are under way will bring with them a focus of broad capacity development throughout CDERA (CDERA, 2009f). Take, for example, CDERA’s annual Web-based training in operating an emergency operations center. In this training exercise, individuals learn and practice how to run Emergency Operations Centers (EOCs) using computer simulated scenarios. These types of exercises were adapted from the planning of the 2006 World Cup Cricket competition in the Caribbean (E. Arthurs, personal communication, May 24, 2008). The United States Agency for International Development Office of Foreign Disaster Assistance also sponsors management training for national disaster coordinators (E. Arthurs, personal communications, May 24, 2008).

CDERA’s top leaders have realized that it needs to focus on building its technical expertise and they have put a number of programs in place to do that. The continued problem that CDERA faces is whether, once trained, it is able to keep at CDERA the human resources necessary to build its technical expertise for effectiveness.
Simulation Exercises

Much of CDERA’s technical expertise has been built through simulation exercises. Four different levels of simulation exercises have been used (J. DuBois, personal communication, May 19, 2008). The first level consists of briefing exercises. In briefing exercises all the key players—police, health, fire, customs, and the disaster office—are involved in the debriefing. Here participants are presented with a scenario, for example a pandemic flu, and asked how they would solve a particular problem. In their response they must take into account all the resources they would need. The second level is the table-top exercises. In these exercises, participants already know the disaster management plans and are assigned different functions to carry out during a disaster. During the tabletop exercises the participants discuss the plan in its entirety to ensure that each knows what is required of them in the event of a disaster. At the third level there are functional exercises and drills. For instance, there might be a fire drill, an evacuation drill, search and rescue drill, or an Emergency Operations Center (EOC) exercise of shuttering buildings in preparation for a hazard impact (E. Arthurs, personal communication, May 24, 2008). At the fourth level full scale exercises are conducted, where all the different aspects of the exercise are integrated and practiced (E. Arthurs, personal communication, May 24, 2008). Belize had a full-scale simulation at the end of May 2008, fifteen days prior to the start of the hurricane season. The exercise was initiated based on the activation for Hurricane Bonzie, a category-five storm (E. Arthurs, personal communication, May 24, 2008). All the NDO committees across the country and all relevant government agencies were activated for this exercise.
Full scale exercises are usually expensive to undertake and so are rarely conducted. In many cases smaller-scale exercises are undertaken instead. For instance, to test its communications systems CDERA conducts a small exercise called *Region Rap*. *Region Rap* is a functional exercise in which CDERA operates and tests its Satellite telephones and radios using a series of messages and codes. Each year the testing simulation exercise gets more complex with the addition of a new dimension of a disaster problem that complicates communication operations to see how much the current system can endure and what is needed to improve it (E. Arthurs, personal communication, May 24, 2008).

**Collaboration with Key Stakeholders**

Another method that CDERA uses to build technical expertise is to collaborate with key stakeholders, such as the US Southern Command (SOUTHCOM), which is located in Miami, Florida. SOUTHCOM is a branch of the US Military that has responsibility for South and Central America and the Caribbean. SOUTHCOM polices the region and is generally concerned with immigration, drug trafficking, weapons transshipment, and disaster management. SOUTHCOM trains different regional response units, helps the region with disaster risk assessments, and conducts warehousing training for regional disaster management staff (United States Southern Command, 2009)). SOUTHCOM also carries out technical inspections in the Caribbean region and runs a state partnership for its peace program. In this program, each island or a group of islands in the region is coupled with the national guards units of one of the US states to do professional development exchanges (S. Russell, personal communication, May 20, 2008). For instance, Bahamas is coupled with the Rhode Island national guards, Jamaica

CDERA also has a collaborative relationship with FEMA. Through this collaboration, National Disaster Coordinators are able to spend periods of time in FEMA offices in Washington, DC, and elsewhere to learn the intricacies of comprehensive disaster management, which they can later apply to their own setting in the Caribbean (S. Russell, personal communication, May 20, 2008).

The technical capacities of CDERA and the member states are in large part focused on responses to disasters and much less on mitigation, preparedness, and recovery. The technical capacity of CDERA needs be improved significantly, but the member states are strapped for resources to build the technical capacity it needs. With this in mind, CDERA has embarked on efforts to create Centers of Excellence. These Centers of Excellence would concentrate on building the expertise needed to facilitate improved performance in different stages of the disaster management cycle and in all the CDERA participating member states (E. Riley, personal communication, May 27, 2008, Y. Chakallal, personal communication, May 25, 2008). Instead of trying to build the full range of technical capacity required in each of the CDERA member states, CDERA would focus on developing these Centers of Excellence across the region, each focusing on honing technical resource pools skilled in particular aspects of the disaster management cycle (Y. Chakallal, personal communication, May 25, 2008). These Centers would then give support to the member states as they need it. As an example, CDERA sees the University of the West Indies (UWI) as a critical regional Center of Excellence, because the university already has research and educational units, such as the
seismic research unit, the Center for Geospatial Studies, the Geo Informatics Unit, and Center for Meteorology (E. Riley, personal communication, May 27, 2008; J. Collymore, personal communication, May 26, 2008). All these specialized entities at UWI are expected to provide expertise to each member state, as needed, and help to build regional technical capacity in areas such as earthquake monitoring, geographical information systems capable of assembling, storing, manipulating, and displaying geographically referenced information, and geographical informatics that allow exchange, sharing, and application of geographic information (E. Riley, personal communication, May 27, 2008; J. Collymore, personal communication, May 26, 2008). This way each member state does not have to struggle to build these capabilities individually and limited resources can be dedicated to other critical endeavors.

To improve its technical capabilities, CDERA is also trying to develop an online disaster management training program, in collaboration with the University of the West Indies and the Clavity Scott Community College in the British Virgin Islands (S. DaBreo & Z. McLean, personal communication, May 20, 2008; J. Collymore, Personal communication, May 26, 2008; E. Riley, personal communication, May 27, 2008). Scholarships are offered to anyone undertaking disaster management research on the region, and CDERA is pushing for curriculum development and exploring other initiatives that they can build on to boost the technical capacity for disaster management in the region (A. Cook, personal communication, May 24, 2008).
DISCUSSION AND ANALYSIS

Importance of Capacity Components for Disaster Response

In the discussion in the preceding sections, it is apparent that the lack of capacity has plagued CDERA’s effectiveness in fundamental ways. The CDERA response to Hurricanes Ivan and Dean show that capacity is a prerequisite for performance. Capacity issues have been central to CDERA’s efforts to improve its effectiveness. The capacity components presented in my conceptual model are important for effectiveness, but some are more important than others. The critical components are: attracting and retaining staff, accessing technology, and developing technical expertise. The significance of these components was evident during Hurricanes Ivan and Dean. After Hurricane Ivan, CDERA was successful in employing additional staff at the regional level, acquiring technology, particularly ICT technology, and improving technical expertise at the regional and national levels. However, CDERA was not as successful as it could have been was it able to address the critical capacity deficiencies at the national level (NDOs) also. The CDERA response to Hurricane Dean in 2007 highlighted deficiencies in leadership, staffing, and technical expertise in Dominica. Capacity deficiencies at the national level during Hurricane Dean meant that even though the situation in Dominica was assessed as a level two impact and therefore did not require the CU intervention, the impact overwhelmed the country and caused significant damage to its economy. Regionally CDERA did significantly better than it had under Hurricane Ivan, but there were weak components of the system (Dominica) that dampened overall effectiveness.
The overall behavior of the system is a result of the large number of decisions that are made frequently by many individuals (Waldrop, 1992). Human resources are the building blocks of disaster management systems. They are central to building the technical capacity needed at CDERA. In the operating environment of CDERA human resources are fundamental. Systems scan their environments and develop action rules about how they should operate; they then implement these rules guided by their overall mandates, goals, and objectives (Waldrop). As an extension to these environmental assessments, organizations must endeavor to have the “right people at the right time,” as suggested by Ingraham, Joyce & Donahue (2005). This means that the CDERA CU must acquire a core staff with the requisite technical expertise in planning and preparedness, mitigation, and response and recovery. This core staff should also be able to work closely with each member state to align CDERA’s goals with those of the member states and coordinate all the resources and capabilities to ensure success. Human resources are very important resource for environmental assessments and goal delivery.

**Importance of Technical Expertise for Effectiveness**

When CDERA adopted its comprehensive disaster management strategy in 2001, it broadened its scope and mandate, from a focus on disaster response to one on all aspects of the disaster management cycle—mitigation, mitigation, preparedness, response and recovery—in an effort to minimize the “lasting impact of disasters” (E. Jones, personal communication, June 4, 2008). However, because of limited financial resources, CDERA has struggled to acquire human resources with the variety of expertise required to effectively deliver on the objectives of comprehensive disaster management (CDM).
National disaster coordinators I interviewed noted that technical expertise was critical for success. They expressed concern whether CDERA CU would be able to recruit enough staff with all the expertise required to fulfill the enhanced CDM mandate. However, they offered suggestions as to how the CU could acquire technical resources. One suggestion was that instead of attempting to employ core staff, the CU could contract consultants on a short term basis. These consultants would move into the member states as needed and work with their NDOs to establish disaster offices that would integrate the right components and capabilities to be effective in all the areas of CDM (C. Herbert & P. Peets, personal communication, May 20, 2008; H. Prince, personal communication, May 21, 2008). The CDERA CU leadership hopes that aligning its mandate to its name (CDEMA as opposed to CDERA) will change the focus on building the expertise and staffing it needs to deliver advice and guidance to long term planning and mitigation, emergency preparedness and response, damage assessment, business continuity, and restoration (E. Jones, personal communication, June 4, 2008).

To more properly assess the importance of technical expertise for effectiveness at CDERA, we need to examine it in the context of the objectives of CDM. In CDM all hazards and all phases of the disaster management are encompassed for all levels of government and the private sector. Each of these CDM components requires specific skills and expertise to support and deliver CDM objectives. Table 7 summarizes the strategic considerations for the technical capacity I identified as a result of my research; these considerations will be important in building technical capacities to support CDM at CDERA. I developed the table based on my own knowledge of the CDM process,
insights of the individuals I interviewed, and the recorded experiences of CDERA in Hurricanes Ivan and Dean.
Table: 7: Technical expertise required during different Stages of the CDM cycle and strategic consideration need at each stage

<table>
<thead>
<tr>
<th>Definition: Phases of CDM Cycle</th>
<th>Strategic considerations</th>
<th>Technical capabilities Required in CDERA</th>
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<tr>
<td><strong>Mitigation:</strong> The lessening or limitation of the adverse impacts of hazards and related disasters (International Strategy for Disaster Reduction, 2009)</td>
<td>Mitigation measures encompass structural measures such as engineering techniques and hazard-resistant construction, (International Strategy for Disaster Reduction, 2009). There are also non-structural considerations such as improved environmental policies and public awareness to get communities to accept that they have a role to play.</td>
<td>Understanding public policy and being able to frame policy issues will propel disaster management unto the national agenda; Mitigation measures must be supported by formal institutional, legal and budgetary capacities (International Strategy for Disaster Reduction, 2009). Strategic partnerships and linkages are significant options for CDERA to acquire needed mitigation expertise and technology. CDERA must push for employees to understand the links between Mitigation, Preparedness, response, recovery; learning from context &amp; past experiences; knowledge integration &amp; sharing platforms and policy advocates needed to frame issues at national level. Literature on mitigation shows it to be a long term endeavor, bureaucracy is important here to push efforts, but must be balanced by networks for monitoring.</td>
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<td><strong>Preparedness:</strong> knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events (International Strategy for Disaster Reduction, 2009)</td>
<td>Preparedness is based on a sound analysis of disaster risks and good linkages with early warning systems. It includes contingency planning, stockpiling of equipment and supplies, the development of arrangements for coordination, evacuation and public information, and associated training and field exercises (International Strategy for Disaster Reduction, 2009).</td>
<td>CDERA alone cannot develop all of its preparedness capabilities; it must do so with the CDERA network partners –collaboration management skills is key. Skills in disaster risk reduction and experience in disaster response is key resource to be housed within CDERA. Preparedness measures must be supported by formal institutional, legal and budgetary capacities (International Strategy for Disaster Reduction, 2009); preparedness needs a central agency to coordinate actions of all partners. National and international best practice is instructive. ICT support critical for success.</td>
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<td><strong>Response:</strong> The provision of emergency services and public assistance during or immediately after a disaster – to save lives, reduce health impacts, ensure public safety, meet the basic subsistence needs of those affected (International Strategy for Disaster Reduction, 2009)</td>
<td>Skills in supplying temporary housing, water supplies, and others important. Response equipment must be available; contingency planning and logistics paramount (International Strategy for Disaster Reduction, 2009).</td>
<td>All participating member states must have access to response technology. National and international best practice is instructive. ICT support critical for success. Network and collaborative management critical here. Response activities must be supported by formal institutional, legal and budgetary capacities (International Strategy for Disaster Reduction, 2009).</td>
</tr>
<tr>
<td><strong>Recovery:</strong> The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors (International Strategy for Disaster Reduction, 2009)</td>
<td>Recovery tasks of rehabilitation and reconstruction begins soon after the emergency phase ends, and should be based on pre-existing strategies and policies that facilitate clear institutional responsibilities for recovery action and enable public participation (International Strategy for Disaster Reduction, 2009). Recovery planning and operation must be integrated into CDM strategy and budgets.</td>
<td>Recovery is often linked to reconstruction indicating a long term endeavor; network members often need to focus on their individual organizations core functions, leaving task to designated disaster management body to resolve- Bureaucracy is critical here –prioritizes, schedules &amp; coordination of activities, contingency planning skills cost management, and oversight important- must have formal institutional, legal and budgetary support (International Strategy for Disaster Reduction, 2009).</td>
</tr>
</tbody>
</table>

**Note:** Based on my own knowledge of the CDM process, insights of the individuals I interviewed, and the recorded experiences of CDERA in Hurricanes Ivan and Dean.
Table 7 does not address specific staffing needs, nor does it address the numbers needed for success. The specific combinations of the two will depend on national level context—geography, population, hazard vulnerability, and so on—and to achieve the right fit. What the table does is to look at the technical requirements of each phase of the comprehensive disaster management cycle and try to propose important assumptions and considerations that must be made to ensure that the right skills are available at the right time to ensure effectiveness. My focus in the table is on the strategic considerations to be made for each phase and link them with organizational form.

Table 7 starts with the definition of each of the Comprehensive Disaster Management (CDM) phases (first column) and move on to note important considerations to be made at each phase of CDM (second column). These definitions and considerations are taken from a leading global authority on disaster reduction, the United Nations International Strategy for Risk Reduction (ISDR). These definitions can be found at the International Strategy for Disaster Reduction website at (International Strategy for Disaster Reduction, 2009). The last column in Table 7 is based on my own proposals of the technical capabilities that CDERA would need if it wants to deliver on the goal of the promise of comprehensive disaster management.

Strategic considerations for mitigation involve understanding that disaster management is a policy issue. Hence the disaster agency must have resources dedicated to framing policy issues so that there is a political buy-in by policy brokers and decision makers to the importance of disaster management, particularly mitigation and prevention and preparedness. The countries of the Caribbean are poor and small and are not diverse.
economically. Instead of focusing at response, these countries need to leverage the limited resources they have to reducing the impact of hazards in the first place. Importantly, in-house policy skills can be used to develop high-level policy advocates who will propel disaster management unto the national agenda. Mitigation measures must be supported by formal institutional, legal and, budgetary capacities and considerations (International Strategy for Disaster Reduction, 2009). Too often disaster management agencies are marginalized from the policy and political process and therefore do not get the resources they deserve to mount a proper disaster management operation. Inevitably, then, many disaster management agencies are seen as failures.

Not all expertise, skills and technology needed by CDERA for its operations need to be maintained in CDERA itself; strategic linkages can be made with other agencies that are in related businesses. This assumption is particularly true in the area of mitigation, which involves engineering and other technical skills that might not necessarily be most productive in a disaster entity. The role of disaster management agencies is to ensure that appropriate standards are established via legislation and provide support and oversight of the monitoring and compliance functions.

The phases of CDM must be integrated or mainstreamed into national development planning and reflected in all government policies and programs. Working to mainstream CDM will boost positioning of NDOs and ultimately increase resources needed to build technical expertise within the NDOs and in the general CDERA system.

Strategic considerations for preparedness capabilities must take into account the developmental context of the participating member states within CDERA, which were
noted earlier. Within the context of the CDERA member states, preparedness capabilities must be leveraged from within the network developed in and around CDERA. By itself, CDERA CU is limited in terms of financial and human resources and is not able by itself to effectively mitigate and respond to a level-three impact, which is the trigger point to request for CDERA CU support. The CDERA CU is acutely aware of this situation and has rightly joined forces with other regional organizations to access their resources and capabilities as needed. Networking with other regional organizations might be a strategic as well as a practical endeavor, but there are some resources that must be housed within CDERA itself for reasons of expediency. Preparedness support skills in areas such as disaster risk reduction and disaster response expertise are key resources that must be housed within CDERA itself. This is prudent because CDERA’s overall mandate is disaster management and disaster risk reduction, which means that they get the country ready for a disaster and coordinate response operations. CDERA therefore needs to know the technicalities involved in achieving these goals. Other areas such as logistics are best left to the experts, most of whom may reside in other organizations, because CDERA cannot dedicate its limited resources to undertaking these functions that it might not do effectively in the first place.

Preparedness measures must be supported by formal institutional, legal and budgetary capacities (International Strategy for Disaster Reduction, 2009). If not, preparedness efforts will fail for lack of resources. It is important for CDERA to learn from national and international best practice to improve its own performance. I discuss this issue in more detail in the next chapter.
Preparedness relies on technology to materialize effective response. ICT and other critical technologies are therefore critical for success. Network and collaborative management are critical here, but it must be noted that preparedness needs a central agency to coordinate preparedness efforts, which are usually expansive in scope.

Strategic considerations for response efforts must take into account the need for formal institutional and legal support as well as budgetary capacities for effectiveness (International Strategy for Disaster Reduction, 2009). During response, people tend to show special needs that rely on medical, financial, housing and other support that national decision-makers have to sanction before assistance can be rendered. However, someone has to coordinate these efforts. CDERA needs a dedicated staff to take care of this activity, but network and collaborative management are critical for delivery.

National and international best practice is instructive in guiding proper response. Lessons learned from how other countries handled specific impacts, their successes and failures, and intended and unintended consequences of country practices are important in providing feedback and opportunities to improve CDM at national and regional levels. The questions that need to be answered here are, (1) who does the job of accessing, analyzing, and integrating information and disseminating it in such a way that it will be useful and (2) at what level does this information processing and management take place?

Acquisition of appropriate technology is also critical for effective response. CDERA will need to access the information needs of the entire CDERA system and put a plan in place to strategically access or acquire the technology needed to support not only response, but mitigation, preparedness and recovery as well. In the area of response ICT
support is critical for success; so too are search and rescue technology, transportation, and logistics and coordination technology and skills.

Limited resources inhibit proper and effective response. Undertaking strategic considerations of the technical expertise required during the various phases of the comprehensive disaster management cycle can facilitate proper management of limited technical capacity. Undertaking strategic considerations can lead to CDERA acquiring and or coordinating the necessary technical resources and work to fill the existing gaps in technical capabilities needed in a creative yet deliberate manner.

**Additional Capacity Components**

During my interviews, a few other capacity components emerged as important although they were not explicitly noted in the model guiding this dissertation. The additional capacity components uncovered during the process of interviewing are integration and alignment of the management systems, managing for results, business continuity, and transportation management. These components will be discussed one at a time. Hurricane Ivan tested CDERA’s management systems and showed that they were lacking. Among other things, Hurricane Ivan showed that CDERA was weak in its integration of services and in the alignment of its goals with the CDM mandate. Further, three years later, while enhanced comprehensive disaster management was being implemented, Hurricane Dean showed that there was no explicit system for managing for results, business continuity considerations were not well thought out, and the transportation management systems were inadequate.
These additional components are inextricably linked to leadership. Ingraham, Joyce and Donahue (2005), express the profound influence that leadership has on management systems (e.g. finances, HR); leaders set priorities and influence certain activities. They marshal these systems together to operate as elements of a coherent and cohesive administrative framework.

Leadership matters, because leaders must understand or set the mission of the organization and acquire resources that will deliver the objectives of the mission. Leadership must also put systems, mechanisms, and processes in place to transform capabilities and resources into outcomes (Ingraham, Joyce & Donahue, 2005). To accomplish these tasks, leadership of the organization must manage for results and must align and integrate the key elements for organizational success (Ingraham, Joyce & Donahue). Moreover, in the area of disaster management leaders must plan to work with various critical economic sectors to facilitate business continuity after disasters. Business continuity is profoundly important for community resilience. They support life by providing healthcare, food, and other support services needed to resume normalcy to affected communities.

**Managing for Results**

In 2006, pushed by international aid agencies, such as CIDA, CDERA implemented a results-based approach to managing comprehensive disaster management. Enhanced CDM was packaged in the 2007 – 2012 *Comprehensive Disaster Management Strategy and Program Framework* (CDERA, 2006). Essentially enhanced CDM is a results-based performance management system that was developed to improve the way
programs were delivered, the agency’s strategic focus and organization, and donor collaboration; build project support and implementation; pool regional resources; and support institutional development, especially at the national level (CDERA, 2006). Using results-based Comprehensive Disaster Management, CDERA management could identify more easily the areas in which CDERA was doing well and those areas that needed work.

Enhanced CDM particularly focuses on the critical shortage of financial and technical resources to build adequate capacity at the national level for disaster risk management and disaster risk reduction (CDERA, 2006). Under enhanced CDM four outcomes are being targeted for the period 2007-2012 (CDERA 2006):

1. Enhanced Institutional Support for CDM Program Implementation at National and Regional Levels;
2. An effective mechanism and program for management of comprehensive disaster management knowledge;
3. Disaster risk management has been mainstreamed at national levels and incorporated into key sectors of national economies (including tourism, health, agriculture, and nutrition; and
4. Enhanced community resilience in CDERA states/territories to mitigate and respond to the adverse effects of climate change and disasters.

These four results areas build on the first CDERA (2001-2006) CDM Strategy and Program Framework, with the added feature of clearly articulating outcome measures in each area of CDM. Enhanced CDM presents a targeted approach to assessing the system against results and bridging the gaps as best as possible. The enhanced CDM
strategy is seen as the roadmap for building resilience to hazards in CDERA participating member states and is meant to facilitate harmonization among key development sectors, partners and institutions (CDERA CDM, 2008). Enhanced CDM is supported by the latest regional and international thought and approaches to disaster management (CDERA CDM, 2008, p. 1).

**Integration and Alignment of Mission, Vision and Practice**

Integration and alignment is important to deliver the CDM objectives. According to Ingraham, Joyce & Donahue (2005), effective management means that management systems function together towards a common, reinforcing purpose, not as ends in themselves. This means that there must be a clear vision and mission, people must have the right information at the right time, and they must have the right resources at the right time throughout the CDERA system (Ingraham, Joyce & Donahue). Also, in the case of disaster management, for CDM to be effective, necessary factors such as mitigation, risk reduction, vulnerability reduction must be integrated in daily practice of public and private agencies. Integration and alignment are difficult in the CDERA context because CDERA participating member states constitute disparate autonomous sovereign players and governance systems and separate land masses over which the CDERA CU has no authority—a point already discussed in details. The process of mainstreaming disaster management in policies in all CDERA states should facilitate such integration and alignment. The 2007-2012 CDM strategy and Framework has this as one of its priority objective (CDERA, 2006). Through advocacy, the CDERA CU is lobbying national governments to ensure that disaster mainstreaming takes place in each participating member state (E. Riley, personal communication, May 27, 2008).
Transportation Management

Transportation assets are essential in disaster management operations. The number and types of CDERA’s transportation assets at the CU and in participating member states are inadequate and threatens effective response and relief efforts. For instance, the CDERA CU Coordinator notes that the current transportation levels cannot support rapid deployment (J. Collymore, personal communication, May 26, 2008). The countries in the region are still depending on commercial airlines, or through a third party like USAID that have their own schedules. During the interviews I learned that it was a logistical nightmare to coordinate relief transportation to the islands impacted by Hurricane Dean. CDERA’s relief efforts depend on commercial carriers including ships and airplane. However, these carriers are not always responsive to CDERA’s relief efforts needs because they have their own schedules and routes to keep (A. Grosvenor, personal communication, December 10, 2008). During Hurricane Dean, CDERA had to improvise. They had to commission small fishing vessels to move whatever relief effort they could so that relief could be provided to impacted participating member states (A. Grosvenor, personal communication, December 10, 2008)

This situation poses serious limitations for CDERA’s response efforts in getting to people on time thereby minimizing suffering. The question that arises from this information is, how should a disaster management organization ensure adequate transportation including relief equipment to support response? In other words, “what are the mission implications of transportation acquisition and maintenance?” (Ingraham, Joyce & Donahue, 2005, p.115). This consideration of mission of transportation
acquisition is an important one especially given the logistical challenges of operating within and between multiple islands and government jurisdiction.

**Business Continuity & Succession Planning**

Business continuity is a concept that defines the practice of seeking to ensure that organizations are able to withstand any disruption to normal functioning by natural or man-made hazards (Elliot, Swartz & Herbane, 2002). The concept of continuity is important, especially in the context of the Caribbean, which relies on only a couple of sectors (tourism and agriculture) for economic stability and growth, but whose disaster management offices are faced with frequent staff turnover and have few resources. At the same time the Caribbean area lies in a geographically hazard-prone region of the world.

Another important aspect of business continuity for disaster management entities concerns the ad hoc and unpredictable nature of disasters that can cause communities including businesses to become complacent. For instance, sometimes there are up to 100 years between impacts. The Soufriere Hill Volcano in Montserrat took some 500 years between the last eruption and the most recent one in 1995 (Love, 1998). A similar situation occurred in Grenada before Hurricane Ivan. So many hurricanes had missed the islands that when Ivan was approaching there was a feeling of complacency on the island and the islanders were caught unprepared. Building businesses to be resilient and in a constant state of preparation for disasters must be an ongoing and deliberate endeavor. If the business cannot withstand disasters, they will die and their communities will disappear along with them.
In addition, succession planning is an issue requiring critical attention among the CDERA participating member states. The disaster management directors are mostly political appointees in the civil service and can be replaced with every election cycle, although this is not always the case (C. Herbert & P. Peets, personal communication, May 20, 2008; Prince personal communication, May 21, 2008). Moreover there is no succession plan that is written down or known throughout the CU or for the CDERA participating member states. If the current CU coordinator were to leave the organization for any reason, there would be a leadership void in the CDERA system (E. Jones, personal communication, June 4, 2008). This void could potentially set back the region’s disaster reduction agenda several years, possibly a decade. CDERA does not have a leadership development strategy in place to train the next group of leaders for the CU. Continuity in these cases, then, must rely on proper systems of recording and documenting information that is easily accessible, roles and procedures and protocols including strategic plans to facilitate ease in transitions at the regional and national level.

CHAPTER SUMMARY

This chapter attempted to answer the following question on organizational capacity: What organizational capacity variables have been most influential on CDERA’s effectiveness. I specifically examined the following capacity components: leadership and staffing, conceived as key capacity resources; financial resources; technical expertise; technology; and physical resources. Based on my interviews and assessments of CDERA performance during Hurricanes Ivan and Dean I found that organizational capacity is important for performance in fundamental ways. CDERA is experiencing a capacity
deficiency at all levels of its operations, but the regional level is more resourced than the
national level. All the capacity variables examined are important, but staffing, technical
expertise across all phases of the comprehensive disaster management cycle, and
technology are as the most important capacity variables for the effectiveness of CDERA.
Without people to implement the strategies of CDM, very little can get done. The area of
response shows this vividly.

Without the necessary skills appropriate for each stage of the CDM cycle, the
objectives of CDM cannot be achieved; without the technology necessary to support
information and communications, search and rescue operations and planning and
monitoring functions will be stymied. Technical capabilities must be developed with each
phase of the comprehensive disaster management cycle in mind. The pending CDERA
name change should address fundamental capacity issues including technical capacity
development by directly focusing on these areas for priority improvement. Adequate
physical infrastructure is a problem at CDERA. Hurricane Ivan’s destruction of
Grenada’s Emergency Operation Center (EOC) without an alternative site in place
underlines the mission critical implication of physical infrastructure CDERA needs to
address this problem based on the mission implications of these assets. Technology is
paramount for disaster management operations. CDERA is no different. Importantly the
CDERA CU has already identified ICT as a critical technology consideration. It needs
now to find ways to integrate communication platforms across the region and work on a
dedicated public media network across the region that will prioritize disaster broadcast.

Other components emerged as important in the context of disaster management at
CDERA. These are integration and alignment of the management systems, managing for
results, business continuity and succession planning, and transportation management. These areas help to make CDERA more results driven and more sustainable. One can infer the lesson from the disaster response in the region that there needs to be more integration and alignment and results-based management in the CDERA system, particularly at the national level. These needs for integration and alignment and results-based management are particularly important because of the developmental context of the countries and the resource crunch countries experience. Regionally, however, concerted efforts have been made, perhaps out of necessity, to align the region’s disaster management operations to global initiatives on disaster risk reduction and sustainable development. The global alignments bring in much needed resources and capabilities to the region.
CHAPTER 7 FINDINGS AND ANALYSIS—ORGANIZATIONAL LEARNING

What role does organizational learning play in the evolutions of CDERA’s organizational form and organizational capacity? To answer this question I examined different modes of learning as presented in my conceptual model, assessed how lessons were applied to organizational practices, and assessed the implications of different types of learning for organizational success. I used the information I gathered from interviews and complemented them with information from various technical reports on CDERA and informational pamphlets disseminated by CDERA.

Organizational learning involves encoding inferences from history into organizational routines that guide behavior (Levitt & March, 1988). As such, organizational learning relies on the active involvement of employees in knowledge access and application. “Organizational learning occurs when members of the organization act as agents for the organization, responding to changes in the internal and external environments of the organization by detecting and correcting errors in its employees’ implicit and explicit understanding of how things are done, and embedding the results of this inquiry in private images and shared maps of organization” (Argyris & Schön, 1978, p. 23). While it has not categorically been proven that organizational learning does impact performance there is an appreciation of the relevance of organizational learning to organizational competitiveness (Sinkula, Baker, & Noordewier, 1997; Fiol and Lyles (1985). Fiol and Lyles note that although there are different definitions of organizational learning, in all of them there is an assumption that applied learning will improve performance. They argue that through effective learning
relevant knowledge may lead to positive performance. In order for learning to improve performance there must be deliberate efforts made to facilitate learning and application of the lessons learned throughout the organization.

In this dissertation I assessed the modes of learning CDERA employs. These are learning from the national experiences of other CDERA participating member states (“country experiences”), simulation exercises, learning from best practices, and technical assistance. During my interviews, I found two additional learning modes: out-of-region experiences and self-reflection by CDERA staff [or top managers, etc.]. I discuss all these modes below.

In the following sections, I first clarify what is meant by each of the learning modes in the CDERA context. Next I examine the different learning modes against the background of what CDERA delivers. I address specifically how CDERA learns and whether this constitutes adaptive or generative learning. I end the chapter by examining the implications of organizational learning for effectiveness.

**BRIEF DESCRIPTIONS OF LEARNING MODES**

In this dissertation “learning mode” means the process of learning including the manner in which learning is initiated. The first learning mode I investigated was *country experiences*, which means that knowledge derived from the outcomes of the actions taken by other CDERA participating member states to respond to natural disasters is used by particular member. Examples of these experiences include Grenada’s response to Hurricane Ivan, adoption of a shelter management model from St. Kitts and Nevis, and knowledge built from the Caribbean countries’ experience in planning for the hosting of
the 2006 World Cup Cricket series in the Caribbean (E. Arthurs, personal communication, May 24, 2008). These experiences are documented by the CDERA CU and presented to member states as models for them to follow (C. Herbert & P. Peets, personal communication, May 20, 2008). They are also shared with CDERA members and stakeholders at CDERA Board Meetings, council meetings with heads of government and at CDERA sponsored conferences.

*Simulation exercises* allow for problem solving based on different scenarios (Rose, 2006). Simulation exercises are often used in emergency preparedness training where participants are placed into a simulated situation that requires them to function as if in their real world capacity (National Oceanic & Atmospheric Administration, 2009). Such exercises are designed to assess, enhance, and evaluate preparedness; they test policies, plans, standard operating procedures, and personnel training (National Oceanic & Atmospheric Administration, 2009). Common types of simulation activities conducted by CDERA are table top exercises that test components of the system such as communication and field training exercises. An example is the annual training exercise named Exercise FAHUM (Allied Forces Humanitarian), which is coordinated by the USA Southern Command in Latin America and the Caribbean (E. Arthurs, personal communication, May 24, 2008). Exercise FAHUM is a two-week long field training exercise that is meant to enhance relief and response coordination between military, government and non-governmental organizations in the northern hemisphere (United States Southern Command, 2009)). This annual field training exercise is typically held before the start of the Atlantic Hurricane Season. CDERA evaluators assess the staging of
the exercise and its outcomes and make improvements to CDERA’s response operations as needed.

*Technical Assistance* (TA) programs seek to build and sustain capabilities through specific services and analytical capacities across functional areas (Department of Homeland Security, 2009). As critical capability gaps are identified, CDERA accesses TA from international aid agencies to address those needs. Technical assistance consists of a variety of services to CDERA that transfer knowledge and build capacity for delivery of the CDM mandate. Technical assistance might involve a few activities: skills training or consulting services, knowledge transfers to CDERA personnel from overseas consultants in an important technical area, and training in the implementation and appropriate use of technology among CDERA participating member states.

*Best practices* are defined as methods, processes and procedures that are known to consistently produce the best results given a particular situation (Visitask, 2009). Best practice benchmarking by CDERA often includes using indicators to track performance or using a grading tool to monitor progress towards comprehensive disaster management by national disaster organizations and the CU itself (Visitask). The notion of best practices implies an accumulation and application of knowledge about what works and what does not work in different contexts (Visitask,). Selected best practices from international practices and from participating member states are documented by the CDERA CU and presented as model documents for all the CDERA participating member state to follow (C. Herbert & P. Peets, personal communication, May 24, 2008).
Out-of-region experiences are responses to hazards from countries or disaster management organizations that are not CDERA’s members or in the Caribbean region. CDERA drew lessons from are major international disasters such as the 2008 earthquake in Sichuan Province in China, which killed about 70,000 people, the 2004 Indian Ocean Tsunami, which resulted in more than 150,000 deaths, and the Pakistan-India in 2005 earthquake, which killed 73,000 (E. Jones, personal communication, June 4, 2008; E. Riley, personal communication, May 27, 2008; R. Jackson, personal communication, May 16, 2008). The 2008 Sichuan earthquake was an important out-of-region experience for CDERA. This earthquake provided opportunities for CDERA to learn and improve its comprehensive disaster management efforts based on the successes, failures, and unintended consequences of this disaster. Lessons from out-of-region experiences are documented by the CDERA CU and presented as models in documents for all the CDERA participating member state to follow (C. Herbert & P. Peets, personal communication, May 2008).

CDERA self-reflections are occasions when CDERA CU calls its members and other important stakeholders to take stock of where they are, whether they are doing the right thing (effectiveness), they are doing things right (efficiency), and what is needed to move forward in achieving the goals of comprehensive disaster management. CDERA’s self reflections include CDERA CU sponsored retreats and meetings such as pre-Board Meeting sessions held at the start of the CDERA annual Board Meeting. Here CDERA’s

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2 See the China Daily May 13, 2008 for more detail on this 7.9 magnitude earthquake online at http://www2.chinadaily.com.cn/china/2008-05/13/content_6678227_2.htm retrieved July 24, 2009
overall performance is evaluated, and innovations at the national level shared and assessed for general implementation. CDERA’s self-reflections provide distinct opportunities for learning and application of that learning throughout CDERA.

In order to more fully assess lessons learned and the application of the learning from various learning modes, we will need to put them in the context of CDERA’s mandate and what it delivers.

**LEARNING MODES AND THE TYPES OF LEARNING OPPORTUNITIES THEY OFFER CDERA**

One of CDERA’s priority areas under its enhanced comprehensive disaster management strategy is to develop an effective mechanism and program for managing and sharing CDM knowledge (CDERA, 2006; King, 2008). But, how does CDERA learn and how does it apply lessons learned to improve its performance?

![Figure 10. Relative frequencies of modes of learning employed by CDERA (1991-2009)](image)

*Note: The figure is developed from information collected during interviews with CDERA representatives between May 15 and June 4, 2008*
Figure 10 shows that in the CDERA context participating member states rely heavily on the experiences of other participating member states in the region for lessons because of shared geography, development context, and resources issues. What works in one country may not work in another. Knowledge from country experiences are built into model documents by the CDERA CU and transferred to participating member states by the CDERA CU (J. Collymore, personal communication, May 26, 2008; S DaBreo & Z. McLean, personal communication, May 20, 2008).

Disaster management entities like CDERA can learn several lessons from best practices of similar organizations around the globe. CDERA acquires knowledge from best practices through collaboration with international aid agencies, seminars, conferences, training by global experts, and CDERA CU personnel’s observations of events around the globe. CDERA’s Enhanced CDM strategy, the harmonized approach to the delivery of CDM, and the Regional Response Mechanism are all examples of the applications of best practice learning initiatives (E. Riley, personal communication, May 27, 2008).

In the CDERA context, simulation exercises provide the best opportunities for improving effectiveness. Simulation exercises preemptively highlight the deficiencies and challenges as well as the strength of the regional system, thereby providing opportunities to correct and improve high costs and other implications of failure during response to a hazard impact.

There are other less frequently used learning modes that offer significant opportunities for CDERA to learn and apply knowledge. Out-of-region experiences such
as the South East Asian tsunami have led to the installation of a tsunami early warning system in the region and have led to continued focus on multi-island impacts from a single event (E. Riley, personal communication, May 27, 2008). CDERA’s self-reflection has led to the development of thematic cooperating groups that are responsible for monitoring and building response capabilities for each economic sector (J. Collymore, personal communication, May 26, 2008). At the 2002 CDERA Board Meeting it was agreed that to achieve the objectives of CDM there needed to be strong commitment and coordination across sectors was discussed. Each economic sector needed to focus on key CDM issues—mitigation policy and planning, hazard mapping and vulnerability assessment, and safer buildings if the region is to be successful in achieving sustainable development through risk reduction. The Thematic Coordinating Groups (TCG) was established by the CDERA CU under the Caribbean Hazard Mitigation Capacity Building Program (CHAMP) to guide project implementation (CDERA, 2009e; CDERA, 2009g). Through the TCG, a regional hazard mitigation planning methodology was developed and distributed among CDERA participating member states. In addition, a draft model mitigation policy was also developed for wide distribution among CDERA members (CDERA).

While there is evidence that CDERA has leveraged learning to improve capacity, there are significant missed opportunities. In 2006 when the 2007-2012 Comprehensive Disaster Management Strategy and Program Framework was developed it outlined several gaps in CDERA’s capacity. The Framework noted that several institutional enhancements were made at the CDERA CU based on knowledge acquired during the 2001-2006 implementation of CDM. The report noted that the CU had already made
improvements in programming, strategic focus and organization, donor collaboration, project support and implementation and resource pooling in the region (CDERA, 2006). However, critical issues such as institutional development and capacity building, especially at the national level remained unrealized (CDERA). This is in part because of asymmetrical information among CDERA participating member states and a lack of integration of the knowledge and information that were available throughout the CDERA system. There was a clear recognition in the 2007-2012 Comprehensive Disaster Management Strategy and Program Framework, for example, that there has not been enough emphasis on integrating information learned from the 2001-2006 CDM experience into policies and programs and budgets either at the national or at the regional levels of CDERA (CDERA).

CDERA is experiencing a capacity deficit throughout its system at the regional and sub-regional levels. The various modes of learning available to CDERA offer many opportunities to improve its capabilities and consequently its performance. Table 8 below provides a summary of the different types of learning modes available or used in the CDERA system and how they could link to effectiveness. I constructed the table based on my assessment of the information I collected in interviews during May of 2008 and at the 2008 CDERA CDM conference held in Barbados December 10-14, 2008. The information is supplemented by archival information on the different modes of learning.

These different modes of learning provide valuable opportunities for CDERA to identify and solve problems, correct the deficiencies in its capacity and to better organize itself. I will discuss each “learning mode” and specific application of lessons from these in a separate section below.
### Table 8: Summary of Learning Modes and Their Applications at CDERA

<table>
<thead>
<tr>
<th>Modes of Learning</th>
<th>Summary of Lessons Learned by CDERA</th>
<th>Application of Lessons Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country experience</td>
<td>Technical and technological capabilities and human resources are areas of weakness for CDERA. Low positioning of national level disaster offices hinders access to critical resources (Grenada &amp; Dominica are examples); NDOs’ performances at the national level hindered overall CDERA performance.</td>
<td>- Enhance technical and technological capability in areas of response (seen in Hurricane Dean); - Improve contingency planning for multi-island hazard impacts;</td>
</tr>
<tr>
<td>Simulation exercises</td>
<td>Simulation exercises are important to improve systems and processes in disaster management; they are especially useful for planning and system appraisal in resource scarce areas.</td>
<td>- Improvement in communications and coordination based on tabletop and field exercises (as in Hurricane Dean); - Improvement in community response capability because more sectors involved (FAHUM);</td>
</tr>
<tr>
<td>Best Practices</td>
<td>Introduction of international standards like Hyogo Framework for Action into regional practice allows access to resources for CDERA through project funding, as well as important lessons from other countries and methodologies for disaster risk reduction.</td>
<td>- Lessons led to Coordination and Harmonization Council – too early to assess, but should lead to better optimization of funding, etc; - Introduction of results-based approach (better measurement of progress and also Identify/quantify areas of need – more targeted interventions result;</td>
</tr>
<tr>
<td>Technical Assistance</td>
<td>This can be used to build CDERA CU’s risk reduction capabilities.</td>
<td>- Improvements in risk reduction</td>
</tr>
<tr>
<td>Out-of-region Experiences</td>
<td>Mitigation is an important component of CDM that needs to be emphasized in the region.</td>
<td>- Improvements in earthquake readiness capability, - Training in how to use technology acquired; - Improvements in HR capability in contingency planning. - Mitigation of hazard impact on coastal community thereby boosting community resilience</td>
</tr>
<tr>
<td>CDERA self reflection</td>
<td>How to deliver objectives and leverage limited resources better. Lessons on how CDERA can become more effective.</td>
<td>- Better organizing for delivery of CDM – e.g. Thematic Coordinating Groups; CHC - Using projects to drive the delivery of CDM, - Strategically filling capability gaps in the CDERA system by linking with international disaster reduction arrangements (Hyogo Framework)</td>
</tr>
</tbody>
</table>

**Note:** Developed based on information collected from interviews I conducted in May 2008, technical documents and CDERA pamphlets on comprehensive disaster management (CDM), and Situation Reports one year after Hurricane Ivan (CDERA 2005).
Country Experiences

The country experiences showed that there were gaps in the CDERA mitigation and response capacity, as in the example of Hurricane Ivan’s impacts in Grenada. Country experiences have also helped CDERA to coordinate funding at the CU level so that those countries with weak disaster management infrastructure will get the help they need, should they be impacted by a hazard (D. Gentles, personal Communication, May 21, 2008). CDERA was aware of the inadequate disaster management capacity in Dominica before Hurricane Dean impacted that country. When CDERA learned of Hurricane Dean’s projected path towards Dominica, it put its response system on alert in preparation for impact (D. Gentles, personal Communication, May 21, 2008). As a consequence, when Hurricane Dean impacted Dominica, CDERA was able to quickly respond and averted what could have been a major disaster in Dominica (A. Mullings, personal communication, May 15, 2008; D. Gentles, personal communication, May 21, 2008).

Lessons learned from Hurricanes Ivan and Dean at the Country Level

At the national level many lessons emanated from CDERA’s response to Hurricanes Ivan and Dean as noted earlier. Hurricane Ivan impacted six of CDERA’s sixteen member states. It was the agency’s first coordinated response to a multi-island impact of a single event. Multiple capability and preventive gaps were identified in the CDERA system at both the national and regional levels (see CDERA, 2004). Hurricane Ivan has been the disaster most cited by CDERA stakeholders to demonstrate CDERA’s capacity issues (P. Mullin, personal communication, May 19, 2008; A. Mullings,

Importantly, many of disaster management personnel in the six impacted countries were not skilled in the preparation of Damage Assessments and Needs Analysis reports (CDERA, 2005). These reports are needed to initiate CDERA’s response mechanisms such as the RRM (R. Jackson, personal communication, May 16, 2008; A. Mullings, personal communication, May 15, 2008). As a result these countries were not able to access available CDERA resources. From this experience CDERA CU implemented training tools that would develop the capability in damage assessments and needs analysis in the region. During Hurricane Dean CDERA deployed personnel to complete needs analysis and damage assessment reports, including national disaster coordinators from countries that were not impacted by Hurricane Dean (E. Riley, personal communication, May 27, 2008).

Response personnel and other resources were pre-positioned in preparation for Hurricane Dean. There was no pre-positioning of resources or personnel during Hurricane Ivan. This resulted in delayed search and rescue and relief operations. For instance, the Regional Security System personnel were not deployed until three days after the hurricane, by which time citizens were looting stores, to get whatever they could to sustain themselves (R. Jackson, personal communication, May 16, 2008; A. Mullings, personal communication, May 15, 2008). In fact, multilateral and bilateral donors were in Grenada post-disaster three days before CDERA arrived (R. Jackson, personal communication, May 16, 2008; A. Mullings, personal communication, May 15, 2008).
addition, the telecommunications systems failed and Grenada was cut off from the rest of the world for several days (R. Jackson, personal communication, May 16, 2008). There was no arrangement in place for an alternative Emergency Operations Center (EOC) when the existing one suffered extensive damage (D. Gentles, personal communication, May 21, 2008; A. Mullings personal communication, May 15, 2008.) Only after the primary EOC was destroyed did Grenadian disaster management authorities begin to prepare an alternative venue from which to mount a response (A. Mullings, personal communication, May 15, 2008). An alternative EOC was not included in the disaster preparation plan. In short, CDERA’s response to Hurricane Ivan in Grenada is seen as the lowest point in this agency’s history.

The lessons learned from Hurricane Ivan were reflected in CDERA’s improved response to Hurricane Dean three years later. CDERA built its disaster response capacity that had been so lacking during Hurricane Ivan. In the following two sub-sections, a synopsis of the ways CDERA’s learning and performance improvements are presented.

**Pre-Impact Preparation**

One important lesson learned by CDERA was that preparedness is critical to minimizing loss of lives and property. In preparation for Hurricane Dean, the Regional Response Mechanism (RRM) was placed on standby seventy-two hours before the projected landfall (CDERA 2007; Gentles personal communication, May 21, 2008). The National Disaster Committees in the threatened states reviewed their preparedness and response plans and initiated readiness actions; CDERA contacted National Disaster Coordinators and government officials to ascertain preparedness (CDERA, 2007). None of these activities took place prior to Hurricane Ivan. In addition, both the Eastern and the
North Western Caribbean Donor Groups convened meetings, and CDERA developed an operational plan for “worst case scenario” in Jamaica and Belize (CDERA, 2007, p. 2). The Pan American Health Organization was pre-deployed in Jamaica, St. Lucia and Dominica so as to more readily assess the public health needs in the impacted states (CDERA, 2007, p. ). Further, USAID OFDA team was deployed to Jamaica, while an OFDA consultant was stationed in Dominica (CDERA, 2007).

**Post Impact Response**

An important lesson learned from post impact response operations during Hurricane Dean was that the Eastern Caribbean Donor Group was an invaluable resource for the impacted countries of the Eastern Caribbean. The Eastern Caribbean Donor Group was formed by international aid agencies after Hurricane Ivan to support regional mechanisms and member states of the Eastern Caribbean to facilitate an effective, timely, and coordinated response operation to a rapid onset emergency (United Nations Development Program, Barbados & the OECS, 2009). This support was lacking during Hurricane Ivan. The Eastern Caribbean Donor Group was able to provide substantial assistance to Dominica during Hurricane Dean. Given the success of the Eastern Caribbean Donor Group during Hurricane Dean, a Northwestern Caribbean Donor Group has been formed to coordinated donor activities post impact in the Northwestern Caribbean (R. Jackson, personal communication, May 16, 2008; A. Mullings, personal communication, May 15, 2008).

**Summary of Lessons Learned from Country Experiences**

The lessons CDERA learned from country experiences significantly improved its preparedness and response capacity. Hurricane Ivan taught CDERA that preparedness
plays an important role in minimizing loss of lives and property during a disaster. Prior to Hurricane Ivan, CDERA focused mainly on response, to the detriment of the other phases of the comprehensive disaster management cycle. Now all phases of the CDM cycle are given attention by CDERA. It is still too early, however, to assess whether this new focus is helping to improve CDERA’s effectiveness and in what ways. CDERA has also learned that donor groups are invaluable during the response period and that it needed to boost technical capabilities in damage assessment and needs assessment because these skill help to trigger the CDERA response to impacted countries in a timely manner. Finally, country experiences showed that at the national level, positioning within the government bureaucracy, not bureaucracy itself, impedes access to capabilities and resources. The CDERA CU has embarked on a mission to advocate for better positioning of NDOs in national government bureaucracies.

**Simulation Exercises**

CDERA has learnt that when there are scarce financial resources, simulations exercises, when used right, can help to fill knowledge gaps in key areas of operation. From its experience with the field exercises coordinated by United States Military Southern Command (SOUTHCOM), CDERA learned that simulations like Exercise FAHUM would be useful. These exercises help to improve performance because they improve response coordination, communication and logistics, and improve efficiencies among members of the CDERA network. After Hurricane Ivan, the region’s response to that hurricane was assessed both by CDERA and its key stakeholders, such as SOUTHCOM and the Eastern Caribbean Donor Group (E. Arthurs, personal communication, May 24, 2008; A. Mullings, personal communication, May 15, 2008, D.
Gentles, personal communication, May 21, 2008). Efforts were made by these
stakeholders to correct the deficiencies. Many of the efforts seem to have paid off.
Response to Hurricane Dean showed marked improvements over Hurricane Ivan in the
areas of communications and coordination (R. Jackson, personal communication, May
16, 2008; A. Mullings, personal communication, May 15, 2008; D. Gentles, personal
communication, May 21, 2008).

**Best Practices**

From its experience with promoting the disaster risk reduction agenda in the
Caribbean, CDERA has learned that the governments of the region are more likely to
respond favorably to the cause of disaster management when it is couched in the
language of the international community. This is so for a few reasons. Because most of
the governments of the region themselves depend on the goodwill of international friends
and organizations for bilateral assistance, they are more likely to respond positively to
disaster management when their international friends themselves have signed on to.
Simply put, it makes the governments look good in global fora to be supporting global
concerns and working in their own behalf. Second, resources including cutting edge
knowledge and technical assistance can be obtained from making such linkages both at
the bilateral and regional levels. Third, the task is not as daunting when there is
international support, compared to a situation when the region is doing it alone.

Lessons from International best practices (e.g., *Hyogo Framework for Action*)
show that disaster mainstreaming is the most effective way to have disaster management
policy instituted at the national level. By extension, mainstreaming disaster risk reduction
into government policies and programs and budgets avails national disaster offices to
much needed financial resources to deliver on the objectives of CDERA’s overall CDM strategy. The CDERA Council decided to build mainstreaming disaster management into government policies and programs; this was stated as one of the objectives in the 2007–2012 CDM strategy and Program Framework. Much of the CDERA CDM benchmarks come from the international organizations such as the United Nations Strategy for Disaster Reduction and international agreements, such as the Hyogo Framework for Action and the UN International Strategy for Disaster Reduction.

CDERA learned also, based on international best practices that managing for results or results-based management facilitates better targeted interventions, better monitoring of progress, and better measurement of outcomes. CDERA then, has integrated the principle of managing for results into its 2007–2012 CDM strategy and Program Framework.

**Technical Assistance**

Although technical assistance is utilized less frequently than other modes of learning (only 9% [Figure 12.]), it has the potential to provide valuable learning opportunities for CDERA. For example, through technical assistance CDERA now has the services of a risk management consultant employed by the Canadian International Development Agency and placed at the CDERA CU. His mandate includes transferring his specialist knowledge to key staff at CDERA CU and national disaster offices. Technical assistance comes to CDERA almost exclusively from international aid agencies and foreign governments. My interviewees noted that technical assistance to CDERA came essentially from the Japanese, Canadian, and American governments (e.g., USAID/OFDA, FEMA) and the European Union. The Japanese offered technical
assistance in Geographical Information Systems (GIS) and other technology including hazard mapping. Canadian International Development Agency (CIDA) and the United States Agency for International Development (USAID) are among the largest contributor of technical assistance to CDERA. CIDA for example offers wide capacity support including placing technical international and regional experts in the CDERA CU, where the skills can best be leveraged through knowledge transfer to maximize impact (Y. Chakallal, personal communication, May 25, 2008). In addition, national disaster coordinators are sent to the Federal Emergency Management Agency (FEMA) to learn skills and ways of doing things for periods of two weeks or more; this is facilitated by USAID s (S. Russell, personal communication, May 20, 2008). In addition, these agencies are among the co-sponsors of the annual CDERA CDM conference which see international attendance and presentation of technical reports and papers from experts. The annual Comprehensive Disaster Management conference is a major venue for disaster management knowledge sharing in the Caribbean region.

**Out-of-Region Experiences**

Experiences from the 2001 Gujarat earthquake in India, the 2004 South East Asian Tsunami, and the 2008 Sichuan Earthquake in China, and were all very instructive to CDERA in assessing its state of readiness for such an event; the information CDERA gained for these experiences also helped CDERA to bridge make up for its deficits in technology, human resources, and other areas (D. Gentles, personal communication, May 21, 2008; C. Herbert & P. Peets, personal communication, May 20, 2008; P. Mullin, personal communication, May 19, 2008). After assessing these overseas events CDERA understood that it had critical deficiencies in mitigation. By applying the lessons it
learned from out-of-region experiences, CDERA embarked on efforts to mainstream mitigation measures and particularly to mitigate hazard impacts on coastal community. An example is the adaption and testing of a draft tsunami protocol suit in Antigua and Barbuda between July 7 and 9 in 2009 (CDERA, 2009). This tsunami protocol suite is part of the Tsunami and Other Coastal Hazards Warning System Project, which is sponsored by the United State Agency for International Development. The project supports development of a comprehensive coastal hazards warning system for the Caribbean and adjacent regions (CDERA). A pilot project was developed in order to accelerate the Caribbean region’s ability to respond to tsunamis and other coastal hazards (CDERA).

Self Reflections

CDERA does some self-reflection during system-wide strategizing on the CDERA Board and in its joint meeting with regional stakeholders, such as the Caribbean Center for Development Administration (CARICAD), and with international aid agencies (D. Gentles, personal communication, May 21, 2008). In these strategizing sessions CDERA CU has learned three important lessons. First, CDERA has learned that implementing its comprehensive disaster management initiative by focusing on different sectors of the economy, rather than implementing the strategy widely at the macro or societal level in the participating member states, will offer best results. The sector focus is coordinated by Thematic Coordinating Groups. Second, CDERA has learned that given its scarce resources the best way to deliver on the objectives of CDM was through projects funded by international aid agencies. As a result, CDERA has implemented a project focus that is meant to strategically fill human resource and other capability gaps.
in the CDERA system that has been a pressing concern for years. Third, CDERA has learned that by linking with international disaster reduction arrangements such as the Hyogo Framework for Action, it can receive technical and capability support as well as technology resources.

**A Summary of the Learning Modes used by CDERA**

CDERA learned from simulation exercises and out-of-region experiences and applied this knowledge to improve its communication and coordination technologies and the technical skills of its staff; these exercises and experiences also helped CDERA to identify the weaknesses of its human resources skills and knowledge, particularly at the regional level. Out-of-region experiences helped CDERA to focus on readiness capabilities, such as acquiring a tsunami early warning system for the region. Best practice learning was particularly important for CDERA, because this allowed it to establish benchmarks and work towards these benchmarks. Learning from best practices facilitated CDERA’s introduction of results-based approach to achieving its goal of comprehensive disaster management. Technical assistance primarily contributes to CDERA’s human resource development and development of other functional capacities like earthquake monitoring and risk analysis. The member country experiences helped CDERA to solve problems in the areas of its technical capabilities, particularly in response and mitigation, and helped improve the CU monitoring function at the country level.
As shown earlier, the majority of CDERA’s lessons came from country experiences. Then the process of acquiring and applying knowledge from country experiences needs more elaboration.

DISCUSSION AND ANALYSIS

Mechanisms of Capturing Knowledge from Country Experiences

In May 2008, I participated in the Jamaica National Briefing on the 2007 hurricane season, which included the impact of Hurricane Dean (August 2007). I observed the CDERA Board Meeting in Antigua one week later. The mechanism presented in Figure 11 below depicts how CDERA captures, processes and applies lessons from country experiences was based on my observations of these processes and supplementary interviews.

![Diagram showing the mechanisms of capturing knowledge from country experiences](image)

Figure 11: Depiction of the manner in which CDERA captures information and knowledge from country experiences

Note. The arrows represent the flow of information from community level to the regional level and back. The boxes represent the methods through which information is captured and also application of knowledge back to the various levels. The figure was culled from my observations of Jamaica National Debriefing of
the 2007 hurricane season and supplemented by interviews conducted during May 2008 and early June 2008, as well as secondary information collected at the CDERA CU in Barbados May 2008.

Figure 11 presents the flow of information and the capture of knowledge within the CDERA system from country experiences. The figure shows the information flows (arrows) from the community level or ground zero of the disaster to the national level where all community information is compiled and analyzed and documented, and sent to the regional (CU) level. The figure also presents the feedback of information and knowledge from the regional (CU) level and back to the country level and communities. NDOs extract the lessons from national experiences and organize remedial action. The national disaster coordinators report to CDERA CU at the annual board meeting on activities during the last disaster cycle. Information and knowledge are then translated into interventions, programs, projects, and documents at the regional level; it is then transferred back to the national level via the NDOs. Information flows from the community level to the national level and to the regional level. Interventions, on the other hand, come either from the regional level and go through the national level to reach the community level, or they are initiated at the national level and directed to the community level. Communities are ground zero for a disaster and are often the origin of country experiences. Based on my own observations, communities provide a wealth of information from response operations on the ground, including operational reports on all that had to be done to stem the effects of the disaster and remediation efforts needed to reduce the impact of a similar hazard. The community level is primarily the source of raw, unprocessed information that is reported to the national level via real-time operational records and post-event evaluation reports. Response efforts, the successes,
failures, unintended consequences, and intervention needs are reported in these
documents. All community operational records and post-event evaluation reports are
compiled into a national post-event evaluation report at the national disaster office and
assessed. This national post-event evaluation report forms the basis of remedial action,
planning for the next disaster cycle and for needed mitigation work and is presented at
the annual national briefings.

National briefings are usually held annually, usually a few months prior to the
upcoming hurricane season (R. Jackson, personal communication, May 16, 2008). At
these briefings, detailed reports on performance during the previous hurricane cycle are
presented and outcomes discussed by key stakeholders involved in disaster management
at the national level, deficiencies are noted and brainstorming done on how to fix the
problems encountered during the last hurricane period. These are a mandated by the
heads of state as part of the disaster management efforts at the national level and the top
decision-makers are informed of the outcome of national briefings by the national
disaster coordinator. The good thing about national briefings is that documentation
associated with these briefings are usually the most complete set of data available to
analyze capabilities, deficiencies, and opportunities for improvement at the national
level. Information and analysis from briefing reports are collated and reported to CDERA
at its annual board meeting (R. Jackson, personal communication, May 16, 2008).

All the national disaster coordinators and key country stakeholders are
represented at the CDERA board meeting, which is a venue for reflection and strategizing
about comprehensive disaster management at how to achieve it at both the country and
regional levels. The short and medium term program of action at the regional level
(CDERA CU) will incorporate successes and failures reported by individual members with the hope of improving performance for the next cycle.

At the regional level, the CDERA CU compiles a series of Situation Reports submitted by national disaster offices that describe unfolding events in impacted communities throughout the response cycle. These Situation Reports describe the prognoses based on the impact of a hazard, government action, NGO action, CDERA action, and needs. These reports can be found at the CDERA website (http://www.cdera.org). When a country has been impacted, an impact assessment is carried out by country representatives in conjunction with CDERA personnel and the needs are determined. The CDERA CU then coordinates assistance in the short term and extracts important information. In the medium to long term all the information and knowledge acquired from country experiences are converted to interventions such as programs, projects, and model documents and advocacy to improve the capabilities and to improve community resilience at the national level. The information and knowledge accessed are also used to improve technology and request technical assistance and funding to fix problems that arose from the disaster.

As the mechanism for extracting knowledge from country experiences shows, CDERA does engage in learning through knowledge extraction and application of this knowledge to make improvements in its operations both at the national and regional level. CDERA learns mainly through its interactions with participating member states by observing and assessing their failures and successes primarily in the response phase of CDM.
It should be noted here that lessons CDERA learns are applied primarily short-term problem solving, such as trying to improve its response capabilities, staffing, and finances. These lessons are not used to critically assess what factors have led to the current problems in the first place. In other words, CDERA’s is adaptive learning, not generative learning (Senge, 1990). Without critically assessing the fundamental factors, the fixes CDERA applies will be only incremental, not profound, as Senge points out.

Senge (1990, 1994) defines the learning organization as one with an embedded philosophy for anticipating, reacting, and responding to change, complexity, and uncertainty. In his conceptualization, as I mentioned earlier, adaptive learning (“single-loop learning”) is a precursor to generative learning (“double-loop learning”). Adaptive learning focuses on current, short term problem solving at the expense of critical assessment of the conditions that led to the current results in the first place. Generative learning, on the other hand, focuses on redefining problems and questioning common sense thinking about them. To be successful, Senge (1990) argues, organizations must focus on generative learning because it is based on self questioning and ultimately leads to large scale improvement or transformations.

<table>
<thead>
<tr>
<th>Table 9: Summary of Common Features of Adaptive and Generative Learning</th>
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<tbody>
<tr>
<td><strong>Adaptive Learning</strong></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
</tbody>
</table>


- Problem solving focus
- Future strategies depend on prior experiences;
- Improvements are incremental
- Short term
- Passive engagement
- Strategic interventions
- Future strategies involve creating and solving own problems;
- Integration of new and old
- Improvements are transformative
- Long term
- Active engagements
- System-wide thinking, self-questioning
- Culture of learning, knowledge building – employees are learning agents for the organization

*Note:* These classifications are derived from the literature on learning.

Table 9 presents a summary of the common features of adaptive and generative forms of learning. I constructed the table using information from the literature on learning (Wimberg & Hollins, 2002; Argyris & Schon, 1974, 1978; Wittrock, 1992; Senge, 1990, 1994) and from my own understanding of the learning processes in CDERA.

From Table 9 we can deduce that adaptive and generative learning are diametrically opposed. Learning does not appear to run along a continuum; an organization learns either using one paradigm or another, with no positions in-between. This is the case, because the move from adaptive to generative learning constitutes a fundamental shift in an organization’s culture; it is not a gradual transition.

**Learning for Incremental or Transformational Improvements**

Table 10 provides a summary of CDERA’s primary sources of learning, how lessons learned from these sources are applied, and how they are applied. The last two columns of the table provide a classification of the knowledge application as adaptive or generative based on the literature on learning (check marks) presented earlier. More
detailed tables are presented in Appendices C to H. Appendix C breaks out learning from country experiences, outlines the application of learning, highlights the source of lessons and then classifies the learning as adaptive or generative. Appendix D breaks out learning from simulation exercises, outlines the application of learning, highlights the source of lessons and then classifies the learning as adaptive or generative. Appendix E breaks out learning from technical assistance, outlines the application of learning, highlights the source of lessons and then classifies the learning as adaptive or generative. Appendix F breaks out learning from best practices, outlines the application of learning, highlights the source of lessons and then classifies the learning as adaptive or generative. Appendix G breaks out learning from out-of-region experiences, outlines the application of learning, highlights the source of lessons and then classifies the learning as adaptive or generative. Appendix H breaks out learning from CDERA’s own self-reflection, outlines the application of learning, highlights the source of lessons and then classifies the learning as adaptive or generative. Each learning source and its classification as adaptive or generative will be discussed in detail below. I classified learning as adaptive if it is derived from passive engagement, if it focuses on problem solving that result in incremental improvements, and where future strategies are dependent on prior experiences. I classified learning as generative if it is derived from active engagement and self questioning based on a culture of learning. Generative learning results in strategic long term, and transformative interventions (see Table 10 for details).
### Table 10: Classifying Learning as adaptive or generative based on the application of knowledge from lessons learned

<table>
<thead>
<tr>
<th>Source of Lessons</th>
<th>Summary of Application</th>
<th>Adaptive Learning</th>
<th>Generative Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Practice</td>
<td>Assist strategic positioning; Integration of international benchmarks/indicators</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
| Country Experiences    | Improve aspects of the CDM cycle:  
                          -technology – communications, response  
                          -capacity – standards, search & rescue, shelter management  
                          -systems – planning and response for multi-island impacts | ✓ Mostly  
                          ✓ some  |                     |
| Out-of-region experiences | Improve Mitigation technology:  
                             -earthquake readiness, tsunami early warning systems  
                             Improvement in capability assessment | ✓                 |                     |
| CDERA Self-reflection | Formal mission and strategic operation changes – name change; Thematic cooperating groups to implement mission  
                          Coordination and harmonization Council | ✓                 |                     |
| Simulation Exercises   | Improve systems and processes – disaster coordination & logistics, communication | ✓                 |                     |
| Technical Assistance   | Improve technology & expertise: Risk reduction, Geographical Information Systems | ✓                 |                     |

*Note: Derived from data collected during interviews with CDERA employees and CDERA associates conducted May 14 to June 4, 2008. The check marks in the table represent placement marks of CDERA learning activities based on Senge’s (1990) definition of adaptive and generative learning presented earlier.*
Table 10 shows the various types of lessons from each of the sources of learning and how learning is applied. I will discuss each in turn. Country experiences came from three primary sources: from Hurricane Ivan via After Impact Reports; national level policies and programs observed by the CDERA CU or reported by the CDERA CU at its annual Board Meeting and lessons transferred to CDERA CU by CU officers who were involved in the planning of the 2006 Cricket World Cup held in several CDERA participating member states (see Appendix C). Lessons from hurricane Ivan essential helped to fill gaps in CDERA’s preparedness, mitigation and response capacity. The lessons also resulted in closer monitoring of participating member states by the CDERA CU to ensure that systems are in place to respond to a hazard impact. The response phase of CDM has benefited most from the interventions made as a result of Hurricane Ivan.

Based on its lessons from country experiences CDERA has integrated a housing policy from St. Kitts and Nevis into its regional mitigation standards that will help to cut down on property damage during a hazard (C. Herbert & P. Peets, personal communication, May 20, 2008).

Based on the definition of the two types of organizational learning and the application of the knowledge acquired one can clearly see that CDERA lessons from country experiences has largely been used for problem solving based on passive engagement. The knowledge acquired through country experiences has assisted CDERA in improving its response capabilities and mitigation efforts. Only the lessons learned during the 2006 planning and staging of the Cricket World Cup has contributed to generative learning at CDERA. During the staging of the 2006 Cricket World Cup CDERA employees acted as agents for the organization. Based on what was learned at
the Cricket World Cup CDERA extrapolated information on Contingency and logistics planning and through a dedicated officer at CDERA CU implemented much of this knowledge system-wide using pre-board meeting to disseminate information and guides to national disaster coordinators (E. Arthurs, personal communication, May 24, 2008; H. Prince, personal communication, May 24, 2008). CDERA officers responded to the external environment and corrected errors in the way logistics, mitigation planning, and response planning were done at CDERA resulting in marked improvement in these processes at CDERA. Employees saw the benefits that the Cricket World Cup could accrue to CDERA and so acquired knowledge and introduced these practices to CDERA (E. Arthurs, personal communication, May 24, 2008). This is the hallmark of generative learners.

The knowledge gained through simulation exercises is used in improving systems and processes throughout the CDERA system, primarily as a means of problem solving in the area of logistics, communication improvement, integrate response and planning and improving system-wide capacity (see Appendix D). This limited use of simulation activities is very short-sighted. Simulation exercises have the potential for generative learning. By posing different scenarios, attempting to solve problems, questioning the underlying assumptions of how things are done, simulation exercises could enable CDERA to question whether its mission of CDM will lead to the regional objectives of sustainable development. The simulation exercises (both tabletop and field) could also allow CDERA to be pre-emptive in planning for disasters; the successes, failures, and unintended consequence encountered during scenarios could lead CDERA to make systemic improvements. It is likely that some systematic changes would require
questioning of the underlying assumptions of the CDERA CDM mandate. Disaster management organizations operate in very complex and unpredictable environments. For these organizations to be successful, their underlying assumptions and *modus operandi* necessarily change over time because of the nature of the environment. Simulation exercises offer opportunities for transformative changes and improved performance as a result of these changes.

CDERA essentially uses the knowledge from Technical Assistance (TA) to improve practice and fill gaps in its capacity (see Appendix E). For instance, the Japanese project on flooding and technology has been used to improve the GIS and flood monitoring technologies in the Caribbean region. Table 10 also shows that TA has also been used to transfer knowledge on various aspects of disaster risk reduction. These applications of technical assistance demonstrate that CDERA utilizes adaptive, rather than generative learning.

Based on the application of lessons learned from Best Practice shows that CDERA utilizes Best Practices to improve the implementation of its CDM mandate and to integrate international standards into the regions disaster management practice (see Appendix F). In addition, best practices have helped CDERA to improve the existing way CDERA carries out its CDM functions and assess the regions readiness for a potentially catastrophic event. For instance, through best practices CDERA has improved systems, standards, and processes. However, some note missed opportunities for more fundamental systemic and long term changes based on best practices (S. DaBreo & Z. McLean, personal communication, May 20, 2008). These missed opportunities highlight the absence of a culture of learning at CDERA that would allow its employees and
leaders to pick up on opportunities for self-questioning and result in strategic interventions as a result of best practice.

From Table 10 we can glean that out-of-region experiences helped to push capacity building in specific areas including earthquake readiness, tsunami early warning system, and caused the CDERA member states to focus on the vulnerabilities of coastal communities (see Appendix G). These are all examples of adaptive learning. Adaptive learning is derived based on passive engagement and the lessons are geared towards problem solving rather than strategic long term interventions. Application of lessons learned based on adaptive learning result in incremental rather than transformative learning.

Self-reflections have resulted in fundamental changes at CDERA. Three important shifts in the way CDERA does business and organize itself result from self-reflection (see Appendix H). These shifts indicate that application of generative learning does accrue transformational benefits to CDERA.

First, the pending name change from CDERA to CDEMA will be the culmination of a fundamental shift for CDERA. In the late 1990s CDERA management started to question whether a response focus was the right mandate for the organization after a series of storms devastated the region (A. Mullings, personal communication, May 15, 2008). After a system-wide audit, intense focus on the issue in Board Meetings, the management decided that it was not. In 2001, CDERA adapted comprehensive disaster management to focus on all hazards and all phases of the hazards. This focus was intensified in 2006, when CDERA management again realized that they needed to
measure progress. The result was the adoption of the “enhanced comprehensive disaster management” strategy. These outcomes were the results of active questioning by the CDERA CU and system-wide questioning. Second, through self-reflection CDERA realized that using sectors via Thematic Coordinating Groups to drive the CDM efforts would be more beneficial than continuing to do so at the national level. The sector focus ensures that all the bases are covered and that more effective monitoring can take place. Information from sectors filter up to the national level, analyzed, documented and sent to the regional level, where a comprehensive assessment of achievements and shortcomings is done. Remedial action is then implemented in the CDERA system. This is a strategic intervention being made by CDERA to ensure that the results of CDM are achieved.

Although there is evidence in Table 10 (and Appendix H) that CDERA’s self-reflections facilitated generative learning, most of the information presented in the table shows largely adaptive applications of the lessons learned. For example, in Appendix VIII, interviewees lament the missed opportunities for transformative outcomes as a result of self-reflection. CDERA also conducts occasional retreats with important stakeholders to work on solving particular issues or problems. An example of these retreats is the one conducted with the Caribbean Center for Development Administration (CARICAD) to flesh out the terms of their collaborative initiatives (D. Gentles, personal communication, May 21, 2008). The CARICAD experience is an evidence of adaptive learning application in the area of changes to organizational form. Simon (1969) and Fiol and Lyles (1985) suggest that structure and learning are related in a circular manner: Structure is an outcome of learning, but also determines learning processes. A centralized mechanistic structure tends to reinforce past behaviors, while an organic, more
decentralized structure tends to allow shifts of beliefs and actions and facilitates greater learning because there is a reduction of the cognitive overload on the individual (Fiol & Lyles). CDERA is an organization that displays both network and bureaucratic structures at the regional and national levels; the national level is more bureaucratic than networked, while the regional level is more networked than bureaucratic. It is normal, then, that we see more adaptive learning at the national level. However, the CDERA CU needs to promote a culture of learning at the national level to allow for a culture of learning that would impact the organizational form of the NDOs and cause them to adapt more organic elements. This would allow for greater flexibility and resource access at the national level, and ultimately better performance.

CDERA’s self-reflection has the potential to promote generative learning, but, as Table 14 shows, it usually facilitates adaptive learning. The fact that there are some generative learning opportunities at CDERA is important because they can be built into a learning culture as soon as CDERA gets a handle on its problems and capability issues. Senge (1990) suggests that adaptive learning is a precursor to generative learning. A generative learning culture will not evolve by itself, however, it has to be deliberately crafted and nurtured. A culture of generative learning offers organizations the opportunity to thrive in a complex and unpredictable operating environment, which is the case for disaster management agencies.

Information and knowledge acquisition, management, and retention are significant early steps in learning. But knowledge building is a strategic, purposive, and deliberate process. It is a means to an end; the end is better performance and sometimes, depending on the environment, the organization’s very survival. Because learning is a
deliberate and strategic endeavor techniques must be put in place to acquire knowledge, management it, and retain it.

Knowledge Management and Retention

There is a lack of consensus on the definition of knowledge management in part because of a lack of agreement on how to define knowledge itself (Firestone & McElroy, 2003). In this dissertation I borrow a definition of knowledge management from Ron Young (1996, 2008), Chief Knowledge Officer of Knowledge Associates International, based in the United Kingdom. Young has dedicated over a decade to studying the topic of knowledge management and is known in knowledge management circles as an expert on the topic. Young (2008) notes that "Knowledge Management is the discipline of enabling individuals, teams and entire organizations to collectively and systematically create, share and apply knowledge, to better achieve their objectives."

Knowledge building is an important and strategic endeavor for CDERA. Several issues make knowledge management and retention particularly important for this organization. It is imperative that CDERA learns lessons from its various experiences and that it applies these lessons in such a way that the good practices are sustained and adopted system-wide to advance the goals of CDM and regional sustainability. In addition, it is equally as important to retain the knowledge gained so that it can guide future action and forestall future negative actions. Knowledge management and retention is important in the CDERA context because CDERA loses large portions of its workforce at a high rate. As a result, there is also a high rate of knowledge attrition. The big question is. How does CDERA effectively tackle this problem of knowledge attrition?
Currently, CDERA is undertaking to computerize most of its documents and technical reports to provide wide access (H. Prince, personal communication, May 21, 2008; D. Gentles, personal communication, May 21, 2008). But beyond this computerization for knowledge for dissemination purposes, there is no clear effort at knowledge management. CDERA needs to undertake a major knowledge management initiative that is not completely focused on information distribution, as the current strategy suggest. It needs a strategy that allows information to circulate efficiently throughout the CDERA system thereby reducing the impact of high attrition.

Organizations must capture as much knowledge from employees and others as possible and document their processes of operation as well as what worked and what did not work (Thomas, 2007). CDERA’s employees and its stakeholders need the right information at the right time. CDERA relies on information technology to get the information to users. However, the computerized information is not integrated, codified, or disseminated in a way that people can easily make linkages to various aspects of CDERA’s operation and history without help from CDERA’s documentation specialist. CDERA’s documentation specialist’s job it is that of managing information requests and computerization of information at the CU. In the individual territories there is very limited documentation on limited storage for archiving and cataloguing what documents exists, let alone to facilitate the management of knowledge. Jamaica has one of the most developed disaster management offices in the region, but even it has only a tiny resource center and limited computer storage capabilities. At the Jamaican resource center documents are not easily retrieved, most of the documents are in hard copy, and some documents cannot be found.
Information technology is the backbone of the knowledge retention and management function at CDERA, but it is only one component. Information technology must allow people to identify, find, and extract the information they want and allow them to contribute to the process of knowledge building while operating from geographically dispersed locations across the region. Wide involvement in knowledge building is especially critical when responding to hazards because knowledge comes from a wide cross-section of CDERA stakeholders, each providing a part of a huge and complex puzzle that must be pieced together for effective response. The better the information from ground zero of the hazard impact, the better the system performance ultimately. The same is true for on-going hazard and risk identification from community level up. Comfort (2002b) points out that reliable performance of information functions is important in disaster situations. In disaster situations the ability to access and process information and to innovate as a result is essential to effective performance. The first set of conditions needed to ensure good information access, processing and management includes technical structure that support information search and exchange (Comfort, 2002).

Having the technical structure that support information search and exchange is particularly challenging for disaster management entities with characteristics like those of Caribbean countries. These countries, although geographically dispersed, are linked together into one disaster management system, and they are located in an unpredictable environment. Yet at the same time the countries lack the financial and technical resources necessary to acquire the critical technical structure required to sustain information search and exchange. Given these sets of conditions in the Caribbean strategic information
collection, management and integration, and dissemination are essential. Because of the high staff attrition rates, knowledge management must be an essential focus of leadership who should inculcate a culture of documenting, analyzing and synthesizing success and failures in different scenarios based on past experience. The culture must be one that sees all CDERA stakeholders including new employees to the organization as important purveyors of information and users of knowledge. New employees for example should have on their desks a set of pertinent analyzed and summarized set of information, procedures and codes related to their functions. Then these users must be pointed to additional informational and knowledge resources that will assist them in their jobs. These steps are important in order to minimize information attrition when key personnel leave the organization at both regional and national levels.

Figure 12 below presents the learning process from country experiences as a step-wise iterative process of capturing information from experiences, then applying this information to organizational processes, and then refining and retaining knowledge acquired for future use.

Figure 12 A Postulated Model for Capturing, Applying and Retaining Information
Note: The learning process moves sequentially from the learning acquired from CDERA experiences via the different modes of learning described earlier in this chapter, to capturing of the information from the modes of learning to application and retention of knowledge. The figure was derived from my knowledge of research methods and based on my understanding of how CDERA captures information, and also on my understanding of the role that information plays in comprehensive disaster management.

Figure 12 depicts four stages for capturing and retaining lessons in unpredictable environments. At stage one, information exists in everyday experiences of disaster management or information is sought by CDERA to improve its operations. At stage two, information is analyzed, validated, and documented. To analyze information means to scrutinize information collected and make sense out of them. To validate information means to establish the accuracy, relevance, applicability of information by comparing with other relevant and available information. To document information means to keep a record of information collected using established standards, processes and formats that facilitate access. At stage three, the application of learning by organizational leaders result in policies, procedures and practice and at stage four, information is codified into appropriate categories and cross referenced and later archived. The archived information has to be secured so that it is not lost and so can later be promulgated in order that all involved with CDERA or wanting information on CDERA can access and use.

CHAPTER SUMMARY

This chapter presented information to answer the research question: “What role does organizational learning play in the evolutions of CDERA’s organizational form and organizational capacity?” Based on the findings on learning presented above we can conclude that CDERA does learn and that CDERA learns in several different learning modes: country experiences, best practices, simulation exercises, technical assistance,
CDERA self-reflection and out-of-region experiences. Based on the findings and analysis we also know that CDERA does apply many of the lessons it learns largely to improve its capacity. The role that learning plays in organizational capacity can be seen in concerted efforts made to acquire technology, technical resources and human resources to improve all the phases of comprehensive disaster management. We particularly saw these improvements during Hurricane Dean; there were marked improvements in response to Dean compared to the one in response over Hurricane Ivan, which had occurred three years earlier. We also saw an indication of learning impacting organizational form through CDERA self-reflection in CDERA’s experience with CARICAD to sort out their collaborative initiative. However, there was only a small indication of how organizational learning impact organization form.

Although we cannot categorically conclude that learning impacts organizational performance and in what ways, the differences in the performances of CDERA between Hurricanes Ivan and Dean suggest that learning may lead to improved performance. Sinkula, Baker, and Noordewier, (1997) caution that the success of learning activities should be assessed by using performance measures that would weigh results achieved against results expected; also a careful analysis of all the factors that could impact performance should be conducted. Using performance measures to judge whether learning impact performance was not the focus of this dissertation. Previous researchers have observed that there is some correlation between learning and performance. Stein and Smith (2009) find for example that when a company integrates information from internal and external sources into its operating systems, this improves performance. In the educational arena, Goodman and Beenen (2008) found that learning records can serve as
a diagnostic tool for student’s performance. They show how these records can help improve management education overall. Learning that is effective and knowledge that is relevant may lead to positive performance (Fiol & Lyles, 1985; Vera & Crossan 2003).

From the CDERA experience we can conclude that learning helped it to improve its performance mainly in the areas of organizational capability and resource acquisition. For instance, the lessons learned during Hurricane Ivan in 2004 allowed CDERA to fill gaps in its capabilities and resources. We also found that experiences from out-of-the-region helped CDERA build its mitigation infrastructure and early warning systems.

In order for learning to be leveraged to improve performance, CDERA must strategically collect, document, analyze, integrate and manage knowledge and facilitate broad access to knowledge. Broad access facilitates expansion of knowledge, which is critical in CDERA’s case because the rate of staff turnover is high.

With an understanding of the central role that information and knowledge play in effectiveness, CDERA should invest in its infrastructure for knowledge capture, analysis and integration, and promulgation. For these to happen, the leadership has to see knowledge access, management, and retention as important. They must also support a culture of information access, collection and application, and must therefore ensure that proper structures and systems are in place to facilitate information and knowledge collection, exchange and retention. Information technology is essential to support CDERA’s information and knowledge collection, exchange, and retention. CDERA is only beginning to seriously address its information technology needs at the regional level. Putting a system in place to allow for all employees and stakeholders to become actively
engaged in the improvement of the organization and act as agents for the organization is essentially for generative learning. If, for example, employees are learning agents for the organization, there will soon be a culture of learning and knowledge building. CDERA is a long way away from there, but seems to be well on its way.

Depending too heavily upon lessons from devastating country experiences, which is the main mode of learning in CDERA, is not viable in the long term. At the national level there are still great deficiencies in information capture, management, application, and retention. However, at the regional level there are definite signs of generative learning – there is some self reflection that have resulted in transformational changes at CDERA including delivery and monitoring of the CDM mandate through sectors as opposed to focusing on the country in general. CDERA would benefit greatly if it strove towards generative learning while maximizing the potential of adaptive learning. Information access, knowledge management and retention can greatly assist this cause of building a generative learning culture that could ultimately lead to effectiveness at CDERA.
CHAPTER 8 CONCLUSION & RECOMMENDATIONS

The purpose of this dissertation was to find out what factors contributed to the organizational effectiveness of CDERA in executing its comprehensive disaster management mandate. To achieve this purpose I utilized a systems approach and focused on the inputs to the CDERA disaster management system, the processes within the system, and the outcomes of the system’s workings. In my model organizational form and organizational capacity are the input variables. They influence organizational effectiveness through organizational processes and performance systems. Effectiveness is the outcome variable. Organizational learning is the feedback loop in the system; it influences organizational form and capacity. In my research I utilized the case study methodology to examine the variables in my model. I compared the historical performances of CDERA in two disasters: Hurricanes Ivan (2004) and Dean (2007). I utilized data I collected from face-to-face interviews and archival materials on CDERA in writing up my case study results.

The findings of my study confirm some of what is known in the field of disaster management and adds to the body of knowledge. It was already known that disaster management systems operate in complex environments, that the events disaster management systems handle are complex and unpredictable, and that the systems must be equipped with proper resources and expertise to prevent disasters from escalating. Two primary contributions of the dissertation are that it utilizes a holistic approach and that it is the first systematic study of CDERA.
Most of the studies on disaster management organizations utilize reductionist approaches (they focus on studying the components of a system separately) because of the need for simplicity and abstraction. The problem is, reality cannot be reduced to components when these components interact at different stages and different levels of the system. Although I had to construct my discussions in a reductionist manner out of necessity, I attempted to utilize a more holistic approach to assess the effectiveness of CDERA. An important consideration in the model I developed is that the input variables are intricately linked and must be examined together.

By examining the CDERA system this dissertation adds to the body of knowledge on disaster management, because before this there was no published academic work on the organization itself. Although this is a case study and it is difficult to make generalizations from case studies, the findings of this dissertation can be used to draw lessons for other disaster management systems.

A major lesson is that geography, national divisions in geographical regions, and the limitations in economic and human resources matter in disaster management. The Caribbean region is highly vulnerable to natural hazards because of its geography. Also CDERA is an organization of island states and territories with independent governments. These states and territories have developing economies and limited skilled human resources because of high rates of outmigration. Large percentages of the population of the Caribbean are vulnerable to natural disasters because they live along coastal areas that are susceptible to extensive damage from even small storms (UNDP, 2002). This geographic, political, and economic context requires complex organizational systems that can strategically leverage the limited national and regional capacities available and apply
the lessons learned from past experiences. The following sections summarize the main findings of the dissertation in this complex context of CDERA and draw some generalizations from them.

RESEARCH QUESTIONS REVISITED

Organizational Form and Organizational Capacity

My conceptual model suggests that organizational form and organizational capacity are the prerequisites for the effectiveness of disaster management, particularly in the context of CDERA. My findings confirm that both are important for effectiveness in fundamental ways. Organizational form and capacity are linked with each other in an almost circular manner. As the findings show, capacity is dependent on organizational form for support and organizational form impacts the capacities of disaster management systems, particularly resourcing, at its different levels. In the case of CDERA capacity was dependent on: (1) the positions of NDOs in their respective governmental bureaucracies (higher position result in better resourcing); (2) networking with other entities that can provide capabilities and resources necessary for comprehensive disaster management. The findings of my research also show that bureaucratic form of organization is important to ensure efficiency in coordinating responses to disasters, particularly by coordinating information sharing and retention. Bureaucracies are also good in implementing routine tasks in-between disasters.
To What Extent Does Organizational Form Play a Role in the Effectiveness of CDERA?

In order to be effective, disaster management entities must have both network and bureaucratic elements in their organizational forms. These entities are not like typical bureaucratic organizations that respond only to routine events, but they must work with and/or within the bureaucratic structures of governments. They respond to non-routine events, but they need to be routinely prepared for such events.

It is generally accepted in the disaster management literature that these organizations require organic structures that are highly adaptive to complex, non-routine tasks. However, for structural flexibility to work there must be proper coordination, control, and information management. Networks by themselves are insufficient to deliver on the goals of comprehensive disaster management. To achieve their goals, disaster management entities must be capable of responding rapidly, as well as of preparing long-term plans and implementing them in a disciplined fashion. In other words, these agencies need to conduct routine planning to prepare themselves for the non-routine tasks of disaster response and recovery. In addition, with so many players in the response phase of the Comprehensive Disaster Management cycle, there is a great need for coordination and control. In the case of Hurricane Ivan we saw that the lack of proper coordination by CDERA CU resulted in a failure in Grenada.

The organization theory literature shows that bureaucracies can excel in efficiently coordinating people, other resources, and information. Olsen (2005) reminds us that rules-based organizing does not always depict rigidity and inflexibility. A new type of bureaucracy has emerged since the 1990s; one that combines the best of bureaucracy and networks given the exigencies of the operating context. The hay-day of
traditional top-down bureaucracy ended a couple of decades ago, Olsen observes. But the bureaucratic form of organization is still necessary; it cuts down on gaps in delivery, which is essential if one wants to build capacity for service (Longford, 1986). Disaster management entities usually contain a central authority for functions including knowledge management and retention, monitoring and reporting, resource mobilization, and policy action. This feature is essential for effective performance in disaster management entities. Choi (2008) recommends that a combination of centralized planning and decentralized execution should be utilized to make disaster management agencies effective.

The CDERA experience in Hurricane Dean illustrates Choi’s point. Even as CDERA CU took on more bureaucratic features after Hurricane Ivan in an effort to become more results-focused, it continued to rely on a support network that included the Eastern Caribbean Donor Group; other neighboring territories; non-governmental organizations, such as the Red Cross; and regional entities, such as Pan-American Health Organization. CDERA utilized the organizing principle that it needed both agility of action and coordination and control to be effective. Based on the disaster management literature and my findings, I conclude that a hybrid organizational form (both bureaucratic and networked) is important for disaster management agencies to achieve effectiveness. It is my conclusion that neither bureaucratic structures nor networks alone will be suitable for organizations handling non-routine events; each form provides distinct advantages in the execution of comprehensive disaster management. For instance, bureaucracies are good at coordination and control and will work to keep the response and planning networks intact between disasters. They also keep the system
focused on preparedness, mitigation, response, and recovery objectives while other network members pursue their core business objectives in-between disasters that might not necessarily be associated with disaster management. Networks are good in response operations and the acquisition of resources, expertise, and technology needed to get ready for disasters, which is particularly important for small and developing economies. Both network and bureaucracy together are necessary and sufficient for organizing disaster management.

In addition, my findings show that organizational positioning within a national government’s bureaucracy is fundamental for effectiveness, because this determines the level of access to resources and decision making. I found that in the CDERA system many national disaster offices are not positioned sufficiently high in their respective governmental bureaucracies to influence access to resources, primarily financial resources. Low positioning in one country has negative repercussions throughout the CDERA system. As Hurricane Ivan showed, the system is as strong as its weakest parts.

**What Organizational Capacity Variables Have Been Most Influential on the Effectiveness of CDERA?**

Organizational capacity is an important determinant of effective performance. This is particularly true in the context of disaster management. A disaster occurs from the combination of conditions of vulnerability, and hazards coupled with insufficient capacity to reduce the potential negative consequences of risk posed by these (International Strategy for Disaster Reduction, 2009). After Hurricane Ivan, CDERA focused on improving its capacity. The improved performance in Hurricane Dean justified this focus. In my research I found that technical expertise, staffing, and
technology are the most important capacity components in the CDERA context. Leadership was not among the capacity components in my model, but during my research I learned that it is necessary to provide direction and guidance for the other capacity components. Leadership is the basis on which capacity rests, Anderson, Plotnikoff, Cook, Barrett and Smith (2008) argue. Ingraham, Joyce and Donahue (2005) point out that sound leadership contributes to management effectiveness in two important ways: “it influences each management system independently by setting priorities and influencing certain activities; and it marshals these systems to operate as elements of a coherent and cohesive administrative framework” (p. 17). Leadership sets people and resources to the right problem at the right time allowing for the integration of resources, processes, and programs and ultimately better outcomes.

My findings show that much of CDERA’s organizational capacity has been built through the strategic linkages with other organizations: disaster management organizations (for example FEMA) and specialized agencies (for example, Pan-American Health Organization, United Nations Commission for Latin America and the Caribbean, International Red Cross, Food and Agricultural Organization). These linkages are especially important for CDERA because it operates in a region with scarce economic and human resources. Organizations are parts of wider societies and maintain relationship with elements in their social environments to achieve their goals (Jurie, 2000). As a consequence, they cannot be examined in isolation from their environments (Franks, 1999). Also, as the literature points out, it is not necessary to retain all the needed resources in house; it may be more cost-effective to tap into the resources and capacities of other organizations for critical needs (Grindle & Hildreband, 1995).
Organizational form and capacity are linked in important ways. To achieve optimal effectiveness, organizations must be relatively well structured and relatively well positioned to access resources needed and must learn and apply learning to build capacity and organizational processes.

Of the multitudes of studies conducted on the ineffectiveness of disaster management agencies, organizational capacity has been the primary focus. There is undeniable evidence from these studies that capacity is indeed an important prerequisite for effectiveness. My dissertation shows that in the CDERA context, important capacity elements that are needed to ensure effectiveness are: attracting and retaining suitably qualified staff, technical expertise and access to technology. In addition, my dissertation shows that managing for results, transportation management, alignment and integration of values, mission, process and business continuity are also important capacity elements that need priority focus in order to build and maintain effectiveness.

Of the important capacity components mentioned above, my research shows that access to technology, technical expertise and attracting and retaining staff are essential for goal delivery. CDERA needs core staff with the requisite skills to accomplish the goal of comprehensive disaster management as outlined in Table 7 (Chapter 6). Developing technical expertise in the various components of CDM is necessary for the delivery of comprehensive disaster management. Properly training and incentivizing staff will boost CDERA’s in-house technical expertise. There is no need to house all critically needed technology within CDERA itself. This is neither practical nor efficient; there are often long periods in between disasters, and collaborating with partners who use the needed
technology in their line of work is more efficient. CDERA must leverage its position and work in the region to access and mobilize resources.

This dissertation showed that while important, capacity is not the only consideration for effectiveness; it is necessary, but by itself insufficient. Disaster management systems are complex and are reliant on not one, but many important components. Considerations for such aspects as structure, learning, and positioning are necessary and important.

What Role Does Learning Play In CDERA’s Choice of Organizational Form and Organizational Capacity Components for Effectiveness?

Learning is fundamentally important in disaster management, especially for organizations like CDERA, which are resource-constrained, but must manage disasters across disparate economies, land masses, governments, frequent hazard impacts and limited human resources. Learning is especially important in these settings, because it is necessary to rectify procedures for dealing with pressing problems in capacity and to regulate the system. Learning organizations can take effective actions because they expand their institutional capacities by applying the knowledge they acquired. Other researchers observe that there is some correlation between learning and performance (Fiol & Lyles, 1985; Vera & Crossan, 2003; Goodman & Beenen, 2008; Stein & Smith, 2009).

While I did not categorically demonstrate in this dissertation that learning leads to effectiveness, the improved performance of CDERA after Hurricane Ivan can be used to infer this conclusion. CDERA learned that it needed to improve its technical expertise
and human resources and the integration of its systems. The findings presented in the chapter on organizational learning confirm that CDERA does learn and that it applies learning to solve some problems in organizational capacity. As I demonstrated in Chapter 7, CDERA’s mode of learning is adaptive, not generative. However, CDERA seems to be poised to make a transition to a generative learning culture (see for example how CDERA extracts knowledge from country experiences, out-of-region experiences, and its own self reflection). Adaptive learning is the first step towards generative learning. First the organization works on filling gaps in its capacity (adaptive learning), then it works on building a culture of learning to systematically inquire and pre-empt problems and strategically position itself in its operating environment (generative learning). In generative learning, knowledge access and learning becomes a way of life for organizational members. This leads to more profound organizational changes than problem solving learning. It may be too early to tell at the writing of this dissertation, but I can speculate that CDERA is in a transitional stage. The fact that it created Thematic Coordinating Groups at the national and regional levels and that it is being reorganized and its name has been changed to the Caribbean Disaster and Emergency Management Agency (CDEMA) are indicators of this transition. The CDERA leadership has estimated that changing its name can better align the organization to access resources and better position itself to work with governments and donors to achieve the CDM objectives through better planning and preparation. There are some elements of deliberateness in CDERA’s transition: The name change from CDERA to CDEMA arose out of CDERA’s own self reflection on its future state and reorganizing to ready itself for this future state. In its reflections CDERA understood that the best way to minimize losses from the
increasing regional hazard vulnerability was to move from focusing on disaster response to focusing on comprehensive disaster management. In this CDERA realized that no matter how good it became at response, it would not be effective if it kept ignoring the other phases of comprehensive disaster management (planning and preparedness, mitigation and recovery). In addition, CDERA’s leadership understood that donors were moving from repeatedly funding the same types of losses to focusing on managing and reducing hazard risks. By actively scrutinizing how the environment was and is evolving and readying itself to deal with these changes and be effective CDERA is practicing generative learning.

**REVISIONS TO THE INITIAL CONCEPTUAL MODEL**

The findings of my dissertation indicate that the conceptual model I used needs to be revised to more correctly show what variables and their components are essential for effectiveness. Figure 13 presents the revised model for effectiveness in disaster management agencies.
The revised model includes all the components in the original model, but there are also important revisions. The revisions are highlighted with bold and italics in the figure. In the area of organization form, organizational positioning (of NDOs) must be included, because it influences resource access, access to decision making, and organizational visibility. The revised model also includes a linkage between the organizational form and organizational capacity boxes because the two are intricately linked as explained above. Organizational form and positioning are directly associated with resource access. The better placed organizations in the national government bureaucracies can access more resources than the lowly placed, less visible ones.
In the area of capacity, there are four important additions. These additions are management for results; integration and alignment of mission, vision, and practice; transportation management; and business continuity and succession planning. Managing for results allows for more effective monitoring, benchmarking, and measuring of outcomes. Integration and alignment of mission, vision, and practice allows for the components of the CDERA management system to function together towards a common purpose. All the phases of the Comprehensive Disaster Management (CDM) cycle must be integrated to achieve overall results, and CDM must be integrated into regional, national and organizational policies.

Transportation management refers to the number and type of transportation assets CDERA has. CDERA’s transportation assets are inadequate and cannot support rapid deployment. Small island developing states of the Caribbean pose particular transportation problems both in the sea and in the air. With so many islands scattered over such a large area, organizing transportation among them can be a logistical nightmare. For instance, it is not unusual for someone wanting to go from Trinidad to Jamaica to be required to fly to Miami to move between the two Caribbean islands because there are limited flights by regional commercial carriers. CDERA is still dependent on commercial carriers, which fly on their own schedules. This is a serious limitation on the response efforts, as responses in both hurricanes showed.

In the CDERA system, at both the regional and national levels, there is limited planning for business continuity and succession planning. With the lack of disaster management expertise in the region, the absence of succession planning could pose a
serious challenge for continuity and stifle development in the region, especially if the current CDERA CU coordinator and top managers should suddenly leave.

Building effectiveness in disaster management systems is a difficult endeavor, as the CDERA case shows. But disaster management agencies can be made more effective with a good understanding of what the important variables are and how they should be integrated. With this approach CDEMA can be made more effective. CDERA is not there yet, but the ongoing transition to CDEMA seems to indicate that it is poised to do so.

**RECOMMENDATIONS TO CDEMA (FORMERLY CDERA)**

Based on the foregoing discussions, I make the following recommendations to make CDEMA more effective in the future. Capacity is not the only important factor necessary for its effectiveness; organizational form and learning are also important. Assessing effectiveness in disaster management organizations requires a holistic approach that incorporates all these important factors and examines them together. The complexities of the operating environments of disaster management organizations, their tasks, and the wide scope of their operations require a complex framework to understand them.

A component of this framework should be organizational form. CDEMA needs to find ways to build a balanced hybrid organizational form that integrates both network and bureaucratic elements throughout the system. At the national level, CDEMA needs to leverage the existing bureaucratic organizational form to become more effective. This might be done by ensuring that a disaster management champion or other high level individual is located in the government bureaucracy. This in turn will facilitate better
integration of disaster management in national development planning with disaster management initiatives at the policy, strategy and implementation levels of operation nationally and regionally. Higher positions of the NDOS in their respective national bureaucracies is of paramount importance; with that they can gain access to necessary capacity and visibility, and facilitate a better integration and alignment of policies, strategies, and implementation activities.

CDEMA operates in a resource poor environment, which reduces the organization’s chances of achieving its mandate. CDEMA must focus on organizational learning, particularly generative learning to improve its performance. Learning is important because it helps CDEMA to strategically regulate its system, that is, use information to evaluate current state, predict future scenarios and generate pre-emptive response strategies to the evolving state. This means that CDEMA must focus more attention on facilitating the transition from adaptive or problem-solving learning to generative learning where the staff operate as agents of learning and are proactive in solving future problems. If this is done, transformational changes can be made in the CDEMA system that would make it better able to effectively fulfill its mandate. To build a learning organization (generative learning), CDEMA must pay particular attention to developing knowledge management and retention systems. It needs to collect and have access to the right information at the right time. Efforts must be made not only in information capture, but also in integrating, codifying, and disseminating knowledge throughout the CDEMA system.
LIMITATIONS OF THE STUDY

There are two important components of a disaster management system that I did not focus on specifically in my empirical research: politics and organizational processes. As I discussed earlier, in my early conceptualization politics was a contextual variable. I did not include it in conceptual model, because without a clear definition of what it means and a clear conceptualization of how different forms of politics affect organizational processes, its inclusion would not be meaningful. Consequently, I did not study the effects of politics specifically, but referred to them in my discussions as they became relevant.

I did present the process variables in my model, but did not specifically study them. I recognized that they would be important in transferring the effects of organizational capacity and organizational form variables to organizational effectiveness and made some references to them in the context of my discussions. Process variables are important for effectiveness because, with guidance from leadership, they transform inputs into outputs. Great care must be taken about the processes and they need to be studied with a more focused design than mine.

My study also has methodological limitations. This was a single case study methodology, which is ideal for an exploratory inquiry into a little researched area, but it limits the researcher in making generalizations. A comparative case study approach would improve the generalizability of the findings, but it was not feasible because of the demands it would have placed on my time and resources. Another weakness is that the study focused on CDERA’s performance in only two disasters (Hurricanes Ivan and
Because of the high attrition rates at CDERA and the limited documentation of disaster events pre-1991, the two disasters offered the most complete sets information for my research. A study of the entire history of CDERA would undoubtedly yield better results.

**RECOMMENDATION FOR FURTHER STUDIES**

It is clear that organizational form, organizational capacity, and organizational learning are important components of the effectiveness of CDERA. However, it is not clear how important they are as predictors of effectiveness in general. At this stage there is an argument to be made for further research to determine the level of importance of each variable with studies on other disaster management systems around the globe. Such studies can help us understand if there are other variables of importance.

Effectiveness in disaster management organizations is elusive, but it is achievable. As the CDERA case shows disaster management is a complicated endeavor requiring a complex web of relationships, complex organizational structures, an ability to strategically leverage limited resources, and an ability to learn as an organization. All these must be considered simultaneously to make disaster management systems perform effectively. But empirical studies inevitably need to focus on parts of the complex whole of disaster management systems. Of those parts, organizational capacity has been studied quite extensively and my research confirmed some of the earlier findings and added to them.

Organizational form and learning need further attention. CDERA has been both a bureaucracy and a network; these forms can help meet the multiple demands its complex
environment imposes on it. The issue is to find out the particular configurations of the bureaucratic and networked relationships within and around CDEMA to make its operations more effective. This would require deeper studies into organizational form, both in CDEMA and other disaster management organizations. Organizational learning is a vast area of research. The degree to which CDEMA transforms itself into a generatively learning organization and the details of this transformation should be investigated in future studies.

CONCLUDING THOUGHTS

Disasters are the result of a lack of capacity to respond adequately to hazards. Recurring disasters significantly hamper development, with detrimental effects, especially in developing countries. The influence of disasters is global and pervasive because they impact every aspect of human life – social, economic, political and psychological and governance. Therefore having adequate capacity in disaster management systems is mission critical to human development. On that basis, it is important that we continue to systematically study disaster management for both intellectual and practical reasons.

Intellectually, it is necessary to expand the disaster management knowledge base and develop theories to complement the tools and approaches used to plan for and manage development. There currently are encouraging signs in the academe: (1) more and more universities are establishing courses of study and schools in emergency management; (2) the American Society for Public Administration has created a section on emergency management and is promoting comparative research projects in the area.
Practically, improved effectiveness in disaster management translates directly to improving the economic situation of societies, especially those in the developing world including small island developing states. Effective disaster management has the potential to increase the rate of development in developing countries because it minimizes the time and resources used to rebuild the same infrastructure. This in turn ultimately reduces income disparities among peoples since more resources are available for other pressing developmental concerns. We still have a far way to go in achieving the above. However, on the bright side, the increasing availability of ICT and other communication and mitigation technology and the connectivity and movement of skills and expertise in this global village suggest that disaster management will receive the attention that is required to mitigate risks and consequently losses. The merging of new disaster management programs within the academe and current focus on disaster risk reduction by international agencies working in the field is creating a good environment for pursuing effectiveness in disaster management systems.
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Kasper Reinink


LIST OF ARCHIVAL DOCUMENTS

Reports, Technical Reports & Conference Papers

Bisek, Jones, Ornstein (2001) A strategy and results framework for Comprehensive Disaster Management in the Caribbean
http://www.cdera.org/doccentre/publications/CDM_Strategy_FDF.pdf. CDERA Archives, St. Michaels, Barbados

Bisek, Jones, Ornstein (2001). Strategy and Results Framework, Annex 1 Results Framework

http://www.cdera.org/doccentre/publications/dmmatrix.pdf. CDERA Archives, St. Michaels, Barbados


Situation Reports


Project Resources


Flyers


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Press Release


Databases


Web Pages

### Appendix A: Matrix of Interview Questions, Interviewees & Interview Date

<table>
<thead>
<tr>
<th>Questions</th>
<th>Interviewees/Dates of Interviews</th>
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<tbody>
<tr>
<td>1. In your opinion, is CDERA a network or a bureaucracy?</td>
<td>H. Truitt, NDC, Montserrat 14-May-08</td>
</tr>
<tr>
<td>2. Why do you say so?</td>
<td>Michelle Edwards (ODPEM) 16-May-08</td>
</tr>
<tr>
<td>3. How often do the NDOs connect with the CDERA CU, other NDOs?</td>
<td>Callistus Coloher (CDERA CU) 26-May-08</td>
</tr>
<tr>
<td>4. What about?</td>
<td>Elizabeth Riley (Program Manager, CDERA CU) 27-May-08</td>
</tr>
<tr>
<td>5. Are the levels of contacts the same in-between disasters and during a disaster?</td>
<td>Rom Jackson (NDC JA) 16-May-08</td>
</tr>
<tr>
<td>6. In your office, who decides on important matters concerning your work—e.g., how resources are used?</td>
<td>D. Gentles (CDERA CU) 21-May-08</td>
</tr>
<tr>
<td>7. Does CDERA CU make decisions about your work at the national level?</td>
<td>Judy Thomas (NDC B’dos) 21-May-08</td>
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Organizational Form

<table>
<thead>
<tr>
<th>Questions</th>
<th>Interviewees/Dates of Interviews</th>
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<tr>
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## B. Organizational Capacity

### Questions

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<tr>
<th>Questions</th>
<th>Interviewees/Dates of Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. How would you describe the capacity of CDERA to respond to disasters in areas of human resources, technology, leadership, finances, technical assistance?</td>
<td>H. Truitt (NDC, Montserrat), M. Edwards (ODPEM), J. Collymore (CDERA CU) Coordinator, E. Riley (Program Manager, CDERA CU), R. Jackson (NDC JA) 29-May-08, D. Gentles (CDERA CU), A. Thomas (NDC NH), T. Prince (CDERA CU), C. Herbert (NDC St. Kitts &amp; Nevis), P. Peets (Senior Employee, St. Kitts &amp; Nevis) 08-May-08, Y. Chakallal (CIDA), S. Russell (NDC, Bahamas), W. Sweet (UWI Professor), A. Harris (Technology Officer, CU) 04-May-08, A. Cook (Program Officer, CDERA CU), B. Arthurs (CDERA CU Technical Support), I. King (Author, CDERA Baseline) 04-May-08.</td>
</tr>
<tr>
<td>9. Which one(s) do you think most important?</td>
<td>H. Truitt (NDC, Montserrat), M. Edwards (ODPEM), J. Collymore (CDERA CU) Coordinator, E. Riley (Program Manager, CDERA CU), R. Jackson (NDC JA) 29-May-08, D. Gentles (CDERA CU), A. Thomas (NDC NH), T. Prince (CDERA CU), C. Herbert (NDC St. Kitts &amp; Nevis), P. Peets (Senior Employee, St. Kitts &amp; Nevis) 08-May-08, Y. Chakallal (CIDA), S. Russell (NDC, Bahamas), W. Sweet (UWI Professor), A. Harris (Technology Officer, CU) 04-May-08, A. Cook (Program Officer, CDERA CU), B. Arthurs (CDERA CU Technical Support), I. King (Author, CDERA Baseline) 04-May-08.</td>
</tr>
<tr>
<td>10. Tell me about CDERA’s capacity gaps.</td>
<td>H. Truitt (NDC, Montserrat), M. Edwards (ODPEM), J. Collymore (CDERA CU) Coordinator, E. Riley (Program Manager, CDERA CU), R. Jackson (NDC JA) 29-May-08, D. Gentles (CDERA CU), A. Thomas (NDC NH), T. Prince (CDERA CU), C. Herbert (NDC St. Kitts &amp; Nevis), P. Peets (Senior Employee, St. Kitts &amp; Nevis) 08-May-08, Y. Chakallal (CIDA), S. Russell (NDC, Bahamas), W. Sweet (UWI Professor), A. Harris (Technology Officer, CU) 04-May-08, A. Cook (Program Officer, CDERA CU), B. Arthurs (CDERA CU Technical Support), I. King (Author, CDERA Baseline) 04-May-08.</td>
</tr>
<tr>
<td>11. What efforts are being made to bridge these gaps?</td>
<td>H. Truitt (NDC, Montserrat), M. Edwards (ODPEM), J. Collymore (CDERA CU) Coordinator, E. Riley (Program Manager, CDERA CU), R. Jackson (NDC JA) 29-May-08, D. Gentles (CDERA CU), A. Thomas (NDC NH), T. Prince (CDERA CU), C. Herbert (NDC St. Kitts &amp; Nevis), P. Peets (Senior Employee, St. Kitts &amp; Nevis) 08-May-08, Y. Chakallal (CIDA), S. Russell (NDC, Bahamas), W. Sweet (UWI Professor), A. Harris (Technology Officer, CU) 04-May-08, A. Cook (Program Officer, CDERA CU), B. Arthurs (CDERA CU Technical Support), I. King (Author, CDERA Baseline) 04-May-08.</td>
</tr>
<tr>
<td>12. How does the CDERA CU support your national office?</td>
<td>H. Truitt (NDC, Montserrat), M. Edwards (ODPEM), J. Collymore (CDERA CU) Coordinator, E. Riley (Program Manager, CDERA CU), R. Jackson (NDC JA) 29-May-08, D. Gentles (CDERA CU), A. Thomas (NDC NH), T. Prince (CDERA CU), C. Herbert (NDC St. Kitts &amp; Nevis), P. Peets (Senior Employee, St. Kitts &amp; Nevis) 08-May-08, Y. Chakallal (CIDA), S. Russell (NDC, Bahamas), W. Sweet (UWI Professor), A. Harris (Technology Officer, CU) 04-May-08, A. Cook (Program Officer, CDERA CU), B. Arthurs (CDERA CU Technical Support), I. King (Author, CDERA Baseline) 04-May-08.</td>
</tr>
<tr>
<td>13. What are the weakest and strongest areas of CDERA’s capacity at the regional and national levels?</td>
<td>H. Truitt (NDC, Montserrat), M. Edwards (ODPEM), J. Collymore (CDERA CU) Coordinator, E. Riley (Program Manager, CDERA CU), R. Jackson (NDC JA) 29-May-08, D. Gentles (CDERA CU), A. Thomas (NDC NH), T. Prince (CDERA CU), C. Herbert (NDC St. Kitts &amp; Nevis), P. Peets (Senior Employee, St. Kitts &amp; Nevis) 08-May-08, Y. Chakallal (CIDA), S. Russell (NDC, Bahamas), W. Sweet (UWI Professor), A. Harris (Technology Officer, CU) 04-May-08, A. Cook (Program Officer, CDERA CU), B. Arthurs (CDERA CU Technical Support), I. King (Author, CDERA Baseline) 04-May-08.</td>
</tr>
<tr>
<td>14. Who are main collaborators</td>
<td>H. Truitt (NDC, Montserrat) 25-May-08, M. Edwards (ODPEM) 20-May-08, J. Collymore (CDERA CU) Coordinator 24-May-08, E. Riley (Program Manager, CDERA CU) 24-May-08, R. Jackson (NDC JA) 25-May-08, D. Gentles (CDERA CU) 08-May-08, A. Thomas (NDC NH) 08-May-08, T. Prince (CDERA CU) 08-May-08, C. Herbert (NDC St. Kitts &amp; Nevis) 08-May-08, P. Peets (Senior Employee, St. Kitts &amp; Nevis) 08-May-08, Y. Chakallal (CIDA) 08-May-08, S. Russell (NDC, Bahamas) 08-May-08, W. Sweet (UWI Professor) 19-May-08, A. Harris (Technology Officer, CU) 19-May-08, A. Cook (Program Officer, CDERA CU) 19-May-08, B. Arthurs (CDERA CU Technical Support) 19-May-08, I. King (Author, CDERA Baseline) 19-May-08.</td>
</tr>
</tbody>
</table>
### Appendix A

**Matrix of Interview Questions, Interviewees & Interview Date (Continued)**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Interviewees/Dates of Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizational Learning</strong></td>
<td></td>
</tr>
<tr>
<td><strong>15</strong> Do you think CDERA learns?</td>
<td>x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td><strong>16</strong> Does CDERA learn from its past experiences?</td>
<td>x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td><strong>17</strong> How does CDERA learn?</td>
<td>x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td><strong>18</strong> What does CDERA learn?</td>
<td>x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td><strong>19</strong> How does CDERA apply its learning?</td>
<td>x x x x x x x x x x x x x x x</td>
</tr>
<tr>
<td><strong>20</strong> Who among these is your chief collaborator? Why?</td>
<td>x x x x x x x x x x x x x x x</td>
</tr>
</tbody>
</table>
APPENDIX B: Informed Consent Form for Social Science Research

The Pennsylvania State University

Title of Project: Building effectiveness in Disaster Management Agencies: the case of CDERA

Principal Investigator: Denise Thompson; 676 Blue Mountain Lake, East Stroudsburg, PA 18301; ddt113@psu.edu; 570 350 5262

Advisor: Dr. G. Morcol; School of Public Affairs, Pennsylvania State University; 777 W. Harrisburg Pike, Middletown PA 17057; gxm27@psu.edu, telephone number: 717-948-6126

1. Purpose of the Study:
The purpose of this research is to find out what factors contribute to effectiveness in emergency management organizations when handling disasters. In this research, I will focus on how organizational form, organizational capacity and organizational learning affect effectiveness in the Caribbean Disaster and Emergency Response Agency (CDERA). I will ask you a series of questions that will help me understand the functioning and effectiveness of CDREA.

2. Procedures to be followed:
Our face-to-face interview may last 30 minutes to one hour, depending on how elaborate you wish to be in your answers. I will audiotape the interview. I will later transcribe the taped interview and interpret its contents. I will report the cumulative results of my interviews to you and others in a narrative format.

In my reporting of the results, I may need to identify you with your name or your work title. If you wish not to be identified in either way, please let me know by noting that at the end of this consent form and signing your note. Then I will honor your request and keep your anonymity in the best way possible.

Once the research is complete, if you choose to receive a draft copy of the research to peruse, I will either mail it to you or send you a copy by e-mail.

3. Benefits:
I will be doing this research in a time period when the occurrence and impact of disasters have increased and the need for effective responses by disaster response and mitigation agencies to such disasters has become an urgent need. At the same time public administration scholars continue to study disaster management agencies such as FEMA in
the USA, particularly after 9/11 and Katrina, in an effort to broaden our understanding of that agency’s performance. Scholarly studies on CDERA are non-existent, even though the scale of disasters plaguing small Caribbean territories have intensified. Therefore, the topic of the research I propose holds significance on both a practical and a theoretical level. On the practical level, this research will provide some insights into how disaster agencies, particularly CDERA, can organize themselves to effectively respond to non-routine events. The research will also provide an analytical tool for assessing the affects of the organizational form and capacity variables on effectiveness.

On the theoretical level, my research will add to the body of literature on networks and bureaucracies as organizational forms. It has been well documented that more and more governmental organizations are conducting work in network arrangements, even though governmental organizations are traditionally built on the bureaucratic, rule-based designs (for example see Perrow, 1993; Jesserand, Teo, & Cleg, 2006; O’Toole & Meier, 2004; Considine & Lewis, 1999). That being the case, then, what is the best theoretical lens for assessing effectiveness in disaster agencies? This will be a central question in this dissertation. The research will also add to the capacity building literature in public policy and management. Specifically the research will focus on what capacities should public organizations seek to build in order to be able to effectively respond to non-routine events, particularly in disasters. My research will also help to build a body of academic work on CDERA that will aid our understanding of the agency’s organizational form, capacity and how these help to foster organizational effectiveness. The research provides potential benefit by way of reduced loss of life, damage, the cost of responding to disasters even as they frequency of occurrence increases because it focuses on effectiveness in disaster agencies.

As a result, while the research has no real benefit to participants individually, it potentially offers real benefits to society in general.

4. Duration/Time:

From thirty minutes to one hour is needed to complete the interview. The interview will take place at a time that is convenient for you.

5 Statement of Confidentiality: Your participation in this research is confidential. will store the interview tapes in a locked cabinet in the basement of my home in East Stroudsburg, Pennsylvania, U.S.A. I will keep the transcriptions of the interview on the hard disk of my computer, which will be accessible only by me.

All recordings from the interview will be destroyed by the year 2018, ten years after the completion of this research.
6. **Right to Ask Questions**: Please contact Denise Thompson at telephone number 1-570-350-5262 with questions, complaints or concerns about this research.

   Significant new findings developed during the course of the research, which may relate to the participant's willingness to continue in the study will be provided if and when they become available.

7. **Voluntary Participation**: Your decision to be in this research is voluntary. You can stop your participation at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits you would receive otherwise.

   You must be 18 years of age or older to consent to take part in this research study. If you agree to take part in this research study and the information outlined above, please sign your name and indicate the date below.

   You will be given a copy of this consent form for your records.

8. Please indicate your willingness to be recorded during this interview

   ______ I do give my permission to be AUDIO taped.

   ______ I do not give my permission to be AUDIO Taped.

9. Please also indicate whether you are willing to be quoted in publications/presentations

   _________ I do give my permission for portions of this interview to be directly quoted in publications/presentations.

   _________ I do NOT give my permission for portions of this interview to be directly quoted in publications/presentations.

_____________________________________________  _____________________
Participant Signature              Date

_____________________________________________  _____________________
Person Obtaining Consent             Date
## Appendix C: Classifying Learning from Country Experiences as Adaptive or Generative

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Source of Lesson</th>
<th>Application of learning from this source</th>
<th>Adaptive Learning</th>
<th>Generative learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Mullings</td>
<td>- Hurricane Ivan; - <em>After Impact Reports</em>; - <em>Country Progress Reports</em></td>
<td>- to improve preparedness monitoring function; - improve preparedness, mitigation and response capacity</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>M. Edwards</td>
<td>- Hurricane Ivan; - Lessons learned from Jamaica applied to other countries</td>
<td>- improve technical &amp; technological capabilities</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>R. Jackson</td>
<td>- Hurricane Ivan; - Lessons learned from Jamaica</td>
<td>- build the search &amp; rescue &amp; other response capabilities</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>Jamaica Parish Director</td>
<td>- Hurricane Ivan: now shelter management program in place at community level with good shelter manager in place</td>
<td>- improve the CDERA’s overall shelter management capabilities</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>F. Mulling</td>
<td>- Ivan - <em>After Impact Reports</em> inform capability gaps</td>
<td>- Improving Monitoring; - improve preparedness and response capabilities</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>C. Herbert &amp; P. Peets</td>
<td>- Ivan; - Housing Policy from St. Kitts experience; - Montserrat volcano experience</td>
<td>- improve preparedness capabilities - improve mitigation standards Slight Improvement in technological capabilities</td>
<td>√</td>
<td>-</td>
</tr>
</tbody>
</table>
**Appendix C**

**Classifying Learning from Country Experiences as Adaptive or Generative (continued)**

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Source of Lesson</th>
<th>Application of learning from this source</th>
<th>Adaptive Learning</th>
<th>Generative learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>H. Prince</td>
<td>- Ivan: developed system to use other country coordinators to assist impacted countries; - Caribbean staging of World Cup 2006 Cricket competition helped with logistical planning; - Regional Response Teams</td>
<td>- improve response capacity - instituted System-wide planning &amp; response mechanisms - Improve response capabilities - communications*</td>
<td>(\sqrt{\ })</td>
<td>-</td>
</tr>
<tr>
<td>Horatio Truitt</td>
<td>- Ivan</td>
<td>- improve technology</td>
<td>(\sqrt{\ })</td>
<td>-</td>
</tr>
<tr>
<td>S. DaBreo &amp; Z. McLean</td>
<td>- Ivan - BVI; Jamaica as region leaders</td>
<td>- improve capacity - integrating regional best practice esp. in hazard mitigation</td>
<td>(\sqrt{\sqrt{\ }\ })</td>
<td>-</td>
</tr>
<tr>
<td>E. Riley</td>
<td>- Ivan made the region give thought to multi-island impacts and responses; Strengthen regional and response planning; - Eastern &amp; Western Carib. Donor Group functioning and integrated into operations orders; - now have plan in place for functioning of the CU in multi-island impacts</td>
<td>- improve multi-island response coordination - planning for multi-island impacts-contingency planning - improve response and recovery systems; - improve financing of response and mitigation efforts - implementation of contingency planning</td>
<td>- (\sqrt{\ })</td>
<td>-</td>
</tr>
<tr>
<td>E. Jones</td>
<td>- Hurricane Ivan</td>
<td>- boost response capabilities</td>
<td>(\sqrt{\ })</td>
<td>-</td>
</tr>
<tr>
<td>A. Mullings</td>
<td>- Hurricane Ivan; - <em>After Impact Reports</em> Country</td>
<td>- Improve preparedness monitoring function;</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note: Derived from data collected during interviews with CDERA employees and CDERA associates conducted May 14 to June 4, 2008*
### Appendix D: Classifying Learning from Simulation Exercises as Adaptive or Generative

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Simulation Type</th>
<th>Application of learning from this type of Simulation</th>
<th>Adaptive Learning</th>
<th>Generative learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Mullings</td>
<td>-CDERA sponsored Region Rap Table Top exercise</td>
<td>- boost response capacity: including technology and how to use them</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>E. Arthurs</td>
<td>SOUTHCOM Exercise FAHUM Country Exercises - Belize</td>
<td>- Response Coordination-logistics; - Building communication capacity; - checking integration of response &amp; planning; Early warning systems &amp; technology application</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Prof. Suite</td>
<td>SOUTHCOM need more in plan for future events</td>
<td>- improve response capacity</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>C. Herbert/P. Peets</td>
<td>SOUTHCOM Exercise FAHUM</td>
<td>- improve communications, technology, coordination</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>H. Truitt</td>
<td>Exercise FAHUM - Montserrat country exercises</td>
<td>- improve regional disaster response coordination, and communication through various scenarios</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>L. Riley</td>
<td>-Region Rap</td>
<td>- Improve communications</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>A. Mullings</td>
<td>SOUTHCOM</td>
<td>- Improve technical skills</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note:** Derived from data collected during interviews with CDERA employees and CDERA associates conducted May 14 to June 4, 2008. The check marks in the table represent placement marks of CDERA learning activities based on Senge’s (1990) definition of adaptive and generative learning presented earlier.
### Appendix E: Classifying Learning from Technical Assistance as Adaptive or Generative Learning

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Technical Assistance Type</th>
<th>Application of learning from this type of technical assistance</th>
<th>Adaptive Learning</th>
<th>Generative learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Mullings</td>
<td>Japanese Project on Flooding &amp; Technology</td>
<td>-improve GIS and other technology</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>R. Gentles</td>
<td>Japanese Project on Flooding &amp; Technology</td>
<td>-improve GIS and other technology</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>W. Suite</td>
<td>-need more FEMA secondments SouthCom; CIDA-risk management</td>
<td>-improve disaster management expertise of disaster coordinators</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>Y. Chakallal</td>
<td>-Experts provided by CIDA-risk management</td>
<td>-build CU risk reduction expertise -HR</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>C. Herbert/P. Peets</td>
<td>-participation in international events</td>
<td>-Build HR capabilities at national and regional levels for various CDM components -expose staff to different thinking &amp; exposure to disaster management knowledge</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>H. Truitt</td>
<td>I travel to various countries to assess their technological capabilities and suggest improvements; I also train personnel in the use of new technologies</td>
<td>-Improve country level technological capabilities to prepare and respond to hazards</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>A. Mullings</td>
<td>Japanese Project on Flooding &amp; Technology</td>
<td>-improve GIS and Flood monitoring technology</td>
<td>√</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note:** Derived from data collected during interviews with CDERA employees and CDERA associates conducted May 14 to June 4, 2008. The check marks in the table represent placement marks of CDERA learning activities based on Senge’s (1990) definition of adaptive and generative learning presented earlier.
### Appendix F: Classifying Learning from Best Practices as Adaptive or Generative Learning

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Best Practices Type</th>
<th>Application of learning from this Best Practice Type</th>
<th>Adaptive Learning</th>
<th>Generative learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Edwards</td>
<td>Intl orgs; Jamaica</td>
<td>- improve disaster management systems and capabilities</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>R. Jackson</td>
<td>Hyogo Framework for Action; CIDA, USAID, EU; Jamaica</td>
<td>- help with strategic positioning of Caribbean globally; - integration of indicators to CDM - assist with integration of CDM components - Exposure to international technical standards in the field including response - Access to Finances - access to knowledge and expertise.</td>
<td>✓ ✓ ✓</td>
<td>- -</td>
</tr>
<tr>
<td>R. Gentles</td>
<td>BVI, Jamaica; UN ISDR, Hyogo</td>
<td>- help to shore up understanding of the CDM functions; - Integration of international disaster management standards into Caribbean standards via CDERA CU - access to technology - improvement in regional technical skills</td>
<td>✓ ✓</td>
<td>- -</td>
</tr>
</tbody>
</table>

*Note: Derived from data collected during interviews with CDERA employees and CDERA associates conducted May 14 to June 4, 2008. The check marks in the table represent placement marks of CDERA learning activities based on Senge’s (1990) definition of adaptive and generative learning presented earlier.*
## Appendix F

### Classifying Learning from Best Practices as Adaptive or Generative Learning (continued)

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Best Practices Type</th>
<th>Application of learning from this Best Practice Type</th>
<th>Adaptive Learning</th>
<th>Generative learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y. Chakallal</td>
<td>International conferences and seminars; Hyogo, UN ISDR, CIDA</td>
<td>Exposure to international disaster management standards in Caribbean practice</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>S. DaBreo &amp; Z. McLean</td>
<td>-BVI grading tool -CHAMPS Project provided an opportunity to learn, but did not help to assess readiness of agencies working in disaster management; -miss many of the lessons from best practices</td>
<td></td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>E. Jones</td>
<td>-Intl Best Practice; Hyogo Agencies such as UN ISDR, CIDA, DFID, USAID/OFDA</td>
<td>Improve CDM functions – improved capacity; -Helps with access to funding</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>M Edwards</td>
<td>-Intl orgs - Hyogo; Jamaica</td>
<td>Improve systems, structures, processes for CDM</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note: Derived from data collected during interviews with CDERA employees and CDERA associates conducted May 14 to June 4, 2008. The check marks in the table represent placement marks of CDERA learning activities based on Senge’s (1990) definition of adaptive and generative learning presented earlier.*
## Appendix G: Classifying Learning from Out-of-Region Experiences as Adaptive or Generative Learning

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Type of Out of Region Experiences</th>
<th>Application of learning from this type of Out-of-Region Experience</th>
<th>Adaptive Learning</th>
<th>Generative learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. Jackson</td>
<td>2008 China Earthquake; -2007 Indian Earthquake; -SE Asian Tsunami</td>
<td>- help with assessment of capacity deficiencies; - helped with development of a regional early warning system; - led to the Earthquake Readiness Capacity Building Project; - little learning that leads to sustainability</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CIDA, EU, Japanese investing in CDM in the region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Mulling</td>
<td>-2008 China Earthquake; -2007 Indian Earthquake; -SE Asian Tsunami</td>
<td>- help with assessment of capacity deficiencies; - helped with development of a regional early warning system; - led to the Earthquake Readiness Capacity Building Project</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Y. Chakallal</td>
<td>2008 China Earthquake; -2007 Indian Earthquake; -SE Asian Tsunami and others</td>
<td>- helped with development of a regional Tsunami Early Warning System</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>C. Herbert/P. Peets</td>
<td>-2008 China Earthquake; -2007 Indian Earthquake; -SE Asian Tsunami</td>
<td>- help with assessment of capacity deficiencies; - helped with development of a regional Tsunami Early Warning System; - led to the Earthquake Readiness Capacity Building Project</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>
### Appendix G

Classifying Learning from Out of Region Experiences as Adaptive or Generative Learning (continued)

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Type of Out of Region Experiences</th>
<th>Application of learning from this type of Out-of-Region Experience</th>
<th>Adaptive Learning</th>
<th>Generative learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. Riley</td>
<td>-2008 China Earthquake; -2007 Indian Earthquake; -SE Asian Tsunami</td>
<td>- help with assessment of capacity deficiencies; -helped with development of a regional early warning system; -led to the Earthquake Readiness Capacity Building Project &amp; related geological hazards; -improved focus on contingency planning-HR, Technology</td>
<td>√</td>
<td>-</td>
</tr>
<tr>
<td>E. Jones</td>
<td>-2008 China Earthquake; -2007 Indian Earthquake; -SE Asian Tsunami</td>
<td>- help with assessment of capacity deficiencies; -helped with development of a regional Tsunami Early Warning System; -led to the Earthquake Readiness Capacity Building Project; -mitigating hazard impact on coastal communities</td>
<td>√</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note: Derived from data collected during interviews with CDERA employees and CDERA associates conducted May 14 to June 4, 2008. The check marks in the table represent placement marks of CDERA learning activities based on Senge’s (1990) definition of adaptive and generative learning presented earlier.*
Appendix H: Classifying Learning from CDERA Self-Reflection as Adaptive or Generative Learning

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Type of CDERA self-reflection</th>
<th>Application of learning from this Type of self-reflection</th>
<th>Adaptive Learning</th>
<th>Generative Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. Jackson</td>
<td>Self reflection weak; Board Meeting offers some reflection ops, but does very little stock taking</td>
<td>-very little application -changing name from CDERA to CDEMA</td>
<td>X</td>
<td>√</td>
</tr>
<tr>
<td>D. Gentles</td>
<td>Reflections on how to build community resilience at CU</td>
<td>-Thematic cooperating groups for community response capacity;</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>-CDERA Board Meetings Retreat with partners including CARICAD to plan</td>
<td>-CDERA system-wide strategic planning -contributed to harmonization council; -training of community leaders to build community resilience; -development of collaborative initiatives -changing name from CDERA to CDEMA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>J. Thomas</td>
<td>So focused on projects, that it has very little time for self reflection</td>
<td>-problem solving; very little strategic inquiry</td>
<td>√</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: Derived from data collected during interviews with CDERA employees and CDERA associates conducted May 14 to June 4, 2008. The check marks in the table represent placement marks of CDERA learning activities based on Senge’s (1990) definition of adaptive and generative learning presented earlier.
**VITAE**

**DENISE DIANNE PATRICIA THOMPSON**

**EDUCATION**

Ph.D. Public Administration (May 2010) - School of Public Affairs, Pennsylvania State University  
Sub-fields: Public Management, Public Policy, Organization Theory.  
Dissertation Topic: Building Effectiveness in Multi-State Disaster Management Systems: The Case of the Caribbean Disaster & Emergency Response Agency (CDERA; now CDEMA)

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Focus: Equal Status and Human Rights of Women

Master of Business Administration (1995). Nova Southeastern University, Ft. Lauderdale, USA

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- Social network analysis in disaster management especially examining the important role of peripheral players in terms of mitigation and recovery capacity
- Comparative international assessments in disaster management e.g. FEMA and CDERA different but similar; Special circumstances – e.g. small island states v. continental territorial organizing for disasters, mega cities at their vulnerabilities, sustainability and organizing for disasters
- Organization of entities that handle disasters – e.g. the need to bureaucratize the center of networks
- Governance–governance gaps; regional and international governance and their national implications

**MEMBERSHIPS:** American Society for Public Administration; section membership: complexity and network studies; emergency and crisis management.